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Invertebrate remains from excavations at Dalhousie Mains, Bonnyrigg, Midlothian (site code: 1140): Technical report

by

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Summary

Samples from seven contexts representing the infilling of a large enclosure ditch at Dalhousie Mains, Bonnyrigg, have been analysed for their content of insect remains. Four assemblages were recorded fully, the remainder more perfunctorily. The lower fills of the ditch clearly related to a phase of gradual infilling during which there was reasonably clean open water with at least some aquatic vegetation. There was no evidence of dumping of rubbish into the ditch, or of human habitation, at this stage. The surroundings were at least in part probably under grazing, although beasts may have been kept from the immediate vicinity of the ditch. The possibility that there may have been no occupation at this stage, rather than the evidence having been destroyed by ploughing out, is discussed.

An organic layer deposited at a later stage of infilling gave evidence of human occupation, perhaps only very humble, and possibly in association with the housing of livestock. Material from a stable or byre may have been dumped into this layer. The fill of a small recut higher in the sequence indicated conditions much as for the lower contexts, however.

*Radiocarbon dating is awaited: if these deposits are of Iron Age date the synanthropic fauna from Context 5008 is of considerable importance, especially the records of human fleas (*Pulex irritans*).*

Keywords: DALHOUSIE MAINS; BONNYRIGG; MIDLOTHIAN; DITCHED ENCLOSURE; INVERTEBRATE REMAINS; INSECTS

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Introduction

The ditched enclosure at Dalhousie Mains near Bonnyrigg, Midlothian has been provisionally designated as a late prehistoric defended farmstead, although the possibility of a later (even medieval) date cannot be ruled out: radiocarbon dating is awaited. If the site is indeed of late prehistoric date the invertebrate assemblages from it will assume a greater significance, but in either case they are of considerable interest.

During August 1995 eleven samples of sediment ('GBAs' *sensu* Dobney *et al*. 1992) were submitted for an assessment of their invertebrate remains; five were assigned high priority for further work (Large *et al.* 1995). Unfortunately, financial constraints on the project would not allow for a complete analysis on *all* of the five samples, so, in view of the likely importance of these samples to research questions, the EAU agreed to subsidise the project. All of the samples were from Ditch Section IV; one was from a secondary cut feature and the remaining four were from the lower ditch fills.

The archaeological questions addressed in this report relate to the use of the enclosure, conditions in the ditch, local ecology, economic activities in the environs of the site, and degree of interchange with other occupation sites.

Methods

Sample numbers and sediment descriptions follow those originally assigned by the EAU during the assessment (Large *et al.* 1995).

Practical methods

All remaining material was processed (Kenward *et al*. 1980) from three of the samples, sediment from a monolith tin was sent from AOC for further processing and one sample had no material remaining.

Recording methods followed those outlined by Kenward (1992). A fully quantitative scan was carried out; the remains of adult beetles and bugs of the groups used for calculating main statistics were all counted and identified as far as possible within a reasonable period of time. Invertebrates other than the adults of the beetles and bugs used in calculating 'main statistics' of the assemblages were recorded semi-quantitatively. This method employs a five-point scale (Kenward *et al.* 1986), abundance for each taxon being noted as 1, 2, 3, 'several', 'many', or an estimate of a larger number. 'Several' and 'many' are converted to 6 and 15 for statistical purposes, a conversion discussed by Kenward (1992).

The manuscript lists and notes made during insect recording were entered to a Paradox database. From this, principal statistics and species lists in rank order for each assemblage were produced.

Interpretative methods

The interpretative methods employed in this study were essentially as employed in work on a variety of sites by Kenward and co-workers (see Kenward 1978, with modifications outlined by, for example, Kenward 1982; 1988 and Hall and Kenward 1990). Thus, interpretation rests primarily on a number of `main statistics' of whole assemblages of adult beetles and bugs, and on the recognition of ecologically-related groups of species.

The main statistics used include: (a) a measure of species-richness (or diversity), $\forall$ of Fisher *et al*. (1943), for the whole assemblage and for components of it; and (b) proportions of `outdoor' species (OB), aquatics (W), waterside 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). Decomposers are subdivided into (a) species primarily associated with somewhat dry habitats (RD), (b) those found mostly in rather, to very, foul habitats (RF), and (c) a residuum not easily assignable to one of these. The category 'RT' includes all three of these groups of decomposers.

A further ecological component quantified for the present site was the synanthropes, i.e. those species favoured by human activity. Taxa have been assigned codes for degree of synanthropy as follows: 'sf' - facultative synanthrope, common in 'natural' habitats but clearly favoured by artificial ones; 'st' - particularly favoured by, and typical of, artificial habitats but believed to be able to survive in nature in the long term; 'ss' - strong synanthrope, essentially dependent on human activity for survival. These have been quantified by site to give corresponding categories (SF, ST, SS). All of these have been summed to give the category 'SA'. Free-living phytophages and open-field dung beetles favoured by human activity have been excluded. It is strongly emphasised that these codes are in many cases only a first guess which is currently subject to modification (and for this reason there are some minor inconsistencies between the ecological codes assigned to taxa in Table 1 and the statistics in Table 3). .

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

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

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

Results

A complete list of the taxa recorded is given in Table 1. Table 2 summarises some statistics of the assemblages of adult beetles and bugs from individual subsamples and from the combined assemblages for the site as a whole.

Invertebrate fossils were present in moderate concentrations, necessitating the processing of quite large subsamples to recover useful assemblages of adult beetles and bugs. Preservation of insect remains was generally rather good, although the remains of some species from some samples showed a substantial degree of fragmentation, reflected in the number of taxa which could not be specifically identified. A wide range of invertebrates was noted, including (in one or more samples) numerous mites, spiders, cladocerans, fly larvae, pupae, puparia and adults, ants, beetle larvae, scale insects and fleas.

The sample assemblages

The contexts are considered from lowest to highest through the stratigraphic sequence. The weight of the subsample processed for insect remains is given, together with notes from the report by O'Sullivan (1994) and sediment descriptions made in the EAU. Refer to Table 3 throughout for values of the parameters discussed for individual assemblages (and for the material from the

site as a whole), and to Table 5 for complete species lists in rank order.

Lower Ditch Fills

Context 5023, Sample 11/T (1.0 kg; possibly glacial till quarried from the ditch and redeposited during earthwork construction or by early settlement and weathering)

Moist, light/mid brown (internally slightly grey on cm scale), stiff, slightly sandy silty clay (working just crumbly to just plastic and sticky when wet). Stones (2 - 20 mm) and a trace of coal were noted.

A small washover resulted from processing during assessment; it was mainly charcoal (to 7 mm) and some sand, with a trace of plant detritus (including moss). No invertebrates were recovered.

Context 5016, Sample 10/T (1.0 kg; possibly a mixture of silts (?earthwork erosion) and occupation dumps in wet conditions)

Moist, light orange-brown externally and light grey (with mm mottling) internally, stiff, slightly sandy silty clay with patches of rotted sandstone and vari-coloured flecks. Small stones (2 - 6 mm) and charcoal were present.

The flot from processing at assessment was tiny and contained a few seeds and a little plant debris. There were only traces of invertebrate remains, including two *Daphnia* sp. ephippia (water flea resting eggs). The material was of no substantial interpretative value.

Context 5013 Sample 9/2 (5kg; remaining material from monolith tin. Possibly dumped occupation material within silted standing water)

Moist, light/mid brown to light/mid orangish brown and pinkish patches (?mineral deposition), 'cheesy' (working plastic), slightly sandy clay silt. Vivianite and ?decayed twigs were present.

The concentration of macro-invertebrate remains was not as high as in some of the samples higher in the sequence (31/kg for the adult beetles and bugs), but the large subsample processed provided a very substantial assemblage. For the adult beetles and bugs, whole-assemblage diversity was quite high (alpha = 97, SE = 14), but probably in the normal range for deposits formed in the open with a substantial component from natural or semi-natural habitats. These habitats, roughly measured by the parameter 'OB', contributed over half of the individuals and species, with aquatics very significantly represented (over a fifth of the individuals). The most abundant species was a water beetle (*Helophorus* sp., 13 individuals), and there were 16 aquatic taxa, all of which might be found in still water with at least some aquatic vegetation and not too much pollution, indicating the conditions within the ditch at this stage. *Daphnia* ephippia were extremely abundant. Damp-ground forms, likely to have lived at the edge of the water, were not present in significant numbers.

Terrestrial 'outdoor' species included phytophages suggesting the presence of herbaceous vegetation including crucifers, rushes (*Juncus* spp.), docks (*Rumex* spp.), knotgrasses (*Polygonum* spp.) and vetches or clovers. There were a few dung beetles, perhaps indicating grazing nearby but not necessarily immediately adjacent to the ditch: three individuals of *Aphodius contaminatus* and a second *Aphodius*, two of *A ?prodromus*, and single specimens of *A ?ater*, another *Aphodius*, and a *Geotrupes* sp. This group of species, together with the plant-feeders, strongly suggests human dominance over the landscape, and no insects indicative of unmodified 'natural' habitats were found.

Other decomposers were present in rather limited numbers, and (together with the dung beetles) accounted for less than a fifth of the assemblage of adult beetles and bugs. Species typically associated with fairly dry decaying matter were rare (only 3% of the individuals), and foul-matter taxa other than true dung beetles almost absent. Synanthropes typical of occupation sites were represented almost exclusively by

facultative forms, and even these were rare (% N SA = 6.5; % N SF = 5.9; Table 3).

Overall, it appears that this deposit formed in fairly clean water with some vegetation, in an area which was strongly modified by human activity and included grazing land, but no evidence of intensive occupation was obtained from the insect remains.

Context 5012 Sample 8/T (270g; possibly dumps of organic material)

Moist, mid/dark grey-brown, stiff (working crumbly to plastic), sandy clay silt.

No further material was available. The 270g processed at the assessment stage did not produce enough remains to merit further, detailed analysis. The material was described at assessment as producing a small flot, consisting mostly of plant detritus, including moss and many seeds. There was an insect assemblage of modest size, dominated by aquatics, but with a few decomposers. It was suggested that the remains indicated natural aquatic deposition with a small input from dung, perhaps in grazing land, in the surroundings. There was nothing (from the insect remains) to suggest dumped material from occupation.

Context 5011 Sample 7/2 (3.45 kg; possibly containing dumps of occupation material or miscellaneous organic inclusions in waterlogged silts)

Moist, internally dark grey with a shell of pale grey-brown and purplish-brown oxidation, 'cheesy' (working plastic), humic silt. Iron staining, compressed ?reeds and root channels present.

The concentration of remains was a little higher than in the sample from Context 5013 (an MNI of 46.4/kg for adult beetles and bugs). Outdoor taxa were predominant (over half of the species and two thirds of the individuals falling in this category, Table 3). Whole-assemblage diversity was not significantly different from the value for Context 5013 (alpha = 90, SE = 13, but note the trend through the sequence, Table 3), strongly indicating the presence of a dominant community *in situ*. This community was an aquatic one: over a fifth of the individuals belonging to aquatic taxa and there were also numerous *Daphnia* ephippia. The water beetles and bugs suggested conditions as for Context 5013.

The terrestrial insects included a substantial proportion of plant feeders (these accounting for almost a quarter of the assemblage). These phytophages mostly occurred in small numbers but the froghopper *Conomelus anceps* was abundant; with 17 individuals it was the commonest of the taxa contributing to the main statistics. *C. anceps* is associated with *Juncus* and doubtless lived close to the ditch. Among the remaining terrestrial forms there were a few ground beetles and decomposers. The latter contributed only 9% of the assemblage, half of this component being associated with foul matter, including dung.

Deposition at this stage of the infilling of the ditch remained aquatic, and the surroundings were essentially as when Context 5013 was being laid down; evidence for grazing in the immediate surroundings was, however, considerably weaker.

Context 5008 Sample 6/2 (3.33 kg; possibly dumped material with organic inclusions, or natural accumulation of silt and plant debris in standing water)

Moist, mid/dark grey-brown, crumbly (working just plastic), silt. The sediment appeared heterogeneous or mottled on the mm scale with some patches of ?decayed humic matter and abundant fine stones (2-6 mm).

The concentration of adult beetles and bugs was again higher in the subsample from this layer (58/kg), and the value of alpha, although barely significantly lower than that for the assemblage from Context 5011, continued the downward trend seen below (dropping to 79, SE = 10). The proportion of aquatics (4%) was dramatically lower than in the rest of the

sequence, and *Daphnia* ephippia were rare, but there were just enough water beetles to suggest at least temporary water. There was a much smaller component of plant feeders than in other samples from the site, and a notable feature of the 'outdoor' component was a group of species from moorland/heathland habitats (*Bradycellus ruficollis*, *Micrelus ericae* and *Ulopa reticulata*). These may have arrived as 'background fauna', but importation with plant resources is a possibility.

The most striking feature of this assemblage was the presence of (relatively) abundant decomposers: 44% of the individuals fell in this category, as did 15 of the 17 taxa represented by three or more individuals. The most abundant taxa were a *Ptenidium* species (17 individuals), *Carpelimus bilineatus* (15), *Platystethus arenarius* (9), *Anotylus tetracarinatus* (7), *Cercyon analis* (6), and an *Atomaria* species (5). Some of these and some of the rarer decomposer taxa are regarded as at least facultative synanthropes, and there were 20 coded synanthropic taxa, contributing over a fifth of the assemblage. It appears likely that these either bred in some material in the dried-up ditch, or (more probably) entered with dumped refuse resulting from human activity of some kind. The records of *Crataraea suturalis* and *Cryptophagus scutellatus* are regarded as quite strong evidence for artificial habitats. There were no strong synanthropes, however, and no clear evidence from the beetles for a fauna from within a structure. This may simply reflect the failure of such species to arrive at the site, rather than the lack of buildings contemporary with deposition - the rate of arrival of synanthropes at isolated sites is still a matter for speculation (Kenward, forthcoming).

In strong contrast to this evidence is the record of seven human fleas, *Pulex irritans*. While this insect has occasionally been recorded on other hosts, it is reasonable to assume that the present specimens came from within a building *used* by humans (not necessarily a dwelling, however, since fleas can breed in litter). A second significant record is that of very large numbers of scale insects (Coccidoidea). Although these have not been identified to species (thus giving a host range), it is most probable that they originated on plant material (such as brushwood) which was dumped into the ditch. Perhaps this material was a component of litter from the floor of a building. If this was the case, it seems as likely that the dumped layer included byre or stable litter as that it came from a house.

Secondary Linear Cut Feature

Context 5006 Sample 5/2 (3.27 kg; possibly ploughsoil from ploughed down earthwork or perhaps waterborne silt)

Moist, mid grey-brown (mottled browner and greyer), stiff (working crumbly, plastic and sticky when wet), slightly sandy clay silt with patches of iron staining and a few white flecks

Although of lower diversity (Table 3), the assemblage of beetles and bugs from this deposit was broadly like those from Contexts 5013 and 5011, with a large proportion of 'outdoor' forms and a very large aquatic component (% N W = 29; there were also numerous *Daphnia* ephippia), indicating conditions much as lower in the sequence. There was a very modest decomposer group (only a fifth of the individuals). Half of the latter were coded 'rf', i.e. associated with foul matter, but dung beetles (*Aphodius*) were not quite sufficiently numerous to indicate very local grazing. Synanthropes were rather rare and over half categorised as 'facultative', so that there was no evidence of human occupation from the insect remains.

Discussion

The massive ditch at Dalhousie Mains appears, at least in the part seen in Trench IV, to have infilled gradually in its early stages by a combination of sedimentation from the steep unstable sites, and deposition of organic matter through natural vegetational development. There is no evidence from the invertebrate remains for the introduction of any material by

dumping at this stage. Indeed, and perhaps remarkably, there is no evidence for any human activity from the lower contexts (5023 - 5011) or from the fill of the secondary cut (5006), apart from modification of the landscape resulting from agricultural use. There was probably grazing land around the site, although the evidence from dung beetles suggests that stock may not have deposited dung immediately by the ditch. This is perhaps not surprising while the sides of the ditch were still very steep; it would have presented a considerable hazard to beasts, which may consequently have been kept away. The insects indicate that the water in the ditch was not seriously polluted (by dung or human ejectamenta), that it carried an aquatic flora including some emergent or waterside plants, and that its immediate surroundings probably had a vegetation limited to typical taxa of grazing land or disturbed ground. Grassland is indicated by the records of *Phyllopertha horticola* (larvae on the roots of grasses and herbs, often in poor pasture in hill areas) and *Dascillus cervinus* (larvae on plant roots, typically grasses).

The steepness of the cut sides at the earlier stages of infill may be responsible for the remarkably small proportion of species associated with damp ground and water margins (D): 1.5-5.2% in the lower three contexts. Perhaps there were effectively no 'marginal' habitats at this stage. The proportion is rather higher, at 8%, in the uppermost context (5006). This may be because by this stage the cut sides had collapsed to become shallower, allowing invasion of marginal vegetation and exposing bare mud for insect colonisation. Even so, only eleven 'D' individuals were recorded, most of them belonging to two species: the ground beetle *Bembidion aeneum* and the weevil *Notaris acridulus*. The remaining individuals were of *Anotylus nitidulus*, which is so eurytopic that it perhaps should be removed from the D category.

Trees were represented by only a single insect: the tiny weevil *Rhamphus pulicarius*, found on various tree and shrub species. Only a single deadwood insect was recorded: a woodworm, *Anobium ?punctatum*, represented by a minute elytral fragment from Context 5013. While *A. punctatum* is typical of structural timber, it is common in the open too; it is also possible that the specimen belongs to *A. inexpectatum*, found in ivy.

The contrast between the assemblages from Context 5008 and those from the remaining contexts is striking, and most likely to be the result of dumping of litter by humans. The material may have come from a stable or byre; even this layer gives no definite indications of human dwelling, however.

This investigation has provided useful information which, when combined with the results of botanical and other analyses, will allow the depositional regime and the nature of the materials input to be defined more closely. It has not, however, answered one major question: why should the occupants of the site have dug an extensive, deep and wide ditch which does not appear to have had substantial buildings within it? The suggestion of O'Sullivan (1994) that the archaeological traces of structures had been ploughed out seems a reasonable one, except that there appears to be no record of a scatter of artefacts resulting from this, and that there was no evidence from six of the seven samples examined for insect remains for human occupation. At first sight, it seems unlikely that occupation contemporary with the earlier stages of infilling of the ditch, which must have taken some decades at least, would not have left *some* evidence in the insect assemblages.

It must be said, however, that the relationship between the distance of structures and the numbers of synanthropic insects likely to enter the deposits examined for insects, is uncertain (Kenward, forthcoming). A medieval farm site at Fazakerley, Merseyside, illustrates this uncertainty particularly well. Here, the fills of a pond which lay within 30 metres of an apparently contemporaneous occupation site were examined (Hall *et al.* 1996). The synanthropic fauna was very restricted, despite the close proximity of a

likely source; was this a reflection of an impoverished fauna (perhaps the result of small size and isolation) or was some selective depositional process involved? Two mechanisms may have prevented transfer of synanthropes from the settlement to the pond at Fazakerley: the presence of an intervening ditch and bank (perhaps with a hedge), which may have discouraged dumping, and the location of the pond to the west of the settlement, i.e. upwind during warm, humid weather with gentle south-westerly air movement, the most likely atmospheric conditions to stimulate migration of most synanthropic species. Conceivably some characteristic of the site at Bonnyrigg had a similar effect.

On the other hand, is it possible that the site was abandoned during an early stage of construction, when the ditch was dug but before any occupation which left clear traces? If this was so, perhaps the evidence for synanthropes, and thus for human utilisation of the site in the later part of the ditch sequence, is completely unrelated to the initial construction, and perhaps this stage was one of very low-grade use as an animal enclosure with some kind of shed to protect stock and perhaps provide shelter for their human minder.

Retention and disposal

Material assigned P0 or P3 in the assessment can be disposed of so far as the invertebrate remains are concerned; other samples should be retained for at least three years after publication to allow for further investigation. Flots and residues from invertebrate analysis should be retained in the longer term.

Archive

All extracted fossils and flots 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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Table 1. Complete list of invertebrate taxa recorded from Dalhousie Mains, Bonnyrigg, Midlothian. Conventions: `sp(?).' - indicates probable additional taxon; `sp(?). indet.' - indicates may be (or include) previously listed taxon or taxa. Order and nomenclature for Insecta follows Kloet and Hincks (1964-77). An asterisk (*) against a code indicates that there are reservations concerning its appropriateness.

CLADOCERA
Daphnia sp. (ephippium)

DERMAPTERA
Dermaptera sp.

HEMIPTERA
Scolopostethus sp. oa-p
Saldula ?saltatoria (Linnaeus) oa-d
Corixa punctata oa-w
?Sigara spp. oa-w
Corixidae spp. oa-w
Ulopa reticulata (Fabricius) oa-p-m
Conomelus anceps (Germar) oa-p
Auchenorhyncha spp. oa-p
Auchenorhyncha sp. (nymph)
Psylloidea sp. oa-p
Psylloidea sp. (nymph)
Aphidoidea sp.
Coccoidea sp.
Hemiptera sp. (nymph)

TRICHOPTERA
Trichoptera sp. (larval case)

DIPTERA
Bibionidae sp.
Chironomidae sp. (larva)
Syrphidae sp. (larva)
Diptera sp. (adult)
Diptera sp. (larva)
Diptera sp. (pupa)
Diptera sp. (puparium)

SIPHONAPTERA
Pulex irritans Linnaeus

HYMENOPTERA
Formicidae sp.
Hymenoptera sp.

COLEOPTERA
Nebria brevicollis (Fabricius) oa
Loricera pilicornis (Fabricius) oa
Dyschirius sp. oa
Clivina fossor (Linnaeus) oa
Trechus quadristriatus (Schrank) oa
Trechus obtusus or *quadristriatus* oa
Bembidion lampros or *properans* oa
Bembidion aeneum Germar oa-d
Bembidion spp. oa
Pterostichus strenuus (Panzer) oa
Pterostichus diligens or *strenuus* oa
Pterostichus (*Poecilus*) sp. oa
Pterostichus spp. ob
Calathus fuscipes (Goeze) oa
Calathus sp. oa
Amara spp. oa
Harpalus spp. oa
Bradycellus ruficollis (Stephens) oa-m
Carabidae spp. indet. ob
Haliplus sp. oa-w
Haliplidae sp. indet. oa-w
Hydroporinae spp. oa-w
Agabus bipustulatus (Linnaeus) oa-w
Agabus nebulosus (Forster) oa-w
Agabus sp. oa-w
Colymbetes fuscus (Linnaeus) oa-w
Colymbetinae sp. oa-w
Dytiscus sp. oa-w
Hygrotus inaequalis (Fabricius) oa-w
Hydrochus sp. oa-w
Helophorus ?aquaticus (Linnaeus) oa-w
Helophorus grandis Illiger oa-w
Helophorus ?nubilus Fabricius oa
Helophorus tuberculatus Gyllenhal oa
Helophorus spp. oa-w
Cercyon analis (Paykull) rt-sf
Cercyon ?haemorrhoidalis (Fabricius) rf-sf
Cercyon melanocephalus (Linnaeus) rt-sf
Cercyon ?terminatus (Marsham) rf-st
Cercyon spp. indet. u
Megasternum obscurum (Marsham) rt
Cryptopleurum minutum (Fabricius) rf-st
Hydrobius fuscipes (Linnaeus) oa-w
Chaetarthria seminulum (Herbst) oa-w
Hydrophilinae spp. A oa-w
Acritus nigricornis (Hoffmann) rt-st
Onthophilus striatus (Forster) rt
Hister bissexstriatus Fabricius rt-sf
Histerinae sp. indet. rt
Ochthebius bicolon Germar oa-w
Ochthebius auriculatus or *dilatatus* oa-w
Ochthebius ?minimus (Fabricius) oa-w
Ochthebius spp. indet. oa-w
Limnebius aluta or *nitidus* oa-w

Limnebius truncatellus (Thunberg) oa-w
Limnebius sp. indet. oa-w
Ptenidium sp. rt
Acrotrichis spp. rt
Catops sp. u
Silphidae sp. u
Scydmaenidae sp. u
Micropeplus fulvus Erichson rt
Micropeplus sp. indet. rt
Megarthrus sp. rt
Lesteva longoelytrata (Goeze) oa-d
Lesteva sp. oa-d
Omalium sp. rt
Xylodromus concinnus (Marsham) rt-st
Carpelimus bilineatus Stephens rt-sf
Carpelimus ?corticinus (Gravenhorst) oa-d
Carpelimus spp. u
Aploderus caelatus (Gravenhorst) rt
Platystethus arenarius (Fourcroy) rf
Platystethus nitens (Sahlberg) oa-d
Platystethus nodifrons (Mannerheim) oa-d
Anotylus complanatus (Erichson) rt-sf
Anotylus nitidulus (Gravenhorst) rt-d*
Anotylus rugosus (Fabricius) rt
Anotylus sculpturatus group rt
Anotylus tetracarinatus (Block) rt
Oxytelus sculptus Gravenhorst rt-st
Stenus spp. u
Lathrobium sp. u
Rugilus orbiculatus (Paykull) rt-sf
Leptacinus sp. rt-st
Gyrohypnus angustatus Stephens rt-st
Gyrohypnus fracticornis (Muller) rt-st
Gyrohypnus spp. indet. rt
Xantholinus glabratus (Gravenhorst) rt
Xantholinus linearis (Olivier) rt-sf
Xantholinus sp. indet. u
Philonthus spp. u
Quedius cinctus (Paykull) rt
Staphylininae spp. indet. u
Mycetoporus sp. u
Tachyporus spp. u
Tachinus corticinus Gravenhorst u
Tachinus laticollis or *marginellus* u
Tachinus signatus Gravenhorst u
Tachinus sp. u
Falagria sp. rt-sf
Crataraea suturalis (Mannerheim) rt-st
Aleochara sp. u
Aleocharinae spp. A u
Geotrupes sp. oa-rf
Aphodius ?ater (Degeer) oa-rf
Aphodius contaminatus (Herbst) oa-rf
Aphodius ?prodromus (Brahm) ob-rf
Aphodius spp. ob-rf
Serica brunnea (Linnaeus) oa-p
Phyllopertha horticola (Linnaeus) oa-p
Melolonthinae/Rutelinae/Cetoninae sp. indet. oa-p
Dascillus cervinus (Linnaeus) oa-p
Clambus pubescens Redtenbacher rt-sf
Agriotes sp. oa-p
Elateridae sp. ob
Cantharidae spp. ob
Anobium ?punctatum (Degeer) l-sf
Ptinus sp. rd-sf
Brachypterus sp. oa-p
Meligethes ?aeneus oa-p
Meligethes sp. oa-p
Monotoma picipes Herbst rt-st
Cryptophagus scutellatus Newman rd-st
Cryptophagus spp. rd-sf
Atomaria spp. A rd
Ephistemus globulus (Paykull) rd-sf
Orthoperus sp. rt
?Scymnus sp. s. lat. oa-p
Lathridius minutus group rd-st
Enicmus sp. rt-sf
Dienerella sp. rd-sf
Corticaria spp. rt-sf
Corticarina sp. rt
Chrysolina fastuosa (Scopoli) oa-p
Gastrophysa polygoni (Linnaeus) oa-p
Gastrophysa ?viridula (Degeer) oa-p
Phaedon sp. oa-p
Longitarsus spp. oa-p
Crepidodera sp. oa-p
Chaetocnema concinna (Marsham) oa-p
Chaetocnema sp. oa-p
Halticinae sp. oa-p
Apion (*Ceratapion*) *?carduorum* Kirby oa-p
Apion spp. oa-p
Phyllobius or *Polydrusus* sp. oa-p
Sitona hispidulus (Fabricius) oa-p
Sitona lepidus Gyllenhal oa-p
Notaris acridulus (Linnaeus) oa-d-p
Micrelus ericae (Gyllenhal) oa-p-m
Ceutorhynchus ?contractus (Marsham) oa-p
Ceutorhynchus spp. oa-p
Rhamphus pulicarius (Herbst) oa-p
Curculionidae sp. oa
Coleoptera spp. u
Coleoptera sp. (larva)

Insecta sp. u
Insecta sp. pupa u

ARACHNIDA
Acarina sp.
Aranae sp.
Opiliones sp

Table 2. Abbreviations used in text and tables. Lower case codes in parentheses are those assigned to taxa and used to calculate the group values (codes in capitals). See Table 1 for codes assigned to taxa from Bonnyrigg. Indivs - individuals (based on MNI); No – number.

No taxa	S		Percentage of indivs of grain pests	%NG	
Estimated number of indivs (MNI)	N		No decomposer taxa (rt + rd + rf)	SRT	
Index of diversity (∀)	alpha		Percentage of RT taxa	%SRT	
Standard error of alpha	SE alpha		No RT indivs	NRT	
No 'certain' outdoor taxa (oa)	SOA		Percentage of RT indivs	%NRT	
Percentage of 'certain' outdoor taxa	%SOA		Index of diversity of RT component	alpha RT	
No 'certain' outdoor indivs	NOA		Standard error	SEalphaRT	
Percentage of 'certain' outdoor indivs	%NOA		No 'dry' decomposer taxa (rd)	SRD	
No OA and probable outdoor taxa (oa + ob)	SOB		Percentage of RD taxa %	SRD	
Percentage of OB taxa	%SOB		No RD indivs	NRD	
No OB indivs	NOB		Percentage of RD indivs	%NRD	
Percentage OB indivs	%NOB		Index of diversity of the RD component	alphaRD	
Index of diversity of the OB component	alphaOB		Standard error	SEalphaRD	
Standard error	SEalphaOB		No 'foul' decomposer taxa (rf)	SRF	
No aquatic taxa (w)	SW		Percentage of RF taxa	%SRF	
Percentage of aquatic taxa	%SW		No RF indivs	NRF	
No aquatic indivs	NW		Percentage of RF indivs	%NRF	
Percentage of W indivs	%NW		Index of diversity of the RF component	alphaRF	
Index of diversity of the W component	alphaW		Standard error	SEalphaRF	
Standard error	SEalphaW		No synanthropic taxa (sf+st_ss)	SSA	
No damp ground/waterside taxa (d)	SD		Percentage of synanthropic taxa	PSSA	
Percentage D taxa	%SD		No synanthropic indivs	NSA	
No damp D indivs			Percentage of SA indivs	PNSA	ND
Percentage of D indivs	%ND		Index of diversity of SA component	ALPHASA	
Index of diversity of the D component	alphaD		Standard error	SEALPHASA	
Standard error	SEalphaD		No facultatively synanthropic indivs	SSF	
No strongly plant-associated taxa (p)	SP		Percentage of SF taxa	PSSF	
Percentage of P taxa	%SP		No SF indivs	NSF	
No strongly P indivs	NP		Percentage of SF indivs	PNSF	
Percentage of P indivs	%NP		Index of diversity of SF component	ALPHASF	
Index of diversity of the P component	alphaP		Standard error	SEALPHASF	
Standard error	SEalphaP		No typical synanthropic indivs	SST	
No heathland/moorland taxa (m)	SM		Percentage of ST taxa	PSST	
Percentage of M taxa	%SM		No ST indivs	NST	
No M indivs	NM		Percentage of ST indivs	PNST	
Percentage of M indivs	%NM		Index of diversity of ST component	ALPHAST	
Index of diversity of the M component	alphaM		Standard error	SEALPHAST	
Standard error	SEalphaM		No strongly synanthropic taxa	SSS	
No wood-associated taxa (l)	SL		Percentage of SS taxa	PSSS	
Percentage of L taxa	%SL		No SS indivs	NSS	
No L indivs	NL		Percentage of SS indivs	PNSS	
Percentage of L indivs	%NL		Index of diversity of SS component	ALPHASS	
Index of diversity of the L component	alphaL		Standard error	SEALPHASS	
Standard error	SEalphaL		No uncoded taxa (u)	SU	
No indivs of grain pests (g)	NG		Percentage of uncoded indivs	PNU	

Table 3. Main statistics for assemblages of adult beetles and bugs (excluding Aphidoidea and Coccidoidea) from samples from Bonnyrigg, Midlothian. For explanation of abbreviations see Table 2. Note that an initial 'P' in this table should be read as '%' in Table 2 when cross-referring.

Sitecode	AOC1140	AOC1140	AOC1140	AOC1140	
Context	5006	5008	5011	5013	
Sample	5	6	7	1000	Whole site
Ext	/2	/2	/2	/1	
S	78	98	92	92	232
N	139	194	160	153	646
ALPHA	73	79	90	97	130
SEALPHA	11	10	13	14	8
SOB	48	37	58	49	127
PSOB	61.5	37.8	63.0	53.3	54.7
NOB	86	49	107	80	322
PNOB	61.9	25.3	66.9	52.3	49.8
ALPHAOB	45	68	52	53	77
SEALPHAOB	9	21	9	11	6.9
SW	14	5	21	16	36
PSW	17.9	5.1	22.8	17.4	15.5
NW	40	7	42	33	122
PNW	28.8	3.6	26.3	21.6	18.9
ALPHAW	8	0	17	12	17.3
SEALPHAW	2	0	4	4	2.5
SD	3	1	4	4	8
PSD	3.8	1.0	4.3	4.3	3.4
ND	11	3	5	8	27
PND	7.9	1.5	3.1	5.2	4.2
ALPHAD	0	0	0	0	4
SEALPHAD	0	0	0	0	1
SP	16	17	18	17	43
PSP	20.5	17.3	19.6	18.5	18.5
NP	21	21	39	24	105
PNP	15.1	10.8	24.4	15.7	16.3
ALPHAP	32	43	13	27	27
SEALPHAP	16	25	4	12	4
SM	0	3	0	0	3
PSM	0.0	3.1	0.0	0.0	1.3
NM	0	5	0	0	5
PNM	0.0	2.6	0.0	0.0	0.8
ALPHAM	0	0	0	0	0
SEALPHAM	0	0	0	0	0
SL	0	0	0	1	1
PSL	0.0	0.0	0.0	1.1	0.4
NL	0	0	0	1	1
PNL	0.0	0.0	0.0	0.7	0.2

Sitecode	AOC1140	AOC1140	AOC1140	AOC1140	
Context	5006	5008	5011	5013	
Sample	5	6	7	1000	Whole site
Ext	/2	/2	/2	/1	
ALPHAL	0	0	0	0	0
SEALPHAL	0	0	0	0	0
SRT	12	27	10	14	87
PSRT	15.4	27.6	10.9	15.2	37.5
NRT	28	86	15	29	241
PNRT	20.1	44.3	9.4	19.0	37.3
ALPHART	8	14	0	11	49
SEALPHART	3	2	0	3	5
SRD	2	8	2	4	16
PSRD	2.6	8.2	2.2	4.3	6.9
NRD	2	19	2	4	27
PNRD	1.4	9.8	1.3	2.6	4.2
ALPHARD	0	0	0	0	16.8
SEALPHARD	0	0	0	0	6
SRF	7	7	6	8	28
PSRF	9.0	7.1	6.5	8.7	12.1
NRF	10	20	8	18	56
PNRF	7.2	10.3	5.0	11.8	8.7
ALPHARF	0	4	0	0	23
SEALPHARF	0	1	0	0	5
SSA	8	20	4	8	32
PSSA	10.3	20.4	4.3	8.7	13.8
NSA	10	54	4	10	78
PNSA	7.2	27.8	2.5	6.5	12.1
ALPHASA	0	12	0	0	20
SEALPHASA	0	3	0	0	4
SSF	4	10	4	7	20
PSSF	5.1	10.2	4.3	7.6	8.6
NSF	6	36	4	9	55
PNSF	4.3	18.6	2.5	5.9	8.5
ALPHASF	0	5	0	0	11
SEALPHASF	0	1	0	0	3
SST	4	10	0	1	12
PSST	5.1	10.2	0.0	1.1	5.2
NST	4	18	0	1	23
PNST	2.9	9.3	0.0	0.7	3.6
ALPHAST	0	0	0	0	10
SEALPHAST	0	0	0	0	4
SSS	0	0	0	0	0
PSSS	0.0	0.0	0.0	0.0	0
NSS	0	0	0	0	0
PNSS	0.0	0.0	0.0	0.0	0
ALPHASS	0	0	0	0	0

Sitecode	AOC1140	AOC1140	AOC1140	AOC1140	
Context	5006	5008	5011	5013	
Sample	5	6	7	1000	Whole site
Ext	/2	/2	/2	/1	
SEALPHASS	0	0	0	0	0

Table 4. 'Dominance' (Berger and Parker 1970) values for samples from Dalhousie Mains, Bonnyrigg, Midlothian. The most abundant taxon (i.e. that responsible for the dominance value) is noted.

Sitecode	AOC1140	AOC1140	AOC1140	AOC1140
Context	5006	5008	5011	5013
Sample	5/2	6/2	7/2	1000/1
Dominance (% of most abundant taxon)	*8.2%* (*Helophorus* sp. A)	*8.7%* (*Ptenidium* sp.)	*9.7%* *(Conomelus anceps)*	*7.3%* (*Helophorus* sp. B)

Table 5. Lists of invertebrates from Dalhousie Mains, Bonnyrigg, by sample in rank order. For each sample a list for those groups used in caluclating main statistics (adult Coleoptera and Hemiptera excluding Coocidoidea and Aphidoidea) is followed by a list of other invertebrates. The latter were recorded semi-quantitatively, the numbers having been converted for storage (see text).

Context 5006, Sample 5/2

Helophorus sp. A	12
Megasternum obscurum	9
Helophorus ?aquaticus	7
Helophorus sp. B	7
Aleocharinae sp. C	7
Notaris acridulus	6
Bembidion aeneum	5
Anotylus rugosus	4
Aphodius ?prodromus	4
Hydrobius fuscipes	3
Anotylus nitidulus	3
Corticaria sp. A	3
Trechus quadristriatus	2
Calathus fuscipes	2
Amara sp.	2
Limnebius ?truncatellus	2
Lesteva longoelytrata	2
Anotylus sculpturatus group	2
Tachyporus sp.	2
Corixidae sp.	1
Auchenorhyncha sp. A	1
Auchenorhyncha sp. B	1
Auchenorhyncha sp. C	1
Nebria ?brevicollis	1
Loricera pilicornis	1
Dyschirius sp.	1
Bembidion sp. A	1
Bembidion sp. B	1
Pterostichus diligens or strenuus	1
?Pterostichus sp.	1
Pterostichus sp. B	1
Harpalus sp.	1
Haliplidae sp.	1
Hydroporinae sp. A	1
Hydroporinae sp. B	1
Hydroporinae sp. C	1
Agabus bipustulatus	1
Agabus sp.	1
Helophorus ?grandis	1
Cercyon ?terminatus	1
Cercyon sp.	1
Cryptopleurum minutum	1
Ochthebius sp.	1
Silphidae sp.	1
Omalium sp.	1
Carpelimus ?bilineatus	1
Platystethus arenarius	1
Stenus sp.	1
Lathrobium sp.	1
Gyrohypnus sp. A	1
Gyrohypnus sp. B	1
Xantholinus glabratus	1
Xantholinus ?linearis	1
Staphylininae sp. A	1
Staphylininae sp. B	1
Mycetoporus sp.	1
Tachinus ?signatus	1
Tachinus sp.	1
Aleocharinae sp. A	1
Aleocharinae sp. B	1
Aphodius ?ater	1
Aphodius sp. B	1
Aphodius sp. C	1
Serica brunnea	1
Dascillus cervinus	1
Elateridae sp.	1
Meligethes sp. A	1
Meligethes sp. B	1
Monotoma picipes	1
Cryptophagus sp.	1
Orthoperus sp.	1
Lathridius minutus group	1
Corticaria sp. B	1
Chrysolina fastuosa	1
Longitarsus sp.	1
Crepidodera sp.	1
?Chaetocnema concinna	1
Halticinae sp.	1
Apion (Ceratapion) ?carduorum	1
Apion sp.	1
Sitona hispidulus	1
Ceutorhynchus sp.	1
Coleoptera sp. (larva)	15
Acarina sp.	15
Daphnia sp. (ephippium)	15
Diptera sp. (adult)	15
Diptera sp. (larva)	6
Formicidae sp.	6
Opiliones sp.	5
Dermaptera sp.	3

Context 5008, Sample 6/2

Ptenidium sp.	17
Carpelimus bilineatus	15
Platystethus arenarius	9
Anotylus tetracarinatus	7
Cercyon analis	6
Atomaria sp. A	5
Clambus pubescens	4
Helophorus sp.	3
Megasternum obscurum	3
Anotylus nitidulus	3
Oxytelus sculptus	3
Gyrohypnus angustatus	3
Aphodius ?contaminatus	3
Aphodius sp. A	3
Ephistemus globulus	3
Lathridius minutus group	3
Longitarsus sp.	3
Bradycellus ruficollis	2
Acritus nigricornis	2
Acrotrichis sp. A	2
Acrotrichis sp. B	2
Micropeplus fulvus	2
Omalium sp.	2
Xylodromus concinnus	2
Carpelimus sp.	2
Xantholinus linearis	2
Tachinus signatus	2
Aleochara sp.	2
Aleocharinae sp. B	2
Aleocharinae sp. C	2
Aleocharinae sp. G	2
Aphodius ?prodromus	2
Cryptophagus sp. A	2
Cryptophagus sp. B	2
Atomaria sp. B	2
Chaetocnema concinna	2
Micrelus ericae	2
Scolopostethus sp.	1
Ulopa reticulata	1
Auchenorhyncha sp. A	1
Auchenorhyncha sp. B	1
Bembidion lampros or properans	1
Bembidion sp.	1
Pterostichus strenuus	1
Pterostichus sp. A	1
Calathus sp.	1
Amara sp.	1
Carabidae sp. A	1
Carabidae sp. B	1
Colymbetinae sp.	1
Helophorus aquaticus or grandis	1
Cercyon melanocephalus	1
Cercyon sp.	1
Cryptopleurum minutum	1
Hydrobius fuscipes	1
Onthophilus striatus	1
Histerinae sp.	1
Ochthebius sp.	1
Silphidae sp.	1
Scydmaenidae sp.	1
Aploderus caelatus	1
Anotylus rugosus	1
Leptacinus sp.	1
Gyrohypnus fracticornis	1
Philonthus sp. A	1
Philonthus sp. B	1
Philonthus sp. C	1
Quedius cinctus	1
Staphylininae sp.	1
Staphylininae sp.	1
Tachyporus sp. A	1
Tachyporus sp. B	1
Tachinus laticollis or marginellus	1
Falagria sp.	1
Crataraea suturalis	1
Aleocharinae sp. A	1
Aleocharinae sp. D	1
Aleocharinae sp. E	1
Aleocharinae sp. F	1
Aleocharinae sp. H	1
Geotrupes sp.	1
Aphodius sp. B	1
Phyllopertha horticola	1
Dascillus cervinus	1
Agriotes sp.	1
Ptinus sp.	1
?Brachypterus sp.	1
Meligethes sp.	1
Cryptophagus scutellatus	1
?Scymnus sp. s. lat.	1
Corticaria sp.	1
Gastrophysa ?viridula	1
Halticinae sp.	1
Apion sp.	1
Phyllobius or Polydrusus sp.	1
Sitona lepidus	1
Rhamphus pulicarius	1
Curculionidae sp.	1
Coleoptera sp. A	1
Coleoptera sp. B	1
Coccoidea sp.	100
Diptera sp. (puparium)	50
Acarina sp.	15
Pulex irritans	7
Coleoptera sp. (larva)	6
Diptera sp. (adult)	6
Formicidae sp.	6

Insecta sp. pupa	6
Opiliones sp.	6
Aranae sp.	2
Daphnia sp. (ephippium)	2
Aphidoidea sp.	1
Bibionidae sp.	1
Dermaptera sp.	1
Syrphidae sp. (larva)	1

Context 5011, Sample 7/2

Conomelus anceps	17
Helophorus sp. A	9
Cercyon sp. A	6
Cercyon sp. B	4
Stenus sp. B	4
Longitarsus sp. B	4
Trechus obtusus or quadristriatus	3
Hydroporinae sp. B	3
Agabus bipustulatus	3
Megasternum obscurum	3
Onthophilus striatus	3
Ochthebius ?minimus	3
Ochthebius sp. A	3
Auchenorhyncha sp. C	2
Nebria brevicollis	2
Agabus sp.	2
Helophorus ?nubilus	2
Helophorus sp. B	2
Hydrobius fuscipes	2
Hydrophilinae sp. B	2
Hydrophilinae sp. C	2
Lesteva sp.	2
Stenus sp. A	2
Xantholinus ?linearis	2
Philonthus sp. A	2
Aleocharinae sp. A	2
Aphodius ?contaminatus	2
Aphodius sp.	2
Crepidodera sp.	2
Corixidae sp. A	1
Corixidae sp. B	1
Auchenorhyncha sp. A	1
Auchenorhyncha sp. B	1
Auchenorhyncha sp. E	1
Clivina fossor	1
Calathus fuscipes	1
Calathus sp.	1
Amara sp. A	1
Amara sp. B	1
Carabidae sp.	1
Hydroporinae sp. A	1
Hydroporinae sp. C	1
Colymbetes fuscus	1
Colymbetinae sp.	1
Dytiscus sp.	1
Hydrochus sp.	1
Cercyon sp. C	1
Hydrophilinae sp. A	1
Ochthebius sp. B	1
Limnebius sp.	1
Acrotrichis sp.	1
Catops sp.	1
Micropeplus sp.	1
Omalium sp.	1
Carpelimus ?corticinus	1
Carpelimus sp. B	1
Platystethus arenarius	1
Platystethus nitens	1
Anotylus nitidulus	1
Stenus sp. C	1
Gyrohypnus sp.	1
Philonthus sp. B	1
Staphylininae sp. A	1
Mycetoporus sp.	1
Tachyporus sp. A	1
Tachyporus sp. B	1
Tachinus ?signatus	1
?Tachinus sp.	1
Aleochara sp.	1
Aleocharinae sp. B	1
Geotrupes sp.	1
Aphodius sp. B	1
Aphodius sp. C	1
Melolonthinae/Rutelinae/Cetoninae sp.	1
Dascillus cervinus	1
Cantharidae sp.	1
Meligethes sp.	1
Cryptophagus sp.	1
Enicmus sp.	1
Dienerella sp.	1
Corticaria sp.	1
Chrysolina fastuosa	1
Longitarsus sp. A	1
Chaetocnema sp.	1
Apion sp. A	1
Apion sp. B	1
Phyllobius or Polydrusus sp.	1
Sitona lepidus	1
Ceutorhynchus ?contractus	1
Curculionidae sp.	1
Coleoptera sp.	1
Coleoptera sp. B	1
Opiliones sp.	15
Coleoptera sp. (larva)	15
Acarina sp.	15
Aphidoidea sp.	15
Aranae sp.	15

Daphnia sp. (ephippium)	15
Formicidae sp.	15
Diptera sp. (larva)	15
Insecta sp. pupa	15
Diptera sp. (puparium)	15
Chironomidae sp. (larva)	15
Dermaptera sp.	6
Diptera sp. (adult)	6
Hemiptera sp. (nymph)	2
Coccoidea sp.	1
Hymenoptera sp.	1

Context 5013, Sample 1000/1

Helophorus sp. B	13
Platystethus arenarius	6
?Sigara sp. A	5
Anotylus nitidulus	5
Tachyporus sp. A	5
Onthophilus striatus	4
Ochthebius auriculatus or dilatatus	4
Anotylus tetracarinatus	4
Aleocharinae sp. C	4
Meligethes ?aeneus	4
Corixa punctata	3
Conomelus anceps	3
Trechus quadristriatus	3
Helophorus sp. A	3
Megasternum obscurum	3
Aphodius contaminatus	3
Aphodius sp. B	3
Longitarsus sp. B	3
?Sigara sp. B	2
Auchenorhyncha sp. A	2
Helophorus grandis	2
Ochthebius bicolon	2
Ochthebius sp. A	2
Aploderus caelatus	2
Anotylus complanatus	2
Tachyporus sp. B	2
Tachinus ?signatus	2
Aleocharinae sp. F	2
Aphodius ?prodromus	2
Dascillus cervinus	2
Corticaria sp.	2
Chaetocnema concinna	2
Saldula ?saltatoria	1
Auchenorhyncha sp. B	1
Psylloidea sp.	1
Nebria brevicollis	1
Pterostichus (Poecilus) sp.	1
Pterostichus sp.	1
Amara sp.	1
Harpalus sp. A	1
Harpalus sp. B	1
Haliplus sp.	1
Hydroporinae sp.	1
Agabus nebulosus	1
Agabus sp.	1
Hygrotus inaequalis	1
Hydrochus sp.	1
Helophorus tuberculatus	1
Cercyon ?haemorrhoidalis	1
Hydrobius fuscipes	1
Chaetarthria seminulum	1
Hydrophilinae sp. A	1
Hydrophilinae sp. B	1
Hister bissexstriatus	1
Ochthebius sp. B	1
Limnebius aluta or nitidus	1
Limnebius truncatellus	1
Catops sp.	1
Megarthrus sp.	1
Lesteva sp.	1
Omalium sp.	1
Platystethus nodifrons	1
Anotylus sculpturatus group	1
Rugilus orbiculatus	1
Gyrohypnus sp.	1
Xantholinus sp.	1
Philonthus sp.	1
Staphylininae sp.	1
Mycetoporus sp.	1
Tachyporus sp. C	1
Tachyporus sp. D	1
Tachinus corticinus	1
Tachinus sp.	1
Aleochara sp.	1
Aleocharinae sp. A	1
Aleocharinae sp. B	1
Aleocharinae sp. D	1
Aleocharinae sp. E	1
Aleocharinae sp. G	1
Aleocharinae sp. H	1
Aleocharinae sp. I	1
Geotrupes sp.	1
Aphodius ?ater	1
Aphodius sp. A	1
Phyllopertha horticola	1
Cantharidae sp. A	1
Cantharidae sp. B	1
Anobium ?punctatum	1
Brachypterus sp.	1
Meligethes sp.	1
Atomaria sp. A	1
Atomaria sp. B	1
Lathridius minutus group	1
Enicmus sp.	1
Dienerella sp.	1
Corticarina sp.	1

Gastrophysa polygoni	1
?Gastrophysa viridula	1
Phaedon sp.	1
Longitarsus sp. A	1
Sitona hispidulus	1
Ceutorhynchus sp. A	1
Ceutorhynchus sp. B	1
Curculionidae sp.	1
Daphnia sp. (ephippium)	100
Diptera sp. (pupa)	100
Opiliones sp.	15
Coleoptera sp. (larva)	15
Acarina sp.	15
Aranae sp.	15
Diptera sp. (adult)	15
Hemiptera sp. (nymph)	15
Diptera sp. (puparium)	15
Insecta sp.	6
Formicidae sp.	6
Trichoptera sp. (case)	6
Psylloidea sp. (nymph)	1
Auchenorhyncha sp. (nymph)	1
Aphidoidea sp.	1
Dermaptera sp.	1
Diptera sp. (larva)	1