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Insect and plant remains from excavations at 16-18 Netherkirkgate, Aberdeen (site code E35): Technical report

by

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Summary

Plant and insect macrofossils and parasite eggs from six samples of deposits with a high organic content of medieval date from excavations at 16-18 Netherkirkgate, Aberdeen, have been analysed. Preservation was generally quite good, although many insects were fragmentary.

The nature of the deposits appears to have been mixed refuse from occupation, with evidence for a heathland/moorland component in every sample. This is thought to represent debris from stabling of domestic animals, an interpretation supported by elements in the insect assemblages likely to have come from buildings and the presence of uncharred cereal remains without evidence for human faeces.

Keywords: Aberdeen; Netherkirkgate; medieval; plant remains; insect remains; parasite eggs

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Introduction

During 1992 excavations of a yard to the rear of 16-18 Netherkirkgate, Aberdeen, revealed areas of medieval organic material. A selection of six samples of sediment from some of the exposed layers and pits were submitted to the EAU for analysis of insect and plant remains and the eggs of nematodes parasitic in the guts of vertebrates.

The aims of the present study, developed on the basis of the assessment exercise (Hall *et al.* 1994) were:

1. To elucidate the nature of the deposits and to give information concerning the human activities that led to their formation;

2. To determine whether the cereal remains accompanying the parasite sample entered via human or animal faeces;

3. To provide information and records of biota of value in wider synthesis of our understanding of medieval urban environmental archaeology;

4. If possible, to identify a selection of the fly puparia, in order to obtain additional information about the nature of the material contributing to the deposits.

Methods

Practical methods

The samples submitted were initially examined for the assessment report (Hall *et al.* 1994); descriptions of the lithology were made using a standard *pro forma* and 1 kg 'test' subsamples were processed following methods outlined by Kenward *et al.* (1980; 1986). As a result of the assessment two first priority (P1) plant macrofossil assemblages, one P1 sample for parasite eggs and four P1 plus two P2 insect groups were recommended for further analysis.

Plant remains were examined by scanning the wet residues left after paraffin flotation for the extraction of arthropod remains. All components in the residues were scored on a four-point scale of abundance and the results are presented in Appendix 1.

The 'squashes' for *parasite eggs* followed the methods of Dainton (1992).

For the *insect* analysis, all six samples were re-examined using the 'scan' recording method outlined by Kenward (1992). This method represents a compromise between speed and full identification of all remains and is now the standard technique employed at York. Typically, fossils of adult beetles and bugs are identified as far as is possible in a short period of time, the more difficult taxa being recorded at a higher taxonomic level (genus or family) unless it is believed that they will provide important interpretative or entomological information. However, recording sometimes approaches 'detail' recording as defined by Kenward (*loc. cit.*). Recording was carried out on material sorted on to damp filter paper. Individual sclerites (or fragments of them) were usually counted. Counts are for 'minimum number of individuals' represented by the recorded remains, and the figures given may include both positive and provisional identifications.

Invertebrates other than adults of the beetles and bugs used in calculating 'main statistics' for the assemblages were usually recorded semi-quantitatively. This method employs a five-point scale (Kenward *et al.* 1986), abundance for each taxon being estimated as 1, 2, 3, 'several' or 'many'. The last two are converted to 6 and 15 for statistical purposes, a conversion discussed briefly by Kenward (1992).

The manuscript lists and notes made during recording were entered to the University of York VAX mainframe computer and processed using a Pascal system written by HK, producing 'main statistics' and species lists in rank and taxonomic order for each assemblages, together with files of main statistics, species records and notes for the whole site. These were interrogated using the DATATRIEVE system.

Interpretative methods

Plants: Taxa recorded from these samples were assigned to one or more groups (Appendix 3) following the scheme of Hall and Kenward (1990) in which 'abundance-indicator values' (AIVs) are calculated from these group indicator scores and the abundance values shown in Appendix 1. These statistics offer a means of identifying particular types of plants used at the site or components of vegetation at or around the point of deposition.

Insects: The interpretative approach used here is as employed for a variety of sites by Kenward and collaborators (see, for example, Kenward 1978, with continuing modifications discussed by Kenward 1982; 1988 and Hall and Kenward 1990, and elsewhere). Interpretation rests on certain 'main statistics' of whole assemblages of adult beetles and bugs, and of ecologically-related groups of species within them. These groups are given in Appendix 4. The main statistics used include: a measure of species-richness (or diversity), Fisher *et al.*'s (1943) alpha (α), for the whole assemblage and for components of it; proportions of ecological groups, especially 'outdoor' species (OB in the following text), aquatics (W), waterside/damp ground species (D), phytophages (plant feeders, P), species associated with dead wood (L), moorland/heathland taxa (M), and decomposers (species associated with decomposing matter of some kind; RT). The last category is subdivided into species associated primarily with rather dry habitats (RF), those found mostly in rather, to very, foul habitats (RF), and a residuum not easily assignable to one of these. The statistics describing assemblages are used comparatively, with modal values for material from a large number of occupation sites setting the 'standard'.

Results

Preservation of plant and invertebrate remains from these samples was generally quite good, though concentrations were often low. A constraint was placed on the identification of many insect fossils by their very fragmentary condition, and this is reflected in the large number of identifications which are tentative or only made to generic level. It is not clear whether this fragmentation was a result of ground conditions or events subsequent to excavation.

A complete list of the plant and invertebrate taxa recorded is given in Table 2.

Lists of plant taxa by sample are given in Appendix 1. The derived statistics,

Table 1. Some statistics of the combined assemblages of beetles and bugs. For explanation of abbreviations, see Appendix 4

Parameter	Value	Number of estimates
Number of assemblages	6	
Mean N	77.3	
Mean S	53.8	
Where alpha > 0 and SE alpha <alpha:		
Mean alpha	125	6
Mean alphaob	97.3	3
Mean alphart	29.0	3
Where alpha >0 and SE alpha< alpha/2:		
Mean alpha	87.2	4
Mean alphaob	37.0	1
Mean alphart	29.0	3
Total number of individuals:	464	
Site PNOB	30.2	
Site PNW	7.8	
Site PND	2.6	
Site PNP	6.7	
Site PNM	1.1	
Site PNL	3.9	
Site PNG	0.0 (>0)	
Site PNRT	48.7	
Site PNRD	11.9	
Site PNRF	6.7	

including AIVs, for each assemblage are shown in Appendix 2 in which, for each set of groups ('Use', 'Vegetation', etc.), the AIV values are presented in descending order. The numbers and percentage of taxa contributing to the AIVs are also shown.

Species lists for the adults of Coleoptera and those Hemiptera used in calculating statistics of the assemblages are listed in Appendix 4, together with summary statistics by assemblage. Statistics for the combined assemblages are given in Table 1.

The abbreviations for statistics used in the accounts of the insect assemblages are those used in the Appendix tables.

Table 2. List of plant and invertebrate taxa recorded from 16-18 Netherkirkgate. The plants are listed together with parts recorded. Nomenclature and taxonomic order for vascular plants follow Tutin et al. *(1964-90) and those for mosses follow Smith (1978). Conventions for invertebrates: 'sp(?).'—indicates probable additional taxon; 'sp(?). indet.'— indicates may be (or include) previously listed taxon or taxa. Order and nomenclature for Insecta follow Kloet and Hincks (1964-77). Taxa not included in the calculation of main statistics are indicated by enclosing their ecological code in parentheses.*

MOSSES
Sphagnum sp(p). [shoot fragment(s), leaf/leaves]
Polytrichum sp(p). [leaf/leaves/lf-base(s) and/or sht fgt(s)]
Dicranum sp(p). [leaf/leaves and/or shoot fragment(s)]
Thuidium tamariscinum (Hedw.) Br. Eur. [leaf/leaves and/or shoot fragment(s)]
Calliergon cuspidatum (Hedw.) Kindb. [leaf/leaves and/or shoot fragment(s)]
Pseudoscleropodium purum (Hedw.) Fleisch [leaf/leaves and/or shoot fragment(s)]
Hypnum cf. *cupressiforme* Hedw. [leaf/leaves and/or shoot fragment(s)]
Rhytidiadelphus sp(p). [leaf/leaves and/or shoot fragment(s)]
Pleurozium schreberi (Brid.) Mitt. [leaf/leaves and/or shoot fragment(s)]
Hylocomium splendens (Hedw.) Br. Eur. [leaf/leaves and/or shoot fragment(s)]

VASCULAR PLANTS
Pteridium aquilinum (L.) Kuhn [pinnule fragment(s)]
Myrica gale L. [leaf fragment(s)]
Betula sp(p). [fruit(s), female catkin scale(s)]
Corylus avellana L. [bud(s) and/or bud-scale(s), nut(s) and/or nutshell fragment(s)]
Urtica dioica L. [achene(s)]
U. urens L. [achene(s)]
Polygonum persicaria L. [fruit(s)]
P. lapathifolium L. [fruit(s)]
Bilderdykia convolvulus (L.) Dumort. [fruit fragment(s)]
Rumex acetosella agg. [fruit(s)]
Rumex sp(p). [fruit(s)]
Chenopodium album L. [seed(s)]
Atriplex sp(p). [seed(s)]
Stellaria media (L.) Vill. [seed(s)]
Cerastium sp(p). [seed(s)]
Spergula arvensis L. [seed(s)]
Lychnis flos-cuculi L. [seed(s)]
Agrostemma githago L. [seed fragment(s)]
Ranunculus Section *Ranunculus* [achene(s)]
Ranunculus flammula L. [achene(s)]
cf. *Brassica* sp(p). [pod fragment(s)]
Brassica rapa L. [seed(s)]
Brassica sp./*Sinapis arvensis* [seed(s)]
Brassica sp./*Raphanus raphanistrum* [pod segment(s) and/or fragment(s)]
Raphanus raphanistrum L. [pod segments and/or fragment(s)]
Filipendula ulmaria (L.) Maxim. [achene(s)]
Potentilla cf. *reptans* L. [achene(s)]
Aphanes microcarpa (Boiss. & Reuter) Rothm. [achene(s)]
Leguminosae [flower(s) and/or petal(s)]
Linum usitatissimum L. [capsule fragment(s)]
Viola sp(p). [seed(s)]
Erica cinerea L. [leaf/leaves]
Calluna vulgaris (L.) Hull [shoot fragment(s), bud(s), root and/or twig fragment(s), flower(s)]
Vaccinium sp(p). [seed(s)]
Myosotis sp(p). [nutlet(s)]
Ajuga reptans L. [nutlet(s)]
Galeopsis Subgenus *Galeopsis* [nutlet(s)]
Carduus/*Cirsium* sp(p). [achene(s)]
Lapsana communis L. [achene(s)]
Gramineae [waterlogged caryopsis/es]
Gramineae/Cerealia [waterlogged chaff]
cf. Gramineae/Cerealia [culm fragment(s)]
Cerealia indet. [waterlogged chaff]
Cerealia indet. [charred chaff fragment(s)]
Triticum/*Secale* [waterlogged caryopsis/es]
Triticum/*Secale* [waterlogged periderm fragments]
Secale cereale L. [charred caryopsis/es]
cf. *Hordeum* sp(p). [waterlogged caryopsis/es]
Avena sp(p). [waterlogged and charred caryopsis/es]
Eriophorum vaginatum L. [sclerenchyma spindles (from leaf sheaths), rhizome and/or stem fragment(s)]
Carex sp(p). [nutlet(s)]

ANNELIDA
Oligochaeta sp. (egg capsule)

CRUSTACEA: CLADOCERA
Daphnia sp. (ephippium)

DERMAPTERA
Dermaptera sp.

MALLOPHAGA
?Damalinia sp.

SIPHUNCULATA
?Pediculus humanus Linnaeus

HEMIPTERA
Lygaeidae sp. [oa-p]
Corixidae sp. [oa-w]
Heteroptera sp. [u]
Cicadella viridis (Linnaeus) [oa-p]
Conomelus anceps (Germar) [oa-p]
Auchenorhyncha spp. [oa-p]
Aphidoidea sp.
Coccoidea sp.
?Hemiptera sp. [u]

DIPTERA
Scatopse notata (Linnaeus) (puparium)
?Heleomyzidae sp. (puparium)
Sepsidae sp. (puparium)
Leptocera sp. (puparium)
?Limosininae sp. (puparium)
Sphaeroceridae spp. (puparium)
?Drosophilidae sp. (puparium)
Anthomyidae sp. (puparium)
Melophagus ovinus (Linnaeus)
Diptera sp. (adult)
Diptera sp. (larva)
Diptera sp. (pupa)

SIPHONAPTERA
Pulex irritans (Linnaeus)

HYMENOPTERA
Hymenoptera Parasitica sp.
Formicidae spp.
Apoidea sp.
?Hymenoptera sp.

COLEOPTERA
Nebria ?brevicollis (Fabricius) [oa]
Nebria sp. indet. [oa]
Loricera pilicornis (Fabricius) [oa]
?Trechus sp. [ob]
Bembidion (Philochthus) sp. [oa]
Bembidion sp. [oa]
Pterostichus ?diligens (Sturm) [oa-d]
Pterostichus spp. [ob]
Pterostichus sp. indet. [ob]
Harpalus sp. [oa]
Bradycellus ruficollis (Stephens) [oa-m]
?Bradycellus sp. [oa]
Carabidae spp. [ob]
Carabidae spp. indet. [ob]
Hydroporinae sp. [oa-w]
Agabus ?bipustulatus (Linnaeus) [oa-w]
Helophorus spp. [oa-w]
Coelostoma orbiculare (Fabricius) [oa-w]
Cercyon analis (Paykull) [rt]
Cercyon atricapillus (Marsham) [rf]
Cercyon haemorrhoidalis (Fabricius) [rf]
Cercyon terminatus (Marsham) [rf]
Cercyon unipunctatus (Linnaeus) [rf]
Cercyon sp. indet. [u]
Megasternum obscurum (Marsham) [rt]
Anacaena sp. [oa-w]
Chaetarthria seminulum (Herbst) [oa-w]
Hydrophilinae sp. [oa-w]
Hydrophilidae sp. [u]
?Acritus sp. [u]
Onthophilus striatus (Forster) [rt]
Ochthebius sp. [oa-w]
Hydraena sp. [oa-w]
Limnebius sp. [oa-w]
Ptenidium sp. [rt]
Acrotrichis sp. [rt]
Catops ?nigricans (Spence) [u]
Silphidae sp. [u]
Micropeplus fulvus Erichson [rt]
Micropeplus sp.indet. [rt]
Olophrum ?piceum (Gyllenhal) [oa]
Olophrum sp. indet. [oa]
Lesteva heeri Fauvel [oa-d]
Lesteva sp. [oa-d]
Eusphalerum ?minutum (Fabricius) [oa-d]
Dropephylla vilis (Erichson) [l]
Omalium ?rivulare (Paykull) [rt]
Omalium spp. [rt]
Xylodromus concinnus (Marsham) [rt]
Omaliinae spp. [u]
Carpelimus ?bilineatus Stephens [rt]
Carpelimus pusillus group [u]
Carpelimus sp. indet. [u]
Aploderus caelatus (Gravenhorst) [rt]
Platystethus arenarius (Fourcroy) [rf]
Anotylus complanatus (Erichson) [rt]
Anotylus nitidulus (Gravenhorst) [rt-d]
Anotylus rugosus (Fabricius) [rt]
Stenus spp. [u]
Euaesthetus sp. [oa]
Lathrobium sp. [u]
Rugilus orbiculatus (Paykull) [rt]
Gyrohypnus angustatus Stephens [rt]
Gyrohypnus fracticornis (Müller) [rt]
Gyrohypnus sp. indet. [rt]
Xantholinus linearis or *longiventris* [rt]
Xantholinus sp. indet. [u]

?Neobisnius sp. [u]
Philonthus spp. [u]
Quedius spp. [u]
Staphylininae spp. indet. [u]
Tachyporus sp. [u]
Tachinus sp. [u]
?Crataraea suturalis (Mannerheim) [rt]
Aleocharinae spp. [u]
Pselaphus heisei (Herbst) [u]
Pselaphidae spp. [u]
Geotrupes sp. [oa-rf]
Aphodius spp. [ob-rf]
Serica brunnea (Linnaeus) [oa-p]
?Melolonthinae/Rutelinae/Cetoninae sp. [oa-p]
?Clambus sp. [rt]
?Cyphon sp. [oa-d]
Dryops sp. [oa-d]
Actenicerus sjaelandicus (Müller) (larva)
Ctenicera cuprea (Fabricius) [oa-p]
Actenicerus sjaelandicus or *Ctenicera* sp. [oa-p]
Denticollis linearis (Linnaeus) [u]
Elateridae spp. [ob]
Cantharidae sp. [ob]
Grynobius planus (Fabricius) [l]
Anobium punctatum (Degeer) [l]
Anobiidae sp. [l]
Tipnus unicolor (Piller & Mitterpacher) [rd]
Ptinus fur (Linnaeus) [rd]
Ptinus sp. indet. [rd]
Brachypterus sp. [oa-p]
Meligethes sp. [oa-p]
Monotoma sp. [rt]
Cryptophagus acutangulus (Gyllenhal) [rd]
Cryptophagus scutellatus Newman [rd]
Cryptophagus spp. [rd]
Atomaria ?nigripennis (Kugelann) [rd]
Atomaria spp. [rd]
?Sericoderus lateralis (Gyllenhal) [rt]
Orthoperus sp. [rt]
Lathridius minutus group [rd]
Enicmus sp. [rt]
Corticaria spp. [rt]
Aglenus brunneus (Gyllenhal) [rt]
Salpingidae sp. [l]
Bruchidae sp. [u]
Donaciinae sp. [oa-w-p]
Chrysomelinae sp. [oa-p]
Barynotus sp. [oa-p]
Sitona sp. [oa-p]
Sitophilus granarius (Linnaeus) [g]
Micrelus ericae (Gyllenhal) [oa-p-m]
Cidnorhinus quadrimaculatus (Linnaeus) [oa-p]
Ceutorhynchus ?contractus (Marsham) [oa-p]
Curculionidae sp. [oa]
Scolytidae sp. [l]
Curculionidae or Scolytidae sp. [u]
Coleoptera spp. [u]
Coleoptera sp. (larva)

ARACHNIDA
Acarina sp.
Aranae sp.

Sample by sample description and interpretation of biota

The samples are considered in context number order within each phase. Archaeological descriptions/interpretations of the deposits are given in brackets.

Phase 2. Cobbles and associated layers

Context 27 [‘organic general layer’]

Sample 6
Moist, brownish-black, brittle and slightly fibrous (working crumbly), slightly sandy amorphous organic sediment with fine and coarse woody and herbaceous detritus and twigs.

Plants: The small assemblage clearly consisted in part of peat, for there were fragments of this and leaves and shoots of *Sphagnum* moss each at an abundance score of 2. Most of the other taxa could have arrived from heathland/moorland habitats, either in or with the peat, though the wild radish (*Raphanus raphanistrum*)—a weed of cultivated land—certainly did not.

Parasite eggs: A single *Trichuris* egg was recorded.

Insects: The assemblage of adult beetles and bugs was of moderate size (N = 113; S = 78), and of very high diversity (alpha = 111, SE = 21). Mites and beetle larvae were rather abundant and there were modest numbers of fly puparia, including a few Sphaeroceridae and ?Anthomyidae. ‘Outdoor’ forms of beetles and bugs accounted for 43% of the individuals and two-fifths of the species. Aquatics were rather abundant (% N W = 26), suggesting aquatic deposition, unless this component was introduced with moss or other material. Much of the fauna may have originated in nearby semi-natural habitats, or have been imported in some way; the presence of three *Chaetarthria seminulum* and some of the other recorded taxa rather suggests moss from wet places. There were four larvae of the click beetle *Actenicerus sjaelandicus*, which may have developed *in situ* or have been imported in peaty soil. There were rather few plant feeders, and decomposers (species associated with decaying matter) were rare (relative to their proportions in a large number of assemblages from occupation sites): % N RT = 32. Diversity of the decomposers was rather high (alpha RT = 32, although SE = 11). This component appears not to have originated more than in part *in situ*, and was probably mostly of ‘background’ origin; the fact that the only species in the assemblage associated with rotting matter that was at all abundant was *Anotylus complanatus* tends to support this, as it is highly migratory and thus likely to be abundant in the background fauna (as well as being a rapid invader of newly created habitats!).
Small numbers of species associated with habitats created by human activity were present, but there was no strong ‘house fauna’ component. (‘House fauna’ is a group identified on the basis of archaeological records as apparently typical of primitive buildings housing people, stock, or stored organic material such as hay or straw. It is not suggested that they formed a single community; species living in timber, wattle, thatch, floors and stored products may be present in any particular case. The species are not likely to be found together today as a rule, since the habitats harbouring them have largely disappeared. This component of archaeological insect assemblages is discussed by Hall and Kenward (1990), Kenward and Hall (forthcoming) and, obliquely, by Kenward and Allison (in press).)

Synthesis: The deposit clearly included both peat and imported moss. The fauna may have been brought in large part with these material, but there may have been a local fauna of natural or semi-natural habitats, and there was a modest component of synanthropic insects.Whether this last group indicates that the moss and peat had been used elsewhere (e.g. as floor litter) is uncertain.

Context 37 [‘brown organic general layer’]

Sample 5
Moist, black, brittle (working crumbly), sandy amorphous organic sediment with fine and coarse woody and herbaceous detritus. Stones of the size range 2-6 mm and 20-60 mm were present, as were twigs and mammal bone.

Plants: The rather small assemblage again gave evidence for *Sphagnum* moss, though no peat was observed; the presence of *Calluna* and *Erica* certainly points to the exploitation of heathland/moorland vegetation or perhaps turves from such habitats. Wood fragments were quite abundant, however, together with bark and twigs.

Unidentified uncharred cereal chaff may indicate the presence of threshing debris or waste from animal feed, but the rather mixed assemblage gives no strong indications of how the deposit formed other than as a mixture of materials from occupation debris.

Parasite eggs: A single *Trichuris* egg was recorded.

Insects: The assemblage of adult beetles and bugs was quite substantial (137 individuals of 78 taxa) and there were numerous beetle larvae and mites and a few scale insects. Fly puparia were very abundant, predominantly ?Heleomyzidae and Sphaeroceridae, the latter including abundant *Leptocera*; these are most likely to occur together rather foul decomposing matter. Although one beetle species, *Anotylus complanatus*, was very abundant, the value of Fisher *et al.*'s alpha was quite high (alpha = 75, SE = 11). The outdoor component was modest (% N OB = 17), and aquatics too were no more numerous than is likely to be the case in background fauna.
Decomposers were plentiful (% N RT = 65). These included taxa associated with both relatively dry (% N RD = 17) and relatively foul (% N RF = 8) matter in quantities somewhat larger than might be expected unless suitable habitats for these species existed in or around the deposit as it formed. It appears likely that some of these decomposers lived *in situ*, especially *A. complanatus* (25 individuals). Alternatively, or additionally, a range of decomposers may have been imported in organic refuse of some kind, for there was a distinct 'house fauna' component including *Ptinus fur* (5), *Xylodromus concinnus* and *Tipnus unicolo*r (4 each), *Cryptophagus acutangulus* (3), *C. scutellatus* (2) and *?Crataraea suturalis* (1). These must have come from a building of some kind. Conceivably this deposit included stable manure (the grain weevil *Sitophilus granarius* having come from feed grain), but the insect evidence is weak on this point.

The three *Micrelus ericae* indicate nearby *Erica* or *Calluna*, or importation of cut vegetation or soil/turf. Another component of note was a single leg fragment which appeared to be from the sheep ked *Melophagus ovinus*. This species has been recorded from a number of other archaeological sites, notably Anglo-Scandinavian 16-22 Coppergate (Kenward and Hall in press) and later medieval Stóraborg, Iceland (Buckland and Perry 1989). The ked remains are interpreted as originating from the cleaning of wool; for a discussion of the biology and significance of *M. ovinus*, see Kenward and Hall (in press).

Synthesis: This deposit seems to represent an accumulation resulting from waste disposal, and probably incorporated litter (including heathland/moorland materials) from within a building, perhaps a stable.

Phase 3. Post holes, stake holes and pits

Context 410 ['black organic layer ?in pit']

Sample 2
Moist, black, brittle (working crumbly), slightly sandy 'peat' with 2-6 mm stones and twigs present.
Plants: The moderate numbers of corncockle (*Agrostemma githago*) seed fragments with uncharred cereal chaff and perhaps grass or straw fragments suggests the presence of material from animal stabling. The largest group represented was weeds of waste ground, and nipplewort, *Lapsana communis*, a species typical of cultivated soils, was moderately common. Again, wood fragments formed a large part of the residue.

Parasite eggs: None were recorded.

Insects: A rather small group of beetles and bugs was recorded (N = 41, S = 33), together with many mites, beetle larvae and fly puparia, the last principally Sphaeroceridae. Statistics of such a small group must be used carefully, but the fairly low proportion of decomposers (% N RT = 46) and large proportion of outdoor forms suggest deposition in the open. A quite large part of the RT component was contributed by taxa coded 'rd', and some forms regarded as typical components of 'house fauna' were present: three *Atomaria ?nigripennis*, two each of *Xylodromus concinnus* and *Anobium punctatum* (woodworm beetle), and single individuals of four other taxa. These may have been strays from nearby habitats, or have been brought in dumped material from indoors.

Synthesis: Again, the presence of litter, perhaps from stabling, is suggested. The weeds may be in part cornfield taxa from straw or feed, but probably also include taxa growing locally.

Context 430 [organic layer in pit KM]

Sample 14
Moist, black, brittle (working crumbly), slightly sandy, silty, amorphous organic sediment with fine and coarse woody and herbaceous detritus. Wood and rotted mussel shell were present.

Plants: With the exception of moderate amounts of wheat/rye 'bran' and large quantities of wood fragments, all the plant taxa recorded were present in very small amounts; they included a wide range of plants representing primarily heathland/moorland vegetation and weed communities. Flax capsule fragments indicate the use of this plant, for fibre and/or oil or food.

Parasite eggs: The parasite 'squash' yielded a single *Trichuris* egg and many fungal hyphae, diatoms and organic detritus.

Insects: The assemblage of beetles was small (N = 31, S = 28). Also present were abundant mites and single tentatively identified individuals of the human louse *Pediculus humanus* and the animal louse *Damalinia* sp. There were large numbers of fly puparia, principally Heleomyzidae, a family associated with various kinds of decaying matter. Over two fifths of the beetle and bug individuals were 'outdoor' forms, aquatics were relatively abundant (five individuals), and decomposers were (again, relatively) rather poorly represented (less than half of the individuals. This may have been entirely background fauna, but it is possible, especially in view of the presence of the lice, that a mixture of this together with remains brought in litter was present.

Synthesis: The biological evidence overall suggests that this was a rather mixed deposit of occupation debris, including food waste, with no component predominating.

Context 442 [organic layer in pit KQ]

Sample 13
Moist, very dark brown, crumbly and just brittle, sandy, silty, amorphous organic sediment. The sediment also included local patches of up to 50% coarse sand with some silt and other patches which were more humic. Stones were present in the 2-20 mm size range. Fragments of mussel shell were also present.

Plants: Wood fragments were again common in this sample, along with moderate numbers of *Sphagnum* leaves and of cotton-grass (*Eriophorum vaginatum*) 'sclerenchyma spindles' (small woody structures within the leaf sheaths; rhizome-stem fragments of this plant were also present). These surely represent the importation of peat, and indeed, some possible fragments of peat were recognised during sorting. The rest of the small assemblage had no particular character

Parasite eggs: None were recorded.

Insects: Forty-three individuals of 39 beetle and bug taxa were recorded together with numerous mites and fly puparia (a few Sphaeroceridae and some ?Heleomyzidae). Little can be said on the basis of the main statistics other than that the deposit seems to have formed in the open (or incorporated material with such an origin). Decomposers were present (*Cercyon analis* and *Anotylus complanatus*, both with three individuals, were the most numerous species), but were as likely to have been background fauna as colonisers.

Synthesis: This deposit appears to have formed through the accumulation of mixed organic waste, including peat. The use to which the peat and other plant material had been put before disposal is not certain but it may be conjectured that, as appears to have been the case for some of the other deposits examined here, it had functioned as litter in stables, although an origin in roofing material (see below) must is also be considered.

Phase 4. Widespread organic layers

Context 108 [organic loam layer]

Sample 3
Moist, black, brittle to slightly layered, working crumbly, sandy, amorphous organic sediment with some fine and coarse woody and herbaceous detritus and twigs present.

Plants: Wood fragments and uncharred cereal chaff formed a large component of this sample, along with flowers and shoots of heather and a wide range of other taxa representing heathland/moorland habitats, woodland/scrub (perhaps from brushwood?), waste ground and cultivated land

Parasite eggs: None were recorded.

Insects: A modest group of beetles and bugs was present: 99 individuals of 66 taxa. Also present were abundant mites, beetle larvae and fly puparia (mostly Sphaeroceridae, but including several other taxa: *Scatopse notata* was identified to species) and 'several' scale insects, these last probably brought with wattle or twigs. There were plenty of outdoor forms amongst the beetles and bugs, but these were not predominant (% N OB = 26). Two species, *Brachypterus* sp. (two individuals) and *Cidnorhinus quadrimaculatus* (1) suggest the presence of nettles. There were hints of house fauna from *Tipnus unicolor* (3) and *Xylodromus concinnus* and *Ptinus ?fur* (both 2), and some of the species present as single individuals might have originated with these in dumped waste from indoors. A background origin, or a mixture of this with trample and random dumping, could account for the entire assemblage, however, assuming there were buildings nearby.

Synthesis: It seems likely that this deposit also included a large component derived from a floor—either a stable, or perhaps the floor of a human dwelling since a single human flea, *Pulex irritans*, was recorded, although as suggested above, roofing material may also have been present.

Discussion

The first two aims listed above have been satisfactorily achieved. All the deposits examined in these analyses gave at least a small amount of evidence for the incorporation of peat and/or heathland/moorland vegetation. It appears that this component did not simply reflect the local vegetation and soil; it seems certain to have been imported for some purpose. The most likely use is for litter for stabling animals, given the presence of cereal chaff and small numbers of a suite of insects likely to have originated in buildings with plant debris on their floors. The pit fill material and 'general layers' seem to be of very similar nature and foul matter seems to have been rather widely dispersed at this site.

The word stabling is used here without prejudice, following the former meaning of *stable* (*OED* 1973): 'a building in which domestic animals, as cattle, goats, etc., are kept'), rather than the narrower, more modern use applied to places where horses are kept.

That these deposits do not appear to have contained more than traces of human faeces is evident from the combination of the extreme rarity of human foodplant remains, the very small numbers of parasite eggs, and (in the case of the pit fills) the absence of a distinctive fauna of non-porous foul matter.

One other possible source for the peat and peatland taxa is in material using in roofing at or near the site. Cut turves, cut heather and *Sphagnum* peat have all been observed by various of the authors within old roofs in Northern Britain and they seem very likely to have been both available to and used by the inhabitants of medieval Aberdeen.

Although only a small number of samples has been examined and the evidence from each of them was rather limited, the observations from this site in Netherkirkgate have considerable value at the level of wider synthesis. The similarity of biota to those of many sites of Roman and medieval date throughout the British Isles is striking, despite the geographical and geological differences. It is significant to have records of a substantial number of the typical synanthropic insects of occupation sites from Aberdeen and, for these species in particular, the predominance of human over natural factors in determining ecological conditions is emphasised.

The fourth aim stated overtly above, to investigate fly puparia, has only been met in part because of financial constraints to the study of biological remains. However, many of the puparia have been identified to family or subfamily, and a few more closely, so that their broad ecological implications are apparent.

Archive

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

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