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**Technical report: Plant and invertebrate remains from
Gallowgate Middle School, Aberdeen (site code E34)**

by

Harry Kenward, Allan Hall, Michael Issitt, Frances Large and Colin Nicholson

Summary

Plant remains, parasite eggs and other invertebrates (mainly insects) have been examined from four samples of the fills of two pits of 12/13th century date from excavations at Gallowgate Middle School, Aberdeen. They suggest that the fills of one pit may have included quantities of litter, perhaps from a stable or stock pen. The fill of the other pit may have included remains of turves. There was no good evidence for human dwellings, food or faeces.

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Introduction

This report considers plant and invertebrate remains from four samples from two 12th/13th century features at the Middle School site, Gallowgate, Aberdeen. Three of the samples were from the organic fill of pit CT, the fourth from the organic fill of pit EU. These were described by Alison Cameron (*in litt.*) as 'the only really organic medieval features' on the site. An assessment of their potential for bioarchaeological analysis was reported by Hall *et al.* (1994), applying a priority scale from P0 (no remains) through P3 (some remains but of very limited bio-archaeological value) and P2 (worth recording if funds allow) to P1 (of substantial value). It was recommended that each of the four samples should be subjected to more detailed examination for plant remains, insects or parasite eggs, having been assigned P1 or P2 for at least one of these groups

Methods

The samples submitted were examined in the laboratory and the lithology described using a standard *pro forma*. For each sample, 1 kg 'test' subsamples were processed for assessment following methods outlined by Kenward *et al.* (1980; 1986) and 'squashes' for parasite eggs made following methods of Dainton (1992). The assessed material was used for this main phase of study.

Plant remains (and other components of both 'flots' and residues), were recorded on a four-point scale of abundance from 1 (rare, one or a few fragments or individuals only) to 4 (abundant). Note that only a proportion of each sieved fraction of the residues for these

subsamples has been examined, so that it is probable that some rare taxa will have been missed.

Insects from the one 'first priority' sample were recorded using 'scan recording' as described by Kenward (1992); the remaining assemblages were 'assessment recorded'.

Interpretative methods for all groups followed those exemplified by Hall and Kenward (1990).

Results

Table 1 presents a complete list of taxa from the samples; species lists for the individual samples and various statistics for these assemblages are presented in Tables 2-4. The following section describes the material, context by context.

Site: South of pool. Phase 2. Main period of medieval activity; large square pit CT (late C12th/early C13th; filled with leather boots, shoes and belts, pottery and a boat paddle and other wooden artefacts)

Context 107, sample 14 [bottom fill of pit CT]

Sediment description: Very dark brown, plastic, layered, slightly sandy amorphous organic sediment with coarse woody and herbaceous detritus, including bark and twig fragments.

Plant macrofossils: Assessment priority was P1. The moderately large residue for the subsample examined consisted of about 20% by volume of sand and grit; the >4 mm fraction consisted mostly of twig fragments and wood up to 40 mm

maximum dimension with a few wood 'chips'. Some of the twigs bore distinctive lenticels which were very similar to those on modern reference material of bog myrtle, *Myrica gale*. Leaf fragments certainly of this plant were recorded in moderate numbers in the finer fractions but no fruits were recorded. There were also moderate numbers of other dicotyledonous leaf fragments, probably from trees or shrubs. Although these may, of course, simply have originated in trees in the vicinity, they may also be part of the litter component suggested by many of the other plant remains.

Cereal chaff preserved by anoxic waterlogging was abundant in the >2 mm fraction and there was 'bran' of wheat/rye, barley and oats in the finest fraction perhaps suggesting the presence of animal feed. The traces of seeds and capsule fragments of linseed/flax (*Linum usitatissimum*) in this sample may also have been part of this.

There were traces of cereal/grass culm nodes, bracken (*Pteridium aquilinum*) frond fragments, leaves of *Sphagnum*, a few large hypnoid moss taxa and some leafy shoot fragments of heather which might together indicate litter from livestock or human habitation. Seeds of the weed taxa fat-hen (*Chenopodium album*) and chickweed (*Stellaria media*) were, apart from small grass caryopses, the only other taxa recorded in more than trace amounts; in general the content of 'seeds' was rather limited but preservation was quite good.

Parasite eggs: An initial squash gave a single *Trichuris* egg. Five further squashes were made for subsamples from different parts of the sample. All gave testate amoebae and fungal spores, but there were no further parasite eggs. One was found to contain live nematodes and a rotifer. A single diatom was observed in another subsample.

Insects: The remains were assessment-recorded and assigned priority P2. There were numerous fly puparia and pupae, and a small group of beetles dominated by

species associated with decaying matter. This was probably foul, and the assemblage may represent the early stages of colonisation of foul matter either in the pit or in the situation from which it was removed to be dumped. Bearing in mind the evidence from plant macrofossils, this material may have been stable cleanings. Unfortunately there were too few remains to confirm this interpretation. No species *strongly* associated with habitats created by human activity were noted.

Context 104, sample 26 [middle organic fill of pit CT]

Sediment description: Dark brown, plastic, slightly sandy amorphous organic sediment with traces of plant detritus.

Plant macrofossils: Assessment priority was P1. The modest-sized residue was about 60% by volume of sand, grit and gravel; the >4 mm fraction included a few wood, bark and twig fragments with traces of leather. 'Seeds' were abundant and well preserved. The >2 mm fraction included abundant small fragments of leather, evidently trimmings, together with many fly puparia, presumably associated with this concentration of rotting organic matter. Fragments of dicotyledonous leaves, probably from trees or shrubs, were also well represented. There were moderate amounts of animal hair in this fraction (perhaps associated with the working of leather), along with fairly frequent *Sphagnum* leaves and shoot fragments (including some identified as *S. papillosum*, a species of acid moorland and bogs. Other taxa included bracken, bog myrtle (a fruit), several other moss taxa (mostly typical of grassland, heathland or moorland) and a few weeds of waste ground and cultivated soils. There were some further peatland indicators, notably cross-leaved heath (*Erica tetralix*) and cotton-grass (*Eriophorum vaginatum*).

Parasite eggs: No parasite eggs were observed in the single squash examined.

Insects: Assessment recorded, and assigned P2. Fly puparia were quite

numerous, probably representing an association of species associated with foul decomposing matter. Beetles were rather rare, and the assemblage mixed, so that interpretation was not possible, although some elements seem most likely to have originated in artificial accumulations of decaying plant debris. There were no insects which might be thought of as likely to be associated with leather production or the decay of leather waste.

Context 84, sample 18 [top fill layer of pit CT]

Sediment description: Dark brown, plastic, slightly sandy, slightly silty amorphous organic sediment with some fine and coarse woody and herbaceous detritus.

Plant macrofossils: Assessed as priority P2. There was a rather small residue, about 60% of it by volume being sand and grit. The >4 mm fraction consisted of stones, leather fragments, wood, bark and twig fragments and fish bone. Identifiable plant remains in the residue included several mosses indicative of grassland and wetland habitats, a small range of weeds of waste ground and cultivated soils and some representing peatland (a bog myrtle fruit, cotton-grass 'sclerenchyma spindles', and *Sphagnum* leaves and shoot fragments). However, the only taxa present in more than small amounts were corncockle (*Agrostemma githago*, as seed fragments), corn spurrey (*Spergula arvensis*, seeds), orache (*Atriplex* spp., seeds) and *Sphagnum* (leaves). Traces of cereal/grass culm nodes, bracken (*Pteridium aquilinum*) frond fragments and heather (*Calluna*) shoot fragments and flowers may indicate the presence of litter, but the overall impression gained is of occupation material with a mixture of plant remains of no particular character. The poor quality of preservation and smaller range of plant taxa no doubt reflects the position of this layer at the top of the fill.

Parasite eggs: No parasite eggs were observed in the single squash examined.

Insects: Designated P2 on assessment, the insect assemblage was of rather small size. Fly puparia were quite numerous, and apparently of species associated with decaying matter. Only about 20-30 adult beetles and bugs were present, and this group was clearly of mixed origins. Some (for example the tentatively identified planthopper *Conomelus anceps*) came from natural or semi-natural habitats, while others (for example *Cryptophagus acutangulus* and the spider beetle *Tipnus unicolor*) seem likely to have originated in buildings. All may have been imported or have arrived naturally and they add little to the interpretation of the deposit, although clearly there was no opportunity for large population of decomposer beetles associated with rotting matter to develop *in situ*.

Site: North of pool. Phase 2. Main period of medieval activity (C12th/13th); large rectangular pit EU

Context 233, sample 1233 [organic fill of rectangular pit EU; sample number assigned by EAU]

Sediment description: Very dark brown, crumbly, slightly fibrous, slightly sandy amorphous organic sediment with some fine and coarse herbaceous detritus and a few stones 2-6 mm.

Plant macrofossils: Priority P1 on assessment. About 30% by volume of the moderately large residue was sand and grit. Almost all the >4 mm fraction consisted of undisaggregated sediment—a humic silt containing some herbaceous detritus. Much of the >2 mm fraction, likewise, was pellets of sediment which had not broken up on processing, but there moderate numbers of culm bases or rhizome fragments of unidentified grass, a few fragments of moss (mostly very decayed) and several achenes of ?tormentil (*Potentilla* cf. *erecta*), together with some *Sphagnum* shoot fragments and a very few other taxa of limited interpretative value. There were also a few lumps of ?peat in the >1 mm fraction. The presence of the

?tormentil achenes and moderate numbers of earthworm egg capsules with the grass remains perhaps points to the presence of soil in the form of turf forming a large proportion of the residue. The ?peat might represent the mor humus horizon from such a turf/soil.

Parasite eggs: No parasite eggs were observed in the single squash examined.

Insects: Assigned P1 on assessment since it was distinctive but had unclear implications, the insect assemblage from this subsample was scan recorded. Insects and other arthropods were rather abundant: there were 'many' beetle larvae and mites, 'several' earthworm egg capsules and spiders, small numbers of various other remains, and 65 individuals of 40 beetle and bug taxa, an assemblage considered to be only just of a size adequate for an attempt at interpretation. A quarter of the species were 'outdoor' forms, as were over a fifth of the individuals: these are quite substantial proportions. However, diversity (measured by *alpha* of Fisher *et al.* 1943) was rather low for an assemblage formed primarily in the open. This was accounted for by the presence of a small group of species associated with decaying matter of various kinds ('decomposers') in the upper ranks of abundance, accounting for well over half of the individuals.

This decomposer component was of low diversity and, although the numbers were small, included a moderately large proportion of foul-matter species (group RF). The more abundant taxa could be divided into two main groups. These were: (a) species typically associated with very foul matter, usually dung (four *Aphodius ?prodromus* and two *A. ?contaminatus*); and (b) a group of rather generalised decomposers, mostly common in archaeological occupation deposits but lacking strong synanthropes (species with a very strong association with artificial habitats). The rare species repeated this pattern, but with the addition of 'outdoor' species associated with water, water margins and herbaceous vegetation.

It has been suggested elsewhere that, where strong synanthropes are not present locally and hence not available for colonisation, their place may be taken in the detritus of human occupation by species common in natural habitats (Kenward *et al.* 1993; Kenward and Allison forthcoming). In the present case, *Micropeplus fulvus* (the most abundant species, nine individuals), Pselaphidae sp. (4), and *Xantholinus gallicus* or *linearis* (probably the latter, three individuals) are all taxa suspected (by HK) of acting in this way. However, these taxa are all found in litter under natural vegetation and could, if the hypothesis of introduction of turf suggested by the botanical evidence is correct, have been imported. Evidence (albeit weak) in support of this comes from the presence of an elaterid (click beetle) larva. Although this disintegrated during handling, it appeared likely to be one of a small number of species found in turf (and sometimes in peat or rotting wood). Adults of two click beetles were found, both likely to have been brought with turf but quite capable of arriving in several other ways. If there *was* turf from grazing land, most of the fauna may have come with it, although one taxon (*Lathridius minutus* group, three individuals) seems much more likely to have originated in the litter in or around buildings.

In summary, this group of insects appears to have been ultimately deposited in the open. The decomposers were essentially species associated with natural habitats but able to invade artificial ones successfully, so may have been brought with turf or have exploited plant debris *in situ* (or at the point of origin of the debris, if rubbish had been thrown into the pit). Both mechanisms may have operated in parallel, *L. minutus* group and some others probably invading on the site.

It is quite likely that a substantially better understanding of this deposit would be obtained from a very detailed examination of a larger subsample (perhaps 3 kg). Pollen analysis of the ?peat fragments might also be illuminating.

Discussion

Examination of the biological remains has provided a substantial insight into the nature of the fills of these two pits. It is clear that they do not consist of food remains or human faeces, nor the product of any one specialised activity, although leather waste was conspicuous in at least the middle layer of pit CT.

The three contexts from pit CT were rather similar in overall nature, having a variety of possible litter materials like bracken, moss and straw, with wood fragments, including chips from wood-working. The insect assemblages are consistent with colonisation of litter in an open place. These insects *may* have invaded once the litter had been deposited in the pit, but if this was the case it seems unlikely that the material was exposed more than briefly.

The diversity of litter components might be seen as indicating a variety of different activities using resources of these kinds. However, it seems as, or more, likely that these materials were channelled through a single function, perhaps litter in stables or stock pens.

The picture is certainly not as clear in the present case as for some other sites. Roman deposits at 24-30 Tanner Row and 12 Rougier Street (Hall and Kenward 1990), Ribchester (Large *et al.* 1994) and some sites in Carlisle (e.g. Kenward *et al.* 1992a-c). At each of these sites there were greater or lesser numbers of deposits which undoubtedly included substantial quantities of stable manure, indicated by plant remains and insects of kinds which would be expected in hay, cereals and associated grain beetles, and a characteristic suite of beetles from fairly foul open-textured organic matter. Differences of social organisation and geographical location perhaps make it unlikely that such unequivocal evidence would be recovered from a site in Aberdeen.

The evidence from pit EU was very different, most of the plant remains

probably having originated in turf, and with insect remains which may mostly have had the same origin. Dung beetles perhaps indicate that the turf was cut in grazing land, but the evidence is by no means certain.

This putative turf might also have been used for animal litter as an absorbent medium, but may of course have arrived by other functional routes, such as via roofing material.

Archive

Flots, residues and any undisaggregated sediment from the samples supplied by Aberdeen City Museums and Art Gallery Services, and all paper and electronic archives pertaining to biological analyses of the samples discussed here are currently lodged at the EAU, York.

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Table 1. Complete list of taxa recorded from samples from excavations at Gallowgate Middle School, Aberdeen, together with part(s) recorded. Nomenclature and taxonomic of plants order follow Tutin et al. (1964-80) and Smith (1978); and for insects Kloet and Hincks (1964-77).

Mosses

Sphagnum sp(p). [leaf/leaves, capsule(s) and/or lid(s), shoot fragment(s)]
S. papillosum Lindb. [leaf/leaves and/or shoot fragment(s)]
Polytrichum sp(p). [leaf/leaves/lf-base(s) and/or sht fgt(s)]
Aulacomnium palustre (Hedw.) Schwaegr. [leaf/leaves and/or shoot fragment(s)]
Calliergon cuspidatum (Hedw.) Kindb. [leaf/leaves and/or shoot fragment(s)]
Hypnum cf. *cupressiforme* Hedw. [leaf/leaves and/or shoot fragment(s)]
Rhytidiadelphus cf. *triquetrus* (Hedw.) Warnst. [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. [fruit(s), leaf fragment(s), twig fragment(s)]
Betula sp(p). [fruit(s), female catkin scale(s)]
Corylus avellana L. [nut(s) and/or nutshell fragment(s), bud(s) and/or bud-scale(s)]
Urtica dioica L. [achene(s)]
U. urens L. [achene(s)]
Polygonum aviculare agg. [fruit(s)]
P. persicaria L. [fruit(s)]
P. lapathifolium L. [fruit(s)]
Bilderdykia convolvulus (L.) Dumort. [fruit(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)]
Stellaria sp(p). [seed(s)]
Spergula arvensis L. [seed(s)]
Lychnis flos-cuculi L. [seed(s)]
Agrostemma githago L. [seed fragment(s)]
Silene vulgaris (Moench) Garcke [seed(s)]
Ranunculus Section *Ranunculus* [achene(s)]
Descurainia sophia (L.) Webb ex Prantl [seed(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)]
Potentilla cf. *erecta* (L.) Räuschel [achene(s)]
P. cf. *reptans* L. [achene(s)]
Aphanes microcarpa (Boiss. & Reuter) Rothm. [achene(s)]
Leguminosae [charred cotyledon(s)]
Linum usitatissimum L. [capsule fragment(s), seed(s)]
Viola sp(p). [capsule segment(s), seed(s)]
Hydrocotyle vulgaris L. [mericarp(s)]
Erica tetralix L. [leaf/leaves, seed(s)]
E. cinerea L. [leaf/leaves, seed(s)]
Calluna vulgaris (L.) Hull [flower(s), seed(s), shoot fragment(s), root and/or twig fragment(s)]
Galeopsis Subgenus *Galeopsis* [nutlet(s)]
Rhinanthus sp(p). [seed(s)]
Lapsana communis L. [achene(s)]
Gramineae [waterlogged caryopsis/es]
Gramineae/Cerealialia [culm node(s), culm fragment(s)]
Cerealialia indet. [waterlogged chaff]
Triticum/Secale [waterlogged periderm ('bran') fragments]
Hordeum sp(p). [periderm fragment(s)]
Avena sp(p). [waterlogged periderm fragment(s)]
Lemna sp(p). [frond(s)]
Eriophorum vaginatum L. [sclerenchyma spindles (from leaf sheaths)]
Carex sp(p). [nutlet(s)]

Nematoda

Trichuris sp.

Annelida

Oligochaeta sp. (egg capsule)

Crustacea-Cladocera

Daphnia sp. (ephippia)

Hemiptera

Lygaeidae sp.

Lygaeidae sp. (nymph)

?*Conomelus anceps* (Germar)
Auchenorrhyncha sp.
Aphidoidea sp.

Diptera

Diptera sp.
Diptera sp. (puparium)

Hymenoptera

Chalcidoidea sp.
Hymenoptera Parasitica sp.
Formicidae sp.

Coleoptera

Bradycellus sp.
Carabidae sp.
Colymbetinae sp.
Helophorus sp.
Cercyon analis (Paykull)
Cercyon sp.
Megasternum obscurum (Marsham)
Acrotrichis sp.
Micropeplus fulvus Erichson
Lesteva longolytrata (Goeze)
Dropephylla sp.
Omalium spp.
Omaliinae sp.
Aploderus caelatus (Gravenhorst)
Platystethus arenarius (Fourcroy)
Anotylus complanatus (Erichson)
Gyrohypnus fracticornis (Müller)
Stenus sp.
Euaesthetus sp.

Xantholinus gallicus or *linearis*
Philonthus spp.
Quedius boops group
Staphylininae sp. indet.
Mycetoporus sp.
Aleochara sp.
Aleocharinae spp.
Pselaphidae sp.
Aphodius ?contaminatus (Herbst)
Aphodius ?prodromus (Brahm)
Aphodius sp.
Simplocaria ?semistriata (Fabricius)
Ctenicera cuprea (Fabricius)
Agriotes sp.
Elateridae sp. indet. (larva)
Tipnus unicolor (Piller & Mitterpacher)
Ptinus sp.
Meligethes sp.
Cryptophagus acutangulus (Gyllenhal)
Cryptophagus spp.
Atomaria sp.
Lathridius minutus group
Corticaria spp.
Donaciinae sp.
Longitarsus sp.
Curculionidae sp.
Scolytidae sp.
Coleoptera sp. (larva)

Arachnida

Acarina sp.
Aranae sp.

Table 2. Lists of plant taxa and some other components of the subsamples. Full names of plant taxa and the parts recorded appear in Table 1. All remains were recorded on a four-point scale of abundance.

Context 107	Sample 14/T	Context 104	Sample 26/T
Pteridium aquilinum (pinn fgts)	1	Pteridium aquilinum (pinn fgts)	1
Myrica gale (tw fgts)	1	Myrica gale	1
Myrica gale (lf fgts)	1	Betula sp(p).	1
Betula sp(p).	1	Urtica dioica	1
Corylus avellana	1	Polygonum persicaria	1
Corylus avellana (b/bs)	1	Polygonum lapathifolium	1
Urtica urens	1	Rumex sp(p).	1
Polygonum aviculare agg.	1	Atriplex sp(p).	2
Rumex acetosella agg.	1	Stellaria sp(p).	1
Chenopodium album	2	Stellaria media	1
Stellaria media	2	Spergula arvensis	1
Spergula arvensis	1	Lychnis flos-cuculi	1
Silene vulgaris	1	Agrostemma githago (sf)	1
Potentilla cf. erecta	1	Ranunculus Section Ranunculus	1
Linum usitatissimum	1	Descurainia sophia	1
Linum usitatissimum (caps fgts)	1	Brassica cf. rapa	1
Erica tetralix (lvs)	1	Brassica sp./	
Erica cinerea (lvs)	1	Raphanus raphanistrum (pod fgts)	1
Calluna vulgaris (s)	1	Viola sp(p).	1
Calluna vulgaris (fls)	1	Viola sp(p). (caps segs)	1
Calluna vulgaris (sht fgts)	1	Erica tetralix	1
Calluna vulgaris (rt-tw fgts)	1	Erica cinerea	1
Galeopsis Subgenus Galeopsis	1	Calluna vulgaris (fls)	1
Gramineae	2	Calluna vulgaris (rt-tw fgts)	1
Gramineae/Cerealialia (c/n)	1	Galeopsis Subgenus Galeopsis	1
Cerealialia indet. (w/l chaff)	3	Rhinanthus sp(p).	1
Triticum/Secale ('bran' fgts)	1	Lapsana communis	1
Hordeum sp(p). ('bran' fgts)	1	Lemna sp(p). (fronds)	1
Avena sp(p). ('bran' fgts)	1	Eriophorum vaginatum (scl sp)	1
Carex sp(p).	1	Carex sp(p).	1
Sphagnum sp(p). (lvs)	2	Sphagnum sp(p). (shts)	2
Polytrichum sp(p).	1	Sphagnum sp(p). (lvs)	3
Aulacomnium palustre	1	Sphagnum sp(p). (caps/lids)	1
Hypnum cf. cupressiforme	1	Sphagnum papillosum	1
Hylocomium splendens	2	Hypnum cf. cupressiforme	1
		Pleurozium schreberi	1
charcoal	1	Hylocomium splendens	1
dicot lf fgts	2		
earthworm egg caps	1	Cenococcum (sclerotia)	2
fly puparia	1	bark fgts	1
leather fgts	1	charcoal	1
twig fgts	2	dicot lf fgts	3
wood chips	1	fly puparia	3
wood fgts	1	hairs	2
		leather fgts	3
		twig fgts	1
		wood fgts	1

Context 84	Sample 18/T	Context 233	Sample 1233/T
Pteridium aquilinum (pinn fgts)	1	Rumex acetosella agg.	1
Myrica gale	1	Ranunculus Section Ranunculus	1
Betula sp(p). (fcs)	1	Potentilla cf. erecta	2
Corylus avellana	1	Hydrocotyle vulgaris	1
Urtica dioica	1	Gramineae	1
Polygonum persicaria	1	Gramineae/Cerealialia (culm fgts)	2
Polygonum lapathifolium	1	Sphagnum sp(p). (shts)	1
Bilderdykia convolvulus	1	Polytrichum sp(p).	1
Rumex acetosella agg.	1	Rhytidiadelphus cf. triquetrus	1
Chenopodium album	1	Hylocomium splendens	1
Atriplex sp(p).	2		
Stellaria media	1	?peat fgts	2
Spergula arvensis	2	earthworm egg caps	2
Agrostemma githago (sf)	2	fish bone	1
Brassica rapa	1	fly puparia	1
Brassica sp./Sinapis arvensis	1	moss	2
Raphanus raphanistrum (pod segs/fgts)	1	twig fgts	1
Potentilla cf. reptans	1	wood fgts	1
Aphanes microcarpa	1		
Leguminosae (ch cot)	1		
Erica cinerea	1		
Calluna vulgaris (s)	1		
Calluna vulgaris (fls)	1		
Calluna vulgaris (sht fgts)	1		
Galeopsis Subgenus Galeopsis	1		
Lapsana communis	1		
Gramineae/Cerealialia (c/n)	1		
Sphagnum sp(p). (shts)	1		
Sphagnum sp(p). (lvs)	2		
Sphagnum sp(p). (caps/lids)	1		
Aulacomnium palustre	1		
Calliergon cuspidatum	1		
Hypnum cf. cupressiforme	1		
Rhytidiadelphus cf. triquetrus	1		
Pleurozium schreberi	1		
Hylocomium splendens	1		
bark fgts	1		
charcoal	1		
dicot lf fgts	1		
fish bone	1		
fly puparia	1		
hair	1		
leather fgts	1		
stone	1		
twig fgts	1		
wood fgts	1		

Table 4. Main statistics and species list in rank order for adult Coleoptera and Hemiptera from sample 1233 from Middle School, Gallowgate, Aberdeen.

Context: 233 Sample: 1233/T - beetle/bug main statistics

Erosion = 3; Fragmentation = 3; Weight = 1.000kg

Number of individuals estimated as	N = 65
Number of taxa	S = 40
Index of diversity (alpha)	alpha = 45
Standard error of alpha	SE alpha = 10
Number of 'certain' outdoor taxa	SOA = 9
Percentage of 'certain' outdoor taxa	%SOA = 23
Number of 'certain' outdoor individuals	NOA = 10
Percentage of 'certain' outdoor individuals	%NOA = 15
Number of 'certain' and probable outdoor taxa	SOB = 10
Percentage of 'certain' and probable outdoor taxa	%SOB = 25
Number of 'certain' and probable outdoor individuals	NOB = 14
Percentage 'certain' and probable outdoor individuals	%NOB = 22
Diversity index for OB not calculated, NOB = SOB or NOB < 20	
Number of aquatic taxa	SW = 2
Percentage of aquatic taxa	%SW = 5
Number of aquatic individuals	NW = 2
Percentage of aquatic individuals	%NW = 3
Number of damp ground/waterside taxa	SD = 1
Percentage of damp ground/waterside taxa	%SD = 3
Number of damp ground/waterside individuals	ND = 1
Percentage of damp ground/waterside individuals	%ND = 2
Number of strongly plant-associated taxa	SP = 5
Percentage of strongly plant-associated taxa	%SP = 13
Number of strongly plant-associated individuals	NP = 5
Percentage of strongly plant-associated individuals	%NP = 8
Number of heathland/moorland taxa	SM = 0
Number of heathland/moorland individuals	NM = 0
Percentage of heathland/moorland individuals	%NM = 0
Number of wood-associated taxa	SL = 0
Number of wood-associated individuals	NL = 0
Percentage of wood-associated individuals	%NL = 0
Number of decomposer taxa	SRT = 16
Percentage of decomposer taxa	%SRT = 40
Number of decomposer individuals	NRT = 37
Percentage of decomposer individuals	%NRT = 57
Number of 'dry' decomposer taxa	SRD = 3
Percentage of 'dry' decomposer taxa	%SRD = 8
Number of 'dry' decomposer individuals	NRD = 5
Percentage of 'dry' decomposer individuals	%NRD = 8
Number of 'foul' decomposer taxa	SRF = 3
Percentage of 'foul' decomposer taxa	%SRF = 8
Number of 'foul' decomposer individuals	NRF = 7
Percentage of 'foul' decomposer individuals	%NRF = 11
Index of diversity of decomposer component	alpha RT = 11
Standard error	SE alpha RT = 3
Number of individuals of grain pests	NG = 0
Percentage of individuals of grain pests	%NG = 0

Number of individuals of grain pests
 Number of uncoded taxa
 Percentage of uncoded individuals

NG = 0
 SU = 16
 PNU = 31

Context: 233 Sample: 1233/T - species list in rank order

Taxon	Number	%	Rank	Ecodes
<i>Micropeplus fulvus</i> Erichson	9	14	1	rt
<i>Pselaphidae</i> sp.	4	6	2	u
<i>Aphodius ?prodromus</i> (Brahm)	4	6	2	ob rf
<i>Xantholinus gallicus</i> or <i>linearis</i>	3	5	4	rt
<i>Lathridius minutus</i> group	3	5	4	rd
<i>Corticaria</i> sp.	3	5	4	rt
<i>Cercyon analis</i> (Paykull)	2	3	7	rt
<i>Megasternum obscurum</i> (Marsham)	2	3	7	rt
<i>Anotylus complanatus</i> (Erichson)	2	3	7	rt
<i>Aleocharinae</i> sp. D	2	3	7	u
<i>Aphodius ?contaminatus</i> (Herbst)	2	3	7	oa rf
<i>Auchenorhyncha</i> sp.	1	2	12	oa p
<i>Colymbetinae</i> sp.	1	2	12	oa w
<i>Cercyon</i> sp.	1	2	12	u
<i>Acrotrichis</i> sp.	1	2	12	rt
<i>Lesteva longoelytrata</i> (Goeze)	1	2	12	oa d
<i>Omalium</i> sp. A	1	2	12	rt
<i>Omalium</i> sp. B	1	2	12	rt
<i>Aploderus caelatus</i> (Gravenhorst)	1	2	12	rt
<i>Platystethus arenarius</i> (Fourcroy)	1	2	12	rf
<i>Philonthus</i> sp. A	1	2	12	u
<i>Philonthus</i> sp. B	1	2	12	u
<i>Quedius boops</i> group	1	2	12	u
<i>Staphylininae</i> sp.	1	2	12	u
<i>Mycetoporus</i> sp.	1	2	12	u
<i>Aleochara</i> sp.	1	2	12	u
<i>Aleocharinae</i> sp. A	1	2	12	u
<i>Aleocharinae</i> sp. B	1	2	12	u
<i>Aleocharinae</i> sp. C	1	2	12	u
<i>Aleocharinae</i> sp. E	1	2	12	u
<i>Aleocharinae</i> sp. F	1	2	12	u
<i>Aleocharinae</i> sp. G	1	2	12	u
<i>Aleocharinae</i> sp. H	1	2	12	u
<i>Ctenicera cuprea</i> (Fabricius)	1	2	12	oa p
<i>Agriotes</i> sp.	1	2	12	oa p
<i>Cryptophagus</i> sp. A	1	2	12	rd
<i>Cryptophagus</i> sp. B	1	2	12	rd
<i>Donaciinae</i> sp.	1	2	12	oa w p
<i>Longitarsus</i> sp.	1	2	12	oa p
<i>Curculionidae</i> sp.	1	2	12	oa