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Technical Report: plant and invertebrate remains from medieval deposits at various sites in Aberdeen

Part I: Text

by

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Summary

This report brings together data concerning plant and invertebrate remains from a number of excavations of medieval deposits from the city of Aberdeen. Preservation of remains was very variable, many samples proving to contain little more than a few charred fragments, though these often included remains of heather and of burnt peat. Peatland materials and organisms were prominent in many of the samples with anoxic waterlogging and present in almost all—much of this component probably originated in cut turves (vegetation mats) with peaty soil attached. The turves may well have been used largely for roofing. There may also have been peat in the strict sense, probably for fuel. The assemblages gave modest evidence for plant foods with a rather restricted range and probably only two or three imported taxa; no more than one or two deposits appearing to consist of faeces, but one yielded abundant honey bees, representing an important activity and food source. Insects which seem to have originated in the floors of buildings suggest reasonably clean conditions, with fairly large numbers of humans fleas (although many of the beetles may have come from roofing). The range of insects dependent on artificial conditions was somewhat restricted by comparison with more southerly towns.

KEYWORDS: ABERDEEN; MEDIEVAL; OCCUPATION DEPOSITS; PLANT REMAINS (CHARRED AND WATERLOGGED); FUEL; PEAT; INSECT REMAINS; BEETLES; PARASITE EGGS

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Technical Report: plant and invertebrate remains from medieval deposits at various sites in Aberdeen

Background to this report

Medieval occupation deposits in Aberdeen have offered superb opportunities to extend our knowledge of human activity and living conditions, the urban environment, and to some extent the natural environment, using plant and animal remains preserved in them. Aberdeen is special within the British Isles in that it has many layers with preservation by anoxic waterlogging, and in that it is spatially isolated from other large towns and set in a landscape very much dominated by upland, moor and heath, vegetation. It thus presents opportunities to make comparisons with lowland towns in Britain and Ireland, and with towns in Scandinavia. This report presents the results of analyses of plant and invertebrate macrofossils and eggs of parasitic nematodes from a series of sites (Table 1). Samples of various kinds intended for analysis of plant and invertebrate remains were taken during excavation by Aberdeen Archaeological Unit at these sites during the period 1980-2001. Material from some sites was studied not long after excavation and the results of some of these early studies were published in a report by Kenward and Hall (2001). Much material remained in store, however, and for some sites no analyses of plant and invertebrate remains were initially possible, and many of the insect assemblages recorded earlier were too small for confident interpretation, so the opportunity afforded by the *Environment of Medieval Aberdeen* project was eagerly grasped in order to review all the remaining samples from medieval deposits and make detailed analyses where appropriate.

Initially, the authors inspected all the extant samples and selected a proportion for investigation (variously) of plants, macro-invertebrates (principally insects) and parasite eggs. Some material had become desiccated in store, and much of this had to be rejected as being unlikely to furnish useful evidence, but the larger samples of sediment with a high organic content had generally remained viable for analysis. Work followed a two-part programme in which a series of samples was subjected first to a phase of assessment. On the basis of this, selected samples were then revisited for more complete recording, with the processing of additional subsamples where required to provide sufficiently large assemblages of insect remains for statistical analysis.

Methodology

The material reported here was selected from a corpus comprising 292 samples of various kinds from 13 excavations (Table 1), of which 64 samples collected as 'general biological analysis' and 15 'spot' samples (in the terminology of Dobney *et al.*, 1992) were submitted to analysis after initial inspection. For three of the excavations, no material was considered suitable to be carried forward to analysis at this stage.

Assessment

All of the submitted samples were inspected in the laboratory and the lithologies of those selected for assessment were recorded using a standard *pro forma*. Samples varied in size from small amounts of sediment containing specimens for identification (usually wood) to large bags of several litres in volume. Where material seemed likely to contain evidence of plant and invertebrate macrofossils, subsamples of up to 5 kg (sometimes the whole sample if it was small) were processed for the assessment following techniques described by Kenward *et al.* (1980); processing was carried out by Palaeoecology Research Services, Shildon, Co. Durham. For these 'test' subsamples (marked /T in the tables), treatments were as follows: where there was clearly a quantity of uncharred ('waterlogged') organic material, the residue left after sieving was subjected to paraffin flotation (*ibid.*), then a washover of less dense material was taken off. The residue was re-sieved into fractions on 0.3, 1 and 2 mm sieves (with 4 mm and 10 mm sieves used where necessary) and some or all of each fraction

examined under a low-power binocular microscope. Where uncharred organic material was thought to be absent (or at any rate very sparse), a 'washover' of the lighter (in this case usually charred) fraction was made by swirling and decanting. The washover was examined wet or dry, depending on the results of an initial inspection to check for uncharred remains, whilst the residue was generally dried before being inspected.

Two samples were rather large and were thought to contain much fishbone; they were subjected to 'bulk sieving' (*ibid.*) but only one was examined for this assessment (marked '/BS' in the relevant table).

The small samples of material for identification (/SPT in the tables) included some material selected from the larger samples during inspection in the laboratory in cases where the separate identification of a distinctive component was required.

A tally of plant remains and other components of the various fractions (flots, washovers and residues) examined was recorded directly into a personal computer (using *Paradox* software), together with notes on the general nature of the material. All taxa and other components were recorded using four-point semi-quantitative scale (with a three-point scale for one BS sample and for samples treated as 'spot' finds of individual remains or small samples of material for identification).

Insects in those flots observed by ARH during examination of plant remains to contain macro-invertebrates were recorded using 'assessment recording' *sensu* Kenward (1992), creating a list of the taxa observed during rapid inspection of the flot, with an estimate of abundance, and a subjective record of the main ecological (e.g. aquatics, grain pests) or indicator (e.g. for stable manure, Kenward and Hall 1997) groups present. A record of the preservational condition of the remains was made using scales given by Kenward and Large (1998).

Forty-three samples, mostly from cut features, were selected for initial investigation for the eggs of intestinal parasites. These were examined using the 'squash' technique of Dainton (1992). Assessment slides were scanned at x150 magnification, with x600 used where necessary. Although primarily for the detection of intestinal parasitic nematode eggs, the 'squash' technique routinely reveals other microfossil remains, and where present these were also noted. The abundances of the various types of microfossils were recorded either by actual counts or semi-quantitatively on a four-point scale as follows: f = few (up to 3 individuals); s = some (4 to 20); m = many (21 to 50); v = very many (more than 50).

Eggs of intestinal parasitic nematodes were present in only seven of the examined samples (from three of the sites, Tables 9-15) and only in very small numbers (at most four eggs per slide). Rather high concentrations of other microfossils (e.g. diatoms) were occasionally observed, however. No further analysis was undertaken.

Main analysis

Where the assessment indicated that larger subsamples were required for analysis of insect remains, additional subsamples were processed. Some samples seen in the assessment were too small to provide useful quantities of insect remains, and this influenced the selection process in some cases. In other cases little or no sediment remained after assessment and it was necessary to make a detailed record from the assessment subsamples. In addition to the priorities determined during assessment and the availability of unprocessed sediment, choice of samples for detailed analysis of insect remains was dictated by the need to avoid sorting too many very large flots (each taking more than a day to sort).

In the laboratory, a record was made of sample lithology, using a standard *pro forma*. Where possible, at least 3 kg of sediment was processed; where less sediment was available, it was all processed apart from a small subsample retained as a 'voucher'. Processing was again carried out by Palaeoecology

Research Services. The sediment was sieved to 300 μm, and invertebrate macrofossils recovered using procedures broadly following the paraffin (kerosene) flotation method described by Kenward *et al*. (1980; 1986). The flots were examined for invertebrate remains, but records of any invertebrates picked out during the analysis of residues for plants were added to the data.

Remains were identified in the flot (for familiar species) or placed on damp filter paper for more careful inspection where necessary. The remains of adult beetles and bugs from a selection of samples were 'detail' recorded in the terminology of Kenward (1992); brief descriptions of the invertebrates present in other samples examined during assessment are also given here.

Quality of preservation was recorded using the scales of Kenward and Large (1998). In summary, preservation was recorded as chemical erosion (E) and fragmentation (F), in each case on a scale from 0.5 (in superb condition) to 5.5 (extremely decayed or fragmented), giving a range and mode for the whole assemblage of fossils. Other characteristics such as colour change weee recorded where appropriate. When there were few fossils only single values were applied to each of these characteristics. All these data were recorded on a *pro forma* and subsequently transferred to *Paradox* database tables.

Fossils were identified by comparison with modern reference material and using the standard works. Adult beetles and bugs, other than aphids and scale insects, were recorded fully quantitatively and a minimum number of individuals estimated on the basis of the fragments present. Other invertebrate macrofossils were usually recorded semi-quantitatively using the scale described by Kenward *et al.* (1986) and Kenward (1992), again using estimates for extremely abundant taxa. Data pertaining to invertebrate remains were recorded onto a paper *pro forma* then transferred to a computer database (using *Paradox* software) for analysis and long-term storage.

Interpretative methods

Interpretation of assemblages of plant remains followed the ARH's usual practice. All identifiable remains were assigned to one or more groups according to their ecological preferences (mainly relating to the kinds of vegetation in which each may be found) or to their known or supposed usefulness to people in the past. An outline of this method is given by Hall and Kenward (1990). Account was also taken of the many other components recorded during examination of the plant remains—material such as charcoal, peat, wood and bark fragments, and the mineral matrix surviving the sieving process, as well as inclusions such as bone and shell, artefactual material, and so on. The full data for the semui-quantitiative abundance scores for these groupings is not presented here but forms the basis for much of the discussion of the results of the individual samples.

The interpretative methods employed for insect remains were essentially the same as those used in work on a variety of sites by Hall, Kenward and co-workers (see Kenward 1978, with modifications outlined by, for example, Kenward 1982; Hall *et al.* 1983; 1988; Hall and Kenward 1990; and Kenward and Hall 1995). 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. The main statistics used include: (a) a measure of species-richness (or diversity), α 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; see also Carrott and Kenward 2001).

The quantification of an 'outdoor' component in what are sometimes clearly natural or semi-natural assemblages may not appear entirely logical, but in fact is often useful when working with any deposits associated, even if rather indirectly, with human occupation.

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 α, while very specialised communities, such as those of decaying matter deposited by humans, or stored grain, have low or very low ones.

Results and discussion

In order to make the results accessible, the salient results and intepretations of this investigation are presented here in a summarised form. Detailed results, discussed sample by sample, appear below (p. 12). Complete lists of taxa recorded from each site are included (Tables 2-3), with data relating to plant remains and other materials of utility in Table 4. Records from individual subsamples appear in Tables 5 (plant remains and other components) and 6 (insect remains and other macro-invertebrates). Statistics relating to the assemblages of adult beetles and bugs are given in Table 7. Data relating to the analyses of parasite ova (and other microfossils seen in the 'squashes') can be found in Tables 9-15.

Overview of the results

Many of the deposits analysed were richly organic and yielded abundant 'waterlogged' plant and invertebrate macrofossils as well as some eggs of parasitic nematodes. However, a good proportion of the samples were less richly organic and sometimes contained no more than small amounts of charred plant material, often wood charcoal (indeed, some samples were collected for the identification of such material). An appreciable proportion of the GBA samples contained no invertebrate remains, or only a few fragments of no interpretative value, and this was true for all of the samples from some of the sites. Where there was abundant preserved material, some subsamples yielded very large flots or flots containing abundant fine plant material, making them very slow to record for invertebrates, limiting number which could be analysed, even within this well-funded project.

Where plant and invertebrate remains were preserved in appreciable quantities they often proved archaeologically useful, and there were some striking results (e.g. assemblages consisting almost entirely of heath/moor biota, and one with abundant honey bees).

With hindsight, and in view of Abedreen's geographical location, it may appear obvious that many of the deposits studied here were peaty or, indeed, mostly peat. However, experience of other urban occupation deposits would not have led us to such a conclusion. Interpretation on the basis of analysis of plant and invertebrate remains is essential. A great deal of material from medieval York is 'peaty', for example, but contains no imported peatland material; it is simply highly organic detritus formed *in situ*. The recognition of peat within occupation deposits cannot be certain in the field or even in the laboratory without microscopic examination.

It is notable that there were very few 'inclusions' (in the sense of artefacts, bone, shell or even coarse charcoal) in any of the samples. The sediments were generally rather 'monotonous' brown amorphous peaty material, with some fine charcoal. The lack of bone and shell and perhaps also metalwork may relate to a highly acidic burial environment, of course, no doubt at least in part induced by the abundance of peat.

The following section outlines some of themes informed by the plant and invertebrate remains.

Vast quantities of materials from heaths and or moors were clearly imported into medieval Aberdeen. The plant remains and materials recorded from the residues suggest these included peat, turves (in the sense of cut surface 'sods' or 'scraws'), and probably also cut heathland vegetation such as heather. The peat may have arrived with the turves if they were cut from the surface of a body of peat. Unless they were imported from above the treeline (unlikely, even for Aberdeen, especially since no montane plants or insects were recorded), the turves must have been cut from grazed or closely mown surfaces in order to be sufficiently even and closely matted to be viable for roofing or other structural purposes. It is just possible, of course, that stripped turf may have been used for burning, in which case a coherent vegetation mat would be less critical. The numbers of dung beetles present in some of the turf-rich samples may support the hypothesis that turves were cut from grazing land, but these insects may have entered at a later stage of deposit formation. Charred remains indicative of importation of peatland do not, unfortunately, prove the use to which peat or turves were put—material may have become burnt after its primary use for another purpose, and the burning may be deliberate or accidental. Charred peatland material might even reach the town already burnt as part of the record of past 'muirburns' buried in the peat or present on the surfaces of turves. Turves may have had many uses, from make-up or fuel to construction, and particularly in roofing, either as an 'underlay' to thatch or perhaps even as a 'living roof'. As is the case at so many sites, there is no clear evidence—from plant remains at least—for the nature of roofing in medieval Aberdeen, other perhaps than in three of the samples from Castle St (E37), two of them collected as 'burnt roofing'. These included heathland material but also some straw with a 'sooting' and part-charring thought to be characteristic of smoke-blackened thatch.

Almost all of the samples contained at least some heath/moor plant or insect remains, but this does not prove that resources from such environments were always directly incorporated, for it appears that such large quantities were introdied to the sites that they would inevitably become redeposited, and indeed may well have been scattered and wind-blown into virtually all layers as they formed. Insects may have arrived on the wing from nearby heath/moor vegetation as part of the 'background fauna', too.

Several of the insect assemblages included quite large numbers of species and individuals assigned the heathland and/or moorland habitat code 'm' (Table 3), but these are only those which are more or less confined to such habitats. Many others, including some which were abundant in certain of the samples discussed here, typically occur with them but may exploit a range of other habitats, so that they receive a more general code. Taking a broader definition of heath/moor fauna, some of the assemblages were dominated by such species, and one (from a late 12^{th}-13^{th} century midden deposits at site E34) included almost no insects which necessarily came from any other source.

One possible use of peat and turf is on the floors of stables. Certainly some of the plant assemblages contained a variety of probable 'litter', such as bracken, heather and straw-like material, and the seeds

of cornfield weeds might well have originated in straw. Many of the 'house fauna' insects discussed below are typical of stable manure assemblages as seen at a variety of other sites (Hall and Kenward 1990; Kenward and Hall 1997), but communities of insects taken to be typical of the foul conditions of the stable floor were not recorded from Aberdeen. Similarly, the prominent component of grassland plant taxa so frequently associated with other indicators of stable manure were rather sparse in these deposits. Stable manure cannot therefore be positively identified as a component of any of the deposits.

The use of wood at all the sites can be assumed from the presence of wood charcoal—though the precise use cannot be determined, and much of the charcoal might as easily have originated in accidental fires as deliberate use for fuel. Those pieces of charcoal and wood that were identified included oak, hazel, alder, willow/poplar/aspen, pine (and unidentified conifer)—none out of place in the geographical context of the lowland fringes of N E Scotland. Wood chips were recorded in several deposits, but they were never abundant. Other parts of trees present in the assemblages were buds and bud-scales (of oak, hazel, alder and ?birch) and propagules (mainly hazel nutshell, but also alder and birch). With the exception of the nutshell, most of this material might have originated in brushwood or even in peat or turves.

Evidence for moss was limited to about 20 taxa, all of them very typically recorded from medieval occupation deposits. Some, such as the various remains of *Sphagnum* (Table 4) probably arrived in peat, or as deliberately imported moss (e.g. for hygienic purposes—e.g. in Context 393 at site E38) whilst others are usually found on tree bark or twigs and may well have reached the town on imported undressed timber.

Aquatic organisms—mainly invertebrates—were constantly present but usually in very small numbers (Tables 6 and 7). Many of the insects may have arrived in flight, and this is especially the case for beetles such as *Helophorus* species and *Agabus bipustulatus*. However, aquatics such as the larvae of chironomid midges and the resting eggs of water fleas must have some other origin. These may have lived in small bodies of water on the sites (as may the 'fronds' of duckweed recorded in five samples from three sites), or they (and many aquatic and wetland beetles and bugs) may have been brought in peat or turf from wetter areas. All occupation sites need a source of water for various purposes, of course, and aquatic plants and invertebrates may have been brought with it. The cleanliness for livestock or for craft processes would hardly have mattered, but it is entirely likely that even water used for drinking would contain small invertebrate remains and perhaps even seeds.

It is widely held that the poor quality of drinking water in the medieval period was obviated by the drinking of ale or beer. From the Aberdeen sites we have investigated the only evidence which might relate to the production of such drinks is the material of sweet gale (bog myrtle) and the barley grains, some of which had become sprouted before charring and might therefore represent debris from malting. However, *Myrica* may have been brought for one or more of a number of different purposes, including dyeing and for medicine or even have arrived with peatland materials, and the barley may represent the disposal of spoiled grain or germination of grains in straw or in wet stable floors. The raw material for a stronger brew—mead—was available, for one of the pit fill samples from site E34 yielded abundant remains of honey bees. However, there is no obvious way of determining whether mead was actually made.

Bees' honey would have been the only easily available source of sweetening for the inhabitants of medieval Aberdeen, and an important source of energy. The samples did not yield any evidence of the other useful product of bees, wax (wax has been found at various other sites, for example at Coppergate, York for the Anglo-Scandinavian period, Kenward and Hall 1995). Bees may have been kept in the 13th-14th C at the Gallowgate Middle School site (E34), but the presence of large numbers of corpses cannot be taken as evidence of bee-keeping *in situ*, since early methods of removing combs often involved killing the occupants of hives. The remains of adult bees may consequently have been present in comb, extracted honey, or wax. This problem is discussed by Kenward (in press). Even

allowing for climate change, it is unlikely that wild populations of bees could have been exploited so far north.

The other important invertebrate food resource, found at most sites, is shellfish. These did not fall within the remit of this study, but imported shellfish may have been the source of the fragments of bivalve periostracum and hydroid branches and thecae noted in several of the samples, and perhaps of the rare 'wrack' beetles, though all may represent scatter from the seashore. On the other hand, there is evidence of a range of plant foods—cereals and fruits (both cultivated and wild-growing)—though the list (Table 4) is remarkably short. In part, this may reflect the nature of the deposits examined, with rather few cess pit layers being amongst the sampled material, though one has the impression that the range of plant foods really was more limited than seen in urban centres further south. Two fruits must have been imported: fig and grape, though the evidence for the latter is restricted to a trace of seeds in a single deposit (a 14th-15th C midden layer at No 3 Bonded Warehouse Virginia St, site E15). No other traded material can be identified unequivocally from the assemblages.

One of the principal motiviations for studies of insects from archaeological sites is to discover what living conditions were endured or enjoyed by the occupants. In the present study, this aim is frustrated by the absence of insect assemblages from primary floor deposits. There were, however, several groups rich in 'house fauna' which seem certainly to have originated within buildings of some kind, and in the absence of clear indicators of stabling these structures seem most likely to have been houses or workshops. Whichever was the case, the buildings seem to have been somewhat damp, but the floors not to have been too foul, perhaps strewn with plant litter. The abundance of the spider beetle *Tipnus unicolor* follows a pattern seen in medieval urban sites generally in the British Isles. Although these house fauna groups are perhaps most likely to represent dumped floor sweepings, another possible origin is in old roofing (cf. Smith 1996; 1999; Smith *et al.* 1999), in which case some of the deposits analysed may include both turf and cut plant material from roofing. As an aside, it may be mentioned here that beetles from structural or other timber were generally not at all common at these sites. There were a few records of woodworm beetles, but this insect, which is typically abundant in occupation deposits, was only present as more than single individuals in a sump fill from the Carmelite Friary site E38. The few other wood beetles recorded probably came from firewood or structural timber (e.g. wattle) bearing bark.

Fleas, when identified always *Pulex irritans*, the human flea, were found in a substantial number of samples and were sometimes moderately abundant, so this parasite at least must have impinged on human life. There was a single record of the human louse *Pediculus humanus*, but the rarity of this species may reflect the generally rather challenging preservation conditions rather than freedom from infestation. Eggs of intestinal parasites (the whipworm *Trichuris* and maw-worm *Ascaris*) were found only in a small proportion of the deposits (Tables 9-15), but this may reflect poor preservation and the nature of the features sampled rather than rarity of infestation. As suggested by the evidence for plant foods, it seems that most of the pit fills studied did not contain concentrations of faecal material.

Conditions outdoors do not appear to have been too objectionable. Many of the deposits analysed (pit fills and middens) must represent waste disposal but where there was preservation they mostly appear to have incorporated relatively innocuous material, often apparently including large quantities of peat or turf. It is hard to believe that the peatland fauna and flora would have survived in deposits where other waste decayed. The conclusion must be that foul waste was disposed of in unexcavated areas or completely removed from the properties represented by the excavations (although some previous investigations of deposits from medieval Aberdeen have brought to light rather more convincing assemblages with evidence for faeces—such as a sample from a 15th century at 30-46 Upperkirkgate (Kenward and Hall 2001). There was no evidence for gardening, whether for ornamental or utilitarian plants, with the exception of a single box leaf from a 13th-14th C pit fill from the Gallowgate Middle School site (E34). If the bees from the same context were kept in the town, this too might hint at a garden rather than a unkempt yard.

Many of the insects recorded from these sites are regarded as 'pests' in the modern literature, in that they are unacceptable to most people in stores, shops and houses. Almost all are, however, harmless and only aesthetically objectionable, and their presence would have been unavoidable in the past, without insecticides and vacuum cleaners. Woodworm beetles are widely regarded as serious pests today, but their presence in archaeological sites tells us no more than that some timber survived long enough for them to invade, and indeed they are notably rare at the Aberdeen sites by comparison with towns further south. The only serious pest (apart from parasites) recorded in the present study was the grain weevil *Sitophilus granarius* (recorded in small numbers from two samples). The bean weevil *Bruchus rufimanus* represents another, less serious, pest from the sites, present in several samples and at least sometimes considered to have entered the deposits via faeces, having been accidentally eaten. It is, incidentally, the only evidence—albeit proxy—for the use of pulses (probably field bean, *Vicia faba*) in the town.

Evidence from plant and invertebrate remains for craft activities is rather sparse. Bees were kept somewhere. Dyeing of textiles may be evidenced by the few records for seeds of weld, but the low concentrations are equally consistent with the presence of this plant in the urban weed flora. Various other plants recorded may have been used in dyeing, but again the evidence is far from strong and the remains (e.g. of heather, tormentil and bog myrtle) may have arrived in turf or peat. One feature from which samples were rather extensively analysed—a pit (CT) at the Gallowgate Middle School site, E34—is believed to have some connexion with leather working. Previous studies of samples from this pit (Kenward and Hall 2001) failed to reveal any evidence for such activities, though the new analyses yielded a record of a moderate concentration of bark 'sclereids' from a sample from Context 84. These decay-resistant bodies of lignified tissue are found in tree bark and may well stand as evidence for the use of this raw material in tanning (cf. Hall and Kenward 2003). In the present case, however, one might expect the same remains to be present in other fills of the same pit; the only other record for sclereids was for a trace of these structures in a midden deposit (Context 85) from the same site. Although sclereids will have been overlooked in previous studies, they should not have been missed if present in the samples investigated here. The single record of the deer fly *Lipoptena cervi* from a 13th-14th C midden at 16-18 Nether Kirkgate (E35) probably indicates the presence of deer skins or corpses (probably roe or red deer), although it is just conceivable that the fly arrived accidentally on a human or dog.

Comparisons between sites

Although the quantity and quality of preservation of plant and invertebrate remains varied widely, with the samples from some sites yielding very few remains, where there was good preservation the kinds of taxa recorded were rather similar. As noted above, heathland/moorland biota were often abundant and almost always present. Despite the range of contexts explored and the wide range of dates (12th-16th century), only rarely did assemblages stand out as in any way unusual. This seems to imply a high degree of uniformity in time and space.

Comparisons with previous studies in Aberdeen

With regard to records of plant taxa, this new set of investigations of medieval material from Aberdeen has added rather little information. As Table 4 shows, only walnut and box amongst the 'useful' plants have not previously been recorded either by Kenward and Hall (2001 and unpublished data) or Fraser and Dickson (1982). Moreover, a number of taxa recorded previously have not come to light again latterly—opium poppy, coriander, and bilberry (as seeds/fruits), flax (as capsule fragments), leek/onion (as leaf epidermis), rye (as charred grains), and barley and oats (as waterlogged 'bran'). Amongst the other taxa, only the following have notbeen recorded previously: wood and charcoal identified as far as 'conifer', pine wood (worked), propagules of the weed taxa corn gromwell (*Buglossoides arvensis*), goosegrass (*Galium aparine*), deadnettle (*Lamium* Section *Lamiopsis*), field scabious (*Knautia arvensis*), shepherd's needle (*Scandix pecten-veneris*), annual

knawel (*Scleranthus annuus*) and dandelion (*Taraxacum*), and some taxa which probably arrived with turves or other grassland/heathland material: wild mignonette (*Reseda lutea*), cat's ears (*Hypochoeris*), ribwort (*Plantago lanceolata*) (as propagules), heath grass (*Danthonia decumbens:* caryopses, spikelets and cleistogenes). Also recorded for the first time are two wetland taxa: skullcap (*Scutellaria galericulata*) and bulrush (*Scirpus lacustris*), and the mosses *Drepanocladus* sp(p)., *Isothecium myosuroides*, and *Sphagnum squarrosum*.

However, closer attention to recording nature of disaggregated deposits and in particular to recognition of various kinds of peat preserved charred, uncharred or as ash has greatly extended our record for this kind of resource where the plant remains may only be a proxy for its presence (cf. Table 4, lower part). Fraser and Dickson mention peat in passing, and there are some records from previous sites examined by ARH, but the variety of records for peat has increased greatly in the current investigation, indicating the likely importance of this material to the medieval inhabitants of Aberdeen. Likewise, the use of turves (in the sense of grass sods rather than blocks of peat) is also apparent in some samples from at least two of the sites studied here: E34 and E35.

The invertebrates from the current group of samples were remarkably similar to those seen previously, although the larger subsamples used provided more substantial assemblages which were thus better characterised. One notable addition was the record of abundant bees, discussed above, and another was a very pure assemblage of heath/moor insects, useful in indicating the kind of community contributing to the smaller components seen in most of the samples.

Comparisons with other British towns

The most obvious contrast with other medieval British towns that have been subjected to analysis of plant and invertebrate remains is the abundance of heath/moor biota, suggesting a considerable reliance on such materials. Similar assemblages of plants and insects from acid peatland soils have been found at various other medieval urban sites (e.g. Beverley, York and Kingston upon Hull), but never in such quantities. The published evidence for medieval Perth (Robinson 1987) is remarkable—perhaps surprisingly—for its lack of peatland taxa. The range of plants used for food also contrasts with that from other medieval towns, Aberdeen having a rather limited list (though more extensive than for Perth, *op. cit.*, for example).

The wide range of weed taxa recorded from medieval Aberdeen would not be out of place in the species lists for any other medieval British town. Some taxa, if growing locally, were rather further north than their late 20th century distribution, though this may in part reflect a decline in arable weeds commencing well before the first major national recording schemes of the late 1950s (Perring and Walters 1962). A notable absentee from the list of weeds is stinking mayweed (*Anthemis cotula*), a species recorded regularly and often in quantity from medieval towns (although apparently unrecorded at Perth, too). Its absence at Aberdeen is difficult to explain although a prevalence of acid sandy soils along the coastal strip in N E Scotland may be a factor, since the plant is usually considered to be an indicator of heavy clays (indicators of sandy soils—such as corn spurrey and sheep's sorrel—were rather freqently recorded).

The range of 'house fauna' and other synanthropic insects also appears relatively limited, though whether this is a result of northerly latitude or of the nature and use of the buildings is not certain. It seems unlikely that a sea port such as Aberdeen would lack opportunities for the colonisation of insects dependent on human dwellings, so local conditions (perhaps both climate and the use of buildings) seem more probably to be the limiting factor.

In-ground preservation issues

It has recently been argued that organic-rich archaeological deposits in urban centres may be at risk from decay consequent upon changes in groundwater status (e.g. Kenward and Hall 2000 and forthcoming). In York some deposits seem to be suffering damage by alkaline leachates from concrete (Davis *et al.* 2002), but more important may be a general degradation of near-surface (mostly later- and post-medieval) deposits (Kenward and Hall 2000; in press). One characteristic of deposits undergoing current decay may be a general reddening of organic material through oxidation, whereas decay during deposition might be expected to be more heterogeneous (Kenward and Hall in press). Both patterns of decay have been seen in deposits at Aberdeen, so that at least some *may* have degraded recently. Development over the past decades may therefore be causing damage to an irreplaceable archaeological resource. However, the material examined in this study most certainly does *not* provide evidence for this, and it is not inconceivable that the general decay seen in some samples was a result of long-term storage rather than degradation in the ground prior to excavation. It may be wise to consider some form of monitoring of the organic deposits left *in situ* in Aberdeen, to ensure that they will be available for future research.

Sample by sample discussion

In each case, following a brief summary, the results of the various analyses of the samples are listed in phase (if known), context and sample number order, with material from the same feature grouped together wherever possible. For each sample, the weight and a brief description of the context type and dating (where known) are included. Samples marked '*' were only examined for insect remains during the assessment stage. It can be assumed that where no insect remains are reported from /T subsamples for which paraffin flotation was undertaken, such remains were found to be lacking or extremely sparse during investigation of plant remains from the flots.

Site E15: No 3 Bonded Warehouse Virginia St

Summary: Not surprisingly, given their date and context, the three subsamples from medieval layers examined gave rather different results. The late 12th-13th C posthole fill produced an assemblage of (mainly) weed seeds unusual in the abundance of remains (even in a rather large subsample of over 3 kg in weight), suggestive of some mechanism for concentration. Not unexpectedly in a feature of this kind, there were few insect remains. The larger sample from a 14th-15th C midden contained a diversity of remains including some traces of foodplants and probably material originating in imported peat or turf, whilst a smaller sample from the same feature, whilst having suffered desiccation in store, may well have been stable manure or similar litter-rich organic waste, but contained too few insect remain for this to be confirmed.

Late 12th-13th C

*Context 103 [posthole fill 103AV], Sample 103/T (3.08 kg)
There was a very large flot mostly (and unusually) consisting of seeds, of which the bulk were from weeds (including many cornfield taxa): there were vast numbers of seeds or fruits of chickweed (*Stellaria media*) and hemp-nettle (*Galeopsis* Subgenus *Galeopsis*) with abundant 'turnip' (*Brassica rapa*), sheep's sorrel (*Rumex acetosella* agg.) and corn spurrey (*Spergula arvensis*). Taxa present in modest numbers included black bindweed (*Bilderdykia convolvulus*), fat hen (*Chenopodium album*), nipplewort (*Lapsana communis*), wild radish (*Raphanus raphanistrum*) and field penny-cress (*Thlaspi arvense*), with various other cornfield weeds present in smaller numbers (including, for example, shepherd's needle, *Scandix pecten-veneris*, corn marigold, *Chrysanthemum segetum*, ?cornflower, *Centaurea* cf. *cyanus*, and corncockle, *Agrostemma githago*). Also recorded were seeds and other remains of plants likely to have originated in heathland (heather, *Calluna vulgaris*, was present as

moderate numbers of uncharred shoot fragments and tentatively identified charred root/basal twig fragments). Charred cereals in the form of oats (*Avena*, including some tentatively identified cultivated oat, *A. sativa* spikelets) and barley (*Hordeum*), the latter with some grains showing evidence of sprouting prior to charring, were also observed. Other 'useful' plants included traces of seeds or fruits of fig (*Ficus carica*) and hemp (*Cannabis sativa*), with hazel (*Corylus avellana*) nutshell and stalk and frond fragments of bracken (*Pteridium aquilinum*).

The very large residue of about 1600 cm^3 was about half organic debris, mainly woody fragments (wood, including eroded chips, and bark), but with further abundant seeds, the rest being sand with a little grit and gravel (to 35 mm); amongst these mineral clasts were some fragments of baked clay/soil/daub throughout the fractions. Charred and uncharred peat (to 10 mm) were also present.

Though the plant remains recorded are not surprising in any way for a medieval urban context, the huge concentration of seeds and fruits calls for some explanation. Presumably the post-hole acted as a 'sink' for the collection of material during its lifetime (assuming it remained partly open at the surface) or was backfilled with seed-rich surface soil. Perhaps the seeds were concentrated by being swept across the floor from an area of grain cleaning or a grain store. Invertebrate remains were unfortunately restricted to a few beetle fragments and a trace of decayed cuticle recovered during the investigation of plant remains.

14^{th}-15^{th} C midden

Context 26, Sample 26/T (2.024 kg)
This subsample yielded a moderate-sized 'flot' (from paraffin-flotation) in which there were some fragments of feather, and uncharred heather shoot tips and leaves. There was a very large residue of about 750 cm^3, of which about 400 cm^3 was sand, grit and a little gravel (to 55 mm) and bone. The washover was of granular woody debris; many of the coarser fragments seeming to be slightly indurated flaky/laminated sediment, perhaps matrix which had dried in storage or perhaps in the more distant past and not properly disaggregated on washing. There were quite a lot of animal hairs, even bristles, and some charred and uncharred peat (to 10 mm); some charred fragments seemed to be from roots/basal twigs of heather. Identifiable plant remains included rare uncharred seeds of grape (*Vitis vinifera*) and fig; many of the other uncharred seeds were rather flattened or eroded, sometimes mainly fragmentary. They mainly represented weeds, the more abundant being persicaria (*Polygonum persicaria*) and chickweed, although traces of charred oat and barley grains were also noted. The fragments of moss present were all taxa likely to have arrived from heathland (in cut heather or turves) or in peat. The trace of uncharred duckweed (*Lemna*) fronds seems likely to point to importation of water from a pond or stream.

The subsample of 2.024 kg examined in the assessment could not be supplemented by additional material, and so the invertebrates from it were recorded in detail. Curiously, the material appeared better preserved when re-examined, and in particular the trend to yellow noted during assessment was not at all obvious. The initial record was 'E 2.5-5.0, mode 4, weak; F 2.5-5.0, mode 3.5 weak; trend to yellow 1-4, mode 3 distinct'. On re-recording the record was recorded as 'preservation variable: E 1.5-4.0, mode 3.0 weak; F 1.5-3.0, mode 2.5 weak'. One of the *Lathridius minutus* group fossils, a joined pair of elytra together with attached meso- and metasternum and abdomen, had different, seemingly fresher, preservation than the remaining fossils and was perhaps recent. Although there were moderately large numbers of mites and puparia, there were rather few beetles (and no bugs): 22 individuals of 29 taxa. Only one species was at all numerous, *Monotoma longicollis* (six individuals). While found in various kinds of decaying plant matter, this species appears typical of archaeological stable manure deposits, and some of the other species recorded here are often found with it in them.

There is thus a hint from the insects, at least, that this midden included something resembling stable manure, but the assemblage was too small for a clear interpretation; the plant remains offer no strong confirmation—there were only traces of cornfield weeds and no grassland taxa. Whatever it consisted

of, the midden does not appear to have been especially foul or to have been exposed for a long period. Although the plant remains included some food taxa often indicative of the presence of faeces, no supporting evidence from parasite eggs was obtained.

*Context 57, Sample 57/SPT (0.05 kg)
This was a small sample of almost dry, 'platy' amorphous organic/compressed detritus, very like peat, but probably organic occupation material. The subsample was left to soak for some days but was still rather intractable, very little passing the sieve, and remaining platy and coherent. It appeared essentially to be sandy, herbaceous detritus with some quite coarse straw-like fragments and some fragments of fly puparia.

Site E19: Carmelite Friary (an account of the evidence from this site will appear in the report by Cameron *et al.*(forthcoming))

Summary: For the most part, the samples from this excavation examined in the assessment yielded only small amounts of charred material, mainly charcoal (but always in small amounts), though in some cases quantities of burnt and/or unburnt peat were identified (especially uncharred peat forming the spot sample 345 from Pit DH, and charred peat fragments from 276 (burnt area DT within church) and perhaps also 10041 (a sample containing coffin remains). Indeed, one sample (274, 'charcoal') proved to consist of what was probably largely peat ash. By contrast, the concretions from sample 336 from Pit DH appeared to have formed from faecal material (supported by the presence of moderate numbers of fig seeds). The significance of these observations may become clearer when an archaeological narrative is available for this site. None of the samples contained useful insect remains

Phase 1 (13th C.)

*Context 269 [fill in pit in church], Sample 269/T (2.05 kg)
The moderate-sized residue consisted of clean quartz sand and a little gravel (to 45 mm); there was a very small flot containing a trace of charcoal and very decayed insect cuticle. The very small washover comprised a few cm^3 of charcoal (to 5 mm)

*Context 272 [pit fill], 272/SPT (0.3 kg)
This was reddish-brown, crumbly, just moist ?ash with clasts of grey-brown clay yielded a moderate-sized residue of about 25 cm^3 of sand and red ?burnt soil to (5 mm) and a little gravel (10 mm).

*Context 274 [charcoal; for comparison with 252, to establish what was being burnt], Sample 274/SPT (0.3 kg)
This deposit was a slightly reddish-brown (locally bright red to buff to black), soft to crumbly, rather undense ?peat ash. It yielded a small washover of about 15 cm^3 of what was probably mainly charred heather root/basal twig fragments (to 15 mm) and a moderate-sized residue of about 50 cm^3 of sand and gravel (to 10 mm) and some undisaggregated sediment.

*Context 276 [burnt area DT within church], Sample 276/T (2.418 kg)
The tiny flot for this sample contained traces of heather leaves (which may have included both charred and slightly charred specimens), and some other charred remains of dwarf shrubs in the Ericaceae family. The largish washover of about 150 cm^3 consisted of charcoal (to 15 mm) and burnt peat (10 mm) and there was a moderate-sized residue of about 175 cm^3 of sand, grit and gravel (to 10 mm). With this was charred ?heather root/twig material, and also some strange reddish root casts of silt (to 20 mm). A small amount of uncharred peaty material left undisaggregated was made into a smear on a microscope slide and proved to be rich in diatom frustule fragments, so is perhaps a mud (gyttja) or similar natural lacustrine deposit (from within a peat sequence?). The only other plant remains were

rare charred oat grains, bracken pinnule fragments and corn spurrey, persicaria and pondweed (*Potamogeton* sp.) propagules, the last perhaps also originating in an imported lacustrine sediment.

*Context 279 [pit fill in DU], Sample 279/T (1.226 kg)
There was a moderate-sized residue of about 120 cm^3 of clean quartz sand and a little gravel (to 10 mm); the tiny flot contained a trace of fine charcoal, whilst the small washover comprised a few cm^3 of charred and (mainly) uncharred peat (to 5 mm) and a little charcoal (to 5 mm). There were traces of charred oat grains and hazel nutshell fragments.

Fills of pit DH

*Context 315 [lower fill], Sample 315/T (1.68 kg)
This sample yielded a small flot containing a little fine charcoal; the large residue of about 200 cm^3 was of sand, grit and gravel (to 20 mm). There was also a small washover of a few cm^3 of charcoal (to 10 mm) and uncharred peat (to 5 mm)

*Context 336 [accumulation of black organic material], Sample 336/SPT (0.5 kg)
This material comprised moist, crumbly (working plastic), varicoloured (mid-dark brown to grey-brown) sandy clay silt with patches of light grey ?ash and black specks of ?charcoal. There was a mixture, when disaggregated, of slimy clay and crisp, brittle, somewhat concreted material. The washover contained moderate numbers of rather poorly preserved fig seeds and very decayed, concreted material, like extremely degraded faecal concretion. The residue of about 250 cm^3 (i.e. very large) was of undense concreted material, presume further very decayed faecal concretion, with some sand and a little gravel (to 15 mm). There were traces of insect cuticle in this sample.

*Context 345 [accumulation of black organic material], Sample 345/SPT (0.2 kg)
This sample had dried out, and at the time of examination consisted of crumbly, brittle (clearly ashy), fine-grained material with a colour ranging from pale brown to dark brown with dark grey-brown patches, with a little gravel. A large quantity of undense uncharred material (peat, to 15 mm) formed the huge residue of about 200 cm^3.

Phase 2

Fill of stone feature EC

*Context 314, Sample 314/T (1.1 kg: dry, light to mid grey-brown, crumbly, unconsolidated (sticky when wet) ?slightly sandy clay silt with ?mortar/plaster and ?wood fragments)
The very small washover consisted of a few cm^3 of what looked like amorphous 'faecal concretion' or mineralised plant tissue; the traces of fig seeds certainly suggest a faecal component. The very large residue of about 425 cm^3 was of gravel (to 40 mm) and sand with ?decayed faecal concretions: the gravel and sand component included much very amorphous concreted material (with a reddish-brown, glassy character), and there were quite a lot of small and very eroded bone fragments (to 10 mm), including those of fish.

*Context 322, Sample 322/T (1.1 kg: dry, light grey-brown, crumbly, unconsolidated (sticky when wet) sandy clay silt with stones 2-20 mm)
The small washover of a few cm^3 consisted of charred material (apparently burnt peat) and burnt ?soil; the very large residue of about 425 cm^3 was of sand, grit and gravel (to 25 mm).

*Context 323, Sample 323/T (1.15 kg: dry, light to mid grey-brown crumbly, unconsolidated (slightly sticky when wet) sandy clay silt with stones 2-6 mm)
There was a small washover of a few cm^3 of charcoal (to 10 mm) and some ?charred peat (5 mm); the large residue of about 350 cm^3 was of sand, grit and gravel (to 25 mm).

*Context 324, Sample 324/T (0.43 kg: dry, light grey-brown brittle to crumbly (sticky when wet) sandy clay silt with ?charcoal)
The very small washover consisted of a few cm^3 of charcoal (to 10 mm); there was a moderate-sized residue of about 50 cm^3 of sand, grit and a little gravel (to 25 mm).

Phase 2c

*Context 252 [layer of soil above coffin remains DA], Sample 252/SPT (0.775 kg)
This was a rather small sample of indurated, slightly purplish grey-brown, gritty, sandy silty clay with some charcoal (washed to 0.3 mm to check the charcoal and other charred remains). There was a very small washover of a few cm^3 of charcoal (to 5 mm) and charred peat (10 mm) and a large residue of about 200 cm^3 of sand and gravel to 25 mm).

*Context 10041[coffin remains DA, Phase 2c], Sample 10041/T (1.48 kg)
The modest-sized flot of fine granular material appeared to comprise very humified peat. The large residue of about 225 cm^3 was of grit, gravel (to 15 mm) and sand, with some pieces of oak (*Quercus*) wood (to 30 mm). The latter were infiltrated with mineral material, probably from iron (presumably coffin nails). The small washover of about 50 cm^3 was of granular peat or peat-like sediment in rounded fragments (to 10 mm; the rounding may be just a function of processing), but there was also some ?burnt peat, charcoal and a little decayed wood (all to 5 mm).

Site E21: 43-57 Upperkirkgate

Summary: Plant remains in the series of samples from this site were limited to small numbers of charred specimens (with the exception of a single uncharred duckweed frond from Sample 70). The identifiable remains included ?heather root/twig material and occasional cereal grains (mainly barley but with some records for bread/club wheat, *Triticum 'aesitvo-compactum'* and oats). Charcoal was moderately common in samples from some of the 13^{th}-14^{th} C fills of gulleys CP and CR (contexts 210, 225 and 226) but it was charred and uncharred peat which formed the largest organic component in this series, with charred peat being abundant in 13^{th}-14^{th} C pit fills BM (117) and 109 as well as forming much of the spot sample from 157a and probably present in a series of three fills of a 15^{th}-16^{th} century pit fill (AA) (along with charred remains of heather). Uncharred peat was abundant—not surprisingly!—in the 13^{th}-14^{th} C peat layer, Context 36. Smaller amounts of charred or uncharred peat were recorded in several other samples. The lack of uncharred plant material (other than peat) contrasts somewhat with the results for the examination of one sample from this site previously: the sample from Context 200 yielded some uncharred remains of probable urban weeds (flixweed, *Descurainia sophia*) and weld (*Reseda luteola*) amongst other remains, along with burnt peat. None of the samples containe duseful invertebrate remains

Phase 1, 13^{th}-14^{th} C

*Context 117 [pit fill in BM, Phase 1,], Sample 117/T (0.732 kg: just moist, light gingery brown, brittle to crumbly silt with ?charcoal flecks and ?lime precipitate)
The very small flot contained a little charred wood and a cereal grain. The large residue of about 150 cm^3 was mainly undense black/buff fragments (to 15 mm), with some very pale or pinkish ones, which might be mineral soil; the former seemed to be burnt peat with mineral material. There was a little gravel and stone (to 50 mm) and some sand. The small washover comprised a few cm^3 of burnt peat charcoal and burnt soil and there were traces of unidentifiable charred cereal grains.

Deposits in gullies CP and CR

*Context 210 [fill in gully CP], Sample 210/T (1.234 kg: just moist, dark brown to black soft sandy amorphous organic sediment with a 'compost' smell)
The large flot was mostly charcoal, with some charred cereal grains (showing rather variable preservation); no invertebrate remains were seen. After drying, to permit easier examination, this flot, along with a washover of about 60 cm^3 of further charcoal was found to contain some diffuse-porous roundwood material as well as a little ?heather root/basal twig (to 15 mm) and leafless heather twig, charred root/rhizome fragments and charred herbaceous detritus (both to 5 mm), giving an impression of material originating in the burning of turves (in the sense of material pared from vegetated surfaces rather than in the usual Scottish sense of blocks of peat). The presence of some 'varnished' fragments may indicate an origin in roofing material. The large residue of about 275 cm^3 was of gravel (to 25 mm), grit and sand.

*Context 225 [layer in gully CR], Sample 225/T (1.738 kg: speckled: very dark grey-brown to yellowish-white) , crumbly sandy silt with some charcoal)
There was a small flot with charcoal and rootlets (which might have been ancient). The modest-sized washover of about 75 cm^3 consisted of charcoal, quite heavily iron-stained, and the very large residue of about 600 cm^3 was of sand, grit and gravel (to 55 mm) with small iron-rich concretions (which might be amorphous organic material cementing together sand grains). There were a few charred cereal grains–oats and barley—but they were poorly preserved.

*Context 226 [gully fill in CR], Sample 226/T (0.584 kg: just moist dark grey-brown to black sandy silt with much charcoal)
The very small flot comprised a few charcoal fragments and a few rather poorly preserved charred cereal grains (including bread/club wheat and ?barley); there was a small washover of about 20 cm^3 of angular charcoal. The very large residue of about 200 cm^3 was of sand and grit with a little charcoal (to 30 mm) and some more charcoal. The charcoal fragments were rather rounded and iron-salt-encrusted and so were perhaps reworked.

*Context 229 [gully fill in CR], Sample 229/T (0.806 kg: dry, dark brown (with mm-scale yellowish-white mottles) crumbly sandy silty amorphous organic sediment)
The small washover of about 20 cm^3 consisted mainly of ?iron-rich concreted material or perhaps very decayed peat (to 3 mm), with a little charred peat (of the same size), charcoal (to 10 mm) and a single charred barley grain. There was a very large residue of about 425 cm^3 of sand, grit and gravel (to 35 mm).

Phase 2, 13th-14th C

*Context 36 ['peat layer'], Sample 36/T (1.666 kg: dry, dark brown to black crumbly and indurated sandy stony amorphous organic sediment; processing required repeated boiling and soaking and disaggregation was very difficult)
There was a huge residue of about 1850 cm^3 of granular, rather indurated and brittle amorphous humified sandy peat with some quite large fragments (up to 45 mm).

*Context 109 [pit fill], Sample 109/T (0.588 kg: just moist, black sandy silt with some charcoal and brown and white flecking)
There was a moderately large flot of charred plant material, apparently mostly heather twig fragments (to 15 mm). The small washover of about 30 cm^3 consisted of more such charred material including fragments of burnt peat (to 10 mm) and a few heather twig fragments. The moderate-sized to large residue of about 100 cm^3 was of gravel (to 10 mm) and further burnt peat fragments.

Phase 2a, 15th-16th C

Fills in Pit AA

*Context 2, Sample 2/T (1.204 kg: just moist, dark grey-brown, brittle to crumbly, slightly sandy silty clay and amorphous organic sediment with a distinct crumb structure and a slightly purplish cast; traces of stones 20-60 mm present)
There was a tiny flot in which the only biological remains were sclerotia (resting bodies) of the soil-dwelling fungus *Cenococcum* which probably has no interpretative significance in isolation—the taxon is common in a wide variety of soils including peaty and cultivated ones. The large residue was of sand, grit and gravel (35 mm), with a trace of charred ?peat; in addition, there was a small washover of about 20 cm^3 of charred and uncharred peat (to 15 and 5 mm respectively) and further *Cenococcum* sclerotia; rare charred oat grains were also noted.

*Context 6, Sample 6/T (0.775 kg: just moist, mid-dark grey-brown (mottled lighter) brittle (working crumbly) sandy silt with traces of charcoal)
This sample yielded a small residue of about 150 cm^3 of sand, grit, and gravel (to 25 mm), and a small washover about 30 cm^3 of charred material. The latter mainly comprised ?heather root/twig fragments with traces of securely identified heather leaves and twig fragments, and a little other charcoal (to 10 mm). Traces of coal and charred ?peat (both to 5 mm) were also noted.

*Context 7, Sample 7/T (0.64 kg: just moist, mid to dark grey-brown, crumbly humic silt with traces of charcoal)
There was a small residue of 75 cm^3 of sand, grit and gravel (to 5 mm) and a small washover of about 60 cm^3 of fine charred material, mostly ?heather root/twig and burnt fish bone (but also some uncharred fish bone). There were traces of coal (to 15 mm) and charred ?peat (to 5 mm).

*Context 8, Sample 8/T (1.02 kg: just moist, slightly yellowish grey-brown crumbly ?silty amorphous organic sediment)
The small residue of about 125 cm^3 consisted of sand, grit and gravel (to 10 mm); the washover about 60 cm^3 was fine charred material, mainly ?heather root/twig. A trace of charred heather twig and sedge stem was also noted. Some burnt ?peat was present in the form of a modest component of brownish (sometimes black) material (to 5 mm), much of it remaining with residue

Fills in Pit AX

*Context 68, Sample 68/T (1.208 kg: just moist, dark brown, crumbly, very humic, slightly gritty silt)
There was a moderately large flot, mainly charred peat and charcoal and charred ?heather root/twig fragments; the large residue of sand and gravel (to 30 mm) including a little more burnt peat (to 10 mm) whilst the very small washover consisted of a few cm^3 of burnt peat with a little uncharred peat (to 5 mm), charcoal, and coal.

*Context 70, Sample 70/T (1.706 kg: moist, dark brown, stiff to crumbly to plastic sandy stony amorphous organic sediment)
This sampled produced a small flot of charcoal and charred peat. The large residue of about 250 cm^3 was sand and gravel (to 15 mm) with a trace of pottery (40 mm) and baked clay/daub (10 mm). The washover of about 60 cm^3 was mainly oak charcoal (to 30 mm), charred ?heather root/basal twig and shoot fragments, and peat (from uncharred fragments up to 2 mm, via black charred fragments to clasts of yellow ashy material thought to be heavily combusted peat. The only other identifiable plant material was a single uncharred frond of duckweed.

Other deposits, not phased

*Context 157a, Sample 1571/SPT (0.1 kg)
This material consisted of crumbly (but with indurated lumps), varicoloured, very undense, almost dry material with pinkish to rufous-brown, black and white speckling; it looked most like compacted peat ash/imperfectly burnt peat or something similar; a subsample of 100 g was washed to 0.3 mm and it produced a huge residue of about 125 cm^3. The interpretation of peat ash seems to be confirmed by this observation. (Material from Context 157b, Sample 1572, was very like 1571, but somewhat greyer; it was not examined further.)

Site E29: 30-46 Upperkirkgate

Summary: No further material was thought worthy of assessment for this excavation: almost all the samples had been studied previously (and were not considered to require further analysis via new subsamples), and those which had not did not appear likely to furnish useful biological material.

Site E34: Gallowgate Middle School

Summary: Although several samples from this site had been examined during earlier work, it was felt that some warranted re-examination and others should be assessed because they had not been investigated before and appeared promising as a source of bioarchaeological information. The samples for contexts previously explored were three fills of a late 12^{th}-13^{th} C pit interpreted (from the quantities of leather offcuts present and in the context of the site as a whole) as being associated with leatherworking, and one fill from the contemporaneous pit, EU (Context 233).

Perhaps the most striking feature of some of the samples from this site was the evidence for both grass turves and peat turves (the latter in the Scottish sense of blocks of peat)—the latter not having been very securely established in previous analyses. Peat was present in a charred and/or uncharred form in all but one of the samples and abundant in an uncharred state in late 12th-13th midden Contexts 22, 70 and 81 and late 14th barrel (BN) fill 60; burnt peat was only ever present in trace amounts. Grass turf is indicated primarily by the remains of heath grass, *Danthonia decumbens*. and especially the cleistogenes (see accounts of samples from Contexts 70 and 233). Taxa also likely to have originated in this way are the sedge (*Carex*) and ?tormentil (*Potentilla* cf. *erecta*) found alone, or (in more than half the cases) together, in almost every sample. Various remains of charred and uncharred heather and ?heather were present throughout the samples in low concentrations too, as were remains of *Sphagnum* (in eleven samples) consistent with the cutting of heathland turves as well as with importing peat. This peat/turf group was strongly represented by the insect assemblages, too. There were also substantial 'house fauna' components in some samples, probably representing material cleared from floors, but conceivably originating from roofing. If the latter was the case, turf and other roofing material may have contained house fauna elements when dumped.

One of the samples contained abundant honey bees, most probably representing local apiculture.

Remains of plants potentially useful to the inhabitants of the site included seeds of fig (traces in pit fill 33 in BG and barrel fill 60 in BN), and traces of fruits (or in one case leaf fragments) of bog myrtle or sweet gale (*Myrica gale*) in midden 81, and pit fills 84, 104 and 107 in CT. These very small amounts do not appear to represent deliberate use of the latter plant on the site, however, and they may simply have arrived incidentally in peat or some other peatland material. The single box (*Buxus sempervirens*) leaf in 13^{th}-14^{th} C pit fill 111 in DA presumably stands as evidence for a formal garden somewhere in the vicinity, whilst the presence of (mostly uncharred) hazel nutshell fragments at 'background' levels (traces in nine contexts) is consistent with the general picture of medieval occupation deposits here in Aberdeen and elsewhere.

A last comment which needs to be made concerns the 'leatherworkers' pit'. CT. An obvious material whose presence might be established—if the leatherworking involved the tanning stage as well as the making up of leather goods—is tree bark. Bark was noted in 24 samples in the group examined in this project, usually in small amounts, the largest concentrations being recorded in Contexts 88 (midden) and 111 (fill of pit DA) from site E34. They *may* therefore represent waste from tanning, but more telling perhaps is the record of bark sclereids from pit fill 84 (moderate amounts) and midden 85 (a trace). These small clusters of lignified cells are characteristic of many kinds of bark and their recognition in quantity (they are almost certainly present but overlooked in many deposits) seems to point to the presence of abundant decayed bark—one likely source of which is via tanning.

Late 12th-13th C midden deposits

*Context 14, Sample 34/T (2.48 kg)
The modest-sized flot consisted of fine plant debris. A washover of about 100 cm^3 taken from the residue proved to be mainly granular decayed wood debris and undisaggregated sediment (it had probably become dried and somewhat indurated in store), with a little peat and charcoal. Amongst the wood fragments were some eroded chips of oak (to 15 mm in maximum dimension). Seed and fruits were not abundant—only seeds of toad rush (*Juncus bufonius*), persicaria, ?tormentil, and sheep's sorrel—were present in more than trace amounts—and mostly somewhat eroded: there were suggestions from them that part of the deposit comprised material originating in soil or turf as well as from peat (there were moderate numbers of *Sphagnum* leaves). The best represented vegetaion types were seed communities, however. The large dry residue of about 525 cm^3 was of sand, grit and gravel (to 70 mm).

The small flot was mainly woody and herbaceous plant debris, with an insect group of modest size. Many of the remains were very pale (E2.0 - 4.5, mode 3.0 weak; F 2.0 -5.0, mode 2.5, weak; trend to pale 1-4, mode 3 weak). The assemblage appeared ecologically mixed, with occupation site fauna and a weak heath/moor component, and probably some background fauna. A single human flea (*Pulex irritans*) was noted.

Context 22, Sample 28/T (3 kg: moist, dark grey-brown (mottled paler with ?mineral-rich clastsa at mm scale) sandy amorphous organic sediment with some granite fragments)
The large residue of about 900 cm^3 consisted of about 350 cm^3 sand and gravel, the rest being granular organic material, mainly indurated peat (fragments to 10 mm) and a little charred ?heather root/basal twig material and ?charred peat. The small range of identifiable plant remains probably represented taxa brought from a variety of sources with only turves or imported soil being more than weakly indicated.

The flot from the assessment subsample was recorded since no further material was available. Although there were abundant beetles, some bugs, and quite large numbers of mites, many of the fossils were well-decayed and very fragile, although others were in much better condition (E 2.5-4.0, mode 3.5; F 1.5-5.0, mode 3.0 distinct). A minimum number of 134 adult individuals of 64 beetle and bug taxa was counted. There were two strong ecological components, the first from moorland or heathland habitats, the second probably from within a building. The rather low value for the index of diversity (alpha = 48, SE = 7) suggests that these components dominated the fauna, without a significant 'background' component. The first component was notably represented by the ground beetles *Bradycellus ruficollis* (10 individuals), *Pterostichus diligens* (4), *Trichocellus cognatus* (3) and *Dyschirius globosus* (2), by the plant-living *Micrelus ericae* (4) and *Ulopa reticulata* (3), and by moss and litter-dwellers such as *Olophrum piceum* (3). A substantial number of other species probably came with these and this component was sufficiently abundant to indicate the importation of turf or peat. The 'house fauna' included the spider beetle *Tipnus unicolor* (12), *Xylodromus concinnus* (11), *Mycetaea hirta* (10), and smaller numbers of various others; a rather restricted and specialised

group These may have come from a damp house or outhouse, another possible source being from a thatch roof (see discussion, above). There was nothing in the fauna to suggest stable manure as a source.

Context 70, Sample 3/T (3 kg: moist, very dark brown, brittle to stiff and slightly indurated amorphous organic sediment with white flecks)
The modest-sized flot was of fine plant debris, insect remains and some uncharred ?heather root/basal twig fragments. The moderate-sized residue was about 500 cm^3, of which a few tens of cm^3 were sand and grit, the rest rather fine granular organics, mainly in the <1 mm fraction. They included small twiggy debris, some of which was further ?heather root/twig, along with silty peat and some rhizome fragments—altogether giving the appearance of material originating in turves, in support of which interpretation can be cited all the records of identifiable plant remains: in addition to heather, these were heath grass spikelets/cleistogenes (the latter are cleistogamous, i.e. non-opening, spikelets found at the bases of the culms rather than on flowering spikes), sedge, ?tormentil and the moss *Hypnum* cf. *cupressiforme*. Unusually for an urban occupation deposit, there was not a single weed taxon!

Insects (and mites) were abundant, although the remains of the former were notably fragmented, limiting identifications severely (E 2.0-4.0, mode 3.0 weak; F 1.5-5.0, mode 3.5 weak). The number of adult beetles and bugs was estimated as 348, representing 93 taxa. Diversity was not very high (alpha = 42, SE = 4), and this was reflected in the fact that almost all of the recorded species probably had a single ecological origin, in heath or moor vegetation. Characteristic taxa were *Dyschirius globosus* (32 individuals), *Bradycellus ruficollis* (28), *Ulopa reticulata* (18), *Micrelus ericae* (12), *Olophrum piceum* (9), and *Altica ?britteni* (7), but the other abundant species (and especially *Xantholinus linearis* (37), *Quedius boops* group (18), *Olophrum piceum* (9) and *Stygnocoris pedestris* (6)) all may have lived with these. *Aphrodes trifasciatus* (?5) is found on heaths in England and not known from Scotland according to Le Quesne (1965), while the closely similar *bifasciatus* (Linnaeus) is found in Scotland; it is thus possible that the remains are of the latter species, but in either case they represent another heath/moor component. Another tentative identification from this assemblage is of *Limnobaris ?t-album*. This weevil, separated from its archaeologically-frequent relative *L. pilistriatus* (Stephens) on the non-overlapping scales of the elytra, is recorded breeding in *Scirpus lacustris* L., although it is found on other Cyperaceae and Juncaceae (Hoffmann 1954, 1084). The numerous click-beetle larvae doubtless were brought in peaty soil; the identification as *Denticollis linearis* was made with varying degrees of certainty. The *Aphodius* dung beetles (notably five *A. ?prodromus*) may have exploited foul matter on site, or have been imported with grazed turf.

There can be no doubt that this deposit included a significant proportion of (or was entirely) heath/moor material, either peat or turf. This was certainly heather-rich, but probably supported at least some rushes or sedges. The almost complete lack of aquatics is notable, providing an argument that this was turf rather than wetland peat.

Context 81, Sample 2/T (3 kg; invertebrates recorded from additional 7.2 kg subsample)
The modest-sized flot was of fine plant detritus including 'bleached' heather leaves and shoot tips and *Sphagnum* leaves. The large residue comprised about 800 cm^3 of material of which about 325 cm^3 was woody debris and peat (mainly the latter) and a little charcoal; the remaining 475 cm^3 was sand, grit and gravel (to 70 mm). The organic fraction of the residue yielded further vegetative fragments of heather, and a variety of (presumably) peat- or heathland-derived remains, including rhizome fragments of cotton-grass (*Eriophorum vaginatum*), seeds of bell heather (*Erica cinerea*) and the mosses *Aulacomnium palustre* and *Polytrichum*. Nutlets of bog myrtle or sweet gale must also have originated in material from peatland but whether deliberately or accidentally imported cannot be determined. There was a rather large assemblage of other plant remains, mainly fruits or seeds of various weed taxa typical of cultivated land—the more frequent were fat hen, hemp nettle, nipplewort, persicaria, wild radish and chickweed—but with some aquatics (including duckweed fronds) perhaps arriving with imported water.

The flot was large and difficult to sort, especially since many remains were fragmented (hence the numerous imprecise identifications). Insects were generally quite well preserved chemically, but some showed patchy decay and others were badly rotted (e.g. a proportion of the *Bradycellus*): E 2.0-4.0, mode 3.0 weak; F 1.5-4.0, mode 3.5, weak. Beetles and bugs were abundant (369 individuals of 152 taxa). There was an appreciable heath/moor component (e.g. *Pterostichus diligens* (7 individuals), *Bradycellus ruficollis* and *Micrelus ericae* (both 4) and *Ulopa reticulata* (3)); these were probably from dumps of turf or peat. However, the long 'tail' of rare species and the high diversity (alpha = 97, SE = 8) suggest that the fauna had mixed origins and the heath/moor fauna may have been repeatedly redeposited. A few aquatics, all rare apart from 'several' *Daphnia* (water flea) resting eggs, may have come with this material, from waste water, or in the case of the beetles, have arrived in flight. A hint of foul moist conditions *in situ* comes from remains of aquatic hover-fly (Syrphidae) larval appendages.

The most abundant beetle was the rove beetle *Anotylus complanatus*, of which there were 22. This species occurs in a range of slightly to very moist decomposing matter. An appreciable part of the remaining fauna may have lived with it in conditions resembling a compost heap—very much what would be expected in a midden. *Xylodromus concinnus* (16) may have lived in the midden, but perhaps came with *Tipnus unicolor* (11) and a few other species from within a building. Two human fleas may represent waste from a building, too, but other routes to the deposit are possible. There was little to suggest that vegetation established on the midden layer, although nettles were indicated by a single *Cidnorhinus quadrimaculatus*.

A tentatively-identified sheep ked (*?Melophagus ovinus*) and two unidentifiable lice may have been the product of wool cleaning, as postulated for York (e.g. Kenward and Hall 1995). Two *Bruchus* sp., of the right size and general form for *B. rufimanus*, perhaps originated from pulses used for food.

Overall, the invertebrate evidence is very much in accord with this deposit having received a variety of waste material.

Context 83, Sample 1/T (3 kg; invertebrates recorded from an additional 9.35 kg subsample: just moist pink clay in very dark brown humic sandy soilt with ash inclusions)
The small flot contained a little charcoal and a few weed seeds. The large residue of about 750 cm^3 included about 450 cm^3 sand and gravel, the rest being granular organics, mainly uncharred peat with a little burnt peat (both to 10 mm). Identifiable plant remains were limited to trace amounts of a modest variety of taxa, including weeds and some which may have arrived in turves from, for example, wet grassland.

The flot was large, with moss leaves, plant and peat fragments and invertebrates. Preservation was variable, from good to poor, and fragmentation perhaps bimodal: E 1.5-4.5, mode 2.5 weak; F 1.5-5.5, mode 3.0 weak. Insects were abundant (including 385 individuals of 149 taxa of adult beetles and bugs), mites extremely numerous (of the order of 500), and there was a range of other invertebrates. The fauna was very reminiscent of that from Context 81 (above), with much the same range of abundant species and the same strong ecological groups. There were five human fleas (*Pulex irritans*), probably from house sweepings or stable manure. Dung beetles were rather common: there were six *Aphodius sphacelatus*, five *A. fimetarius*, two *A. ?contaminatus*, and one *A. ?ater*. These may have been attracted to the midden or have been imported with grazed soil.

*Context 85, Sample 5/T (3 kg)
There was a large flot with fine organic detritus, mainly beetles, but also some moss, and seeds, and including cross-leaved heath (*Erica tetralix*) leaves and heather flowers. The large residue of about 850 cm^3 included about 400 cm^3 of grit, gravel and sand, the rest being woody debris with some very decayed leather (to 45 mm) and animal hairs (?from leather processing). A wide range of plant

remains was recorded including weeds, duckweed fronds, mosses and some further remains of heather; there may have been some material derived from burnt and unburnt turves.

The small flot contained a few insect remains with variable, often poor, preservation (E 1.5-5.0, mode 3.0 distinct; F 2.0-4.0, mode 2.5 weak). There were peat/turf and occupation site components, but otherwise the material had limited interpretative potential.

Context 88, Sample 17/T (3 kg)
The modest-sized flot was of fine plant debris and insect cuticle, with a modest range of seeds, including weeds of cereal fields and some possible uncharred cereal grains. The *Sphagnum* leaves and stems (the latter present in moderate numbers) seemed to be from *S. palustre*, but there were also some other bog/fen taxa and woodland mosses typical of urban medieval occupation deposits, though none was very common. The modest-sized to large residue amounted to about 900 cm^3, of which about 500 cm^3 was woody debris (bark, wood and wood chips), the rest being sand, grit and gravel. The wood fragments included some worked material identified as pine (*Pinus*). The seed assemblage was dominated by weed taxa (though only pale persicaria, *Polygonum lapathifolium*, was present in more than trace amounts).

The flot contained moderate numbers of beetles, a few bugs, and small amounts of a range of other invertebrates. There were 86 adult beetles and bugs from 60 taxa. Preservation was variable, sometimes good (E 1.5-3.0, mode 2.5 weak; F 1.5-5.0, mode 2.5 weak). Most of the fauna consisted of small numbers (mostly singletons) of a range of occupation-site and heath/moor fauna, but one component was striking: the dung beetles. There were six each of *Aphodius prodromus* and *A. sphacelatus*, three *A. contaminatus*, and a single individual of a fourth species. There was no evidence as to whether these invaded foul matter (probably dung) in the midden or were imported with grazed soil together with the natural-habitats component.

Fills of 'leatherworkers' pit' CT

Context 84, Sample 21/T (3 kg; invertebrates recorded from an additional 2.8 kg subsample; another subsample had been examined during a previous study)
The modest-sized flot was of fine plant debris with decayed bark and some seeds. The large residue was about 1000 cm^3, of which all but about 300 cm^3 was woody debris: wood (including chips to 50 mm) and bark (30 mm), plus some peat (25 mm), with some large (to 70 mm) bone fragments. The finer fractions included moderate numbers of sclereids (clusters of lignified cells from within bark and thought to be diagnostic of decayed bark such as that originating in the tanning process). Identifiable remains represented by fruits and seeds included various weeds, with bog myrtle and hazel nutshell but all were present in trace amounts. The moderate numbers of *Sphagnum* leaves may have originated in peat or imported bog moss.

Preservation of invertebrates in the flot was rather good to rather poor (E 2.0-4.0, no mode; F 2.0-4.5, mode 3.0 weak). Beetles (and a few bugs) were fairly abundant (160 individuals of 96 taxa), but the high diversity suggested a mixed assemblage (alpha = 101, SE = 15). Mites were numerous, too. There were some very decayed *Stenus* and *Bradycellus* which probably originated with a fairly weak heath/moor component of which the more abundant taxa were *Micrelus ericae* (4) and *Pterostichus diligens* (2). Much of the remaining fauna was typical of occupation sites. The most common beetles were *Anotylus complanatus* (7), *Micropeplus fulvus* and *Tipnus unicolor* (6), and *Cercyon analis* (5). All may have invaded the pit fill *in situ*, but the presence of three human fleas (*Pulex irritans*) and an adult of *Melophagus ovinus* (sheep ked, probably from wool-cleaning) perhaps hints at floor sweepings. There were several *Daphnia* ephippia (water flea resting eggs), which may have invades water in the pit, but are perhaps more likely to have originated with the aquatic beetles in water brought to the site.

Context 104, Sample 16/T (3 kg; invertebrates studied from an additional 3.6 kg subsample; another subsample had been examined during a previous study)
The rather large flot was of fine plant detritus. There was a very large residue of about 1500 cm^3 in which there were large components of fish and mammal bone (numerically, mainly the former, to 110 mm in maximum dimension), wood fragments (to 25 mm) and grit, the lighter material in the washover making up about 800 cm^3. Other organic material included moderate amounts of bark, leather, peat and twig fragments. Identifiable plant remains were quite abundant, the range including a variety of weeds (including those of cultivated places and waste ground—the more abundant were fat hen, nipplewort, corn spurrey, chickweed and both stinging and annual nettles (*Urtica dioica* and *U. urens*)—with some plants perhaps originating in heathland (e.g. with turves). A trace of duckweed fronds perhaps indicates imported water (agreeing with the records of midge larvae and water fleas, see below).

The flot, of moderate size, contained abundant fibres of hair or wool. Insect remains were numerous (253 adult individuals of 120 beetles and bugs) and there were small numbers of various other invertebrates. Preservation was often good (E 2.0-3.5, mode 3.0 weak; F 1.5-4.0, mode 3.0 weak). There was a small heath/moor component (the most numerous member of this group being *Ulopa reticulata*, with three individuals), and there may have been a large background component (diversity was high: alpha = 89, SE = 9), but most of the fauna was species typical of occupation deposits. The more common beetles (and two human fleas) may have come from the floor of a building, although most species may equally have invaded the fill *in situ*. The balance is tipped in favour of an indoor (or, of course, mixed) origin by the numerous spider beetles: seven *Ptinus fur* and five *Tipnus unicolor*. There were sufficient aquatics to suggest importation in water (PNW = 11, 27 individuals, and also numerous chironomid midge larvae, and some *Daphnia* ephippia).

Context 107, Sample 27/T (3 kg; invertebrates recorded from an additional 5.6 kg subsample; another subsample had been examined during a previous study)
There was a large flot with coarse plant detritus, fly puparia and earthworm egg capsules. The large residue of about 1200 cm^3 contained only about 300 cm^3 of mineral material (mainly sand and gravel with some bone), the rest being organic, mainly woody, fragments (wood, bark, but also some peat). Some large wood fragments were clearly from roundwood of alder (*Alnus glutinosa*). Other plant remains included a variety of taxa typical of these occupation deposits with no one group clearly predominant: there were annual weeds of waste places and arable fields, plants of heathland and a few representatives of a wide range of other possible habitats.

The flot consisted of woody plant debris with useful quantities of insects and was rather large. Preservation of invertebrates was variable, from very good to rather poor (E 1.0-4.0, mode 2.5 distinct; F 1.0-4.5, mode 2.5 weak). Adult beetles and bugs were abundant (338 individuals of 137 taxa) and ecologically rather varied (alpha = 86, SE = 8, a value which was high in view of the clear *in situ* fauna). However, the assemblage was dominated by a clear occupation site decomposer fauna, with a smaller heath/moor group. The former was best represented by *Cercyon analis* (34), *Megasternum obscurum* (12), *Omalium rivulare* and *Xylodromus concinnus* (11 each), *Anotylus complanatus* and *Lathridius minutus* group (9 each), and *Gyrohypnus fracticornis* (7), although much of the fauna may have co-existed with these in compost-like conditions. This group may have originated within a building, for there were five spider beetles *Tipnus unicolor* and ten human fleas (*Pulex irritans*).

The aquatics may represent imported water (though most have invaded open water in the pit). A single *?Melophagus ovinus* adult and a *?Damalinia* louse may have originated from wool cleaning.

Pit fill in EU

*Context 233, Sample 39/T (5 kg: just moist, very dark brown, slightly sandy amorphous organic sediment, locally woody or silty; another subsample had been examined during a previous study)
There was a rather large flot of fine plant detritus, including many *Sphagnum* leaves, and a few 'seeds' including a possible turf element (*Danthonia*). The moderate-sized to large residue was of about 1000 cm^3, of which 600 cm^3 was sand and gravel (to 40 mm). The remainder was mainly granular organic material including some indurated peat (to 10 mm) and some charred peat (to 5 mm). Further *Sphagnum* remains (including shoots and stems) were noted, with some rhizome fragments and further remains of *Danthonia*. Overall, the assemblage was consistent with an origin in peat and/or turves—the only taxa reaching an abundance score of 2 were heath grass, ?tormentil and sedge—with just a few weed taxa. Some other taxa hinted at the presence of cut grassland vegetation such as hay, rather than grass turves *per se*.

The flot was quite large, with moss, plant debris and modest numbers of insects. The smallish group of beetles, often quite well preserved (E 1.5-3.5, mode 2.5 weak; F 2.0-4.0, mode 2.5 weak), offered hints of foul matter, e.g. from three *Aphodius (?prodromus* and *contaminatus*).

13^{th}-14^{th} C

Pit fill in BG

*Context 33, Sample 37/T (2.212 kg)
The very large residue of about 700 cm^3 was of sand, grit and gravel, with a piece of part-charred wood (oak). The rather large washover of about 70 cm^3 was of fine organic material with some wood and charcoal, but the coarser fraction was mainly charred heather twig fragments (some 'varnished' with ?soot). There were some quite well preserved cereal grains, including a part-burnt barley caryopsis. Fly puparia fragments were abundant and the uncharred plant material included heather shoots and a modest range of taxa in trace quantities with no ecological group predominant. Seeds of fig were present but the deposit did not give the appearance of containing faecal material.

The small flot consisted or plant and fly puparial fragments, with a few beetles, most very decayed and with no interpretative potential (E 3.5-5.0, mode 4.0 distinct; F 3.0-5.0, mode 4.0, weak; trend to pale 3-4, mode 3 weak).

Fill in pit DA

Context 111, Sample 15/T (3 kg; invertebrates recorded from an additional 8.1 kg subsample)
The rather large flot was of fine and coarse organic detritus, both woody and herbaceous, with modest numbers of beetles. The large residue of about 1200 cm^3 consisted of woody detritus apart from about 200 cm^3 of sand and stones. The coarser woody material was mainly bark and twig fragments (including heather), and there were also some peat fragments (to 20 mm), in which the vegetative remains of cotton-grass probably originated. Some of the peat was charred. With the woody detritus and peat was a small range of plant taxa likely to have arrived from weeds in the vicinity or in material such as straw. One indicator of human activity was a rather large box (*Buxus sempervirens*) leaf fragment, a taxon not previously recorded from medieval Aberdeen and rather unusual, although not unique, in a medieval (rather than Roman or post-medieval) context within the British archaeological record.

The flot was extremely large, consisting of plant detritus, insect fragments, and moss leaves. It was very difficult to sort, and insect remains will inevitably have been overlooked: the unusual fauna made the exercise worthwhile. Preservation was mostly good, though some was much poorer: E 1.5-4.0, mode 2.5 weak; F 1.5-4.0, mode 2.5 weak. There were numerous adult beetles and bugs (408

individuals of 123 taxa) in what seems to have been a moderately mixed group (alpha = 60, SE = 5). There were also many fly puparia, and a range of other remains, but much the most notable component of the fauna was a minimum of 84 honey bees, *Apis mellifera*. The problem of interpreting large groups of bees in archaeological deposits is discussed above, but it is tempting to suggest that been were kept on the site.

The heath/moor component was distinct, its more abundant taxa being *Micrelus ericae* (8), *Bradycellus ruficollis* (6), and *Dyschirius globosus* and *Pterostichus diligens* (both 4). However, the dominant component was a group of very typical occupation-site decomposer: The most abundant were *Xylodromus concinnus* (49), *Orthoperus* sp. (27), *Megasternum obscurum* and *Crataraea suturalis* (18), *Tipnus unicolor* and *Lathridius minutus* group (both 14), a *Corticaria species* (12), and *Clambus* sp. (10). A large proportion of the remaining fauna would have co-existed with these, in decomposing matter which was probably of varying texture but generally not too foul. An origin indoors is suggested by *C. suturalis* and *T. unicolor*, as well as by the seven human fleas (*Pulex irritans*).

Late 14th C

Organic fill of barrel BN

Context 60, Sample 13/T (3 kg)
The modest-sized flot consisted of fine organic material including quite a lot of beetles, and some uncharred seeds. The large residue of about 650 cm^3 included about 525 cm^3 of organic debris, the rest being sand and gravel, with one sherd of fine pottery. The organic material was mainly peat fragments (though some may have been undisaggregated peaty matrix), with a little wood, bark and charcoal. Seeds and fruits included fig and hazel nutshell with a small range of taxa from a number of sources. A possible heathland/turf component was certainly present, though small.

Invertebrate remains were rather abundant, and 149 adults of 76 beetle and bug taxa were noted. Preservation was variable, and a range of decay was seen even within single taxa (e.g. *Bradycellus*, *Hydraena*): E 1.5-4.5, mode 3.0 weak; F 2.0-5.0, mode 3.0 weak. While there were clear components from heath or moor and from in or around buildings, the long tail of species represented by single individuals suggests a fairly mixed group (reflected in the moderately high value of the index of diversity: alpha = 62, SE = 9). The more numerous heath/moor species were *Olophrum piceum* (5), *Bradycellus ruficollis* (4) and *Pterostichus diligens* (3), with smaller numbers of several others: too many to have arrived as background fauna even from nearby habitats, and thus presumably brought in turf or peat. House fauna was well represented, but by a rather restricted range of species (cf. Context 22): *Tipnus unicolor* (12), *Xylodromus concinnus* (11), *Mycetaea hirta* (10), an *Atomaria* species (6), and small numbers of a few others.

Possible sources for the material forming this deposit are stables (though there was not characteristic stable manure fauna) or roofing, though a fairly well cleaned out domestic building might support the insect species. There was nothing from the biota to suggest that it represented any use of the barrel other than waste disposal, and only two well decayed *Trichuris* eggs and a trace of fig seeds. These were perhaps from faeces, but bearing in mind their rarity and durability, reworking cannot be ruled out.

*Context 361 [‘burnt stuff from black circle’ [?context FW]], Sample 361/SPT (0.025)
This sample comprised a few grammes of charred plant material from which a large (for a 25 g sample) residue of about 20 cm^3 of charcoal, including oak (to 10 mm), with a little sand and gravel, and some cemented buff ?silt clasts (which might be concreted peat ash).

Site E35: 16-18 Nether Kirkgate

Summary: Cut turves seem likely to have formed part of at least three of the deposits examined for this site: 'turf stack' Context AH (translated numerically here as 18), and midden deposits 109 and 306. Various fragments of heather (mostly uncharred) were present in almost all the samples and other plant and insect indicators of peatland or moorland quite frequent in small amounts. Uncharred peat was recorded in abundance in turf stack 18, midden layers 37 (here clearly including *Sphagnum* peat), 109 and 306, and pit fill 482. That the midden layers also contained various kinds of 'litter' (?from stable manure) is perhaps indicated by the records of uncharred fragments of bracken stalk and/or frond in all the midden deposits, albeit in very small amounts, with grass/cereal straw material in three of them. The insects suggested fairly foul, compost-heap-like conditions in some midden layers, as well as the presence of material derived from floors (bringing with it, among others, human fleas and a human louse). There was also a single deer fly, most probably broight with a carcase or skin. With the exception of a moderate number of tentatively identified uncharred oats spikelets in midden Context 109, food remains were limited to traces of hazel and walnut (*Juglans regia*) nutshell, fruitstones of raspberry (*Rubus idaeus*) and rowan (*Sorbus aucuparia*) and some charred and uncharred cereal caryopses. The record for walnut is the first for any site in Aberdeen though it is long 'overdue', walnut being recorded from many urban archaeological deposits of medieval date throughout the British Isles (the nearest record in space and time to that in Aberdeen being from Kirk Close, Perth, in a 13th-14th C context, cf. Robinson 1987).

13th-14th C

*Context 18 [Context 'AH', Area B: turf stack], Sample 8/T (3 kg: moist, very dark brown, somewhat indurated amorphous organic sediment with traces of bone and wood)
This subsample yielded a huge residue of about 1600 cm^3, of which barely 300 cm^3 was sand and gravel (to 40 mm), the rest being granular organics—mainly peat (highly humified with minute rootlets, in clasts up to 25 mm), with some bark and twigs, traces of heather (various parts of the plant) a few weeds (mainly cornfield taxa but also a component which looks like 'turf' from a grassland area on acidic soil. The more abundant taxa were bugle (*Ajuga reptans*), sedges, spike rush (*Eleocharis palustris*), ?tormentil, buttercups (*Ranunculus* Section *Ranunculus*), sheep's sorrel and violet/field pany (*Viola*), most of which have been shown to be probable indicators of turves in early medieval rath deposits at Deer Park Farms, Co. Antrim, N. Ireland (Hall 2003). With regard to preservation, there were some quite worn seeds, others being very well preserved—something which might be consistent with material including turves in which a proportion of the propagules in the seed bank had begun to decay whilst fresher material was present in the component at the surface or in plants growing on the sod (the 'serotinous' component). The modest-sized flot contained fine plant detritus, including many *Sphagnum* leaves and a few insects and seeds. There were appreciable numbers of insects, which were fairly well preserved (E 2.5-3.5, mode 3.0 weak; F 2.5-4.0, mode 2.5 weak). There was a mixture of turf/peat and occupation site fauna, although the former component was by no means as strong as in some of the other samples from medieval Aberdeen, the latter perhaps invading stacked peat/turf *in situ* or possibly indicating that the material had been used for some purpose before being placed in its final position.

Overall, then, the archaeological interpretation of a turf stack seems to be accurate, the 'turf' in question including both surface-cut turves (scraws or divots in the Scottish sense) and peat proper, perhaps attached to the undersurface of the turves.

*Context 37 [Area B, midden], Sample 22/T (3 kg: moist, very dark brown (locally yellowish) more or less layered, compressed amorphous organic sediment to herbaceous detritus (and with sandy clay silt lenses)
The huge residue of about 2.2 litres, of which barely 100 cm^3 was sand and a little gravel, comprised woody and herbaceous organics, including many rather coarse moss stems, especially large and

mainly leafless *Sphagnum* stems, though some bore well-preserved leaves. There were also some quite large fronds of *Hylocomium splendens* and *Thuidium tamariscinum*; which, if they arrived with the *Sphagnum* make it more likely that the larger *Sphagnum* stems are from collected live material. However, much of remainder of residue comprised peat, both humified with fine rootlets and paler clasts of fragmented, compressed *Sphagnum*-rich material. The moderate numbers of sedge nutlets present are consistent with peat or turves. There were also some weed seeds, their concentration probably much diluted by the peat and moss. The very large flot of about 30 cm^3 consisted of fine plant detritus with more *Sphagnum* remains and some uncharred rhizome, as well as modest numbers of insects. Preservation was variable, mostly good (E 1.0-4.0, mode 1.5 weak; F 1.5-3.5, mode 1.5 weak). There were indications of somewhat foul conditions from several *Cercyon analis* and some *C. haemorrhoidalis* and *Anotylus complanatus*.

Area C midden

*Context 109, Sample 16/T (3 kg: moist, dark brown sandy amorphous organic sediment with some herbaceous detritus)
The large residue of about 1400 cm^3 consisted mainly of granular organics and some moss and twig fragments and a little sand and gravel (about 300 cm^3 within the total volume, the gravel up to 20 mm). It was not unlike midden Sample 22 in this sequence, but with a rather different moss component, the more abundant taxa being *Eurhynchium praelongum* and, again, *Sphagnum*, but with traces of *Aulacomnium palustre*, *Hypnum* cf. *cupressiforme* and *Polytrichum* sp(p). Also present were heath grass (*Danthonia*) cleistogenes, likely to indicate the presence of grass turves, and some woody taxa. Overall, a mixed 'litter' with a straw component and (from uncharred ?oat chaff) perhaps animal feed. The modest-sized flot of fine plant detritus included fragments of herbaceous root and rhizome and further *Danthonia* cleistogenes, all consistent with an origin in turves. It contained a rather varied insect group, mostly well preserved (E 1.5-3.0, mode 2.5 weak; F 2.0-3.5, mode 2.5 weak). Three species of *Aphodius* dung beetles were noted, together with a rich outdoor component, probably turf/peat fauna.

Context 119, Sample 30/T (3 kg: just moist, dark brown slightly sandy woody/herbaceous detritus and amorphous organic sediment)
There was a large residue of about 1300 cm^3, of which all but about 250 cm^3 was granular organics, including twig fragments (many seem to be *Calluna*), and some wood chips; the rest was sand and gravel, with some cinder-like fragments and very decayed concretions (?faecal), and a little bone. The organics included some peat and a variety of litter components. There was also some food waste in the form of nutshell fragments of hazel and walnut (*Juglans regia*) and much more wood bark and twig and much less peat than other midden samples in this sequence. Uncharred cereal chaff, probably oats, was again present (cf. Context 109). The moderately large flot contained further fine plant detritus, more *Calluna* leaves and shoot fragments and unusually large numbers (for medieval Aberdeen!) of bell heather (*Erica cinerea*) leaves, the last looking too well preserved to be likely to have arrived in peat and thought, therefore, to have arrived with cut heathland vegetation (along with much or most of the heather remains).

The also contained 198 adult individuals of 97 beetle and bug taxa, and quite large numbers of fly puparia and mites, together with a range of other invertebrates. Preservation was generally good (E 2.0-3.5, mode 2.5 weak; F 1.5-3.5, mode 2.5 weak). This assemblage was ecologically mixed (reflected in the fairly high value of the index of diversity: alpha = 78, SE = 9), but predominantly occupation site fauna. There was probably a background fauna contribution. The heath/moor component was rather smaller than in most of the groups from Aberdeen. The most numerous beetles were *Cercyon analis* (12 individuals), *Xylodromus concinnus* (11), *Anotylus complantatus* (9), and *Lathridius minutus* group (8). These may have co-existed in decomposing plant matter which was not too foul. Rather moister and fouler conditions were suggested by *Platystethus arenarius* (5), *Cercyon haemorrhoidalis* (4), and *Omalium rivulare* (3). At least part of the fauna seems to have come from indoors, for there were six each of the spider beetles *Tipnus unicolor* and *Ptinus fur*, as well as four

human fleas (*Pulex irritans*) and one human louse (*Pediculus humanus*), and some other primarily 'indoor' taxa such as *Crataraea suturalis* (3).

The decomposers in this deposit were probably accumulated through the history of the material, from building to midden, as well as representing variations of foulness in the midden itself.

This sample produced fragments of a single adult of the parasitic fly *Lipoptena cervi*, which is confined to deer, particularly roe deer (*Capreolus capreolus* (Linnaeus)) and red deer (*Cervus elephas* Linnaeus) (Hutson 1984). Although these parasites may occasionally temporarily stray onto other hosts (including dogs and humans), perhaps the most likely route into the medieval town would be with deer carcases, or their fresh skins. There appears to be only one previous archaeological record of this fly, from a sample from a borehole at the former Victoria House site, Micklegate, York. Dating of this specimen was not clear, although the fauna and flora hinted at an Anglo-Scandinavian date (Hall *et al.* 2001).

Context 306 [Context 306 BU], Sample 26/T (3 kg; invertebrate recorded from an additional 9 kg subsample: moist, mid to dark brown (locally yellower) humic sandy silt with stones 2-20 mm and traces of ?mortar/plaster)
The large residue of about 900 cm^3 contained about 300 cm^3 of granular organics, the rest being sand and gravel (to 100 mm). The organic fraction contained some undisaggregated compressed herbaceous detritus-rich sediment with a 'strawy' character, but also some peat. The seeds present were mainly from cornfield and waste ground weeds, the material usually being rather eroded/decayed.

The flot added a further record for caryopses of *Danthonia* and contained substantial numbers of invertebrate remains, among them 203 adult individuals of 100 beetle and bug taxa and 'many' mites and fly puparia. Preservation was often good (E 1.5-3.5, mode 2.5 weak; F 2.0-4.0, mode 2.5 weak). Diversity was high (alpha = 78, SE = 9), suggesting a variety of origins, and there was probably an appreciable component of background fauna. Although differing in detail, the fauna was ecologically similar to that from Context 119, with a range of decomposers. *Xylodromus concinnus* was the most abundant species (18 individuals), and there were eight each of *Lathridius minutus* group and a *Corticaria* species, and seven each of *Omalium ?allardii* and *Anotylus complanatus*. Although they probably bred in the midden, the first of these, and perhaps all of them (and many other components of the fauna) may have come from a building together with *Ptinus fur* (4), *Tipnus unicolor* (3) and five human fleas (*Pulex irritans*). There was a small heath/moor component. A single *?Melophagus ovinus* (sheep ked) may originally have been deposited on to a floor by wool cleaning, and three *Bruchus rufimanus* probably came from pulses intended for food, for its principal host is the field/broad bean *Vicia faba* L., although it is occasionally noted on other *Vicia* species (Hoffmann 1945, 43). A fragment of stem of a large hydroid resembling *Eudendrium* or *Obelia* was also noted.

Like that from Context 119, this assemblage probably built up through the taphonomic history of the various components of the midden.

Pit fill in KM, Area E

*Context 482, Sample 1/T (3 kg: moist dark brown crumbly jumbled soft humic silt and sand with some patches more mineral-rich; small granite clasts)
There was a large residue of about 800 cm^3 of which a little under half by volume was sand and gravel, the rest 'crisp' fragments of what was essentially sandy, indurated, very humified peat with a little bone. The tiny flot contained a little charcoal, further indurated peat, and a few uncharred seeds of no interpretative value. There were also a very few, poorly preserved, insects, including unidentifiable scraps of cuticle (E 4.5-5.5, Mode 5.5 weak; F 4.0-5.5, mode 5.0 weak).

Site E37: Castle Street

Summary: Material from four contexts was examined, mostly in the form of 'spot' samples. All the plant remains were charred (in some cases only partly so, having a 'toasted' appearance) and some fragments bore a sooty or 'varnished' surface. This material seems most likely to have originated in roofing where the effects of smoke-blackening in preservation of organic thatch are now well documented (cf. Letts 1999). Lens 347 proved to be rich in remains of heather (mainly charred twig fragments, but also some leaves, shoots, flowers and capsules), and much the same material was recorded from Sample 11 from ?burnt roof material 398, whilst a sample of the quarry pit fill in 396GG (7) had only charred herbaceous material, perhaps cereal straw (and, from the presence of other remains, oat straw). This material is important in suggesting the nature of at least part of the roofing material at this period (13th-15th C) in Aberdeen and it is roofing which may account for the presence of small amounts of charred heather and other remains in so many of the deposits where no great concentration of fossils formed in the past. This site did not yield any invertebrate remains.

13th-14th C

*Context 347 ['lens of loam with twigs', ?13th-?14th C], Sample 3/SPT (0.380 kg)
Described in the laboratory as just moist, dark brown to black, crumbly ashy silt with charred twig fragments, this sample consisted essentially of charred heather remains, mainly twig fragments (to 20 mm) with some root/basal twig material, flower, leaves and shoots and traces of seed capsules.

Quarry pit fill in 396GG

*Context 396, Sample 7/T (1 kg: just moist black, unconsolidated charred herbaceous detritus with some sand and silt)
The smallish flot contained charred twig fragments (to 30 mm), some with a 'sooted' appearance; some, at least, appeared to be willow (*Salix*). There was a very large washover of charred herbaceous detritus and wood charcoal, including some beautifully preserved charred grass/cereal culm fragments and culm bases. A little of the material was 'toasted' rather than fully charred, consistent perhaps with an origin in a large body of material such as roof thatch. It was remarkably free of weeds.

*Sample 8/SPT (sediment essentially the same as Sample 7)
A sample of undense charred material, not examined further.

*Sample 9/T (1.975 kg: moist, very dark brown unconsolidated charcoal with some yellow sand)
There was very large residue of about 460 cm^3 of sand, grit and gravel (to 40 mm) and a very large washover of about 600 cm^3 of charred material which proved to consist entirely of wood charcoal, apparently all oak (to 45 mm).

*10/SPT (0.1 kg)
Black flaky charcoal and apparently little else, the larger fragments all apparently oak.

15th C

?Burnt roof material

*Context 398 [Area E+, labelled E37 II E+; Context 398GO], Sample 11/SPT (0.29 kg)
This sample consisted mainly of black, loose twig-sized charcoal. This sample was sieved dry: it seemed to be mainly heather with some hazel rod fragments, likely to represent collapsed purlins and heather thach from a roof. Some clumps of fine whitish to yellowish black debris might be ash,

binding small heather twig fragments together. (Sample 12, another bag, very like Sample 11, 190g in weight; was not examined further.)

*Context 625, Sample 5/SPT (0.39 kg)
Described in the laboratory as a just moist, crumbly, dark brown to black ashy silt, this sample separated on processing into charred fine twiggy debris and rather coarse sand. The former were found to be heather twigs and other heather debris, including some 'toasted' material. There were quite a few very small rhizome/culm-base fragments which might indicate the basal parts of plants; these and the presence of some baked clay/daub and sand might indicate that turves *per se* formed part of this material.

Site E38: Carmelite Friary (an account of the evidence from this site will appear in the report by Cameron *et al.*(forthcoming))

Summary: Plant remains were rather limited in these samples, many of which were spot finds from pit fill ND (1138). Apart from some very decayed oak wood, this pit fill yielded material which proved to be very humified peat (Sample 40) and ?peat ash (Samples 75 and 87). Humified peat was also abundant in the sample from pit fill 878 and present in charred or uncharred form in modest amounts in several other samples. Pit fill 393 in HD seems likely to have had a faecal component (with *Sphagnum* perhaps being used as toilet tissue), whilst one of the samples (50) from sump fill 549 perhaps also contained food waste (there were traces of several edible fruit taxa, including fig, apple (*Malus sylvestris*) and strawberry, *Fragaria* cf. *vesca*). The loam layer 342 may have contained material originating in turves (if not having actually supported turf *in situ*).

Phase 1

*Context 645 [organic deposit in water channel LU], Sample 24/T (1.274 kg)
The modest-sized residue of about 140 cm^3 was of sand and gravel; the small flot was mainly of what were apparently peat fragments, whilst the modest-sized washover of about 100 cm^3 was of granular undisaggregated sediment (which looked as though it had dried out and become somewhat indurated), a little peat, and a little charcoal—and very little else. The minute flot, entirely strongly yellowed, contained no invertebrates other than a single earthworm egg capsule.

Phase 2a

Context 393 [pit fill in HD], Sample 30/T (1.84 kg)
The moderately large flot of fine plant detritus included beetles and wheat/rye 'bran'. The modest-sized residue of about 200 cm^3 was approximately half by volume sand and grit, the rest organics, including some concretions. Probable indicators of foods included rowan and crowberry (*Empetrum*), along with endcoarp fragments of apple and moderate numbers of seed fragments of linseed, (*Linum usitatissimum*). The rest of the identifiable remains were mainly weeds, including fragments of seeds or fruits of taxa likely to have grown in cornfields (and thus perhaps representing seeds milled with flour or linseed), and moderate numbers of seeds of other annual weeds of waste places and cultivated land. A large proportion of the finest fraction was wheat/rye bran and, whilst worm eggs were not observed in a 'squash' made by ARH (there were traces of eggs in a squash made by JC), there were rather a lot of *Sphagnum* leaves with the bran, perhaps indicating use of this moss for hygienic purposes.

The flot was moderately large, with abundant pale filmy plant fragments which made sorting difficult. A fairly small group of adult beetles and bugs (81 individuals of 49 taxa) was accompanied by numerous fly puparia and small numbers of a few other invertebrates. Some of the insect fossils were quite badly decayed: E 2.0-4.0, mode 2.5 weak; F 2.0-3.5, mode 2.5 weak. *Anotylus complanatus* was abundant (16 individuals); its occurrence in the upper ranks of abundance together with *Cercyon*

haemorrhoidalis and *Gyrohypnus angustatus* (both 4), *Cercyon analis* (3), and *C. unipunctatus* (2) suggests a community similar to many found in cess pits in Anglo-Scandinavian deposits at 16-22 Coppergate, York (Kenward and Hall 1995). The presence of six *Bruchus rufimanus* accords well with such an interpretation, for it seems that this beetle was often accidentally eaten with pulses and passed with faeces. A single grain weevil, *Sitophilus granarius*, may have had a similar entry route, or arrived by some other means. The remaining beetles probably included some species which lived in the pit, but many were probably background fauna.

There is little doubt that this was a layer rich in faecal material, presumably human. The lack of eggs of parasitic worms in one of the two squashes and their rarity in the other is notable and perhaps suggests that infection was not universal.

Phase 3

Pit fill in BI

*Context 61, Sample 41/T (1.154 kg)
There was a large flot, mainly peat fragments with a little charcoal; the modest-sized residue of barely 100 cm^3 was of sand and gravel, with a washover of a few cm^3 of peat fragments.

*Sample 44/T (0.772 kg)
The small residue of about 30 cm^3 consisted of clean quartz sand and gravel; the very small flot contained a little charred material. The small washover of about 20 cm^3 was of granular peat (amorphous, very well humified) and a little more charred material. The minute flot contained no recognisable invertebrate remains.

*Context 878 [black organic pit-fill], Sample 69/SPT
This consisted of dark brown amorphous organic material, presumably natural peat, with a little sand; it was not examined further.

Phase 5

*Context 342 [loam (general layer)], Sample 33/T (1.208 kg)
This sample yielded a large residue of about 200 cm^3 of sand and coal, including a little undisaggregated sediment which looked dark and 'peaty', but which might just have been soot-rich. There were some charred ?heather root/basal twig fragments. The smallish flot contained *Cenococcum* sclerotia and charred sedge nutlets and might therefore have contained an element of turf. The rather large washover of about 100 cm^3 was of angular charcoal, with burnt peat and coal. There was quite a large component of apparently uncharred silty peat-like material which might be uncharred mor humus (from turves).

Grave soil ND

Context 863, *Sample 13/BS (10 kg)
There was a large residue of about 1400 cm^3 of pebbles, gravel and sand, with rather abundant bone, especially fish. Some faecal concretions were present in small fragments, too, mostly with a rather 'platy' configuration probably relating to compression in the ground. There were some peat clasts.

Sample 13/T (5 kg)
The large residue of about 1000 cm^3 was sand, grit, gravel and bone, especially fish. There was a moderately large flot of fine plant detritus, with beetles, fly puparia and a few seeds. The rather large washover of about 200 cm^3 consisted of granular organics, mostly peat, with bark and some wood, and a little more fish bone, charcoal, bracken pinnule fragments, moss, fly puparia.

A fairly small group of adult beetles and bugs was recovered from the flot (71 individuals of 50 taxa), although mites and fly puparia were rather numerous. Some of the remains were substantially decayed or fragmented, limiting identification (E 2.0-4.0, mode 3.0 weak; F 2.0-4.0, mode 2.5 weak). *Anotylus complanatus* (14) was the most abundant species, no others being represented by more than three individuals.

It seems likely that this 'grave soil' was disturbed earlier occupation material, perhaps including foul pit fills of the kind seen in Context 393.

Soil in church

*Context 929, Sample 70/T (2.205 kg)
The large residue of about 275 cm^3 consisted of quartz sand and some gravel; there was a modest-sized flot, mainly charcoal and insect cuticle, with some corncockle seed fragments. The very small washover of a few cm^3 was of charcoal and ?burnt peat. The small flot was mostly charcoal with mica and rotted plant fragments. There were only a few very decayed insect scraps (E5.5).

Pit fill in ND

*Context 1138, Sample 10/SPT (Very dark brown fibrous wood in a speckled brown silty clay matrix)
The wood was very decayed oak.

*17/SPT
This sample comprised very decayed oak ?planks in a silty matrix.

*40/SPT
This sample consisted of 'blocky', moist, very dark brown, compacted, amorphous organic sediment with woody detritus—it had the appearance of very decayed organic matter (peat or 'midden'). A small subsample was washed to 0.3 mm; the sediment was very fine, washing away to almost nothing when rubbed: it seemed to be amorphous organic debris with a minimal pollen content (to judge from a 'squash'); there was a little gravel and sand when washed out, apparently from another component (grey ashy material), not the peat itself. There were some <5 mm fragments of very decayed wood or bark, all very soft and losing their structure, and some tiny charred root/rhizome and twig fragments which have originated in burnt peat/turves, whilst the trace of uncharred heather shoot tips and modest amounts of extremely decayed *Sphagnum* shoots are likely to have come from uncharred material of this kind. A few insects of no interpretative value were recovered from the sample.

*75/SPT (Dry, crumbly, somewhat layered and vesicular, undense, light brown to buff to yellowish-white to slightly reddish brown material, perhaps mainly peat ash; sample weight not recorded but probably about 200 g)
There was a large residue, very little material being sieved away and that remaining tending to cohere in a dry, slightly indurated fashion; there were some clasts of grey-brown, speckled material which might have had an organic content once and may still have very decayed organics within grey, slightly indurated silt-like clasts and yellowish to orange brittle non-calcareous concreted material. There was quite a lot of wood, especially in the finer fractions; it was very desiccated and decayed, perhaps most of it actually mineral-replaced or at least mineral-impregnated, having a very brittle character. There was in addition some brownish material that might have been peat. The whole sample had a somewhat 'ashy' feel to it.

*78/SPT
A samples ofdry, black wood 'fibres', with a brittle character. This material appeared to be very decayed oak wood.

*81/SPT
This material was the same in nature as Sample 78.

*82/SPT
A sample of dark brown, dry, flaky peaty material (perhaps organic rubbish rather than peat?) with some very dry oak wood in fibrous strips.

*86/SPT
This consisted of completely desiccated wood and ?grey silty clay, some of the former actually consisting of bark (to 50 mm and perhaps including birch, *Betula*) when examined more closely.

*87/SPT (1.1 kg: mid-dark greyish-brown, crumbly, just moist, ?humic silt with abundant pale orange clasts of ?ash or clay and some wood fragments)
This sample yielded a huge residue of about 900 cm^3 of very decayed bark (and a little wood) and speckled, unwashed sediment (locally somewhat clayey, but mostly undense grey ashy material which was rather brittle) with patches of yellowish to orange non-calcareous concretion.

Phase 6

*Context 864 [black organic layer], Sample 27/T (0.986 kg)
The largish flot was mainly charcoal and peat with some *Sphagnum* leaves/shoots. The small residue of about 50 cm^3 was sand and gravel, and the small washover a few cm^3 of charred and uncharred peat fragments. The flot was of moderate size—mostly granular charcoal or burnt soil. There were some very eroded scraps of insect (E 5.5, F 5.0).

Phase 7

*Context 549 [sump fill in KV (?549)], Sample 47/T (1.31 kg)
The large flot was of fine plant detritus, ?mainly epidermis and including grass and a shrubby legume (perhaps broom). There may also have been epidermis from young heather shoots. The residue of about 75 cm^3 was not checked (see Sample 50, which looked very similar).

There was a large flot, only part of which could be examined during assessment. Only a few insects were noted, although they included at least two woodworm beetles, *Anobium punctatum*, not strongly represented at these sites.

*Sample 50/T (1.952 kg)
There was a large flot, rather like that from Sample 47, with many epidermis fragments, much of which might (in this instance) be from willow twigs. The small residue/washover of about 75 cm^3 contained a large proportion of floating, fine plant debris, and spongy plant tissue in sheets; the heavier material was sand, coal and ‘char (probably largely exuded material from coal). There were some small rather soft woody twigs. Food remains were present as traces, only, but included fig, strawberry, blackberry (*Rubus fruticosus* agg.), raspberry and apple.

This subsample yielded a large flot, only part of which could be assessed. Preservation was quite good (E 2.5, F 1.5), although too few fossils were observed for a proper record to be made. There was a small group of beetles, with ‘several’ *Anobium punctatum* (the only record of more than one or two from the sites considered here and possibly a reflection of the higher status and greater longevity of buildings at the Carmelite Friary).

Unphased

*Context 879 [peaty black organic], Sample 25/SPT (0.2 kg)
This sample consisted of amorphous, black-brown organics forming a 'blocky' sediment, with grey-brown silty material and some black and white 'speckling' (it looked rather like Sample 40 from Context 1138 from this site): perhaps peat in ashy matrix?

There was a large residue of about 100 cm^3 of sandy amorphous organic material, mainly that which had not, by that point, disaggregated (the organics would probably nearly all have passed the 0.3 mm sieve with sufficiently aggressive disaggregation). There was some microlamination internally in some clasts, so they were perhaps ashy; pollen of Ericales and fungal spores were abundant, so this material may have been derived from mor humus or peat.

Site E42: Aberdeen Academy

Neither of the two samples submitted was considered to be worth assessing.

Site E43: St Clements Street

Neither of the two samples submitted was considered to be worth assessing.

Site E45: St Clements Street

Summary: The two samples submitted, both dated '?medieval', and described as 'organic layer in sand dune', were examined more closely. They yielded only small amounts of charred material, the sample from 13 having only a little fine charcoal, whilst that from 11 was found to contain traces of charred ?heather root/twig, oat grains and *Cenococcum* sclerotia, with traces of charred and uncharred peat—the most likely origin for which is perhaps in (incompletely) burnt turves or peat, though the evidence is hardly substantial enough to be compelling.

*Context 11 [?Context 398], Sample 11/T (3 kg: wet, mid to dark grey-brown, locally black (with manganese or charcoal), unconsolidated humic sand)
The moderate-sized residue was of clean quartz and mica sand; there was one fragment of micaceous sandstone. The small washover of about 15 cm^3 was of charred material: ?heather root/basal twig and burnt peat with quite a lot of (presumably charred) *Cenococcum* sclerotia; some unburnt peat was also present.

*Context 13, Sample 13/T (3 kg: just moist, light yellowish-grey, slightly brittle, very slightly sandy silt clay with ancient root traces)
The small residue of about 40 cm^3 consisted of quartz and mica sand; the minute washover was mainly mica with a trace of fine charcoal.

Site E47: Shiprow

Summary: Material from this excavation was assessed prior to the present project (Hall and Kenward 2000) and is reiterated here. The three samples from feature AD indicated some of the material which was probably burnt as fuel in the oven or kiln: heather and heathland/moorland turf and perhaps also some bracken and grass. The reason for constructing the kiln or oven was not, however, clear from the

plant remains. The bulk of the material burnt and forming the fill of shallow oval cut AK/AL was heather brushwood.

12th C

Deposits associated with oven or kiln: Pit fills in AD

*Context 15, Sample 15/T (1 kg)
The sample comprised black, crumbly sandy ?charcoal and ash. The large residue of about 300 cm^3 consisted of sand and fine charcoal-like material, the latter making a washover of about 200 cm^3. The charred material resolved, on inspection under the binocular microscope, into what appeared to be burnt peat or mor humus (it was rather vesicular and had sand grains embedded in it, so there was clearly some mineral soil present), with a little wood charcoal (and part-burnt oak wood/charcoal. The 1-2 mm fraction contained some uncharred ?mor humus (or other peaty sediment). A 'squash' (*sensu* Dainton 1992) of a fragment of the uncharred peaty material proved it to consist largely of amorphous organic material but with considerable amounts of heather pollen, suggesting it was mor humus from heather-dominated heathland or moorland. The small numbers of uncharred plant propagules present included some rush seeds (perhaps brought with peatland material) but also some chickweed seeds which were presumably from weeds growing in the vicinity of the feature. Invertebrates were represented only by a few scraps of unidentifiable cuticle.

*Context 25, Sample 25/T (1 kg)
This sediment was a mid grey-brown (but speckled orange-brown to black), crumbly/unconsolidated to slightly plastic, slightly silty, slightly clay sand or perhaps largely ash, with some stones 2-20 mm and charcoal. The very large residue of a little over 400 cm^3 was obtained extremely quickly as the sediment disaggregated easily. All but about 125 cm^3 consisted of sand, the rest being charcoal with some burnt bone and traces of 'toasted' (part-charred) heather leaves and shoot fragments, and uncharred bracken frond fragments. Also present were some part-charred culm (stem) fragments from grasses or cereals, probably the former. Again, this deposit seemed to consist largely of ash, including material, which had escaped complete combustion by burning in a fire.

*Context 34, Sample 34/T (1 kg)
This was a moist, dark brown, crumbly to soft (working plastic), sandy amorphous organic sediment or sandy humic silt with ?charcoal traces; it was difficult to determine what the organic content was (it might have been very small if the colour was strongly influenced by the mineral sediment present). A rather large lump of somewhat coherent humic material remained during the early stages of disaggregation, but it was sandy internally so was perhaps just the normal matrix of the sample. However, some of the buttery, brown, humic lumps of this kind were found to contain some whitish material inside which seemed to be rich in silica spicules, so it was perhaps all plant ash.

A moderate-sized residue of about 375 cm^3 of unwashed humic material and sand/grit in roughly equal proportions was eventually obtained. In it were some small (up to 5 mm) fragments of charcoal and others of cinder-like charred material; a few charred cereals in good condition were present (both oats and 'bread/club' wheat being noted). The finest fraction contained quite a lot of very decayed vertebrate hairs. A few small lumps of ?mor humus were found, via a squash, to be rich in heather pollen in matrix of humus, so imported peatland material is again likely here, consistent with the moderate amounts of uncharred heather shoot tips and traces of charred shoot fragments also recorded in the sample.

The very lightest material floating above the residue was decanted to check for insects. Amongst the debris were some very 'flimsy' uncharred plant fragments, perhaps mostly the 'interiors' of chenopod seeds, with some heather leaves. There were a few insects and quite a few vertebrate hairs. The insect remains were rather decayed (E3.0-4.5, with a distinct mode at 4.0). All showed a colour change towards orange (strength 3-4, mode 4), some having passed beyond orange to 'pale'. There were a

few fly puparia and perhaps 20 beetles, among which only *Neobisnius* sp. was represented by more than one individual. The subjective impression was of a small group from fairly to very foul matter.

Overall, the samples from this feature indicate some of the material which was probably burnt as fuel: heather and heathland/moorland turf and perhaps also some bracken and grass. The reason for constructing the kiln or oven is not, however, clear from the plant remains.

?*Undated*

Fill of shallow oval cut AK/AL

*Context 96, Sample 96/T (2 kg)
This material was completely unconsolidated black crumbly charcoal, with traces of light brown ?burnt soil or ash; very rich in mica. There was a very large residue after sieving of about 1350 cm^3, of which about 800 cm^3 was sand and gravel (of rotted granite), some of the gravel clasts apparently burnt (or perhaps just picking up a black coloration from charcoal). The remainder consisted of charred ?heather twig/root including some quite large pieces (to 40 x 10 mm) and charred heather shoot fragments; the finer fractions yielded charred capsules and leaves of heather and there can be little doubt that the bulk of the material burnt was heather brushwood.

Site E58: Dunbar Hall

Summary: The four samples (three from 13^{th}-14^{th} C pit fills, one from a ?medieval ditch fill) contained only rather small amounts of charred material. Samples from pit fill Contexts 3 and 5 both gave a few remains consistent with the presence of debris from burnt turves whilst there were traces of charred oat grains in the other two, but no suite of remains consistent with a clear origin for the material.

13^{th}-14^{th} C (all pits fills)

*****Context 3, Sample 3/T (1.484 kg: moist, crumbly to soft ?slightly silty sand with charcoal)
There was very small flot, perhaps including material from burnt turves. The moderate-sized residue of about 150 cm^3 consisted of sand and grit and a little charcoal; there was black and reddish burnt ?soil, the black material perhaps burnt mor humus or peaty A horizon. The small washover of about 70 cm^3 was of charcoal.

*Context 5, Sample 5/T (1.274 kg: moist, mid-dark brown (locally yellowish), crumbly to soft slightly humic slightly silty sand with ?charcoal)
The tiny flot contained a few charred seeds, which might have originated in burnt turves or peat. The moderate- sized residue of about 125 cm^3 consisted of sand and charcoal, and included ?heather detritus and charred peat (the latter very black and brittle). The modest-sized washover of about 30 cm^3 contained charred root/rhizome material and charred and ?uncharred peat, and more heather, as well as a tentatively identified charred heath grass caryopsis, all pointing to an origin in heathland turves.

*Context 6, Sample 6/T (1.208 kg: moist, mid grey-brown, crumbly, slightly humic sandy silt with a little clay locally and traces of brick/tile)
The tiny flot contained a trace of fine charcoal and one very decayed chenopod seed; the very small washover consisted of a few cm^3 of charcoal. The large residue of about 400 cm^3 comprised daub/baked clay with plant impressions and some sand and gravel, with a few barley and oat grains (all well preserved).

?medieval, ditch fill in AF

*Context 99, Sample 99/T (2.056 kg: just moist, mid-dark grey-brown, crumbly humic, slightly silty sand)
There was a very small flot containing a trace of coal and charcoal; the large residue of about 400 cm^3 was of sand and grit. The tiny washover of 1-2 cm^3 consisted of charred material, all of it charcoal except for a trace of unidentifiable cereal grains.

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