

Palaeoecology Research Services

"
"
"
"
"
"

Technical report: The implications of macro-invertebrates, mainly insects, from medieval and early post-medieval deposits at Morton Lane, Beverley, East Riding of Yorkshire (site code: MLA01)

PRS 2003/58

Technical report: The implications of macro-invertebrates, mainly insects, from medieval and early post-medieval deposits at Morton Lane, Beverley, East Riding of Yorkshire (site code: MLA01)

by

Harry Kenward and John Carrott

Summary

An archaeological excavation was carried out by Archaeological Services, WYAS, at Morton Lane, Beverley, East Riding of Yorkshire, between the 17th of September and the 16th of November 2001. This report considers the invertebrate remains (mainly insects) recovered from deposits of medieval and early post-medieval date.

Of twelve samples processed, six gave interpretatively valuable assemblages of invertebrate remains. These have contributed to the interpretation of the individual features from which they came (providing evidence of both the immediate environment and human activity), but also have wider relevance to the site and beyond.

Four of the species present are regarded as perhaps of climatic significance, being north of their generally known range in the 21st century. Although perhaps under-recorded in the North, these species are so very common in archaeological deposits that it may be argued that, even if present in the area now, their abundances have changed greatly, climate change being one reasonable explanation.

*The record of a single head of the beetle *Prostomis mandibularis*, from Context 1239 is most unusual. Unknown in modern Britain, this species is an 'urwaldiere', associated in mainland Europe with very decayed wood in ancient forests. This record requires careful evaluation since it would move the species forward into the second millennium AD, rather than being a first millennium BC extinction as formerly supposed.*

KEYWORDS: MORTON LANE; BEVERLEY; EAST RIDING OF YORKSHIRE; TECHNICAL REPORT; MEDIEVAL; EARLY POST-MEDIEVAL; MID 12TH TO LATE 15TH CENTURY; INVERTEBRATE REMAINS; INSECTS; CLIMATE CHANGE; *PROSTOMIS MANDIBULARIS*

Contact address for authors:

Palaeoecology Research Services
Unit 8
Dabble Duck Industrial Estate
Shildon
County Durham DL4 2RA

Prepared for:

Archaeological Services, WYAS
P. O. Box 30
Nepshaw Lane South
Morley
Leeds LS27 0UG

16 July 2003

Technical report: The implications of macro-invertebrates, mainly insects, from medieval and early post-medieval deposits at Morton Lane, Beverley, East Riding of Yorkshire (site code: MLA01)

Introduction

An archaeological excavation was carried out by Archaeological Services, WYAS, at Morton Lane (to the north and east of its junction with New Walkergate), Beverley, East Riding of Yorkshire (NGR TA 033 398), between the 17th of September and the 16th of November 2001.

Two trenches were excavated revealing a complex series of deposits and features mostly of medieval date. Extensive stratified deposits were examined throughout the site and multiple phases of use and occupation were noted.

Dates obtained from pottery recovered from a number of small pits and a shallow gully gave a mid 12th century date for the earliest occupation.

Of particular interest, from the point of view of the invertebrate remains, were the later pit fills. Some of the pits had been used for the disposal of large amounts of refuse (in the late 12th to mid 13th century – Phase III) and many of their fills gave strong hints of deposition under waterlogged conditions. One of two later pits (late 15th century – Phase IV) gave remains which suggested that it had been used for hemp retting. There appears to have been no activity at the site throughout the 14th century.

An assessment of two samples from the site was carried out by Hall *et al.* (2002), following which a decision was made to carry into a main phase of analysis in which an initial review of a series of samples would be followed by targeted detailed study. In the event only six samples (of 12 submitted) were productive of more than traces of invertebrate

remains, and all of these have been recorded in detail.

Methods

The sediment samples ('GBA'/'BS' *sensu* Dobney *et al.* 1992) were inspected in the laboratory and descriptions of their lithologies were recorded using a standard *pro forma*. Subsamples were processed, following the procedures of Kenward *et al.* (1980; 1986) for the recovery of invertebrate macrofossils.

Flots, and sometimes washovers, from twelve subsamples were reviewed and detailed analysis made where appropriate: six contained more than a trace of invertebrate remains. These assemblages are discussed below. Sediment descriptions and results for the 'barren' subsamples are given in Table 1.

Remains were identified in the flots (for familiar species) or placed on damp filter paper for more careful inspection where necessary. The remains of adult beetles and bugs were 'detail' recorded in the terminology of Kenward (1992), and a record of preservational condition made using the scales presented by Kenward and Large (1998). Fossils were identified by comparison with modern reference material and using the standard works. Adult beetles and bugs, other than aphids and scale insects, were recorded fully quantitatively and a minimum number of individuals estimated on the basis of the fragments present. Other invertebrate macrofossils were usually recorded semi-quantitatively using the scale described by Kenward *et al.* (1986) and Kenward (1992), again using estimates for extremely abundant taxa. Data pertaining to invertebrate remains were recorded directly or transferred from a paper record to computer databases (using

Paradox software) for analysis and long-term storage.

The interpretative methods employed were essentially the same as those used in work on a variety of sites by Hall, Kenward and co-workers (see Kenward 1978, with modifications outlined by, for example, Kenward 1982; 1988; Hall and Kenward 1990; and Kenward and Hall 1995). Interpretation rests primarily on a number of 'main statistics' of whole assemblages of adult beetles and bugs, and on the recognition of ecologically-related groups of species. The main statistics used include: (a) a measure of species-richness (or diversity), α of Fisher *et al.* (1943), for the whole assemblage and for components of it; and (b) proportions of 'outdoor' species (OB, calculated from taxa coded oa and ob), aquatics (W, w), waterside species (D, d), phytophages (plant-feeders) (P, p), species associated with dead wood (L, l), moorland/heathland taxa (M, m), and decomposers (species associated with decomposing matter of some kind). Decomposers are subdivided into (a) species primarily associated with somewhat dry habitats (RD, rd), (b) those found mostly in rather, to very, foul habitats (RF, rf), and (c) a residuum not easily assignable to one of these (rt). The category 'RT' includes all three of these groups of decomposers (rt + rd + rf). In each case, the lower-case codes (e.g. 'rd') are those applied to species and the upper-case codes ('RD') are for the ecological group.

A further ecological component quantified for the present site was the synanthropes, i.e. those species favoured by human activity (Kenward 1997). Taxa have been assigned codes for degree of synanthropy as follows: 'sf'—facultative synanthrope, common in natural as well as artificial habitats; 'st'—typically synanthropic, but able to live in nature; 'ss'—strong synanthrope, absent from or very rare in natural habitats in the relevant geographical area. These codes give rise to ecological groups SF, ST, and SS, which are summed to give SA (all synanthropes). A group of synanthropes regarded as particularly

typical of buildings of various kinds has been termed 'house fauna' (Kenward and Hall 1995).

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 and % N RF are both high at 10.

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

Results

The results are presented in date order by phase and, in the case of multiple fills of the same feature, lowest first. Archaeological information, provided by the excavator, is given in square brackets. A brief summary of the processing method and an estimate of the remaining volume of unprocessed sediment follows (in round brackets) after the sample numbers.

Sample numbers for the two samples from Context 5006 were created by PRS and were derived from their positions within the deposit: Sample 4050 – 40 to 50 cm from the top of the context, and Sample 5060 – 50 to 60 cm from the top of the context.

Phase III

Context 1239 [primary fill of pit 1240, with early 12th century pottery]

Sample 189/T2 (2 kg sieved to 300 microns with 3 sets of paraffin flotations; approximately 3 litres of unprocessed sediment remains).

Laboratory description: Moist, very dark grey to dark grey-brown (with some mid brown patches), crumbly (working soft), very humic slightly clay silt. Patches of mid-grey soft clay silt, stones (2-60 mm), wood 'chips' and other wood (to 100 mm), and ?straw were all present.

Invertebrate remains: The flot was fairly small, but yielded quite large numbers of insects and an assortment of other macro-invertebrates. There were fragments of 164 adult beetles and bugs of the groups used in calculating assemblage statistics, representing 81 taxa. Preservation was variable, from quite good to poor, with many very fragmented fossils (E 1.5-4.0, mode 2.5 weak; F 1.5-5.0, mode 3.0, distinct). Even though one species was very abundant, the assemblage was of fairly high mathematical diversity ($\alpha = 63$, SE 8: removing *Lathridius minutus* group gave a value of α of 94, SE 16 for the residual assemblage of 126 individuals). This was reflected to an extent in the ecological diversity of the assemblage.

Over a quarter of the individuals were from taxa typically found in fairly dry litter, the most numerous being *Lathridius minutus* group (39 individuals), three *Corticaria* species (5, 4 and 3, though some of these are found in rather moister habitats), and *Xylodromus concinnus* (4). Various of the rarer species may have lived with these, but this component was in fact rather restricted by comparison with, for example, many assemblages from Anglo-Scandinavian York (Kenward and Hall 1995). A range of taxa represented rather moister decaying matter, the most abundant being *Cercyon analis* (6), *Carpelimus bilineatus* and *Anotylus nitidulus* (4: both now mainly found in waterside litter but very common on past occupation sites, including house floors), *Gyrophypnus angustatus* (3) and *Neobisnius* sp. (3: another 'waterside' taxon which lived in past towns). This component was complemented by a range of rarer taxa, suggesting the nature of an important component in the deposit. The 'drier' taxa may in fact have lived together with them, in an accumulation of rotting litter of variable (or

varying) moisture content. A few aquatics were present, perhaps of background origin (having arrived in flight), or perhaps from imported water. The latter explanation presumably applies to the *Daphnia ephippia* (water flea resting eggs), which must have arrived passively. Two other components were present in small numbers but notable: various 'house fauna' species (as defined by Kenward and Hall 1995, and investigated more closely by Carrott and Kenward 2001), and plant feeders often found in deposits supposed to have included hay. These, together with some distinctive elements representing a 'foul mouldering matter' fauna perhaps suggest that the deposit contained stable manure (cf. Kenward and Hall 1997), though house floor cleanings may have produced a similar fauna. There were hints that wool cleaning debris may have been present, for there were parts of three adult sheep keds (*Melophagus ovinus*): these are far more likely to have originated on a floor than from sheep kept on the site. A single human flea (*Pulex irritans*) does not help to resolve this since it is common in stable manure contexts. However, either origin would accord with the presence of large amount of moss and remains of monocotyledon leaves and stems observed in Sample 186 from this context. There were no grain pests in this subsample: these are increasingly typical of stable manure from the Norman conquest onwards, but their absence is not surprising in a deposit of early 12th century date. Some of the plant feeders and most of the ground beetles seem likely to represent a surface with limited 'weed' vegetation around the pit.

A very remarkable discovery in the assemblage from this sample was a single head of the beetle *Prostomis mandibularis*, discussed below.

It appears that this deposit consisted of plant litter, which had probably been brought from a building, with hints of both domestic activity and the keeping of livestock. The surroundings of the pit were probably intensively disturbed, with some weed vegetation.

Context 1234 [secondary fill of pit 1236]

Sample 185/T2 (3 kg sieved to 300 microns with 3 sets of paraffin flotations; approximately 3 litres of unprocessed sediment remain)

Laboratory description: Moist, light to mid grey-brown, crumbly (working soft), humic, slightly clay silt and fine to coarse herbaceous detritus. There were also some patches of orange-brown and light grey (with some parts black internally), sticky (working soft), clay silt. Stones (2-6 mm), wood and twigs were present.

Invertebrate remains: This subsample gave a quite large flot, consisting mainly of plant debris and seeds. Amongst these were substantial numbers of generally rather well preserved insect remains and a few other

invertebrates (E 2.0-4.0, mode 2.5 weak; F 2.0-4.0, mode 3.0 weak). There were 202 individuals of 87 taxa of adult beetles and bugs. As for Sample 189, diversity was quite high despite the presence of large numbers of one species (and quite large numbers of three others): alpha = 58, SE 7. Removing the most abundant species raised alpha to 75, SE 10. In this case it is rather clearer that a breeding community (or communities) was present, with *Lathridius minutus* group (41) and *Cryptophagus* sp. representing relatively dry conditions, and *Cercyon analis* (10), *Platystethus arenarius* (8), *Anotylus complanatus* (6), and *A. nitidulus*, *Oxytelus sculptus*, and probably *Stenus* sp. and the two most abundant Aleocharinae species (all 4) perhaps from moister decaying matter. All of these, and many of the other species represented by one to three individuals, may have existed in different parts of one accumulation of decaying matter, or represent a local succession or the removal of material from elsewhere to the pit. Light may be thrown on this question by the presence of three human fleas and adult and puparial remains of *Melophagus ovinus*, remains which seem likely to have been brought from the floor of a building; there were also four *Anobium punctatum*, woodworm beetles, probably from structural timber. There were hints in the assemblage of stable manure-like conditions, but the various components (suggesting water, hay and foul mouldering matter) may have had other origins, the plant feeders from local vegetation and these and the aquatics as background fauna, for example. Grain pests were again absent.

Context 1156 [secondary fill of pit 1147, probably late 12th/early 13th century]

Sample 187/T2 (2 kg sieved to 300 microns with 3 sets of paraffin flotations; approximately 3 litres of unprocessed sediment remain)

Laboratory description: Moist to wet, very dark brown to black, fibrous and brittle, fine to coarse herbaceous detritus, with some amorphous organic matter. There was a minor component of dark brown humic silt (in patches), while stones (2-60 cm) and twigs were present.

Invertebrate remains: The flot was quite small and contained only a rather modest number of invertebrate remains. Preservation was very variable, with many remains highly fragmented (E 2.0-4.0, mode 3.0 weak; F 1.5-5.0, mode 3.0 weak). There were 90 individuals of 62 taxa of adult beetles and bugs of the groups used for calculating statistics, and diversity was quite high (Alpha = 88, though with a large SE of 19), suggesting mixed origins. The more abundant taxa included some from drier conditions (notably 10 *Lathridius minutus* group) and others suggesting slightly foul matter, e.g. *Anotylus nitidulus* (5). This might mostly be background fauna (elements found in the previous two

samples were present in trace amounts) or redeposited material. The small stag beetle *Sinodendron cylindricum*, found mainly in rotting wood, was represented by a very small elytral fragment.

Phase IV

Pit 5008: both fills late 15th century on pottery spot dates

Context 5007 [primary fill of very large pit 5008]

Sample 130/T2: (3 kg sieved to 300 microns with 3 sets of paraffin flotations; approximately 6 litres of unprocessed sediment remains)

Laboratory description: Moist light to mid grey-brown to black, crumbly (working sticky), humic, sandy silty clay, with some fine herbaceous detritus in patches and more sand locally. The sample smelled of sulphides and the presence of stones (2-6 mm) and bone was noted.

Invertebrate remains: The flot was moderately large and contained abundant insects and other invertebrates. There was a single mineralised insect. Preservation was good (E 1.5-2.0, mode 2.0 distinct; F 1.5-2.0, mode 2.0 distinct). Remains of 470 individuals of 193 taxa of adult beetles and bugs were recovered, together with a range of other macro-invertebrates, among which crustaceans were the most abundant. The mathematical diversity of the beetle and bug assemblage was very high indeed (with a small error: alpha = 122, SE 9), and this was reflected in ecological diversity, for it was clear that a range of living communities was well-represented. It appears that deposition took place in water, for there were very large numbers of water beetles and water fleas, and a range of waterside taxa. The first were represented by 26 taxa, of which *Ochthebius minutus* (16), *Helophorus* sp. (15), *Limnebius truncatellus* (10) and *Hydrobius fuscipes* (7) were the most abundant. There were of the order of 100 ostracods and around 50 *Daphnia*. Aquatic beetles and bugs accounted for almost a fifth of the assemblage, and waterside taxa contributed a further 5%. This rich aquatic fauna seems hardly likely to have arrived in waste water. The aquatics as a whole indicate standing water which was not too polluted, with a developed ecosystem including detritus and plant feeders and predators (among the latter was the aggressive backswimmer *Notonecta maculata*, recorded from this and the other two samples from the pit and so presumably established in it). The fauna suggests the presence of water plants, and at least duckweeds (*Lemna*) were established, for remains of three duckweed-feeding weevils, *Tanysphyrus lemnae*, were recorded.

The terrestrial component of the fauna indicates a rich vegetation (38 taxa of plant feeders, 13% of the fauna), with the accent on herbaceous vegetation including nettles (*Urtica*: from three *Cidnorhinus*

quadrinaculatus, and *Brachypterus* sp.) and crucifers (two *Ceutorhynchus contractus*). Many of the plant feeders were rather generalist, however, and might be found in stands of plants of many kinds. Three examples of the bark beetle *Leperisinus varius* suggest ash (*Fraxinus*), either as a tree or trees nearby or as imported wood with bark. This species was present in appreciable numbers in all three samples from Pit 5008, so the presence of a tree might be suspected.

Decaying matter of varying degrees of foulness was suggested. Among the more abundant decomposers were taxa typically associated with fairly dry conditions (notably *Lathridius minutus* group, of which there were 16), very foul matter (e.g. eleven *Platystethus arenarius*), and rather more open textured foul matter such as stable manure (several well-represented species). As it appears that the pit was water-filled (unless it received large amounts of waste water originally obtained from a clean pond or ditch), it seems likely that foul to dry litter was dumped into it. A likely source would be a stable floor, for the full range of elements typical of stable manure was present (cf. Kenward and Hall 1997). Notable taxa from foul open-textured decaying matter were: *Carpelimus bilineatus* (10), *Anotylus complanatus*, *A. tetracarinated* and *Cordalia obscura* (all 9), *Acrilus nigricornis* and *Monotoma picipes* (7), *Cryptopleurum minutum*, *Ptenidium* sp. and *Leptacinus pusillus* (5), and many species at frequencies of 1 to 4 individuals. 'House fauna' taxa representing a building included: *Lathridius minutus* group (16), *Mycetaea hirta* (6), *Tipnus unicolor* (5) and some rarer species. Stored cereals, perhaps feed, were indicated by *Oryzaephilus surinamensis* (6) and *Sitophilus granarius* (2). While the two human fleas may have developed in a stable floor, the presence of an adult and a puparium of sheep ked (*Melophagus ovinus*) may hint at the inclusion of domestic waste (from wool-cleaning).

Overall, then, this invertebrate fauna suggests that the cut was pond-like and received waste from in or around buildings. The presence of the death-watch beetle *Xestobium rufovillosum* perhaps hints at very old structures, or at least the long-term re-use of large timbers within buildings: it can be argued that it was not likely to have lived in the open in Yorkshire in the cooling climate of the 15th century (see Buckland 1975).

5006 [secondary fill of pit 5008: 50-60 cm (from top of context)]

Sample 5060/T2 (2 kg sieved to 300 microns with 3 sets of paraffin flotations; approximately 0.5 litres of sediment remains)

Laboratory description: Fine and coarse herbaceous detritus in a matrix of moist to wet, mid to dark grey-

brown, crumbly and slightly sticky (working soft), slightly sandy clay silt. There were twigs (common) and wood 'chips' (present).

Invertebrate remains: A very large assemblage of adult beetles and bugs (443 individuals, 188 taxa) was recovered from the moderate-sized flot, which also contained large numbers of other invertebrates. Preservation was variable, though generally fairly good (E 2.0-4.0, mode 2.5 weak; F 1.5-4.0, mode 2.5 weak). The fauna was very diverse mathematically ($\alpha = 123$, SE 10), with a range of ecological groups represented. In general terms the fauna was very similar to that from Context 5007, with the same range of ecological groups in roughly the same proportions. The most abundant among the 32 aquatic beetle and bug taxa noted were *Helophorus* sp. (17), *Ochthebius minimus* (13), *Limnebius truncatellus* (8), and a corixid bug and *Helochaers* sp. (both 5), but there were also huge numbers of ostracods, numerous chironomid midge larvae, some *Daphnia* and various others. There were three *Tanysphyrus lemnae*. Again, the most parsimonious explanation is deposition in a well-established body of water.

The same mixture of terrestrial fauna, with plant feeders and 'stable manure' elements, as seen in 5007 was noted. The 'foul mouldering' group was rather clear, with *Carpelimus bilineatus* and *Falagria* sp. (both 11), *Leptacinus pusillus* (10), *Monotoma bicolor* (5) and *Cercyon atricapillus*, *Oxytelus sculptus* and *Anthicus formicarius* (all 4) the most numerous components; most of the other decomposer beetles could have co-existed with these given a little variation in moisture content. There were two human fleas and a single sheep ked puparium.

Botanical analysis showed evidence of a range of trees, and this is matched by two bark beetles: *Leperisinus varius* (5), mainly in ash, and *Dryocoetinus villosus* (1), typically in oak (*Quercus*).

This deposit, like the one below it, appears to have formed by dumping of at least moderate amounts of litter from buildings into water with a rich fauna.

Context 5006 [secondary fill of pit 5008: 40-50 cm (from top of context)]

Sample 4050/T2 (3 kg sieved to 300 microns with 3 sets of paraffin flotations; approximately 0.5 litres of sediment remains)

Laboratory description: Fine and coarse herbaceous detritus in a matrix of moist to wet, mid to dark grey-brown, brittle (working soft), slightly clay sandy silt. Twigs were present.

Invertebrate remains: A very large group of adult beetles and bugs was recovered from the moderately large flot (509 individuals of 173 taxa), together with a rich variety of other invertebrate remains. Preservation varied, with many very fragmented remains, but was often good (E 1.5-4.0, mode 2.5 weak; F 1.5-4.0, mode 3.0 weak). The fauna was, in broad terms, like that from the two lower layers, with a slight shift towards terrestrial species. Aquatics were still numerous, the most abundant being *Helophorus* sp. (19), *Ochthebius minimus* (16), *Limnebius truncatellus* (8), and a second *Helophorus* and *Hydrobius fuscipes* (both 4). There were also significant numbers of ostracods. The various components typical of 'stable manure' were more distinct. There were grain pests: abundant *Oryzaephilus surinamensis* (31: the 'saw-toothed grain beetle') and *Sitophilus granarius* (5), the grain weevil. The 'foul mouldering' group was clear: *Monotoma picipes* (10), *Acrilus nigricornis* and *Anthicus formicarius* (7 of each), *Cercyon atricapillus*, *Oxytelus sculptus*, *Lithcharis ochracea* and *Cordalia obscura* (all 6), and many other taxa likely to have co-existed with them. 'House fauna' was rich: *Lathridius minutus* group (47), *Tipnus unicolor* and *Mycetaea hirta* (both 8), *Ptinus fur* and a *Cryptophagus* species (5), *Xylodromus concinnus* and *Anobium punctatum* (4), and various rarer taxa including *Pulex irritans* (3, the human flea), *Ctenocephalides canis* (1, the dog flea) and single adult and pupal sheep keds. Lastly, species believed liable to importation in hay-like cut vegetation were present, albeit mostly in traces and possibly of some other origin: *Sitona ?lineatus* (3), *Apion* sp, *Sitona ?lepidus*, and *Sitona* sp. (all single specimens). The bark beetle *Leperisinus varius* was unusually abundant in this subsample (9 individuals).

Discussion

The six assemblages discussed here, some of which were large and rich in species, have contributed to the interpretation of the individual features from which they came, but have wider relevance to the site and beyond.

The suspicion that many (or even most) of the aquatic invertebrates found on occupation sites may have been imported with water has grown gradually over the past decade. Many water beetles may have flown to sites and contributed to the 'background fauna' (in the sense used by Kenward 1976), but this cannot be the case for remains such as resting eggs of water fleas and the characteristic statoblasts of bryozoans (e.g. *Cristatella mucedo*, illustrated

by Hall *et al.* in press). The abundant aquatics in Cut 5008 might be argued to have been imported with water for industrial or craft use, or (as there are indications of stable manure) for watering livestock. However, the numbers of remains are very large (probably many tens of thousands from the entire fills), and active aquatics like *Notonecta maculata* (single individuals from all three samples) perhaps add to the argument that the aquatic fauna developed *in situ* and was not brought in buckets of water. An argument against this is that if dumping occurred early on in the formation of the fills why was the water not so polluted as to kill off the rich fauna? There are several possible explanations for this. Small amounts of litter, insufficient to pollute the water excessively, may have been deposited over a period (e.g. from scatter or small quantities of floor sweepings); there may have been two short episodes of dumping (for the two contexts recognised); or the cut may have been completely backfilled at one time, the contexts recognised in the field just reflecting minor variation in dumped material. In the last two cases, remains in sediment already in the pit may have become dispersed among the dumped material, in the way postulated for the Roman well at Skeldergate, York (Hall *et al.* 1980). The fauna changed appreciably in terms of the abundances of some species between the samples from 50-60 and 40-50 cm (Context 5006), but this is compatible with any of the mechanisms. The lithology of the samples casts little light on the problem.

Stable manure seems quite possibly to have contributed to the fills of 5008, for the various components typically found in stable manure invertebrate assemblages were present (cf. Kenward and Hall 1997). All these components may have had other origins, but combined with the evidence from plant remains they do suggest that stable cleanings found their way (directly or indirectly) into this cut.

The presence of the bark beetle *Leperisinus varius* in significant numbers throughout the fills of Cut 5008 is notable. This beetle is

often present in ones and twos in archaeological occupation site deposits, and often suspected to have emerged from imported ash timber. In the present case, the beetles may conceivably have emerged from ash logs, or been imported with litter from a woodland floor, but they are perhaps more likely to have come from a local, probably overhanging, tree.

Observations of a very large number of samples from occupation deposits of the 9th century onwards have shown that two faunal components underwent a substantial change in abundance following the Norman Conquest. The grain beetles *Cryptolestes ferrugineus*, *Oryzaephilus surinamensis* and *Sitophilus granarius* were common in the Roman period, but extremely rare (probably absent, those records which have been made being suspected to be contaminants) from later pre-Conquest Britain, but reappeared later in the 11th century and became more abundant, widespread and regularly present as the centuries passed. The change is most likely to reflect changes in patterns of grain transport and storage related to economic control. The present material supports this pattern, though admittedly only on three samples from each of the periods represented. The samples from Phase III lacked grain pests, while those from Phase IV contained reasonably large numbers. Another element which showed a similar pattern of changing abundance was the spider beetle *Tipnus unicolor*. Absent from the assemblages from Phase III, it is present, and sometimes numerous, in those from Phase IV.

The site produced a single specimen of the honeybee *Apis mellifera*. This economically important insect is frequently found in archaeological occupation deposits, and sometimes abundant enough to suggest apiculture (reviewed by Kenward in press). A single record from the present site is not evidence for bee keeping, of course, but it fits into the general pattern.

The record of the large black ground beetle *Pterostichus madidus* from Context 5007 (a

single individual identified from a fragment of a pronotal base) is notable. This species, now very common, is only sporadically found in archaeological deposits, with no obvious explanation for the change in abundance.

Four species, *Platystethus degener* (3 records), *P. ?cornutus* (2 records), *P. nitens* (4 records) and *P. nodifrons* (1 record), are regarded as perhaps of climatic significance, being north of their generally known range in the 21st century (Hammond 1971). Although perhaps under-recorded in the North, these species are so very common in archaeological deposits that it may be argued that, even if present in the area now, their abundances have changed greatly, climate change being one reasonable explanation (Kenward forthcoming).

A single head of a dog flea, *Ctenocephalides canis*, was recovered from the subsample from Context 5006, Sample 4050 (40-50 cm). This species is known from a few other sites in Britain. Hall and Kenward (1990, 341) reported two from late 2nd century deposits at Tanner Row, York; Carrott *et al.* (1992) found a single specimen at the Palmer Lane site, York, in what was probably a dump of 12th-14th century date into the King's Fishpool; nearly 20 (from seven contexts) were recorded from early 14th century occupations deposits at the Magistrates' Courts, site, Hull (Hall *et al.* 2000); Hall *et al.* (1992) found a single dog flea in a sample from a mid 15th-early 17th century layer at The Bedern, York; and Carrott *et al.* (1996) recorded it from medieval Winchester. Several of these records came from floors or deposits interpreted as containing domestic sweepings, reflecting the domestic role of dogs. In contrast there appear to be no records of cat fleas (*C. felis*) earlier than those of Girling (1984) for 18th century London and Schelvis (1994) for a site in Holland, also of 18th century date. This is odd in view of its current abundance ('the most important ectoparasite of domestic cats and dogs worldwide', Rust and Dryden 1997), its range of alternative hosts, and the fact that it quickly builds up huge populations in the same way as *C. canis*. Possible reasons for its

absence, concerned with human attitudes to cats, were suggested by Allison and Kenward (1990), but a late introduction, or just conceivably a recent divergence from the dog flea, is not impossible.

The record of a single head of the beetle *Prostomis mandibularis*, from Context 1239, the primary fill of pit 1240, requires discussion. The species is extremely distinctive, the head bearing massive flattened saw-toothed jaws and having most unusual protuberances beneath (the species is illustrated by Buckland and Kenward 1973). Unknown in modern Britain, this species is an 'urwaldiere', associated in mainland Europe with very decayed wood in ancient forests. There are records from prehistoric sites in Britain, the most recent apparently being for the Late Bronze Age (Buckland and Kenward 1973; Buckland 1979). The present record requires careful evaluation since it would move the species forward into the second millennium AD, rather than being a first millennium BC extinction as formerly supposed. In particular, could it be redeposited from peat brought to Beverley? The specimen is very fresh-looking and robust, with the jaws still articulated, so importation as a free fossil in prehistoric peat seems extremely unlikely: remains from peat are mostly rather fragile and thinned by comparison, and often pale (e.g. those in the Roman well at Skeldergate, York, Hall *et al.* 1980). An alternative possibility is that it was brought in bog timber, still beneath the bark. This might account for its freshness, though it might be argued that wood suitable for it might be too decayed to be carried to an occupation site. Until further evidence can be gathered, we must leave the discussion open: the survival of supposedly extinct species such as this into the second millennium would require both re-evaluation of the causes of their demise and investigation of medieval natural deposits with more vigour than shown to date.

Archive

All material is currently stored by Palaeoecology Research Services (Unit 8, Dabble Duck Industrial Estate, Shildon, County Durham), along with paper and electronic records pertaining to the work described here.

Acknowledgements

The authors are grateful to Alistair Webb of Archaeological Services, WYAS, for supplying the material and the archaeological information. Harry Kenward wishes to thank English Heritage for permission to carry out this work.

References

- Allison, E. P. and Kenward, H. K. (1990). Hopping mad? Fleas from archaeological deposits. *Interim (Archaeology in York)* **15** (1), 27-33.
- Buckland, P. C. (1975). Synanthropy and the deathwatch: a discussion. *Naturalist* **100**, 37-42.
- Buckland, P. C. (1979). Thorne Moors: a palaeoecological study of a Bronze Age site (a contribution to the history of the British insect fauna). *University of Birmingham, Department of Geography Occasional Publications* **8**. Birmingham.
- Buckland, P. C. and Kenward, H. K. (1973). Thorne Moor : a palaeoecological study of a Bronze Age site. *Nature (London)* **241**, 405-406.
- Carrott, J. and Kenward, H. (2001). Species associations among insect remains from urban archaeological deposits and their significance in reconstructing the past human environment. *Journal of Archaeological Science* **28**, 887-905.
- Carrott, J. B., Dobney, K. M., Hall, A. R., Kenward, H. K., Milles, A. and Nicholson, R. (1992). *Evaluation of biological remains from boreholes at Palmer Lane, York (YAT/Yorkshire Museum code 1992.3)*. Prepared for York Archaeological Trust.
- Carrott, J., Hall, A., Issitt, M., Kenward, H. and Large, F. (1996). Medieval plant and invertebrate remains

principally preserved by anoxic waterlogging at The Brooks, Winchester, Hampshire (site code: BRI and BRII): Technical Report. *Reports from the Environmental Archaeology Unit, York* **96/20**, 32 pp.

Dobney, K., Hall, A. R., Kenward, H. K. and Milles, A. (1992). A working classification of sample types for environmental archaeology. *Circaea, the Journal of the Association for Environmental Archaeology* **9** (for 1991), 24-6.

Fisher, R. A., Corbet, A. S. and Williams, C. B. (1943). The relation between the number of species and the number of individuals in a random sample of an animal population. *Journal of Animal Ecology* **12**, 42-58.

Girling, M. A. (1984). Eighteenth century records of human lice (Pthiraptera, Anoplura) and fleas (Siphonaptera, Pulicidae) in the City of London. *Entomologist's Monthly Magazine* **120**, 207-210.

Hall, A., Carrott, J., Jaques, D., Johnstone, C., Kenward, H., Large, F. and Usai, R. (2000). Technical report: Studies on biological remains and sediments from Periods 1 and 2 at the Magistrates' Courts site, Kingston-upon-Hull (site codes HMC 94 and MCH99). Part 1: Text. *Reports from the Environmental Archaeology Unit, York* **2000/25**, 78 pp.

Hall, A. R. and Kenward, H. K. (1990). Environmental evidence from the Colonia: General Accident and Rougier Street. *The Archaeology of York* **14** (6), 289-434 + Plates II-IX + Fiche 2-11. London: Council for British Archaeology.

Hall, A., Kenward, H. and Carrott, J. (2002). Assessment of biological remains from excavations at Morton Lane, Beverley, East Riding of Yorkshire (site code: MLA01). *PRS* **2002/01**.

Hall, A. R., Kenward, H. K. and McComish, J. M. (in press). Pattern in thinly-distributed plant and invertebrate macrofossils revealed by extensive analysis of occupation deposits at Low Fisher Gate, Doncaster, U. K. *Environmental Archaeology*.

Hall, A. R., Kenward, H. K. and Robertson, A. (1992). Investigation of medieval and post-medieval plant and invertebrate remains from Area II of the excavations in The Bedern (north-east), York (YAT/Yorkshire Museum sitecode 1976-81.14 II): Technical report. Ancient Monuments Laboratory Report **58/93**.

Hall, A. R., Kenward, H. K. and Williams, D. (1980). Environmental evidence from Roman deposits in Skeldergate. *The Archaeology of York* **14** (3), 101-56. London: Council for British Archaeology.

Hammond, P. M. (1971). Notes on British Staphylinidae 2. - On the British species of *Platystethus* Mannerheim, with one species new to Britain. *Entomologist's Monthly Magazine* **107**, 93-111.

Kenward, H. K. (1976). Reconstructing ancient ecological conditions from insect remains: some problems and an experimental approach. *Ecological Entomology* **1**, 7-17.

Kenward, H. (1997). Synanthropic decomposer insects and the size, remoteness and longevity of archaeological occupation sites: applying concepts from biogeography to past 'islands' of human occupation. *Quaternary Proceedings* **5**, 135-151.

Kenward, H. K. (1978). The analysis of archaeological insect assemblages: a new approach. *The Archaeology of York* **19** (1), 1-68 + plates I-IV. London: Council for British Archaeology.

Kenward, H. K. (1982). *Insect communities and death assemblages, past and present*, pp. 71-8 in Hall, A. R. and Kenward, H. K. (eds). Environmental archaeology in the urban context. *Council for British Archaeology Research Reports* **43**.

Kenward, H. K. (1988). Insect remains, pp. 115-40 in Schia, E. (ed.), *De arkeologiske utgravninger i Gamlebyen, Oslo. Vol. 5 Mindets Tomt - Sondrefelt*. Øvre Ervik: Alvheim and Eide.

Kenward, H. K. (1992 for 1991). Rapid recording of archaeological insect remains - a reconsideration. *Circaea, the Journal of the Association for Environmental Archaeology* **9**, 81-8.

Kenward, H. K. (in press). Honeybees (*Apis mellifera* Linnaeus) from archaeological deposits in Britain. *Proceedings of an Association for Environmental Archaeology conference in honour of Susan Limbrey*.

Kenward, H. K. (forthcoming). Did insects from archaeological occupation sites track late Holocene climate in Northern England? Submitted to *Environmental Archaeology*.

Kenward, H. K., Hall, A. R. and Jones, A. K. G. (1980). A tested set of techniques for the extraction of plant and animal macrofossils from waterlogged archaeological deposits. *Science and Archaeology* **22**, 3-15.

Kenward, H. K., Engleman, C., Robertson, A., and Large, F. (1986). Rapid scanning of urban archaeological deposits for insect remains. *Circaea* **3**, 163-72.

Kenward, H. K. and Hall, A. R. (1995). Biological evidence from Anglo-Scandinavian deposits at 16-22 Coppergate. *The Archaeology of York* **14** (7), 435-797 + xxii + loose figures. York: Council for British Archaeology.

Kenward, H. and Hall, A. (1997). Enhancing bioarchaeological interpretation using indicator groups: stable manure as a paradigm. *Journal of Archaeological Science* **24**, 663-673.

Kenward, H. and Large, F. (1998). Recording the preservational condition of archaeological insect fossils. *Environmental Archaeology* **2**, 49-60.

Kloet, G. S. and Hincks, W. D. (1964-77). *A check list of British Insects*. (2nd ed.) London: Royal Entomological Society.

Rust, M. K. and Dryden, M. W. (1997). The biology, ecology, and management of the cat flea. *Annual Review of Entomology* **42**, 451-473.

Schelvis, J. (1994). Caught between the teeth. A review of Dutch finds of archaeological remains of ectoparasites in combs. *Proceedings of the Section Experimental and Applied Entomology of the Netherlands Entomological Society* **5**, 131-132.

Table 1. Morton Lane, Beverley: Samples processed, sediment descriptions and notes on invertebrates in the flots. Washovers were generally not examined where there was a flot.

Context	Sample number	Description	Invertebrates in flot
1011	102	Moist, mid grey-brown, crumbly (working plastic), very slightly sandy clay. Stones (2-60 mm), mortar/plaster and ?rotted soft charcoal were present.	Only traces of invertebrate remains from 2 sets of paraffin flotations
1035	111	Moist, mid grey-brown, crumbly (working plastic), stony clay. Stones (2-60 mm), ?brick/tile, charcoal, marine molluscs and land snails were present.	No insect remains seen from 2 sets of paraffin flotations
1071	147	Moist, mid grey to mid grey brown, sticky to crumbly (working soft), stony clay silt. Stones (20-60+ mm) and ?rotted soft charcoal were present.	Traces of very oxidised cuticle from 2 sets of paraffin flotations
1156	187	see text	see text
1234	185	see text	see text
1239	189	see text	see text
5005	104	Moist, mid grey-brown, crumbly (working slightly plastic), clay silt. Stones (2-6 mm), brick/tile, rotted charcoal or sulphide stained patches, and land snails were present.	Only a few snails from 1 set of paraffin flotations
5006	4050	see text	see text
5006	5060	see text	see text
5007	130	see text	see text
5043	163	Moist, mid grey-brown, locally mid reddish brown (?from heated mineral sediment), sticky to crumbly (working soft), stony slightly sandy clay silt. Stones (2-60+ mm), ?brick/tile and ?decayed soft charcoal were present.	A few earthworm egg capsules and scraps of insect cuticle from 1 set of paraffin flotations
5054	173	Moist, light to mid grey-brown to light to mid orange-brown, silty sand. Some rotted soft charcoal and lumps of ?burnt sediment (to 75 mm) were present.	No insect remains seen from 1 set of paraffin flotations

Table 2. Morton Lane, Beverley: Complete list of invertebrate remains recorded from samples. Order and nomenclature follow Kloet and Hincks (1964-77) for insects. Where both secure and tentative identifications for a given taxon were recorded, only the former are listed here. Ecological codes used in calculating statistics (Table 4) are given (they are explained in Table 5) together with the number of samples in which each taxon was recorded. * = not used in calculating assemblage statistics. The remains were of adults unless stated. 'Sp.' indicates that record was probably an additional taxon, 'sp. indet.' that the material may have been of a taxon listed above it.

Taxon	ec	no rees			
			*Aphidoidea sp.	u	2
			*Coccoidea sp.	u	1
Oligochaeta					
*Oligochaeta sp. (egg capsule)	u	5	Lepidoptera		
			*Lepidoptera sp. (pupa)	u	1
Crustacea					
Cladocera			Diptera		
*Daphnia sp. (ephippium)	oa-w	5	*Chironomidae sp. (larva)	w	3
			*Bibionidae sp.	u	5
Ostracoda			*Nematocera sp. (immatures)	u	1
*Ostracoda sp.	u	4	*Melophagus ovinus (Linnaeus) (puparium)	u	
Diplopoda			*Melophagus ovinus (Linnaeus) (adult)	u	4
*Diplopoda sp.	u	3	*Diptera sp. (adult)	u	5
Insecta			*Diptera sp. (puparium)	u	5
Dermaptera			*Diptera sp. (pupa)	u	3
*Forficula auricularia Linnaeus	u	1	Siphonaptera		
*Dermaptera sp. indet.	u	3	*Pulex irritans Linnaeus	ss	5
Trichoptera			*Ctenocephalides canis (Curtis)	st	1
*Trichoptera sp.	oa-w	1	Coleoptera		
*Trichoptera sp. (case)	oa-w	2	Carabus sp.	oa	1
Mallophaga			Nebria brevicollis (Fabricius)	oa	2
*?Damalinia sp.	u	2	Loricera pilicornis (Fabricius)	oa	1
Hemiptera			Clivina ?collaris (Herbst)	oa	2
Megalonotus sp.	oa-p	1	Clivina fossor (Linnaeus)	oa	1
Temnostethus sp.	oa	2	Clivina sp. indet.	oa	1
Anthocoris sp.	oa-p	2	Trechus quadristriatus (Schrank)	oa	2
Cimicidae sp.	oa-p	1	Trechus obtusus or quadristriatus	oa	1
Saldula sp.	oa-d	2	Bembidion doris (Panzer)	oa-d	3
Chartoscirta sp.	oa-w	1	Bembidion biguttatum (Fabricius)	oa-d	2
Gerris sp.	oa-w	3	Bembidion guttula or mannerheimi	oa	1
Notonecta maculata Fabricius	oa-w	3	Bembidion sp.	oa	2
Corixa sp.	oa-w	1	Pterostichus cupreus (Linnaeus)	oa	3
Corixidae spp.	oa-w	5	Pterostichus madidus (Fabricius)	ob-st	1
*Heteroptera sp. (nymph)	u	2	Pterostichus melanarius (Illiger)	ob	2
Philaenus spumarius (Linnaeus)	oa-p	1	Pterostichus nigrita (Paykull)	oa-d	2
Macropsis sp.	oa-p	1	Pterostichus sp. indet.	ob	4
Aphrodes flavostriatus (Donovan)	oa-p-d	2	Laemostenus ?terricola (Herbst)	ss	1
Aphrodes sp.	oa-p	2	Platyderus ruficollis (Marshall)	oa	1
Cicadellidae sp.	oa-p	3	Agonum sp.	oa	3
Delphacidae spp.	oa-p	5	Amara sp.	oa	2?1
Auchenorhyncha sp.	oa-p	1	Harpalus spp.	oa	2
*Auchenorhyncha sp. (nymph)	oa-p	2	Bradycellus sp.	oa	1
Psylloidea sp.	oa-p	3	Metabletus sp.	oa	1
*Psylloidea sp. (nymph)	oa-p	2	Carabidae spp. and spp. indet.	ob	4
			Haliplus sp.	oa-w	3

<i>Graptodytes granularis</i> (Linnaeus)	oa-w	1	<i>Omaliium excavatum</i> Stephens	rt-sf	2
<i>Hygrotus inaequalis</i> (Fabricius)	oa-w	1	<i>Omaliium caesum</i> or <i>italicum</i>	rt-sf	1
<i>Hydroporus</i> spp.	oa-w	4	<i>Omaliium ?rivulare</i> (Paykull)	rt-sf	5
Hydroporinae spp.	oa-w	2	<i>Omaliium</i> sp. indet.	rt	5
<i>Agabus bipustulatus</i> (Linnaeus)	oa-w	3	<i>Xylodromus concinnus</i> (Marshall)	rt-st	5
<i>Agabus</i> sp.	oa-w	3	Omaliinae sp.	rt	1
<i>Colymbetes fuscus</i> (Linnaeus)	oa-w	4	<i>Coprophilus striatulus</i> (Fabricius)	rt-st	1
<i>Acilius sulcatus</i> (Linnaeus)	oa-w	1	<i>Carpelimus bilineatus</i> Stephens	rt-sf	5
<i>Dytiscus</i> sp.	oa-w	2	<i>Carpelimus corticinus</i>		
Dytiscidae sp.	oa-w	2	(Gravenhorst)	oa-d	1?1
<i>Hydrochus</i> sp.	oa-w	1	<i>Carpelimus elongatulus</i> (Erichson)	oa-d	3
<i>Helophorus ?aquaticus</i> (Linnaeus)	oa-w	3	<i>Carpelimus fuliginosus</i>		
<i>Helophorus grandis</i> Illiger	oa-w	3?1	(Gravenhorst)	st	5?1
<i>Helophorus aquaticus</i> or <i>grandis</i>	oa-w	1	<i>Carpelimus rivularis</i>		
<i>Helophorus nubilis</i> Fabricius	oa	1	(Motschulsky)	ob-d	1?4
<i>Helophorus</i> spp.	oa-w	6	<i>Carpelimus</i> spp. indet.	u	1
<i>Coelostoma orbiculare</i> (Fabricius)	oa-w	2	<i>Platystethus arenarius</i> (Fourcroy)	rf	6
<i>Sphaeridium</i> sp.	rf	1	<i>Platystethus ?cornutus</i>		
<i>Cercyon analis</i> (Paykull)	rt-sf	6	(Gravenhorst)	oa-d	2
<i>Cercyon atricapillus</i> (Marshall)	rf-st	5	<i>Platystethus degener</i>		
<i>Cercyon haemorrhoidalis</i>			Mulsant & Rey	oa-d	3
(Fabricius)	rf-sf	3?1	<i>Platystethus cornutus</i> group	oa-d	2
<i>Cercyon terminatus</i> (Marshall)	rf-st	2?1	<i>Platystethus nitens</i> (Sahlberg)	oa-d	4
<i>Cercyon tristis</i> (Illiger)	oa-d	1	<i>Platystethus nodifrons</i>		
<i>Cercyon unipunctatus</i> (Linnaeus)	rf-st	1?1	(Mannerheim)	oa-d	1
<i>Cercyon ustulatus</i> (Preysslner)	oa-d	3	<i>Anotylus complanatus</i> (Erichson)	rt-sf	6
<i>Megasternum obscurum</i>			<i>Anotylus nitidulus</i> (Gravenhorst)	rt	6
(Marshall)	rt	4	<i>Anotylus rugosus</i> (Fabricius)	rt	6
<i>Cryptopleurum minutum</i>			<i>Anotylus sculpturatus</i> group	rt	6
(Fabricius)	rf-st	4?1	<i>Anotylus tetracarinated</i> (Block)	rt	5
<i>Hydrobius fuscipes</i> (Linnaeus)	oa-w	3	<i>Oxytelus sculptus</i> Gravenhorst	rt-st	5
<i>Anacaena</i> sp.	oa-w	1?1	<i>Stenus ?crassus</i> Stephens	rt	1
<i>Laccobius</i> sp.	oa-w	1	<i>Stenus</i> spp. and sp. indet.	u	6
<i>Helochares</i> sp.	oa-w	1	<i>Lathrobium</i> spp.	u	3
<i>Enochrus</i> sp.	oa-w	2	<i>Lithocharis ochracea</i>		
<i>Chaetarthria seminulum</i> (Herbst)	oa-w	1	(Gravenhorst)	rt-st	3
<i>Berosus</i> sp.	oa-w	1	<i>Astenus</i> sp.	rt	1
Hydrophilinae spp. indet.	oa-w	2	<i>Rugilus orbiculatus</i> (Paykull)	rt-sf	1
<i>Acritus nigricornis</i> (Hoffmann)	rt-st	2	<i>Rugilus rufipes</i> Germar	rt-st	3
Histerinae sp.	rt	6	Paederinae sp.	u	2
<i>Ochthebius minimus</i> (Fabricius)	oa-w	5	<i>Leptacinus batychnus</i> (Gyllenhal)	rt-st	1?2
<i>Ochthebius ?pusillus</i> Stephens	oa-w	3	<i>Leptacinus pusillus</i> (Stephens)	rt-st	3
<i>Ochthebius</i> sp.	oa-w	2	<i>Leptacinus</i> sp. indet.	rt-st	2
<i>Hydraena testacea</i> Curtis	oa-w	1	<i>Gauropterus fulgidus</i> (Fabricius)	rt-st	1
<i>Hydraena</i> sp.	oa-w	3	<i>Gyrophypnus angustatus</i> Stephens	rt-st	5
<i>Limnebius aluta</i> (Bedel)	oa-w	1	<i>Gyrophypnus fracticornis</i> (Muller)	rt-st	6
<i>Limnebius truncatellus</i> (Thunberg)	oa-w	3?1	<i>Xantholinus longiventris</i> Heer	rt-sf	1
<i>Ptenidium</i> spp.	rt	5	<i>Xantholinus</i> sp. indet.	u	1
<i>Acrotichis</i> sp.	rt	5	Xantholininae sp. indet.	u	2
<i>Ptomophagus</i> sp.	u	1	<i>Neobisnius</i> sp.	u	6
<i>Seydmanus tarsatus</i>			Philonthus spp.	u	6
(Muller & Kunze)	rt-sf	1	<i>Philonthus</i> or <i>Gabrius</i> sp.	u	2
<i>Micropeplus fulvus</i> Erichson	rt	3	<i>Staphylinus</i> sp.	u	1
<i>Megarthus sinuatocollis</i>			<i>Quedius</i> sp.	u	1
(Boisduval & Lacordaire)	rt	1	<i>Philonthus</i> or <i>Quedius</i> sp. indet.	u	1
<i>Megarthus</i> sp. indet.	rt	3	Staphylininae sp. indet.	u	1
<i>Acidota crenata</i> (Fabricius)	oa	1	<i>Tachyporus hypnorum</i> (Fabricius)	u	1
<i>Lesteva longoelytrata</i> (Goeze)	oa-d	3?1	<i>Tachyporus ?nitidulus</i> (Fabricius)	u	1
<i>Dropephylla</i> sp.	u	2	<i>Tachyporus</i> spp.	u	4

<i>Tachinus laticollis</i> or <i>marginellus</i>	u	2	<i>Oryzaephilus surinamensis</i>		
<i>Tachinus ?signatus</i> Gravenhorst	u	1	(Linnaeus)	g-ss	3
<i>Tachinus subterraneus</i> (Linnaeus)	u	1?1	<i>Cryptophagus acutangulus</i>		
<i>Tachinus</i> sp. indet.	u	1	(Gyllenhal)	rd-sf	1
<i>Cypha</i> sp.	rt	2	<i>Cryptophagus scutellatus</i>		
<i>Cordalia obscura</i> (Gravenhorst)	rt-sf	5	Newman	rd-st	3
<i>Falagria caesa</i> or <i>sulcatula</i>	rt-sf	5	<i>Cryptophagus</i> spp.	rd-sf	6
<i>?Crataraea suturalis</i>			<i>Atomaria</i> spp.	rd	6
(Mannerheim)	rt-st	3	<i>Ephistemus globulus</i> (Paykull)	rd-sf	2
<i>Aleochara</i> sp.	u	3	Phalacridae sp.	oa-p	1
Aleocharinae spp.	u	6	<i>Orthoperus</i> sp.	rt	5
Pselaphidae sp.	u	2	<i>Coccidula</i> sp.	oa-p-d	1
<i>Sinodendron cylindricum</i>			Coccinellidae sp.	oa-p	1
(Linnaeus)	l	1	<i>Mycetaea hirta</i> (Marsham)	rd-ss	4
<i>Trox scaber</i> (Linnaeus)	rt-sf	3?1	<i>Stephostethus lardarius</i> (Degeer)	rt-st	2
<i>Geotrupes</i> sp.	oa-rf	2	<i>Lathridius minutus</i> group	rd-st	5
<i>Aphodius ater</i> (Degeer)	oa-rf	1	<i>Enicmus</i> sp.	rt-sf	3
<i>Aphodius contaminatus</i> (Herbst)	oa-rf	1	<i>Dienerella</i> sp.	rd-sf	2
<i>Aphodius fimetarius</i> (Linnaeus)	oa-rf	2?2	<i>Corticaria</i> spp.	rt-sf	6
<i>Aphodius granarius</i> (Linnaeus)	ob-rf	2	<i>Corticarina ?fuscula</i> (Gyllenhal)	rt	1
<i>Aphodius prodromus</i> (Brahm)	ob-rf	1?2	<i>Corticarina gibbosa</i> (Herbst)	rt	1
<i>Aphodius prodromus</i>			<i>Corticarina</i> or <i>Corticarina</i>		
or <i>sphacelatus</i>	ob-rf	1	sp. indet.	rt	2
<i>Aphodius</i> sp. and spp. indet.	ob-rf	4	<i>Aglenus brunneus</i> (Gyllenhal)	rt-ss	3
<i>Oxyomus sylvestris</i> (Scopoli)	rt-sf	3	<i>Tenebrio obscurus</i> Fabricius	rt-ss	2
<i>Onthophagus</i> sp.	oa-rf	1	<i>Anthicus floralis</i> (Linnaeus)	rt-st	2
<i>Clambus</i> sp.	rt-sf	3	<i>Anthicus formicarius</i> (Goeze)	rt-st	3
<i>Cyphon</i> sp.	oa-d	3	<i>Anthicus floralis</i> or <i>formicarius</i>	rt-st	2
Byrrhidae sp.	oa-p	2	<i>Bruchus ?rufimanus</i> Boheman	st	1
<i>Dryops</i> sp.	oa-d	1	Bruchinae sp. indet.	u	1
<i>Athous haemorrhoidalis</i>			<i>Plateumaris</i> sp.	oa-d-p	1
(Fabricius)	oa-p	1?2	Donaciinae sp. indet.	oa-d-p	2
<i>?Selatosomus</i> sp.	oa	1	<i>Prasocuris phellandrii</i> (Linnaeus)	oa-p-d	1
<i>Agriotes obscurus</i> (Linnaeus)	oa-p	1	<i>?Phyllodecta</i> sp.	oa-p	1
<i>Agriotes</i> sp. indet.	oa-p	2	Chrysomelinae sp.	oa-p	1
Elateridae sp. indet.	ob	3	<i>Lochmaea ?caprea</i> (Linnaeus)	oa-p	1
*Elateridae sp. (larva)	ob	1	<i>Phyllotreta nemorum</i> group	oa-p	4
Cantharidae spp. A	ob	2	<i>Phyllotreta</i> spp.	oa-p	4
<i>Anthrenus</i> sp.	rt-sf	1	<i>Aphthona</i> sp.	oa-p	2
<i>Xestobium rufovillosum</i> (Degeer)	l-st	1	<i>Longitarsus</i> sp.	oa-p	4
<i>Anobium punctatum</i> (Degeer)	l-sf	5	<i>Altica</i> sp.	oa-p	1
<i>Tipnus unicolor</i>			<i>Chalcoides</i> sp.	oa-p	1
(Piller & Mitterpacher)	rt		<i>Chaetocnema arida</i> group	oa-p	1
<i>Ptinus fur</i> (Linnaeus)	rd-sf	4?2	<i>Chaetocnema concinna</i> (Marsham)	oa-p	3
<i>?Anthocomus fasciatus</i> (Linnaeus)	ob	1	<i>Psylliodes</i> sp.	oa-p	1
<i>Kateretes</i> sp.	oa-p-d		Halticinae sp.	oa-p	1
<i>Brachypterus ?glaber</i> (Stephens)	oa-p	1	<i>Apion (Oxystoma) pomonae</i>		
<i>Brachypterus urticae</i> (Fabricius)	oa-p	1	(Fabricius)	oa-p	1
<i>Brachypterus</i> sp. indet.	oa-p	1	<i>Apion</i> spp.	oa-p	5
<i>Meligethes</i> sp.	oa-p	5	<i>Otiorhynchus</i> sp.	oa-p	1
<i>Omosita ?discoidea</i> (Fabricius)	rt-sf	1	<i>Phyllobius</i> sp.	oa-p	1
<i>Soronia grisea</i> (Linnaeus)	u	1	<i>Phyllobius</i> or <i>Polydrusus</i> sp.	oa-p	1
<i>Monotoma brevicollis</i> Aube	rt-st	1	<i>Sitona lepidus</i> Gyllenhal	oa-p	3
<i>Monotoma bicolor</i> Villa	rt-st	1	<i>Sitona lineatus</i> (Linnaeus)	oa-p	5
<i>Monotoma longicollis</i> (Gyllenhal)	rt-st	3	<i>Sitona</i> sp. and sp. indet.	oa-p	3
<i>Monotoma picipes</i> Herbst	rt-st	4	<i>Hypera nigrirostris</i> (Fabricius)	oa-p	1
<i>Monotoma spinicollis</i> Aube	rt-st	1	<i>Hypera punctata</i> (Fabricius)	oa-p	2
<i>Prostomis mandibularis</i>			<i>Hypera</i> sp.	oa-p	2
(Fabricius)	l	1	<i>Leiosoma</i> sp.	oa-p	2

<i>Tanysphyrus lemnae</i> (Paykull)	oa-w-p	4
<i>Sitophilus granarius</i> (Linnaeus)	g-ss	3
<i>Cidnorhinus quadrimaculatus</i> (Linnaeus)	oa-p	3
<i>Ceuthorhynchidius</i> sp.	oa-p	1
<i>Ceutorhynchus contractus</i> (Marsham)	oa-p	2??
<i>Ceutorhynchus</i> sp.	oa-p	2
<i>Rhinoncus pericarpus</i> (Linnaeus)	oa-p	1
<i>Phytobius</i> sp.	oa-d	1
Ceuthorhynchinae sp. indet.	oa-p	1
Curculionidae spp.	oa	4
<i>Lepersinus varius</i> (Fabricius)	l	3
<i>Dryocoetinus villosus</i> (Fabricius)	l	1
Scolytidae sp.	l	1
Coleoptera sp.	u	5
*Coleoptera sp. (larva)	u	5

Hymenoptera

*Proctotrupeoidea sp.	u	3
*Chalcidoidea sp.	u	4
*Hymenoptera Parasitica sp.	u	4
* <i>Myrmica</i> sp.	u	1
*Formicidae sp.	u	5
* <i>Apis mellifera</i> Linnaeus	u	1
*Apoidea sp.	u	1
*Hymenoptera sp.	u	2
*Insecta sp.	u	3

Arachnida

*Pseudoscorpiones sp.	u	1
*Aranae sp.	u	3
*Acarina sp.	u	5

Mollusca

*Gastropoda sp.	u	3
-----------------	---	---

Table 3. Morton Lane, Beverley: Species lists in rank order for invertebrate macrofossils from samples. For each sample assemblage the adult Hemiptera (bugs) and Coleoptera (beetles) are listed first, followed by the remaining invertebrates. Headers: ReM – recording method; D – detailed; CA – context note; Weight is in kilogrammes; E – erosion; F – fragmentation (following Kenward and Large 1998); ec – ecological codes; n = minimum number of individuals; SQ = semi-quantitative (e = estimate; - = fully quantitative, m = ‘many’, translated as 15 individuals; s = several, translated as 6). For translation of ecological codes, see Table 5. ‘Null’ samples (i.e. lacking recordable insect remains) are not included; they are listed in Table 1. Note: specific epithets are not italicised in this table.

Context: 1156 Sample: 187/T2 ReM: D
Weight: 2.00 E: 3.00 F: 3.00

Notes: Input HK 9/7/03. Recorded in flot and on filter paper. Two dish. E 2.0-4.0, mode 3.0 weak; F 1.5-5.0, mode 3.0 weak. Very fragmented material in many cases.

Taxon	n	SQ	ec
Cercyon analis	5	-	rt-sf
Anotylus nitidulus	5	-	rt
Orthoperus sp.	5	-	rt
Anobium punctatum	4	-	l-sf
Atomaria sp. A	3	-	rd
Corticaria sp. B	3	-	rt-sf
Corticaria sp. D	3	-	rt-sf
Anotylus complanatus	2	-	rt-sf
Anotylus tetracaratus	2	-	rt
Neobisnius sp.	2	-	u
Ptinus fur	2	-	rd-sf
Cryptophagus sp. B	2	-	rd-sf
Mycetaea hirta	2	-	rd-ss
Corticaria sp. C	2	-	rt-sf
Corixidae sp.	1	-	oa-w
Delphacidae sp.	1	-	oa-p
Pterostichus sp.	1	-	ob
Carabidae sp.	1	-	ob
Haliplidae sp.	1	-	oa-w
Helophorus sp.	1	-	oa-w
Megasternum obscurum	1	-	rt
Histerinae sp.	1	-	rt
Lesteva ?longoelytrata	1	-	oa-d
Omalium sp.	1	-	rt
Carpelimus fuliginosus	1	-	st
Carpelimus ?rivularis	1	-	ob-d
Carpelimus sp. A	1	-	u
Carpelimus sp. B	1	-	u
Platystethus arenarius	1	-	rf
Platystethus degener	1	-	oa-d
Platystethus nitens	1	-	oa-d
Anotylus rugosus	1	-	rt
Anotylus sculpturatus group	1	-	rt
Stenus sp.	1	-	u
Gyrophynus fracticornis	1	-	rt-st
Xantholininae sp.	1	-	u
Philonthus sp.	1	-	u
Tachyporus sp.	1	-	u
Cordalia obscura	1	-	rt-sf
Aleocharinae sp. A	1	-	u
Aleocharinae sp. B	1	-	u

Aleocharinae sp. C	1	-	u
Aleocharinae sp. D	1	-	u
Aleocharinae sp. E	1	-	u
Aleocharinae sp. F	1	-	u
Sinodendron cylindricum	1	-	l
?Trox scaber	1	-	rt-sf
Aphodius sp.	1	-	ob-rf
Clambus sp.	1	-	rt-sf
Elateridae sp.	1	-	ob
Monotoma picipes	1	-	rt-st
Cryptophagus ?scutellatus	1	-	rd-st
Cryptophagus sp. A	1	-	rd-sf
Atomaria sp. B	1	-	rd
Corticaria sp. A	1	-	rt-sf
Anthicus floralis or formicarius	1	-	rt-st
Apion sp.	1	-	oa-p
?Sitona sp.	1	-	oa-p
Hypera sp.	1	-	oa-p
Ceutorhynchus ?contractus	1	-	oa-p
Ceuthorhynchinae sp.	1	-	oa-p
Curculionidae sp.	1	-	oa
*?Damalinia sp.	2	-	u

Context: 1234 Sample: 185/T2 ReM: D
Weight: 3.00 E: 2.50 F: 3.00

Notes: Entered HK 9/7/03. Recorded in meths and on filter paper. Six dish flot, mostly seeds and plant debris. E 2.0-4.0, mode 2.5 weak; F 2.0-4.0, mode 3.0 weak.

Taxon	n	SQ	ec
Lathridius minutus group	41	-	rd-st
Cercyon analis	10	-	rt-sf
Platystethus arenarius	8	-	rf
Anotylus complanatus	6	-	rt-sf
Acrotrichis sp.	5	-	rt
Cryptophagus sp.	5	-	rd-sf
Anotylus nitidulus	4	-	rt
Oxytelus sculptus	4	-	rt-st
Stenus sp.	4	-	u
Aleocharinae sp. A	4	-	u
Aleocharinae sp. D	4	-	u
Anobium punctatum	4	-	l-sf
Trechus quadristriatus	3	-	oa
Cercyon atricapillus	3	-	rf-st
Omalium ?rivulare	3	-	rt-sf
Xylodromus concinnus	3	-	rt-st
Carpelimus bilineatus	3	-	rt-sf
Anotylus rugosus	3	-	rt

Gyrohypnus fracticornis	3	-	rt-st
Aphodius prodromus	3	-	ob-rf
Corticaria sp. C	3	-	rt-sf
Sitona ?lineatus	3	-	oa-p
Carpelimus fuliginosus	2	-	st
Neobisnius sp.	2	-	u
Philonthus sp. B	2	-	u
Falagria caesa or sulcatula	2	-	rt-sf
Aleocharinae sp. C	2	-	u
Monotoma brevicollis	2	-	rt-st
Atomaria sp. A	2	-	rd
Atomaria sp. B	2	-	rd
Corixidae sp.	1	-	oa-w
Aphrodes sp.	1	-	oa-p
Delphacidae sp.	1	-	oa-p
Nebria brevicollis	1	-	oa
Bembidion sp.	1	-	oa
Pterostichus sp.	1	-	ob
Agonum sp.	1	-	oa
?Amara sp.	1	-	oa
Halipus sp.	1	-	oa-w
Hydroporus sp.	1	-	oa-w
Helophorus grandis	1	-	oa-w
Helophorus nubilus	1	-	oa
Cercyon terminatus	1	-	rf-st
Megasternum obscurum	1	-	rt
Cryptopleurum minutum	1	-	rf-st
Histerinae sp.	1	-	rt
Ochthebius minimus	1	-	oa-w
Limnebius ?truncatellus	1	-	oa-w
Ptenidium sp.	1	-	rt
Lesteva longoelytrata	1	-	oa-d
Dropephylla sp.	1	-	u
Omalium excavatum	1	-	rt-sf
Omalium sp.	1	-	rt
Platystethus cornutus group	1	-	oa-d
Anotylus sculpturatus group	1	-	rt
Anotylus tetracarinated	1	-	rt
Lathrobium sp. A	1	-	u
Lathrobium sp. B	1	-	u
Leptacinus sp.	1	-	rt-st
Gyrohypnus angustatus	1	-	rt-st
Philonthus sp. A	1	-	u
Philonthus or Gabrius sp.	1	-	u
Tachinus sp.	1	-	u
Cordalia obscura	1	-	rt-sf
Aleocharinae sp. B	1	-	u
Clambus sp.	1	-	rt-sf
Elateridae sp.	1	-	ob
Ptinus ?fur	1	-	rd-sf
?Kateretes sp.	1	-	oa-p-d
Meligethes sp.	1	-	oa-p
Soronia grisea	1	-	u
Cryptophagus scutellatus	1	-	rd-st
Orthoperus sp.	1	-	rt
Enicmus sp.	1	-	rt-sf
Corticaria sp. A	1	-	rt-sf
Corticaria sp. B	1	-	rt-sf
Corticaria sp. D	1	-	rt-sf

Tenebrio obscurus	1	-	rt-ss
Anthicus floralis or formicarius	1	-	rt-st
Donaciinae sp.	1	-	oa-d-p
Prasocuris phellandrii	1	-	oa-p-d
Phyllotreta nemorum group	1	-	oa-p
Longitarsus sp.	1	-	oa-p
Ceutorhynchus sp.	1	-	oa-p
Rhinoncus pericarpus	1	-	oa-p
Scolytidae sp.	1	-	l
Coleoptera sp.	1	-	u
*Diptera sp. (puparium)	15	m	u
*Acarina sp.	15	m	u
*Diptera sp. (pupa)	6	s	u
*Coleoptera sp. (larva)	6	s	u
*Oligochaeta sp. (egg capsule)	3	-	u
*Pulex irritans	3	-	ss
*Bibionidae sp.	2	-	u
*Dermaptera sp.	1	-	u
*Daphnia sp. (ephippium)	1	-	oa-w
*Ostracoda sp.	1	-	u
*Diptera sp. (adult)	1	-	u
*Melophagus ovinus (adult)	1	-	u
*Melophagus ovinus (puparium)	1	-	u
*Elateridae sp. (larva)	1	-	ob
*Formicidae sp.	1	-	u
*Hymenoptera Parasitica sp.	1	-	u
*Proctotrupoidea sp.	1	-	u
*Gastropoda sp.	1	-	u

Context: 1239 Sample: 189/T2 ReM: D
Weight: 2.00 E: 2.50 F: 3.00

Notes: Entered 9/7/03 HK. Two dish flot, recorded in meths, problems on filter paper. Remains appeared very fragmented. E 1.5-4.0, mode 2.5 weak; F 1.5-5.0, mode 3.0, distinct.

Taxon	n	SQ	ec
Lathridius minutus group	39	-	rd-st
Cercyon analis	6	-	rt-sf
Corticaria sp. C	5	-	rt-sf
Xylodromus concinnus	4	-	rt-st
Carpelimus bilineatus	4	-	rt-sf
Anotylus nitidulus	4	-	rt
Corticaria sp. B	4	-	rt-sf
Trechus quadristriatus	3	-	oa
Anotylus rugosus	3	-	rt
Stenus ?crassus	3	-	rt
Gyrohypnus angustatus	3	-	rt-st
Neobisnius sp.	3	-	u
Anobium punctatum	3	-	l-sf
Corticaria sp. A	3	-	rt-sf
Cercyon atricapillus	2	-	rf-st
Cercyon haemorrhoidalis	2	-	rf-sf
Acrotichis sp.	2	-	rt
Micropeplus fulvus	2	-	rt
Lesteva longoelytrata	2	-	oa-d
Platystethus arenarius	2	-	rf

Anotylus complanatus	2	-	rt-sf
Philonthus sp. C	2	-	u
Aleocharinae sp. B	2	-	u
Cryptophagus sp.	2	-	rd-sf
Chaetocnema concinna	2	-	oa-p
Nebria brevicollis	1	-	oa
Loricera pilicornis	1	-	oa
Clivina ?collaris	1	-	oa
Pterostichus sp.	1	-	ob
Colymbetes fuscus	1	-	oa-w
Helophorus aquaticus or grandis	1	-	oa-w
Helophorus sp.	1	-	oa-w
?Cryptopleurum minutum	1	-	rf-st
Chaetarthria seminulum	1	-	oa-w
Histerinae sp.	1	-	rt
Ochthebius minimus	1	-	oa-w
Hydraena sp.	1	-	oa-w
Ptenidium sp.	1	-	rt
Megarthus sp.	1	-	rt
Omalius ?rivulare	1	-	rt-sf
Omalius sp.	1	-	rt
Carpelimus elongatulus	1	-	oa-d
Carpelimus fuliginosus	1	-	st
Carpelimus ?rivularis	1	-	ob-d
Anotylus sculpturatus group	1	-	rt
Oxytelus sculptus	1	-	rt-st
Lithocharis ochracea	1	-	rt-st
Leptacinus sp.	1	-	rt-st
Gyrophypnus fracticornis	1	-	rt-st
Philonthus sp. A	1	-	u
Philonthus sp. B	1	-	u
Philonthus sp. D	1	-	u
Tachinus laticollis or marginellus	1	-	u
Falagria caesa or sulcatula	1	-	rt-sf
?Cratarea suturalis	1	-	rt-st
Aleocharinae sp. A	1	-	u
Aleocharinae sp. C	1	-	u
Aleocharinae sp. D	1	-	u
Aphodius fimetarius	1	-	oa-rf
Aphodius sp.	1	-	ob-rf
Ptinus ?fur	1	-	rd-sf
Kateretes sp.	1	-	oa-p-d
Meligethes sp.	1	-	oa-p
Monotoma picipes	1	-	rt-st
Prostomis mandibularis	1	-	l
Atomaria sp. A	1	-	rd
Atomaria sp. B	1	-	rd
Ephistemus globulus	1	-	rd-sf
Orthoperus sp.	1	-	rt
Corticarina or Cortinicara sp.	1	-	rt
Tenebrio obscurus	1	-	rt-ss
Plateumaris sp.	1	-	oa-d-p
?Phyllodecta sp.	1	-	oa-p
Lochmaea ?caprea	1	-	oa-p
Phyllotreta sp.	1	-	oa-p
Apion sp.	1	-	oa-p
Apion sp. B	1	-	oa-p
Sitona ?lineatus	1	-	oa-p
Tanysphyrus lemnae	1	-	oa-w-p

Curculionidae sp.	1	-	oa
Coleoptera sp.	1	-	u
*Acarina sp.	15	m	u
*Oligochaeta sp. (egg capsule)	6	s	u
*Daphnia sp. (ephippium)	6	s	oa-w
*Diptera sp. (pupa)	6	s	u
*Diptera sp. (puparium)	6	s	u
*Coleoptera sp. (larva)	6	m	u
*Melophagus ovinus (adult)	3	-	u
*Auchenorhyncha sp. (nymph)	1	-	oa-p
*Diptera sp. (adult)	1	-	u
*Bibionidae sp.	1	-	u
*Melophagus ovinus (puparium)	1	-	u
*Pulex irritans	1	-	ss
*Chalcidoidea sp.	1	-	u
*Formicidae sp.	1	-	u
*Proctotrupoidea sp.	1	-	u
*Araneae sp.	1	-	u

Context: 5006 Sample: 4050/T2 CA: 40-50 cm
ReM: D Weight: 3.00 E: 2.50 F: 3.00

Notes: Entered HK 9/7/03. Recorded in meths and on filter paper. Six dish flot, assorted plant debris and numerous insects. Preservation noticeably good to poor: E 1.5-4.0, mode 2.5 weak; F 1.5-4.0, mode 3.0 weak. Some *O. surinamensis* quite pale.

Taxon	n	SQ	ec
Lathridius minutus group	47	-	rd-st
Oryzaeophilus surinamensis	31	-	g-ss
Helophorus sp. A	19	-	oa-w
Ochthebius minimus	16	-	oa-w
Anotylus complanatus	16	-	rt-sf
Monotoma picipes	10	-	rt-st
Aleocharinae sp. F	9	-	u
Leperisinus varius	9	-	l
Limnebius truncatellus	8	-	oa-w
Anotylus nitidulus	8	-	rt
Leptacinus pusillus	8	-	rt-st
Tipnus unicolor	8	-	rt-ss
Mycetaea hirta	8	-	rd-ss
Cercyon analis	7	-	rt-sf
Acritus nigricornis	7	-	rt-st
Anthicus formicarius	7	-	rt-st
Cercyon atricapillus	6	-	rf-st
Platystethus arenarius	6	-	rf
Oxytelus sculptus	6	-	rt-st
Lithocharis ochracea	6	-	rt-st
Cordalia obscura	6	-	rt-sf
Aphodius fimetarius	5	-	oa-rf
Ptinus fur	5	-	rd-sf
Cryptophagus sp. B	5	-	rd-sf
Orthoperus sp.	5	-	rt
Sitophilus granarius	5	-	g-ss
Helophorus sp. B	4	-	oa-w
Hydrobius fuscipes	4	-	oa-w
Xylodromus concinnus	4	-	rt-st

Carpelimus bilineatus	4	-	rt-sf	Clivina sp.	1	-	oa
Anotylus rugosus	4	-	rt	Trechus obtusus or quadristriatus	1	-	oa
Anotylus tetracaratus	4	-	rt	Bembidion doris	1	-	oa-d
Gyrophypnus angustatus	4	-	rt-st	Bembidion sp.	1	-	oa
Philonthus sp. B	4	-	u	Pterostichus sp.	1	-	ob
Falagria caesa or sulcatula	4	-	rt-sf	Laemostenus ?terricola	1	-	ss
Aleocharinae sp. G	4	-	u	Amara sp.	1	-	oa
Aleocharinae sp. H	4	-	u	Carabidae sp.	1	-	ob
Anobium punctatum	4	-	l-sf	Hydroporus sp. A	1	-	oa-w
Cercyon ustulatus	3	-	oa-d	Hydroporus sp. B	1	-	oa-w
Ptenidium sp.	3	-	rt	Hydroporinae sp.	1	-	oa-w
Carpelimus fuliginosus	3	-	st	Agabus bipustulatus	1	-	oa-w
Carpelimus ?rivularis	3	-	ob-d	Agabus sp.	1	-	oa-w
Leptacinus ?batychnus	3	-	rt-st	Colymbetes fuscus	1	-	oa-w
Neobisnius sp.	3	-	u	Dytiscidae sp.	1	-	oa-w
Pselaphidae sp.	3	-	u	Helophorus ?aquaticus	1	-	oa-w
Cyphon sp.	3	-	oa-d	Helophorus ?grandis	1	-	oa-w
Atomaria sp. B	3	-	rd	Cercyon ?haemorrhoidalis	1	-	rf-sf
Phyllotreta sp. A	3	-	oa-p	Cercyon ?unipunctatus	1	-	rf-st
Sitona ?lineatus	3	-	oa-p	Cryptopleurum minutum	1	-	rf-st
Tanysphyrus lemnae	3	-	oa-w-p	Enochrus sp.	1	-	oa-w
Corixidae sp.	2	-	oa-w	Berosus sp.	1	-	oa-w
Pterostichus cupreus	2	-	oa	Hydrophilinae sp. A	1	-	oa-w
Halipus sp.	2	-	oa-w	Histerinae sp.	1	-	rt
Acrotichis sp.	2	-	rt	Ochthebius ?pusillus	1	-	oa-w
Megarthus sinuatocollis	2	-	rt-sf	Ochthebius sp.	1	-	oa-w
Omalium caesum or italicum	2	-	rt-sf	Micropeplus fulvus	1	-	rt
Omalium ?rivulare	2	-	rt-sf	Dropephylla sp.	1	-	u
Platystethus ?cornutus	2	-	oa-d	Omalium excavatum	1	-	rt-sf
Platystethus degener	2	-	oa-d	Coprophilus striatulus	1	-	rt-st
Platystethus nitens	2	-	oa-d	Platystethus nodifrons	1	-	oa-d
Anotylus sculpturatus group	2	-	rt	Stenus sp. A	1	-	u
Paederinae sp.	2	-	u	Stenus sp. B	1	-	u
Philonthus sp. A	2	-	u	Lathrobium sp.	1	-	u
Philonthus or Gabrius sp.	2	-	u	Rugilus rufipes	1	-	rt-st
Tachyporus sp. A	2	-	u	Gauropterus fulgidus	1	-	rt-st
Tachyporus sp. B	2	-	u	Gyrophypnus fracticornis	1	-	rt-st
Aleocharinae sp. D	2	-	u	Xantholinus sp.	1	-	u
Aleocharinae sp. J	2	-	u	Philonthus sp. C	1	-	u
Trox scaber	2	-	rt-sf	Philonthus sp. D	1	-	u
Meligethes sp.	2	-	oa-p	Staphylinus sp.	1	-	u
Cryptophagus sp. C	2	-	rd-sf	Quedius sp.	1	-	u
Atomaria sp. A	2	-	rd	Tachinus laticollis or marginellus	1	-	u
Dienerella sp.	2	-	rd-sf	Tachinus ?subterraneus	1	-	u
Corticaria sp. B	2	-	rt-sf	Cypha sp.	1	-	rt
Corticaria sp. C	2	-	rt-sf	?Cratarea suturalis	1	-	rt-st
Corticarina ?fuscula	2	-	rt	Aleochara sp.	1	-	u
Corticaria gibbosa	2	-	rt	Aleocharinae sp. A	1	-	u
Phyllotreta nemorum group	2	-	oa-p	Aleocharinae sp. B	1	-	u
Longitarsus sp.	2	-	oa-p	Aleocharinae sp. C	1	-	u
Megalonotus sp.	1	-	oa-p	Aleocharinae sp. E	1	-	u
Temnostethus sp.	1	-	oa	Aleocharinae sp. I	1	-	u
Saldula sp.	1	-	oa-d	Geotrupes sp.	1	-	oa-rf
Gerris sp.	1	-	oa-w	Aphodius granarius	1	-	ob-rf
Notonecta maculata	1	-	oa-w	Aphodius ?prodromus	1	-	ob-rf
Corixidae sp. B	1	-	oa-w	Aphodius sp.	1	-	ob-rf
Cicadellidae sp.	1	-	oa-p	Oxyomus sylvestris	1	-	rt-sf
Delphacidae sp.	1	-	oa-p	Clambus sp.	1	-	rt-sf
Psylloidea sp.	1	-	oa-p	Byrrhidae sp.	1	-	oa-p

?Athous haemorrhoidalis	1	-	oa-p
Agriotes sp.	1	-	oa-p
Brachypterus ?glaber	1	-	oa-p
Monotoma longicollis	1	-	rt-st
Cryptophagus ?scutellatus	1	-	rd-st
Cryptophagus sp. A	1	-	rd-sf
Phalacridae sp.	1	-	oa-p
Stephostethus lardarius	1	-	rt-st
Enicmus sp.	1	-	rt-sf
Corticaria sp. A	1	-	rt-sf
Aglenus brunneus	1	-	rt-ss
Anthicus floralis	1	-	rt-st
Bruchus ?rufimanus	1	-	st
Phyllotreta sp. B	1	-	oa-p
Altica sp.	1	-	oa-p
Chalcoides sp.	1	-	oa-p
Chaetocnema arida group	1	-	oa-p
Chaetocnema concinna	1	-	oa-p
Apion sp.	1	-	oa-p
Phyllobius or Polydrusus sp.	1	-	oa-p
Sitona ?lepidus	1	-	oa-p
Sitona sp.	1	-	oa-p
Cidnorhinus quadrimaculatus	1	-	oa-p
Ceutorhynchus ?contractus	1	-	oa-p
Curculionidae sp.	1	-	oa
Coleoptera sp.	1	-	u
*Diptera sp. (pupa)	100	e	u
*Ostracoda sp.	15	m	u
*Acarina sp.	15	m	u
*Diptera sp. (adult)	6	s	u
*Diptera sp. (puparium)	6	s	u
*Bibionidae sp.	6	s	u
*Coleoptera sp. (larva)	6	s	u
*Chalcidoidea sp.	6	s	u
*Hymenoptera Parasitica sp.	6	s	u
*Myrmica sp.	6	s	u
*Pulex irritans	3	-	ss
*Daphnia sp. (ephippium)	2	-	oa-w
*Auchenorhyncha sp. (nymph)	2	-	oa-p
*Araneae sp.	2	-	u
*Oligochaeta sp. (egg capsule)	1	-	u
*Trichoptera sp.	1	-	oa-w
*Diplopoda sp.	1	-	u
*Forficula auricularia	1	-	u
*Heteroptera sp. (nymph)	1	-	u
*Psylloidea sp. (nymph)	1	-	oa-p
*Coccoidea sp.	1	-	u
*Chironomidae sp. (larva)	1	-	w
*Melophagus ovinus (adult)	1	-	u
*Melophagus ovinus (puparium)	1	-	u
*Ctenocephalides canis	1	-	st
*Apoidea sp.	1	-	u
*Formicidae sp.	1	-	u
*Insecta sp.	1	-	u
*Pseudoscorpiones sp.	1	-	u

Context: 5006 Sample: 5060/T2 CA: 50-60 cm
 ReM: D Weight: 2.00 E: 2.50 F: 2.50

Notes: Entered HK 8/7/03. Recorded in alcohol, problems on filter paper. Four-dish flot. E 2.0-4.0, mode 2.5 weak; F 1.5-4.0, mode 2.5 weak.

Taxon	n	SQ	ec
Helophorus sp.	17	-	oa-w
Lathridius minutus group	16	-	rd-st
Ochthebius minimus	13	-	oa-w
Carpelimus bilineatus	11	-	rt-sf
Falagria caesa or sulcatula	11	-	rt-sf
Leptacinus pusillus	10	-	rt-st
Aleocharinae sp. A	9	-	u
Atomaria sp. C	9	-	rd
Limnebius truncatellus	8	-	oa-w
Anotylus nitidulus	8	-	rt
Anotylus rugosus	8	-	rt
Cercyon analis	7	-	rt-sf
Anotylus complanatus	6	-	rt-sf
Aleocharinae sp. B	6	-	u
Anobium punctatum	6	-	l-sf
Sitona lineatus	6	-	oa-p
Ceutorhynchus contractus	6	-	oa-p
Corixidae sp. A	5	-	oa-w
Helochares sp.	5	-	oa-w
Carpelimus elongatulus	5	-	oa-d
Cordalia obscura	5	-	rt-sf
Brachypterus urticae	5	-	oa-p
Monotoma bicolor	5	-	rt-st
Longitarsus sp. A	5	-	oa-p
Leperisinus varius	5	-	l
Cercyon atricapillus	4	-	rf-st
Cercyon ustulatus	4	-	oa-d
Ptenidium sp. A	4	-	rt
Platystethus arenarius	4	-	rf
Oxytelus sculptus	4	-	rt-st
Tachyporus hypnorum	4	-	u
Aleocharinae sp. J	4	-	u
Aglenus brunneus	4	-	rt-ss
Anthicus formicarius	4	-	rt-st
Phyllotreta nemorum group	4	-	oa-p
Pterostichus cupreus	3	-	oa
Helophorus ?aquaticus	3	-	oa-w
Helophorus sp. B	3	-	oa-w
Hydrobius fuscipes	3	-	oa-w
Carpelimus ?corticinus	3	-	oa-d
Platystethus nitens	3	-	oa-d
Gyrophypnus angustatus	3	-	rt-st
Philonthus sp. B	3	-	u
Aleocharinae sp. C	3	-	u
Ptinus fur	3	-	rd-sf
Mycetaea hirta	3	-	rd-ss
Tanysphyrus lemnae	3	-	oa-w-p
Anthocoris sp.	2	-	oa-p
Delphacidae sp. A	2	-	oa-p
Bembidion biguttatum	2	-	oa-d
Cercyon ?terminatus	2	-	rf-st
Ochthebius sp.	2	-	oa-w
Hydraena sp.	2	-	oa-w

Limnebius aluta	2	-	oa-w	Cryptopleurum minutum	1	-	rf-st
Acrotrichis sp.	2	-	rt	Anacaena sp.	1	-	oa-w
Omalium sp.	2	-	rt	Laccobius sp.	1	-	oa-w
Xylodromus concinnus	2	-	rt-st	Histerinae sp.	1	-	rt
Carpelimus ?rivularis	2	-	ob-d	Ochthebius ?pusillus	1	-	oa-w
Anotylus sculpturatus group	2	-	rt	Hydraena testacea	1	-	oa-w
Stenus sp. B	2	-	u	Ptenidium sp. B	1	-	rt
Leptacinus ?batychrus	2	-	rt-st	Ptomophagus sp.	1	-	u
Gyrohypnus fracticornis	2	-	rt-st	Megarthus sp.	1	-	rt
Neobisnius sp.	2	-	u	Lesteva longoelytrata	1	-	oa-d
Philonthus sp. C	2	-	u	Omalium ?rivulare	1	-	rt-sf
Aleocharinae sp. H	2	-	u	Omaliinae sp.	1	-	rt
Aphodius ?fimetarius	2	-	oa-rf	Carpelimus ?fuliginosus	1	-	st
Aphodius prodromus or sphaelatus	2	-	ob-rf	Platystethus ?cornutus	1	-	oa-d
Agriotes obscurus	2	-	oa-p	Platystethus degener	1	-	oa-d
Tipnus unicolor	2	-	rt-ss	Anotylus tetracarinatus	1	-	rt
Monotoma spinicollis	2	-	rt-st	Stenus sp. A	1	-	u
Oryzaephilus surinamensis	2	-	g-ss	Lathrobium sp.	1	-	u
Cryptophagus sp. A	2	-	rd-sf	Astenus sp.	1	-	rt
Atomaria sp. A	2	-	rd	Rugilus orbiculatus	1	-	rt-sf
Atomaria sp. B	2	-	rd	Rugilus rufipes	1	-	rt-st
Corticarina or Cortinicara sp.	2	-	rt	Xantholinus longiventris	1	-	rt-sf
Phyllotreta sp. A	2	-	oa-p	Philonthus sp. A	1	-	u
Cimicidae sp.	1	-	oa-p	Philonthus or Quedius sp.	1	-	u
Gerris sp.	1	-	oa-w	Staphylininae sp.	1	-	u
Notonecta maculata	1	-	oa-w	Tachyporus sp.	1	-	u
Corixidae sp. B	1	-	oa-w	Tachinus ?signatus	1	-	u
Aphrodes flavostriatus	1	-	oa-p-d	Cypha sp.	1	-	rt
Aphrodes sp.	1	-	oa-p	Aleochara sp.	1	-	u
Cicadellidae sp.	1	-	oa-p	Aleocharinae sp. D	1	-	u
Delphacidae sp. B	1	-	oa-p	Aleocharinae sp. E	1	-	u
Delphacidae sp. C	1	-	oa-p	Aleocharinae sp. F	1	-	u
Psylloidea sp.	1	-	oa-p	Aleocharinae sp. G	1	-	u
Carabus sp.	1	-	oa	Aleocharinae sp. I	1	-	u
Clivina fossor	1	-	oa	Pselaphidae sp.	1	-	u
Bembidion doris	1	-	oa-d	Trox scaber	1	-	rt-sf
Bembidion guttula or mannerheimi	1	-		Aphodius ater	1	-	oa-rf
Pterostichus melanarius	1	-	ob	Aphodius sp.	1	-	oab-rf
Pterostichus nigrita	1	-	oa-d	Aphodius sp. B	1	-	ob-rf
Agonum sp.	1	-	oa	Oxyomus sylvestris	1	-	rt-sf
Amara sp.	1	-	oa	Cyphon sp.	1	-	oa-d
Harpalus sp.	1	-	oa	Dryops sp.	1	-	oa-d
Carabidae sp.	1	-	ob	Athous ?haemorrhoidalis	1	-	oa-p
Hydroporus sp. A	1	-	oa-w	Cantharidae sp. A	1	-	ob
Hydroporus sp. B	1	-	oa-w	Anthrenus sp.	1	-	rt-sf
Hydroporinae sp. A	1	-	oa-w	?Anthocomus fasciatus	1	-	ob
Hydroporinae sp. B	1	-	oa-w	Meligethes sp.	1	-	oa-p
Agabus bipustulatus	1	-	oa-w	Omosita ?discoidea	1	-	rt-sf
Agabus sp.	1	-	oa-w	Monotoma longicollis	1	-	rt-st
Colymbetes fuscus	1	-	oa-w	Cryptophagus acutangulus	1	-	rd-sf
Acilius sulcatus	1	-	oa-w	Cryptophagus sp. B	1	-	rd-sf
Dytiscus sp.	1	-	oa-w	Coccidula sp.	1	-	oa-p-d
Dytiscidae sp.	1	-	oa-w	Coccinellidae sp.	1	-	oa-p
Hydrochus sp.	1	-	oa-w	Corticaria sp. A	1	-	rt-sf
Helophorus grandis	1	-	oa-w	Corticaria sp. B	1	-	rt-sf
Coelostoma orbiculare	1	-	oa-w	Donaciinae sp.	1	-	oa-d-p
Cercyon haemorrhoidalis	1	-	rf-sf	Phyllotreta sp. B	1	-	oa-p
Megasternum obscurum	1	-	rt	Aphthona sp.	1	-	oa-p
				Longitarsus sp. B	1	-	oa-p

Psylliodes sp.	1	-	oa-p
Apion (Oxystoma) pomonae	1	-	oa-p
Apion sp. A	1	-	oa-p
Apion sp. B	1	-	oa-p
Sitona ?lepidus	1	-	oa-p
Sitona sp. A	1	-	oa-p
Sitona sp. B	1	-	oa-p
Sitona sp. C	1	-	oa-p
Hypera punctata	1	-	oa-p
Hypera sp.	1	-	oa-p
Leiosoma sp.	1	-	oa-p
Sitophilus granarius	1	-	g-ss
Cidnorhinus quadrimaculatus	1	-	oa-p
Ceutorhynchus sp.	1	-	oa-p
Phytobius sp.	1	-	oa-d
Curculionidae sp.	1	-	oa
Dryocoetinus villosus	1	-	l
Coleoptera sp.	1	-	u
*Ostracoda sp.	1000	e	u
*Acarina sp.	100	e	u
*Bibionidae sp.	15	m	u
*Chironomidae sp. (larva)	15	m	w
*Oligochaeta sp. (egg capsule)	6	s	u
*Daphnia sp. (ephippium)	6	s	oa-w
*Diptera sp. (puparium)	6	s	u
*Coleoptera sp. (larva)	6	s	u
*Formicidae sp.	6	s	u
*Hymenoptera Parasitica sp.	6	s	u
*Dermaptera sp.	2	-	u
*Trichoptera sp. (case)	2	-	oa-w
*Diptera sp. (adult)	2	-	u
*Pulex irritans	2	-	ss
*Gastropoda sp.	2	-	u
*Diplopoda sp.	1	-	u
*?Damalinia sp.	1	-	u
*Heteroptera sp. (nymph)	1	-	u
*Psylloidea sp. (nymph)	1	-	oa-p
*Aphidoidea sp.	1	-	u
*Lepidoptera sp. (pupa)	1	-	u
*Melophagus ovinus (puparium)	1	-	u
*Apis mellifera	1	-	u
*Chalcidoidea sp.	1	-	u
*Hymenoptera sp.	1	-	u
*Proctotrupeoidea sp.	1	-	u
*Insecta sp.	1	-	u

Context: 5007 Sample: 130/T2 ReM: D
Weight: 3.00 E: 2.00 F: 2.00

Notes: Entered by HK 8/7/03. Five dish flot, abundant insects and other invertebrates. Recorded from flot, problems on filter paper. E 1.5-2.0, mode 2.0 distinct; F 1.5-2.0, mode 2.0 distinct. One mineralised insect. Two beetles to tube for future investigation.

Taxon	n	SQ	ec
Ochthebius minimus	16	-	oa-w
Lathridius minutus group	16	-	rd-st
Helophorus sp. A	15	-	oa-w
Platystethus arenarius	11	-	rf
Anotylus nitidulus	11	-	rt
Limnebius truncatellus	10	-	oa-w
Carpelimus bilineatus	10	-	rt-sf
Aleocharinae sp. D	10	-	u
Anotylus complanatus	9	-	rt-sf
Anotylus tetracaratus	9	-	rt
Cordalia obscura	9	-	rt-sf
Hydrobius fuscipes	7	-	oa-w
Acritus nigricornis	7	-	rt-st
Monotoma picipes	7	-	rt-st
Aleocharinae sp. G	6	-	u
Oryzaephilus surinamensis	6	-	g-ss
Mycetaea hirta	6	-	rd-ss
Cercyon analis	5	-	rt-sf
Cryptopleurum minutum	5	-	rf-st
Ptenidium sp.	5	-	rt
Leptacinus pusillus	5	-	rt-st
Aleocharinae sp. E	5	-	u
Tipnus unicolor	5	-	rt-ss
Megarthus sp.	4	-	rt
Carpelimus elongatulus	4	-	oa-d
Anotylus rugosus	4	-	rt
Oxytelus sculptus	4	-	rt-st
Leptacinus batychnus	4	-	rt-st
Falagria caesa or sulcatula	4	-	rt-sf
Aleocharinae sp. B	4	-	u
Anthicus floralis	4	-	rt-st
Phyllotreta nemorum group	4	-	oa-p
Anthocoris sp.	3	-	oa-p
Delphacidae sp. B	3	-	oa-p
Cercyon atricapillus	3	-	rf-st
Cercyon unipunctatus	3	-	rf-st
Acrotrichis sp.	3	-	rt
Carpelimus corticinus	3	-	oa-d
Carpelimus rivularis	3	-	ob-d
Anotylus sculpturatus group	3	-	rt
Gyrophypnus fracticornis	3	-	rt-st
Philonthus sp. B	3	-	u
Tachyporus sp. B	3	-	u
Aleocharinae sp. F	3	-	u
Aphodius ?prodromus	3	-	ob-rf
Athous haemorrhoidalis	3	-	oa-p
Meligethes sp.	3	-	oa-p
Ephistemus globulus	3	-	rd-sf
Anthicus formicarius	3	-	rt-st
Tanysphyrus lemnae	3	-	oa-w-p
Cidnorhinus quadrimaculatus	3	-	oa-p

Leperisinus varius	3	-	l	Agonum sp.	1	-	oa
Corixidae sp. A	2	-	oa-w	Harpalus sp. A	1	-	oa
Bembidion biguttatum	2	-	oa-d	Harpalus sp. B	1	-	oa
Pterostichus cupreus	2	-	oa	Bradycellus sp.	1	-	oa
Hydroporus sp.	2	-	oa-w	Metabletus sp.	1	-	oa
Helophorus grandis	2	-	oa-w	Carabidae sp.	1	-	ob
Helophorus sp. B	2	-	oa-w	Hygrotus inaequalis	1	-	oa-w
Coelostoma orbiculare	2	-	oa-w	Agabus bipustulatus	1	-	oa-w
Cercyon haemorrhoidalis	2	-	rf-sf	Agabus sp.	1	-	oa-w
Megasternum obscurum	2	-	rt	Colymbetes fuscus	1	-	oa-w
Ochthebius ?pusillus	2	-	oa-w	Dytiscus sp.	1	-	oa-w
Omalium ?rivulare	2	-	rt-sf	Helophorus ?aquaticus	1	-	oa-w
Xylodromus concinnus	2	-	rt-st	Sphaeridium sp.	1	-	rf
Stenus sp. A	2	-	u	Cercyon terminatus	1	-	rf-st
Lithocharis ochracea	2	-	rt-st	Cercyon tristis	1	-	oa-d
Neobisnius sp.	2	-	u	Cercyon ustulatus	1	-	oa-d
Philonthus sp. A	2	-	u	?Anacaena sp.	1	-	oa-w
Philonthus sp. E	2	-	u	Enochrus sp.	1	-	oa-w
Aleocharinae sp. J	2	-	u	Hydrophilinae sp.	1	-	oa-w
Aleocharinae sp. K	2	-	u	Histerinae sp.	1	-	rt
Aphodius ?fimetarius	2	-	oa-rf	Hydraena sp.	1	-	oa-w
Oxyomus sylvestris	2	-	rt-sf	Scydmaenus tarsatus	1	-	rt-sf
Cyphon sp.	2	-	oa-d	Micropeplus fulvus	1	-	rt
Ptinus fur	2	-	rd-sf	Acidota crenata	1	-	oa
Monotoma longicollis	2	-	rt-st	Omalium sp.	1	-	rt
Cryptophagus sp. A	2	-	rd-sf	Carpelimus fuliginosus	1	-	st
Cryptophagus sp. B	2	-	rd-sf	Platystethus cornutus group	1	-	oa-d
Atomaria sp. A	2	-	rd	Platystethus nitens	1	-	oa-d
Atomaria sp. B	2	-	rd	Stenus sp. B	1	-	u
Corticaria sp. B	2	-	rt-sf	Rugilus rufipes	1	-	rt-st
Phyllotreta sp. A	2	-	oa-p	Paederinae sp.	1	-	u
Phyllotreta sp. B	2	-	oa-p	Gyrophypnus angustatus	1	-	rt-st
Aphthona sp.	2	-	oa-p	Xantholininae sp.	1	-	u
Longitarsus sp. A	2	-	oa-p	Philonthus sp. C	1	-	u
Longitarsus sp. B	2	-	oa-p	Philonthus sp. D	1	-	u
Sitona lepidus	2	-	oa-p	Tachyporus ?nitidulus	1	-	u
Sitona ?lineatus	2	-	oa-p	Tachyporus sp. A	1	-	u
Sitophilus granarius	2	-	g-ss	Tachinus subterraneus	1	-	u
Ceutorhynchus contractus	2	-	oa-p	?Crataera suturalis	1	-	rt-st
Temnostethus sp.	1	-	oa	Aleochara sp.	1	-	u
Saldula sp.	1	-	oa-d	Aleocharinae sp. A	1	-	u
Chartoscirta sp.	1	-	oa-w	Aleocharinae sp. C	1	-	u
Gerris sp.	1	-	oa-w	Aleocharinae sp. H	1	-	u
Notonecta maculata	1	-	oa-w	Aleocharinae sp. I	1	-	u
Corixa sp.	1	-	oa-w	Aleocharinae sp. L	1	-	u
Philaenus spumarius	1	-	oa-p	Aleocharinae sp. M	1	-	u
Macropsis sp.	1	-	oa-p	Aleocharinae sp. N	1	-	u
Aphrodes flavostriatus	1	-	oa-p-d	Trox scaber	1	-	rt-sf
Cicadellidae sp.	1	-	oa-p	Geotrupes sp.	1	-	oa-rf
Delphacidae sp. A	1	-	oa-p	Aphodius contaminatus	1	-	oa-rf
Auchenorhyncha sp.	1	-	oa-p	Aphodius granarius	1	-	ob-rf
Psylloidea sp.	1	-	oa-p	Aphodius sp. B	1	-	ob-rf
Graptodytes granularis	1	-	oa-w	Onthophagus sp.	1	-	oa-rf
Clivina ?collaris	1	-	oa	Byrrhidae sp.	1	-	oa-p
Bembidion doris	1	-	oa-d	?Selatosomus sp.	1	-	oa
Pterostichus madidus	1	-	ob-st	Agriotes sp.	1	-	oa-p
Pterostichus melanarius	1	-	ob	Elateridae sp.	1	-	ob
Pterostichus nigrita	1	-	oa-d	Cantharidae sp. A	1	-	ob
Platyderus ruficollis	1	-	oa	Cantharidae sp. B	1	-	ob

Xestobium rufovillosum	1	-	l-st	*Melophagus ovinus (adult)	1	-	u
Brachypterus sp.	1	-	oa-p	*Melophagus ovinus (puparium)	1	-	u
Atomaria sp. C	1	-	rd	*Insecta sp.	1	-	u
Orthoperus sp.	1	-	rt	*Gastropoda sp.	1	-	u
Stephostethus lardarius	1	-	rt-st				
Enicmus sp.	1	-	rt-sf				
Dienerella sp.	1	-	rd-sf				
Corticaria sp. A	1	-	rt-sf				
Aglenus brunneus	1	-	rt-ss				
Bruchinae sp.	1	-	u				
Chrysomelinae sp.	1	-	oa-p				
Chaetocnema concinna	1	-	oa-p				
Halticinae sp.	1	-	oa-p				
Apion sp. A	1	-	oa-p				
Apion sp. B	1	-	oa-p				
Apion sp. C	1	-	oa-p				
Otiorhynchus sp.	1	-	oa-p				
Phyllobius sp.	1	-	oa-p				
Sitona sp.	1	-	oa-p				
Hypera nigrirostris	1	-	oa-p				
Hypera punctata	1	-	oa-p				
Leiosoma sp.	1	-	oa-p				
Ceuthorhynchidius sp.	1	-	oa-p				
Coleoptera sp.	1	-	u				
*Ostracoda sp.	100	e	u				
*Daphnia sp. (ephippium)	50	e	oa-w				
*Diptera sp. (adult)	15	m	u				
*Nematocera sp. (immatures)	15	m	u				
*Coleoptera sp. (larva)	15	m	u				
*Acarina sp.	15	m	u				
*Aphidoidea sp.	6	s	u				
*Diptera sp. (puparium)	6	s	u				
*Bibionidae sp.	6	s	u				
*Chironomidae sp. (larva)	6	s	w				
*Formicidae sp.	6	s	u				
*Hymenoptera Parasitica sp.	6	s	u				
*Hymenoptera sp.	6	s	u				
*Oligochaeta sp. (egg capsule)	3	-	u				
*Trichoptera sp. (case)	3	-	oa-w				
*Dermaptera sp.	2	-	u				
*Pulex irritans	2	-	ss				
*Chalcidoidea sp.	2	-	u				
*Aranae sp.	2	-	u				
*Diplopoda sp.	1	-	u				

Table 4. Morton Lane, Beverley: Main statistics for assemblages of adult beetles and bugs (excluding aphids and scale insects) from samples. For explanation of abbreviations, see Table 5.

Context	1156	1234	1239	5006	5006	5007	Whole site
Sample	187	185	189	4050	5060	130	
Ext	/T2	/T2	/T2	/T2	/T2	/T2	
Conalphan				40to50cm	50to60cm		
S	62	87	81	173	188	193	358
N	90	202	165	509	443	470	1879
ALPHA	88	58	63	92	123	122	131
SEALPHA	19	7	8	7	10	9	5
SOB	18	28	28	73	100	99	194
PSOB	29	32	35	42	53	51	54
NOB	18	34	32	144	196	185	609
PNOB	20	17	19	28	44	39	32
ALPHAOB	0	73	104	59	82	86	98
SEALPHAOB	0	31	53	8	10	11	6
SW	3	6	7	25	32	26	51
PSW	5	7	9	14	17	13	14
NW	3	6	7	75	86	78	255
PNW	3	3	4	15	19	17	14
ALPHAW	0	0	0	13	19	14	19
SEALPHAW	0	0	0	2	3	3	2
SD	4	5	5	9	17	13	28
PSD	6	6	6	5	9	7	8
ND	4	5	6	18	30	22	85
PND	4	2	4	4	7	5	5
ALPHAD	0	0	0	0	17	14	15
SEALPHAD	0	0	0	0	6	5	3
SP	6	11	11	26	38	38	78
PSP	10	13	14	15	20	20	22
NP	6	13	12	35	65	61	192
PNP	7	6	7	7	15	13	10
ALPHAP	0	0	0	47	39	43	49
SEALPHAP	0	0	0	18	9	11	6
SM	0	0	0	0	0	0	0
PSM	0	0	0	0	0	0	0
NM	0	0	0	0	0	0	0
PNM	0	0	0	0	0	0	0
ALPHAM	0	0	0	0	0	0	0
SEALPHAM	0	0	0	0	0	0	0
SL	2	2	2	2	3	2	7
PSL	3	2	2	1	2	1	2
NL	5	5	4	13	12	4	43
PNL	6	2	2	3	3	1	2
ALPHAL	0	0	0	0	0	0	2
SEALPHAL	0	0	0	0	0	0	1
SRT	29	42	41	67	61	65	284
PSRT	47	48	51	39	32	34	79
NRT	53	137	115	261	185	218	969
PNRT	59	68	70	51	42	46	52
ALPHART	27	21	23	29	32	31	135
SEALPHART	7	3	3	3	4	3	7
SRD	7	6	6	10	9	10	48
PSRD	11	7	7	6	5	5	13

Context	1156	1234	1239	5006	5006	5007	Whole site
Sample	187	185	189	4050	5060	130	
Ext	/T2	/T2	/T2	/T2	/T2	/T2	
ConalphaN				40to50cm	50to60cm		
S	62	87	81	173	188	193	358
N	90	202	165	509	443	470	1879
NRD	12	52	45	76	39	37	261
PNRD	13	26	27	15	9	8	14
ALPHARD	0	2	2	3	4	5	17
SEALPHARD	0	1	1	1	1	1	2
SRF	2	5	6	10	10	14	47
PSRF	3	6	7	6	5	7	13
NRF	2	16	9	24	19	36	106
PNRF	2	8	5	5	4	8	6
ALPHARF	0	0	0	7	0	9	33
SEALPHARF	0	0	0	2	0	2	5
SSA	19	30	26	53	41	46	80
PSSA	31	34	32	31	22	24	22
NSA	35	109	92	251	135	157	779
PNSA	39	54	56	49	30	33	41
ALPHASA	17	14	12	21	20	22	22
SEALPHASA	5	2	2	2	3	3	2
SSF	13	16	13	23	20	18	35
PSSF	21	18	16	13	11	9	10
NSF	28	44	35	74	63	59	303
PNSF	31	22	21	15	14	13	16
ALPHASF	10	9	8	12	10	9	10
SEALPHASF	3	2	2	2	2	2	1
SST	5	13	12	24	16	23	38
PSST	8	15	15	14	9	12	11
NST	5	64	56	123	60	78	386
PNST	6	32	34	24	14	17	21
ALPHAST	0	5	5	9	7	11	11
SEALPHAST	0	1	1	1	2	2	1
SSS	1	1	1	6	5	5	7
PSSS	2	1	1	3	3	3	2
NSS	2	1	1	54	12	20	90
PNSS	2	0	1	11	3	4	5
ALPHASS	0	0	0	2	0	2	2
SEALPHASS	0	0	0	0	0	1	0
SG	0	0	0	2	2	2	2
PSG	0	0	0	1	1	1	1
NG	0	0	0	36	3	8	47
PNG	0	0	0	7	1	2	3
ALPHAG	0	0	0	1	0	0	1
SEALPHAG	0	0	0	0	0	0	0

Table 5. Abbreviations for ecological codes and statistics used for interpretation of insect remains in text and tables. Lower case codes in parentheses are those assigned to taxa and used to calculate the group values (the codes in capitals). See Table 2 for codes assigned to taxa from Morton Lane, Beverley. Indivs - individuals (based on MNI); No - number.

No taxa	S	Percentage of RT taxa	PSRT
Estimated number of indivs (MNI)	N	No RT indivs	NRT
Index of diversity.(α)	α	Percentage of RT indivs	PNRT
Standard error of α	SE α	Index of diversity of RT component	α RT
No 'certain' outdoor taxa (oa)	SOA	Standard error	SE α RT
Percentage of 'certain' outdoor taxa	PSOA	No 'dry' decomposer taxa (rd)	SRD
No 'certain' outdoor indivs	NOA	Percentage of RD taxa	PSRD
Percentage of 'certain' outdoor indivs	PNOA	No RD indivs	NRD
No OA and probable outdoor taxa (oa + ob)	SOB	Percentage of RD indivs	PNRD
Percentage of OB taxa	PSOB	Index of diversity of the RD component	α RD
No OB indivs	NOB	Standard error	SE α RD
Percentage OB indivs	PNOB	No 'foul' decomposer taxa (rf)	SRF
Index of diversity of the OB component	α OB	Percentage of RF taxa	PSRF
Standard error	SE α OB	No RF indivs	NRF
No aquatic taxa (w)	SW	Percentage of RF indivs	PNRF
Percentage of aquatic taxa	PSW	Index of diversity of the RF component	α RF
No aquatic indivs	NW	Standard error	SE α RF
Percentage of W indivs	PNW	No synanthropic taxa (sf + st + ss)	SSA
Index of diversity of the W component	α W	Percentage of synanthropic taxa	PSSA
Standard error	SE α W	No synanthropic indivs	NSA
No damp ground/waterside taxa (d)	SD	Percentage of SA indivs	PNSA
Percentage D taxa	PSD	Index of diversity of SA component	ALPHASA
No damp D indivs	ND	Standard error	SEALPHASA
Percentage of D indivs	PND	No facultatively synanthropic taxa	SSF
Index of diversity of the D component	α D	Percentage of SF taxa	PSSF
Standard error	SE α D	No SF indivs	NSF
No strongly plant-associated taxa (p)	SP	Percentage of SF indivs	PNSF
Percentage of P taxa	PSP	Index of diversity of SF component	ALPHASF
No strongly P indivs	NP	Standard error	SEALPHASF
Percentage of P indivs	PNP	No typical synanthropic taxa	SST
Index of diversity of the P component	α P	Percentage of ST taxa	PSST
Standard error	SE α P	No ST indivs	NST
No heathland/moorland taxa (m)	SM	Percentage of ST indivs	PNST
Percentage of M taxa	PSM	Index of diversity of ST component	ALPHAST
No M indivs	NM	Standard error	SEALPHAST
Percentage of M indivs	PNM	No strongly synanthropic taxa	SSS
Index of diversity of the M component	α M	Percentage of SS taxa	PSSS
Standard error	SE α M	No SS indivs	NSS
No wood-associated taxa (l)	SL	Percentage of SS indivs	PNSS
Percentage of L taxa	PSL	Index of diversity of SS component	ALPHASS
No L indivs	NL	Standard error	SEALPHASS
Percentage of L indivs	PNL	No uncoded taxa (u)	SU
Index of diversity of the L component	α L	Percentage of uncoded indivs	PNU
Standard error	SE α L	No indivs of grain pests (g)	NG
No decomposer taxa (rt + rd + rf)	SRT	Percentage of indivs of grain pests	PNG