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**Technical report: Biological remains from excavations at the former D. C. Cook site, off Lawrence Street, York**
**(site code: YORYM 2001.9444)**

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# Technical report: Biological remains from excavations at the former D. C. Cook site, off Lawrence Street, York (site code: YORYM 2001.9444)

by

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**Summary**

*Archaeological excavations were carried out by York Archaeological Trust at the former D. C. Cook site, off Lawrence Street, York, in May 2001 and February 2003.*

*Plant and invertebrate remains were investigated from three deposits considered worthy of further examination following an assessment. One, from a feature interpreted as a 10th century oven or kiln, yielded modest concentrations of charred cereal grains (mainly barley and oats) showing evidence of sprouting—and probably representing material burnt during drying of grain in the malting process. Two later, medieval, deposits rich in remains preserved by anoxic 'waterlogging' were also studied. They came from features interpreted as a barrel well and a ditch. Both gave abundant evidence for natural, semi-natural and artificial habitats in the vicinity, but with some additional evidence of plant food waste (in the ditch). In some respects the assemblage from the ditchfill seemed more typical of a well fill, whilst the well fill was rich in aquatic invertebrates as would be expected from a ditch deposit. Altogether, these remains offered a rare opportunity to examine the environment (and aspects of the economy) of the inhabitants of an area of the city of York well beyond the city walls.*

*Though too small for detailed analysis, the bone assemblages have been recorded to provide a basic archive for the purposes of possible use for comparanda and synthetic projects.*

**KEYWORDS**: FORMER D. C. COOK SITE; LAWRENCE STREET, YORK; TECHNICAL REPORT; ?10TH CENTURY; MEDIEVAL; CHARRED PLANT REMAINS; PLANT REMAINS; INVERTEBRATE REMAINS; VERTEBRATE REMAINS; MALTING

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# Technical report: Biological remains from excavations at the former D. C. Cook site, off Lawrence Street, York (site code: YORYM 2001.9444)

## Introduction

Archaeological excavations were carried out by York Archaeological Trust at the former D. C. Cook site, off Lawrence Street, York (SE 6157 5126 and SE 6158 5125), in May 2001 and February 2003.

Plant and animal remains from excavations at this site were investigated as part of an initial evaluation of the material collected in 2001 (Hall *et al.* 2001) with assessment of material collected during the intervention in 2003 (Hall *et al.* 2003). The first exercise, in which five sediment samples and a small collection of vertebrate remains was studied, concluded: 'It is recommended that no further work is carried out either on these samples or those from the evaluation which were not examined bioarchaeologically. The animal bones do not warrant further examination. Further excavation at this site seems unlikely to yield valuable material, though the possibility of moderate or high concentrations of charred remains and the recovery of a small vertebrate assemblage should be allowed for.' In the event, a subsequent phase of excavation yielded some well preserved material—both charred plant remains and uncharred ('waterlogged') plant and invertebrate macrofossils, with samples from three contexts being identified as worthy of further examination, providing useful interpretative evidence for the contexts concerned as well as rare examples of well preserved biological remains from an area of York for which such evidence has so far proved very sparse. The bone was not considered to warrant any further study, however.

Though too small for detailed analysis, the bone assemblages have been recorded to provide a basic archive for the purposes of possible use for comparanda and synthetic projects. The results, including biometrical data, are presented as the Appendix to this report.

## Methods

Subsamples from the three samples identified as justifying further analysis were processed according to the methods of Kenward *et al.* (1980), using paraffin flotation in the two cases where uncharred insect material was known to be present and with the use of a 'washover' for the charred material in the third sample. Recording of plant remains was semi-quantitative, using a four-point scale of abundance from 1 (one or a few specimens or a very rare component of the deposit) to 4 (abundant remains or a large component of the deposit), these being related as far as possible to the size of the subsample, not the size of the sieved material. Records of plant taxa and other components of the three samples were entered directly into a PC using *Paradox* software, along with notes about the material. Some unusual or problematic specimens were retained but no systematic recovery of remains was attempted during scanning.

Insects were identified by comparison with modern reference material and using the standard works. Adult beetles and bugs, other than aphids and scale insects, were recorded fully quantitatively and a minimum number of individuals estimated on the basis of the fragments present. Numbers of Aleocharinae spp. were difficult to estimate and the division between types is more arbitrary than usual. Other invertebrate macrofossils were recorded semi-quantitatively using the scale described by Kenward *et al.* (1986) and Kenward (1992), again using estimates for extremely abundant taxa. Data pertaining to invertebrate remains were recorded directly or transferred from a paper record to computer databases

(using *Paradox* software) for analysis and long-term storage.

The interpretative methods employed in this study were essentially the same as those used in work on a variety of sites by Hall, Kenward and co-workers (see Kenward 1978, with modifications outlined by, for example, Kenward 1988; Hall and Kenward 1990; and Kenward and Hall 1995). For the insect remains, interpretation rests primarily on a number of 'main statistics' of whole assemblages of adult beetles and bugs, and on the recognition of ecologically-related groups of species.

## Results

The material is considered in chronological order. Lists of plant and invertebrate taxa appear in Tables 1, 2 and 4 with statistics relating to the insect remains in Table 3.

*(i) Context 11018 and other deposits associated with 10th century ?oven 11057*

Context 11018, the first proper backfill of a feature (11057) interpreted as a kiln, oven, or furnace, and seen along the full length of 11057, was described in the field as a greyish-brown silty clay containing large amounts of charcoal and pot dated to the 10th century. (The laboratory description was as follows: moist, mid grey-brown to mid to dark grey-brown, crumbly and slightly sticky (working soft), sandy clay silt, with patches of mid reddish-brown silty sand. Very small, small and medium-sized stones (2 to 60 mm) were present, together with fragments of ?rotted mortar/plaster. Rotted charcoal was common.) Subsamples of 3 kg (assessment) and 5 kg (analysis phase) were taken from this sample.

The small to moderate-sized washovers, of about 200 ml and 320 ml, consisted mainly of charred material, though there were small amounts of fine modern rootlets and occasional uncharred seeds (which may be intrusive). The charred remains largely comprised oak (*Quercus*) charcoal (to 25 mm in maximum dimension), the fragments mostly exhibiting a characteristic 'wavy' internal structure, perhaps representing wood with knots or burrs that was not suitable for other purposes and being selected for fuel. Traces of willow/poplar/aspen (*Salix/Populus*) charcoal were also present.

With the charcoal were modest amounts of rather variably preserved cereal grains (perhaps about 10% by volume of the washovers and perhaps about 1% by volume of the raw sediment). The grain was mainly barley (*Hordeum*) and oats (*Avena*, some of it *A. sativa*, cultivated oat), with a trace of bread/club wheat (*Triticum 'aestivo-compactum'*) and rye (*Secale cereale*), and with moderate numbers of brome (*Bromus*) grains, presumably present as a crop weed. A high proportion of the grains showed evidence of having begun to germinate (and there were some detached coleoptiles—shoots—amongst the grains); some grains of both types had sprouts reaching almost to the full length of the grain (or rarely, in oats, longer than this), though for the most part the coleoptiles tended to extend to about 30-50% of the length of the grain. Perhaps the most likely explanation for this material is that it represents grain which became burnt whilst being dried during the malting process.

A clue as to a possible fuel (other than wood) may lie in the remains of charred heather (*Calluna vulgaris*) root/basal twig fragments, though these are perhaps most likely to have arrived with turves or peat, since remains of the upper parts of the plant were restricted to a trace of charred twig and there were some fragments of charred material (to 5 mm) which may have been peat or mor humus (highly humified peaty soil typically developing on heather-dominated heathland or moorland).

The cereal crop must have been rather clean: there were only a very few weed seeds present, the more abundant being corn spurrey (*Spergula arvensis*) and sheep's sorrel (*Rumex acetosella* agg.), probably indicative of cultivation of light sandy soils (and so perhaps denoting a crop grown locally, in the environs of York). There were also modest numbers of small charred seeds of vetch (probably *Vicia* spp.), perhaps another crop weed. One unusual specimen from the second subsample examined was what appeared to be a charred emerging cotyledon (seed leaf) of corncockle (*Agrostemma githago*) to which a fragment of the very characteristic testa (seed coat) was still attached (and which afforded the identification). The presence of such a macrofossil is not only unusual, but represents a contaminant which had begun to germinate along with the grain prior to charring. The few charred leguminous cotyledons which were tentatively assigned to lentil (*Lens culinaris* Medicus) during assessment (Hall *et al.* 2003) are now included with other 'unidentifiable small legumes' (probably *Vicia* spp.).

Other deposits associated with this feature (but only examined at assessment stage) comprised Contexts 11046 (a layer mainly of charcoal with some black loam and burnt clay forming the earliest context within the circular southern end of 11057) and 11040 (a use

deposit directly associated with the construction and use of 11057).

The sediment from 11046 was described in the laboratory as a moist, mid reddish-brown to mid to dark grey to mid to dark grey-brown, sticky to crumbly (working soft), clay silt, with very small stones (2 to 6 mm), with abundant rotted charcoal and some modern roots and rootlets. The moderate-sized to large residue of about 300 ml (from a subsample of 3 kg) mainly consisted of charred material: charcoal (to 15 mm, including hazel, oak and willow/poplar) with well-preserved cereal grains (mainly barley, with a few oats and a trace of bread/club wheat), again showing evidence of sprouting, though altogether at a much lower overall concentration compared with the grain in the sample from Context 11018. There were some quite substantial heather root/twig fragments (to 20 mm) and some other indicators that turves or peat may well have been present: charred root/rhizome fragments, sedge (*Carex*) nutlets and herbaceous detritus (cf. Hall 2003).

A 1 kg subsample from Context 11040 (described as a moist, light brown to light to mid grey-brown, crumbly and unconsolidated, sandy silt (?ashy), with fragments of brick/tile and rotted charcoal and some modern roots and rootlets) yielded a small washover of about 30 ml of charcoal (to 10 mm), two charred cereal grains (one each of barley, and oats, the latter showing evidence of sprouting), uncharred rootlets (perhaps actually ancient) and fine (less than 2 mm) calcareous material in amorphous granules which may, for example, have been recrystallised lime. There were traces of charred ?heather root/twig fragments (to 5 mm).

*(ii) Medieval barrel well fill 11023 (Context group 5.2.6)*

Context 11023 (Sample 11) was described in the field as a soft, dark greyish-brown, silty clay with a moderate organic content including small twigs and pieces of shaped wood. This fill also contained tile of the 13th-16th centuries and 14th century pottery. It was the only post-use backfill positively identified from the barrel.

In the laboratory the sediment of Sample 11 was described as a moist, light grey-brown to mid to dark grey-brown, crumbly (working soft), humic, slightly sandy clay silt (with lighter areas of clay sand), with medium and large-sized stones (20 to greater than 60 mm). Fragments of wood, twigs and ?rotted mortar/plaster were present and traces of vivianite, indicating some decay of organic matter, were observed.

The rather large residues from the subsamples of 3 and 5 kg respectively from the assessment and analysis phases were about 500 ml and 1100 ml of which up to about half by volume was sand and gravel (to 60 mm), the rest being woody detritus, including twig fragments, and mainly quite strongly decayed wood, amongst which there seemed to be some wood chips. Some of this material carried traces of vivianite, as seen in the whole sediment.

'Seeds' were not abundant and rather lacking in diversity, but usually well preserved. They included a range of taxa typical of neglected waste ground and land marginal to woodland or scrub or the banks of rivers: tall perennial and biennial herbs requiring some soil enrichment. Most prominent were cow parsley (*Anthriscus sylvestris*) and stinging nettle (*Urtica dioica*), but plants such as burdock (*Arctium*) and hogweed (*Heracleum sphondylium*) were also present. Other taxa suggested the presence of waterside or wetland habitats, perhaps just those obtaining along a shady ditchbank. Several taxa might have formed the 'woody' aspect to this community: elder (*Sambucus nigra*) and ash (*Fraxinus excelsior*), via seeds and seed epidermis fragments, respectively, as well as poplar/aspen (*Populus*, as bud-scales) and willow (*Salix*, buds and twig fragments).

Some taxa were certainly not part of this community: cereals (a single charred bread/club wheat grain and some poorly preserved cereals not identifiable further), fig (traces of well-preserved seeds), hemp (*Cannabis sativa*, a trace of achenes), and the dyeplant woad (*Isatis tinctoria*, a few uncharred decayed pod fragments). Altogether food remains were moderately frequent, the more abundant being the decay-resistant seeds of elder and blackberry (*Rubus fruticosus* agg.), with traces of strawberry (*Fragaria* cf. *vesca*), raspberry (*Rubus idaeus*) and hazel (*Corylus avellana*, nutshell).

The record for woad is one of a growing number for York. Remains of the plant were quite frequent in Anglo-Scandinavian deposits at 16-22 Coppergate (Kenward and Hall 1995). It has also been noted from a 12th century ash deposit at 41-9 Walmgate ('Time Team' site), from a 14th century well at 22 Piccadilly, and from a pit fill of late 14th century date at 17-21 Piccadilly ('Reynard's Garage' site). The material from the present site takes us well outside the city. It should be noted that woad, like weld (see above) is a competent weed when escaping from cultivation and the material from Lawrence Street may not have been specifically connected with dyeing.

Insect and other invertebrate remains were very abundant in the flot from the later, 5 kg, subsample, and included 657 adults of at least 221 species of beetles and bugs, as well as of the order of a thousand *Daphnia* and a similar number of ostracods. Preservation varied considerably, some remains showing substantial decay or fragmentation (E 1.5-4.0, mode 2.5 weak; F 1.0-4.0

mode 2.5 weak, comparing well with the assessment record of E 2.0-4.5, mode 3.0 weak; F 2.0-4.0, mode 2.5 weak). Diversity of the adult beetle and bug fauna was very high (alpha = 117, SE = 7), and a wide range of habitats was represented.

An exceptionally large proportion of the fauna was contributed by 'outdoor' forms: among the beetles and bugs, 53% of the species and 59% of the individuals. Aquatics were very abundant. They formed almost a quarter of the beetles and bugs (% N W = 24), and these were supplemented by immense numbers of water fleas (*Daphnia*) and ostracods. There were also appreciable numbers of midge larvae (Chironomidae), and some aquatic snails. The two most abundant beetles were *Limnebius papposus* (estimated 64 individuals) and *L. truncatellus* (51). There were also 16 *Ochthebius minimus*. These three surely lived *in situ*, unless very large quantifies of water were introduced into the barrel from elsewhere. Another likely denizen of the barrel was *Lesteva longoelytrata* (38), common in the vertical sides of concrete ponds and the like, and abundant in the Roman well at Skeldergate, York, where it surely lived in the damp conditions of the well shaft (Hall *et al.* 1980). The various *Carpelimus* species (*elongatulus*, with seven individuals, *bilineatus* with five, and *rivularis* with four) may have lived in the well during use, too, but equally may have flown from some distance away. Other aquatics were very much less abundant, and may not have bred *in situ*, perhaps representing stray arrivals. A remarkable record is the pondskater *Velia* ?*craprai*, typically found in flowing water, but sometimes, according to Southwood and Leston (1959), '...in shaded basins, troughs of clear water..', perhaps hinting like *L. longoelytrata*, at conditions in the well during use (see below). There was little to suggest aquatic vegetation, hardly surprising bearing in mind the depositional circumstances, though a specimen of *Grypus equiseti* (found on horsetails, *Equisetum arvense* and *E. palustre*, Morris 2002) is a little unexpected. It may indicate that horsetails were growing in the surrounding area.

In addition to *L. longoelytrata* there were other waterside species, although most were insects also found in accumulations of rotting matter away from water. More typical of the water's edge were Saldidae sp., (2, probably in fact the very common *Saldula saltatoria*), *Platystethus nodifrons* (1), and *Cyphon* sp. (1); so few individuals as to suggest a possible transported origin in background fauna (*sensu* Kenward 1976).

Plant feeders were represented by numerous species (at least 59), but few were at all abundant. They included 12 *Phyllotreta nemorum* group (which live on crucifers, often 'weed' species), together with *Chaetocnema concinna* (6, docks and knotgrasses), *Sitona* ?*lineatus* (4) and *S. hispidulus* (3), both usually on clovers and vetches, various *Apion* species (probably mostly with vetches and clovers as hosts), and single individuals of *Sciaphilus asperatus* (various herbs and shrubs) and *Hypera nigrirostris* (docks and their relatives), evoking a picture of herbaceous vegetation, probably stands of weeds. There were various other plant feeders with a wide range of hosts, including five individuals of the 'cuckoo-spit insect' *Philaenus spumarius*, and a few other 'froghoppers' found on herbaceous vegetation. Among these were two *Aphrodes flavostriatus*, usually found in fairly damp places. *Barypeithes* ?*areneiformis* (6) and *Tropiphorus terricola* (3) are both typically found at the roots of herbaceous vegetation, including grassland. *Phyllobius calcaratus* and *P. oblongus* are both typically found on trees and tall scrub (Morris 1997), as *S. asperatus* often is, suggesting that such vegetation existed locally. Hints of dead twigs, and thus trees or shrubs, comes from *Rhinosimus planirostris* (2), while the bark beetle *Leperisinus varius* (3) lives in the trunks of ash trees (*Fraxinus*). A plausible reconstruction is the presence of a hedge nearby, with a rich herbaceous vegetation along its fringes.

Dung beetles were fairly abundant: *Aphodius equestris* (11); *A. prodromus* (5); *A. contaminatus* and *A. sphacelatus* (3 each); *A. rufipes* (2); *A.* ?*ater*; and seven individuals of three other *Aphodius* species and single *Geotrupes* and *Onthophagus* sp. It thus seems likely that there was livestock nearby, for the numbers seem too large to represent long-travelled strays. There were numerous other species often found in foul matter, including dung, the most abundant of which were *Omalium rivulare* (14), *Anotylus tetracarinatus* (13), *A. sculpturatus* group (12), *A. rugosus* (8), and *A. nitidulus* (7). All may have lived in other habitats, however.

There were strong hints of a component brought from a building. The following are placed in the 'house fauna' category by Kenward and Hall (1995) or Carrott and Kenward (2001): *Anobium punctatum* (9); *Cryptophagus* sp. (7); *Tipnus unicolor* (6); *Lathridius minutus* group (6); *Ptinus fur* (5); *Mycetaea hirta* (4); and some rarer species. There were seven heads of the human flea *Pulex irritans*, too, and two grain weevils, *Sitophilus granarius*. A single death watch beetle, *Xestobium rufovillosum*, seems more likely to have come from a building than to have lived in the wild. Overall, it appears likely that material from within a building found its way into the well, and in the absence of any component typical of stables and byres, a source in a dwelling seems possible. *X. rufovillosum* and *T. unicolor* seem more likely to have been found in a substantial and long-lived building than in a post-and-wattle structure. It is, of course, possible that some of these 'house' insects had other sources, and in particular *A. punctatum* may have exploited structures

such as fences, or even some superstructure protecting the well.

How did the insect remains get into the well fill? Many species may have fallen in by accident, probably in flight or by crawling up any protective rim; settlement of flying insects was perhaps enhanced if there was a hedge nearby (e.g. Lewis 1965; 1969), giving increased representation of habitats over some distance. One possibility is that the well contained a 'use-phase' fauna, dominated by the more abundant water beetles and *Lesteva longoelytrata*, with small numbers of many species which entered accidentally, but that these became mixed in with dumped soil and litter from the surrounding surfaces. A proportion of the fauna may have entered with this dump, and the use-phase fauna been mixed in, a mechanism suggested for the Skeldergate well (Hall *et al.* 1980). There was little evidence that the well functioned as a 'pitfall trap', for only *Pterostichus madidus* (3; see also below), *Loricera pilicornis* (2) and *Patrobus atrorufus* (2) among the typical large ground beetle fauna were represented by more than one individual. That the aquatics and *L. longoelytrata* were better preserved than much of the remaining fauna, and thus probably autochthonous (originating *in situ*), was not obvious during assessment (Hall *et al.* 2003), but certainly *L. longoelytrata* was generally in superb condition, often with a full complement of hairs, for example. On the other hand, the house fauna component included some rather more strongly decayed fossils, suggesting transport or at least a phase of decay on the surface.

Apparently this well was set in an occupied area, but one in which semi-natural habitats had survived—therefore presumably not intensively occupied, perhaps farmland (supported by the abundant dung beetles).

*(iii) Medieval ditch fill 11095 (Phase group 5.2.7)*

A very large ditch (11055 = 11064 = 11098 = 11102) was revealed by the excavation. It ran along (and partly beyond) parts of the southern limit of the excavation and then, to the east, turned 90° to the north to run close to the eastern limit of excavation (but fully within the trench). It was examined in four separate areas which were independently recorded. In the north-east corner of the southern half of the trench a small section of the ditch was fully excavated. Here it was found to be at least 4 m wide and 1.4 m deep with quite steeply sloping sides and a gently curved base. There was some possible evidence for a recut. The earliest fills were a pale silty sand (11096) containing much gravel and with pottery of the 2nd century, then a soft, loose, coarse sand (11097) which represent the primary silting of the ditch. Above 11096 and 11097 was a deposit described in the field as a compact, dark greyish-brown, slightly clayey sandy silt (11095), containing 12th–13th century pot and tile of the 14th– 16th centuries.

The sediment sampled from Context 11095 (Sample 15) was described in the laboratory as a moist, light to mid grey-brown to mid grey-brown, brittle to crumbly (working soft), sandy clay silt, with small and medium-sized stones (6 to 60 mm). Twigs and a few land snails were present and modern roots and rootlets were noted.

The 3 and 5 kg subsamples yielded large residues of, respectively, about 750 ml and 800 ml of which in each case rather more than a third by volume was sand and gravel (to 60 mm), the rest woody fragments, especially twigs, but also some rather large 'chips' (to about 40 mm). Seeds were rather sparse but mainly well preserved. The more abundant taxa were weeds, plants of woodland or scrub habitats or foodplants, suggesting deposition of food (and perhaps other) waste into a ditch with a semi-natural vegetation of disturbed ground and, perhaps, a hedge, in the vicinity.

The remains of taxa likely to have served as food included well-preserved seeds of fig (*Ficus carica*), as well as endocarp ('core') fragments of apple (*Malus sylvestris*) and rare fruitstones of 'cherry' (*Prunus* Section *Cerasus*) and 'plum' (*P. domestica* ssp. *insititia*). The corncockle (*Agrostemma githago*) seed fragments, present here in moderate amounts, are typically found in deposits containing milled cereal foods, and thus may represent a 'sewage' component, (though cereal 'bran'—normally a good indicator for such waste—was not observed). Rare uncharred pea (*Pisum*) hila (seed-scars) and field bean (*Vicia faba*) 'tracheid bars'—material normally only recovered from the best-preserved waterlogged cess pit fills—probably also originated in this way.

The seeds of weed taxa included a large proportion representing tall-herb communities of neglected waste places, riverbanks and hedgerows—particularly cow parsley, hemlock (*Conium maculatum*), weld or dyer's rocket (*Reseda luteola*, perhaps a dyeplant, but probably no more than a weed in this context) and woundwort (*Stachys*, perhaps hedge woundwort, *S. sylvatica*). A single very well preserved specimen of caper spurge, *Euphorbia lathyris*, should probably also be counted with the 'weed' component, though it is not a native species and must at some point have been introduced to the area. For sites in York, it is recorded from seven Anglo-Scandinavian contexts at 16-22 Coppergate *fide* Kenward and Hall (1995), as well as from one 12th-13th century context in Swinegate and one ?medieval context at Layerthorpe Bridge (Hall, unpublished data). The presence of modest numbers of seeds of white bryony, *Bryonia cretica* ssp. *dioica*, in association with the caper spurge might be interpreted as evidence for the use of purgatives, but both plants may simply have been growing in the vicinity, caper

spurge as a weed and bryony probably scrambling through scrub or a hedge. Woody taxa from this deposit included ash (as bud-scales) and willow (as bud-scales and twig fragments).

Invertebrate remains were abundant in the flot, with immense numbers of fragments of immature insects (order of $10^3$) and abundant beetles and mites. At least 508 adult individuals of 188 species of beetles and bugs were recorded. Preservation was variable and some fossils were particularly rotted or fragmented (E 1.5-4.0, mode 2.5 weak; F 1.5-4.0, mode 2.5 weak, corresponding well with the record from assessment: E 2.0-4.0, mode 2.5 weak; F 2.0-3.5, mode 2.5 weak). remains of few terrestrial and freshwater snails were present. Some of the latter could be identified as far as genus (Planorbidae) but the former remained unidentified.

Many habitats were represented by the insect assemblage, and this is reflected in the high (mathematical) diversity: alpha = 108 (SE = 8). Outdoor forms were very abundant (% N OB = 36, although in this case most of the remaining fauna also probably exploited outdoor habitats), and within this category aquatics were a significant component (% N W = 9, with 46 individuals). A large proportion of the insect immatures may have been fragments of larvae and pupae of Chironomidae (midges), heads of the aquatic larvae of which were quite common, and there were also small numbers of water fleas. The most numerous water beetle was *Ochthebius minimus* (12 individuals), followed by *Limnebius truncatellus* (9), *Anacaena* ?*globulus* (5) and *Limnebius papposus* (4). These, and the rarity of other aquatics, suggest a muddy environment with restricted vegetation and perhaps impermanent water. *Tanysphyrus lemnae* (a single tentatively identified individual) feeds on duckweeds (*Lemna*), and *Prasocuris phellandrii* (1) apparently has waterside umbelliferous plants as its hosts, but there was nothing to suggest well established submerged, floating or emergent aquatic vegetation. Many of the recorded insects may have lived in litter and on mud at the edge of water, but *Lesteva longoelytrata* (26) certainly did. This beetle is common at the edge of ditches and ponds, and appears tolerant of shady conditions and disturbance. The ditch may have only held water for part of the year, or have been too shaded for the development of a rich aquatic fauna. Another factor may have been the deposition of waste, although the evidence for this is very limited (see below).

Plant-feeding insects were present in modest numbers (% NP = 13). None were abundant, although there were five *Chaetocnema concinna* (with docks, *Rumex*, and knotgrasses, *Polygonum*, as hosts), and a rich variety of *Apion* species. There were at least six kinds which were not identified closely, but were probably species found on clovers, vetches and their relatives, but also *A. aeneum* and *A. urticarium*, both as single individuals, on mallows (*Malva* and its relatives) and nettles (*Urtica*) respectively. Other plant feeders included *Phyllotreta nemorum* group (3, on crucifers), *Cidnorhinus quadrimaculatus* (3, on nettles, *Urtica*), *Phaedon tumidulus* (2, umbellifers), *Sitona lineatus* (2, probably from vetches or clovers), and *Ceutorhynchus* ?*contractus* (1, crucifers). These, and many of the other plant-associated insects, which match well the evidence from the plant remains, suggest only the vegetation of rather disturbed ground and very probably the ditch sides. However, the presence in small numbers of some species such as *Phyllobius oblongus* and *Sciaphilus asperatus* hints at a rather richer ecology, perhaps with shrubs.

Land-use in the surroundings is not clear. There were quite large numbers of dung beetles. *Aphodius prodromus* (11), the most abundant, is found in decaying vegetable matter as well as dung, but its occurrence with small numbers of *A. contaminatus* (2) and *A.* ?*ater* and *A.* ?*granarius* (both 1) perhaps just swings the balance in favour of dung. Various other species may have come from dung, but are also found in other kinds of decaying matter, whether in natural or artificial accumulations. Among these were some of the most abundant species in this assemblage: *Anotylus nitidulus* (31), *A. tetracarinatus* (24), *Omalium rivulare* (12), *Cercyon haemorrhoidalis*, *Platystethus arenarius* and *Anotylus rugosus* (all 9), *A. sculpturatus* group (8), *Acrotrichis* spp. (6 and 5), and *Omalium* ?*caesum* and *Anotylus complanatus* (both 5), and many others. Their abundance relative to *Aphodius* and other 'true' dung beetles suggests an origin in natural accumulations of rotting vegetation or waste from human activity. Species associated with decaying matter generally were abundant in the assemblage (228 individuals, % N RT = 45, a high proportion for a deposit formed in the open in semi-natural conditions). Within this component, species associated primarily with fairly dry decomposing matter were strikingly rare (% N RD = 3, 16 individuals), and those typically found in fouler matter relatively well represented (37 individuals, % N RF = 7). However, the last statistic is deceptively low, for most of the taxa listed above can be found in dung and other foul matter (their coding as 'rt' reflect their wide habitat range, a constraint to any habitat classification system). There was nothing to suggest stable manure (cf. Kenward and Hall 1997, several typical 'stable manure' species were present in ones or twos, but there was no developed community), and little evidence of waste from buildings ('house fauna', Kenward and Hall 1995; Carrott and Kenward 2001). The last of these components was represented by only a few individuals (including a human flea, *Pulex irritans*), some of which may not have originated within buildings. This component sometimes showed (subjectively) poorer preservation than most of the fauna, suggesting a more complex taphonomic history.

There was a single grain weevil, *Sitophilus granarius* and some spider beetles, *Tipnus unicolor* (4) and *Ptinus fur* (3). These are robust insects which may have survived transport or redeposition better than most 'domestic' species.

There were seven woodworm beetles, *Anobium punctatum*, and a few other wood-associated beetles. These may have come from structural timber (buildings or fences, etc) but in the present deposits are as likely to have originated in dead wood on standing trees. *Acalles turbatus* (2) is associated with dead twigs of trees and shrubs. *Leperisinus varius* (2) is a bark beetle primarily associated with ash (*Fraxinus*). While often suspected to have originated in firewood, it may in this case have come from nearby trees.

Overall, the evidence from the insects suggests a ditch with semi-permanent standing water, lacking in aquatic vegetation but with mud and litter, perhaps shaded, with herbaceous annual and perennial 'weed' vegetation and some trees and (or) scrub. There may have been livestock in the surroundings, but probably not immediately adjacent. There was little evidence of waste from human occupation or the keeping of livestock indoors, such evidence as there might be suggesting great dilution by transport before arriving in the ditch.

## Discussion

The three very disparate deposits examined subsequent to assessment yielded a wide range of plant and invertebrate remains representing in one case what appears to be debris from the malting of grain and in the other two waterlain sediment with a variety of plants and animals from natural, semi-natural and artificial habitats. That the deposits from the ditch and the barrel well have currently rather broad dating based on artefacts is not too important as any information about York's rural fringes in the medieval period is important, and it is most likely that almost all of the fauna and flora dates to the end of the range in both the features analysed here. There might be some value in obtaining AMS dates from biological remains before publication.

The two samples with waterlogged preservation give a very rare view of rural conditions in this part of York's environs. It seems likely that we are looking at a roadside settlement with farmland behind it, resembling the layout in many villages in the area until the past few decades. We know so little about the immediate surroundings of York in the medieval (or, indeed, any other) period, that it is essential that every opportunity is taken to investigate relevant material when it is exposed, ideally through intensive sampling.

Evidence from germinating grain for what is presumed to be malting for brewing has so far not been found in York from deposits of any period, though there are reports of material interpreted as coming from an Anglian malt kiln at West Heslerton (Carruthers and Hunter, unpublished) some 40 km to the NE of the city, and medieval material thought to be grain burnt during malting has been described from elsewhere in the north of England by Huntley (1999) from a site in Berwick-upon-Tweed, and by Jaques *et al.* (2001) from Bishop Wilton, rather closer to York (from a 14$^{th}$/15$^{th}$ century layer).

One feature of the two waterlogged assemblages was an apparent 'reversal' of the fauna (and to a lesser extent flora) which might have been predicted bearing in mind the nature of the features from which they came. The barrel well fill was richer in aquatic and natural/semi-natural habitat invertebrate species than the ditch fill. The same phenomenon was observed in both the assessment and main phase subsamples, so it may be safely assumed that this was not the result of a labelling error in the laboratory.

The recovery of parts of three individuals of the large ground beetle *Pterostichus madidus* from the barrel well fill is notable. There are very few fossil records of this large and distinctive ground beetle and most (but not all) of them are for the later medieval and post-medieval periods. It is now extremely common in large areas of Britain and usually (though not exclusively) found around areas strongly modified by humans. No records were made by Hall and Kenward (1990) or Kenward and Hall (1995), for example, although hundreds of archaeological samples

were analysed for insect remains. Fossils will certainly not often have been overlooked. The reason for the paucity of records is unclear, but *P. madidus* appears to have undergone a significant change in abundance. It may only recently have adapted to a synanthropic way of life. Conceivably it originated outside its present known range, although there is no evidence for this. Certainly, if as common in the past as now that it would be expected to be a frequent component of archaeological assemblages.

Altogether, these remains have offered a rare opportunity to examine the environment (and aspects of the economy) of the inhabitants of an area of the city of York well beyond the city walls.

## Archive

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

## Acknowledgements

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## *Table 1. Complete list of plant and invertebrate remains from deposits at the former D. C. Cook site, Lawrence Street, York.*

*Nomenclature and taxonomic order follow Tutin* et al. *(1964-80) for vascular plants, Smith (1978) for mosses, and Kloet and Hincks (1964-77) for insects. Plant remains are uncharred except where specifically indicated; mosses were all represented by leaf/leaves and/or shoot fragment(s). Where both secure and tentative identifications for a given invertebrate taxon were recorded, only the former are listed here. Ecological codes used in calculating statistics (Table 3) are given (they are explained in Table 5) together with the number of samples in which each taxon was recorded. * = not used in calculating assemblage statistics. The remains were of adults unless stated. 'Sp.' indicates that record was probably an additional taxon, 'sp. indet.' that the material may have been of a taxon listed above it.*

| | | |
|---|---|---|
| *Salix* sp(p). | willow | bud(s), twig epidermis fragment(s), twig fragment(s) |
| *Salix/Populus* sp(p). | willow/poplar/aspen | charcoal fragment(s) |
| *Populus* sp(p). | poplar/aspen | bud(s) and/or bud-scale(s) |
| *Corylus avellana* L. | hazel | charred roundwood fragment(s), nut(s) and/or nutshell fragment(s) |
| *Quercus* sp(p). | oak | charcoal fragment(s), charred bud and/or bud-scales |
| *Ficus carica* L. | fig | seed(s) |
| *Cannabis sativa* L. | hemp | achene(s) |
| *Urtica dioica* L. | stinging nettle | achene(s) |
| *U. urens* L. | annual nettle | achene(s) |
| *Polygonum aviculare* agg. | knotgrass | fruit(s) |
| *P. hydropiper* L. | water-pepper | charred and uncharred fruit(s) |
| *P. persicaria* L. | persicaria/red shank | charred and uncharred fruit(s) |
| *P. lapathifolium* L. | pale persicaria | fruit(s) |
| *Bilderdykia convolvulus* (L.) Dumort. | black bindweed | charred and uncharred fruit(s) |
| *Rumex acetosella* agg. | sheep's sorrel | charred and uncharred fruit(s) |
| *Rumex* sp(p). | docks | charred and uncharred fruit(s) |
| Chenopodiaceae | goosefoot family | charred seed(s) |
| *Chenopodium* Section *Pseudoblitum* | red goosefoot, etc. | seed(s) |
| *C. album* L. | fat hen | charred and uncharred seed(s) |
| *Atriplex* sp(p). | oraches | charred and uncharred seed(s) |
| *Stellaria media* (L.) Vill. | chickweed | seed(s) |
| *S.* cf. *neglecta* Weihe in Bluff & Fingerh. | ?greater chickweed | seed(s) |
| *Spergula arvensis* L. | corn spurrey | charred and uncharred seed(s) |
| *Agrostemma githago* L. | corncockle | charred seedling fragment(s); uncharred seed fragment(s) |
| *Silene* cf. *alba* (Miller) Krause in Sturm | ?white campion | charred seed(s) |
| *Ranunculus* Section *Ranunculus* | meadow/creeping/ bulbous buttercup | achene(s) |
| *R. sardous* Crantz | hairy buttercup | achene(s) |
| *R. sceleratus* L. | celery-leaved crowfoot | achene(s) |
| *R. flammula* L. | lesser spearwort | charred achene(s) |
| *Papaver argemone* L. | long prickly-headed poppy | seed(s) |
| *Isatis tinctoria* L. | woad | pod fragment(s) |
| *Brassica rapa* L. | 'turnip' | charred seed(s); uncharred seeds and seed fragment(s) |
| *Raphanus raphanistrum* L. | wild radish | pod segments and/or fragment(s) |
| *Reseda luteola* L. | weld/dyer's rocket | seed(s) |
| *Rubus idaeus* L. | raspberry | seed(s) |
| *R. fruticosus* agg. | blackberry/bramble | seed(s) |
| *Rubus/Rosa* sp(p). | blackberry, etc./rose | prickle(s) |
| *Rosa* sp(p). | roses | prickle(s) |
| *Potentilla* cf. *erecta* (L.) Räuschel | ?tormentil | achene(s) |

| | | |
|---|---|---|
| *Fragaria* cf. *vesca* L. | ?wild strawberry | achene(s) |
| cf. Pomoideae | ?hawthorn/apple/ pear/rowan etc. | twig fragment(s) |
| *Malus sylvestris* Miller | (crab) apple | endocarp, immature seed(s) |
| cf. *M. sylvestris* | | seed(s) |
| *Prunus spinosa* L. | sloe | fruitstone(s) |
| *P. domestica* ssp. *insititia* (L.) C. K. Schneider | plums, etc. | fruitstone(s) |
| *Prunus* Section *Cerasus* | cherries | fruitstone(s) |
| Leguminosae | pea family | charred cotyledon(s) and seed(s); uncharred flower(s) and/or petal(s) |
| *Vicia faba* L. | field bean | tracheid bar(s) (underneath hilum) |
| *Vicia* sp(p). | vetches, etc. | charred seed(s) |
| *Pisum sativum* L. | garden/field pea | waterlogged hilum/a |
| *Euphorbia lathyris* L. | caper spurge | seed(s) |
| *Viola* sp(p). | violets/pansies, etc. | seed(s) |
| *Bryonia cretica* ssp. *dioica* (Jacq.) Tutin | white bryony | seed(s) |
| *Anthriscus sylvestris* (L.) Hoffm. | cow parsley | mericarp(s) |
| cf. *Aegopodium podagraria* L. | ?ground elder | mericarp(s) |
| *Aethusa cynapium* L. | fool's parsley | mericarp(s) |
| *Conium maculatum* L. | hemlock | mericarp(s) |
| *Heracleum sphondylium* L. | hogweed | mericarp(s) |
| *Calluna vulgaris* (L.) Hull | heather, ling | charred root and/or basal twig fragment(s) and twig fragment(s) |
| *Fraxinus excelsior* L. | ash | bud(s) and/or bud-scale(s), seed epidermis fragment(s), seed fragment(s) and wood chips |
| *Galium aparine* L. | goosegrass, cleavers | epicarp (fruit skin) |
| cf. *Borago officinalis* L. | ?borage | nutlet(s) |
| *Myosotis* sp(p). | forget-me-nots | nutlet(s) |
| *Galeopsis* Subgenus *Galeopsis* | hemp-nettles | nutlet(s) |
| *Galeopsis* sp(p). | | charred nutlet(s) |
| *Lamium* Section *Lamiopsis* | annual dead-nettles | nutlet(s) |
| *Stachys* sp(p). | woundworts | nutlet(s) |
| *Hyoscyamus niger* L. | henbane | seed(s) |
| *Solanum nigrum* L. | black nightshade | seed(s) |
| *S. dulcamara* L. | woody nightshade | seed(s) |
| *Sambucus nigra* L. | elder | seed(s) |
| *Valerianella dentata* (L.) Pollich | narrow-fruited cornsalad | charred fruit(s) |
| *Knautia arvensis* (L.) Coulter | field scabious | fruit(s) |
| *Anthemis cotula* L. | stinking mayweed | charred and uncharred achene(s) |
| *Chrysanthemum segetum* L. | corn marigold | charred and uncharred achene(s) |
| *Arctium* sp(p). | burdocks | achene(s) |
| *Carduus/Cirsium* sp(p). | thistles | achene(s) |
| *Centaurea* cf. *cyanus* L. | ?cornflower | charred and uncharred achene(s) |
| *Centaurea* sp(p). | knapweeds, etc. | achene(s) |
| *Sonchus asper* (L.) Hill | prickly sow-thistle | achene(s) |
| *S. oleraceus* L. | sow-thistle | achene(s) |
| *Taraxacum* sp(p). | dandelions | achene(s) |
| *Lapsana communis* L. | nipplewort | achene(s) |
| *Juncus* sp(p). | rushes | seed(s) |
| *Luzula* sp(p). | woodrushes | charred seed(s) |
| Gramineae | grasses | charred caryopses and spikelet(s); uncharred caryopsis/es |
| Cerealia indet. | cereals | charred coleoptile(s) |
| *Bromus* sp(p). | bromes, etc. | charred caryopses |
| *Triticum 'aestivo-compactum'* | bread/club wheat | charred caryopses (some sprouting) |

| | | |
|---|---|---|
| *Secale cereale* L. | rye | charred caryopses |
| *Hordeum* sp(p). | barley | charred caryopses (some sprouting); charred rachis fragment(s) |
| *Avena sativa* L. | cultivated oat | charred spikelet(s)/spikelet fragment(s), some sprouting |
| *Avena* sp(p). | oats | charred awn fragment(s), caryopses (some sprouting), chaff |
| *Carex* sp(p). | sedges | charred nutlet(s) |

*Thuidium* sp(p).
cf. *Drepanocladus* sp(p).
*Homalothecium sericeum* (Hedw.) Br. Eur./*H. lutescens* (Hedw.) Robins.
*Eurhynchium praelongum* (Hedw.) Br. Eur.
*Eurhynchium* sp(p).

| | |
|---|---|
| **Annelida-Oligochaeta** | |
| *Oligochaeta sp. (egg capsule) | u |
| **Crustacea** | |
| **Daphnia* sp. (ephippium) | oa-w |
| *Cladocera sp. F (ephippium) | oa-w |
| *Ostracoda sp. | u |
| **Insecta** | |
| **Dermaptera** | |
| **Forficula auricularia* Linnaeus | u |
| *Dermaptera sp. | u |
| **Hemiptera** | |
| *Scolopostethus* sp. | oa-p |
| *Anthocoris* sp. | oa-p |
| Cimicidae sp. | oa-p |
| Miridae sp. | oa-p |
| *Saldula ?saltatoria* (Linnaeus) | oa-d |
| Saldidae sp. indet. | oa-d |
| *Velia ?caprai* Tamanini | oa-w |
| *Heteroptera sp. (nymph) | u |
| *Aphrophora alni* (Fallen) | oa-p |
| *Philaenus spumarius* (Linnaeus) | oa-p |
| *Aphrodes bicinctus* (Schrank) | oa-p |
| *Aphrodes flavostriatus* (Donovan) | oa-p-d |
| *Aphrodes* sp. | oa-p |
| Cicadellidae spp. | oa-p |
| *Cixius* sp. | oa-p |
| Delphacidae spp. | oa-p |
| *Auchenorhyncha sp. indet. (nymph) | oa-p |
| *Psylloidea sp. (nymph) | oa-p |
| *Aphidoidea sp. | u |
| **Trichoptera** | |
| *Trichoptera sp. | oa-w |
| **Diptera** | |
| *Bibionidae sp. | u |
| *Chironomidae sp. (larva) | w |
| *Diptera sp. (adult) | u |
| *Diptera sp. (puparium) | u |
| **Siphonaptera** | |
| **Pulex irritans* Linnaeus | ss |
| **Coleoptera** | |
| *Notiophilus* sp. | oa |
| *Loricera pilicornis* (Fabricius) | oa |
| *Dyschirius globosus* (Herbst) | oa |
| *Patrobus atrorufus* (Strom) | oa |
| *Trechus quadristriatus* (Schrank) | oa |
| *Trechus micros* (Herbst) | u |
| *Bembidion biguttatum* (Fabricius) | oa-d |
| *Bembidion guttula* or *mannerheimi* | oa |
| *Bembidion* (*Philochthus*) sp. indet. | oa |
| *Bembidion* sp. | oa |
| *Stomis pumicatus* (Panzer) | oa |
| *Pterostichus madidus* (Fabricius) | ob-st |
| *Pterostichus melanarius* (Illiger) | ob |
| *Pterostichus ?strenuus* (Panzer) | oa |
| *Pterostichus* (*Poecilus*) sp. | oa |
| *Agonum dorsale* (Pontoppidan) | oa |
| *Agonum* (*Europhilus*) sp. | oa |
| *Amara* spp. | oa |
| *Harpalus* sp. | oa |
| *Dromius linearis* (Olivier) | oa |
| *Dromius quadrimaculatus* (Linnaeus) | oa |
| Carabidae sp. | ob |
| *Haliplus* sp. | oa-w |
| *Hydroporus* spp. | oa-w |
| *Agabus bipustulatus* (Linnaeus) | oa-w |
| *Agabus* sp. | oa-w |
| *Colymbetes fuscus* (Linnaeus) | oa-w |
| *Helophorus grandis* Illiger | oa-w |
| *Helophorus porculus* or *rufipes* | oa |
| *Helophorus* spp. | oa-w |
| *Sphaeridium* sp. | rf |
| *Cercyon analis* (Paykull) | rt-sf |
| *Cercyon atomarius* (Fabricius) | rt |
| *Cercyon atricapillus* (Marsham) | rf-st |
| *Cercyon haemorrhoidalis* (Fabricius) | rf-sf |
| *Cercyon melanocephalus* (Linnaeus) | rt-sf |
| *Megasternum obscurum* (Marsham) | rt |
| *Cryptopleurum minutum* (Fabricius) | rf-st |
| *Hydrobius fuscipes* (Linnaeus) | oa-w |
| *Anacaena ?globulus* (Paykull) | oa-w |

| | |
|---|---|
| *Anacaena* sp. indet. | oa-w |
| Histerinae sp. | rt |
| *Ochthebius minimus* (Fabricius) | oa-w |
| *Ochthebius* sp. | oa-w |
| *Hydraena* sp. | oa-w |
| *Limnebius papposus* Mulsant | oa-w |
| *Limnebius truncatellus* (Thunberg) | oa-w |
| *Ptenidium* sp. | rt |
| *Acrotrichis* spp. | rt |
| *Nargus anisotomoides* (Spence) | u |
| *Sciodrepoides* sp. | u |
| *Catops* sp. | u |
| *Colon* sp. | u |
| *Silpha atrata* Linnaeus | u |
| Scydmaenidae sp. | u |
| *Micropeplus porcatus* (Paykull) | rt |
| *Micropeplus staphylinoides* (Marsham) | rt |
| *Metopsia retusa* (Stephens) | u |
| *Megarthrus depressus* (Paykull) | rt-sf |
| *Megarthrus ?sinuatocollis* (B. & L.) | rt-sf |
| *Megarthrus* sp. indet. | rt |
| *Proteinus* spp. | rt |
| *Anthobium atrocephalum* (Gyllenhal) | oa |
| *Anthobium unicolor* (Marsham) | oa |
| *Acidota cruentata* Mannerheim | oa |
| *Lesteva ?heeri* Fauvel | oa-d |
| *Lesteva longoelytrata* (Goeze) | oa-d |
| *Eusphalerum* sp. | rt |
| *Phyllodrepa floralis* (Paykull) | rt-sf |
| *Acrolocha sulcula* (Stephens) | rt |
| *Omalium ?allardi* Fairmaire & Brisout | rt |
| *Omalium ?caesum* Gravenhorst | rt-sf |
| *Omalium excavatum* Stephens | rt-sf |
| *Omalium rivulare* (Paykull) | rt-sf |
| *Omalium* sp. | rt |
| *Xylodromus ?concinnus* (Marsham) | rt-st |
| *?Coryphium angusticolle* Stephens | u |
| Omaliinae sp. | rt |
| *Coprophilus striatulus* (Fabricius) | rt-st |
| *Carpelimus bilineatus* Stephens | rt-sf |
| *Carpelimus elongatulus* (Erichson) | oa-d |
| *Carpelimus rivularis* (Motschulsky) | ob-d |
| *Carpelimus* sp. | u |
| *Aploderus caelatus* (Gravenhorst) | rt |
| *Platystethus arenarius* (Fourcroy) | rf |
| *Platystethus nodifrons* (Mannerheim) | oa-d |
| *Anotylus complanatus* (Erichson) | rt-sf |
| *Anotylus inustus* (Gravenhorst) | rt |
| *Anotylus nitidulus* (Gravenhorst) | rt |
| *Anotylus rugosus* (Fabricius) | rt |
| *Anotylus sculpturatus* group | rt |
| *Anotylus tetracarinatus* (Block) | rt |
| *Oxytelus laqueatus* (Marsham) | rf |
| *Oxytelus sculptus* Gravenhorst | rt-st |
| *Stenus* spp. | u |
| *Lathrobium* spp. | u |
| *Lithocharis ochracea* (Gravenhorst) | rt-st |
| *Rugilus* sp. | rt |
| Paederinae sp. | u |
| *Leptacinus ?pusillus* (Stephens) | rt-st |
| *Gyrohypnus fracticornis* (Muller) | rt-st |
| *Xantholinus linearis* (Olivier) | rt-sf |
| *Xantholinus* sp. indet. | u |
| *Neobisnius* sp. | u |
| *Philonthus* spp. | u |
| *Gabrius* sp. | rt |
| *Philonthus* or *Gabrius* sp. | u |
| *Staphylinus* sp. | u |
| *Quedius* spp. | u |
| *Tachyporus hypnorum* (Fabricius) | u |
| *Tachyporus obtusus* (Linnaeus) | u |
| *Tachyporus* spp. | u |
| *Tachinus laticollis* Gravenhorst | u |
| *Tachinus marginellus* (Fabricius) | u |
| *Tachinus signatus* Gravenhorst | u |
| *Tachinus* sp. | u |
| *Cypha* sp. | rt |
| *Cordalia obscura* (Gravenhorst) | rt-sf |
| *Falagria caesa* or *sulcatula* | rt-sf |
| *Aleochara* sp. | u |
| Aleocharinae spp. | u |
| Pselaphidae spp. | u |
| *Geotrupes* sp. | oa-rf |
| *Aphodius ?ater* (Degeer) | oa-rf |
| *Aphodius contaminatus* (Herbst) | oa-rf |
| *Aphodius equestris* (Panzer) | oa-rf |
| *Aphodius ?granarius* (Linnaeus) | ob-rf |
| *Aphodius prodromus* (Brahm) | ob-rf |
| *Aphodius rufipes* (Linnaeus) | oa-rf |
| *Aphodius sphacelatus* (Panzer) | oa-rf |
| *Aphodius* spp. | ob-rf |
| *Onthophagus* sp. | oa-rf |
| *Phyllopertha horticola* (Linnaeus) | oa-p |
| *Clambus ?pubescens* Redtenbacher | rt-sf |
| *Clambus* sp. | rt-sf |
| *Cyphon* sp. | oa-d |
| *Simplocaria ?semistriata* (Fabricius) | oa-p |
| *Dryops* sp. | oa-d |
| *Melanotus ?erythropus* (Gmelin) | l |
| *Athous ?hirtus* (Herbst) | oa-p |
| *Agriotes* sp. | oa-p |
| *Adrastus ?pallens* (Fabricius) | oa-p |
| *Cantharis* sp. | ob |
| *Rhagonycha* sp. | ob |
| *Grynobius planus* (Fabricius) | l |
| *Xestobium rufovillosum* (Degeer) | l-st |
| *Anobium punctatum* (Degeer) | l-sf |
| *Ptilinus pectinicornis* (Linnaeus) | l-sf |
| *Tipnus unicolor* (Piller & Mitterpacher) | rt-ss |
| *Ptinus fur* (Linnaeus) | rd-sf |
| *Malachius ?aeneus* (Linnaeus) | u |
| *Brachypterus* sp. | oa-p |
| *Meligethes* sp. | oa-p |
| *Rhizophagus* sp. | u |
| *Monotoma longicollis* (Gyllenhall) | rt-st |
| *Cryptophagus scutellatus* Newman | rd-st |
| *Cryptophagus* sp. | rd-sf |
| *Atomaria* spp. | rd |

| | |
|---|---|
| *?Ephistemus globulus* (Paykull) | rd-sf |
| *Oulibrus* sp. | oa-p |
| Phalacridae sp. indet. | oa-p |
| *Orthoperus* sp. | rt |
| *Mycetaea hirta* (Marsham) | rd-ss |
| *Stephostethus angusticollis* (Gyllenhal) | rt-st |
| *Stephostethus lardarius* (Degeer) | rt-st |
| *Lathridius minutus* group | rd-st |
| *Enicmus* sp. | rt-sf |
| *Dienerella* sp. | rd-sf |
| *Corticaria ?elongata* (Gyllenhal) | rt-sf |
| *Corticaria* spp. | rt-sf |
| *Corticarina* sp. | rt |
| *Cortinicara gibbosa* (Herbst) | rt |
| *Corticarina* or *Cortinicara* sp. indet. | rt |
| *Aglenus brunneus* (Gyllenhal) | rt-ss |
| *Rhinosimus planirostris* (Fabricius) | l |
| *Bruchus* sp. | u |
| Donaciinae sp. | oa-d-p |
| *?Lema cyanella* (Linnaeus) | oa-p |
| *Phaedon tumidulus* (Germar) | oa-p |
| *Prasocuris phellandrii* (Linnaeus) | oa-p-d |
| Chrysomelinae sp. | oa-p |
| *Phyllotreta nemorum* group | oa-p |
| *Phyllotreta* spp. | oa-p |
| *Longitarsus* spp. | oa-p |
| *?Altica* sp. | oa-p |
| *Chalcoides* sp. | oa-p |
| *Chaetocnema arida* group | oa-p |
| *Chaetocnema concinna* (Marsham) | oa-p |
| Halticinae sp. | oa-p |
| *Cassida* sp. | oa-p |
| *Apion (Aspidapion) aeneum* (Fabricius) | oa-p |
| *Apion (Taenapion) urticarium* (Herbst) | oa-p |
| *Apion* spp. | oa-p |
| *Phyllobius calcaratus* (Fabricius) | oa-p |
| *Phyllobius oblongus* (Linnaeus) | oa-p |
| *Phyllobius* or *Polydrusus* spp. | oa-p |
| *Barypeithes ?areneiformis* (Schrank) | oa-p |
| *Sciaphilus asperatus* (Bonsdorff) | oa-p |
| *?Strophosomus* sp. | oa-p |
| *Tropiphorus terricola* (Newman) | oa |
| *Sitona hispidulus* (Fabricius) | oa-p |
| *Sitona lineatus* (Linnaeus) | oa-p |
| *Sitona ?sulcifrons* (Thunberg) | oa-p |
| *Sitona* sp. indet. | oa-p |
| *Hypera nigrirostris* (Fabricius) | oa-p |
| *Leiosoma ?deflexum* (Panzer) | oa-p |
| *?Tanysphyrus lemnae* (Paykull) | oa-w-p |
| *Sitophilus granarius* (Linnaeus) | g-ss |
| *Acalles turbatus* Boheman | u |
| *Acalles* sp. indet. | u |
| *Grypus equiseti* (Fabricius) | oa-p |
| *Cidnorhinus quadrimaculatus* (Linnaeus) | oa-p |
| *Ceutorhynchus ?contractus* (Marsham) | oa-p |
| *Ceutorhynchus* spp. | oa-p |
| *Rhinoncus* sp. | oa-p |
| Ceuthorhynchinae sp. | oa-p |
| Curculionidae spp. | oa |
| *Leperisinus varius* (Fabricius) | l |
| Coleoptera sp. | u |
| *Coleoptera sp. (larva) | u |
| **Hymenoptera** | |
| *Proctotrupoidea sp. | u |
| *Chalcidoidea sp. | u |
| *Hymenoptera Parasitica sp. | u |
| *Formicidae sp. | u |
| **?Apis mellifera* Linnaeus | u |
| *Hymenoptera sp. | u |
| *Insecta sp. (immature) | u |
| *Insecta sp. (immature) | u |
| *Insecta sp. (larval case) | u |
| **Arachnida** | |
| *Aranae sp. | u |
| *Acarina sp. | u |
| **Mollusca** | |
| *Planorbidae sp. | f |
| *Gastropoda sp. | u |

*Table 2. Lists of plant remains and other taxa recorded from deposits at the former D. C. Cook site, Lawrence Street, York. For samples with two subsamples, the lists have been compounded. Records are listed in order of abundance (more frequent first) then alphabetically, with materials other than identified plants remains listed at the end.*

*Abbreviations: b—buds; b/bs—buds/bud-scales; ch—charred; endo—endocarp; fgts—fragments; imm—immature; inc—including; rt/tw—root/basal twig; s—seed; segs—segments; s epid—seed epidermis; sf—seed fragments; spklts—spikelets; spr—sprouting grains; tef—twig epidermis fragments; tw—twig; v dec—very decayed.*

**Context 11018, Sample 12/T+T2**

| | | |
|---|---|---|
| Avena sp(p). (inc spr) | 2 | |
| Calluna vulgaris (ch rt/tw fgts) | 2 | max 15 mm |
| Hordeum sp(p). (inc spr) | 2 | |
| Leguminosae | 2 | max 2 mm |
| Quercus sp(p). (charcoal) | 2 | max 25 mm |
| Rumex acetosella agg. (ch) | 2 | |
| Spergula arvensis (ch) | 2 | |
| Agrostemma githago (ch seedling fgts) | 1 | |
| Anthemis cotula (ch) | 1 | |
| Atriplex sp(p). (ch) | 1 | |
| Avena sativa (spklts/fgts) | 1 | |
| Avena sp(p). (awn fgts) | 1 | |
| Avena sp(p). (chaff) | 1 | |
| Bilderdykia convolvulus (ch) | 1 | |
| Brassica rapa (ch) | 1 | |
| Bromus sp(p). | 1 | |
| Carex sp(p). (ch) | 1 | |
| Centaurea cf. cyanus (ch) | 1 | inc fgts |
| Cerealia indet. (cole) | 1 | |
| Chenopodiaceae (ch) | 1 | |
| Chenopodium album (ch) | 1 | |
| Chrysanthemum segetum (ch) | 1 | |
| Galeopsis sp(p). (ch) | 1 | |
| Gramineae (ch spklts) | 1 | |
| Gramineae (ch) | 1 | small type(s) |
| Leguminosae (ch cot) | 1 | max 5 mm |
| Luzula sp(p). (ch) | 1 | |
| Polygonum hydropiper (ch) | 1 | |
| Polygonum persicaria (ch) | 1 | |
| Rumex sp(p). (ch) | 1 | |
| Salix/Populus sp(p). (charcoal) | 1 | max 10 mm |
| Sambucus nigra | 1 | ?modern |
| Secale cereale | 1 | |
| Silene cf. alba (ch) | 1 | |
| Triticum aestivo-compactum (inc spr) | 1 | |
| Valerianella dentata (ch) | 1 | |
| Vicia sp(p). | 1 | max 2 mm |
| amphibian bone | 1 | |
| bark fgts (ch) | 1 | max 10 mm |
| bone fgts | 1 | max 5 mm |
| burnt bone fgts | 1 | max 4 mm |
| burnt fish bone | 1 | max 15 mm |
| charcoal | 2 | max 25 mm |
| coal | 1 | max 2 mm |
| fish scale | 1 | max 2 mm |
| herbaceous detritus (ch) | 1 | max 5 mm |
| ?peat fgts (ch) | 1 | max 5 mm |
| root/rhizome fgts (ch) | 1 | max 5 mm |
| root/rootlet fgts (modern) | 1 | |
| small mammal bone | 1 | |
| twig fgts (ch) | 1 | max 5 mm |

**Context 11023, Sample 11/T+T2**

| | | |
|---|---|---|
| Anthriscus sylvestris | 2 | |
| Rubus fruticosus agg. | 2 | |
| Rumex sp(p). | 2 | |
| Salix sp(p). (b) | 2 | |
| Sambucus nigra | 2 | inc fgts |
| Stachys sp(p). | 2 | |
| Urtica dioica | 2 | |
| Aethusa cynapium | 1 | |
| Arctium sp(p). | 1 | |
| Atriplex sp(p). | 1 | |
| Avena sp(p). | 1 | |
| Bilderdykia convolvulus | 1 | |
| cf. Borago officinalis | 1 | |
| Bryonia cretica ssp. dioica | 1 | |
| Cannabis sativa | 1 | |
| Carduus/Cirsium sp(p). | 1 | |
| Chenopodium album | 1 | |
| Chenopodium album (ch) | 1 | |
| Chrysanthemum segetum | 1 | |
| Corylus avellana | 1 | |
| Eurhynchium praelongum | 1 | |
| Eurhynchium sp(p). | 1 | |
| Ficus carica | 1 | |
| Fragaria cf. vesca | 1 | |
| Fraxinus excelsior (s epid fgts) | 1 | |
| Fraxinus excelsior (wood chips) | 1 | max 10 mm |
| Galeopsis Subgenus Galeopsis | 1 | |
| Galium aparine (epicarp) | 1 | |
| Heracleum sphondylium | 1 | fgt(s) only |
| Homalothecium sericeum/ lutescens | 1 | |
| Hordeum sp(p). (rachis fgts) | 1 | a single specimen |
| Hyoscyamus niger | 1 | |
| Isatis tinctoria (pod fgts) | 1 | |
| Juncus sp(p). | 1 | |
| Lamium Section Lamiopsis | 1 | |
| Lapsana communis | 1 | |
| Leguminosae | 1 | |
| Leguminosae (fls/pet) | 1 | |
| cf. Malus sylvestris | 1 | |

| | | |
|---|---|---|
| Polygonum aviculare agg. | 1 | |
| Polygonum lapathifolium | 1 | |
| Polygonum persicaria | 1 | |
| Populus sp(p). (b/bs) | 1 | |
| Potentilla cf. erecta | 1 | |
| Prunus spinosa | 1 | inc fgts |
| Quercus sp(p). (ch b/bs) | 1 | |
| Ranunculus Section Ranunculus | 1 | |
| Ranunculus flammula (ch) | 1 | |
| Raphanus raphanistrum (pod segs/fgts) | 1 | |
| Rosa sp(p). (prickles) | 1 | |
| Rubus idaeus | 1 | a single fgt |
| Rubus/Rosa sp(p). (prickles) | 1 | |
| Rumex acetosella agg. | 1 | |
| Salix sp(p). (tef) | 1 | |
| Salix sp(p). (tw fgts) | 1 | max 5 mm |
| Solanum dulcamara | 1 | |
| Solanum dulcamara | 1 | |
| Sonchus asper | 1 | |
| Sonchus oleraceus | 1 | |
| Spergula arvensis | 1 | |
| Stellaria media | 1 | |
| Taraxacum sp(p). | 1 | |
| Triticum aestivo-compactum | 1 | |
| Urtica urens | 1 | |
| Viola sp(p). | 1 | subglobose type |
| | | |
| sand | 3 | |
| wood fgts | 3 | v dec, max 30 mm |
| bark fgts | 2 | max 10 mm |
| beetles | 2 | |
| charcoal | 2 | max 20 mm |
| Daphnia (ephippia) | 2 | |
| earthworm egg caps | 2 | |
| gravel | 2 | max 60 mm |
| leaf abscission pads | 2 | |
| ostracods | 2 | |
| twig fgts | 2 | max 30 mm |
| amphibian bone | 1 | |
| bone fgts | 1 | max 25 mm |
| brick/tile | 1 | max 10 mm |
| burnt fish bone | 1 | max 5 mm |
| cinders | 1 | max 5 mm |
| coal | 1 | max 5 mm |
| coal 'char' | 1 | max 10 mm |
| dicot stem fgts | 1 | |
| fly puparia | 1 | |
| mites | 1 | |
| Pisidium sp(p). (valves) | 1 | |
| planorbid snails | 1 | |
| planorbid snails | 1 | |
| root/rootlet fgts | 1 | |
| Rosellinia cf. mammiformis | 1 | |
| snails | 1 | |
| twig fgts (ch) | 1 | max 45 mm |
| wood chips | 1 | max 10 mm |

**Context 11040, Sample 13/T**

| | | |
|---|---|---|
| Avena sp(p). (inc spr) | 1 | |
| Hordeum sp(p). | 1 | |
| calcareous concretions | 1 | max 2 mm |
| cf. Calluna vulgaris (ch rt/tw fgts) | 1 | max 5 mm |
| charcoal | 1 | max 10 mm |

**Context 11046, Sample 14/T**

| | | |
|---|---|---|
| Corylus avellana (ch roundwood) | 2 | max 15 mm |
| Calluna vulgaris (ch rt/tw fgts) | 2 | max 20 mm |
| Anthemis cotula (ch) | 1 | |
| Avena sativa (spklts/fgts inc spr) | 1 | |
| Brassica rapa (ch) | 1 | |
| Calluna vulgaris (ch tw fgts) | 1 | max 5 mm |
| Carex sp(p). (ch) | 1 | |
| Hordeum sp(p). (inc spr) | 1 | |
| Quercus sp(p). (charcoal) | 1 | max 10 mm |
| Salix/Populus sp(p). (charcoal) | 1 | max 10 mm |
| Sambucus nigra | 1 | inc part-charred ('toasted') specimens |
| Triticum aestivo-compactum | 1 | |
| | | |
| charcoal | 2 | max 15 mm |
| bark fgts (ch) | 1 | max 5 mm |
| burnt fish bone | 1 | max 5 mm |
| fish bone | 1 | max 15 mm |
| herbaceous detritus (ch) | 1 | |
| ?peat/mor humus | 1 | max 5 mm |
| root/rhizome fgts (ch) | 1 | max 5 mm |
| root/rootlet fgts (modern) | 1 | |

**Context 11095, Sample 15/T+T2**

| | | |
|---|---|---|
| Urtica dioica | 3 | |
| Agrostemma githago (sf) | 2 | |
| Anthriscus sylvestris | 2 | |
| Bryonia cretica ssp. dioica | 2 | |
| Centaurea cf. cyanus | 2 | |
| Centaurea sp(p). | 2 | inc fgts |
| Ficus carica | 2 | |
| Malus sylvestris (endo) | 2 | |
| cf. Pomoideae (tw fgts) | 2 | |
| Reseda luteola | 2 | inc fgts |
| Rubus fruticosus agg. | 2 | |
| Sambucus nigra | 2 | inc fgts |
| Stachys sp(p). | 2 | |
| Stellaria media | 2 | |
| cf. Aegopodium podagraria | 1 | |
| Anthemis cotula | 1 | |
| Arctium sp(p). | 1 | |
| Atriplex sp(p). | 1 | |
| Brassica rapa | 1 | inc fgts |

| | | |
|---|---|---|
| Carduus/Cirsium sp(p). | 1 | |
| Chenopodium Section Pseudoblitum | 1 | |
| Chenopodium album | 1 | |
| Chrysanthemum segetum | 1 | inc fgts |
| Conium maculatum | 1 | |
| cf. Drepanocladus sp(p). | 1 | |
| Euphorbia lathyris | 1 | |
| Fraxinus excelsior (b/bs) | 1 | |
| Fraxinus excelsior (sf) | 1 | |
| Fraxinus excelsior (wood chips) | 1 | max 40 mm |
| Galeopsis Subgenus Galeopsis | 1 | |
| Galium aparine (epicarp) | 1 | |
| Gramineae | 1 | |
| Knautia arvensis | 1 | |
| Lamium Section Lamiopsis | 1 | |
| Lapsana communis | 1 | |
| Malus sylvestris (imm s) | 1 | |
| Myosotis sp(p). | 1 | |
| Papaver argemone | 1 | |
| Pisum sativum (hila) | 1 | |
| Polygonum aviculare agg. | 1 | |
| Polygonum hydropiper | 1 | |
| Polygonum persicaria | 1 | |
| Prunus Section Cerasus | 1 | |
| Prunus domestica ssp. insititia | 1 | a single specimen |
| Prunus spinosa | 1 | fgts only |
| Ranunculus Section Ranunculus | 1 | |
| Ranunculus sardous | 1 | |
| Ranunculus sceleratus | 1 | |
| Raphanus raphanistrum (pod segs/fgts) | 1 | |
| Rosa sp(p). (prickles) | 1 | |
| Rubus/Rosa sp(p). (prickles) | 1 | |
| Rumex acetosella agg. | 1 | |
| Rumex sp(p). | 1 | |
| Salix sp(p). (b) | 1 | |
| Salix sp(p). (tw fgts) | 1 | max 5 mm |
| Solanum nigrum | 1 | |
| Sonchus asper | 1 | |
| Sonchus oleraceus | 1 | |
| Stellaria cf. neglecta | 1 | |
| Thuidium sp(p). | 1 | |
| Urtica urens | 1 | |
| Vicia faba (tracheid bars) | 1 | |
| root/rootlet fgts | 3 | |
| twig fgts | 3 | max 30 mm |
| wood fgts | 3 | max 25 mm |
| beetles | 2 | |
| gravel | 2 | max 60 mm |
| leaf abscission pads | 2 | |
| sand | 2 | |
| bark fgts | 1 | max 30 mm |
| bone fgts | 1 | max 50 mm |
| brick/tile | 1 | max 10 mm |
| caddis larva cases | 1 | |
| charcoal | 1 | max 10 mm |
| earthworm egg caps | 1 | |
| fly puparia | 1 | |
| Helix aspersa | 1 | fgts only |
| mites | 1 | |
| Pisidium sp(p). (valves) | 1 | |
| planorbid snails | 1 | |
| sclereids (from bark) | 1 | |
| snail shell fgts | 1 | |
| snails | 1 | |
| wood chips | 1 | max 40 mm |
| woody root fgts | 1 | |

*Table 3. Main statistics for assemblages of adult beetles and bugs (excluding aphids and scale insects) from samples from the D. C. Cook site, Lawrence Street, York. For explanation of abbreviations, see Table 5.*

| **Context** | **11023** | **11095** | **Whole site** | **Context** | **11023** | **11095** | **Whole site** |
|---|---|---|---|---|---|---|---|
| Sample | 11 | 15 | | Sample | 11 | 15 | |
| Ext | /T2 | /T2 | | Ext | /T2 | /T2 | |
| S | 221 | 188 | 305 | NRD | 29 | 16 | 45 |
| N | 657 | 508 | 1165 | PNRD | 4 | 3 | 4 |
| ALPHA | 117 | 108 | 134 | ALPHARD | 4 | 0 | 9 |
| SEALPHA | 7 | 8 | 6 | SEALPHARD | 1 | 0 | 2 |
| SOB | 117 | 91 | 155 | SRF | 15 | 10 | 25 |
| PSOB | 53 | 48 | 51 | PSRF | 7 | 5 | 8 |
| NOB | 389 | 185 | 574 | NRF | 40 | 37 | 77 |
| PNOB | 59 | 36 | 49 | PNRF | 6 | 7 | 7 |
| ALPHAOB | 57 | 71 | 70 | ALPHARF | 9 | 5 | 13 |
| SEALPHAOB | 5 | 9 | 5 | SEALPHARF | 2 | 1 | 2 |
| SW | 14 | 15 | 20 | SSA | 31 | 37 | 52 |
| PSW | 6 | 8 | 7 | PSSA | 14 | 20 | 17 |
| NW | 155 | 46 | 201 | NSA | 86 | 99 | 185 |
| PNW | 24 | 9 | 17 | PNSA | 13 | 19 | 16 |
| ALPHAW | 4 | 8 | 6 | ALPHASA | 18 | 22 | 24 |
| SEALPHAW | 1 | 2 | 1 | SEALPHASA | 3 | 4 | 3 |
| SD | 10 | 8 | 14 | SSF | 19 | 23 | 32 |
| PSD | 5 | 4 | 5 | PSSF | 9 | 12 | 10 |
| ND | 59 | 37 | 96 | NSF | 56 | 76 | 132 |
| PND | 9 | 7 | 8 | PNSF | 9 | 15 | 11 |
| ALPHAD | 4 | 3 | 5 | ALPHASF | 10 | 11 | 14 |
| SEALPHAD | 1 | 1 | 1 | SEALPHASF | 2 | 2 | 2 |
| SP | 59 | 47 | 78 | SST | 8 | 11 | 16 |
| PSP | 27 | 25 | 26 | PSST | 4 | 6 | 5 |
| NP | 108 | 68 | 176 | NST | 17 | 14 | 31 |
| PNP | 16 | 13 | 15 | PNST | 3 | 3 | 3 |
| ALPHAP | 53 | 67 | 54 | ALPHAST | 0 | 0 | 14 |
| SEALPHAP | 9 | 16 | 7 | SEALPHAST | 0 | 0 | 4 |
| SM | 0 | 0 | 0 | SSS | 4 | 3 | 4 |
| PSM | 0 | 0 | 0 | PSSS | 2 | 2 | 1 |
| NM | 0 | 0 | 0 | NSS | 13 | 9 | 22 |
| PNM | 0 | 0 | 0 | PNSS | 2 | 2 | 2 |
| ALPHAM | 0 | 0 | 0 | ALPHASS | 0 | 0 | 2 |
| SEALPHAM | 0 | 0 | 0 | SEALPHASS | 0 | 0 | 1 |
| SL | 6 | 4 | 7 | SG | 1 | 1 | 1 |
| PSL | 3 | 2 | 2 | PSG | 0 | 1 | 0 |
| NL | 17 | 11 | 28 | NG | 2 | 1 | 3 |
| PNL | 3 | 2 | 2 | PNG | 0 | 0 | 0 |
| ALPHAL | 0 | 0 | 3 | ALPHAG | 0 | 0 | 0 |
| SEALPHAL | 0 | 0 | 1 | SEALPHAG | 0 | 0 | 0 |
| SRT | 62 | 63 | 109 | | | | |
| PSRT | 28 | 34 | 36 | | | | |
| NRT | 188 | 228 | 416 | | | | |
| PNRT | 29 | 45 | 36 | | | | |
| ALPHART | 32 | 29 | 48 | | | | |
| SEALPHART | 4 | 3 | 4 | | | | |
| SRD | 8 | 8 | 16 | | | | |
| PSRD | 4 | 4 | 5 | | | | |

## *Table 4. Species lists in rank order for invertebrate macrofossils from samples from the D. C. Cook site, Lawrence Street, York.*

For each sample assemblage the adult Hemiptera (bugs) and Coleoptera (beetles) are listed first, followed by the remaining invertebrates. Headers: weight is in kilogrammes; E - erosion; F - fragmentation (following Kenward and Large 1998); ec - ecological codes; n = minimum number of individuals; SQ = semi-quantitative (e = estimate; - = fully quantitative, m = 'many', translated as 15 individuals; s = several, translated as 6). For translation of ecological codes, see Table 5. Note: it has not been practical to italicise specific epithets in this table.

**Context: 11023 Sample: 11/T2** ReM: D
Weight: 5.00 E: 2.50 F: 2.50

Notes: Entered HK 15/1/04. Flot 1 cm in plastic jar. Recorded in meths and on filter paper. Some remains notably rotted or fragmented. E 1.50-4.0, mode 2.5 weak; F 1.0-4.0 mode 2.5 weak.

| | n | SQ | ec |
|---|---|---|---|
| Limnebius papposus | 64 | - | oa-w |
| Limnebius truncatellus | 51 | - | oa-w |
| Lesteva longoelytrata | 38 | - | oa-d |
| Ochthebius minimus | 16 | - | oa-w |
| Omalium rivulare | 14 | - | rt-sf |
| Anotylus tetracarinatus | 13 | - | rt |
| Aleocharinae sp. F | 13 | - | u |
| Anotylus sculpturatus group | 12 | - | rt |
| Aleocharinae sp. C | 12 | - | u |
| Phyllotreta nemorum group | 12 | - | oa-p |
| Aphodius equestris | 11 | - | oa-rf |
| Anobium punctatum | 9 | - | l-sf |
| Anotylus rugosus | 8 | - | rt |
| Aleocharinae sp. D | 8 | - | u |
| Acrotrichis sp. B | 7 | - | rt |
| Carpelimus elongatulus | 7 | - | oa-d |
| Anotylus nitidulus | 7 | - | rt |
| Cryptophagus sp. | 7 | - | rd-sf |
| Corticarina or Cortinicara sp. | 7 | - | rt |
| Tipnus unicolor | 6 | - | rt-ss |
| Lathridius minutus group | 6 | - | rd-st |
| Chaetocnema concinna | 6 | - | oa-p |
| Barypeithes ?areneiformis | 6 | - | oa-p |
| Philaenus spumarius | 5 | - | oa-p |
| Carpelimus bilineatus | 5 | - | rt-sf |
| Aphodius prodromus | 5 | - | ob-rf |
| Aphodius sp. A | 5 | - | ob-rf |
| Ptinus fur | 5 | - | rd-sf |
| Helophorus sp. A | 4 | - | oa-w |
| Carpelimus rivularis | 4 | - | ob-d |
| Mycetaea hirta | 4 | - | rd-ss |
| Sitona ?lineatus | 4 | - | oa-p |
| Anthocoris sp. | 3 | - | oa-p |
| Pterostichus madidus | 3 | - | ob-st |
| Agonum (Europhilus) sp. | 3 | - | oa |
| Hydroporus sp. B | 3 | - | oa-w |
| Megasternum obscurum | 3 | - | rt |
| Anacaena sp. | 3 | - | oa-w |
| Platystethus arenarius | 3 | - | rf |
| Stenus sp. C | 3 | - | u |
| Philonthus sp. C | 3 | - | u |
| Tachinus marginellus | 3 | - | u |
| Tachinus signatus | 3 | - | u |
| Aleocharinae sp. B | 3 | - | u |
| Aphodius contaminatus | 3 | - | oa-rf |
| Aphodius sphacelatus | 3 | - | oa-rf |
| Atomaria sp. A | 3 | - | rd |
| Phyllotreta sp. | 3 | - | oa-p |
| Apion sp. C | 3 | - | oa-p |
| Apion sp. E | 3 | - | oa-p |
| Tropiphorus terricola | 3 | - | oa |
| Sitona hispidulus | 3 | - | oa-p |
| Leperisinus varius | 3 | - | l |
| Scolopostethus sp. | 2 | - | oa-p |
| Saldidae sp. | 2 | - | oa-d |
| Aphrodes flavostriatus | 2 | - | oa-p-d |
| Cicadellidae sp. B | 2 | - | oa-p |
| Loricera pilicornis | 2 | - | oa |
| Patrobus atrorufus | 2 | - | oa |
| Bembidion guttula or mannerheimi | 2 | - | oa |
| Dromius linearis | 2 | - | oa |
| Hydroporus sp. A | 2 | - | oa-w |
| Hydroporus sp. C | 2 | - | oa-w |
| Agabus bipustulatus | 2 | - | oa-w |
| Helophorus sp. B | 2 | - | oa-w |
| Cercyon atomarius | 2 | - | rt |
| Hydrobius fuscipes | 2 | - | oa-w |
| Hydraena sp. | 2 | - | oa-w |
| Micropeplus staphylinoides | 2 | - | rt |
| Metopsia retusa | 2 | - | u |
| Megarthrus sp. | 2 | - | rt |
| Anthobium unicolor | 2 | - | oa |
| Xylodromus sp. | 2 | - | rt-st |
| Coprophilus striatulus | 2 | - | rt-st |
| Aploderus caelatus | 2 | - | rt |
| Stenus sp. A | 2 | - | u |
| Philonthus sp. B | 2 | - | u |
| Philonthus sp. E | 2 | - | u |
| Tachyporus sp. B | 2 | - | u |
| Tachinus sp. | 2 | - | u |
| Cordalia obscura | 2 | - | rt-sf |
| Aleocharinae sp. A | 2 | - | u |
| Aleocharinae sp. H | 2 | - | u |
| Pselaphidae sp. | 2 | - | u |
| Aphodius rufipes | 2 | - | oa-rf |
| Dryops sp. | 2 | - | oa-d |
| Agriotes sp. | 2 | - | oa-p |
| Adrastus ?pallens | 2 | - | oa-p |
| Meligethes sp. | 2 | - | oa-p |
| Atomaria sp. B | 2 | - | rd |
| Enicmus sp. | 2 | - | rt-sf |

| | | | |
|---|---|---|---|
| Rhinosimus planirostris | 2 - l | Paederinae sp. | 1 - u |
| Phaedon tumidulus | 2 - oa-p | Gyrohypnus fracticornis | 1 - rt-st |
| Apion sp. D | 2 - oa-p | Xantholinus linearis | 1 - rt-sf |
| Phyllobius calcaratus | 2 - oa-p | Neobisnius sp. | 1 - u |
| Phyllobius oblongus | 2 - oa-p | Philonthus sp. A | 1 - u |
| Sitophilus granarius | 2 - g-ss | Philonthus sp. D | 1 - u |
| Ceutorhynchus sp. A | 2 - oa-p | Philonthus or Gabrius sp. | 1 - u |
| Cimicidae sp. | 1 - oa-p | Staphylinus sp. | 1 - u |
| Miridae sp. | 1 - oa-p | Quedius sp. A | 1 - u |
| Velia ?caprai | 1 - oa-w | Quedius sp. B | 1 - u |
| Aphrophora alni | 1 - oa-p | Tachyporus sp. A | 1 - u |
| Aphrodes sp. | 1 - oa-p | Tachyporus sp. C | 1 - u |
| Cicadellidae sp. A | 1 - oa-p | Tachinus laticollis | 1 - u |
| Cicadellidae sp. C | 1 - oa-p | Aleochara sp. | 1 - u |
| Cixius sp. | 1 - oa-p | Aleocharinae sp. E | 1 - u |
| Delphacidae sp. A | 1 - oa-p | Aleocharinae sp. G | 1 - u |
| Delphacidae sp. B | 1 - oa-p | Aleocharinae sp. I | 1 - u |
| Dyschirius ?globosus | 1 - oa | Aleocharinae sp. J | 1 - u |
| Trechus obtusus or quadristriatus | 1 - oa | Geotrupes sp. | 1 - oa-rf |
| Trechus micros | 1 - u | Aphodius ?ater | 1 - oa-rf |
| Bembidion biguttatum | 1 - oa-d | Aphodius sp. B | 1 - ob-rf |
| Stomis pumicatus | 1 - oa | Aphodius sp. C | 1 - ob-rf |
| Pterostichus melanarius | 1 - ob | Onthophagus sp. | 1 - oa-rf |
| Pterostichus ?strenuus | 1 - oa | Phyllopertha horticola | 1 - oa-p |
| Pterostichus (Poecilus) sp. | 1 - oa | Cyphon sp. | 1 - oa-d |
| Amara sp. A | 1 - oa | Simplocaria ?semistriata | 1 - oa-p |
| Amara sp. B | 1 - oa | Melanotus ?erythropus | 1 - l |
| Harpalus sp. | 1 - oa | Cantharis sp. | 1 - ob |
| Dromius quadrimaculatus | 1 - oa | Rhagonycha sp. | 1 - ob |
| Haliplus sp. | 1 - oa-w | Cantharidae sp. | 1 - ob |
| Cercyon analis | 1 - rt-sf | Grynobius planus | 1 - l |
| Cercyon haemorrhoidalis | 1 - rf-sf | Xestobium rufovillosum | 1 - l-st |
| Cryptopleurum minutum | 1 - rf-st | Brachypterus sp. | 1 - oa-p |
| Histerinae sp. | 1 - rt | ?Ephistemus globulus | 1 - rd-sf |
| Acrotrichis sp. A | 1 - rt | Oulibrus sp. | 1 - oa-p |
| Sciodrepoides sp. | 1 - u | Stephostethus angusticollis | 1 - rt-st |
| Colon sp. | 1 - u | Dienerella sp. | 1 - rd-sf |
| Silpha atrata | 1 - u | Corticaria ?elongata | 1 - rt-sf |
| Scydmaenidae sp. | 1 - u | Corticaria sp. A | 1 - rt-sf |
| Micropeplus porcatus | 1 - rt | Corticaria sp. B | 1 - rt-sf |
| Megarthrus depressus | 1 - rt-sf | Aglenus brunneus | 1 - rt-ss |
| Proteinus sp. A | 1 - rt | Donaciinae sp. | 1 - oa-d-p |
| Proteinus sp. B | 1 - rt | ?Lema cyanella | 1 - oa-p |
| Anthobium atrocephalum | 1 - oa | Longitarsus sp. A | 1 oa-p |
| Eusphalerum sp. | 1 - rt | Longitarsus sp. B | 1 - oa-p |
| Phyllodrepa floralis | 1 - rt-sf | Chalcoides sp. | 1 - oa-p |
| Acrolocha sulcula | 1 - rt | Chaetocnema arida group | 1 - oa-p |
| Omalium excavatum | 1 - rt-sf | Halticinae sp. | 1 - oa-p |
| Omalium caesum or italicum | 1 - rt-sf | Cassida sp. | 1 - oa-p |
| ?Coryphium angusticolle | 1 - u | Apion sp. A | 1 - oa-p |
| Omaliinae sp. | 1 - rt | Apion sp. B | 1 - oa-p |
| Platystethus nodifrons | 1 - oa-d | Apion sp. F | 1 - oa-p |
| Oxytelus laqueatus | 1 - rf | Phyllobius or Polydrusus sp. A | 1 - oa-p |
| Stenus sp. B | 1 - u | Phyllobius or Polydrusus sp. B | 1 - oa-p |
| Stenus sp. D | 1 - u | Sciaphilus asperatus | 1 - oa-p |
| Stenus sp. E | 1 - u | ?Strophosomus sp. | 1 - oa-p |
| Lathrobium sp. A | 1 - u | Sitona ?sulcifrons | 1 - oa-p |
| Lathrobium sp. B | 1 - u | Sitona sp. | 1 - oa-p |
| Rugilus sp. | 1 - rt | Hypera nigrirostris | 1 - oa-p |

| | | | |
|---|---|---|---|
| Leiosoma ?deflexum | 1 | - | oa-p |
| Acalles sp. | 1 | - | u |
| Grypus equiseti | 1 | - | oa-p |
| Cidnorhinus quadrimaculatus | 1 | - | oa-p |
| Ceutorhynchus ?contractus | 1 | - | oa-p |
| Ceutorhynchus sp. B | 1 | - | oa-p |
| Rhinoncus sp. | 1 | - | oa-p |
| Ceuthorhynchinae sp. | 1 | - | oa-p |
| Curculionidae sp. A | 1 | - | oa |
| Curculionidae sp. B | 1 | - | oa |
| Curculionidae sp. C | 1 | - | oa |
| Coleoptera sp. | 1 | - | u |
| | | | |
| *Daphnia sp. (ephippium) | 1000 | e | oa-w |
| *Ostracoda sp. | 1000 | e | u |
| *Oligochaeta sp. (egg capsule) | 15 | m | u |
| *Chironomidae sp. (larva) | 15 | m | w |
| *Coleoptera sp. (larva) | 15 | m | u |
| *Insecta sp. (immature) | 15 | m | u |
| *Acarina sp. | 15 | m | u |
| *Pulex irritans | 7 | - | ss |
| *Auchenorhyncha sp. (nymph) | 6 | - | oa-p |
| *Aphidoidea sp. | 6 | s | u |
| *Diptera sp. (adult) | 6 | s | u |
| *Chalcidoidea sp. | 6 | s | u |
| *Planorbidae sp. | 6 | s | f |
| *Gastropoda sp. | 6 | s | u |
| *Aranae sp. | 3 | - | u |
| *Heteroptera sp. (nymph) | 2 | - | u |
| *Psylloidea sp. (nymph) | 2 | - | oa-p |
| *Formicidae sp. | 2 | - | u |
| *Proctotrupoidea sp. | 2 | - | u |
| *Trichoptera sp. | 1 | - | oa-w |
| *Forficula auricularia | 1 | - | u |
| *Bibionidae sp. | 1 | - | u |
| *?Apis mellifera | 1 | - | u |
| *Hymenoptera Parasitica sp. | 1 | - | u |
| *Hymenoptera sp. | 1 | - | u |
| *Insecta sp. (larval case) | 1 | - | u |

**Context: 11095 Sample: 15/T2** ReM: D
Weight: 5.00 E: 2.50 F: 2.50

Notes: Entered HK 15/1/04. Flot 1.5 cm in plastic jar, woody and herbaceous fragments. Recorded in flot and on filter paper. Preservation variable - some fossils notably rotted or fragmented. E 1.5-4.0, mode 2.5 weak; F 1.5-4.0, mode 2.5 weak. Many of the insect immatures may have been parts of chironomid larvae and pupae. Aleocharinae particularly difficult to 'type' and may be several extra species.

| | **n** | **SQ** | **ec** |
|---|---|---|---|
| Aleocharinae sp. C | 42 | - | u |
| Anotylus nitidulus | 31 | - | rt |
| Lesteva longoelytrata | 26 | - | oa-d |
| Anotylus tetracarinatus | 24 | - | rt |
| Ochthebius minimus | 12 | - | oa-w |
| Omalium rivulare | 12 | - | rt-sf |
| Aphodius prodromus | 11 | - | ob-rf |
| Cercyon haemorrhoidalis | 9 | - | rf-sf |
| Limnebius truncatellus | 9 | - | oa-w |
| Platystethus arenarius | 9 | - | rf |
| Anotylus rugosus | 9 | - | rt |
| Anotylus sculpturatus group | 8 | - | rt |
| Aleocharinae sp. E | 8 | - | u |
| Anobium punctatum | 7 | - | l-sf |
| Acrotrichis sp. A | 6 | - | rt |
| Anacaena ?globulus | 5 | - | oa-w |
| Acrotrichis sp. B | 5 | - | rt |
| Omalium ?caesum | 5 | - | rt-sf |
| Anotylus complanatus | 5 | - | rt-sf |
| Chaetocnema concinna | 5 | - | oa-p |
| Apion sp. F | 5 | - | oa-p |
| Limnebius papposus | 4 | - | oa-w |
| Carpelimus bilineatus | 4 | - | rt-sf |
| Aploderus caelatus | 4 | - | rt |
| Aleocharinae sp. B | 4 | - | u |
| Tipnus unicolor | 4 | - | rt-ss |
| Mycetaea hirta | 4 | - | rd-ss |
| Corticaria sp. A | 4 | - | rt-sf |
| Corticaria sp. C | 4 | - | rt-sf |
| Apion sp. A | 4 | - | oa-p |
| Helophorus grandis | 3 | - | oa-w |
| Megasternum obscurum | 3 | - | rt |
| Megarthrus ?depressus | 3 | - | rt-sf |
| Carpelimus elongatulus | 3 | - | oa-d |
| Stenus sp. B | 3 | - | u |
| Tachinus laticollis | 3 | - | u |
| Aleocharinae sp. D | 3 | - | u |
| Ptinus fur | 3 | - | rd-sf |
| Corticarina sp. | 3 | - | rt |
| Cortinicara gibbosa | 3 | - | rt |
| Phyllotreta nemorum group | 3 | - | oa-p |
| Cidnorhinus quadrimaculatus | 3 | - | oa-p |
| Delphacidae sp. A | 2 | - | oa-p |
| Trechus quadristriatus | 2 | - | oa |
| Pterostichus melanarius | 2 | - | ob |
| Hydroporus sp. B | 2 | - | oa-w |
| Helophorus sp. B | 2 | - | oa-w |
| Cercyon melanocephalus | 2 | - | rt-sf |
| Hydrobius fuscipes | 2 | - | oa-w |
| Nargus anisotomoides | 2 | - | u |
| Megarthrus ?sinuatocollis | 2 | - | rt-sf |
| Phyllodrepa ?floralis | 2 | - | rt-sf |
| Omalium ?allardi | 2 | - | rt |
| Carpelimus rivularis | 2 | - | ob-d |
| Oxytelus sculptus | 2 | - | rt-st |
| Lithocharis ochracea | 2 | - | rt-st |
| Philonthus sp. A | 2 | - | u |
| Philonthus sp. B | 2 | - | u |
| Philonthus sp. C | 2 | - | u |
| Gabrius sp. | 2 | - | rt |
| Tachyporus hypnorum | 2 | - | u |
| Tachyporus sp. | 2 | - | u |
| Falagria caesa or sulcatula | 2 | - | rt-sf |
| Aleochara sp. | 2 | - | u |

| | | | |
|---|---|---|---|
| Aphodius contaminatus | 2 - oa-rf | Anotylus inustus | 1 - rt |
| Dryops sp. | 2 - oa-d | Stenus sp. A | 1 - u |
| Athous ?hirtus | 2 - oa-p | Stenus sp. C | 1 - u |
| Meligethes sp. A | 2 - oa-p | Stenus sp. D | 1 - u |
| Meligethes sp. B | 2 - oa-p | Lathrobium sp. | 1 - u |
| Cryptophagus sp. A | 2 - rd-sf | Rugilus sp. | 1 - rt |
| Atomaria sp. A | 2 - rd | Leptacinus ?pusillus | 1 - rt-st |
| Orthoperus sp. | 2 - rt | Xantholinus sp. | 1 - u |
| Lathridius minutus group | 2 - rd-st | Tachyporus obtusus | 1 - u |
| Enicmus sp. | 2 - rt-sf | Tachinus signatus | 1 - u |
| Corticaria sp. B | 2 - rt-sf | Tachinus sp. | 1 - u |
| Phaedon tumidulus | 2 - oa-p | Cypha sp. | 1 - rt |
| Sitona lineatus | 2 - oa-p | Cordalia obscura | 1 - rt-sf |
| Acalles turbatus | 2 - u | Aleocharinae sp. A | 1 - u |
| Leperisinus varius | 2 - l | Aleocharinae sp. F | 1 - u |
| ?Scolopostethus sp. | 1 - oa-p | Aleocharinae sp. G | 1 - u |
| Anthocoris sp. | 1 - oa-p | Aleocharinae sp. H | 1 - u |
| Cimicidae sp. | 1 - oa-p | Pselaphidae sp. A | 1 - u |
| Saldula ?saltatoria | 1 - oa-d | Pselaphidae sp. B | 1 - u |
| Aphrodes bicinctus | 1 - oa-p | Pselaphidae sp. C | 1 - u |
| Cicadellidae sp. A | 1 - oa-p | Geotrupes sp. | 1 - oa-rf |
| Cicadellidae sp. B | 1 - oa-p | Aphodius ?ater | 1 - oa-rf |
| Cicadellidae sp. C | 1 - oa-p | Aphodius ?granarius | 1 - ob-rf |
| Delphacidae sp. B | 1 - oa-p | Phyllopertha horticola | 1 - oa-p |
| Delphacidae sp. C | 1 - oa-p | Clambus ?pubescens | 1 - rt-sf |
| Notiophilus sp. | 1 - oa | Clambus sp. | 1 - rt-sf |
| Loricera pilicornis | 1 - oa | Simplocaria sp. | 1 - oa-p |
| Dyschirius globosus | 1 - oa | Agriotes sp. | 1 - oa-p |
| Patrobus atrorufus | 1 - oa | Rhagonycha sp. | 1 - ob |
| Bembidion (Philochthus) sp. | 1 - oa | Grynobius planus | 1 - l |
| Bembidion sp. | 1 - oa | Ptilinus pectinicornis | 1 - l-sf |
| Agonum dorsale | 1 - oa | Malachius ?aeneus | 1 - u |
| Agonum sp. | 1 - oa | Brachypterus sp. | 1 - oa-p |
| Amara sp. A | 1 - oa | Rhizophagus sp. | 1 - u |
| Amara sp. B | 1 - oa | Monotoma longicollis | 1 - rt-st |
| Harpalus sp. | 1 - oa | Cryptophagus scutellatus | 1 - rd-st |
| Carabidae sp. | 1 - ob | Cryptophagus sp. B | 1 - rd-sf |
| Hydroporus sp. A | 1 - oa-w | Atomaria sp. B | 1 - rd |
| Agabus bipustulatus | 1 - oa-w | Phalacridae sp. | 1 - oa-p |
| Agabus sp. | 1 - oa-w | Stephostethus angusticollis | 1 - rt-st |
| Colymbetes fuscus | 1 - oa-w | Stephostethus lardarius | 1 - rt-st |
| Helophorus porculus or rufipes | 1 - oa | Bruchus sp. | 1 - u |
| Helophorus sp. A | 1 - oa-w | Prasocuris phellandrii | 1 - oa-p-d |
| Sphaeridium sp. | 1 - rf | Chrysomelinae sp. | 1 - oa-p |
| Cercyon analis | 1 - rt-sf | Phyllotreta sp. A | 1 - oa-p |
| Cercyon atomarius | 1 - rt | Phyllotreta sp. B | 1 - oa-p |
| Cercyon atricapillus | 1 - rf-st | Longitarsus sp. A | 1 - oa-p |
| Cryptopleurum minutum | 1 - rf-st | Longitarsus sp. B | 1 - oa-p |
| Histerinae sp. | 1 - rt | Longitarsus sp. C | 1 - oa-p |
| Ochthebius sp. | 1 - oa-w | ?Altica sp. | 1 - oa-p |
| Ptenidium sp. | 1 - rt | Chalcoides sp. | 1 - oa-p |
| Catops sp. | 1 - u | Chaetocnema arida group | 1 - oa-p |
| Anthobium atrocephalum | 1 - oa | Apion (Aspidapion) aeneum | 1 - oa-p |
| Acidota cruentata | 1 - oa | Apion (Taenapion) urticarium | 1 - oa-p |
| Lesteva ?heeri | 1 - oa-d | Apion sp. B | 1 - oa-p |
| Omalium sp. | 1 - rt | Apion sp. C | 1 - oa-p |
| Xylodromus ?concinnus | 1 - rt-st | Apion sp. D | 1 - oa-p |
| Carpelimus sp. | 1 - u | Apion sp. E | 1 - oa-p |
| Platystethus ?nodifrons | 1 - oa-d | Phyllobius oblongus | 1 - oa-p |

| | | | |
|---|---|---|---|
| Sciaphilus asperatus | 1 | - | oa-p |
| Sitona sp. | 1 | - | oa-p |
| ?Tanysphyrus lemnae | 1 | - | oa-w-p |
| Sitophilus granarius | 1 | - | g-ss |
| Ceutorhynchus ?contractus | 1 | - | oa-p |
| Ceutorhynchus sp. | 1 | - | oa-p |
| | | | |
| *Insecta sp. (immature) | 1000 | e | u |
| *Acarina sp. | 100 | e | u |
| *Oligochaeta sp. (egg capsule) | 15 | m | u |
| *Diptera sp. (puparium) | 15 | m | u |
| *Chironomidae sp. (larva) | 15 | m | w |
| *Daphnia sp. (ephippium) | 6 | s | oa-w |
| *Auchenorhyncha sp. (nymph) | 6 | s | oa-p |
| *Diptera sp. (adult) | 6 | s | u |
| *Proctotrupoidea sp. | 6 | s | u |
| *Coleoptera sp. (larva) | 3 | - | u |
| *Ostracoda sp. | 2 | - | u |
| *Chalcidoidea sp. | 2 | - | u |
| *Hymenoptera sp. | 2 | - | u |
| *Trichoptera sp. | 1 | - | oa-w |
| *Cladocera sp. F (ephippium) | 1 | - | oa-w |
| *Dermaptera sp. | 1 | - | u |
| *Psylloidea sp. (nymph) | 1 | - | oa-p |
| *Bibionidae sp. | 1 | - | u |
| *Pulex irritans | 1 | - | ss |
| *Formicidae sp. | 1 | - | u |

*Table 5. Abbreviations for ecological codes and statistics used for interpretation of insect remains in text and tables. Lower case codes in parentheses are those assigned to taxa and used to calculate the group values (the codes in capitals). See Table 1 for codes assigned to taxa. Indivs – individuals (based on MNI); No – number.*

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

# Appendix

*The hand-collected vertebrate remains from the former D. C. Cook site, off Lawrence Street, York.*

## Introduction

Both the evaluation and assessment (Hall *et al.* 2001; Hall *et al.* 2003) of the biological remains from the former D. C. Cook site, off Lawrence Street stated the small size of the vertebrate assemblage and its lack of potential for further analyses. The entire hand-collected vertebrate assemblage represented 55 deposits, dating from the Roman period through to the present day. Individually, most of the deposits (42) yielded less than ten fragments, with fresh breakage augmenting the size of some of the assemblages. Once divided by phase the assemblage was rather too small for detailed analysis but has been recorded to provide a basic archive for the purposes of possible use for comparanda and synthetic projects. The following provides a brief outline of the assemblage.

## Methods

For the vertebrate remains, both from hand-collection and from the samples, data were recorded electronically directly into a series of tables using a purpose-built input system and *Paradox* software. Subjective records were made of the state of preservation, colour of the fragments, and the appearance of broken surfaces ('angularity'). Additionally, semi-quantitative information was recorded for each context concerning fragment size, dog gnawing, burning, butchery and fresh breaks.

Where applicable, fragments were identified to species or species group, using the reference collection of Palaeoecology Research Services. Selected elements were recorded using the diagnostic zones method described by Dobney and Rielly (1988). Other fragments, (classified as 'unidentified') were, where possible, grouped into categories: large mammal (assumed to be horse, cow or large cervid), medium-sized mammal 1 (assumed to be sheep, pig or small cervid), medium-sized mammal 2 (assumed to be dog, cat, hare or equivalent-sized mammal), unidentified bird, and totally unidentified. In addition to fragment counts, total weights of bone were recorded for all identifiable and unidentifiable categories.

Caprovid tooth wear stages were recorded using those outlined by Payne (1973; 1987), and those for cattle and pigs followed the scheme of Grant (1982). Mammal bones were described as 'juvenile' if the epiphyses were unfused and the associated shaft fragment appeared spongy and porous. They were recorded as 'neonatal' if they were also of small size. Measurements follow von den Driesch (1976) unless otherwise specified. Additional measurements, not detailed by von den Driesch, follow those described by Dobney *et al.* (1996).

## Results

The hand-collected vertebrate assemblage from both interventions amounted to 383 fragments, of which 119 were identified to species. As can be seen from Table A1, most fragments were recovered from Phase 3 (the later Roman phase), with the medieval phases (6 and 7) producing much of the remainder of the assemblage. Measurements are presented in Table A2 and tooth wear data in Table A3.

Preservation, overall was reasonable and 'angularity' (the nature of the broken surfaces) was fairly consistent, with few fragments that were battered or eroded in appearance. Colour of the fragments varied between deposits, ranging from light to dark brown, with many of the fawn coloured fragments being recovered from the Roman ditch fill deposits. Some of the assemblages were extremely fragmented, the result of much fresh breakage damage during excavation and post-excavation processes. Evidence of butchery, mostly in the form of chop marks, was recorded on a number of cattle bones but no particular patterns of butchery were discernable.

A range of species was identified, which included the remains of the major domesticates – cattle, caprovid, and pig. The large proportion of fragments assigned to the 'unidentified' fraction was mostly composed of large mammal shaft, rib and vertebrae fragments. Skeletal element representation for the main domestic species suggested that all parts of the body were represented, but the assemblage was too small for the identification of specific disposal patterns by species or by period.

Dog remains were identified from several deposits, mainly of medieval date (Phases 6 and 7) and included part of a skull from Context 11038. One of the Roman ditch fills (Context 11049) produced four fragments identified as cat, all probably representing a single adult individual. Additionally, the part skeleton of another adult cat was recovered from a modern drain fill (Context 3011). Another Roman ditch fill, Context 11007, produced the only wild mammal remains, a single roe deer (*Capreolus capreolus* (L.)) radius. Fish and bird bones were scarce. A haddock precaudal vertebra was identified from Context 11018 (a backfill in oven 11057), together with several fish scale fragments from a sample from the same deposit. One chicken bone, representing a juvenile individual, was present in a medieval ditch fill, Context 11038.

Dental attrition and epiphysial fusion data was very limited, but suggested that, in general, most of the animals represented in the deposits were adult when they died. However, pig remains included a mandible from a juvenile individual (Context 11015) and several radii from animals that were less than three years old. It must also be noted, however, that bones representing juvenile animals tend to be less robust and more porous and these fragments do not survive as well as the bones of adult individuals.

The vertebrate assemblage recovered from these excavations was small and the features appear to have been extensively used for the disposal of rubbish. On the basis of this evidence, it seems unlikely that the area was densely occupied and there was little domestic waste indicative of kitchen or table refuse. The bones suggest the occasional dumping of mostly butchery waste, with casual disposal of dogs and cats, probably pets.

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*Table A1. Hand-collected vertebrate remains by phase* from excavations at the former D. C. Cook site, off Lawrence Street, York.*

| **Species** | | **1** | **2** | **3** | **5** | **6** | **7** | **8** | **9** | **Total** |
|---|---|---|---|---|---|---|---|---|---|---|
| *Canis* f. domestic | dog | - | - | 1 | - | 8 | 2 | - | - | 11 |
| *Felis* f. domestic | cat | - | - | 4 | - | - | 2 | 1 | 16 | 23 |
| *Equus* f. domestic | horse | - | - | 5 | - | - | 1 | - | - | 6 |
| *Sus* f. domestic | pig | - | - | 3 | - | 4 | 2 | 3 | 1 | 13 |
| *Capreolus capreolus* (L.) | roe deer | - | - | 1 | - | - | - | - | - | 1 |
| *Bos* f. domestic | cattle | - | 1 | 12 | 2 | 9 | 12 | 1 | 8 | 45 |
| Caprovid | sheep/goat | 1 | - | 4 | - | 7 | 5 | - | 1 | 18 |
| *Gallus* f. domestic | chicken | - | - | - | - | - | 1 | - | - | 1 |
| Unidentified fish | fish | - | - | - | - | - | 1 | - | - | 1 |
| *Sub-total* | | *1* | *1* | *30* | *2* | *28* | *26* | *5* | *26* | *119* |
| Large mammal | | - | 10 | 77 | 3 | 30 | 33 | 3 | 13 | 169 |
| Medium mammal 1 | | - | - | 17 | - | 10 | 7 | 2 | 1 | 37 |
| Medium mammal 2 | | - | - | 2 | - | 4 | - | - | - | 6 |
| Unidentified | | - | - | 22 | - | 13 | 11 | 3 | 3 | 52 |
| *Sub-total* | | *0* | *10* | *118* | *3* | *57* | *51* | *8* | *17* | *264* |
| **Total** | | **1** | **11** | **148** | **5** | **85** | **77** | **13** | **43** | **383** |

*Key to phases:
Phase 1 – natural deposits encountered across the site
Phase 2 – earlier of two Roman phases detected across the site
Phase 3 – later Roman phase
Phase 4 – Anglian activity
Phase 5 – Anglo-Scandinavian activity
Phase 6 – earlier medieval activity
Phase 7 – later medieval activity
Phase 8 – post-medieval features and deposits
Phase 9 – modern deposits, structures and features

*Table A2. Biometrical archive by skeletal element (grouped by species) for the vertebrate remains from excavations at the former D. C. Cook site, off Lawrence Street, York. Measurements follow von den Driesch (1976). Additional measurements, not detailed by von den Driesch, follow those described by Dobney* et al. *(1996). For key to phases see Table A1.*

CALCANEUM

| Phase | Context | bone id. | species | element | C | C+D | DS | GL |
|---|---|---|---|---|---|---|---|---|
| **6** | 9008 | 30 | sheep/goat | calcaneum | 11.9 | 20.76 | 15.97 | 53.16 |

SCAPULA

| Phase | Context | bone id. | species | element | GLP | SLC |
|---|---|---|---|---|---|---|
| **9** | 3042 | 1 | cow | scapula | 86.42 | 65.21 |
| **7** | 11032 | 80 | sheep/goat | scapula | 30.34 | 18.21 |
| **7** | 11092 | 82 | sheep/goat | scapula | 34.21 | 20.52 |

FEMUR

| Phase | Context | bone id. | species | element | GL | SC | Bd | Dd |
|---|---|---|---|---|---|---|---|---|
| **7** | 11032 | 79 | cat | femur | 81.97 | 5.78 | 13.91 | 13.16 |

HUMERUS

| Phase | Context | bone id. | species | element | Bd | GL |
|---|---|---|---|---|---|---|
| **3** | 11049 | 69 | cat | humerus | 16.44 | 97.73 |
| **3** | 11066 | 102 | pig | humerus | 30.11 | - |

METACARPAL

| Phase | Context | bone id. | species | element | Bp | Dp |
|---|---|---|---|---|---|---|
| **7** | 11018 | 94 | sheep/goat | metacarpal | 20.06 | 14.69 |

METATARSAL

| Phase | Context | bone id. | species | element | GL | SD | Bp | Dp | Bd | Dd | Ll | GLl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **6** | 9007 | 24 | sheep/goat | metatarsal | - | 11.39 | 17.98 | - | - | - | - | - |
| **5** | 5008 | 41 | cow | metatarsal | - | - | 42.45 | - | - | - | - | - |
| **6** | 7008 | 47 | cow | metatarsal | - | 21.35 | 36.1 | - | - | - | - | - |
| **3** | 11033 | 60 | cow | metatarsal | - | - | 37.8 | 38.54 | - | - | - | - |
| **3** | 11036 | 96 | cow | metatarsal | - | - | - | - | 60.19 | - | - | - |
| **7** | 11092 | 81 | cow | metatarsal | - | 24.94 | - | - | 47.94 | 27.9 | - | - |
| **3** | 11033 | 58 | horse | metatarsal | 305 | 34.28 | 51.35 | - | 51.78 | 40.42 | 278 | 281 |

RADIUS

| Phase | Context | bone id. | species | element | SD | BFp | Bp | BFd | Bd |
|---|---|---|---|---|---|---|---|---|---|
| **9** | 3042 | 2 | cow | radius | 45.81 | 73 | 82.04 | - | - |
| **9** | 3042 | 4 | cow | radius | - | 82.15 | 89.3 | - | - |
| **7** | 11037 | 68 | cow | radius | 44.55 | - | - | 64.87 | 73 |
| **3** | 11065 | 83 | cow | radius | - | 65.02 | 70.9 | - | - |

TIBIA

| Phase | Context | bone id. | species | element | SD | Bd | Dd |
|---|---|---|---|---|---|---|---|
| **9** | 3020 | 18 | sheep/goat | tibia | 16.28 | 25.15 | 20.15 |
| **6** | 9008 | 31 | sheep/goat | tibia | 14.91 | 26.23 | 20.3 |
| **6** | 5020 | 44 | sheep/goat | tibia | 12.38 | 23.43 | 19.06 |
| **3** | 11007 | 75 | cow | tibia | 35.05 | 53.16 | - |

*Table A3. Tooth wear stages for mandibles and isolated teeth (grouped by species) for the remains from excavations at the former D. C. Cook site, off Lawrence Street, York. Wear stages are as outlined by Grant (1982) for cattle and pigs and following Payne (1973; 1987) for caprovids. For key to phases see Table A1.*

| **Phase** | **Context** | **bone id.** | **species** | **element** | **dP4** | **P4** | **M1** | **M2** | **M3** | **M1/M2** |
|---|---|---|---|---|---|---|---|---|---|---|
| **7** | 11037 | 67 | sheep/goat | mandible | - | 11S | 9A | 9A | 9G | - |
| **3** | 11033 | 62 | sheep/goat | isolated tooth | - | - | - | - | - | 9A |
| **3** | 11033 | 63 | sheep/goat | isolated tooth | - | - | - | - | - | 5A |
| **7** | 11015 | 91 | pig | mandible | C | - | A | - | - | - |
| **6** | 7008 | 48 | pig | isolated tooth | - | - | - | - | A | - |
| **8** | 11021 | 64 | cow | isolated tooth | - | - | - | - | G | - |
| **7** | 11014 | 90 | cow | isolated tooth | - | F | - | - | - | - |
| **7** | 11042 | 100 | cow | isolated tooth | - | - | - | - | - | G |
| **6** | 9005 | 20 | cow | isolated tooth | - | - | - | - | G | - |
| **6** | 9007 | 28 | cow | isolated tooth | | - | - | - | - | G |
| **3** | 8009 | 9 | cow | mandible | - | C | - | J | F | - |