THE INSECT REMAINS, WATERMEAD COUNTRY PARK, LEICESTERSHIRE (ACCESSION NO. A57.1996)

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Tables and Figures

Introduction

The insect remains discussed here were recovered from three different areas and contexts found on this site. They have been arranged in roughly chronological order:

Column 2. These samples came from a range of silt 'peat' deposits associated with the channel to the east of the 'burnt mound'. It was thought that this area of the site was the original location of the human and animal bone initially found at this site. The material described here came from samples taken from a 'column' sequence through the depth of this channel. Radiocarbon dates suggest that the base of the channel fills dates to the Late Glacial (Late Upper Palaeolithic) with a date of Cal BC 9130-8740. The upper fills of the channel are dated to the Early Mesolithic with a date of Cal BC 7000-6420. Samples 21-26 therefore represent a continuous sequence of insect faunas through this period.

A range of contexts associated with the 'burnt mound' from the centre of the site. Sample 56 was taken from the fill of the timber-lined trough from under the mound. Samples 103 and 104 were from the area of charcoal and burnt flints from the hearth.

The extensive sequence of radiocarbon dates from this area of the site suggests that the burn mound dates from the late Neolithic to the early Bronze Age. Two samples (samples 101 and 102) came from the ditch to the north of the 'burnt mound' though subsequent dating suggested that this was a late Iron Age / Romano-British feature.

Column 4. This sequence of samples came from the south eastern area of the site were a palaeochannel, filled with an organic silt, was found associated with the double row of timbers that have been interpreted as the remains of a Saxon bridge or jetty. A 'column sequence' was also taken from an exposed profile of this ditch; this is represented by samples 68-73. The radiocarbon dates from this channel suggest that it dates from the Roman to Saxon periods, though there appear to have been material present from earlier periods that is probably in washed. Sample 46 represents an isolated patch of 'peat' associated with the timbers themselves.

METHODS AND ANALYSIS

The samples were processed using the standard method of paraffin flotation as outlined in Kenward *et al.* (1980) and sorted and identified under a low power binocular microscope. The context details, weight and volume of each sample are presented in Table 1.

Where achievable the insect remains were identified to species level by direct comparison to specimens in the Gorham and Girling insect collections housed in the Institute for Archaeology and Antiquity, the University of Birmingham.

The taxa recovered are presented in Table 2. The nomenclature follows that of Lucht (1987). The majority of the taxa present are beetles (Coleoptera).

In order to aid interpretation, where possible, the taxa present have been assigned to ecological groupings following a simplified version of the scheme suggested by Robinson (1981, 1983). The affiliation of each species to a particular ecological grouping is coded in the second column of Table 2. The meaning of each ecological code is explained in the key at the base of Table 2. The occurrence of each of the ecological groupings is expressed as a percentage in Table 3 and in Figure 1. The pasture/grassland, dung and woodland/ timber species are calculated as percentages of the number of terrestrial species, as opposed to the whole fauna.

Column four in Table 2 indicates those species of beetle that are associated with specific plants. The ecology for this information was mainly derived from Koch (1989, 1992).

Results

The Insects from Column 2

Sample 26, from the bottom of this column, produced a fauna that was relatively small but well preserved. It contains a range of water beetles that are associated with slow flowing or even stagnant water. Typical of this environment are *Hydraena britteni* and *Octhebius minimus*. The small hydrophild *Scarodytes halensis* occurs in pools of slow flowing water with silt or gravely bottoms. It is normally considered to be a pioneer species (Nilsson and Holmen 1995). *Laccornis oblongatus* is associated with clear pools often filled with *Sphagnum* or *Carex* (Nilsson and Holmen 1995). There is also a suggestion that this species is to an extent cold tolerant (Koch 1989, Nilsson and Holmen 1995). Similar slow flowing and vegetated water is also suggested by the aquatic hydrophilids *Cercyon ustulatus* and *C. tristis* and the probably *Cyphon* species recovered.

One species of insect that stands out in this fauna is the small rove beetle *Eucnecosum brachyipterum*. Today it is found mainly at altitude in mountainous areas in the British Isles (Harde 1994, Tottenham 1954) and it is often associated with wet moss and the roots of heather in boglands (Harde 1994, Tottenham 1954). Today it is not found in the lowland river valleys of the Midlands and is probably at Watermead a late survival from glacial faunas. Certainly, it is a very common species in the faunas recovered from similar early post glacial deposits examined at Hemington, Leicestershire and Lea Marston, Warwickshire (Osborne 1973).

There are indications from the phytophage species of beetle recovered that this channel contained a range of waterside vegetation during this period. The single individual of *Platemaris sericea* indicates that stands of water reed or sedges were present. The weevil *Notaris aethiops* is normally associated with *Sparganium* species of bur reed and *Limnobaris pilustrata* with *Carex* sedges (Koch 1992).

There are no species associated with woodland or forest. The presence of an apparently open landscape is not surprising given the early date for this material.

Samples 25 and 24, which lay directly above sample 26, produced small insect faunas. Unfortunately, these faunas contained few species that can be used to comment on the nature of the surrounding environment. The water beetles do at least suggest that the water conditions present were essentially similar to those seen earlier. Given the apparent later date of these upper deposits it is also not surprising that *Eucnecosum brachyipterum* is now absent given the rapid amelioration in climate that occurs at the start of the Holocene.

The insects from the features associated with the burnt mound

The samples taken directly from the trough feature (56), and those from the patch of burnt flints and charcoal (103 and 104), did not produce any insect remains. This probably suggests that the material in these features was not waterlogged at the time of deposition. The samples from the ditch to the north of the mound (101 and 102), however, did produce insect faunas. These are relatively small and have limited interpretative value. The water beetles present, such as *Octhebius minimus* and *Helophorus grandis* and H. *aquaticus* are usually associated with slow flowing and vegetated waters (Hansen 1986). There are indications amongst the various Carabidae 'ground beetles', along with the presence of *Platystethus nitens* and *Dryops* species, that the ground around this ditch was open and muddy.

Unfortunately, aside from a few individuals of dung beetles, there were no taxa recovered that can be used to try to reconstruct the nature of the environment surrounding this ditch. This means that it is difficult to use these faunas to comment on the extent to which the river valley around the site was cleared during the time in which the burnt mound was in use.

The insects from Column 4

The samples so far examined from this location (samples 69, 69, 70, 71, 72, 73), and that from directly next to the bridge timbers (sample 46), all produced insect faunas of a reasonable size in a good state of preservation. There would appear to be little variation between the faunas present and they will be discussed together.

The majority of the species recovered are water beetles typical of slow flowing or still environments often filled with waterside and floating vegetation. This is particular true in the case of the distinctive Dytiscidae beetle *Hydroporus plaustris* Nilsson and Holmen 1995). Other beetles common to this type of water body are the *Octhebius, Limnebius* and *Helophorus* species recovered. Well-vegetated bodies of water are also rather typical of the species of Hydrophilidae recovered such as *Coelostoma orbiculare*, the aquatic *Cerycon*, and the *Laccobius* and *Enochrus*. The channel seems to also have contained quantities of emergent vegetation such as rushes and water reeds to judge from the number of phytophage insects present. The small nitidulidae *Cateretes* is normally associated with rushes and sedges as is the leaf beetle *Plateumaris sericea* and the weevil *Limnobaris pilistriata*. *Plateumaris braccata* occurs only on the common water reed *Pragmites* and *Notaris acridulus* normally only with reed sweet grass (*Glyceria maxima*) (Koch 1992). Such tall vegetation is also the environment favoured by the ground beetle *Chlaenius c.f. nigricornis* (Lindroth 1974). However, with the small carabid *Microlestes maurus* being associated with sandy ground (Lindroth 1974), and both *Dryops* the and *Heterocerus* species often associated with muddy ground, there may have been some variation in the nature of the bank sides.

In terms of the environments near the channel the insects in these faunas clearly suggest grassland and pasture. In particular, there are relatively large numbers of *Aphodius, Geotrupes* and *Sphaeridium scarabaeoides* dung beetles in these samples. In addition, some of the phytophage species present such as the *Sitona, Hypera, Rhinocus, Gastrophasa viridula* and *Apion* species are associated with clovers, docks and plantains. These are all plant species commonly found in pasture and meadowland. There also appears to have been areas of disturbed ground. This is suggested by the presence of *Cidnorhinus quadrimaculatus* which is associated with stinging nettles and *Ceutorhynchus erysimi* which is normally found feeding on shepherd's purse (Koch 1992). Whether this represents scuffed areas of pasture or disturbed ground resulting from the activity of the river as it changed its channel is not clear.

Again, there are no indicators for the presence of woodland in the insects recovered. This suggests that this area of the Soar's catchment had been cleared of forest by the time of the deposition of this channel material.

Discussion

The insect remains recovered from the lower levels of column 2 are amongst the earliest from the Soar Catchment. They match the dates of the earliest material examined at the Croft site (Smith *et al.* in press) and predate those from Kirby Muxloe by some degree (Smith 1996). The fauna recovered from these deposits at Watermead does not contain any of the species of 'exotic' beetles recovered from clasts that dated to 13,200-11,400 cal BC from the quarry sections at Hemington, Leicestershire (Greenwood and Smith in press). These 'exotic' species, such as *Pycnoglypta lurida* and *Boreaphilus henningianus* are associated with glacial climates and periods of intense cold. There absence at Watermead clearly suggests that temperature and climate had radically improved in the region of the Soar catchment by this date. The continued presence of *Eucnecosum brachyipterum* into these early postglacial deposits at Watermead is interesting. It is probably that E. *brachyipterum* can tolerate a degree of warming in temperatures, and that the main limiting factor to its occurrence is a need for open and underdeveloped ground conditions and soils. The other species recovered at Watermead appear to confirm the reconstruction of the landscape suggested at Croft for this period (Smith *et al.* in press) with open conditions, damp grassland and limited tree growth occurring.

Unfortunately, the Neolithic contexts from this site produced no insect remains. This makes it difficult to make a comparison between this site and the Neolithic landscape reconstructed at both Croft and Kirby Muxloe (Smith *et al*. in press, Smith 1996) where dense canopy woodland seems to predominate. Full forestation is also indicated by insect faunas from several sites in the adjacent Trent catchment at this time (Greenwood and Smith in press). If these limited insect faunas from the Neolithic at Watermead are taken at face value, it suggests that the area around the mound was cleared early. It is also possible that they represent an open area cleared by the river as

it changed its course at this time. It is worth noting that similar cleared conditions were also indicated by insect faunas of a similar date from the Shardlow and Girton sites, Nottinghamshire. It may be that such local clearings associated with the river itself are relatively common in the Neolithic.

At present there are only a limited number of insect faunas associated with burnt mounds. In terms of the Trent valley the insect faunas recovered from the mound at Girton (Smith 1994, Greenwood and Smith in press) agree with those recovered at Watermead. Both sites appear to be established into cleared areas and insect species normally associated with human activity, carrion or food waste are absent. This may suggest that the use of these sites was short lived and not of a large scale.

The insect faunas from the later deposits associated with the Saxon bridge timbers clearly suggest that this channel was surrounded by open grazing land. This type of landscape is also indicated by the majority of the insect faunas from the Trent and Soar valleys that date to periods after the Early Iron age.

References

Greenwood, M. & Smith, D.N. in press: A gazetteer of Coleoptera from sedimentary deposits from the Trent Valley. In D.N. Smith, M.B. Brickley and Smith K.W.M., editors, *The Fertile Ground: Papers in Honour of Prof. Susan Limbrey*. Oxford: Oxbow Monograph.

Harde K.W. 1984. *A Field Guide in Colour to Beetles*. London: Octopus.

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

Koch, K. 1989. *Die Kafer Mitteleuropas*. Okologie. Band 2. Krefeld: Goecke & Evers.

Koch, K. 1992. *Die Kafer Mitteleuropas*. Okologie. Band 3. Krefeld: Goecke & Evers.

Lindroth C.H. 1974. Coleoptera: Carabidae. *Handbooks for the Identification of British Insects*. IV. part 2. Royal Entomological Society of London.

Lucht, W.H. 1987. *Die Käfer Mitteleuropas*. Katalog. Krefeld: Goecke & Evers.

Nilsson A.N. and Holmen M. 1995. The aquatic Adephaga (Coleoptera) of Fennoscandia and Denmark. Dytiscidae. *Fauna Entomologica Scandinavica*. Volume **32**.

Osborne, P. J. 1973. A Late-Glacial insect fauna from Lea Marston, Warwickshire. *Proceedings of the Coventry and District Natural History and Scientific Society* **4**, 209-213.

Robinson, M.A. 1981. Appendix 1. the use of ecological groupings of Coleoptera for comparing sites. in Jones, M. and Dimbleby, G. *The Environment of Man: The Iron Age to the Anglo-Saxon Period*. British Archaeological Reports British Series 87, 279-286.

Robinson, M.A. 1983. Arable/Pastoral Ratios from Insects? in Jones, M. *Integrating the Subsistence Economy*. British Archaeological Reports International series 181, 19-45.

Smith, D.N. 1999. *The Insect Remains from Covert Farm (DIRFT East), Crick, Northamptonshire*. Report to Birmingham University Archaeology Unit.

Smith, D.N. 2000. The insect remains from Whitemore Haye Quarry, Alrewas Staffordshire. *The University of Birmingham Environmental Archaeology Services*. Report 11.

Tottenham C.E. 1954. Coleoptera Staphylinidae. Section (a) Piestinae to Euaesthetinae. *Handbooks for the Identification of British Insects*. IV. part 8(a). London: Royal Entomological Society of London.

Tinsley, H. 2003, Assessment of pollen preserved in samples from Bronze Age ditches at Hillfarrance, Somerset.

Smith, D. 1994. *An assessment of the Coleoptera from the burnt mound at Girton Quarry, Nottinghamshire*. Unpublished report to Trent and Peak Archaeological Trust.

Smith, D. 1995. *The Coleoptera from the environmental sequences at Kirby Muxloe, Leicestershire*. Unpublished report to Leicestershire County Council Archaeology Unit.

Smith, D.N., Roseff, R, Brown, A.G., Butler, S., Hughes, G., Monkton, A. in press. *Archaeological and Environmental Investigations of a Late Glacial and Flandrian River Valley Sequence on the River Soar, at Croft, Leicestershire. The Holocene 15.3, 2005, 353-357.*

Table 1: Context Details for insect samples from Watermead

Sample No.	Location	Weight (Kg.)	Volume (L)
21	column 2 40-50 cm	3.9	5
23	column 2 60-70 cm	3	5
24	column 2 70-80 cm	2.5	1.5
25	column 2 80-90 cm	4.5	4
26	column 2. 90-100 cm	2.54	3
46	adjacent to timbers	6.54	9
68	column 4 31-42 cm	3	3
69	column 4 42-54 cm	5.5	6
70	column 4 54-70 cm	4.5	4
71	column 4 70-85 cm	4.6	6
72	column 4 85-95 cm	5	4
73	column 4 95-107	4.25	6
56	hearth	6.5	9
103	contents of trough	7.54	9
104	contents of tough	5.8	7
101	fill of small ditch	8.3	9
102	fill of small ditch	8.9	10

Table 2: The insects from Watermead

Site location		Column 2					Neolithic burnt mound			ditch to north of burnt mound		Column 4							
Sample number		21	23	24	25	26	56	103	104	101	102	46	68	69	70	71	72	73	
Species	ecology																		Phytophage host plant (data taken from Koch 1989, 1992)
HEMIPTERA																			
Family, genus and spp. Indet.																			
Carabidae																			
Loricera pilcornis (F.)		-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	
Clivina fossor (L.)		-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	
Dyschirius globosus (Hbst.)		-	-	1	-	-	-	-	-	1	-	-	3	3	-	2	1	1	
Trechus secalis (Payk.)		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	
T. quadristriatus (Schrk.) or *obtusus* Er.		-	-	-	1	-	-	-	-	1	1	-	-	-	-	-	-	1	
Bembidion lampros (Hbst.)		-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
B. Schueppeli Dej.	ws	-	-	-	-	1	-	-	-	1	-	-	-	1	-	-	-	-	
B. biguttatum (F.)		-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	-	-	
B. guttula (F.)		-	-	1	-	-	-	-	-	2	-	-	-	2	2	-	-	-	
B. spp.		-	-	3	1	-	-	-	-	-	-	1	1	2	1	-	-	-	
Patrobus septrentrionis Dej.	ws	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Pterostichus strenuus (Panz.)		-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	2	-	

P. diligens (Sturm)	ws	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
P. vernalis (Panz.)	ws	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
P. minor (Gyll.)	ws	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	
P. spp.		-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	
Agonum moestrum (Duft.)	ws	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
Agonum nigrum (Dej.)	ws	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
A. spp.		-	-	1	1	1	-	-	-	-	-	-	-	1	-	-	-	-	
*Chlaenius c.f. nigricornis (*F.)	ws	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	
Microlestes maurus (Sturm)	ws	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
Halipidae																			
Halipus spp.	a	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Dytiscidae																			
Hygrotus inaequalis (F.)	a	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Hydroporus palustris (L.)	a	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	
H. spp.	a	-	-	-	-	-	-	-	-	1	1	-	2	3	-	2	1	-	
Laccornis oblongus (Steph.)	a	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Scarodytes halensis (F.)	a	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Agabus bipustulatus (L.)	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
A. spp.	a	-	-	-	-	2	-	-	-	-	-	-	-	2	-	4	-	-	

Rhantus spp.	a	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	
Colymbetes fuscus (L.)	a	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	
GYRINIDAE																			
Gyrinus sp.	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
Hydreanidae																			
Hydraena britteni Joy	a	-	-	-	-	3	-	-	-	-	-	-	-	-	2	-	1	-	
H. spp.	a	-	-	4	5	9	-	-	-	-	-	1	6	8	5	2	-	3	
Ochthebius bicolon Germ.	a	-	-	-	-	-	-	-	-	-	-	-	2	2	-	7	-	-	
O. minumus (F.)	a	-	-	-	1	4	-	-	-	3	-	2	5	10	14	25	-	-	
O. spp.	a	-	-	-	1	12	-	-	-	4	1	4	15	53	25	45	3	2	
Limnebius papposus Muls.	a	-	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	
L. spp.	a	-	-	-	-	1	-	-	-	-	-	1	2	5	1	10	-	1	
Hydrochus sp.	a	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
Helophorus grandis Ill.	a	-	-	-	-	-	-	-	-	1	-	-	1	4	-	3	-	-	
H. aquaticus (L.)	a	-	-	-	-	-	-	-	-	1	-	-	2	4	-	1	-	-	
H. spp.	a	-	-	-	-	3	-	-	-	13	1	3	13	45	9	41	1	-	
Hydrophilidae																			

Coelostoma orbiculare (F.)	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Sphaeridium scarabaeoides (L.)	d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Cercyon ustulatus (Preyssl.)	d	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-
C. tristis (Ill.)	a	-	-	-	1	1	-	-	-	-	-	-	-	3	-	1	-	-
C. convexiusculus Steph.	a	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-
C. analis (Payk.)	d	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-
C. spp.		-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	-
Megasternum boletophagum (Marsh.)	d	-	-	-	-	-	-	-	-	-	-	3	-	1	-	-	-	2
Hydrobius fuscipes (L.)		-	-	-	-	1	-	-	-	-	-	2	-	3	1	1	-	-
Laccobius spp.	a	-	-	-	-	-	-	-	-	-	-	1	-	4	-	2	-	-
Enochrus spp.	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Histeridae																		
Grammostethus marginatus (Er.)	d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Silphidae																		
Silphidae Gen. & spp. Indent.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Staphylindae																		
Micropeplus porcatus (Payk.)		-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-
Eusphalerum sp.		-	-	1	-	4	-	-	-	-	-	-	-	-	-	-	-	1

*Lathrimaeum unicolor (*Marsh.*)*	ws	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Olophrum spp.		-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	
Eucnecosum brachypterum (Grav.)		-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	
Lesteva sicula Er.	ws	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	
L. longelytrata (Goeze)	ws	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	
L. spp.	ws	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	3	
Trogophloeus bilineatus (Steph.)	ws	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2	-	-	
T. corticinus Grav.	ws	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
T. spp.	ws	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	
Oxytelus rugosus (F.)		-	-	-	2	1	-	-	-	1	-	1	2	5	1	5	1	-	
O. nitidulus Grav.		-	-	-	-	-	-	-	-	-	-	-	-	3	-	3	-	-	
Platysethus nodifrons Mannh.	ws	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	
*P. nitens (*Sahlb.*)*	ws	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	
Stenus spp.		-	-	3	-	2	-	-	-	1	-	2	2	2	4	5	12	-	
Stilicus orbiculatus (Payk.)		-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
Lathrobium spp.	ws	-	-	-	-	-	-	-	-	1	-	1	-	1	1	-	-	2	
Xantholinus spp.		-	-	-	-	-	-	-	-	1	-	1	1	4	-	2	-	-	
Philonthus spp.		-	-	-	-	-	-	-	-	-	-	1	2	2	-	2	1	-	
Quedius spp.		-	-	-	-	-	-	-	-	1	1	-	-	1	-	-	-	-	
Tachyporus spp.		-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	
Tachinus spp.		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	

Aleocharinae Gen. & spp. indet.		-	-	-	1	6	-	-	-	1	1	3	5	10	8	9	1	1	
Pselaphidae																			
Bryaxis sp.		-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	
Bracygluta spp.		-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	
Rybaxis sp.			-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Elateridae																			
Ampedus sp.	g	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	
Agriotes spp.	g	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	at roots of various grasses
Athous haemorrhoidalis (F.)	g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	at roots of various grasses
Helodidae																			
Helodidae Gen. & spp. Indet (c.f. *Cyphon* spp.)	a	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	
Dryopidae																			
Dryops spp.	a	-	-	-	-	-	-	-	-	-	1	2	3	1	1	3	-	1	
Elmis aenea (Müll)	a	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Riolus sp.	a	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Oulimnius spp.	a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	

Heteroceridae																			
Heterocerus spp.	a	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	
Dermestidae																			
Megatoma undata (L.)	t	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	
Nitidulidae																			
Cateretes spp.	g	-	-	-	-	-	-	-	-	-	-	1	1	5	2	2	-	-	
Epurea sp.	g	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Meligethes sp.		-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	
Cryptophagidae																			
Cryptophagus spp.		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Atomaria spp.		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	
Phalacridae																			
Phalacrus caricis Sturm.	ws	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	
Lathridiidae																			
Enicmus minutus (group)		-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-	-	
Corticaria or *Corticarina* spp.		-	-	-	-	2	-	-	-	-	-	-	1	2	-	2	-	-	

Mycetophagidae																				
Typhaea stercorea (L.)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-		
Coccinellidae																				
Coccidula rufa (Hbst.)	g	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-		
Scynmus sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-		
Anobiidae																				
Anobium punctatum (Geer)	t	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	1	Decaying timber	
Scarabaeidae																				
Geotrupes spp.	d	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-		
Aphodius depressus (Kug.)	d	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-		
A. contaminatus (Hbst.)	d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-		
A. prodromus (Brahm)	d	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-	-		
A. sphacelatus (Panz.)	d	-	-	-	-	-	-	-	-	1	1	-	-	-	-	7	-	-		
A. fimetarius (L.)	d	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-		
A. spp.	d	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-	-	1		
Phyllopertha horticola (L.)	g	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	Old grassland	

Chrysomelidae																			
Plateumaris sericea (L.)	ws	-	-	-	-	1	-	-	-	-	-	-	-	-	1	2	-	1	
P. braccata (Scop.)	ws	-	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	
G. viridula (Geer)	g	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	*Rumex* species (dock)
Hydrothassa glabra (Hbst.)	ws	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	
Prasocuris phellandrii (L.)	ws	-	-	-	-	1	-	-	-	-	-	-	-	1	1	1	-	-	
Phyllotreta spp.		-	-	-	-	-	-	-	-	1	1	-	1	3	3	7	1	1	
Haltica spp.	t	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	-	
Chaetocnema spp.		-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	-	-	
Curculionidae																			
Apion frumentarium (Payk.)	g	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	*Rumex* species (dock)
A. spp.		-	-	-	-	-	-	-	-	1	-	2	1	2	1	4	-	-	
Phylobius spp.	t	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	various trees
Barynotus sp.		-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	*Trifolium* species (clover)
*Sitona flavescens (*Marsh.*)*	g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	*Trifolium* species
S. lineatus (L.)	g	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	*Trifolium* species
S. cylindricollis (Fahrs.)	g	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	*Trifolium* species
S. humeralis Steph.	g	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	*Trifolium* species often *T. pratense* (clover)

S. spp.	g	-	-	-	-	-	-	-	-	-	-	1	-	2	-	1	-	-	
Bagous sp.	a	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
Notaris acridulus (L.)	ws	-	-	-	-	-	-	-	-	-	-	-	1	3	1	6	-	-	*Glyceria* species often *G. maxima* (Sweet grasses)
N. aethiops (F.)	ws	-	-	-	-	3	-	-	-	-	-	1	-	-	-	-	-	-	
Hypera spp.	g	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	Mainly on *Trifolium* species (clover)
Limnobaris pilistriata (Steph.)	ws	-	-	-	1	7	-	-	-	-	-	-	-	-	-	1	-	-	
Rhinoncus sp.	g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	*Rumex* spp.
Ceutorhynchus erysimi (F.)	g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	Brassicaceae often *Capsella bursa-pastoris* (shepard's purse)
C. spp.	g	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	
Cidnorhinus quadrimaculatus (L.)	g	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	*Urtica dioica* (Stinging nettle)
Gymnetron sp.		-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	

a - aquatic species

ws - waterside species either from muddy banksides or from waterside vegetation

df - species associated with dung and foul matter

d - species associated with dung

g - species associated with grassland and pasture

t - species either associated with trees or with woodland in general

Table 3: The proportions of the ecological groupings of Coleoptera present at Watermead

	21	23	24	25	26	56	103	104	101	102	46	68	69	70	71	72	73
total number of individuals	0	0	17	17	94	0	0	0	41	11	51	86	236	97	256	32	28
total number of species	0	0	10	12	39	0	0	0	22	11	35	34	63	31	69	18	21
% aquatic	0.0%	0.0%	23.5%	52.9%	44.7%	0.0%	0.0%	0.0%	56.1%	36.4%	27.5%	60.5%	64.0%	60.8%	62.5%	18.8%	25.0%
% waterside	0.0%	0.0%	11.8%	11.8%	17.0%	0.0%	0.0%	0.0%	4.9%	0.0%	7.8%	7.0%	5.1%	5.2%	8.2%	9.4%	28.6%
% dung / no. terrestrial	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	12.5%	14.3%	27.3%	3.6%	4.1%	3.0%	16.0%	4.3%	23.1%
% grassland / no of terrestrial	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	0.0%	14.3%	15.2%	3.6%	19.2%	12.1%	14.7%	0.0%	7.7%
% trees / no. of terrestrial	0.0%	0.0%	0.0%	0.0%	8.3%	0.0%	0.0%	0.0%	0.0%	0.0%	6.1%	0.0%	1.4%	3.0%	0.0%	4.3%	15.4%

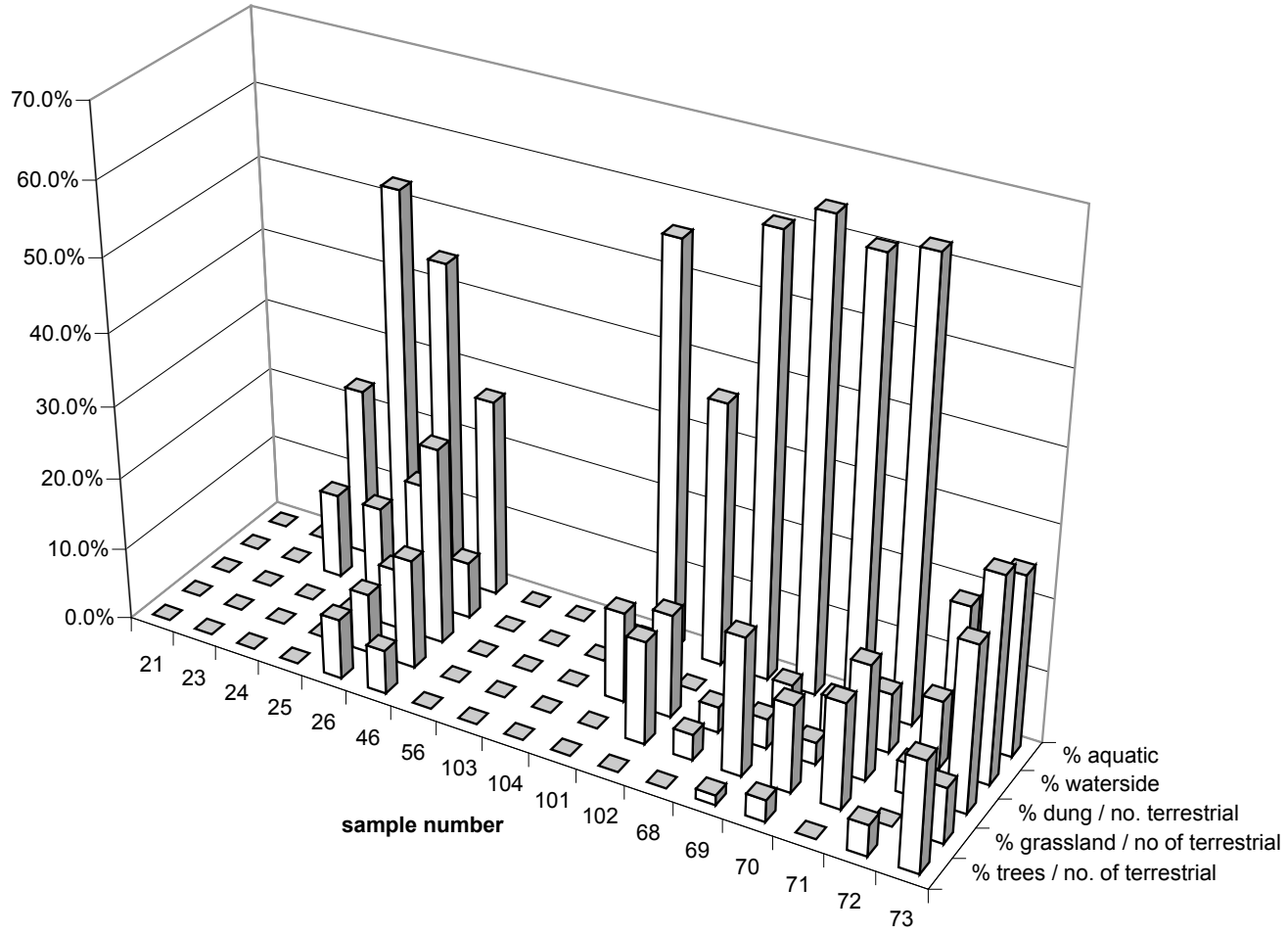

Figure 1: The proportions of the ecological groupings of Coleoptera present at Watermead