

## **Assessment of insect and other invertebrate remains from Viborg Søndersø, Denmark**

by

Harry Kenward

### **Summary**

Subsamples of sediment from deposits from in and around structures of early 11<sup>th</sup> century date revealed by excavations at Viborg Søndersø, Denmark, in 2001 have been assessed for invertebrate remains. All of the subsamples contained at least traces of insects (mainly beetles and fly puparia), and sometimes moderately large quantities. Preservation varied between and within subsamples, but was generally good, although the concentration of remains was lower than in many other broadly similar deposits. The range of synanthropic insects (those favoured by artificial habitats) appeared to be unusually restricted, suggesting that this part of the settlement was unusual in some way, unless the entire town had yet failed to accumulate such species through trade.

Priorities for detailed analysis of large subsamples have been given to the samples, and attention drawn to the range of questions which might be addressed using invertebrate, particularly insect, remains. The importance of integrating results with those from other lines of investigation is emphasised.

**Keywords:** VIBORG SØNDERSØ, DENMARK; 11<sup>TH</sup> CENTURY AD; ASSESSMENT; INVERTEBRATES; INSECTS; SYNANTHROPES; PARASITE EGGS

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### Introduction

The medieval town of Viborg was extensively excavated in 1981-85 (Hjermind *et al.* 1998). During a further phase of excavation, carried out in 2001 with a series of explicit research objectives (including the full integration of multiple lines of evidence), a substantial number of samples were collected for bio-archaeological analysis. One-kilogramme subsamples from 25 of these were submitted for assessment of their content of invertebrate remains, especially insects.

On dendrochronological evidence the deposits formed in the first quarter or third of the 11<sup>th</sup> century. They represent structures and external layers, and are believed to have formed in what was already an urban area, although perhaps very recently established. The structures recorded at the present site appear to have been workshops rather than dwellings. A range of crafts were carried out, and there seem to have been pens for livestock, some deposits being interpreted as animal manure.

### Methods

The samples were inspected in the laboratory and a record made of their lithology, using a standard *pro forma*. The entire 1 kg subsamples were sieved to 300 µm, and invertebrate macrofossils recovered using procedures broadly following the paraffin (kerosene) flotation method described by Kenward *et al.* (1980; 1986). In some cases a stage of 'wet paraffin flotation' was applied in the hope of recovering larger numbers of delicate remains in an undamaged state. This procedure involves shaking or stirring the gently sieved sample as a slurry with water and paraffin. The flots were examined for invertebrate remains.

Adult beetles and bugs were nominally recorded at the 'assessment' level of Kenward (1992),

although in practice a fuller record, approximating to 'semi-quantitative rapid scanning' was made in view of the novelty of the material to the writer, and to enable creation of a database record, albeit often at an approximate level of quantification and identification. Remains were generally recorded using a semi-quantitative scale of 1, 2, 3, 'several' (translated as 6), 'many' (15), with estimates for very large numbers. This system is discussed by Kenward (1992).

Quality of preservation was recorded using the scales of Kenward and Large (1998). In summary, preservation is recorded as chemical erosion (E) and fragmentation (F), in each case on a scale from 0.5 (in superb condition) to 5.5 (extremely decayed or fragmented).

Data were recorded on a *pro forma* and subsequently transferred to *Paradox* tables.

In one case a 'squash' (*sensu* Dainton 1992) was made to test for the presence of eggs of intestinal parasites.

The principal sources for beetle ecology were Friday (1988), Hansen (1987), Koch (1989-92), and for bugs, Southwood and Leston (1959) and the Royal Entomological Society of London *Handbooks*.

### Results

A list of taxa noted during the assessment is given as Table 1: many of these identifications can only be tentative or made to a high taxonomic level at the assessment stage, but the list serves to demonstrate the range of taxa present, especially among the synanthropes. The individual sample lists for invertebrate remains are given in Table 2. It must be emphasised that these are rough lists and *not* suitable as a basis for more than tentative

interpretation. Similarly, the main statistics for the sample assemblages (and the site as a whole) given in Table 3 are essentially approximate, though useful. The ecological groups employed, with their abbreviations, are explained in Table 4.

Note that (a) the EAU's data system does not allow for non-numeric context identifiers, so 'K' has been omitted throughout the tables (and in all the manuscript records made during practical work), and (b) to provide a sample number in the data system, the context number has been repeated. The subsample code '/T' indicates a subsample processed for evaluation or assessment, often using the abbreviated extraction process discussed by Kenward *et al.* (1986).

### General comments on the invertebrate assemblages

All the samples which were processed proved to contain at least small numbers of insect and other invertebrate remains. Their chemical preservation (primarily a measure of the biochemical assault to which fossils have been subjected before, during and after burial) varied both between and within sample assemblages. It ranged from very good (showing little decay beyond separation of most of the sclerites of the exoskeletons) to poor (loss of structure and texture, and strong colour change). The amount of fragmentation of the fossils also varied in the same way: fragmentation probably reflects pre-burial and burial taphonomy to a large extent, but is also probably brought about by recent assaults such as compression by heavy machinery used in clearance before excavation (and by the weight of excavators working on overlying layers), the processes of excavation, sample bagging, transport and storage, and (however carefully carried out) of laboratory processing.

Remains were generally present at low concentrations by comparison with similar richly organic deposits at many sites, e.g. at 16-22 Coppergate, York, England, at Mindets Tomt - Sondrefelt in Oslo, and at the rural site of Deer Park Farms, Co Antrim, Northern Ireland

(Kenward and Hall 1995; Kenward 1988; Allison *et al.* 1999a, b). At Coppergate the mean concentration of adult beetles and bugs (based on MNI) for all periods was 70/kg; at Deer Park Farms it was 127/kg. For the present site the value was 27/kg. This is considered further in the discussion.

The general character of the assemblages was much as at other occupation sites in terms of the range of ecological groups. However, in almost all layers (not just those likely to pre-date occupation) there was a striking paucity of synanthropes (species favoured by artificial habitats, discussed by Kenward 1997), and for the site as a whole a restricted range: this is perhaps very significant.

Remarkably few fleas and lice were found: one human louse, *Pediculus humanus*, and one indeterminate fragment of a flea, which was not necessarily *Pulex irritans* Linnaeus, the human flea. There is no reason to suspect this was a result of poor preservational conditions, as many of the other remains are in an excellent state, and it may be that these animals were rare at the site.

A few remains of bees, probably *Apis mellifera*, the honey bee, were found. Fossil bees are quite common in occupation deposits, and sometimes found in great numbers (see the review by Kenward in press). The identification of these remains requires careful checking.

### Sample-by-sample account

The results are presented in the order given in the notes accompanying the samples on delivery. Archaeological information, taken from these notes, is summarised in square brackets. Notes on the flots, full details of the preservation records and some other information, as well as lists of taxa noted during recording, are given in Table 2. The size of the flot is noted as it is significant in estimating the time required to make a full record of invertebrates in any main phase study.

A *priority* for further work has been assigned to each sample, based on its potential to illuminate

archaeological problems at the context, site or wider level, and assuming that the amount of sample specified is available. The range is 1A (essential) to 3 (no potential). This priority is necessarily entomologically biased and may not take account of special problems arising as a result of other lines of investigation.

**Context K532 [surface of natural peat preceding first building phase, directly under the building]**

The flot was of moderate size, consisting of what appeared to be rootlets, with some leaf fragments and charcoal. The insect fauna was limited, with under 20 adult beetles and bugs, and there were not very many other remains. Preservation was varied, from good to very poor; chemical erosion appeared to have a bimodal distribution (1.5 and 4.5 on the scale of Kenward and Large 1998). It was not clear whether this reflected differential origins of the remains (e.g. those from the 'old' peat, and those which arrived at about the time of burial), but it did not seem to be related to ecological groupings.

A very decayed fragment of a bee was probably the honey bee *Apis mellifera*, but this requires careful examination for confirmation. There were no synanthropic species among the beetles and bugs, the fauna representing marshy conditions with dryer land, perhaps poor grassland, nearby.

*Potential:* A 5 kg subsample would quite possibly (but not certainly) provide a large enough assemblage for reconstruction of conditions at the point of deposition, and a little more information about the wider landscape. **Priority 1B**

**Context K425 [surface of natural peat preceding first building phase, outside the area of the building]**

The flot was rather large, consisting mostly of what appeared to be rootlets, with some moss and undisaggregated humic sediment (possibly indurated by pre-burial dehydration?). Preservation was very varied (1.0-5.0 for both parameters on

the scales of Kenward and Large 1998; associated sclerites were present in some cases), but with no sign of bimodality. There were numerous decayed scraps of cuticle and some remains had probably decayed beyond recognition. Remains of nearly 40 adult beetles (and no bugs) were noted, representing marshy conditions with dryer land, perhaps rough grassland, beyond. *Chaetarthria seminulum*, much the most abundant species, typically lives in mud and litter by water. There were hints of foul matter from a few species (notably *Cryptopleurum minutum* and *Oxytelus sculptus*).

*Potential:* A subsample of 3-5 kg should provide an interpretatively useful assemblage, which would provide information about conditions at the site of deposition and, more importantly, about the wider landscape. **Priority 1A**

**Context K143 [overlying wattle walls of first phase of building, post-use]**

The flot was of modest size, consisting of woody and herbaceous debris, with abundant seeds and insect fragments. Preservation was quite good and fairly consistent. The concentration of invertebrate remains was quite high, with around 40 adult beetles and bugs per kilogramme. These groups included a ecological mixture of species, many representing at least semi-natural habitats (including water), but with a group of beetles which are most likely to have come from artificial accumulations of decaying matter such as might be found in and around a building. There were three *Aphodius* dung beetles, representing a hint that livestock were present.

*Potential:* A subsample of 3-5 kg would provide an assemblage whose detailed recording should give a clearer definition of local ecology, including the relative importance of semi-natural and artificial habitats, and whether livestock were indeed present close by. This sample should also contribute significantly to the assessment of the richness of the synanthropic fauna of the site (see discussion). **Priority 1A**

**Context K185 [overlying wattle walls of first phase of building, post-use]**

The moderately large flot consisted mostly of wood fragments, with numerous seeds and some charcoal. Rather more than 20 adult beetles (no bugs) were observed, with a range of other remains including a human louse, *Pediculus humanus* (the only example found during this assessment). Preservation was generally good and fairly consistent. The beetle assemblage was one of the most strongly synanthropic from the site, with a range of taxa (some only tentatively identified) typically found together in rather foul, perhaps fairly open-textured, decaying matter with the consistency of stable manure. These species included *Cercyon ?atricapillus*, *Platystethus arenarius*, *Oxytelus sculptus* and *?Anthicus* sp. (probably *A. formicarius* (Goeze) or *floralis* (Linnaeus)). Only small numbers were noted, however, so it is not certain that these species bred *in situ*. Some other elements of the fauna may have co-existed with these, or have originated elsewhere, and there was a small element from at least semi-natural conditions.

*Potential:* A subsample of 3 (preferably 5) kg would almost certainly provide an assemblage large enough for detailed recording to determine whether the foul-matter habitat was *in situ*, and provide an opportunity to define more clearly the synanthropic fauna of the site as a whole. **Priority 1A.**

**Context K188 [?change of use, perhaps associated with alteration of primary building]**

The flot was moderately large, consisting of herbaceous debris with some seeds. Invertebrates were present in modest numbers, with a useful quantity of beetles (approaching 50 individuals) and a tentatively-identified honey bee (*Apis mellifera*). The beetles were predominantly synanthropic, an assemblage which would not have been out of place in the Anglo-Scandinavian deposits at 16-22 Coppergate, York (Kenward and Hall 1995). The habitat suggested is rather moist, somewhat foul, decaying matter, but this might be

anything from a rather moist litter-strewn domestic floor to old dumped thatch, or even byre litter. Fuller analysis (and integration with botanical and other evidence) should clarify this.

*Potential:* A subsample of 3-5 kg should provide a large assemblage suitable for numerical analysis in order to clarify ecological conditions, more completely define the range of synanthropic species present, and test for the presence of remains of bees and parasites of humans and livestock. **Priority 1A.**

**Context K188 [block sample]**

It was decided that it would be more appropriate to retain this sample until a main phase of analysis.

**Context K307 [mixed deposit, directly above natural peat, to south of primary building]**

This subsample gave a large flot, difficult to sort, primarily wood fragments, but with appreciable quantities of herbaceous debris and some seeds. Preservation of the invertebrates, which were present in quite large numbers, was generally fairly (sometimes very) good and not too variable, though most showed some tendency towards yellow colouration, and a small proportion had decayed quite strongly towards yellow. This was the only sample to yield any remains which were certainly of a flea, though even in this case only a single body segment was seen. It was not clear whether this may have been a human flea (*Pulex irritans*), or was one of the numerous other species likely to have been present on an occupation site in the past. Around 45 adult beetles (and a single bug) were recorded. The assemblage (both the beetles and rather numerous fly puparia) was predominantly a synanthropic group indicative of rather foul to very foul decaying matter, with a trace of aquatic and waterside taxa.

*Potential:* Detailed recording of an assemblage from 3-5 kg should clarify the ecological implications of this group, and would provide an opportunity for further investigation of any flea or other parasite remains. **Priority 1B.**

**Context K218 [mixed deposit, above K307, separated from it by K188]**

The flot was quite large and composed of herbaceous and woody debris. Preservation of invertebrates was rather variable, and many remains showed a trend towards colour loss ('pale' in the recording scheme). Insect remains were rather abundant, especially fly puparia (of the order of 100). The beetle assemblage (more than 50 adult individuals; no bugs noted) was remarkable for the presence of at least eight individuals of the large scarabaeid *Trox scaber*. It is argued by Hall and Kenward (in press) that large numbers of this beetle together with large quantities of bark may be an 'indicator group' (in the sense used by Kenward and Hall 1997) for tanning. At one site at least, the *T. scaber* were more decayed than other components of the insect fauna, and this was supposed to have come about when the beetles were passed through tanning agents with skins (Hall *et al.* 2000). In the present case, the *Trox* may have been more decayed than the rest of the fauna, being somewhat pale and sometimes cracked, but this was not certain. The abundant fly puparia might give a clue as to the presence of skins or perhaps of materials likely to have been used in tanning. The presence of the remains in the main area of the site might argue against tanning, a foul process not likely to be tolerated near houses. The remaining fauna tended towards foul habitats and was very typical of intensively-occupied sites.

Allan Hall has kindly inspected the residue from this subsample and offers the following comments:

Brief inspection of the residue of Sample 218 showed that the bulk of it consisted of very decayed bark with a little wood attached some cases, together with some mosses which would be typical found growing on bark, tree leaf fragments and some buds (including those of

oak, *Quercus*), and modest numbers of seeds of annual nitrophile weeds. There were also fragments of rather decayed leather, some, at least, apparently offcuts. In the finest fraction were small numbers of bark 'sclereids' (amorphous masses of lignified cells from within the bark of some trees). There is thus some possibility that this deposit contained waste from tanning with bark, perhaps mixed with waste from the next stage of leather working (working tanned leather into artefacts), and colonised by nitrophile weeds after being dumped. Clearly a more detailed analysis is required to shed more light on this interpretation.

*Potential:* The insects from a larger (at least 3 kg) subsample should give a clearer view of the ecological conditions associated with the deposit, and perhaps provide material which will cast light on the origin of the abundant *Trox*. **Priority 1A.**

**Context K309 [external deposit pre-dating northward extension of primary building]**

The flot, which was rather large, consisted of fairly coarse herbaceous debris with some charcoal, and quite large numbers of invertebrates, among them about 45 adult beetles and bugs. These remains varied substantially in their preservational quality, though most were in good condition. The fauna appeared to have had mixed origins, with components from water, herbaceous vegetation, and artificial decomposer habitats. Among the last, fairly foul conditions seem to have obtained at least locally. The several dung beetles (*Aphodius* and *Geotrupes*) present may have come from the same habitat as the other foul decomposers, but may indicate penned livestock or local grazing land. It is just possible that this fauna represents stable or byre litter, with components associated with hay-like cut vegetation (or even turf), dung, and decaying litter, and a group imported in water.

*Potential:* A subsample of 3 -5 kg should provide an assemblage large enough for numerical analysis to elucidate the questions alluded to above. **Priority 1B.**

**Context K392 [external deposit pre-dating northward extension of primary building]**

The flot was quite large, and composed of varied plant debris. Preservation was fairly consistent, and moderately good. The beetle assemblage (of about 50 individuals) was dominated by a group of species rather typical of some deposits at intensive-occupation sites and regarded as indicative of moderately foul conditions. There were traces of species associated with herbaceous plants. This assemblage was similar in flavour, but not detail, to that from Context K309.

*Potential:* A larger subsample, of 3-5 kg, should give an assemblage adequate for analysis and should provide more information about the origin of the organic component of this and associated layers: in particular was there an input from animal litter? **Priority 1B.**

**Context K306 [external deposit pre-dating northward extension of primary building, above K309 and K392]**

A fairly small flot, consisting mainly of woody and herbaceous plant debris (with some seeds), contained useful numbers of invertebrate remains, whose preservational condition varied from good (sometimes with associated sclerites) to distinctly poor. The beetles (of which there were about 50) formed a group which might be found in any intensive occupation site of the period, with a bias towards somewhat foul conditions. There was a hint from some of the plant feeders, and especially from the presence of a newly-emerged clover weevil, *Apion* sp., that cut, hay-like, vegetation had become incorporated in the deposit. This may offer a hint that livestock were present. (Such 'hay' insects, their role in the identification of stable manure, and the routes by which fauna may arrive in manure, are discussed by Kenward and Hall (1997) and Hall and Kenward (1998). A single ?*Apis mellifera* (?honey bee) was noted.

*Potential:* A subsample of 3-5 kg should provide an assemblage large enough for reliable interpretation, to allow investigation of the nature

and source of the organic component, especially the possibility that it was derived from animal husbandry. Here, as for other samples, recovery of further bee material and investigation of synanthrope richness should be an objective. **Priority 1B.**

**Context K295 [floor layer in extension to building, above K306]**

The flot was small, and yielded only small numbers of invertebrates (less than 10 beetles), which were quite well preserved (suggesting low input rather than post-depositional loss by decay). Such remains as were present were a random subsample of the taxa seen elsewhere at this site.

*Potential:* It would be impractical to recover a useful assemblage from this material. **Priority 3.**

**Context K257 [floor layer in extension to building, above K306]**

The flot, which was of modest size, contained numerous fly puparia, and small numbers of other remains, including about 25 adult beetles (no bugs). Preservation varied a little, and was generally fairly good. The beetles were an ecologically diverse group. Most of the taxa would not be out of place in a floor with a little strewn plant material which was not too damp; the large ground beetle *Pterostichus melanarius* is a typical stray in buildings, frequent at many archaeological sites, and the other outdoor forms may have been 'background fauna' (sensu Kenward 1978), or have been imported with various kinds of materials.

*Potential:* A large subsample, 4 kg or more, should allow a more detailed reconstruction of conditions in this floor layer (and hence within the building), and may perhaps give clues as to imported materials. It would also be desirable to search diligently for remains of ectoparasites of humans and livestock in this and other floor deposits. **Priority 1B.**

**Context K253 [floor activity layer in extension to building, above K295/257]**

The flot was fairly small and of mixed composition, with abundant seeds. There were not many invertebrates, and only around 30 beetles and bugs. Preservation was fairly good, although there was a trend to paleness. The more abundant beetles were very typical of fairly dry house floors, as were some of the rarer taxa.

*Potential:* Remains from a large subsample, 4 kg or more, should amplify the reconstruction of conditions in this floor layer (and hence within the building), and might give clues as to imported materials. **Priority 1B.**

**Context K515 [floor layer in primary building: part of sequence, bottom K515 to top K194, in order given here]**

The small flot, which was of varied composition, contained very few invertebrate remains other than mites. There were parts of only four beetles.

*Potential:* The concentration of remains in the subsample examined was too low for a useful assemblage to be recovered. (It may be noted, however, that deposits such as these are often heterogeneous, and other parts of the sample might yield large numbers of remains should there be a pressing archaeological question to be addressed.). **Priority 3.**

**Context K480 [floor layer in primary building: part of sequence]**

The flot (which was of modest size) consisted mostly of charcoal, and contained rather few invertebrates. There were a parts of little more than ten beetles, whose preservation was generally good, sometimes excellent, but subjectively unusual. Many remains showed a strong trend to yellow colours, and scraps of cuticle were present, suggesting the possibility that there had been loss of other remains through decay. House fauna predominated, with a component of outdoor forms.

*Potential:* Although it would be desirable to obtain a clearer insight into conditions and activity at the time this floor was in use, and the materials imported, the concentration of remains is low. A very large subsample (5 kg or more) might give enough remains to address such problems, but this would rely on some parts of the sample having a higher concentration than that assessed. **Priority 2.**

**Context K406 [floor layer in primary building: part of sequence]**

The flot was of modest size but the concentration of remains was low; preservation was rather good. Parts of less than 20 adult beetles were noted, and no bugs; the former were typical of (though not exclusive to) house floor assemblages.

*Potential:* A very large subsample would probably prove enough remains to gain insights into conditions while this layer developed. **Priority 1B.**

**Context K395 [floor layer in primary building: part of sequence]**

The flot, which was rather large, contained moderate numbers of invertebrate remains, including remains of around 30 adult beetles and bugs. These were somewhat mixed ecologically, with 'house fauna' components, and others from outdoor habitats present in appreciable numbers (perhaps imported with some resource).

*Potential:* A large subsample (4-5 kg) should provide an assemblage of beetles and bugs large enough to give a clearer picture of conditions as the floor was in use, and of imported materials (if such was the source of the outdoor fauna). **Priority 1B.**

**Context K365 [floor layer in primary building: part of sequence]**

The flot was very small, with woody fragments, a few seeds, and less than ten adult beetles of no clear ecological nature.



*Potential:* It appears unlikely that even a very large subsample would give enough remains for a useful interpretation, assuming the concentration to be constant throughout the sampled material. **Priority 3.**

**Context K349 [floor layer in primary building: part of sequence]**

The trace flot contained very few arthropod remains other than modest numbers of mites. Preservation varied, but significant numbers of fossils had probably *not* been lost by decay. There were parts of less than ten beetles.

*Potential:* It appears unlikely that even a very large subsample would give enough remains for a useful interpretation, assuming the concentration to be constant throughout the sampled material. **Priority 3.**

**Context K342 [floor layer in primary building: part of sequence]**

The flot was very small, with very few invertebrate remains (less than ten beetles). Preservation was fairly good.

*Potential:* It appears unlikely that even a very large subsample would give enough remains for a useful interpretation, assuming the concentration to be constant throughout the sampled material. **Priority 3.**

**Context K194 [floor layer in primary building: part of sequence; last *in situ* function-layer]**

The flot, which was fairly small, consisted of wood fragments, abundant charcoal, and a trace of seeds. Preservation of invertebrates was fairly consistent and quite good, but their concentration was very low; there were remains of less than ten beetles. These were of mixed ecological origins.

*Potential:* It appears unlikely that even a very large subsample would give enough remains for a useful

interpretation, assuming the concentration to be constant throughout the sampled material. **Priority 3.**

**Context K497 [floor layer in primary building: interleaved in the above sequence, ?faeces of livestock]**

A fairly large flot yielded a little over 20 adult beetles (no bugs), moderate numbers of fly and mite remains, and a few other invertebrates. Preservation was a little variable, sometimes superb but mostly fair. The beetles were a rather mixed group, with indications of foul matter and species representing natural or semi-natural habitats. Subjectively there may have been a component associated with turf or cut vegetation, though the evidence is very weak and other routes to the deposit are possible.

*Potential:* Although the concentration of remains was not high, a subsample of 4-5 kg should provide enough beetle remains for the presence of foul matter to be demonstrated more positively. A combination of botanical and entomological evidence should reveal whether the outdoor forms were imported in some material (e.g. turf or cut vegetation), or originated in faeces (having been eaten accidentally), or were background fauna. **Priority 1B.**

**Context K453 [floor layer in primary building: interleaved in the above sequence, ?faeces of livestock]**

A 'squash' for parasite eggs and other microfossils was carried out on a small subsample, but revealed no eggs.

The flot from paraffin floatation was small, consisting mainly of ?rootlets and other plant tissue. Rather few insects were present, and a few mites. Preservation was good, sometimes very good. A little over 20 beetles were recorded, a rather mixed group with synanthropic and natural or semi-natural components, and no clear dominant ecological group. There was certainly no indication

of foul matter, though both beetles and crustaceans indicated water, probably imported or from faeces.

*Potential:* As for K497, although the concentration of remains was rather low, a subsample of 4-5 kg should provide enough beetle remains for useful information to be obtained and worthwhile questions to be addressed. **Priority 1B.**

**Context K301 [human faeces from privy adjacent to primary building]**

This subsample gave a very large flot, mostly herbaceous debris. Invertebrate remains were abundant, with fly puparia predominant. Preservation was a little variable, often very good. Around 30 beetles (and a single bug) were represented by the recorded remains, but the assemblage was of rather mixed nature. There were components indicative of foul matter, others from water, some likely to have lived in fairly dry litter, and some which may have arrived in moss (though other routes are entirely possible). This kind of mixture has been encountered in cess pits at other sites (e.g. 16-22 Coppergate, York, UK, Kenward and Hall 1995). Aquatics may have come in water rather than invading *in situ*, and abundant remains seem to have been imported in moss, presumed to have been used as anal wipes. A tentatively-identified honey bee represented another component also found in cesspits in York, perhaps arriving in faeces, having been swallowed as a contaminant in food or drink. The complete lack of insect parasites of humans is surprising.

*Potential:* It would be worthwhile to elucidate the origins (and thus archaeological implications) of this fauna, and to search for ectoparasites, by detailed analysis of a larger subsample (4-5 kg). **Priority 1A.**

**Context K304 [human faeces from privy adjacent to primary building]**

This subsample yielded a flot of modest size, containing fairly small numbers of adult beetles (and a bug: around 30 individuals), all as single

individuals, and a limited range of other invertebrates. The preservational condition of these remains varied, and some fossils were very degraded. There was a tendency to loss of colour, and towards slightly orange-brown shades, suggesting post-depositional change, perhaps recent decay (as was seen at the 44-45 Parliament Street site, York, England, Davis *et al.* 2002, and discussed by Kenward and Hall 2000). The beetles and bug represented a range of habitat types, similar to that seen in the assemblage from K301, and similar routes to the deposit may be hypothesised.

*Potential:* As for the material from K301, the origins (and thus archaeological implications) of this fauna should be investigated by detailed analysis of a larger subsample (4-5 kg). **Priority 1A.**

**Discussion**

Clearly ground conditions in the deposits at Viborg are conducive to the survival of insect and other invertebrate remains, and these remains have potential to be used in addressing a range of archaeological questions, some prompted by the insects in particular.

One of the questions generated by the assessment attaches to the low concentrations or remains observed in the subsamples from Viborg, especially in those from floors. Preservation of the remains was usually at least reasonably good and there is no reason to suppose there has been loss by decay from most of the layers, so low input must be evoked. At this stage it is not at all clear why fewer insects should have found their way into forming deposits at Viborg than at many other roughly contemporaneous sites. These observations may give a significant clue to a real difference between the present site and some others; a primarily 'industrial' use may provide the explanation.

In the layer-by-layer account above, a low priority has been given to many of the floor deposits, on the grounds that the concentration of remains in them

was low. It may, however, be worthwhile to analyse subsamples from these floor layers and amalgamate the assemblages from them for statistical purposes. This approach would be speculative, but a rather similar strategy has proved effective for a medieval to post-medieval site at Doncaster, England (Hall *et al.* in press). If such an approach is considered worthwhile, then clearly the priorities need to be revised.

Another contrast with contemporaneous intensive-occupation sites lies in the restricted range of synanthropes recorded at Viborg. Again, it is not at all clear at this stage why this should be. Possibilities which would normally be entertained, using arguments paralleling those of island biogeography, are isolation, short-lived settlement, or seasonal occupation (Kenward 1997). None of these seem likely to have been the cause in the present case. The apparent contrast with the site of Deer Park Farms, County Antrim, Northern Ireland, where a rich synanthropic fauna was present even though the site represented a very small farmstead, is particularly unexpected. Perhaps at this stage the settlement, although extensive, had not existed for long enough to acquire a rich fauna. Even so, the failure of *Aglenus brunneus* eventually to invade the deposits is remarkable: this burrower, rare today, is very frequent and often abundant in archaeological deposits, perhaps in many cases as a post-depositional invader (Kenward 1975). And a trading town would surely have been expected to have been subject to rapid invasion from other settlements. The synanthropes at Viborg require further, objective, investigation using data from a substantial series of fully-recorded assemblages.

Yet another unexpected contrast lies in the almost total absence of insect ectoparasites of humans and livestock. This seems unlikely to be a function of preservation, since many of the beetle and bug (and other invertebrate) remains were in such excellent condition. A single human louse (*Pediculus humanus*) was found. The only fragment of flea noted was a body segment, very difficult or impossible to identify but not recognised subjectively as the human flea, *Pulex irritans*. No lice of livestock were seen, and sheep keds

(*Melophagus ovinus* (Linnaeus)), whose robust puparia are a very regular component of occupation site fauna, probably almost always having been deposited during wool-cleaning, were absent.

A further absentee group were the scale insects (Coccoidea). These are often present in large numbers, and normally seen in ones or twos, in occupation-site assemblages of 'dark age' to medieval date, probably having been imported on small wood bearing bark used, for example, for wattle and basketry.

A single sample (from K453) has been inspected for the eggs of parasitic nematodes during the present investigation. The 'squash' method of Dainton (1992) was employed, and no eggs found even though the deposit was considered to have a faecal component. A systematic survey for these eggs using the squash technique would be a cost-effective of testing for faecal contamination, as well as observing some other classes of microfossils.

## Recommendations

The samples assigned Priority 1A and 1B should be subjected to detailed analysis in order to obtain a range of information concerning ecological (and thus human living) conditions at the site, activity, and formation processes. In addition, consideration should be given to the merits of analysing those floor deposits given a low priority (because the concentration of remains in them was low), and amalgamating results for statistical purposes.

Some particular problems which might be addressed (in addition to any driven by the excavation record and other lines of post-excavation work, and to be integrated with other evidence) include:

- why was the input of insect remains so low for many of the deposits? Is this related to 'industrial' use?

- why is synanthrope diversity (apparently) so low at Viborg?

- reconstruction of vegetation and land use at earliest stage prior to construction of the building.

- are honey bees regular and frequent enough in the deposits to suggest beekeeping? (it would be worthwhile to be look for beeswax in the samples, see Kenward and Hall 1995, 765-767).

- is the concentration of *Trox scaber* found in one layer in some way related to the storage or processing of skins?

- can the insect remains provide clearer evidence of the importation of materials, perhaps turf and cut vegetation?

- why were so few ectoparasites of humans or livestock recorded?

The importance of integration and feedback, with other evidence, especially with botanical results, is reiterated.

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Table 1. Complete list of invertebrate remains recorded during assessment of samples from Viborg, in taxonomic order. 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. Key: \* = not used in calculating assemblage main statistics (Table 3); ecode—ecological code used in generating main statistics; Sp(p).—species not previously listed; Sp(p). indet.—may be a species already listed. Note that many identifications were not closely pursued in the assessment, so that there are numerous tentative or high-level identifications.

| Taxon                                     | ecode | Elaphrus sp.                                  | oa-d  |
|---|-------|---|-------|
|   |       | <i>Dyschirius</i> sp.                         | oa    |
| ANNELIDA: OLIGOCHAETA                     |       | <i>Trechus ?secalis</i> (Paykull)             | oa-d  |
| * <i>Oligochaeta</i> sp. (egg capsule)    | u     | <i>Trechus</i> sp.                            | ob    |
|   |       | <i>Pterostichus melanarius</i> (Illiger)      | ob    |
| CRUSTACEA                                 |       | <i>Pterostichus</i> sp.                       | ob    |
| * <i>Daphnia</i> sp. (ephippium)          | oa-w  | ? <i>Calathus</i> sp.                         | oa    |
| * <i>Cladocera</i> sp. F (ephippium)      | oa-w  | <i>Amara</i> sp.                              | oa    |
| * <i>Ostracoda</i> sp.                    | u     | ? <i>Harpalus</i> sp.                         | oa    |
|   |       | Carabidae spp.                                | ob    |
| INSECTA                                   |       | Colymbetinae sp.                              | oa-w  |
| DERMAPTERA                                |       | <i>Helophorus ?aquaticus</i> (Linnaeus)       | oa-w  |
| * <i>Forficula</i> sp.                    | u     | <i>Helophorus aquaticus</i> or <i>grandis</i> | oa-w  |
|   |       | <i>Helophorus</i> sp.                         | oa-w  |
| SIPHUNCULATA                              |       | <i>Cercyon analis</i> (Paykull)               | rt-sf |
| * <i>Pediculus humanus</i> Linnaeus       | ss    | <i>Cercyon ?atricapillus</i> (Marsham)        | rf-st |
|   |       | <i>Cercyon haemorrhoidalis</i> (Fabricius)    | rf-sf |
| HEMIPTERA                                 |       | <i>Cercyon melanocephalus</i> (Linnaeus)      | rt-sf |
| ? <i>Heterogaster urticae</i> (Fabricius) | oa-p  | <i>Cercyon convexiusculus</i> group           | oa-d  |
| Saldidae sp.                              | oa-d  | <i>Cercyon unipunctatus</i> (Linnaeus)        | rf-st |
| Corixidae sp.                             | oa-w  | <i>Cercyon</i> spp. indet.                    | u     |
| *Heteroptera sp. (nymph)                  | u     | <i>Megasternum obscurum</i> (Marsham)         | rt    |
|   |       | <i>Cryptopleurum minutum</i> (Fabricius)      | rf-st |
| Auchenorrhyncha sp.                       | oa-p  | <i>Hydrotius fuscipes</i> (Linnaeus)          | oa-w  |
| Cicadellidae sp.                          | oa-p  | ? <i>Anacaena</i> sp.                         | oa-w  |
| Delphacidae sp.                           | oa-p  | <i>Chaetarthria seminulum</i> (Herbst)        | oa-w  |
| Auchenorrhyncha sp.                       | oa-p  | <i>Acritus nigricornis</i> (Hoffmann)         | rt-st |
| *Auchenorrhyncha sp. (nymph)              | oa-p  | Histerinae sp.                                | rt    |
| *Aphidoidea sp.                           | u     | <i>Hydraena</i> sp.                           | oa-w  |
| *Hemiptera sp. (nymph)                    | u     | <i>Ptenidium</i> sp.                          | rt    |
|   |       | <i>Acrotichis</i> sp.                         | rt    |
| DIPTERA                                   |       | *Ptiliidae sp. (pupa)                         | u     |
| *Bibionidae sp.                           | u     | <i>Catops</i> sp.                             | u     |
| *Syrphidae sp. (larva)                    | u     | Catopinae sp. indet.                          | u     |
| *Diptera sp. (adult)                      | u     | Scydmaenidae sp.                              | u     |
| *Diptera sp. (larva)                      | u     | <i>Micropeplus</i> sp.                        | rt    |
| *Diptera sp. (puparium)                   | u     | <i>Megarathrus</i> sp.                        | rt    |
| *Diptera sp. (pupa)                       | u     | <i>Anthobium</i> sp.                          | oa    |
|   |       | <i>Acidota crenata</i> (Fabricius)            | oa    |
|   |       | ? <i>Lesteva</i> sp.                          | oa-d  |
| SIPHONAPTERA                              |       | <i>Omalium</i> sp.                            | rt    |
| *Siphonaptera sp.                         | u     | <i>Xylodromus concinnus</i> (Marsham)         | rt-st |
|   |       | Omalinae spp. and spp. indet.                 | rt    |
| COLEOPTERA                                |       | <i>Coprophilus striatulus</i> (Fabricius)     | rt-st |
| <i>Notiophilus</i> sp.                    | oa    | <i>Carpelimus ?bilineatus</i> Stephens        | rt-sf |

|  |       |  |        |
|--|-------|--|--------|
| <i>Carpelimus ?rivularis</i> (Motschulsky)   | ob-d  | ?Cerambycidae sp.                          | l      |
| <i>Carpelimus</i> spp.                       | u     | <i>Plateumaris</i> sp.                     | oa-d-p |
| <i>Platystethus arenarius</i> (Fourcroy)     | rf    | Donaciinae sp. indet.                      | oa-d-p |
| <i>Platystethus cornutus</i> group           | oa-d  | ? <i>Phaedon</i> sp.                       | oa-p   |
| <i>Platystethus ?nitens</i> (Sahlberg)       | oa-d  | Chrysomelinae sp.                          | oa-p   |
| <i>Anotylus nitidulus</i> (Gravenhorst)      | rt    | ? <i>Galerucella</i> sp.                   | oa-p   |
| <i>Anotylus rugosus</i> (Fabricius)          | rt    | <i>Chaetocnema</i> sp.                     | oa-p   |
| <i>Oxytelus sculptus</i> Gravenhorst         | rt-st | Halticinae sp.                             | oa-p   |
| <i>Stenus</i> spp.                           | u     | <i>Apion</i> sp.                           | oa-p   |
| <i>Lathrobium</i> sp.                        | u     | <i>Phyllobius</i> or <i>Polydrusus</i> sp. | oa-p   |
| <i>Rugilus</i> sp.                           | rt    | <i>Strophosomus</i> sp.                    | oa-p   |
| <i>Othius</i> sp.                            | rt    | <i>Sitona</i> sp.                          | oa-p   |
| <i>Leptacinus</i> sp.                        | rt-st | <i>Ceutorhynchus</i> sp.                   | oa-p   |
| <i>Gyrohypnus ?angustatus</i> Stephens       | rt-st | Ceuthorhynchinae sp.                       | oa-p   |
| <i>Gyrohypnus fracticornis</i> (Muller)      | rt-st | ? <i>Limnobaris</i> sp.                    | oa-p-d |
| <i>Xantholinus</i> sp.                       | u     | ? <i>Gymnetron</i> sp.                     | oa-p   |
| Xantholininae sp. indet.                     | u     | <i>Rhynchaenus</i> sp.                     | oa-p   |
| <i>Neobisnius</i> sp.                        | u     | Curculionidae spp.                         | oa     |
| <i>Philonthus</i> spp.                       | u     | <i>Scolytus</i> sp.                        | l      |
| <i>Philonthus</i> or <i>Gabrius</i> sp.      | u     | Scolytidae sp.                             | l      |
| <i>Quedius</i> sp.                           | u     | Coleoptera sp.                             | u      |
| Staphylininae sp. indent.                    | u     | *Coleoptera sp. (larva)                    | u      |
| <i>Tachyporus</i> sp.                        | u     |  |        |
| <i>Tachinus</i> sp.                          | u     | HYMENOPTERA                                |        |
| <i>Cordalia obscura</i> (Gravenhorst)        | rt-sf | *Chalcidoidea spp.                         | u      |
| <i>Falagria</i> sp.                          | rt-sf | *Proctotrupoidea sp.                       | u      |
| ? <i>Crataraea suturalis</i> (Mannerheim)    | rt-st | *Hymenoptera Parasitica sp.                | u      |
| Aleocharinae spp.                            | u     | *? <i>Apis mellifera</i> Linnaeus          | u      |
| Staphylinidae sp.                            | u     | *Apoidea sp.                               | u      |
| Pselaphidae sp.                              | u     | *Formicidae sp.                            | u      |
| <i>Trox scaber</i> (Linnaeus)                | rt-sf | *Hymenoptera sp.                           | u      |
| <i>Geotrupes</i> spp.                        | oa-rf |  |        |
| <i>Phyllopertha horticola</i> (Linnaeus)     | oa-p  | *Insecta sp. (larva)                       | u      |
| ? <i>Cetonia</i> sp.                         | oa    | *Insecta sp. (pupa)                        | u      |
| Melolonthinae/Rutelinae/Cetoniae sp.         | oa-p  |  |        |
| <i>Clambus</i> sp.                           | rt-sf | ARACHNIDA                                  |        |
| <i>Simplocaria ?semistriata</i> (Fabricius)  | oa-p  | *Aranae sp.                                | u      |
| Elateridae sp.                               | ob    | *Acarina sp.                               | u      |
| *Elateridae sp. (larva)                      | ob    |  |        |
| Cantharidae sp.                              | ob    |  |        |
| <i>Ptinus</i> sp.                            | rd-sf |  |        |
| <i>Lyctus linearis</i> (Goeze)               | l-sf  |  |        |
| <i>Meligethes</i> sp.                        | oa-p  |  |        |
| ? <i>Omosita</i> sp.                         | rt-sf |  |        |
| <i>Cryptophagus</i> sp?p.                    | rd-sf |  |        |
| <i>Atomaria</i> sp?p.                        | rd    |  |        |
| ? <i>Ephistemus globulus</i> (Paykull)       | rd-sf |  |        |
| <i>Cerylon</i> sp.                           | l     |  |        |
| <i>Orthoperus</i> sp.                        | rt    |  |        |
| <i>Lathridius minutus</i> group              | rd-st |  |        |
| <i>Enicmus</i> sp.                           | rt-sf |  |        |
| <i>Corticaria</i> spp.                       | rt-sf |  |        |
| <i>Corticarina</i> or <i>Corticicara</i> sp. | rt    |  |        |
| ? <i>Anthicus</i> sp.                        | rt    |  |        |

Table 2. Insects and other macro-invertebrates from Viborg: species lists by sample. Taxa are listed in descending order of abundance, with '\*' taxa following the adult beetles and bugs. Note that these records are from rapid scan recording, sensu Kenward (1992) and not suitable as a basis for detailed interpretation. Key: n - minimum number of individuals; q - quantification (s - semi-quantitative 'several', m - semi-quantitative 'many', both sensu Kenward et al. (1986), e - estimate); ecodes - ecological codes (see Table 6 for explanation); \* - not used in calculation of statistics in Table 3.

Context: 143 Sample: 143/T ReM: RS  
Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 5 mm in jar, woody and herbaceous debris, abundant seeds, conspicuous numbers of insect fragments. E 2.0-3.5, mode 2.5 weak; F 2.0-3.0, mode 2.5 weak.

| Taxon                              | n | q | ecodes |
|------------------------------------|---|---|--------|
| Cercyon analis                     | 2 | - | rt-sf  |
| Carpelimus sp.                     | 2 | - | u      |
| Anotylus nitidulus                 | 2 | - | rt     |
| Falagria sp.                       | 2 | - | rt-sf  |
| Cryptophagus sp.                   | 2 | - | rd-sf  |
| Lathridius minutus group           | 2 | - | rd-st  |
| ?Heterogaster urticae              | 1 | - | oa-p   |
| Cicadellidae sp.                   | 1 | - | oa-p   |
| Dyschirius sp.                     | 1 | - | oa     |
| Carabidae sp.                      | 1 | - | ob     |
| Helophorus ?aquaticus              | 1 | - | oa-w   |
| Helophorus sp.                     | 1 | - | oa-w   |
| Cercyon convexiusculus group       | 1 | - | oa-d   |
| Hydrobius fuscipes                 | 1 | - | oa-w   |
| Coprophilus striatulus             | 1 | - | rt-st  |
| Carpelimus bilineatus or rivularis | 1 | - | u      |
| Carpelimus sp. B                   | 1 | - | u      |
| Platystethus ?nitens               | 1 | - | oa-d   |
| Anotylus rugosus                   | 1 | - | rt     |
| Stenus sp.                         | 1 | - | u      |
| Othius sp.                         | 1 | - | rt     |
| Leptacinus sp.                     | 1 | - | rt-st  |
| Philonthus sp. A                   | 1 | - | u      |
| Philonthus sp. B                   | 1 | - | u      |
| Philonthus sp. C                   | 1 | - | u      |
| Cordalia obscura                   | 1 | - | rt-sf  |
| Aleocharinae sp. A                 | 1 | - | u      |
| Aleocharinae sp. B                 | 1 | - | u      |
| Aphodius sp. A                     | 1 | - | ob-rf  |
| Aphodius sp. B                     | 1 | - | ob-rf  |
| Aphodius sp. C                     | 1 | - | ob-rf  |
| Atomaria sp.                       | 1 | - | rd     |
| Corticaria sp.                     | 1 | - | rt-sf  |
| Ceuthorhynchinae sp.               | 1 | - | oa-p   |

|                             |    |   |      |
|-----------------------------|----|---|------|
| Coleoptera sp.              | 1  | - | u    |
| *Diptera sp. (puparium)     | 15 | m | u    |
| *Acarina sp.                | 15 | m | u    |
| *Coleoptera sp. (larva)     | 6  | s | u    |
| *Auchenorhyncha sp. (nymph) | 2  | - | oa-p |
| *Aphidoidea sp.             | 2  | - | u    |
| *Bibionidae sp.             | 1  | - | u    |
| *Hymenoptera Parasitica sp. | 1  | - | u    |
| *Hymenoptera sp.            | 1  | - | u    |

Context: 185 Sample: 185/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 10 mm in jar, mostly woody fragments, many seeds and some charcoal.

| Taxon                          | n  | q | ecodes |
|--------------------------------|----|---|--------|
| Cercyon analis                 | 2  | - | rt-sf  |
| Philonthus sp.                 | 2  | - | u      |
| Atomaria sp.                   | 2  | - | rd     |
| Lathridius minutus group       | 2  | - | rd-st  |
| Cercyon ?atricapillus          | 1  | - | rf-st  |
| Carpelimus sp.                 | 1  | - | u      |
| Carpelimus sp. B               | 1  | - | u      |
| Platystethus arenarius         | 1  | - | rf     |
| Anotylus nitidulus             | 1  | - | rt     |
| Oxytelus sculptus              | 1  | - | rt-st  |
| ?Othius sp.                    | 1  | - | rt     |
| Falagria sp.                   | 1  | - | rt-sf  |
| Aleocharinae sp.               | 1  | - | u      |
| Aphodius sp.                   | 1  | - | ob-rf  |
| Phyllopertha horticola         | 1  | - | oa-p   |
| Cryptophagus sp.               | 1  | - | rd-sf  |
| Corticaria sp.                 | 1  | - | rt-sf  |
| Corticarina or Cortinicara sp. | 1  | - | rt     |
| ?Anthicus sp.                  | 1  | - | rt     |
| ?Cerambycidae sp.              | 1  | - | l      |
| *Diptera sp. (puparium)        | 15 | m | u      |
| *Acarina sp.                   | 15 | m | u      |
| *Diptera sp. (pupa)            | 2  | - | u      |
| *Pediculus humanus             | 1  | - | ss     |
| *Auchenorhyncha sp. (nymph)    | 1  | - | oa-p   |



|                             |   |   |    |
|-----------------------------|---|---|----|
| *Diptera sp. (adult)        | 1 | - | u  |
| *Syrphidae sp. (larva)      | 1 | - | u  |
| *Elateridae sp. (larva)     | 1 | - | ob |
| *Coleoptera sp. (larva)     | 1 | - | u  |
| *Apoidea sp.                | 1 | - | u  |
| *Hymenoptera Parasitica sp. | 1 | - | u  |
| *Insecta sp. (larva)        | 1 | - | u  |

Context: 194 Sample: 194/T ReM: RS  
Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot of 3 dish volume, wood fragments, trace of seeds, (proportionally) abundant charcoal. E 2.0-3.0, mode 2.5 weak; F 2.0-5.0, mode 2.5, unclear.

Context: 188 Sample: 188/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 8 mm in jar, herbaceous debris with some seeds. E 1.5-2.5, mode 2.0 weak; F 1.0-3.0, mode 2.5 weak (preservation mostly good).

| Taxon                              | n | q | ecodes |
|------------------------------------|---|---|--------|
| Cercyon analis                     | 6 | s | rt-sf  |
| Carpelimus bilineatus or rivularis | 6 | s | u      |
| Oxytelus sculptus                  | 6 | s | rt-st  |
| Gyrophypnus fracticornis           | 3 | - | rt-st  |
| Ptenidium sp.                      | 2 | - | rt     |
| Philonthus sp. B                   | 2 | - | u      |
| Cryptophagus sp.                   | 2 | - | rd-sf  |
| ?Ephistemus globulus               | 2 | - | rd-sf  |
| Lathridius minutus group           | 2 | - | rd-st  |
| Pterostichus sp.                   | 1 | - | ob     |
| Carabidae sp.                      | 1 | - | ob     |
| Colymbetinae sp.                   | 1 | - | oa-w   |
| Cercyon haemorrhoidalis            | 1 | - | rf-sf  |
| Cercyon unipunctatus               | 1 | - | rf-st  |
| Acrotrichis sp.                    | 1 | - | rt     |
| ?Xylodromus concinnus              | 1 | - | rt-st  |
| Carpelimus sp.                     | 1 | - | u      |
| Platystethus arenarius             | 1 | - | rf     |
| Stenus sp.                         | 1 | - | u      |
| Philonthus sp. A                   | 1 | - | u      |
| Cordalia obscura                   | 1 | - | rt-sf  |
| ?Cratarea suturalis                | 1 | - | rt-st  |
| ?Pselaphidae sp.                   | 1 | - | u      |
| Geotrupes sp.                      | 1 | - | oa-rf  |
| Atomaria sp.                       | 1 | - | rd     |
| Corticaria sp.                     | 1 | - | rt-sf  |
| *Diptera sp. (puparium)            | 6 | s | u      |
| *Acarina sp.                       | 6 | s | u      |
| *Coleoptera sp. (larva)            | 2 | - | u      |
| *Oligochaeta sp. (egg capsule)     | 1 | - | u      |
| *Diptera sp. (pupa)                | 1 | - | u      |
| *?Apis mellifera                   | 1 | - | u      |
| *Hymenoptera sp.                   | 1 | - | u      |
| *Proctotrupoidea sp.               | 1 | - | u      |
| *Aranae sp.                        | 1 | - | u      |

| Taxon                    | n | q | ecodes |
|--------------------------|---|---|--------|
| Philonthus sp. A         | 1 | - | u      |
| Philonthus sp. B         | 1 | - | u      |
| Aleocharinae sp.         | 1 | - | u      |
| Aphodius sp.             | 1 | - | ob-rf  |
| Phyllopertha horticola   | 1 | - | oa-p   |
| Cerylon sp.              | 1 | - | l      |
| *Diptera sp. (puparium)  | 6 | s | u      |
| *Acarina sp.             | 6 | s | u      |
| *Daphnia sp. (ephippium) | 1 | - | oa-w   |
| *Aranae sp.              | 1 | - | u      |

Context: 218 Sample: 218/T ReM: RS  
Weight: 1.00 E: 3.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 15 mm in jar, assorted herbaceous and woody plant debris. E 1.5-4.0, mode 3.0 weak; F 1.5-3.0, mode 2.5 weak. Change to pale 0-2, mode 1 weak. Trox perhaps more decayed than most remains, rather pale and cracked, but not definitely so.

| Taxon                              | n | q | ecodes |
|------------------------------------|---|---|--------|
| Trox scaber                        | 8 | - | rt-sf  |
| Cercyon analis                     | 3 | - | rt-sf  |
| Aleocharinae sp. A                 | 3 | - | u      |
| Ptenidium sp.                      | 2 | - | rt     |
| ?Lesteva sp.                       | 2 | - | oa-d   |
| Omaliinae sp. B                    | 2 | - | u      |
| Carpelimus bilineatus or rivularis | 2 | - | u      |
| Gyrophypnus fracticornis           | 2 | - | rt-st  |
| Philonthus sp. B                   | 2 | - | u      |
| Atomaria sp.                       | 2 | - | rd     |
| Carabidae sp. A                    | 1 | - | ob     |
| Cercyon ?atricapillus              | 1 | - | rf-st  |
| Cercyon haemorrhoidalis            | 1 | - | rf-sf  |
| ?Chaetarthria seminulum            | 1 | - | oa-w   |
| Acritus nigricornis                | 1 | - | rt-st  |
| Acrotrichis sp.                    | 1 | - | rt     |
| Omaliinae sp.                      | 1 | - | rt     |
| Carpelimus sp.                     | 1 | - | u      |
| Platystethus arenarius             | 1 | - | rf     |
| Oxytelus sculptus                  | 1 | - | rt-st  |

|                          |           |
|--------------------------|-----------|
| Stenus sp.               | 1 - u     |
| ?Othius sp.              | 1 - rt    |
| Leptacinus sp.           | 1 - rt-st |
| Philonthus sp. A         | 1 - u     |
| Staphylininae sp.        | 1 - u     |
| Cordalia obscura         | 1 - rt-sf |
| Aleocharinae sp. B       | 1 - u     |
| Aphodius sp. A           | 1 - ob-rf |
| Clambus sp.              | 1 - rt-sf |
| ?Cryptophagus sp.        | 1 - rd-sf |
| Lathridius minutus group | 1 - rd-st |
| Corticaria sp.           | 1 - rt-sf |
| ?Phaedon sp.             | 1 - oa-p  |
| Apion sp.                | 1 - oa-p  |
| Ceutorhynchus sp.        | 1 - oa-p  |
| *Diptera sp. (puparium)  | 100 e u   |
| *?Siphonaptera sp.       | 1 - u     |
| *Elateridae sp. (larva)  | 1 - ob    |
| *Coleoptera sp. (larva)  | 1 - u     |
| *Chalcidoidea sp.        | 1 - u     |
| *Aranae sp.              | 1 - u     |

Context: 253 Sample: 253/T ReM: RS  
Weight: 1.00 E: 3.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 5 mm in jar, rather a lot of seeds. E 1.5-3.5, mode 3.5 distinct; F 2.0-4.0, mode 2.5 weak. Pale 2-3, mode 2 weak.

| Taxon                    | n  | q | ecodes |
|--------------------------|----|---|--------|
| Lathridius minutus group | 6  | s | rd-st  |
| Ptinus sp.               | 2  | - | rd-sf  |
| Cryptophagus sp.         | 2  | - | rd-sf  |
| Corticaria sp.           | 2  | - | rt-sf  |
| ?Heterogaster urticae    | 1  | - | oa-p   |
| Cercyon ? analis         | 1  | - | rt-sf  |
| Megasternum obscurum     | 1  | - | rt     |
| Hydrobius fuscipes       | 1  | - | oa-w   |
| Xylodromus concinnus     | 1  | - | rt-st  |
| Coprophilus striatulus   | 1  | - | rt-st  |
| Carpelimus sp.           | 1  | - | u      |
| Anotylus rugosus         | 1  | - | rt     |
| Rugilus sp.              | 1  | - | rt     |
| Gyrophynus sp.           | 1  | - | rt     |
| Aleocharinae sp.         | 1  | - | u      |
| Aphodius sp.             | 1  | - | ob-rf  |
| ?Omosita sp.             | 1  | - | rt-sf  |
| Atomaria sp.             | 1  | - | rd     |
| Orthoperus sp.           | 1  | - | rt     |
| Halticinae sp.           | 1  | - | oa-p   |
| *Diptera sp. (puparium)  | 15 | m | u      |
| *Acarina sp.             | 15 | m | u      |

Context: 257 Sample: 257/T ReM: RS  
Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 6 mm in jar, mostly fragments of wood. E 1.5-3.0, mode 2.5 distinct; F 1.5-3.0, mode 2.5 distinct. Slight yellowing (trend to yellow 1).

| Taxon                        | n  | q | ecodes |
|------------------------------|----|---|--------|
| Cryptophagus sp.             | 2  | - | rd-sf  |
| Corticaria sp.               | 2  | - | rt-sf  |
| Pterostichus melanarius      | 1  | - | ob     |
| Cercyon analis               | 1  | - | rt-sf  |
| Cercyon sp.                  | 1  | - | u      |
| Ptenidium sp.                | 1  | - | rt     |
| Micropeplus sp.              | 1  | - | rt     |
| ?Xylodromus concinnus        | 1  | - | rt-st  |
| Platystethus arenarius       | 1  | - | rf     |
| Anotylus rugosus             | 1  | - | rt     |
| Stenus sp.                   | 1  | - | u      |
| Xantholinus sp.              | 1  | - | u      |
| Philonthus sp.               | 1  | - | u      |
| Falagria sp.                 | 1  | - | rt-sf  |
| Aleocharinae sp. A           | 1  | - | u      |
| Aleocharinae sp. B           | 1  | - | u      |
| Geotrupes sp.                | 1  | - | oa-rf  |
| Phyllopertha horticola       | 1  | - | oa-p   |
| Lyctus linearis              | 1  | - | l-sf   |
| Atomaria sp.                 | 1  | - | rd     |
| Lathridius minutus group     | 1  | - | rd-st  |
| Halticinae sp.               | 1  | - | oa-p   |
| Phyllobius or Polydrusus sp. | 1  | - | oa-p   |
| *Diptera sp. (puparium)      | 50 | e | u      |
| *Coleoptera sp. (larva)      | 3  | - | u      |
| *Aranae sp.                  | 2  | - | u      |
| *Hymenoptera sp.             | 1  | - | u      |
| *Acarina sp.                 | 1  | - | u      |

Context: 295 Sample: 295/T ReM: RS  
Weight: 1.00 E: 0.00 F: 0.00

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Small, almost trace, flot. Quite well preserved (preservation record impractical).

| Taxon                  | n | q | ecodes |
|------------------------|---|---|--------|
| Cercyon sp.            | 1 | - | u      |
| Ptenidium sp.          | 1 | - | rt     |
| ?Xylodromus concinnus  | 1 | - | rt-st  |
| Platystethus arenarius | 1 | - | rf     |
| Aleocharinae sp. A     | 1 | - | u      |

|                                |           |
|--------------------------------|-----------|
| Aleocharinae sp. B             | 1 - u     |
| Staphylinidae sp.              | 1 - u     |
| Phyllopertha horticola         | 1 - oa-p  |
| ?Cryptophagus sp.              | 1 - rd-sf |
| *Oligochaeta sp. (egg capsule) | 1 - u     |
| *Diptera sp. (puparium)        | 1 - u     |
| *Coleoptera sp. (larva)        | 1 - u     |
| *Hymenoptera sp.               | 1 - u     |
| *Acarina sp.                   | 1 - u     |

Context: 301 Sample: 301/T ReM: RS  
Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 30 mm in jar, mostly herbaceous debris. E 1.5-3.5, mode 2.5 weak; F 1.5-3.5, mode 2.5 weak. Some strikingly good preservation.

| Taxon                    | n   | q | ecodes |
|--------------------------|-----|---|--------|
| Philonthus sp. B         | 3   | - | u      |
| Cicadellidae sp.         | 1   | - | oa-p   |
| ?Pterostichus sp.        | 1   | - | ob     |
| Carabidae sp.            | 1   | - | ob     |
| Helophorus sp.           | 1   | - | oa-w   |
| Cercyon melanocephalus   | 1   | - | rt-sf  |
| Cercyon sp.              | 1   | - | u      |
| Ptenidium sp.            | 1   | - | rt     |
| Xylodromus ?concinus     | 1   | - | rt-st  |
| Leptacinus sp.           | 1   | - | rt-st  |
| Gyrohypnus fracticornis  | 1   | - | rt-st  |
| Philonthus sp. A         | 1   | - | u      |
| Aleocharinae sp. A       | 1   | - | u      |
| Aleocharinae sp. B       | 1   | - | u      |
| Aphodius sp. A           | 1   | - | ob-rf  |
| Aphodius sp. B           | 1   | - | ob-rf  |
| Phyllopertha horticola   | 1   | - | oa-p   |
| Simplocaria ?semistriata | 1   | - | oa-p   |
| ?Cantharidae sp.         | 1   | - | ob     |
| Ptinus sp.               | 1   | - | rd-sf  |
| Cryptophagus sp.         | 1   | - | rd-sf  |
| Orthoperus sp.           | 1   | - | rt     |
| Lathridius minutus group | 1   | - | rd-st  |
| ?Enicmus sp.             | 1   | - | rt-sf  |
| Corticaria sp.           | 1   | - | rt-sf  |
| Apion sp.                | 1   | - | oa-p   |
| ?Gymnetron sp.           | 1   | - | oa-p   |
| Scolytus sp.             | 1   | - | l      |
| Coleoptera sp.           | 1   | - | u      |
| *Diptera sp. (puparium)  | 100 | e | u      |
| *Acarina sp.             | 15  | m | u      |
| *Diptera sp. (pupa)      | 1   | - | u      |
| *?Apis mellifera         | 1   | - | u      |

|                             |       |
|-----------------------------|-------|
| *Chalcidoidea sp.           | 1 - u |
| *Hymenoptera Parasitica sp. | 1 - u |
| *Proctotrupoidea sp.        | 1 - u |

Context: 304 Sample: 304/T ReM: RS  
Weight: 1.00 E: 3.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 7 mm in jar, fine herbaceous debris - apparently bran - and trace of moss. E 2.0-4.0, mode 3.0 weak; F 1.5-4.0, mode 2.5 weak. Pale, slightly orange-brown 0-3, mode 1, weak. Some remains quite badly degraded, often fragmented.

| Taxon                           | n  | q | ecodes |
|---------------------------------|----|---|--------|
| Corixidae sp.                   | 1  | - | oa-w   |
| Pterostichus sp.                | 1  | - | ob     |
| Amara sp.                       | 1  | - | oa     |
| ?Harpalus sp.                   | 1  | - | oa     |
| Carabidae sp.                   | 1  | - | ob     |
| Helophorus aquaticus or grandis | 1  | - | oa-w   |
| Cercyon analis                  | 1  | - | rt-sf  |
| Cryptopleurum minutum           | 1  | - | rf-st  |
| Chaetarthria seminulum          | 1  | - | oa-w   |
| Hydraena sp.                    | 1  | - | oa-w   |
| Acrotrichis sp.                 | 1  | - | rt     |
| ?Xylodromus concinnus           | 1  | - | rt-st  |
| Carpelimus ?rivularis           | 1  | - | ob-d   |
| Carpelimus sp.                  | 1  | - | u      |
| Anotylus nitidulus              | 1  | - | rt     |
| Oxytelus sculptus               | 1  | - | rt-st  |
| Stenus sp.                      | 1  | - | u      |
| Lathrobium sp.                  | 1  | - | u      |
| Leptacinus sp.                  | 1  | - | rt-st  |
| Gyrohypnus fracticornis         | 1  | - | rt-st  |
| Aleocharinae sp. A              | 1  | - | u      |
| Aleocharinae sp. B              | 1  | - | u      |
| Pselaphidae sp.                 | 1  | - | u      |
| Geotrupes sp.                   | 1  | - | oa-rf  |
| ?Phyllopertha horticola         | 1  | - | oa-p   |
| Cryptophagus sp.                | 1  | - | rd-sf  |
| Cryptophagus sp.                | 1  | - | rd-sf  |
| Atomaria sp.                    | 1  | - | rd     |
| Orthoperus sp.                  | 1  | - | rt     |
| Lathridius minutus group        | 1  | - | rd-st  |
| Halticinae sp.                  | 1  | - | oa-p   |
| Rhynchaenus sp.                 | 1  | - | oa-p   |
| Curculionidae sp.               | 1  | - | oa     |
| *Diptera sp. (puparium)         | 15 | m | u      |
| *Acarina sp.                    | 15 | m | u      |
| *Diptera sp. (pupa)             | 6  | s | u      |
| *Coleoptera sp. (larva)         | 1  | - | u      |

\*Hymenoptera Parasitica sp. 1 - u  
 \*Hymenoptera sp. 1 - u  
 \*Aranae sp. 1 - u

Context: 306 Sample: 306/T ReM: RS  
 Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 6 mm in jar, herbaceous and woody debris, some seeds. E 1.0-4.0, mode 2.5 weak; F 1.0-4.0, mode 2.5 weak. Some associated parts, delicate hairs, etc. Two crumpled, pale, Apion elytra.

| Taxon                              | n  | q | ecodes |
|------------------------------------|----|---|--------|
| Cercyon analis                     | 6  | s | rt-sf  |
| Carpelimus bilineatus or rivularis | 3  | - | u      |
| Lathridius minutus group           | 3  | - | rd-st  |
| Platystethus arenarius             | 2  | - | rf     |
| Anotylus nitidulus                 | 2  | - | rt     |
| Gyrophynus ?fracticornis           | 2  | - | rt-st  |
| Philonthus sp. A                   | 2  | - | u      |
| Atomaria sp.                       | 2  | - | rd     |
| Cryptopleurum minutum              | 1  | - | rf-st  |
| Hydrobius fuscipes                 | 1  | - | oa-w   |
| Acritus nigricornis                | 1  | - | rt-st  |
| Histerinae sp.                     | 1  | - | rt     |
| Hydraena sp.                       | 1  | - | oa-w   |
| Acrotichis sp.                     | 1  | - | rt     |
| Scydmaenidae sp.                   | 1  | - | u      |
| Platystethus cornutus group        | 1  | - | oa-d   |
| Oxytelus sculptus                  | 1  | - | rt-st  |
| Leptacinus sp.                     | 1  | - | rt-st  |
| Philonthus sp. B                   | 1  | - | u      |
| Falagria sp.                       | 1  | - | rt-sf  |
| Aleocharinae sp. A                 | 1  | - | u      |
| Aleocharinae sp. B                 | 1  | - | u      |
| Aphodius sp.                       | 1  | - | ob-rf  |
| Phyllopertha horticola             | 1  | - | oa-p   |
| Elateridae sp.                     | 1  | - | ob     |
| Lyctus linearis                    | 1  | - | l-sf   |
| ?Ephistemus globulus               | 1  | - | rd-sf  |
| Corticaria sp. A                   | 1  | - | rt-sf  |
| Corticaria sp. B                   | 1  | - | rt-sf  |
| Apion sp.                          | 1  | - | oa-p   |
| Sitona sp.                         | 1  | - | oa-p   |
| ?Gymnetron sp.                     | 1  | - | oa-p   |
| Curculionidae sp.                  | 1  | - | oa     |
| Scolytidae sp.                     | 1  | - | l      |
| *Diptera sp. (puparium)            | 15 | m | u      |
| *Acarina sp.                       | 15 | m | u      |
| *Oligochaeta sp. (egg capsule)     | 2  | - | u      |
| *Cladocera sp. F (ephippium)       | 1  | - | oa-w   |

\*Aphidoidea sp. 1 - u  
 \*Coleoptera sp. (larva) 1 - u  
 \*?Apis mellifera 1 - u  
 \*Chalcidoidea sp. 1 - u  
 \*Proctotrupoidea sp. 1 - u  
 \*Aranae sp. 1 - u

Context: 307 Sample: 307/T ReM: RS  
 Weight: 1.00 E: 0.00 F: 0.00

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 20 mm in jar, mostly wood fragments, with appreciable amount of herbaceous debris. E 1.0-3.5, modes 1.5 and 3.0 distinct; F 1.0-3.5, modes 1.5 and 2.5 distinct. Some remains very fresh-looking (but undoubtedly ancient). Trend to yellow 0-3, modes 1 and 3 distinct (only small proportion at 3).

| Taxon                    | n | q | ecodes |
|--------------------------|---|---|--------|
| Cercyon analis           | 6 | s | rt-sf  |
| Platystethus arenarius   | 3 | - | rf     |
| Philonthus sp.           | 3 | - | u      |
| Stenus sp.               | 2 | - | u      |
| Cryptophagus sp.         | 2 | - | rd-sf  |
| Saldidae sp.             | 1 | - | oa-d   |
| Elaphrus sp.             | 1 | - | oa-d   |
| Pterostichus sp.         | 1 | - | ob     |
| Carabidae sp.            | 1 | - | ob     |
| Megasternum obscurum     | 1 | - | rt     |
| Hydrobius fuscipes       | 1 | - | oa-w   |
| Xylodromus concinnus     | 1 | - | rt-st  |
| Carpelimus ?bilineatus   | 1 | - | rt-sf  |
| Anotylus nitidulus       | 1 | - | rt     |
| Oxytelus sculptus        | 1 | - | rt-st  |
| Rugilus sp.              | 1 | - | rt     |
| Gyrophynus fracticornis  | 1 | - | rt-st  |
| Staphylininae sp.        | 1 | - | u      |
| Tachyporus sp.           | 1 | - | u      |
| ?Crataraea suturalis     | 1 | - | rt-st  |
| Aleocharinae sp. A       | 1 | - | u      |
| Aleocharinae sp. B       | 1 | - | u      |
| Pselaphidae sp.          | 1 | - | u      |
| Geotrupes sp.            | 1 | - | oa-rf  |
| Ptinus sp.               | 1 | - | rd-sf  |
| ?Omosita sp.             | 1 | - | rt-sf  |
| Atomaria sp.             | 1 | - | rd     |
| Lathridius minutus group | 1 | - | rd-st  |
| Chrysomelinae sp.        | 1 | - | oa-p   |
| Ceuthorhynchinae sp.     | 1 | - | oa-p   |
| ?Curculionidae sp.       | 1 | - | oa     |
| Curculionidae sp. A      | 1 | - | oa     |
| Curculionidae sp. B      | 1 | - | oa     |

|                         |    |   |   |
|-------------------------|----|---|---|
| *Diptera sp. (pupa)     | 15 | m | u |
| *Diptera sp. (puparium) | 15 | m | u |
| *Acarina sp.            | 15 | m | u |
| *Aphidoidea sp.         | 1  | - | u |
| *Diptera sp. (larva)    | 1  | - | u |
| *Syrphidae sp. (larva)  | 1  | - | u |
| *Siphonaptera sp.       | 1  | - | u |
| *Coleoptera sp. (larva) | 1  | - | u |
| *Aranae sp.             | 1  | - | u |

Context: 309 Sample: 309/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 12 mm in jar, rather coarse herbaceous debris. E 1.5-4.0, mode 2.0 weak; F 1.0-4.0, mode 2.5 weak.

| Taxon                              | n | q | ecodes |
|------------------------------------|---|---|--------|
| Carpelimus sp.                     | 6 | s | u      |
| Acrotrichis sp.                    | 3 | - | rt     |
| Aphodius sp. B                     | 3 | - | ob-rf  |
| Cercyon analis                     | 2 | - | rt-sf  |
| Carpelimus bilineatus or rivularis | 2 | - | u      |
| Delphacidae sp.                    | 1 | - | oa-p   |
| Carabidae sp.                      | 1 | - | ob     |
| Cercyon sp.                        | 1 | - | u      |
| Hydraena sp.                       | 1 | - | oa-w   |
| Catopinae sp.                      | 1 | - | u      |
| Omaliinae sp.                      | 1 | - | rt     |
| Platystethus arenarius             | 1 | - | rf     |
| Platystethus cornutus group        | 1 | - | oa-d   |
| Anotylus nitidulus                 | 1 | - | rt     |
| Anotylus rugosus                   | 1 | - | rt     |
| Oxytelus sculptus                  | 1 | - | rt-st  |
| Stenus sp.                         | 1 | - | u      |
| Gyrohypnus fracticornis            | 1 | - | rt-st  |
| ?Neobisnius sp.                    | 1 | - | u      |
| Quedius sp.                        | 1 | - | u      |
| Aleocharinae sp. A                 | 1 | - | u      |
| Aleocharinae sp. B                 | 1 | - | u      |
| Geotrupes sp.                      | 1 | - | oa-rf  |
| Aphodius sp. A                     | 1 | - | ob-rf  |
| Phyllopertha horticola             | 1 | - | oa-p   |
| Cryptophagus sp.                   | 1 | - | rd-sf  |
| Atomaria sp.                       | 1 | - | rd     |
| ?Ephistemus globulus               | 1 | - | rd-sf  |
| Lathridius minutus group           | 1 | - | rd-st  |
| Donaciinae sp.                     | 1 | - | oa-d-p |
| ?Galerucella sp.                   | 1 | - | oa-p   |
| ?Gymnetron sp.                     | 1 | - | oa-p   |
| Curculionidae sp. A                | 1 | - | oa     |
| Curculionidae sp. B                | 1 | - | oa     |

|                                |    |   |      |
|--------------------------------|----|---|------|
| *Diptera sp. (puparium)        | 15 | m | u    |
| *Acarina sp.                   | 15 | m | u    |
| *Auchenorhyncha sp. (nymph)    | 2  | - | oa-p |
| *Coleoptera sp. (larva)        | 2  | - | u    |
| *Oligochaeta sp. (egg capsule) | 1  | - | u    |
| *Cladocera sp. F (ephippium)   | 1  | - | oa-w |
| *Aphidoidea sp.                | 1  | - | u    |
| *Chalcidoidea sp.              | 1  | - | u    |

Context: 342 Sample: 342/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.00

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 1 dish. E 1.0-2.5, mode 2.0 weak; F 1.5-3.0, mode 2.0 weak (preservation hard to estimate).

| Taxon                                | n | q | ecodes |
|--------------------------------------|---|---|--------|
| Hydrobius fuscipes                   | 1 | - | oa-w   |
| Rugilus sp.                          | 1 | - | rt     |
| Gyrohypnus sp.                       | 1 | - | rt     |
| ?Neobisnius sp.                      | 1 | - | u      |
| Melolonthinae/Rutelinae/Cetoniae sp. | 1 | - | oa-p   |
| Ptinus sp.                           | 1 | - | rd-sf  |
| Cryptophagus sp.                     | 1 | - | rd-sf  |
| Apion sp.                            | 1 | - | oa-p   |
| Coleoptera sp.                       | 1 | - | u      |
| *Acarina sp.                         | 6 | s | u      |
| *Oligochaeta sp. (egg capsule)       | 1 | - | u      |

Context: 349 Sample: 349/T ReM: RS  
Weight: 1.00 E: 0.00 F: 0.00

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Trace flot. Too few remains for useful preservation record (though variable).

| Taxon                   | n  | q | ecodes |
|-------------------------|----|---|--------|
| Cicadellidae sp.        | 1  | - | oa-p   |
| Carabidae sp.           | 1  | - | ob     |
| Gyrohypnus ?angustatus  | 1  | - | rt-st  |
| Aleocharinae sp.        | 1  | - | u      |
| Curculionidae sp.       | 1  | - | oa     |
| Coleoptera sp.          | 1  | - | u      |
| *Acarina sp.            | 15 | m | u      |
| *Diptera sp. (puparium) | 1  | - | u      |

Context: 365 Sample: 365/T ReM: RS  
Weight: 1.00 E: 0.00 F: 0.00

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Trace flot, woody fragments and a few seeds. Fairly well preserved; impractical to record preservation.

| Taxon                          | n | q | ecodes |
|--------------------------------|---|---|--------|
| Stenus sp.                     | 1 | - | u      |
| Aleocharinae sp. A             | 1 | - | u      |
| Aleocharinae sp. B             | 1 | - | u      |
| Chrysomelinae sp.              | 1 | - | oa-p   |
| Chaetocnema sp.                | 1 | - | oa-p   |
| Ceutorhynchus sp.              | 1 | - | oa-p   |
| Coleoptera sp.                 | 1 | - | u      |
| *Acarina sp.                   | 6 | s | u      |
| *Oligochaeta sp. (egg capsule) | 3 | - | u      |
| *Diptera sp. (puparium)        | 2 | - | u      |
| *Coleoptera sp. (larva)        | 1 | - | u      |

Context: 392 Sample: 392/T ReM: RS  
Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 10 mm in jar, assorted herbaceous debris. E 2.0-3.5, mode 2.5 weak; F 1.5-3.0, mode 2.5 weak.

| Taxon                       | n | q | ecodes |
|-----------------------------|---|---|--------|
| Carpelimus sp.              | 6 | s | u      |
| Gyrophypnus fracticornis    | 4 | - | rt-st  |
| Carpelimus ?bilineatus      | 3 | - | rt-sf  |
| Lathridius minutus group    | 3 | - | rd-st  |
| Cercyon ?analis             | 2 | - | rt-sf  |
| Acrotrichis sp.             | 2 | - | rt     |
| Neobisnius sp.              | 2 | - | u      |
| Atomaria sp.                | 2 | - | rd     |
| Apion sp.                   | 2 | - | oa-p   |
| Carabidae sp.               | 1 | - | ob     |
| Cercyon ?haemorrhoidalis    | 1 | - | rf-sf  |
| ?Cercyon sp.                | 1 | - | u      |
| Carpelimus sp. B            | 1 | - | u      |
| Platystethus arenarius      | 1 | - | rf     |
| Platystethus cornutus group | 1 | - | oa-d   |
| Anotylus nitidulus          | 1 | - | rt     |
| Stenus sp.                  | 1 | - | u      |
| Leptacinus sp.              | 1 | - | rt-st  |
| Gyrophypnus ?angustatus     | 1 | - | rt-st  |
| Aleocharinae sp. A          | 1 | - | u      |
| Aleocharinae sp. B          | 1 | - | u      |
| Aleocharinae sp. C          | 1 | - | u      |
| Aphodius sp. A              | 1 | - | ob-rf  |
| Aphodius sp. B              | 1 | - | ob-rf  |
| ?Phyllopertha horticola     | 1 | - | oa-p   |
| Ptinus sp.                  | 1 | - | rd-sf  |

|                                |    |   |       |
|--------------------------------|----|---|-------|
| Cryptophagus sp.               | 1  | - | rd-sf |
| Enicmus sp.                    | 1  | - | rt-sf |
| Corticaria sp.                 | 1  | - | rt-sf |
| Ceutorhynchus sp.              | 1  | - | oa-p  |
| ?Gymnetron sp.                 | 1  | - | oa-p  |
| Curculionidae sp.              | 1  | - | oa    |
| *Diptera sp. (puparium)        | 15 | m | u     |
| *Oligochaeta sp. (egg capsule) | 6  | s | u     |
| *Coleoptera sp. (larva)        | 6  | s | u     |
| *Bibionidae sp.                | 3  | - | u     |
| *Hemiptera sp. (nymph)         | 1  | - | u     |
| *Ptiliidae sp. (pupa)          | 1  | - | u     |
| *Coleoptera sp. (larva)        | 1  | - | u     |
| *Chalcidoidea sp.              | 1  | - | u     |
| *Insecta sp. (pupa)            | 1  | - | u     |

Context: 395 Sample: 395/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.00

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 12 mm in jar. E 2.0-3.0, mode 2.0 weak; F 2.0-3.0, mode 2.0 weak.

| Taxon                     | n  | q | ecodes |
|---------------------------|----|---|--------|
| Cercyon analis            | 2  | - | rt-sf  |
| Ptinus sp.                | 2  | - | rd-sf  |
| Lathridius minutus group  | 2  | - | rd-st  |
| Auchenorhyncha sp.        | 1  | - | oa-p   |
| Pterostichus sp.          | 1  | - | ob     |
| Anthobium sp.             | 1  | - | oa     |
| Omalium sp.               | 1  | - | rt     |
| Xylodromus concinnus      | 1  | - | rt-st  |
| Stenus sp.                | 1  | - | u      |
| ?Gyrophypnus sp.          | 1  | - | rt     |
| Philonthus or Gabrius sp. | 1  | - | u      |
| Quedius sp.               | 1  | - | u      |
| Aleocharinae sp. A        | 1  | - | u      |
| Aleocharinae sp. B        | 1  | - | u      |
| Geotrupes sp.             | 1  | - | oa-rf  |
| Aphodius sp.              | 1  | - | ob-rf  |
| Aphodius sp. B            | 1  | - | ob-rf  |
| Phyllopertha horticola    | 1  | - | oa-p   |
| Elateridae sp.            | 1  | - | ob     |
| Atomaria sp.              | 1  | - | rd     |
| ?Ephistemus globulus      | 1  | - | rd-sf  |
| Corticaria sp. A          | 1  | - | rt-sf  |
| Corticaria sp. B          | 1  | - | rt-sf  |
| Corticaria sp. C          | 1  | - | rt-sf  |
| ?Cerambycidae sp.         | 1  | - | l      |
| Chrysomelinae sp.         | 1  | - | oa-p   |
| *Acarina sp.              | 15 | m | u      |
| *Diptera sp. (puparium)   | 6  | s | u      |
| *Proctotrupeoidea sp.     | 2  | - | u      |

|                                |       |
|--------------------------------|-------|
| *Oligochaeta sp. (egg capsule) | 1 - u |
| *Diptera sp. (pupa)            | 1 - u |
| *Syrphidae sp. (larva)         | 1 - u |
| *Coleoptera sp. (larva)        | 1 - u |
| *Chalcidoidea sp.              | 1 - u |
| *Formicidae sp.                | 1 - u |
| *Aranae sp.                    | 1 - u |

Context: 406 Sample: 406/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot small, quite a lot of charcoal. NOTE! The jar containing this flot was dropped on the washing room floor and broke. The flot was partly recovered from the floor. Loss and contamination possible. E 1.5-2.5, mode 2 weak; F 1.5-3.5, mode 2.5 weak.

| Taxon                    | n | q | ecodes |
|--------------------------|---|---|--------|
| Cryptophagus sp.         | 3 | - | rd-sf  |
| Cercyon analis           | 2 | - | rt-sf  |
| Atomaria sp.             | 2 | - | rd     |
| Lathridius minutus group | 2 | - | rd-st  |
| Pterostichus ?melanarius | 1 | - | ob     |
| Cercyon sp.              | 1 | - | u      |
| ?Xylodromus concinnus    | 1 | - | rt-st  |
| Gyrophypnus sp.          | 1 | - | rt     |
| Aleocharinae sp. A       | 1 | - | u      |
| Aleocharinae sp. B       | 1 | - | u      |
| Aphodius sp. A           | 1 | - | ob-rf  |
| ?Omosita sp.             | 1 | - | rt-sf  |
| ?Ephistemus globulus     | 1 | - | rd-sf  |
| *Diptera sp. (puparium)  | 6 | s | u      |
| *Acarina sp.             | 6 | s | u      |

Context: 425 Sample: 425/T ReM: RS  
Weight: 1.00 E: 3.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 18 mm in jar, mostly ?rootlets, some moss and some undisaggregated humc sediment. Preservation very varied: E 1.0-5.0, mode 3.0 weak; F 1.0-5.0, mode 2.5, weak. Many scraps of cuticle.

| Taxon                 | n | q | ecodes |
|-----------------------|---|---|--------|
| Chaetarhria seminulum | 6 | s | oa-w   |
| Notiophilus sp.       | 2 | - | oa     |
| Dyschirius sp.        | 2 | - | oa     |
| Acidota crenata       | 2 | - | oa     |
| Philonthus sp. B      | 2 | - | u      |

|                                |   |   |        |
|--------------------------------|---|---|--------|
| Trechus sp.                    | 1 | - | ob     |
| ?Calathus sp.                  | 1 | - | oa     |
| Carabidae sp.                  | 1 | - | ob     |
| Cryptopleurum minutum          | 1 | - | rf-st  |
| Hydrobius fuscipes             | 1 | - | oa-w   |
| ?Anacaena sp.                  | 1 | - | oa-w   |
| Oxytelus sculptus              | 1 | - | rt-st  |
| Stenus sp.                     | 1 | - | u      |
| Philonthus sp. A               | 1 | - | u      |
| Staphylininae sp.              | 1 | - | u      |
| Tachinus sp.                   | 1 | - | u      |
| Aleocharinae sp. A             | 1 | - | u      |
| Aleocharinae sp. B             | 1 | - | u      |
| Pselaphidae sp.                | 1 | - | u      |
| Phyllopertha horticola         | 1 | - | oa-p   |
| ?Cetonia sp.                   | 1 | - | oa     |
| Simplocaria ?semistriata       | 1 | - | oa-p   |
| Elateridae sp.                 | 1 | - | ob     |
| Corticarina or Cortinicara sp. | 1 | - | rt     |
| Plateumaris sp.                | 1 | - | oa-d-p |
| ?Limnobaris sp.                | 1 | - | oa-p-d |
| Coleoptera sp.                 | 1 | - | u      |
| *Diptera sp. (puparium)        | 6 | s | u      |
| *Acarina sp.                   | 6 | s | u      |
| *Coleoptera sp. (larva)        | 2 | - | u      |
| *Heteroptera sp. (nymph)       | 1 | - | u      |

Context: 453 Sample: 453/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.50

Notes: Notes: Entered HK 13/11/02. Assessment record made in flot, entered as RS. Flot 1 dish, rootlets and other plant tissue. E 1.5-2.5, mode 2.0 weak; F 1.5-3.0, mode 2.5 weak.

| Taxon                    | n | q | ecodes |
|--------------------------|---|---|--------|
| Lathridius minutus group | 2 | - | rd-st  |
| Elaphrus sp.             | 1 | - | oa-d   |
| Pterostichus ?melanarius | 1 | - | ob     |
| Pterostichus sp.         | 1 | - | ob     |
| Helophorus sp.           | 1 | - | oa-w   |
| Megarhtrus sp.           | 1 | - | rt     |
| ?Xylodromus concinnus    | 1 | - | rt-st  |
| Carpelimus sp.           | 1 | - | u      |
| Anotylus nitidulus       | 1 | - | rt     |
| Anotylus rugosus         | 1 | - | rt     |
| Xantholininae sp.        | 1 | - | u      |
| Staphylininae sp.        | 1 | - | u      |
| Falagria or Cordalia sp. | 1 | - | rt-sf  |
| Aleocharinae sp.         | 1 | - | u      |
| Aphodius sp.             | 1 | - | ob-rf  |
| Cantharidae sp.          | 1 | - | ob     |
| Ptinus sp.               | 1 | - | rd-sf  |

|                              |            |
|------------------------------|------------|
| Meligethes sp.               | 1 - oa-p   |
| Cryptophagus sp.             | 1 - rd-sf  |
| Corticaria sp.               | 1 - rt-sf  |
| Chrysomelinae sp.            | 1 - oa-p   |
| ?Limnobaris sp.              | 1 - oa-p-d |
| *Acarina sp.                 | 15 m u     |
| *Daphnia sp. (ephippium)     | 2 - oa-w   |
| *Cladocera sp. F (ephippium) | 2 - oa-w   |
| *Diptera sp. (puparium)      | 2 - u      |
| *Diptera sp. (pupa)          | 1 - u      |
| *Aranae sp.                  | 1 - u      |

Context: 480 Sample: 480/T ReM: RS  
Weight: 1.00 E: 2.50 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 4 mm in jar, mostly charcoal. E 1.5-2.5, mode 2.5 distinct; F 2.0-3.5, mode 2.5 weak. Yellow-brown 1-3, mode 3 strong. Scraps of cuticle of various groups present. Preservation unusual.

| Taxon                          | n q e codes |
|--------------------------------|-------------|
| Lathridius minutus group       | 2 - rd-st   |
| Helophorus sp.                 | 1 - oa-w    |
| Cercyon analis                 | 1 - rt-sf   |
| ?Xylodromus concinnus          | 1 - rt-st   |
| Anotylus nitidulus             | 1 - rt      |
| Gyrophypnus ?fracticornis      | 1 - rt-st   |
| Ptinus sp.                     | 1 - rd-sf   |
| Cryptophagus sp.               | 1 - rd-sf   |
| Corticaria sp.                 | 1 - rt-sf   |
| Donaciinae sp.                 | 1 - oa-d-p  |
| ?Gymnetron sp.                 | 1 - oa-p    |
| *Acarina sp.                   | 6 s u       |
| *Oligochaeta sp. (egg capsule) | 3 - u       |
| *Diptera sp. (puparium)        | 2 - u       |
| *Coleoptera sp. (larva)        | 1 - u       |
| *Formicidae sp.                | 1 - u       |

Context: 497 Sample: 497/T ReM: RS  
Weight: 1.00 E: 2.00 F: 2.50

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 1 mm in jar, moss and herbaceous debris; some ?heather. Varied preservation, superb to average: E 1.5-3.5, mode 2.0 weak; F 1.0-4.0, mode 2.5 weak.

| Taxon            | n q e codes |
|------------------|-------------|
| Cercyon ?analis  | 2 - rt-sf   |
| Philonthus sp. A | 2 - u       |

|                                |           |
|--------------------------------|-----------|
| Atomaria sp.                   | 2 - rd    |
| Carabidae sp.                  | 1 - ob    |
| Cercyon sp.                    | 1 - u     |
| Catops sp.                     | 1 - u     |
| Omaliinae sp.                  | 1 - rt    |
| Platystethus arenarius         | 1 - rf    |
| Anotylus nitidulus             | 1 - rt    |
| Stenus sp. A                   | 1 - u     |
| Stenus sp. B                   | 1 - u     |
| Leptacinus sp.                 | 1 - rt-st |
| Simplocaria ?semistriata       | 1 - oa-p  |
| Cryptophagus sp.               | 1 - rd-sf |
| ?Ephistemus globulus           | 1 - rd-sf |
| Enicmus sp.                    | 1 - rt-sf |
| Corticaria sp.                 | 1 - rt-sf |
| Chaetocnema sp.                | 1 - oa-p  |
| Strophosomus sp.               | 1 - oa-p  |
| Curculionidae sp.              | 1 - oa    |
| *Diptera sp. (pupa)            | 15 m u    |
| *Diptera sp. (puparium)        | 15 m u    |
| *Acarina sp.                   | 6 s u     |
| *Oligochaeta sp. (egg capsule) | 1 - u     |
| *Ostracoda sp.                 | 1 - u     |
| *Formicidae sp.                | 1 - u     |
| *Hymenoptera sp.               | 1 - u     |
| *Chalcidoidea sp. A            | 1 - u     |
| *Chalcidoidea sp. B            | 1 - u     |

Context: 515 Sample: 515/T ReM: RS  
Weight: 1.00 E: 0.00 F:

Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot small, rootlets, wood fragments and trace of seeds. Preservation good, but too few remains for useful record.

| Taxon                          | n q e codes |
|--------------------------------|-------------|
| Trechus ?secalis               | 1 - oa-d    |
| Helophorus sp.                 | 1 - oa-w    |
| Gyrophypnus ?angustatus        | 1 - rt-st   |
| Xantholinus sp.                | 1 - u       |
| *Acarina sp.                   | 15 m u      |
| *Oligochaeta sp. (egg capsule) | 1 - u       |
| *Diptera sp. (puparium)        | 1 - u       |
| *Coleoptera sp. (larva)        | 1 - u       |
| *Chalcidoidea sp.              | 1 - u       |
| *Insecta sp. (larva)           | 1 - u       |

Context: 532 Sample: 532/T ReM: RS  
Weight: 1.00 E: 0.00 F: 2.50



Notes: Entered HK 12/11/02. Assessment record made in flot, entered as RS. Flot 6 mm in jar, moss, ?rootlets, leaf fragments, charcoal. E 1.5-5.0, modes 1.5 and 4.5 distinct; F 1.5-5, mode 2.5 weak. Many very decayed scraps.

| <b>Taxon</b>                   | <b>n</b> | <b>q</b> | <b>ecodes</b> |
|--------------------------------|----------|----------|---------------|
| Plateumaris sp.                | 2        | -        | oa-d-p        |
| Saldidae sp.                   | 1        | -        | oa-d          |
| Auchenorhyncha sp.             | 1        | -        | oa-p          |
| Delphacidae sp.                | 1        | -        | oa-p          |
| ?Pterostichus sp.              | 1        | -        | ob            |
| Helophorus sp.                 | 1        | -        | oa-w          |
| Cercyon sp.                    | 1        | -        | u             |
| ?Chaetarthria seminulum        | 1        | -        | oa-w          |
| Anotylus rugosus               | 1        | -        | rt            |
| Stenus sp.                     | 1        | -        | u             |
| Aleocharinae sp.               | 1        | -        | u             |
| Pselaphidae sp.                | 1        | -        | u             |
| Aphodius sp.                   | 1        | -        | ob-rf         |
| Phyllopertha horticola         | 1        | -        | oa-p          |
| Cryptophagus sp.               | 1        | -        | rd-sf         |
| ?Limnobaris sp.                | 1        | -        | oa-p-d        |
| *Acarina sp.                   | 15       | m        | u             |
| *Oligochaeta sp. (egg capsule) | 6        | s        | u             |
| *Diptera sp. (puparium)        | 6        | s        | u             |
| *Diptera sp. (pupa)            | 2        | -        | u             |
| *Forficula sp.                 | 1        | -        | u             |
| *Diptera sp. (adult)           | 1        | -        | u             |
| *?Apis mellifera               | 1        | -        | u             |
| *Aranae sp.                    | 1        | -        | u             |

Table 3. Main statistics for the assemblages of adult Coleoptera and Hemiptera (excluding Aphidoidea and Coccidoidea) from Viborg. For explanation of codes see Table 4. Note that these data are based on rapid recording and therefore very approximate.

| Context | S   | N   | NOB | PNOB | NW | PNW | ND | PND | NP | PNP | NRT | PNRT | NRD | PNRD | NRF | PNRF | NSA | PNSA | NSF | PNSF | NST | PNST | NSS | PNSS |
|---------|-----|-----|-----|------|----|-----|----|-----|----|-----|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|-----|------|
| 143     | 35  | 41  | 13  | 32   | 3  | 7   | 2  | 5   | 3  | 7   | 20  | 49   | 5   | 12   | 3   | 7    | 12  | 29   | 8   | 20   | 4   | 10   | 0   | 0    |
| 185     | 20  | 24  | 2   | 8    | 0  | 0   | 0  | 0   | 1  | 4   | 17  | 71   | 5   | 21   | 3   | 13   | 9   | 38   | 5   | 21   | 4   | 17   | 0   | 0    |
| 188     | 26  | 48  | 4   | 8    | 1  | 2   | 0  | 0   | 0  | 0   | 33  | 69   | 7   | 15   | 4   | 8    | 27  | 56   | 13  | 27   | 14  | 29   | 0   | 0    |
| 194     | 6   | 6   | 2   | 33   | 0  | 0   | 0  | 0   | 1  | 17  | 1   | 17   | 0   | 0    | 1   | 17   | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0    |
| 218     | 35  | 53  | 8   | 15   | 1  | 2   | 2  | 4   | 3  | 6   | 32  | 60   | 4   | 8    | 4   | 8    | 23  | 43   | 16  | 30   | 7   | 13   | 0   | 0    |
| 253     | 20  | 28  | 4   | 14   | 1  | 4   | 0  | 0   | 2  | 7   | 23  | 82   | 11  | 39   | 1   | 4    | 16  | 57   | 8   | 29   | 8   | 29   | 0   | 0    |
| 257     | 23  | 25  | 5   | 20   | 0  | 0   | 0  | 0   | 3  | 12  | 14  | 56   | 4   | 16   | 2   | 8    | 9   | 36   | 7   | 28   | 2   | 8    | 0   | 0    |
| 295     | 9   | 9   | 1   | 11   | 0  | 0   | 0  | 0   | 1  | 11  | 4   | 44   | 1   | 11   | 1   | 11   | 2   | 22   | 1   | 11   | 1   | 11   | 0   | 0    |
| 301     | 29  | 31  | 11  | 35   | 1  | 3   | 0  | 0   | 5  | 16  | 13  | 42   | 3   | 10   | 2   | 6    | 9   | 29   | 5   | 16   | 4   | 13   | 0   | 0    |
| 304     | 32  | 32  | 14  | 44   | 4  | 13  | 1  | 3   | 3  | 9   | 13  | 41   | 3   | 9    | 2   | 6    | 8   | 25   | 2   | 6    | 6   | 19   | 0   | 0    |
| 306     | 34  | 48  | 10  | 21   | 2  | 4   | 1  | 2   | 4  | 8   | 28  | 58   | 6   | 13   | 4   | 8    | 20  | 42   | 11  | 23   | 9   | 19   | 0   | 0    |
| 307     | 33  | 44  | 11  | 25   | 1  | 2   | 2  | 5   | 2  | 5   | 24  | 55   | 5   | 11   | 4   | 9    | 16  | 36   | 11  | 25   | 5   | 11   | 0   | 0    |
| 309     | 34  | 45  | 15  | 33   | 1  | 2   | 2  | 4   | 5  | 11  | 20  | 44   | 4   | 9    | 6   | 13   | 7   | 16   | 4   | 9    | 3   | 7    | 0   | 0    |
| 342     | 9   | 9   | 3   | 33   | 1  | 11  | 0  | 0   | 2  | 22  | 4   | 44   | 2   | 22   | 0   | 0    | 2   | 22   | 2   | 22   | 0   | 0    | 0   | 0    |
| 349     | 6   | 6   | 3   | 50   | 0  | 0   | 0  | 0   | 1  | 17  | 1   | 17   | 0   | 0    | 0   | 0    | 1   | 17   | 0   | 0    | 1   | 17   | 0   | 0    |
| 365     | 7   | 7   | 3   | 43   | 0  | 0   | 0  | 0   | 3  | 43  | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0    | 0   | 0    |
| 392     | 32  | 49  | 10  | 20   | 0  | 0   | 1  | 2   | 5  | 10  | 27  | 55   | 7   | 14   | 4   | 8    | 19  | 39   | 10  | 20   | 9   | 18   | 0   | 0    |
| 395     | 26  | 29  | 9   | 31   | 0  | 0   | 0  | 0   | 3  | 10  | 17  | 59   | 6   | 21   | 3   | 10   | 11  | 38   | 8   | 28   | 3   | 10   | 0   | 0    |
| 406     | 13  | 18  | 2   | 11   | 0  | 0   | 0  | 0   | 0  | 0   | 14  | 78   | 8   | 44   | 1   | 6    | 10  | 56   | 7   | 39   | 3   | 17   | 0   | 0    |
| 425     | 27  | 36  | 23  | 64   | 8  | 22  | 2  | 6   | 4  | 11  | 3   | 8    | 0   | 0    | 1   | 3    | 2   | 6    | 0   | 0    | 2   | 6    | 0   | 0    |
| 453     | 22  | 23  | 9   | 39   | 1  | 4   | 2  | 9   | 3  | 13  | 11  | 48   | 4   | 17   | 1   | 4    | 7   | 30   | 4   | 17   | 3   | 13   | 0   | 0    |
| 480     | 11  | 12  | 3   | 25   | 1  | 8   | 1  | 8   | 2  | 17  | 9   | 75   | 4   | 33   | 0   | 0    | 8   | 67   | 4   | 33   | 4   | 33   | 0   | 0    |
| 497     | 20  | 23  | 5   | 22   | 0  | 0   | 0  | 0   | 3  | 13  | 12  | 52   | 4   | 17   | 1   | 4    | 7   | 30   | 6   | 26   | 1   | 4    | 0   | 0    |
| 515     | 4   | 4   | 2   | 50   | 1  | 25  | 1  | 25  | 0  | 0   | 1   | 25   | 0   | 0    | 0   | 0    | 1   | 25   | 0   | 0    | 1   | 25   | 0   | 0    |
| 532     | 16  | 17  | 11  | 65   | 2  | 12  | 4  | 24  | 6  | 35  | 3   | 18   | 1   | 6    | 1   | 6    | 1   | 6    | 1   | 6    | 0   | 0    | 0   | 0    |
| All     | 166 | 667 | 183 | 27   | 29 | 4   | 21 | 3   | 65 | 10  | 344 | 52   | 94  | 14   | 49  | 7    | 227 | 34   | 133 | 20   | 94  | 14   | 0   | 0    |

Table 4. 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 1 for codes assigned to taxa from the present site. Alpha - the index of diversity alpha (Fisher et al. 1943); Indivs - individuals (based on MNI); No - number.

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