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**Insect remains from excavations at Drum Castle,
Aberdeenshire: Technical report**

by

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Summary

Twenty-five samples from deposits in the cellar and the main hall of Drum Castle, Aberdeenshire, have been investigated for their insect remains. Small to modest-sized assemblages were recovered, with puparia of flies (Diptera) and adult beetles (Coleoptera) the most abundant. Conditions appear to have been rather clean and dry in general, but the flies indicated what were probably localised, perhaps very small, patches of fouler material, including dung-like matter and carrion. There was also evidence of grassy material on the floors. The remains are interpreted as indicating the nature of the building during human occupation, but the possibility that the fauna of at least some layers was associated with birds' nests and droppings, and other natural habitats, during abandonment must be recognised.

Keywords: ABERDEENSHIRE; MEDIEVAL; INSECT REMAINS; SPIDER BEETLES; *TIPNUS UNICOLOR*; FLY PUPARIA; DRUM CASTLE

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Insect remains from excavations at Drum Castle, Aberdeenshire: Technical report

Introduction

Drum Castle is located above the River Dee, west of Peterculter, Aberdeenshire, and is one of the best preserved early tower houses surviving in Scotland. The tower is essentially a rectangular block, with access *via* the first floor. It has a basement cellar. The main floor is a large vaulted hall, the Laird's Hall. Originally this was divided by a timber floor, and the same was true of the present upper storey. Four trenches were excavated in the hall, towards the NW, NE, SE and SW corners and in the North-Central area (NC).

Extracted fossil remains and residues from 25 samples of deposits of medieval date from excavations in the cellar and in the Laird's Hall were submitted for identification and analysis.

The particular aims of this study were: to investigate living conditions, particularly standards of cleanliness, activity and diet of the inhabitants of the Hall; to establish when the building went out of use; and examine depositional processes. Insect remains are especially relevant to the first and last of these topics.

Methods

Practical methods

Subsamples were processed by AOC staff, who also sorted them for insect remains. Only a proportion of the material was sorted in some cases. A small number of the residues were re-sieved and submitted to paraffin floatation at the EAU to extract any overlooked invertebrate remains; Samples 9, 12, 33 and 34 were treated in this way.

For the insect analysis, all samples were examined using the 'scan' recording method outlined by Kenward (1992). This represents a compromise between speed and full identification of all remains, and is

the standard technique used in the EAU. Fossils of adult beetles and bugs were identified as far as possible in an acceptable period of time, the more difficult taxa being recorded at a higher taxonomic level (genus or family) unless it was believed that they would provide important information. Remains were transferred to damp filter paper in some cases, other remains being recorded in industrial methylated spirit. Individual sclerites (or fragments of them) were usually counted.

The abundance of invertebrates was usually recorded semi-quantitatively. This method employs a five-point scale (Kenward *et al.* 1986), abundance for each taxon being estimated as 1, 2, 3, 'several' or 'many'. The last two are converted to 6 and 15 for statistical purposes, a conversion discussed by Kenward (1992). A rough approximation of the actual number of individuals was also made. Counts are for minimum number of individuals (MNI) represented by the recorded remains, and the figures given may include both positive and provisional identifications.

The manuscript lists and notes made during recording were entered to the University of York VAX mainframe computer and processed using a Pascal system written by HK, producing 'main statistics' and species lists in rank and taxonomic order for each assemblage, together with files of main statistics, species records and notes for the whole site. These data have now been transferred to a PC (with the demise of the VAX system in June 1995) and further interrogation has been carried out using the Paradox database package.

Interpretative methods

The interpretative methods employed in this report are those used for a variety of sites by Kenward and co-workers

(introduced by Kenward 1978, with refinements discussed, for example, by Kenward 1982; 1988 and Hall and Kenward 1990). The interpretation of assemblages rests on certain 'main statistics' of whole assemblages of adult beetles and bugs, and upon ecologically-related groups of species.

A component of the assemblages discussed in this report is 'house fauna'. This is a group identified on the basis of archaeological records as apparently typical of primitive buildings housing people, stock, or stored organic material such as hay or straw. It is not necessarily suggested that they formed a single community and insects living variously in timber, wattle, thatch, floors and stored products may be present in any particular case. The species are not likely to be found together today as a rule, since the habitats harbouring them have largely disappeared. This component of archaeological insect assemblages is discussed by Hall and Kenward (1990), Kenward and Hall (forthcoming) and, in a general way, by Kenward and Allison (1994).

Results and general discussion

Most of the samples gave at least a few invertebrate remains, and some produced quite large numbers. Preservation was about average for material from occupation sites with anoxic waterlogging. There were hints (not proven) that fragments of one individual of some large taxa occurred in more than one sample, suggesting scattering, perhaps through trampling or sweeping, in antiquity.

Re-floating gave rather small numbers of remains, generally adding few new taxa to the list for the sample. The additional remains certainly did not demand any modifications to the interpretation placed on the sample assemblages. The invertebrate taxa recorded from the site are listed in Table 2.

The assemblages were generally uniform and very restricted, both in the range of taxa recorded and the number of

significantly-represented ecological groups. The results of the investigations are thus tabulated (Table 3) rather than considered in detail assemblage-by-assemblage in the text. A full list of records of fly puparia is presented in Appendix 1, while species lists in rank order and main statistics for the sample assemblages of adult Coleoptera are given in Appendix 2.

The beetle assemblages had a very distinctive general character, a mixture of house fauna and outdoor forms, with a few generalist decomposers (the last never common enough to indicate that they bred in the building). A single species was predominant - the spider beetle *Tipnus unicolor* (Table 3). The only other species represented by more than a few individuals was the small staphylinid *Xylodromus concinnus*.

T. unicolor is a member of the family Ptinidae, a group commonly called spider beetles because of the superficial resemblance of most of them to small spiders. *T. unicolor* is often present in insect death assemblages recovered from archaeological sites in Britain, occasionally forming a substantial proportion of the fauna as at the present site (e.g. in the fills of the Roman well at Skeldergate, York, Hall *et al.* 1980; in deposits formed in a medieval building at Coffee Yard, York, Robertson *et al.* 1989; and in a medieval barrel-well at Worcester, Osborne 1981). There are marked inter-period differences in its abundance, however; *T. unicolor* is frequent in Roman and later medieval assemblages, but almost unknown from the intervening periods. This time distribution may have considerable importance in relation to changing urban conditions, and conversely the beetle may be a significant indicator species. The species is regarded as a typical component of 'house fauna'.

Although widespread in distribution *T. unicolor* does not appear to be very common in nature and is chiefly found in association with man. Fowler (1890), summarizing records in the late 19th century, also regarded it as '...local and as a

rule not common.' In Britain it appears to be commoner towards the North; there is evidence that it prefers fairly low temperatures (Howe 1955). It occurs at least as far north as Angus in the open (Crowson, *in litt.*). In association with people, it has been found in vegetable refuse and sweepings from buildings (Lindroth 1931, 226-7), in mixed cereal and other debris, and grass seed spillage (O'Farrell and Butler 1948, 361). Although favoured by access to free water (Hunter *et al.* 1973) and found especially in damper situations in warehouses where it may be one of the commoner spider beetles, it is not found in obviously wet or rotten material but in mouldy damp debris (O'Farrell and Butler, *loc. cit.*).

While the great majority of published records are indeed from indoors, *T. unicolor* certainly *does* occur in the open. Records from natural habitats are rare and mostly uninformative, offering no clear evidence as to its original habitat or way of life. Fowler (1890) gives '...in old wood etc., occasionally found in birds' nests'; and Joy (1932) '...among old wood'; Hinton (1941) records specimens in the British Museum (Natural History) taken from the nests of house martins (*Delichon urbica*); Linsley (1944) states that it occurs in the nests of house martins and other birds, and classifies it as having both bark and decomposing wood habitats and the nests and food caches of birds and mammals as its possible natural reservoir; Palm (1959) also refers to its occurrence in old birds' nests in hollow trees. Woodroffe (1953) failed to find it in his investigations of birds' nests as a source of pest species, however.

A modern and well authenticated record is given by Crowson (1972), who collected *T. unicolor* in hanging oak woods at Gledswood, Berwickshire. Crowson (*in litt.*) amplifies this record and comments '...the species is one I have found in many open air sites in Scotland, but all of them fairly close to human occupation sites. Its basic requirement seems to be accumulations of dryish organic matter, protected from heavy rain soaking - commonly inside old hollow trees, under

rock overhangs, etc.' ironically, this unpublished record is probably one of the most useful indications as to its synanthropic habitats in the past - in fairly dry litter and rubbish in roof spaces, wall cavities, and the less disturbed corners of floors, of stables as well as domestic and store buildings. At Drum Castle it probably found many suitable slightly damp corners with a little litter throughout the building. The beetle is doubtless primarily an omnivorous scavenger, although there are hints that it can exploit discrete, probably fairly dry, animal droppings (O'Farrell and Butler 1948, 361), and a review of its biology suggests that it is unlikely ever to be more than a minor pest, perhaps best regarded as a commensal.

Xylodromus concinnus was rather abundant in two samples (12 and 20, both from the SE trench). Three individuals were recorded from four other samples (6 and 8 from the cellar, 9 and 34 from the SE trench), and single individuals were noted in four others. It is presumably a predator, and the modern records and its archaeological associates place it firmly as a 'house fauna' species. It is also found in nature, particularly in birds' nests.

Some other house fauna taxa were recorded, but only in small numbers: the human flea *Pulex irritans*; the woodworm beetle *Anobium punctatum*; the spider beetle *Ptinus* sp.; two rather strong synanthropes, *Cryptophagus scutellatus* and *Mycetaea hirta*; and the rather more eurytopic *Cryptophagus* sp., *Atomaria* sp. and *Lathridius minutus* group. All of these are regarded as absolutely typical of the cruder type of building (for example the Anglo-Scandinavian ones at 16-22 Coppergate, York, Kenward and Hall *in press*), but would have found localised habitats in nests, litter and rubbish, as well as stored products, in most houses until the middle of the 20th century.

Similarly, more generalised decomposer beetles were very rare at Drum Castle, always represented by single individuals. The species recorded were all migratory and particularly likely to have occurred in the local 'background fauna' (*sensu*

Kenward 1975; 1976) from semi-natural or synanthropic habitats. The fact that only single specimens of any of these house fauna or generalist decomposer species were found in the samples (with the exception of two *L. minutus* group from Sample 34) must imply rarity of habitat and thus a generally high standard of cleanliness. Further support for this conclusion comes from the rarity of human (or other) fleas, strongly suggesting clean conditions (assuming there was human occupation). No lice were recovered, but this may have been a consequence of preservational conditions (lice are very delicate) or the use to which the hall was put (lice are likely to have been shed in an area where people undressed and cleaned themselves, rather than in the main hall). The only other parasites found were a rat/mouse flea, *Nosopsyllus* sp., from Sample 12 (SE), and an unidentified flea and a sheep ked, *Melophagus ovinus*, from Sample 34 (also SE). The presence of rodent fleas is hardly surprising. The sheep ked is unlikely to indicate that there were live animals in the hall; it is much more likely to have come from wool or fleece.

'Outdoor' species were present in a good proportion of the samples, but always in small numbers (Table 3). Only *Aphodius* species were found repeatedly, as follows: four *A.* sp. and a single *A. ?ater* in Sample 34; two *A.* sp. in Sample 11; two *A. prodromus* in Sample 12; two *A. ?prodromus* in Sample 9; and single individuals of *A.* sp. in seven other samples. The outdoor component seems likely to have had several sources. Much of it may have been background fauna or imported accidentally with floor levelling or trample. *Aphodius* species may migrate in large numbers and their occurrence indoors is not very remarkable if it is assumed (as must be reasonable) that dung of large herbivores was abundant in the environs of the castle.

The fly puparia - especially those of *Calliphora* sp. - indicate rather fouler conditions within the building, but these may have been extremely localised foul spots - waste food, including perhaps bones with flesh on, or faeces (which seem

more likely to have been from dogs or synanthropic rodents rather than humans). The presence of grassy material is also indicated by the flies; Sample 9 produced numerous 'false puparia' of Cecidomyiidae species, and a single specimen was found in Sample 11. There were also weak hints of the presence of cut waterside vegetation from beetles (single individuals of *Limnobaris* sp., probably *pilistriata*, from Samples 8, 12 and 26, from various parts of the site). Much of the outdoor fauna may have been brought, together with these flies and beetles, in material used to sweeten the floor. Cut vegetation may even have been used as fodder if livestock were brought indoors in times of danger, but this is unlikely to be the reason why so many dung beetles were recorded.

There were accumulations of bones in some of the cellar deposits, and it is notable that two of the samples from that part of the site (6B and 8) gave indications of decaying animal matter or carrion from the puparia (Table 2). Whether this represents a cause and its effect is something which cannot be established.

The rarity of the woodworm beetle *Anobium punctatum* is worthy of remark. Fragments of single individuals were recovered from only three samples (12, 20 and 34, all from the SE area of the Hall). This beetle readily infests timber (although how old wood must be for it to invade appears not to be adequately established). If it was present at all, it would be expected that large populations would develop and that it would become as ubiquitous in deposits as at other sites. *A. punctatum* was present in a very large proportion of deposits at Anglo-Scandinavian 16-22 Coppergate, York, for example (Kenward and Hall, in press; Kenward and Large 1995). At Drum Castle it may have been restricted by plastering or painting of exposed timber, or perhaps by smoke deposits, but this is purely speculative.

Overall, then, the insect remains indicate generally clean conditions. The building was reasonably dry, and the floors free of large accumulations of litter or filth. There

were occasional patches of foul matter, but these may have been insignificantly small in human terms, and temporary. This is a picture very much in accord with the grand nature of the structure and the social status of its occupants. A note of caution should be sounded, however; it is just possible that at least some of the insect assemblages examined here represent periods of abandonment, when the structure was colonised by wild animals. Birds, in particular, might have produced the range of habitats required by most of the recorded decomposer beetle and fly species, in their nests, corpses and droppings.

Discussion by phase and layer

Because dating of these deposits was often difficult, and because some of the samples cannot be related clearly to a particular layer (and thus cannot be placed in a phase), discussion of chronological aspects of the invertebrate fauna is necessarily limited. The samples which can be phased are listed in Table 1.

Table 1. Phase and date of samples from Drum Castle analysed for invertebrate remains. SN - sample number; TR - trench

TR	Layer	AOC SN	Phase	Date (c)
NC	13	38	IV	early 16th
NC	3	26 45	I	13th
NE	13	29 36	IV	early 16th
SE	5	21 34	IV	?early 16th
SE	6	10 11 12	?IV	?late 15th

Phase I

Samples 26 and 45 from NC Layer 3, dated to the 13th century, gave beetle assemblages which may have consisted of strays, although there was a slight hint (from a single *Limnobaris* sp.) that cut waterside vegetation may have been strewn. This was supported by the presence in Sample 45 of fly puparia which may have been imported with plant litter. This evidence is by no means conclusive, however.

Phase IV

Three samples (10-12) from Layer 6 in the SE Trench were dated to ?late 15th century. All three included large numbers of *Tipnus unicolor*. This was accompanied in Sample 12 by ten *Xylodromus concinnus* and several other house fauna taxa, notably single individuals of *Anobium punctatum*, *Ptinus* sp., *Cryptophagus scutellatus* and *Mycetaea hirta*. This sample also included some more generalist decomposer beetles (although all in small numbers), and the fly puparia indicated the presence of decaying animal matter, although this may have been in very tiny amounts. All three samples from this layer gave outdoor taxa, too, including plant feeders, dung beetles and aquatics, generally in very small numbers. These may have been strays, but there are weak hints (e.g. from *Hypera* sp. and *Limnobaris* sp. and some of the fly puparia) that there may have been imported cut vegetation. Again, this evidence is not conclusive. A rat/mouse flea (*Nosopsyllus* sp.) was recovered from Sample 12, so rodents were certainly present.

Layer 7 in the SE Trench, dated to ?15th-16th century, was represented by four samples (9, 20, 28 and 50). One of these (20) gave abundant *Tipnus unicolor* and *Xylodromus concinnus*, as well as other house fauna taxa and generalist decomposers, flies indicating at least some faecal or decayed animal matter. There were also probably strays from out-of-doors. Two other samples (9 and 28) gave small beetle assemblages which were probably essentially similar to that from

Sample 20. Sample 50 gave no beetles, but there were fly puparia indicating the presence of decaying animal matter.

The following layers were dated to the early 16th century: 13 in Trench NC (Sample 38); 13 in NE (Samples 29, 36); and 5 in SE (Samples 21 and 34), although dating was provisional in the last case. These samples gave varied insect assemblages. The remains from Sample 38 included numerous *Tipnus unicolor* but little else. Sample 29 produced few remains, while Sample 36 from the same deposit gave a very small house fauna group. Sample 21 contained a few *T. unicolor* and little else, but Sample 34 (from the same deposit) yielded large numbers of *T. unicolor*. Other beetle remains from this sample were mostly house fauna, but there were also several dung beetles and a water beetle (*Helophorus* sp.), perhaps strays. Fly puparia indicated at least some faecal or decaying animal matter. There was a single sheep ked (*Melophagus ovinus*), perhaps from fleece or wool cleaning.

The insect assemblages from these samples from Phase IV are perhaps best interpreted as indicating human occupation, but the caveat above must be re-emphasised - it is possible that these remains accumulated during a phase of abandonment, the fauna exploiting nests, droppings and corpses of birds, perhaps pigeons or owls. Predators may have introduced the rat/mouse flea with their prey. Other birds (e.g. starlings) might have introduced insect in droppings, the dung beetles being likely candidates in this respect, although the condition of the remains did not suggest this (*cf.* Kenward 1976). Under such conditions a wider range of outdoor forms might be expected to be present, perhaps together with more species characteristic of birds' nests, including parasites. It would be unwise to draw a categorical conclusion from the insect evidence alone; integration with the results of other investigations is essential.

Archive

All extracted fossils and flots are currently stored in the Environmental Archaeology Unit, University of York, along with paper and electronic records pertaining to the work described here.

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Table 2. Complete list of invertebrate taxa recorded from Drum Castle. Nomenclature follows Kloet and Hincks (1964-77). Adults unless stated, except for Diptera, which are puparia unless stated. Three taxa (marked + below) were added to the list from reprocessed material and are not included in Appendix 2.

OLIGOCHAETA	<i>Agabus ?bipustulatus</i> (Linnaeus)
Oligochaeta sp. (egg capsule)	<i>Helophorus</i> sp.
	<i>Cercyon</i> sp.
INSECTA	<i>Megasternum obscurum</i> (Marsham)
	Histeridae sp.
DERMAPTERA	<i>Catops</i> sp.
Dermaptera sp.	<i>Aclypea opaca</i> (Linnaeus)
	Silphidae sp.
DIPTERA	<i>Phyllodrepa</i> sp.
Pedicidae sp. (larva)	<i>Omalium</i> sp.
Bibionidae sp. (adult)	<i>Xylodromus concinnus</i> (Marsham)
Sciaridae sp.	<i>Carpelimus ?fuliginosus</i> (Gravenhorst)
Cecidomyiidae sp. (false puparium)	<i>Anotylus complanatus</i> (Erichson)
Phoridae sp., perhaps <i>Megaselia</i>	<i>Anotylus rugosus</i> (Fabricius)
Phoridae sp. indet.	<i>Anotylus tetracarينات</i> (Block)
?Psilidae sp., perhaps <i>Psilia rosae</i> group	<i>Gyrophypnus</i> sp.
Heleomyza sp.	<i>Xantholinus</i> sp.
Heleomyzidae sp.	<i>Philonthus</i> sp.
Heleomyzidae sp., perhaps <i>Heleomyza</i>	? <i>Staphylinus</i> sp.
<i>Sepsis</i> sp.	<i>Quedius</i> sp.
Sphaeroceridae sp., perhaps <i>Telomerina flavipes</i>	Staphylininae sp.
Limosinini sp.	<i>Aleochara</i> sp.
<i>Piophilidae</i> sp.	Aleocharinae spp.
<i>Meonura</i> sp.	<i>Geotrupes</i> sp.
Chloropidae sp..	<i>Aphodius ?ater</i> (Degeer)
<i>Calliphora</i> sp.	<i>Aphodius prodromus</i> (Brahm)
Anthomyiidae sp.	<i>Aphodius</i> sp. indet.
<i>Scathophaga</i> sp.	<i>Phyllopertha horticola</i> (Linnaeus) +
<i>Fannia scalaris</i> (Fabricius)	?Scarabaeidae sp.
<i>Fannia</i> sp.	<i>Agriotes obscurus</i> (Linnaeus) +
<i>Hydrotaea</i> or <i>Spilogona</i> sp.	Elateridae sp.
<i>Melophagus ovinus</i> (Linnaeus) (adult)	<i>Grynobius planus</i> (Fabricius) +
Diptera spp. indet.	<i>Anobium punctatum</i> (Degeer)
Diptera sp. indet. (larva)	<i>Tipnus unicolor</i> (Piller and Mitterpacher)
Diptera spp. indet. (adult)	<i>Ptinus</i> sp.
	<i>Cryptophagus scutellatus</i> Newman
	<i>Cryptophagus</i> sp.
SIPHONAPTERA	<i>Atomaria</i> sp.
<i>Pulex irritans</i> Linnaeus	<i>Mycetaea hirta</i> (Marsham)
<i>Nosopsyllus</i> sp.	<i>Lathridius minutus</i> (Linnaeus) group
Siphonaptera sp.	Chrysomelinae sp.
	<i>Otiorhynchus</i> sp.
COLEOPTERA	<i>Hypera</i> sp.
<i>Dyschirius globosus</i> (Herbst)	<i>Limnobaris</i> sp.
<i>Trechus</i> sp.	Curculionidae sp. indet.
<i>Calathus fuscipes</i> (Goeze)	Coleoptera spp. and spp. indet.
? <i>Calathus</i> sp. indet.	Coleoptera sp. (larva)
? <i>Harpalus</i> sp.	
Carabidae sp.	

HYMENOPTERA

Apis mellifera Linnaeus

Hymenoptera Aculeata sp.

Hymenoptera sp.

ARACHNIDA

Acarina sp.

Aranae sp.

Table 3. Summary account of invertebrate remains from Laird's Hall, Drum Castle.

Percentages not given as assemblages too small for meaningful values. Numbers following names are number of individuals. Samples numbers are those used by AOC, taken from a concordance supplied by them. 'Several' and 'many' are used in semiquantitative sense following Kenward et al. (1986) and Kenward (1992): Key: N - number of individuals; NOB - number of certain-plus-probable 'outdoor' individuals; S - number of taxa; SN - sample number; T. unic - number of *Tipnus unicolor*; # - N included semi-quantitative estimate of numbers of *Tipnus unicolor* (see T. unicolor column for very approximate estimate of actual numbers).

Samples from the cellar

Location	SN	Adult beetle and bug assemblage				Comments	Other invertebrates
		N	S	NOB	T. unic		
rat-hole to side of feature J	6B	11	4	0	6	Entirely 'house fauna'	Many mites and adult flies. Indications from fly puparia of decaying animal matter, i.e. carrion. <i>Meonura</i> spp. are often associated with bird droppings.
fill of feature L	6C	-	-	-	-	-	A single <i>Meonura</i> sp.
SW area	7	3	1	0	3	Only <i>T. unicolor</i>	None
SW area, West trial	8	12	7	2	1	<i>Limnobaris</i> sp. (1) from waterside	Many fly puparia; indications of faecal or decaying animal matter, i.e. carrion. <i>Meonura</i> spp. are often associated with bird droppings.
N/S trial, base of hollow N	32	2	2	0	1	Second species <i>Lathridius minutus</i> group (1), coded rd	Two puparia only.

Samples from the upper hall

Area, layer and other details	SN	Adult beetle and bug assemblage					Other invertebrates
		N	S	NOB	<i>T. unic</i>	Comments	
North-West Trench (NW)							
NW vault packing	51	1	1	1	0	A single unidentified ground beetle	Several mites and a beetle larva
North-central Trench (NC=N)							
N 13	38	19 #	5	1	many (about 30)	Other taxa include house fauna (1)	Very few
N central top of 3	26	5	5	3	0	Perhaps all strays or imported in cut waterside vegetation (<i>Limnobaris</i> , 1)	Only earthworm egg capsules (3)
N 3	45	5	5	1	1	Hints of fauna from outside	A few, including a beetle larva and some fly puparia. Perhaps includes flies imported with plant litter.
N W trial trench, second layer in W section	54	9 #	4	0	several	Probably all from domestic decomposer habitats	A single mite and many fly puparia which as a group suggest foul matter, probably with excrement
N area, trial trench, from near top of vault crown	58	5	1	0	5		Few other remains but including a honeybee (<i>Apis mellifera</i>)
North-East Trench							
NE 13	29	2	2	0	1	Other individual an unidentified beetle	Only a single earthworm egg capsule
NE 13	36	7	5	0	3	Identifiable remains house fauna	A few remains including fly puparia (3) South-East Trench
SE 5	21	5	3	0	3	Other remains were <i>Atomaria</i> sp. (1, coded rd) and an unidentifiable beetle	

Area, layer and other details	SN	Adult beetle and bug assemblage					Other invertebrates
		N	S	NOB	<i>T. unic</i>	Comments	
SE 5 passageway over 6	34	39 #	19	9	many (over 50)	Mostly house fauna. Also <i>Aphodius</i> dung beetle (4), <i>A. ater</i> (1), a water beetle (<i>Helophorus</i> , 1), perhaps accidentals	A few remains, including fly puparia (with indications of faecal or decaying animal matter), an adult <i>Melophagus ovinus</i> (sheep ked), and an unidentified flea.
SE 6 under 5	10	21 #	7	4	many (about 80)	Fauna from outdoor habitats mixed, including dung beetle (<i>Aphodius</i> , 1) and water beetle (<i>Agabus</i> , 1)	None
SE 6	11	22 #	7	3	many (about 50)	<i>Aphodius</i> (2), <i>Helophorus</i> (1), two typical house fauna taxa and two unidentified beetles	Fly puparia (2; indications of grass) and a hymenopteran
SE 6 feature B, between stones of screen	12	51 #	26	9	many (about 50)	<i>Xylodromus concinnus</i> (10) and single individuals of several house fauna taxa. Variety of more generalised decomposers. Outdoor forms probably mostly strays but <i>Hypera</i> and <i>Limnobaris</i> perhaps in cut vegetation?	Variety of remains including several fly larvae and puparia (with evidence of decaying animal matter, i.e. carrion) and <i>Nosopsyllus</i> sp., a rat and mouse flea
SE 7 under layer 16	9	14 #	6	3	several	Other remains included <i>Xylodromus concinnus</i> (3), <i>Aphodius</i> ? <i>prodromus</i> (2)	Several mites and earthworm egg capsules, many fly puparia (grass was present) and a few others
SE 7 passageway	28	13 #	8	3	several	House fauna and outdoor forms likely to be strays	None
SE 7 passageway balk	20	41 #	15	3	many (over 60)	<i>Xylodromus concinnus</i> (12), other house fauna taxa, a few more generalist decomposers, and outdoor forms likely to be strays, including <i>Aphodius</i> (1) and <i>Geotrupes</i> (1)	Several beetle larvae and mites, many fly puparia (indications of faecal or decaying animal matter), and a few others

Area, layer and other details	SN	Adult beetle and bug assemblage				Comments	Other invertebrates
		N	S	NOB	<i>T. unic</i>		
SE 7	50	0	0	0	0	None	Fly puparia only (several, strongly indicating decaying animal matter, i.e. carrion)
SE possible daub/clay	27	10 #	5	0	several	House fauna and a generalist decomposer	Fly puparia (3)
SE passageway	33	22 #	8	3	many (over 20)	Other taxa of mixed origins, perhaps strays or imports	A few remains including <i>Pulex irritans</i> , the human flea
SE wood at passage 'door', screen	55	4	2	0	3	Other taxon <i>Ptinus</i> sp.	Only a single beetle larva

Appendix 1. Details of records of fly puparia

Records are given in sample number order and refer to puparia unless otherwise stated

Sample 6b

Fannia ?scalaris (adult female)

?*Calliphora* sp. (2)

Meonura sp. (many)

Indications of decaying animal matter, i.e. carrion. *Meonura* spp. are often associated with bird droppings.

Sample 6c

Meonura sp. (1)

Indications of faecal or decaying animal matter.

Sample 8

Meonura sp. (many)

Indications of faecal or decaying animal matter, i.e. carrion. *Meonura* spp. are often associated with bird droppings.

Sample 9

Cecidomyiidae sp. (false puparium) (many)

?Chloropidae sp. (1)

Anthomyiidae sp. (1)

Bibionidae sp. (adult male)

Grass was present.

Sample 10

Phoridae sp.

Piophilidae sp.

Sample 11

Cecidomyiidae sp. (false puparium, 1)

Diptera sp. indet.

Indications of grass.

Sample 12

Fannia ?scalaris (1)

Calliphora sp. (7)

Definitely decaying animal matter, i.e. carrion.

Sample 20

Fannia scalaris (many)

Phoridae sp. (6)

Heleomyza sp. (1)

Limosininae sp. (2)

Indications of faecal or decaying animal matter.

Sample 27

Sciaridae sp. (female adult, 1)

Fannia sp. (1)

Sample 34

Heleomyza sp. (2)

Heleomyzidae sp.

Fannia sp. (1)

Indications of faecal or decaying animal matter.

Sample 36

Sepsis sp. (2)

Sample 45

Pedicidae sp. (1 larval head capsule)

?Psilidae sp. , perhaps *Psilia rosae* group (1)

?*Scathophaga* sp. (1)

?Chloropidae sp. (1)

Hydrotaea or *Spilogona* sp. (1)

Phoridae sp.

Spp. indet.

Perhaps includes flies imported with plant litter.

Sample 46

Diptera sp. indet.

Sample 50

Calliphora sp. (many)

Definitely decaying animal matter, i.e. carrion.

Sample 54

Heleomyzidae sp., perhaps *Heleomyza* (8)

Sphaeroceridae sp., perhaps *Telomerina flavipes*
(6)

Phoridae sp., perhaps *Megaselia* (2)

Scathophaga sp. pupal fragments

As a group suggest foul matter, probably with excrement.

Sample 58

Scathophaga sp. (1)

Appendix 2. Details of beetle and bug assemblages

Main statistics and species lists in rank order for the assemblages of adult Coleoptera from Drum Castle, Aberdeenshire. Nomenclature follows Kloet and Hincks (1964-7). Main statistics (other than S and N) are given only where N was greater than 9.

Site: 230 Context: 0 Sample: 6/T - beetle/bug main statistics

Number of individuals estimated as N = 11
 Number of taxa S = 4
 Index of diversity not calculated, n = s or n < 20
 Number of 'certain' outdoor taxa SOA = 0
 Percentage of 'certain' outdoor taxa %SOA = 0
 Number of 'certain' outdoor individuals NOA = 0
 Percentage of 'certain' outdoor individuals %NOA = 0
 Number of 'certain' and probable outdoor taxa SOB = 0
 Percentage of 'certain' and probable outdoor taxa %SOB = 0
 Number of 'certain' and probable outdoor individuals NOB = 0
 Percentage 'certain' and probable outdoor individuals %NOB = 0
 Diversity index for OB not calculated, NOB = SOB or NOB < 20
 Number of aquatic taxa SW = 0
 Percentage of aquatic taxa %SW = 0
 Number of aquatic individuals NW = 0
 Percentage of aquatic individuals %NW = 0
 Number of damp ground/waterside taxa SD = 0
 Percentage of damp ground/waterside taxa %SD = 0
 Number of damp ground/waterside individuals ND = 0
 Percentage of damp ground/waterside individuals %ND = 0
 Number of strongly plant-associated taxa SP = 0
 Percentage of strongly plant-associated taxa %SP = 0
 Number of strongly plant-associated individuals NP = 0
 Percentage of strongly plant-associated individuals %NP = 0
 Number of heathland/moorland taxa SM = 0
 Percentage of heathland/moorland taxa %SM = 0
 Number of heathland/moorland individuals NM = 0
 Percentage of heathland/moorland individuals %NM = 0
 Number of wood-associated taxa SL = 0
 Percentage of wood-associated taxa %SL = 0
 Number of wood-associated individuals NL = 0
 Percentage of wood-associated individuals %NL = 0
 Number of decomposer taxa SRT = 4
 Percentage of decomposer taxa %SRT = 100
 Number of decomposer individuals NRT = 11
 Percentage of decomposer individuals %NRT = 100
 Number of 'dry' decomposer taxa SRD = 3
 Percentage of 'dry' decomposer taxa %SRD = 75
 Number of 'dry' decomposer individuals NRD = 8
 Percentage of 'dry' decomposer individuals %NRD = 73
 Number of 'foul' decomposer taxa SRF = 0
 Percentage of 'foul' decomposer taxa %SRF = 0
 Number of 'foul' decomposer individuals NRF = 0
 Percentage of 'foul' decomposer individuals %NRF = 0
 Diversity index for RT not calculated, NRT = SRT or NRT < 20
 Number of individuals of grain pests NG = 0
 Percentage of individuals of grain pests %NG = 0
 Number of individuals of grain pests NG = 0
 Number of uncoded taxa SU = 0
 Percentage of uncoded individuals PNU = 0

Diversity index for OB not calculated, NOB = SOB or NOB < 20
 Number of aquatic taxa SW = 0
 Percentage of aquatic taxa %SW = 0
 Number of aquatic individuals NW = 0
 Percentage of aquatic individuals %NW = 0
 Number of damp ground/waterside taxa SD = 1
 Percentage of damp ground/waterside taxa %SD = 14
 Number of damp ground/waterside individuals ND = 1
 Percentage of damp ground/waterside individuals %ND = 8
 Number of strongly plant-associated taxa SP = 1
 Percentage of strongly plant-associated taxa %SP = 14
 Number of strongly plant-associated individuals NP = 1
 Percentage of strongly plant-associated individuals %NP = 8
 Number of heathland/moorland taxa SM = 0
 Percentage of heathland/moorland taxa %SM = 0
 Number of wood-associated taxa SL = 0
 Percentage of wood-associated taxa %NL = 0
 Number of decomposer taxa SRT = 5
 Percentage of decomposer taxa %SRT = 71
 Number of decomposer individuals NRT = 10
 Percentage of decomposer individuals %NRT = 83
 Number of 'dry' decomposer taxa SRD = 4
 Percentage of 'dry' decomposer taxa %SRD = 57
 Number of 'dry' decomposer individuals NRD = 7
 Percentage of 'dry' decomposer individuals %NRD = 58
 Number of 'foul' decomposer taxa SRF = 0
 Percentage of 'foul' decomposer taxa %SRF = 0
 Number of 'foul' decomposer individuals NRF = 0
 Percentage of 'foul' decomposer individuals %NRF = 0
 Diversity index for RT not calculated, NRT = SRT or NRT < 20
 Number of individuals of grain pests NG = 0
 Percentage of individuals of grain pests %NG = 0
 Number of individuals of grain pests NG = 0
 Number of uncoded taxa SU = 0
 Percentage of uncoded individuals PNU = 0

Site: 230 Context: 0 Sample: 8/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Xylodromus concinnus (Marshall)	3	25	1 rt s
Cryptophagus sp.	3	25	1 rd
Ptinus sp.	2	17	3 rd
?Calathus sp.	1	8	4 oa
Tipnus unicolor (Piller & Mitterpacher)	1	8	4 rd s
Lathridius minutus group	1	8	4 rd s
Limnobaris sp.	1	8	4 oa p

Site: 230 Context: 0 Sample: 6/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)	6	55	1 rd s
Xylodromus concinnus (Marshall)	3	27	2 rt s
Cryptophagus sp.	1	9	3 rd
Lathridius minutus group	1	9	3 rd s

Site: 230 Context: 0 Sample: 9/T - beetle/bug main statistics

Number of individuals estimated as N = 14
 Number of taxa S = 6
 Index of diversity not calculated, n = s or n < 20
 Number of 'certain' outdoor taxa SOA = 0
 Percentage of 'certain' outdoor taxa %SOA = 0
 Number of 'certain' outdoor individuals NOA = 0
 Percentage of 'certain' outdoor individuals %NOA = 0
 Number of 'certain' and probable outdoor taxa SOB = 2
 Percentage of 'certain' and probable outdoor taxa %SOB = 33
 Number of 'certain' and probable outdoor individuals NOB = 3
 Percentage 'certain' and probable outdoor individuals %NOB = 21
 Diversity index for OB not calculated, NOB = SOB or NOB < 20
 Number of aquatic taxa SW = 0
 Percentage of aquatic taxa %SW = 0
 Number of aquatic individuals NW = 0
 Percentage of aquatic individuals %NW = 0
 Number of damp ground/waterside taxa SD = 0
 Percentage of damp ground/waterside taxa %SD = 0
 Number of damp ground/waterside individuals ND = 0
 Percentage of damp ground/waterside individuals %ND = 0
 Number of strongly plant-associated taxa SP = 0
 Percentage of strongly plant-associated taxa %SP = 0
 Number of strongly plant-associated individuals NP = 0
 Percentage of strongly plant-associated individuals %NP = 0
 Number of heathland/moorland taxa SM = 0
 Percentage of heathland/moorland taxa %SM = 0
 Number of heathland/moorland individuals NM = 0
 Percentage of heathland/moorland individuals %NM = 0
 Number of wood-associated taxa SL = 0
 Percentage of wood-associated taxa %NL = 0
 Number of wood-associated individuals NL = 0
 Percentage of wood-associated individuals %NL = 0
 Number of decomposer taxa SRT = 3
 Percentage of decomposer taxa %SRT = 50
 Number of decomposer individuals NRT = 11
 Percentage of decomposer individuals %NRT = 79

Site: 230 Context: 0 Sample: 7/T - beetle/bug main statistics

Number of individuals estimated as N = 3
 Number of taxa S = 1

Site: 230 Context: 0 Sample: 7/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)	3	100	1 rd s

Site: 230 Context: 0 Sample: 8/T - beetle/bug main statistics

Number of individuals estimated as N = 12
 Number of taxa S = 7
 Index of diversity not calculated, n = s or n < 20
 Number of 'certain' outdoor taxa SOA = 2
 Percentage of 'certain' outdoor taxa %SOA = 29
 Number of 'certain' outdoor individuals NOA = 2
 Percentage of 'certain' outdoor individuals %NOA = 17
 Number of 'certain' and probable outdoor taxa SOB = 2
 Percentage of 'certain' and probable outdoor taxa %SOB = 29
 Number of 'certain' and probable outdoor individuals NOB = 2
 Percentage 'certain' and probable outdoor individuals %NOB = 17

Number of 'dry' decomposer taxa	SRD =	1
Percentage of 'dry' decomposer taxa	%SRD =	17
Number of 'dry' decomposer individuals	NRD =	6
Percentage of 'dry' decomposer individuals	%NRD =	43
Number of 'foul' decomposer taxa	SRF =	1
Percentage of 'foul' decomposer taxa	%SRF =	17
Number of 'foul' decomposer individuals	NRF =	2
Percentage of 'foul' decomposer individuals	%NRF =	14
Diversity index for RT not calculated, NRT = SRT or NRT < 20		
Number of individuals of grain pests	NG =	0
Percentage of individuals of grain pests	%NG =	0
Number of individuals of grain pests	NG =	0
Number of uncoded taxa	SU =	2
Percentage of uncoded individuals	PNU =	14

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)*	15	71	1 rd s
?Harpalus sp.	1	5	2 oa
Agabus ?bipustulatus (Linnaeus)	1	5	2 oa w
?Staphylinus sp.	1	5	2 u
Staphylininae sp.	1	5	2 u
Aphodius sp.	1	5	2 ob rf
Curculionidae sp.	1	5	2 oa

Site: 230 Context: 0 Sample: 11/T - beetle/bug main statistics

Number of individuals estimated as	N =	22
Number of taxa	S =	7
Index of diversity (alpha)	alpha =	4
Standard error of alpha	SE alpha =	1
Number of 'certain' outdoor taxa	SOA =	1
Percentage of 'certain' outdoor taxa	%SOA =	14
Number of 'certain' outdoor individuals	NOA =	1
Percentage of 'certain' outdoor individuals	%NOA =	5
Number of 'certain' and probable outdoor taxa	SOB =	2
Percentage of 'certain' and probable outdoor taxa	%SOB =	29
Number of 'certain' and probable outdoor individuals	NOB =	3
Percentage 'certain' and probable outdoor individuals	%NOB =	14
Diversity index for OB not calculated, NOB = SOB or NOB < 20		
Number of aquatic taxa	SW =	1
Percentage of aquatic taxa	%SW =	14
Number of aquatic individuals	NW =	1
Percentage of aquatic individuals	%NW =	5
Number of damp ground/waterside taxa	SD =	0
Percentage of damp ground/waterside taxa	%SD =	0
Number of damp ground/waterside individuals	ND =	0
Percentage of damp ground/waterside individuals	%ND =	0
Number of strongly plant-associated taxa	SP =	0
Percentage of strongly plant-associated taxa	%SP =	0
Number of strongly plant-associated individuals	NP =	0
Percentage of strongly plant-associated individuals	%NP =	0
Number of heathland/moorland taxa	SM =	0
Number of heathland/moorland individuals	NM =	0
Percentage of heathland/moorland individuals	%NM =	0
Number of wood-associated taxa	SL =	0
Number of wood-associated individuals	NL =	0
Percentage of wood-associated individuals	%NL =	0
Number of decomposer taxa	SRT =	4
Percentage of decomposer taxa	%SRT =	57
Number of decomposer individuals	NRT =	19
Percentage of decomposer individuals	%NRT =	86
Number of 'dry' decomposer taxa	SRD =	3
Percentage of 'dry' decomposer taxa	%SRD =	43
Number of 'dry' decomposer individuals	NRD =	17
Percentage of 'dry' decomposer individuals	%NRD =	77
Number of 'foul' decomposer taxa	SRF =	1
Percentage of 'foul' decomposer taxa	%SRF =	14
Number of 'foul' decomposer individuals	NRF =	2
Percentage of 'foul' decomposer individuals	%NRF =	9
Diversity index for RT not calculated, NRT = SRT or NRT < 20		
Number of individuals of grain pests	NG =	0
Percentage of individuals of grain pests	%NG =	0
Number of individuals of grain pests	NG =	0
Number of uncoded taxa	SU =	2
Percentage of uncoded individuals	PNU =	9

Site: 230 Context: 0 Sample: 11/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)*	15	68	1 rd s
Aphodius sp.	2	9	2 ob rf
Helophorus sp.	1	5	3 oa w
Cryptophagus sp.	1	5	3 rd
Mycetaea hirta (Marsham)	1	5	3 rd s
Coleoptera sp. A	1	5	3 u
Coleoptera sp. B	1	5	3 u

Site: 230 Context: 0 Sample: 12/T - beetle/bug main statistics

Number of individuals estimated as	N =	51
Number of taxa	S =	26
Index of diversity (alpha)	alpha =	21
Standard error of alpha	SE alpha =	5
Number of 'certain' outdoor taxa	SOA =	5

Site: 230 Context: 0 Sample: 9/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)*	6	43	1 rd s
Xylochromus concinnus (Marsham)	3	21	2 rt s
Aphodius ?prodrum (Brahm)	2	14	3 ob rf
?Scarabaeidae sp.	1	7	4 u
?Elateridae sp.	1	7	4 ob
Coleoptera sp. A	1	7	4 u

Site: 230 Context: 0 Sample: 10/T - beetle/bug main statistics

Number of individuals estimated as	N =	21
Number of taxa	S =	7
Index of diversity (alpha)	alpha =	4
Standard error of alpha	SE alpha =	1
Number of 'certain' outdoor taxa	SOA =	3
Percentage of 'certain' outdoor taxa	%SOA =	43
Number of 'certain' outdoor individuals	NOA =	3
Percentage of 'certain' outdoor individuals	%NOA =	14
Number of 'certain' and probable outdoor taxa	SOB =	4
Percentage of 'certain' and probable outdoor taxa	%SOB =	57
Number of 'certain' and probable outdoor individuals	NOB =	4
Percentage 'certain' and probable outdoor individuals	%NOB =	19
Diversity index for OB not calculated, NOB = SOB or NOB < 20		
Number of aquatic taxa	SW =	1
Percentage of aquatic taxa	%SW =	14
Number of aquatic individuals	NW =	1
Percentage of aquatic individuals	%NW =	5
Number of damp ground/waterside taxa	SD =	0
Percentage of damp ground/waterside taxa	%SD =	0
Number of damp ground/waterside individuals	ND =	0
Percentage of damp ground/waterside individuals	%ND =	0
Number of strongly plant-associated taxa	SP =	0
Percentage of strongly plant-associated taxa	%SP =	0
Number of strongly plant-associated individuals	NP =	0
Percentage of strongly plant-associated individuals	%NP =	0
Number of heathland/moorland taxa	SM =	0
Number of heathland/moorland individuals	NM =	0
Percentage of heathland/moorland individuals	%NM =	0
Number of wood-associated taxa	SL =	0
Number of wood-associated individuals	NL =	0
Percentage of wood-associated individuals	%NL =	0
Number of decomposer taxa	SRT =	2
Percentage of decomposer taxa	%SRT =	29
Number of decomposer individuals	NRT =	16
Percentage of decomposer individuals	%NRT =	76
Number of 'dry' decomposer taxa	SRD =	1
Percentage of 'dry' decomposer taxa	%SRD =	14
Number of 'dry' decomposer individuals	NRD =	15
Percentage of 'dry' decomposer individuals	%NRD =	71
Number of 'foul' decomposer taxa	SRF =	1
Percentage of 'foul' decomposer taxa	%SRF =	14
Number of 'foul' decomposer individuals	NRF =	1
Percentage of 'foul' decomposer individuals	%NRF =	5
Diversity index for RT not calculated, NRT = SRT or NRT < 20		
Number of individuals of grain pests	NG =	0
Percentage of individuals of grain pests	%NG =	0
Number of individuals of grain pests	NG =	0
Number of uncoded taxa	SU =	2
Percentage of uncoded individuals	PNU =	10

Site: 230 Context: 0 Sample: 10/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Percentage of 'certain' outdoor taxa	%SOA =	19
Number of 'certain' outdoor individuals	NOA =	5
Percentage of 'certain' outdoor individuals	%NOA =	10
Number of 'certain' and probable outdoor taxa	SOB =	8
Percentage of 'certain' and probable outdoor taxa	%SOB =	31
Number of 'certain' and probable outdoor individuals	NOB =	9
Percentage 'certain' and probable outdoor individuals	%NOB =	18
Diversity index for OB not calculated, NOB = SOB or NOB < 20		
Number of aquatic taxa	SW =	0
Percentage of aquatic taxa	%SW =	0
Number of aquatic individuals	NW =	0
Percentage of aquatic individuals	%NW =	0
Number of damp ground/waterside taxa	SD =	1
Percentage of damp ground/waterside taxa	%SD =	4
Number of damp ground/waterside individuals	ND =	1
Percentage of damp ground/waterside individuals	%ND =	2
Number of strongly plant-associated taxa	SP =	4
Percentage of strongly plant-associated taxa	%SP =	15
Number of strongly plant-associated individuals	NP =	4
Percentage of strongly plant-associated individuals	%NP =	8
Number of heathland/moorland taxa	SM =	0
Percentage of heathland/moorland taxa	%SM =	0
Number of heathland/moorland individuals	NM =	0
Percentage of heathland/moorland individuals	%NM =	0
Number of wood-associated taxa	SL =	1
Percentage of wood-associated taxa	%SL =	1
Number of wood-associated individuals	NL =	1
Percentage of wood-associated individuals	%NL =	2
Number of decomposer taxa	SRT =	14
Percentage of decomposer taxa	%SRT =	54
Number of decomposer individuals	NRT =	38
Percentage of decomposer individuals	%NRT =	75
Number of 'dry' decomposer taxa	SRD =	6
Percentage of 'dry' decomposer taxa	%SRD =	23
Number of 'dry' decomposer individuals	NRD =	20
Percentage of 'dry' decomposer individuals	%NRD =	39
Number of 'foul' decomposer taxa	SRF =	3
Percentage of 'foul' decomposer taxa	%SRF =	12
Number of 'foul' decomposer individuals	NRF =	4
Percentage of 'foul' decomposer individuals	%NRF =	8
Index of diversity of decomposer component	alpha RT =	8
Standard error	SE alpha RT =	2
Number of individuals of grain pests	NG =	0
Percentage of individuals of grain pests	%NG =	0
Number of individuals of grain pests	NU =	0
Percentage of uncoded taxa	SU =	6
Number of uncoded individuals	PNU =	14

Number of 'certain' outdoor taxa	SOA =	1
Percentage of 'certain' outdoor taxa	%SOA =	7
Number of 'certain' outdoor individuals	NOA =	1
Percentage of 'certain' outdoor individuals	%NOA =	2
Number of 'certain' and probable outdoor taxa	SOB =	3
Percentage of 'certain' and probable outdoor taxa	%SOB =	20
Number of 'certain' and probable outdoor individuals	NOB =	3
Percentage 'certain' and probable outdoor individuals	%NOB =	7
Diversity index for OB not calculated, NOB = SOB or NOB < 20		
Number of aquatic taxa	SW =	0
Percentage of aquatic taxa	%SW =	0
Number of aquatic individuals	NW =	0
Percentage of aquatic individuals	%NW =	0
Number of damp ground/waterside taxa	SD =	0
Percentage of damp ground/waterside taxa	%SD =	0
Number of damp ground/waterside individuals	ND =	0
Percentage of damp ground/waterside individuals	%ND =	0
Number of strongly plant-associated taxa	SP =	0
Percentage of strongly plant-associated taxa	%SP =	0
Number of strongly plant-associated individuals	NP =	0
Percentage of strongly plant-associated individuals	%NP =	0
Number of heathland/moorland taxa	SM =	0
Percentage of heathland/moorland taxa	%SM =	0
Number of heathland/moorland individuals	NM =	0
Percentage of heathland/moorland individuals	%NM =	0
Number of wood-associated taxa	SL =	1
Percentage of wood-associated taxa	%SL =	1
Number of wood-associated individuals	NL =	1
Percentage of wood-associated individuals	%NL =	2
Number of decomposer taxa	SRT =	10
Percentage of decomposer taxa	%SRT =	67
Number of decomposer individuals	NRT =	36
Percentage of decomposer individuals	%NRT =	88
Number of 'dry' decomposer taxa	SRD =	6
Percentage of 'dry' decomposer taxa	%SRD =	40
Number of 'dry' decomposer individuals	NRD =	21
Percentage of 'dry' decomposer individuals	%NRD =	51
Number of 'foul' decomposer taxa	SRF =	2
Percentage of 'foul' decomposer taxa	%SRF =	13
Number of 'foul' decomposer individuals	NRF =	2
Percentage of 'foul' decomposer individuals	%NRF =	5
Index of diversity of decomposer component	alpha RT =	5
Standard error	SE alpha RT =	1
Number of individuals of grain pests	NG =	0
Percentage of individuals of grain pests	%NG =	0
Number of individuals of grain pests	NU =	0
Percentage of uncoded taxa	SU =	3
Number of uncoded individuals	PNU =	7

Site: 230 Context: 0 Sample: 12/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)*	15	29	1 rd s
Xylodromus concinnus (Marsham)	10	20	2 rt s
Carpelimus ?fuliginosus (Gravenhorst)	2	4	3 u s
Aphodius prodromus (Brahm)	2	4	3 ob rf
Trechus sp.	1	2	5 ob
Silphidae sp.	1	2	5 u
?Phyllodrepa sp.	1	2	5 rt
Anotylus complanatus (Erichson)	1	2	5 rt
Anotylus rugosus (Fabricius)	1	2	5 rt
Anotylus tetracarlinatus (Block)	1	2	5 rt
Xantholinus sp.	1	2	5 u
Aleochara sp.	1	2	5 u
Aleocharinae sp.	1	2	5 u
?Geotrupes sp.	1	2	5 oa rf
Aphodius sp.	1	2	5 ob rf
Anobium punctatum (Degeer)	1	2	5 l s
Ptinus sp.	1	2	5 rd
Cryptophagus scutellatus Newman	1	2	5 rd s
Atomaria sp.	1	2	5 rd
Mycetaea hirta (Marsham)	1	2	5 rd s
Lathridius minutus group	1	2	5 rd s
Chrysomelinae sp.	1	2	5 oa p
?Otiorynchus sp.	1	2	5 oa p
Hypera sp.	1	2	5 oa p
Limnobaris sp.	1	2	5 oa p
d			
Coleoptera sp.	1	2	5 u

Site: 230 Context: 0 Sample: 20/T - beetle/bug main statistics

Number of individuals estimated as	N =	41
Number of taxa	S =	15
Index of diversity (alpha)	alpha =	9
Standard error of alpha	SE alpha =	2

Site: 230 Context: 0 Sample: 20/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)*	15	37	1 rd s
Xylodromus concinnus (Marsham)	12	29	2 rt s
Ptinus sp.	2	5	3 rd
Carabidae sp.	1	2	4 ob
Megasternum obscurum (Marsham)	1	2	4 rt
Philonthus sp.	1	2	4 u
Quedius sp.	1	2	4 u
Aleocharinae sp.	1	2	4 u
Geotrupes sp.	1	2	4 oa rf
Aphodius sp.	1	2	4 ob rf
Anobium punctatum (Degeer)	1	2	4 l s
Cryptophagus scutellatus Newman	1	2	4 rd s
Cryptophagus sp.	1	2	4 rd
Atomaria sp.	1	2	4 rd
Lathridius minutus group	1	2	4 rd s

Site: 230 Context: 0 Sample: 21/T - beetle/bug main statistics

Number of individuals estimated as	N =	5
Number of taxa	S =	3

Site: 230 Context: 0 Sample: 21/T - species list in rank order

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)	3	60	1 rd s
Atomaria sp.	1	20	2 rd
Coleoptera sp.	1	20	2 u

Site: 230 Context: 0 Sample: 26/t - beetle/bug main statistics

Number of individuals estimated as N = 5
 Number of taxa S = 5

Site: 230 Context: 0 Sample: 26/t - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Staphylininae sp.	1	20	1 u
Aphodius sp.	1	20	1 ob rf
Elateridae sp.	1	20	1 ob
Limmobaris sp.	1	20	1 oa p
d			
?Coleoptera sp.	1	20	1 u

Site: 230 Context: 0 Sample: 27/T - beetle/bug main statistics

Number of individuals estimated as N = 10
 Number of taxa S = 5

Site: 230 Context: 0 Sample: 27/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)*	6	60	1 rd s
Xylodromus concinnus (Marsham)	1	10	2 rt s
Gyrophypnus sp.	1	10	2 rt
Ptinus sp.	1	10	2 rd
Cryptophagus scutellatus Newman	1	10	2 rd s

Site: 230 Context: 0 Sample: 28/T - beetle/bug main statistics

Number of individuals estimated as N = 13
 Number of taxa S = 8

Index of diversity not calculated, n = s or n < 20
 Number of 'certain' outdoor taxa SOA = 1
 Percentage of 'certain' outdoor taxa %SOA = 13
 Number of 'certain' outdoor individuals NOA = 1
 Percentage of 'certain' outdoor individuals %NOA = 8
 Number of 'certain' and probable outdoor taxa SOB = 3
 Percentage of 'certain' and probable outdoor taxa %SOB = 38
 Number of 'certain' and probable outdoor individuals NOB = 3
 Percentage 'certain' and probable outdoor individuals %NOB = 23
 Diversity index for OB not calculated, NOB = SOB or NOB < 20
 Number of aquatic taxa SW = 0
 Percentage of aquatic taxa %SW = 0
 Number of aquatic individuals NW = 0
 Percentage of aquatic individuals %NW = 0
 Number of damp ground/waterside taxa SD = 0
 Percentage of damp ground/waterside taxa %SD = 0
 Number of damp ground/waterside individuals ND = 0
 Percentage of damp ground/waterside individuals %ND = 0
 Number of strongly plant-associated taxa SP = 0
 Percentage of strongly plant-associated taxa %SP = 0
 Number of strongly plant-associated individuals NP = 0
 Percentage of strongly plant-associated individuals %NP = 0
 Number of heathland/moorland taxa SM = 0
 Number of heathland/moorland individuals NM = 0
 Percentage of heathland/moorland individuals %NM = 0
 Number of wood-associated taxa SL = 0
 Number of wood-associated individuals NL = 0
 Percentage of wood-associated individuals %NL = 0
 Number of decomposer taxa SRT = 4
 Percentage of decomposer taxa %SRT = 50
 Number of decomposer individuals NRT = 9
 Percentage of decomposer individuals %NRT = 69
 Number of 'dry' decomposer taxa SRD = 2
 Percentage of 'dry' decomposer taxa %SRD = 25
 Number of 'dry' decomposer individuals NRD = 7
 Percentage of 'dry' decomposer individuals %NRD = 54
 Number of 'foul' decomposer taxa SRF = 1
 Percentage of 'foul' decomposer taxa %SRF = 13
 Number of 'foul' decomposer individuals NRF = 1
 Percentage of 'foul' decomposer individuals %NRF = 8
 Diversity index for RT not calculated, NRT = SRT or NRT < 20
 Number of individuals of grain pests NG = 0
 Percentage of individuals of grain pests %NG = 0
 Number of individuals of grain pests NRD = 0
 Number of uncoded taxa SU = 2
 Percentage of uncoded individuals PNU = 15

Site: 230 Context: 0 Sample: 28/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)*	6	46	1 rd s
Calathus fuscipes (Goeze)	1	8	2 oa
Carabidae sp.	1	8	2 ob
Xylodromus concinnus (Marsham)	1	8	2 rt s
Aphodius sp.	1	8	2 ob rf
Lathridius minutus group	1	8	2 rd s
Coleoptera sp. A	1	8	2 u
Coleoptera sp. B	1	8	2 u

Site: 230 Context: 0 Sample: 29/T - beetle/bug main statistics

Number of individuals estimated as N = 2
 Number of taxa S = 2

Site: 230 Context: 0 Sample: 29/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)	1	50	1 rd s
Coleoptera sp.	1	50	1 u

Site: 230 Context: 0 Sample: 32/T - beetle/bug main statistics

Number of individuals estimated as N = 2
 Number of taxa S = 2

Site: 230 Context: 0 Sample: 32/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)	1	50	1 rd s
Lathridius minutus group	1	50	1 rd s

Site: 230 Context: 0 Sample: 33/T - beetle/bug main statistics

Number of individuals estimated as N = 22
 Number of taxa S = 8
 Index of diversity (alpha) alpha = 5
 Standard error of alpha SE alpha = 2
 Number of 'certain' outdoor taxa SOA = 2
 Percentage of 'certain' outdoor taxa %SOA = 25
 Number of 'certain' outdoor individuals NOA = 2
 Percentage of 'certain' outdoor individuals %NOA = 9
 Number of 'certain' and probable outdoor taxa SOB = 3
 Percentage of 'certain' and probable outdoor taxa %SOB = 38
 Number of 'certain' and probable outdoor individuals NOB = 3
 Percentage 'certain' and probable outdoor individuals %NOB = 14
 Diversity index for OB not calculated, NOB = SOB or NOB < 20
 Number of aquatic taxa SW = 0
 Percentage of aquatic taxa %SW = 0
 Number of aquatic individuals NW = 0
 Percentage of aquatic individuals %NW = 0
 Number of damp ground/waterside taxa SD = 0
 Percentage of damp ground/waterside taxa %SD = 0
 Number of damp ground/waterside individuals ND = 0
 Percentage of damp ground/waterside individuals %ND = 0
 Number of strongly plant-associated taxa SP = 1
 Percentage of strongly plant-associated taxa %SP = 13
 Number of strongly plant-associated individuals NP = 1
 Percentage of strongly plant-associated individuals %NP = 5
 Number of heathland/moorland taxa SM = 0
 Number of heathland/moorland individuals NM = 0
 Percentage of heathland/moorland individuals %NM = 0
 Number of wood-associated taxa SL = 0
 Number of wood-associated individuals NL = 0
 Percentage of wood-associated individuals %NL = 0
 Number of decomposer taxa SRT = 3
 Percentage of decomposer taxa %SRT = 38
 Number of decomposer individuals NRT = 17
 Percentage of decomposer individuals %NRT = 77
 Number of 'dry' decomposer taxa SRD = 2
 Percentage of 'dry' decomposer taxa %SRD = 25
 Number of 'dry' decomposer individuals NRD = 16
 Percentage of 'dry' decomposer individuals %NRD = 73
 Number of 'foul' decomposer taxa SRF = 1

Percentage of 'foul' decomposer taxa %SRF = 13
 Number of 'foul' decomposer individuals NRF = 1
 Percentage of 'foul' decomposer individuals %NRF = 5
 Diversity index for RT not calculated, NRT = SRT or NRT < 20
 Number of individuals of grain pests NG = 0
 Percentage of individuals of grain pests %NG = 0
 Number of individuals of grain pests NG = 0
 Number of uncoded taxa SU = 3
 Percentage of uncoded individuals PNU = 14

Site: 230 Context: 0 Sample: 33/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)*	15	68	1 rd s
Dyschirius globosus (Herbst)	1	5	2 oa
Histeridae sp.	1	5	2 u
?Aphodius sp.	1	5	2 ob rf
Cryptophagus sp.	1	5	2 rd
Chrysomelinae sp.	1	5	2 oa p
Coleoptera sp. A	1	5	2 u
Coleoptera sp. B	1	5	2 u

Site: 230 Context: 0 Sample: 34/T - beetle/bug main statistics

Number of individuals estimated as N = 39
 Number of taxa S = 19
 Index of diversity (alpha) alpha = 15
 Standard error of alpha SE alpha = 4
 Number of 'certain' outdoor taxa SOA = 4
 Percentage of 'certain' outdoor taxa %SOA = 21
 Number of 'certain' outdoor individuals NOA = 4
 Percentage of 'certain' outdoor individuals %NOA = 10
 Number of 'certain' and probable outdoor taxa SOB = 6
 Percentage of 'certain' and probable outdoor taxa %SOB = 32
 Number of 'certain' and probable outdoor individuals NOB = 9
 Percentage 'certain' and probable outdoor individuals %NOB = 23
 Diversity index for OB not calculated, NOB = SOB or NOB < 20
 Number of aquatic taxa SW = 1
 Percentage of aquatic taxa %SW = 5
 Number of aquatic individuals NW = 1
 Percentage of aquatic individuals %NW = 3
 Number of damp ground/waterside taxa SD = 0
 Percentage of damp ground/waterside taxa %SD = 0
 Number of damp ground/waterside individuals ND = 0
 Percentage of damp ground/waterside individuals %ND = 0
 Number of strongly plant-associated taxa SP = 1
 Percentage of strongly plant-associated taxa %SP = 5
 Number of strongly plant-associated individuals NP = 1
 Percentage of strongly plant-associated individuals %NP = 3
 Number of heathland/moorland taxa SM = 0
 Number of heathland/moorland individuals NM = 0
 Percentage of heathland/moorland individuals %NM = 0
 Number of wood-associated taxa SL = 1
 Number of wood-associated individuals NL = 1
 Percentage of wood-associated individuals %NL = 3
 Number of decomposer taxa SRT = 10
 Percentage of decomposer taxa %SRT = 53
 Number of decomposer individuals NRT = 30
 Percentage of decomposer individuals %NRT = 77
 Number of 'dry' decomposer taxa SRD = 4
 Percentage of 'dry' decomposer taxa %SRD = 21
 Number of 'dry' decomposer individuals NRD = 19
 Percentage of 'dry' decomposer individuals %NRD = 49
 Number of 'foul' decomposer taxa SRF = 2
 Percentage of 'foul' decomposer taxa %SRF = 11
 Number of 'foul' decomposer individuals NRF = 5
 Percentage of 'foul' decomposer individuals %NRF = 13
 Index of diversity of decomposer component alpha RT = 5
 Standard error SE alpha RT = 2
 Number of individuals of grain pests NG = 0
 Percentage of individuals of grain pests %NG = 0
 Number of individuals of grain pests NG = 0
 Number of uncoded taxa SU = 5
 Percentage of uncoded individuals PNU = 13

Site: 230 Context: 0 Sample: 34/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)*	15	38	1 rd s
Aphodius sp.	4	10	2 ob rf
Xylodromus concinnus (Marsham)	3	8	3 rt s
Lathridius minutus group	2	5	4 rd s
Helophorus sp.	1	3	5 oa w
Catops sp.	1	3	5 u
Aclypea opaca (Linnaeus)	1	3	5 ob rf
Phyllodrepa sp.	1	3	5 rt
Omalium sp.	1	3	5 rt
Aleocharinae sp. A	1	3	5 u
Aleocharinae sp. B	1	3	5 u
Aphodius ?ater (Degeer)	1	3	5 oa rf
Anobium punctatum (Degeer)	1	3	5 l s
Cryptophagus scutellatus Newman	1	3	5 rd s
Cryptophagus sp.	1	3	5 rd
Otiorhynchus sp.	1	3	5 oa p
?Curculionidae sp.	1	3	5 oa
Coleoptera sp. A	1	3	5 u
Coleoptera sp. B	1	3	5 u

Site: 230 Context: 0 Sample: 36/T - beetle/bug main statistics

Number of individuals estimated as N = 7
 Number of taxa S = 5

Site: 230 Context: 0 Sample: 36/T - species list in rank order

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)	3	43	1 rd s
?Cryptophagus scutellatus Newman	1	14	2 rd ss
Cryptophagus sp.	1	14	2 rd
Mycetaea hirta (Marsham)	1	14	2 rd s
Coleoptera sp.	1	14	2 u

Site: 230 Context: 0 Sample: 38/T - beetle/bug main statistics

Number of individuals estimated as N = 19
 Number of taxa S = 5

Site: 230 Context: 0 Sample: 38/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Tipnus unicolor (Piller & Mitterpacher)*	6	79	1 rd s
Xylodromus concinnus (Marsham)	1	5	2 rt s
Anotylus tetracarminatus (Block)	1	5	2 rt
Otiorhynchus sp.	1	5	2 oa p
Coleoptera sp.	1	5	2 u

Site: 230 Context: 0 Sample: 45/T - beetle/bug main statistics

Number of individuals estimated as N = 5
 Number of taxa S = 5

Site: 230 Context: 0 Sample: 45/T - species list in rank order

Taxon	Number	%	Rank
Cercyon sp.	1	20	1 u
Aleocharinae sp.	1	20	1 u
Aphodius sp.	1	20	1 ob rf
Tipnus unicolor (Piller & Mitterpacher)	1	20	1 rd s
Coleoptera sp.	1	20	1 u

Reports from the EAU, York, 95/46

Appendix: Insects from Drum Castle

Site: 230; Context: 0; Sample: 50/T

NO RECORDS OF BEETLES OR BUGS

Tipnus unicolor (Piller & Mitterpacher)*	6	67	1	rd	s
Phyllodrepa sp.	1	11	2	rt	
Xylodromus concinnus (Marsham)	1	11	2	rt	s
Aleochara sp.	1	11	2	u	

Site: 230 Context: 0 Sample: 51/T - beetle/bug main statistics

Number of individuals estimated as	N =	1
Number of taxa	S =	1

Site: 230 Context: 0 Sample: 55/T - beetle/bug main statistics

Number of individuals estimated as	N =	4
Number of taxa	S =	2

Site: 230 Context: 0 Sample: 51/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Carabidae sp.	1	100	1 ob

Site: 230 Context: 0 Sample: 55/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)	3	75	1 rd s
Ptinus sp.	1	25	2 rd

Site: 230 Context: 0 Sample: 54/T - beetle/bug main statistics

Number of individuals estimated as	N =	9
Number of taxa	S =	4

Site: 230 Context: 0 Sample: 58/T - beetle/bug main statistics

Number of individuals estimated as	N =	5
Number of taxa	S =	1

Site: 230 Context: 0 Sample: 54/T - species list in rank order

NOTE: this list includes 'semi-quantitative' records, marked by '*' in the first column of the comment following a record.

Taxon	Number	%	Rank
Ecodes:			

Site: 230 Context: 0 Sample: 58/T - species list in rank order

Taxon	Number	%	Rank
Ecodes			
Tipnus unicolor (Piller & Mitterpacher)	5	100	1 rd s