Appendix 6 – Insect remains

Eileen Reilly

Botany Department, Trinity College Dublin, College Green, Dublin 2

APPENDIX 6: CONTENTS

LIST OF ILLUSTRATIONS

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1 INTRODUCTION

Six samples were selected for insect analysis. Insect analysis is just one strand of a multidisciplinary approach being taken to understand the local environment of the area, which also includes pollen, bone, mollusca, wood and plant-macrofossil analyses.

Samples for insect analysis were selected from the pre-ditch ground surface, possible old stream channel and fills from two phases of the medieval ditch (see Section 3 below for full description).

2 METHODOLOGY

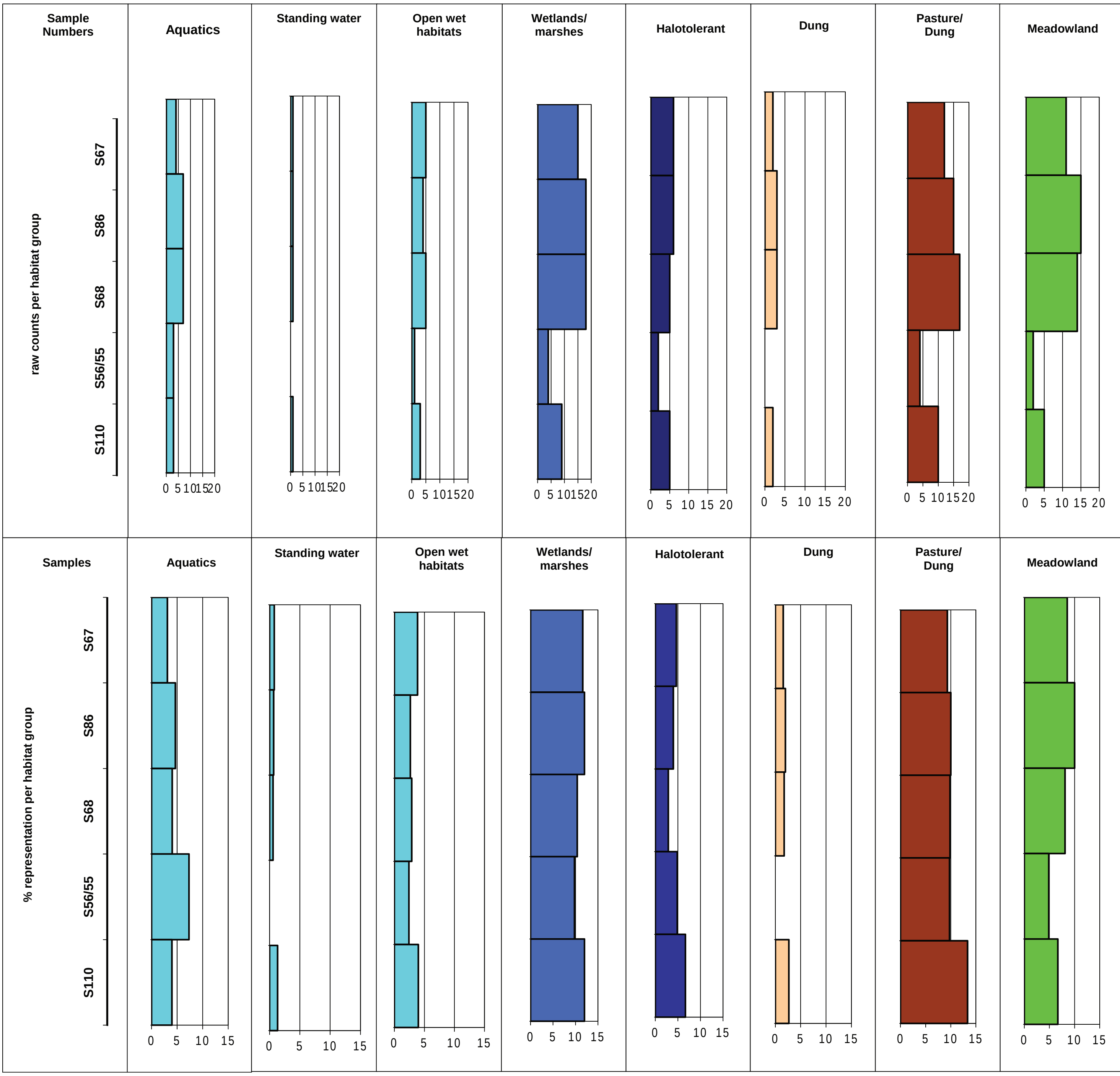
Samples were 10 litres in volume. Sub-samples of 4–5 litres were analysed. The remaining material was retained for potential future use.

All samples were subject to the paraffin flotation method of extracting insect remains from archaeological deposits, devised first by Coope and Osborne (1968) and later modified by Kenward (1980), with further refinements by Kenward *et al* (1986). The samples were disaggregated using water and washed over a 300μm sieve. The retent in the sieve was then treated with paraffin and cold water added. The paraffin concentrates the insects by adhering to the waxy cuticle of the insect exoskeleton. The flot was then poured through a 300μm sieve, washed with detergent in hot water to remove the excess paraffin and stored in 70% ethanol. Processing took place at the flotation facility of Margaret Gowen and Company Ltd, Merrion Square, Dublin 2.

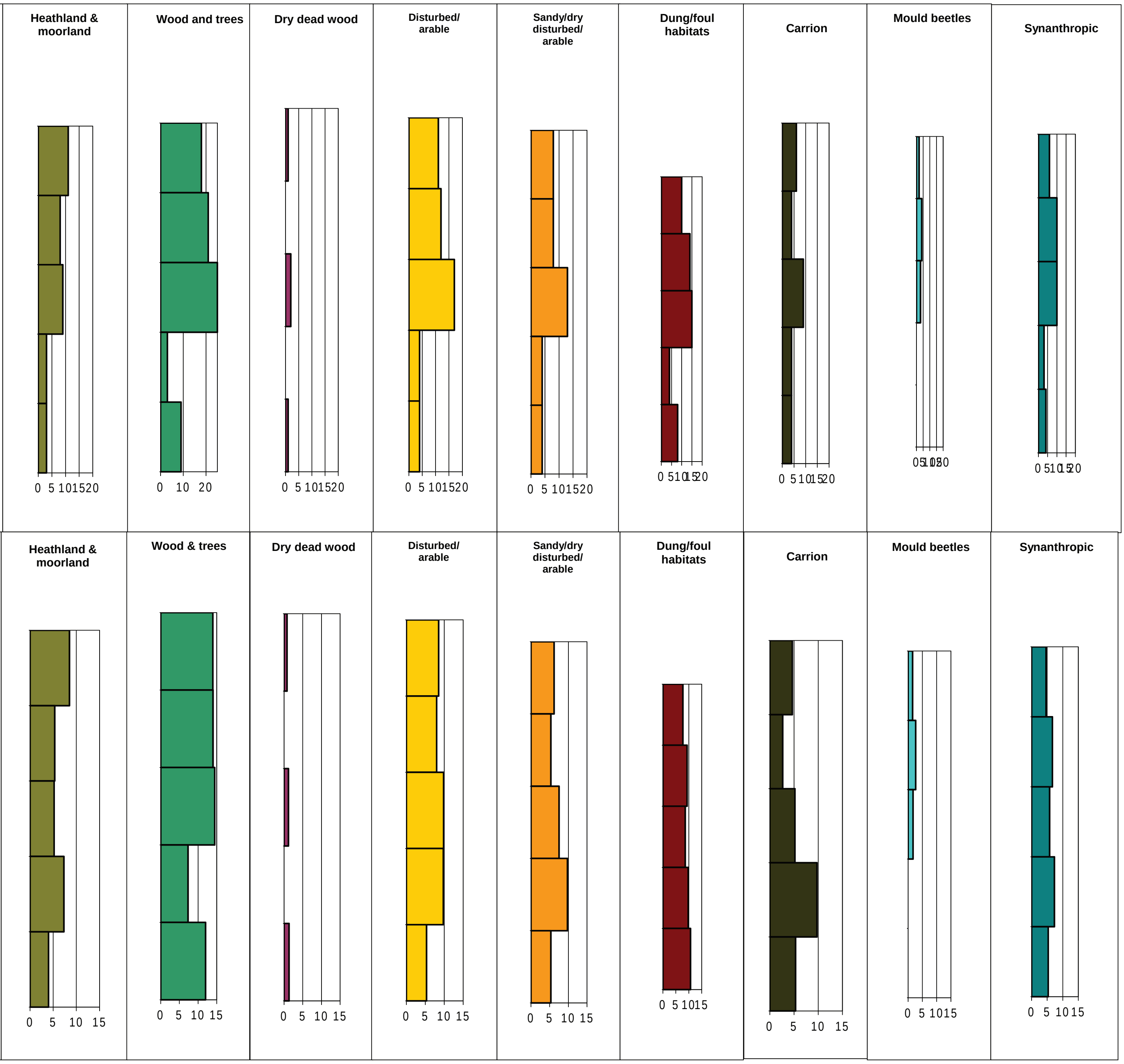
Flots varied in size between 100 and 200ml. All were fully sorted and insect sclerites extracted onto wet filter paper. Identifications were carried out using published keys and the writer's own reference material. Table 6.1 details the full species list. Species marked with '?' indicate identifications that require further checking. The species list was then entered into Bugstats, part of BugsCEP, the Coleopteran Ecology Package devised by Philip and Paul Buckland (Buckland & Buckland 2006). This allowed for analysis of the insect data by producing a multi-sample environmental summary diagram using coded habitat data. This diagram should aid identification of environmental changes through time, in the case of stratified sequences, or spatial analysis in the case of dispersed archaeological samples. The package uses 22 EcoCodes derived from the work of various authors (Kenward 2001; Ponel 1995; Robinson 2001) and the ecological codes assigned by Koch (1989–92). Each taxon (or individual) may be assigned to more than one habitat but will only be assigned to one 'indicator' class, where appropriate. Illus 6.1 shows two EcoGraphs, one displaying the raw counts per habitat group and the other the percentage presence of each habitat as a proportion of the total number of taxa ('environmental representations') in that sample. Illus 6.2 shows the summary statistics for the data. The analysis and discussion (Sections 3 and 4) are based on the results of these graphs.

The index of diversity for the assemblages was also calculated (see Section 4 below). Fisher's alpha is a mathematical model used to measure diversity in ecological communities (Fisher *et al* 1943).

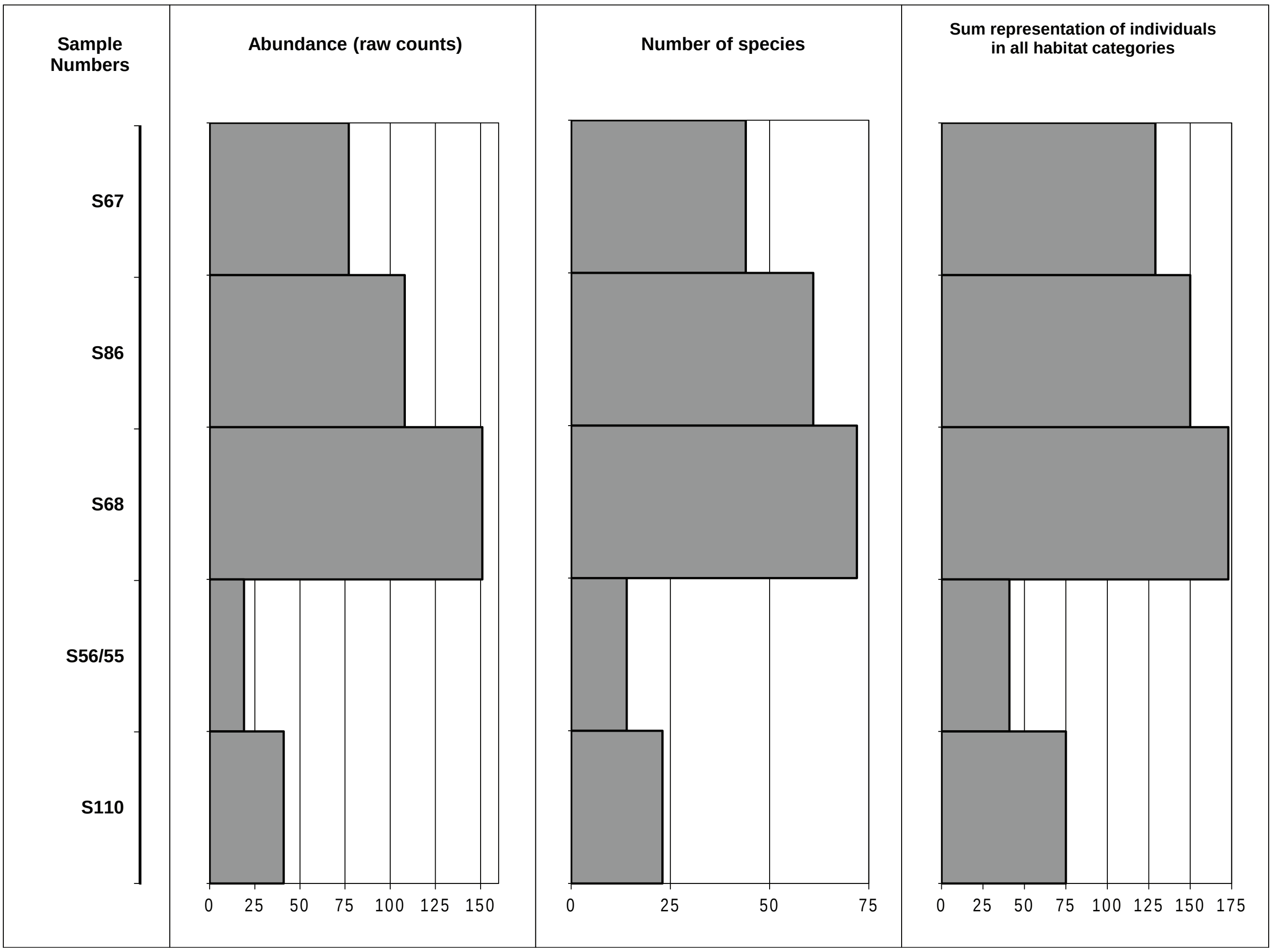
In addition, NMS (non-metric multi-dimensional scaling) ordination of the data was carried out, using PC-Ord 5.0 (McCune & Grace 2002). Ordination is used to summarise complex relationships, extracting one or a number of dominant patterns from an infinite number of possible patterns (*ibid*). It is used here to examine underlying variance/similarities in the insect assemblages between deposit types (illus 6.3 & 6.4). NMS is well suited to data that are non-normal or on arbitrary, discontinuous, or otherwise questionable scales, particularly data sets that have upwards of 70% zeroes.



Illus 6.1 Graph of habitat groups indicated for all insects identified – raw counts and percentage presence of each



habitat group (source: created by BUGSCEP)



Illus 6.2 Summary data – total number of species, individuals and sum abundance per sample for insect remains identified (source: created by BugsCEP)

3 ANALYSIS

Samples are analysed in chronological order.

3.1 Context [142], sample 110

Context 142 is described as a blackish-brown peaty deposit, gritty and organic. The clay and charcoal content was high. Animal bone and shellfish were visible during processing.

This produced an interesting, albeit small, assemblage (MNI = 41, illus 6.1 & 6.2, Table 6.1). Many of the sclerites were fragmented and identification past genus level was not always possible. This resulted in a mixed signature within the assemblage, with many species assigned to multiple habitats. However, generally, foul habitats/dung/pasture indicators were very common, as well as wetland/marsh indicators. The most commonly encountered beetles were *Helophorus* spp., generalist water beetles found in a wide variety of aquatic environments, and *Aphodius luridus*, a dung beetle found in sheep, horse and cow dung in both open and shaded (wooded) locations (Jessop 1986). A small number of arable/disturbed ground species also occurred including *Harpalus affinis*, a generally xerophilus ground beetle found in weedy, agricultural ground and dry grassland (Lindroth 1985; Luff 1998) and *Ceutorhynchus erysimi*, which occurs on Shepherd's Purse (*Capsella bursa-pastoris*) (Bullock 1993). There were no indicators of moving water or specific indicators of wetland plant communities (except one undiagnostic fragment of *Plateumaris* spp.), which might have been expected in an in-filled stream-channel. Overall, the assemblage represented damp, foul ground conditions with occasional representations from nearby agricultural (both pasture and arable) land.

3.2 Context [070], samples 55/56

Context [070] is described as mid-grey silty clay, with lots of pebbles and small stones. It was highly inorganic with few insect remains observed during processing. Lots of small charcoal fragments and a small plant-macrofossil component were also observed.

Two samples were submitted for insect analysis from this deposit. Unfortunately, sample 55 produced only three identifiable fragments, while sample 56 was similarly poor at just sixteen identifiable insects. This was due primarily to the inorganic nature of the deposit. For the purposes of illus 6.1–6.4, these samples are combined. The assemblage indicated mixed origins, with a small number of water beetles (*Limnebius* sp., *Helophorus* sp.) and one possible indicator of flowing water, *Oulimnius* sp., present. The latter beetle is generally found under stones or on moss in fast-flowing, shallow streambeds (Koch 1989–92) and is one of the few species present that suggests the presence of a stream in the locality. A number of species present suggest that, once again, dung/foul-indicating habitats prevailed. The carrion feeder *Necrophorus humator* was identified, as well as *Aphodius* spp., *Anotylus tetracarinatus* and *A. complanatus*. These beetles probably represent the beginnings of accumulated rubbish associated with the growth of the medieval town. In addition, the disturbed waste ground and/or arable signature present in context [142] is also visible in this assemblage through species such as *Otiorhynchus sulcatus*, *Chrysolina* sp. and *Phyllotreta* sp. (Table 6.1). *O. sulcatus* (the 'vine' weevil) is generally closely associated with humans (Morris 1997). Along with other beetles identified in this assemblage, such as *Ptinus fur*, it suggests the beginnings of a synanthropic (ecologically associated with humans) element in the local insect fauna (also vaguely suggested in context [142]), prior to the digging of the town ditch.

3.3 Context [090], samples 86/68

Context [090] is described as blackish-brown silty clay with wood, marine molluscs, land/freshwater molluscs, plant macrofossils and animal bone present. A small silt and charcoal component was visible during processing. This is the primary fill of the original medieval ditch cut.

Two samples from context [090] were analysed for insect remains, sample 86 and sample 68 (see illus 6.1, 6.2 and table 6.1). Both produced large species-rich assemblages. The most frequently occurring species were *Helophorus* spp., *Megasternum obscurum*, *Ceutorhynchus contractus*, *Ophonus rufibarbis*, *Philonthus* spp. and *Phratora vugatissima*. This mix of species is indicated in the habitats represented in illus 6.1, with general aquatics, wetland/marsh, pasture/dung and disturbed/arable (combined) dominant. Also well represented is wood/trees, for example, *P. vulgatissima* generally occurs on willow and poplar (Bullock 1993).

There are also a number of ground beetles within the assemblages that can be indicative of carr woodland, such as *Leistus spinibarbis*, *Trechus rubens* and *Pterostichus madidus*. However, many of these species are equally likely to occur in humus-rich soils in pasture/cultivated land (Lindroth 1974) and the wet ditch fill may have provided an ideal habitat. Other beetles and one fly species recorded in the assemblages suggest that wood/leaf litter may have formed part of the fill, possibly fuel or fodder waste. Species such as *Phyllobius oblongus*, *P. pyri*, *Cryptocephalus* sp. and *Dorytomus* sp. occur on the leaves of a variety of tree and shrub species. The puparia of *Minettia ?lupulina*, a leaf miner in alder and fruit tree species (Smith 1989), were recorded in moderate numbers from sample 68.

In addition, *Rhizophagus* sp., which occurs under bark, and some unidentifiable fragments of Anobids ('woodworm' beetles) were present but in very small numbers. This is somewhat surprising for the fill of a medieval ditch, where species associated with wooden buildings might expect to become incorporated into ditch fills. The 'synanthropic' element of the fauna is generally very small (no more than 8% of the overall assemblage in each sample). Typical species of this habitat group, such as *Cryptophagus dentatus*, *Ptinus fur*, *Tipnus unicolor*, *Mycetaea hirta*, *Atomaria* spp. are present but in small numbers. These species are common in medieval house floor layers and pit fills of this period (Hall & Kenward 1995; Reilly 2003). Along with the lack of structural wood pests, it suggests that waste from houses was not the primary material making up the ditch fill.

An interesting dry/disturbed/arable ground fauna is present in the assemblages. Species indicative of weeds include *Sitona* sp., *Rhinoncus* sp., *Chaetocnema concinna* and *Chrysolina fastuosa*. The digging of the ditch would have caused significant ground disturbance that probably eventually resulted in a diverse weed-plant community growing locally, on which many of these beetles are to be found. Two curious finds, *Batophia rubi* and *Byturus tomentosus*, occur on raspberry and blackberry and may indicate the presence of brambles growing in close proximity to the ditch. However, it is the ground beetle (Carabidae) fauna indicative of disturbed ground that is particularly interesting and diverse. Species such as *Ophonus rufibarbis*, *Harpalus affinis*, *Pterostichus madidus*, *Anchomenus dorsalis*, *Amara familiaris* and *A. equestis* all point to mixed local ground conditions from dry, disturbed, sandy ground to cultivated ground/garden soils. The ditch probably acted as a large pit-fall trap, resulting in diverse ground beetle fauna becoming incorporated into this fill. Undoubtedly, many of these species were attracted to the disturbed ground surface generated by the digging of the ditch but may reflect the landscape surrounding the town at this time also.

The fauna associated with material thrown into the ditch generally indicates foul origins. In particular, the dipterous (fly) fauna, along with elements of the beetle fauna, such as carrion and dung feeders, suggests that fermenting food waste, animal dung/manure and remains of carcasses ended up in the ditch.

3.4 Context [089], sample 67

Context [089] is described as blackish-brown silty clay, with visible wood, animal bone, plant macrofossils, land/freshwater molluscs and frequent stones. Pottery fragments were also recovered. This deposit overlay [090].

While not as numerically rich as either sample 86 or sample 68, sample 67 proved to be just as species-rich. It contains a similar habitat range as the earlier fill, but with a proportionally smaller synanthropic element. Dung/pasture and foul (including carrion) habitats are again well-represented, with a number of species of *Aphodius* present, as well as common 'cess-pit' species like *Oxytelus sculptus*, *Megasternum obscurum* and *Xylodromus concinnus*. In addition, puparia of flies such as *Sepsis* spp., *Drosophila* spp. and *Musca domestica* clearly indicate the presence of dung, including human excrement/urine, fermenting vegetables/fruit and general decaying animal and plant matter (Smith 1989).

The disturbed ground/arable indicators are again well-represented in this deposit. *Ophonus rufibarbis*, *Pterostichus madidus*, *Phyllotreta undulata*, *Sitona* sp. and *Ceutorhynchus* sp. all suggest locally open/disturbed ground with associated weeds. In addition, there is a proportionally larger representation of species associated with heath/moorland. These include the ground beetle *Amara lunicollis*, which only occurs in this deposit and is generally indicative of heath (Lindroth 1986). Dumped peat or turf used for roofing or fuel may possibly be the source for such beetles in the ditch fill.

The woodland/dead wood element of the fauna is proportionally similar to [090], with a similar range of species present.

4 DISCUSSION

4.1 *Diversity and ordination*

Three of the six samples examined, the ditch fills, produced rich, diverse insect faunas. The wet nature of ditches, the associated ground disturbance, the fact that ditches were regularly used for dumping and the 'pit-fall trapping effect' of open-cut features means that ditch fills tend to be species-rich. The index of diversity (Fisher's alpha) for the ditch fills was between 44–60, which is extremely high (Kenward 1978). 12th–13th century midden deposits at Gallowgate Middle School, Aberdeen produced similar high diversity indices (Hall *et al* 2004). The least species-diverse deposit was context [142] (sample 110) with an alpha value of only 23.

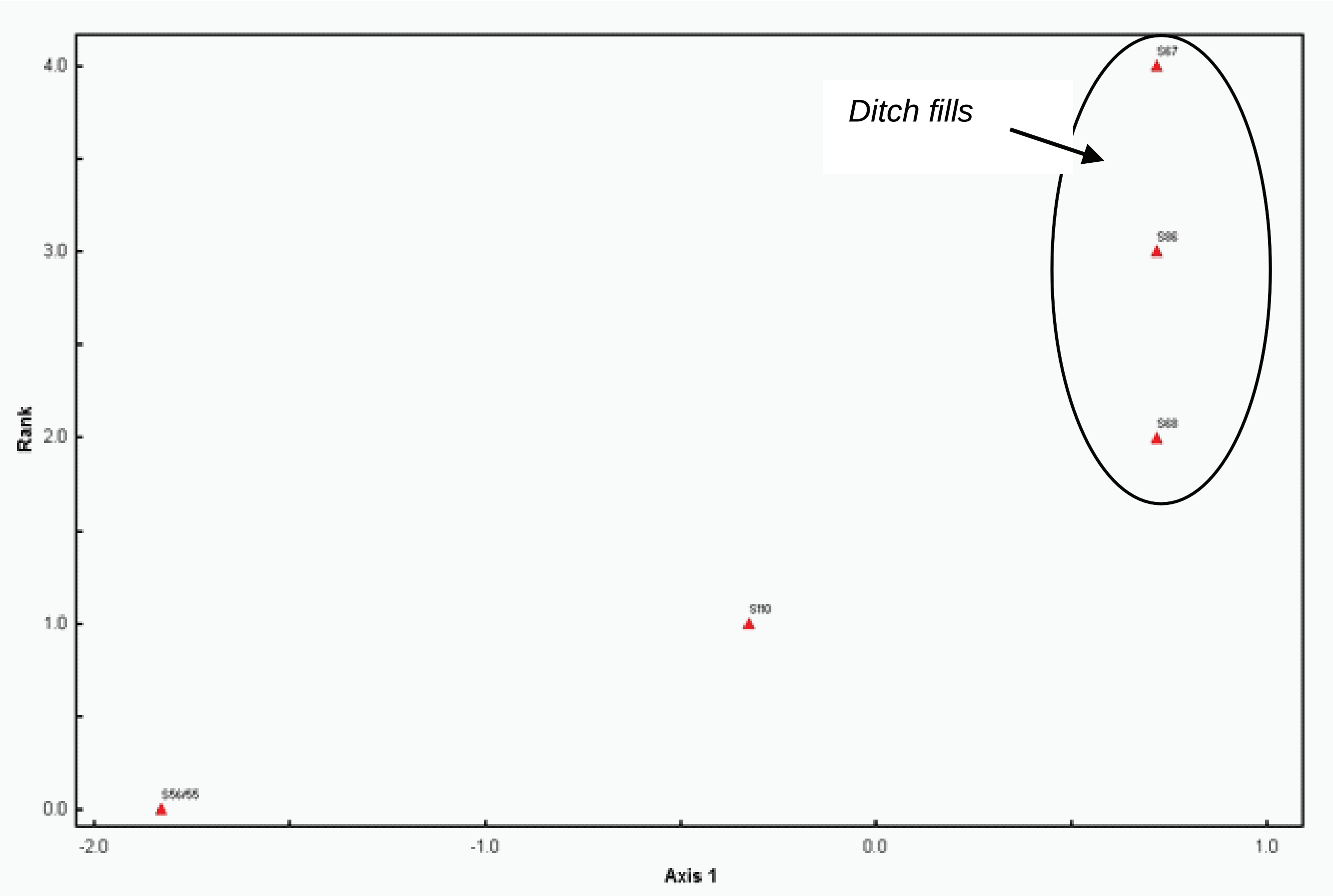
The ordination of the samples produced an interesting pattern with the three ditch fills clustering together (illus 6.3). The species diagram (illus 6.4) suggests that the clustering is not due solely to numerical or species richness but species diversity and relatedness between the deposits. The three ditch fills contain a similar range of species, and there is more overlap between these three assemblages and the assemblage present in Context [142] than in Context [070].

Very few contemporary sites in Edinburgh, or Scotland as a whole, have been analysed for insect remains. A number of medieval-dated sites in Aberdeen (Hall *et al* 2004; Kenward & Hall 2001) will be referred to below but otherwise comparisons are mainly with Iron Age to medieval-dated sites with prominent cut features in other parts of Britain and in Ireland.

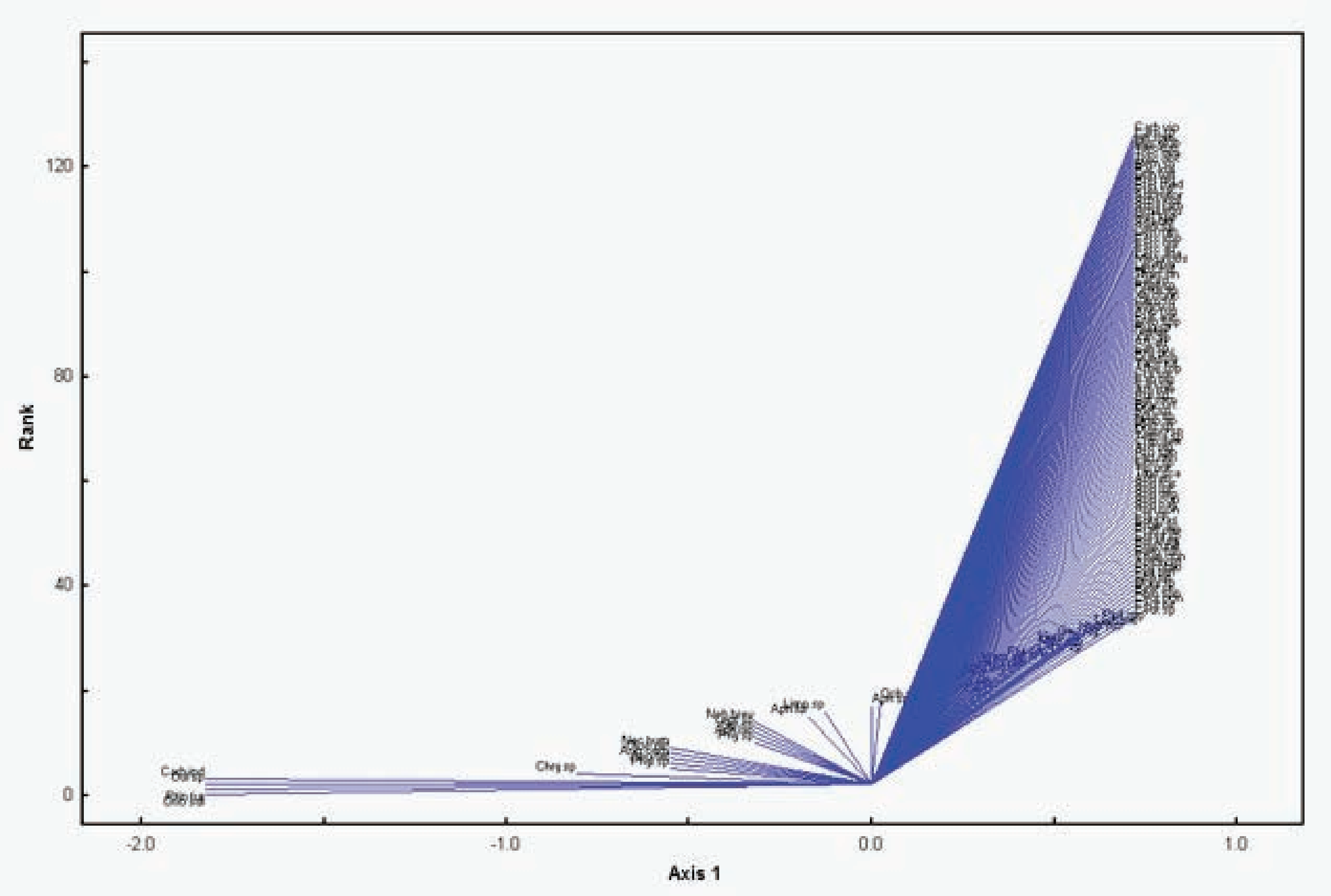
4.2 *Local and wider environment*

4.2.1 Dry/disturbed/arable ground and dung/pasture

There is some overlap between these groups and those of 'meadowland' and 'heathland/moorland'. Numerically, species belonging to these groups make



Illus 6.3 NMS ordination (1-axis solution) for samples examined from insect remains, St Patrick's Church, Cowgate, Edinburgh



Illus 6.4 NMS ordination (1-axis solution) for species distribution in samples from St Patrick's Church, Cowgate, Edinburgh

up the largest part of the ditch-fill assemblages and form a large proportion of the Context [142] assemblage. It is not unusual for enclosing ditches of settlement sites to contain a large 'outdoor' element in the assemblage. Ditches by their nature are an interface between the settlement space and the surrounding landscape. Therefore, both allochthonous and autochthonous insects will generally be represented. Sources of the disturbed ground/arable and dung/pasture species, however, can be mixed with insects being introduced directly (ie by pitfall-trapping effect) or indirectly in fodder residues and manure (Hall & Kenward 1998).

Similar faunas, rich in ground beetles, weed/meadow plant feeders and dung beetles are present in the ditches of Iron Age sites like Mingies Ditch, Oxford (Robinson 1993), Fisherwick, Staffordshire (Osborne 1979), and Roman-age sites like Alchester (Robinson 1975) and Drayton (Robinson 2003). Equally, many Roman well sites produce similar mixed signatures and have a similar pitfall-trapping effect, particularly for many xerophilous ground-dwelling beetles (ie species that would not usually be found in wet ditches). Roman wells such as Appleford, Oxford (Robinson 1981), Rudston, Yorkshire (Buckland 1980), Dragonby, Lincolnshire (Buckland 1996), Dalton Parlours, Yorkshire (Sudell 1990) and Wheatpieces, Tewkesbury (Tetlow 2006a) have many species in common with the ditch-fill assemblages at the Cowgate, including *Harpalus affinis*, *Amara familiaris*, *A. lunicollis* and dung beetles like *Aphodius luridus*. In addition, common ruderal plant feeders like *Ceutorhynchus concinna*, *Rhononcus* spp. and *Ceutorhynchus contractus*, *C. ersymi* and *C. hirtulus* were recovered from Iron Age, Roman and medieval ditch, pit and well fills at Sutton Common (Roper & Whitehouse 1997) Bancroft, Buckinghamshire (Pearson & Robinson 1995), Chichester (Girling 1989), Piddington (Simpson 2001) and Aberdeen (Kenward & Hall 2001). Curiously, the most common ground beetle indicative of disturbed/dry ground encountered in the ditch fills, *Ophonus rufibarbis*, does not appear to have been recorded before from a British prehistoric or medieval site. It is generally confined to coastal locations in Britain and Ireland today (Luff 1998).

4.2.2 Foul habitats and the 'human factor'

Analysis of all deposits suggested the presence of 'foul' conditions at all times in the past but this was particularly clear from the ditch fills. This is unsurprising as ditches regularly fulfilled the role of unofficial rubbish dump for medieval town residents. Even after the ditch went out of use, the excavation revealed a large midden of material had built up in this part of the old town of Edinburgh, on top of which later post-medieval structures were built (Jones 2007).

The pre-ditch 'foul' element of the old stream channel was made up primarily of indicators of wet decaying vegetation, which probably represented *in situ* decay rather than dumped material. The synanthropic element of the fauna was very small, again suggesting autochthonous sources for the foul indicating beetles. However, the puparia of the fly genus *Scathophaga* sp. were frequently encountered in this sample and suggest the presence of dung, human excrement and carrion (Smith 1989). It is possible that animals grazed this area prior to the digging of the town ditch, which would account for the puparia and the presence of *Aphodius luridus* (Section 3).

The foul element in the ditch fills is likely to come from two main sources – the ground conditions prevailing within the ditch itself and dumped or slowly accumulating debris. Ditch fills from sites like the Bronze Age-dated enclosure at Chancellorsland, Co. Tipperary (Reilly 2008b), Iron Age-dated Haughey's Fort, Co. Armagh (Anderson 1989) and Mingies Ditch, Oxford (Robinson 1993) and Roman period Alchester (Robinson 1975) generally have this feature in common. Ditches regularly cut the water table and permanently hold water at the base so that both slow accumulating autochthonous plant matter and dumped organic material are well preserved. Surprisingly, the synanthropic element of the ditch fills is very small. 'House fauna' often makes up a significant proportion of deposits in cut features, like pits and wells, in Roman and medieval sites due to their location within the settlement (Girling 1989; Kenward and Hall 1995; Reilly 2003). However, analysis of fills from Roman wells in Wheatpieces, Tewkesbury (Tetlow 2006a) and Piddington, Northhamptonshire (Simpson 2001) produced quite restricted synanthropic faunas. Tetlow (2006a) suggests that the well at Wheatpieces, in common with pit and ditch features examined at Heathrow Airport (Tetlow 2006b), may not have been used for deliberate dumping and were set in a largely pastoral landscape.

While the Cowgate has a similar range of pasture/disturbed ground indicators in the ditch fills to that of Wheatpieces, it is clear from archaeological evidence that the ditch location was the site of deliberate dumping. However, the quantity and range of dung beetles, meadow plant indicators, carrion feeders, and fly species indicative of dung and carcasses suggests that the dumped material was waste from agricultural and/or butchering activity, rather than domestic activity. Of course, the line between these types of activity may have been somewhat blurred in a medieval town. Similar assemblages indicative of very foul conditions were noted from midden and floor deposits in the heart of the medieval town of Novgorod at the site of a possible leather workshop (Reilly 2008a).

4.2.3 Further afield? Haleotolerant and heath/moorland indicators

Two other interesting elements of the fauna are species indicative of coastal/salt marsh environments and heath/moorland (see Section 3). Given the coastal location of Edinburgh, some halaeotolerant beetles are to be expected in the deposits. In particular, marine shell was recorded in Context [090] (primary ditch fill) and the presence of seaweed is suggested by the finding of *Cafius* sp. in sample 86. Seaweed may also have been brought into the town for use as either animal fodder or manure. Salt-tolerant species were also noted in a number of Dublin sites by the author and others (Reilly 2003; Whitehouse 2007).

As discussed in Section 3, the presence of the ground beetle *Amara lunicollis* and a small group of other beetles is suggestive of heath or moorland. Their presence in the ditch fills may be due to the use of turf in floors, roofs or for fuel within the town. However, the range of species is more limited than that identified from midden deposits in Galloway Middle School, Aberdeen (Hall *et al* 2004) or from 17th-century pit/latrine fills in Newmarket, Dublin (Whitehouse 2007). In both these cases, the presence of peat appeared to be indicated by the range of water beetles, plant feeders and ground beetles present as well as the plant macrofossil evidence. The evidence is somewhat more tentative in the Cowgate due to the fact that many beetle species are not identified beyond genus. *Bugstats* assigns such genera to multiple-habitat categories to reflect the full range of habitats they may potentially represent. This can lead to an over-representation of some habitat categories in the final graph (illus 6.1).

4.3 Conclusions

The four contexts examined for insects cover the period prior to the digging of the town ditch and the primary and secondary phase of ditch use. The insects reflect the change in environment from wet in-filled stream channel, with its limited fauna largely indicative of the decaying accumulating vegetation and surrounding pasture/arable landscape, to inorganic water-deposited clay layer, to the rich diverse communities of the ditch fills, reflecting both the surrounding landscape and the dumped waste of the urban environment. The poor synanthropic element in the assemblages suggests household waste was not the primary source of the ditch fills. Rather, the assemblages are reflective of fouler material, such as butchery waste, animal dung and rotting vegetables/fruit, suggesting market/industrial rather than domestic sources.

Table 6.1 Species list for insects from St Patrick's Church excavations, Cowgate, Edinburgh (nomenclature after Lucht 1987) (Syn = 'synanthropic': in close association with humans/human habitation)

Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
Context No.	142	70	70	90	90	89		
Description of context	Peaty deposit	Accumulated midden		Primary fill of ditch		Fill of ditch above [090]		
Genus/Species								
Carabidae								
Carabidae (indet.)		1						
Carabus cf. violaceus (L.)					1		Grassland, woodland	Common
Carabus sp.						1	Eurytrophic (ie occurs everywhere)	Common
Leistus spinibaris (F.)				2			Woodland litter, cultivated soils	Local (esp. in Scotland)
Nebria brevicollis (F.)	1						Humus-rich soils, gardens, woodlands	Common
Dyschirius globosus (Hbst.)					1	1	Disturbed ground, water-tolerant	Common
Trechus rubens (F.)				1	3		Damp litter near water	RDB Notable B
T. quadristriatus (Schrank)				2			Open ground, cultivated soils etc.	Common
T. obtusus (Er).						1	Damp litter, open ground, water tolerant	Common
Bembidion sp.						1	Eu	Varied status
Patrobus assimilis (Chaud.)					1		Usually upland bogs, heaths, moors	Northern distribution
Harpalus affinis (Schrank)	2			3			Disturbed ground, prefers dry places	Common
Harpalus sp.	1				1	2	Eu	Varied status
Ophonus rufibaris (F.)				9		3	Disturbed ground, prefers dry places	Locally abundant
Pterostichus niger (Schall.)					1	1	Damp meadowland, woodland	Common
P. madidus (F.)				5	2	4	Disturbed/arable ground, woodlands	Common
Pterostichus sp.				1	1		Eu	Generally common
Anchomenus dorsalis (Pont.)				1			Disturbed/arable ground	Locally abundant
Amara lunicollis (Schiödte)						3	Heaths, moors, generally dry ground	Very local
A. familiaris (Duft.)				2	2		Sandy, dry disturbed ground	Common
A. cf. equestris (Duft.)				2			Dry heath, sandy ground	RDB notable B
Dysticidae								
Hydroporus spp.				3	2	2	Aquatic (various)	Varied status

Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
Context No.	142	70	70	90	90	89		
Description of context	Peaty deposit	Accumulated midden		Primary fill of ditch		Fill of ditch above [090]		
Agabus bipustulatus (L.)				3	1		All kinds of aquatic environments	Common
Agabus/*Ilybius* sp.					1	1	Aquatic (various)	Varied status
Hydraenidae								
Ochthebius minimus (F.)					1		All kinds of aquatic environments	Common
Ochthebius sp.	2			1			Aquatic (various)	Common
Limnebius sp.			1	1	1		All kinds of aquatic environments	Varied status
Hydrophilidae								
Helophorus spp.	7		1	5	5	5	All kinds of aquatic environments	Varied status
Cercyon impressus (Sturm)				1			Dung, decaying vegetation	Common
C. unipunctatus (L.)				1			Dung, decaying vegetation, carrion (Syn)	Common
C. atricapillus (Marsh.)				1			Dung, decaying vegetation, carrion (Syn)	RDB notable
C. analis (Payk.)				1	2		Dung, decaying vegetation	Common
Cercyon sp.	1					1	Generally foul habitats	Varied status
Megasternum obscurum (Marsh.)				1	5	3	Dung, decaying vegetation	Common
Hydrobius fuscipes (L.)	1			3	2	1	Aquatic, standing water (ditches etc.)	Common
Laccobius minutus (L.)				2			All kinds of aquatic environments	Common
Histeridae								
Histeridae sp. indet.						1	Generally foul habitats	Varied status
Siliphidae								
Necrophorus humator (Gled.)			1		1		Carrion	Widespread
Thanatophilus sinuatus (F.)				1			Carrion	Widespread
Catopidae								
Catops sp.					1		Generally associated with carrion	Varied status
Staphylinidae								
Phyllodrepa sp.					1		Generally in decaying vegetation (some Syn)	Varied status
Omalium sp.				2			Dung/foul habitats	Varied status

Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
Context No.	**142**	**70**	**70**	**90**	**90**	**89**		
Description of context	**Peaty deposit**	**Accumulated midden**		**Primary fill of ditch**		**Fill of ditch above [090]**		
Xylodromus concinnus (Marsh.)						2	Dung/foul habitats (Syn)	Common
Olophrum piceum (Gyll.)			1			1	Wetland, marsh, heaths in plant debris	Common
Geodromicus nigrita	1			2	1	1	Open wet habitats in moss	Very local
Carpelimus sp.				2	1		Damp locations, mosses, foul habitats	Varied status
Anotylus rugosus (F.)					3	1	Dung, decaying vegetation, damp environments	Common
A. sculpturatus (Grav.)	1					1	Dung, carrion	Common
A. complanatus (Er.)			2	1	1		Dung/foul habitats	Common
A. tetracarinatus (Block)			1	1			Dung, carrion, foul habitats	Common
Oxytelus sculptus (Grav.)				2	4	2	Damp decaying vegetation, dung	Common
Platystethus arenarius (Geoff.)					1		Dung, plant and animal debris	Common
Stenus spp.				2			Meadows, woodland, marshes	Varied status
Rugilus sp.					1		Dung/foul habitats, wet environments	Varied status
Leptacinus sp.	2						Generally dung/foul habitats	Common
Gyrohypnus leibei (Scheer.)					1		Dung/foul habitats, decaying vegetation	Common
Gyrohypnus sp.	3						Generally dung/foul habitats	Varied status
Xantholinus sp.				1			Generally dung/foul habitats	Varied status
Atrecus affinis (Payk.)						1	Woodland litter, under bark	Widespread
?Cafius sp.					1		Tidal debris, under seaweed	Very local
Philonthus politus (L.)				2	2		Dung, carrion, foul habitats	Common
Philonthus spp. (poss. Cafius)	1			10		1	Plant debris/foul habitats in wetlands/woodland	Varied status
Quedius spp.					3		Eu (generally decaying vegetation)	Varied status
Tachinus rufipennis (Gyll.)				2			Woodland litter, heath/moor litter (dung/carrion)	RDB rare
Tachyporus / Tachinus spp.	1			3	3	2	Many species indicative of foul habitats	Varied status
?Atheta spp.				6	6		Eu (generally decaying vegetation/foul)	Varied status

Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
Context No.	142	70	70	90	90	89		
Description of context	Peaty deposit	Accumulated midden		Primary fill of ditch		Fill of ditch above [090]		
Crataraea suturalis (Mann.)				1	1	1	Plant debris (typical Syn, but not obligate)	Common
Aleocharinae sp. indet.	3		1	3	2	3	Eu	Varied status
Cantharidae								
Cantharis ?nigricans (Müll.)				1			On flowers, shrubs, bushes, in woodland	Common
Cantharis sp.					1		Wetlands, woodlands on flowers/shrubs	Varied status
Elateridae								
Athous haemorrhoidalis (F.)				2			On trees, herbs, flowers – disturbed ground/arable	Common
Athous sp.						1	Woodland, meadow, disturbed ground	Varied status
Dryopidae								
Oulimnius sp.			2				In fast-flowing water, bare streambeds	Generally rare (except *O. tuberculatus*)
Byturidae								
?Byturus tomentosus (Deg.)				1			In Rubus spp., esp. raspberry, blackberry	Common
Brachypteridae								
Brachypterus urticae (F.)				1	1		On Urtica spp.	Common
Nitidulidae								
Meligethes sp.				2			On flowers, shrubs (eats pollen)	Varied status
Epuraea sp.				1	3	1	At sap, in fungi, rotting material	Varied status
Omosita sp.				1			Carrion, foul habitats (O. colon often Syn)	Varied status
Rhizophagidae								
Rhizophagus sp.				1	1	1	Predatory on other insects, under bark especially	Varied status
Cucujidae								
Monotoma sp.					1		Wide range of foul habitats (often Syn)	Varied status
Cryptophagidae								
Telmatophilus sp.				2		1	On Typha, Sparganium near standing water	Varied status, generally rare

Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
Context No.	**142**	**70**	**70**	**90**	**90**	**89**		
Description of context	**Peaty deposit**	**Accumulated midden**		**Primary fill of ditch**		**Fill of ditch above [090]**		
Cryptophagus dentatus grp. (Hbst.)				2	2	2	In mould, fungi (often Syn)	Varied status
Atomaria nigripennis					1	3	Plant debris, in fungi (generally Syn)	Widespread but RDB rare today
Atomaria spp.				2			In mould, fungi (many spp. Syn)	Varied status
Lathridiidae								
Lathridius minutus grp. (L.)				1	1		Plant debris, in fungi (often Syn)	Very local
Corticaria sp.					2		In wood/plant debris, mould, fungi (often Syn)	Varied status
Endomychidae								
Mycetaea subterranea (M.)	1			2	1		Plant debris, fungi (generally Syn)	Locally abundant
Anobiidae								
Anobidae indet.	1			1			Dead wood	Varied status
Ptinidae								
Tipnus unicolor (Pill. & Mitt.)				1	4		Plant/wood debris (obligate Syn)	Very local
Ptinus fur (L.)			2				Plant and animal debris (often Syn)	Common
Scarabaeidae								
Trox scaber (L.)				1			Carrion, birds' nests	Common
Apodius erraticus (L.)					1		Dung, pasture	Generally widespread
A. fossor (L.)				3			Cow/horse dung, pasture	Generally widespread
A. rufipes (L.)				2	3	2	Cow/horse dung, pasture	Common
A. luridus (F.)	6					1	Cow/sheep dung, open habitats (dry)	Locally common
A. depressus (Kug.)				2			Cow/sheep dung, shaded habitats	Common (v. common in Scotland)
A. conspurcatus (L.)					1		Horse/sheep dung, shaded habitats	Very local in Scotland (RDB notable B)
A. paykulli (Bedel)				1			Dung, open habitats	Local in Scotland (RDB notable B)
A. contaminatus (Hbst.)					2	1	Dung, pasture	Common

Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
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Description of context	Peaty deposit	Accumulated midden		Primary fill of ditch		Fill of ditch above [090]		
A. lapponum (Gyll.)	1						Sheep/deer dung, uplands	Very local (common in Scottish Highlands)
Aphodius sp.	1		1			3	Dung	Varied status
Chrysomelidae								
Plateumaris spp.	1				2		Wetland plants	Varied status
Cryptocephalus sp.					1		Leaf beetles in wide variety of trees/shrubs	Varied status
Chrysolina ?fastuosa (Scop.)					1		On *Galeopsis* spp. (hemp nettle), heath/moor, marshes	Very local
Chrysolina sp.		2	1	1	1		On leaves of wide variety of ground herbs	Varied status
Phaedon sp.						2	On leaves of marsh, meadow plants	Varied status
Prasocuris phellandri (L.)				1			On leaves of various wetland plants	Widespread
Chrysomela sp.						1	On *Populus* / *Salix* spp.	Generally rare
Phratora vulgatissima (L.)				5		3	On *Populus* / *Salix* spp.	Probably widespread
Phyllotreta undulata (Kuts.)				2	1	2	Disturbed/arable ground on *Brassica* spp.	Common
Phyllotreta sp.			1	1			On ground herbs, various environments	Generally common
?Batophila rubi (Payk.)				2	1		On *Rubus* spp., brambles, weedy locations	Very local
Chaetocnema concinna (Marsh.)					1		Leaves of various herbs/trees, disturbed ground	Common
Chaetocnema sp.	1			3			Leaves of various herbs/trees, disturbed ground	Common
Curculionidae								
Apion sp.				1			Various ground herbs	Varied status
Otiorhynchus cf. sulcatus (F.)			1				On roots/leaves of various plants, disturbed ground (Syn)	Common
Phyllobius pyri (L.)				2			On leaves of various tree species	Common
P. oblongus (L.)					1		On leaves of various tree species	Common
Phyllobius sp.	1						On leaves of various tree species	Varied status
Sitona sp.				1		3	Clover, Vetch, ground herbs, disturbed ground	Varied status

Sample No.	**110**	**55**	**56**	**68**	**86**	**67**	**Habitat**	**Distribution status in Great Britain (Red Book Status if known)**
Context No.	**142**	**70**	**70**	**90**	**90**	**89**		
Description of context	**Peaty deposit**	**Accumulated midden**		**Primary fill of ditch**		**Fill of ditch above [090]**		
Dorytomus sp.				1		1	On *Populus* / *Salix* spp.	Varied status
?Pelenomus sp.				1			On various wetland plants	Varied status
Rhinoncus spp.				2			On *Rumex, Polygonum* spp., disturbed ground	Varied status
Ceutorhynchus contractus (Marsh.)				5	6		On various Crucifereae	Common
C. erysimi (F.)	1				1		On *Capsella bursa-pastoris*, disturbed/ damp ground	Common
C. hirtulus (Germ.)				2			On wetland/disturbed ground herbs	RDB notable B
Ceutorhynchus sp.						2	On various ground herbs	Varied status
Total	**41**	**3**	**16**	**152**	**108**	**77**		
Other Insect Orders								
Hemiptera								
Bugs (nymphs?)						*		
Siphonaptera								
Flea body parts				*	*	*		
Sample No.	110	55	56	68	86	67	Habitat	Distribution status in Great Britain (Red Book Status if known)
Context No.	142	70	70	90	90	89		
Genus/Species								
Diptera (True flies)								
Diptera indet.			*					
Lauxaniidae								
?Minettia lupulina (F.)				**			Leaf miners in various tree species	
Sepsidae								
Sepsis spp.						*	All types of dung including human excrement	
Sphaeroceridae								

Sample No.	**110**	**55**	**56**	**68**	**86**	**67**	**Habitat**	**Distribution status in Great Britain (Red Book Status if known)**
Context No.	**142**	**70**	**70**	**90**	**90**	**89**		
Description of context	**Peaty deposit**	**Accumulated midden**		**Primary fill of ditch**		**Fill of ditch above [090]**		
?Coproica vagans (Hal.)					*		Cow/horse dung, human excrement	
Drosophilidae								
Drosophila spp.					**	*	Rotting fruit/vegetables, fermenting substances	
Calliphoridae								
Calliphora vicina (Rob.)/ *vomitoria* (L.)	*			**	*		Human, animal cadavers, meat waste (blow fly)	
Scathophagidae								
Scathophaga sp.	**						Dung, human excrement, carrion	
Muscidae								
Musca domestica L.					*	*	Refuse, dung, carrion ('house' fly)	
Non-Insect Sclerites								
Arachnid (spiders) indet.					1 (head)			

Each * represents up to five individuals