Landscape Evolution in the Middle Thames Valley
Heathrow Terminal 5 Excavations Volume 2

Insect Remains

(Section 17)

by Emma Tetlow

SECTION 17

THE INSECT REMAINS

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Introduction

The insect remains discussed are from a series of features including boundary ditches, enclosures, water holes and pits from the multi-period site at Terminal 5, Heathrow. Evidence of human activity at the site extends from scattered Palaeolithic and Mesolithic activity to an intensively pastoral landscape between the Bronze Age and Romano-British period.

Palaeoentomological analysis has concentrated on the later prehistoric deposits from the mid Bronze Age to the 2nd/3rd Century AD, with a single analysed sample representing the medieval period. It was hoped that the insect remains from the site would provide information on the nature of the landscape associated with these field systems and archaeological features and its land use.

Methods

Following assessment of insect remains recovered from waterlogged deposits of middle Bronze Age to medieval date from the 2002-2004 excavations (Robinson undated) a number of samples were prioritised for analysis. Further waterlogged deposits were excavated in 2005 and 2006 and were sampled for biological remains, including insects. After a scan by the environmental supervisor at Oxford Archaeology (M. Perez) samples considered worthy of further investigation were also submitted for insect analysis.

In total, 22 bulk samples of 5-10 litres, taken specifically for the analysis of waterlogged plants and insects from waterlogged pits, wells and waterholes, were identified as suitable for further insect analysis. A further 10 incremental samples of 1 litre each, taken sequentially through the fills of various waterlogged features, were also included. One additional sample (24051) was a bulk soil sample, processed on

site using a modified Siraf-style tank. This sample appears from the processing record to have been 80 litres in volume, although much of the sample comprised wood and woody fragments. The flot was retained wet and was submitted for analysis because the feature contained well stratified and well preserved waterlogged remains and also because the waterhole cut the D-shaped enclosure and so represented an important position in the landscape.

With the exception of sample 24051 (see above), the samples were processed by bucket flotation (washover) either on site or at Oxford Archaeology, with both flot and residues being subsequently sieved over a 250 micron mesh. Both flot(s) and residues were recombined and then paraffin floated using the standard method outlined in Kenward *et al.* (1980) at the University of Birmingham. The insect remains were then sorted from the paraffin flot at x10 magnification and the sclerites identified under a low power binocular microscope at up to x80 magnification. Where possible, the insect remains were identified by comparison with specimens in the Gorham and Girling collections housed at the University of Birmingham.

Results

The insect faunas recovered are recorded in Table 1. Nomenclature follows Kloet and Hincks (1964; 1977; 1978). Where applicable, the taxa have been assigned to ecological groups following the scheme outlined by Robinson (1991;1993).The codes for each of the groups are outlined in Table 2. The code assigned to each individual taxon is shown in column 2 of Table 1. Aquatic and marsh taxa (groups 1 and 5) are expressed as a percentage of the total fauna recovered. Terrestrial taxa are expressed as a percentage of the total fauna recovered once aquatic species have been removed. Many individuals are not readily classified and are also omitted from these groupings. This data is presented by archaeological period graphically in Figure 1.

Table 1: The Insect Remains from Heathrow Terminal 5

Period	Ecology (Robinson 1981;1983)	Mid Bronze Age												Mid or late BA			Late Bronze Age				Probably Bronze Age				Late BA/Early IA	Late Iron Age	Early-mid Romano-British					Mid-Late Romano-British	Medieval
Sample		17032	16050	17075	17076	29039	29047	29060	29062	29065	29118	29135	29140	29100	27238	27305	24051	17002	27184	27185	27135	27154	27155	27157	27158	29130	18363	18384	18385	18386	18388	18389	19187	17059
Processed Volume (L.)		7	4.5	10	9	5	9	6	5	6	20	30	10	9	6.5	10	80	4.5	1	9	7.5	1	1	1	1	9	10	1	1	1	1	1	6.5	7
COLEOPTERA																																		
Carabidae																																		
Leistus rufescens (F.)																																		1
Nebria brevicollis (F.)																														1				
Nebria spp.										1			1	-	-		-		1	1														
Notiophilus spp.					1																													
Dyschirius globosus (Herbst.)								1	1	2																								
Clivina fossor (L.)			1				1													2							1	1			1			1
Trechus quadristriatus (Schrk)/*striatulus* Putzeys.		1																						1				2						
Trechus spp.			4	1			1												2						1			1						
Asaphidion pallipes (Duft.)	6b	1	1																															

Bembidion clarki (Daws.)					1															1															
Bembidion minimum(F.)		1	1																															
Bembidion doris (Panzer)								1		1																								
Bembidion guttula (F.)					2								1															2						
Bembidion spp.			5	1	4		1	1		2	2				3			1		3		1	1		1		1	1			2		1	1
Anisodactylus nemorivagus (Duft.)	6b		1																															
Pterostichus cupreus (L.)	6a	1																																
Pterostichus nigrita (Payk.)		2																						1								1		
Pterostichus anthracinus (Ill.)				1	1		1																											
Pterostichus diligens (Sturm.)							1																											
Pterostichus melanarius (Ill.)	6a				2																													
Pterostichus minor (Gyll.)										1																								
Pterostichus niger (Schall.)							2																											
Pterostichus spp.			1				1														1			2								1		2
Calathus fuscipes (Goeze.)	6a																										1				1			
Agonum marginatum L.							1						1																					
Agonum thoreyi Dej.	5						1													1														
Amara aenea (Geer.)	6a		1																															
Amara spp.														1																				1
Harpalus rufipes (Geer.)	6a		1		1								1																					
Harpalus spp.			1																								2							
Badister spp.																					1						1							
Microlestes maurus (Sturm)	6b						1																											
Dytiscidae																																		
Hydroporus cf. scalesianus (Steph.)	1									1																								
Hydroporus spp.	1							2	2	1		1												1									1	

Graptodytes sp.	1							1																									
Agabus bipustulatus (L.)	1									3																							
Agabus spp.	1						2	1	1																								1
Gyrinidae																																	
Gyrinus spp.	1							1	1											1	1												
Hydrophilidae																																	
Helophorus spp.	1						1	12	4			1	1		1					1					1	1		2				1	1
Sphaeridium bipustulatum F.	2	1	1	1																													
Sphaeridium spp.	2				2	1																											1
Cercyon lugubris (Ol.)	1				1																												
Cercyon haemorrhoidalis (F.)	7				1						2			9													3					1	
Cercyon lateralis (Marsh.)	7	2																1													1		
Cercyon convexiusculus (Steph.)	7																			2													
Cercyon tristis (Ill.)	1				5															1					1						2	3	
Cercyon sternalis Shp.	1	1	2			1		1						1						4												1	
Cercyon analis (Payk.)	1				2	1					1	1																					
Cercyon spp.	1	1			4													1		1	2	1						1			1		
Megasternum boletophagum (Marsh.)	7		1												1												2						
Cryptopleurum minutum (F.)	7				2															1									1				
Cryptopleurum spp.	7				1																												
Hydrobius fuscipes Leach	1																			2				1							1	2	3
Chaetarthria seminulum (Hbst.)	1																			1													
Histeridae																																	
Onthophilus striatus (Forst.)	7	1					3			1	1			1				1		1			1									1	
Paralister purpurascens (Hbst.)	7						2																					1					

Hister unicolor L.	7			1			1											1								2				1		1	
Hister spp.	7						4																										
Atholus duodecimstriatus (Shcrk.)	7				1		1																										
Hydraenidae																																	
Hydraena testacea Curt.	1			1	1										1					1													
Hydraena spp.	1							1		2			1		1													1						2
Ochthebius bicolon	1								2																								
Ochthebius minimus (F.)	1			1					1						1																		
Ochthebius spp.	1		1	3	2		2	5	6	7			2		4										1		2	2					2
Limnebius spp.	1									1			1		2			1		1												1	
Liodidae																																	
Agathidium spp.																				1													
Silphidae																																	
Silpha tyrolensis Laich.	7				1																												
Silpha spp.	7																															1	
Clambidae																																	
Clambus spp.													1																				
Staphylinidae																																	
Micropeplus staphylinoides (Marsh.)																				1													
Micropeplus porcatus (Payk.)																																1	
Omalium rivulare (Payk.)					1																					1							
Omalium spp.					1																				1								
Lesteva longelytrata (Goeze)	5	1		3	4															1											1	2	4
Lesteva spp.	5														2							1					1						

Carpelimus bilineatus (Steph.)	5			1																						2							1
Carpelimus spp.	5	1		1																													1
Platystethus cornutus (Grav.)	5			2	2		1																			2						1	
Platystethus arenarius (Fourcr.)	2							1																									
Platystethus spp.				3															1														
Anotylus sculptus Grav.	7														2				2		1									1			
Anotylus rugosus (F.)	7	1					1													1		1				1			1		1		
Anotylus fulvipes Er.	7			1																1													
Anotylus spp.	7			4	1										1																		
Oxytelus sculpturatus Grav.	7			5	2															1						2							
Oxytelus nitidulus Grav.	7	2	1	2																													
Stenus spp.					1		2	1		1	1				3					1	1		1			1							
Paederus spp.	5		1				1																										
Rugilus rufipes Germ.		1					1												1	1													1
Gyrohypnus fracticornis (Mull.)				1	4																												
Medon sp.													1																				
Lathrobium spp.								1		1			1		1										1								2
Xantholinus spp.			4	2	1		4							3	1			1		1						3					1		2
Leptacinus sp.								2					1																				
Philonthus spp.		1	3	1	6	1	3								3					1							2				3		
Staphylinus spp.						1	1													1													
Quedius spp.			1	1																							1				1		
Tachyporus spp.		1	2	1			1												1				2										
Tachinus spp.					1		1						1							1							2						
Tachinus rufipes (Geer.)			2		1		2													1			1			3	1						
Aleocharinidae gen. & spp. Indet.		2	1	2	2			2	1	1			1		1			1		2							1						
Scarabaeidae																																	
Geotrupes spp.	2	1	1		1	35	25			2		5	1	13			2	1	1	1		1				5	3	2					2

Colobopterus erraticus (L.)	2				1																												
Colobopterus fossor (L.)	2						1																										
Aphodius ater (Deg.)	2													1																			
Aphodius coenosus (Panz.)	2	1																															
Aphodius consputus Creutz.	2																																
Aphodius fimetarius (L.)	2	1			7		3																										
*Aphodus granarius (*L.)	2		2	3			2							1			1		1									1				4	
Aphodius rufipes (L.)	2	1		1	3		3	1																				3					1
Aphodius sphacelatus (Panz.) *or Aphodius prodromus (*Brahm.)	2	4	3	6	4		5		1		1			1					2	1								4					4
Aphodius spp.	2	9		14	3		14	2	1	1			1	3			1			1	1		1	1	1	2	12	1		2	2		1	2
Oxyomus silvestris (Scop.)	2	1	1	4	3		1					2									1						1		1			1	
Onthophagus ovatus (L.)	2		1				2					1											1			2							
Onthophagus similis (Scriba.)	2																	1		1													
Onthophagus spp,	2			1	1															1													1
*Phyllopertha horticola (*L.)	11		1		2		1			1		1					1			1	1	1			1								
Cetonia aurata (L.)	11				1													2			1												
Scirtidae																																	
Scirtes gen. & spp. indet.	1																			1					1								
Dryopidae																																	
Dryops spp.	1																																1
Elmidae																																	
Oulimnius spp.	1				1																												
Elateridae																																	
Agriotes spp.	11						1			1		1								1							2	1				1	1

Agrypnus murina (L.)	11		4		2		3			1	10			2	1					1							1								
Athous spp.	11		1																					1	1		1								1
Throscidae																																			
Throscus spp.															2					2	1		1	1											
Anobiidae																																			
Grynobius planus (F.)	4						2																		1										
Anobium punctatum (Deg.)	4	1	3		2		3					2	1		1					1						1				1	1	1			
Nitidulidae																																			
Brachypterus urticae (F.)	3	1		1	3										1			2	1							3								
Cryptophagidae																																			
Cryptophagus spp.	9a																		1								1								
Atomaria spp.	9a		1		1																														
Phalacridae																																			
Phalacrus sp.	5						1																												
Orthoperidae																																			
Corylophus cassidoides (Marsh.)	5														2																		1		
Coccinellidae																																			
Scymnus frontalis (F.)					1																														
Lathridiidae																																			
Lathridiidae spp.	8																																1		

Lathridius minutus (Group)	8	1																		1		1											
Corticaria spp.	8		1												1																1			
Bruchidae																																	
Bruchus atomarius (L.)	3																																1
Bruchus spp.							14													1													
Chrysomelidae																																	
Plateumaris/Donacia sp.	5							1																									
Chrysomela spp.	3				1				1				2							1				1									
Chrysolina fastuosa (Scop.)	3		1		1																												
Phaedon spp.																										2							
Hydrothassa spp.	5				1																						1						
Chaetocnema concinna (Marsh.)															2															1			
Chaetocnema spp.		1	1		1				1						1											4							
Phyllotreta spp.							1																			1				1	2		1
Altica spp.	4		1																	1	1												
Apionidae																																	
Apion aeneum (F.)	3						1					1	1	1						1							1				1	1	4
Apion urticarium (Hbst.)	3						1					1	1	1	1				1			1		1			1	1				1	1
Apion astragali (Payk.)	3																																
Apion spp.	3	2	1	2			2		1											2				1			5	1				1	3
Curculionidae																																	
Otiorhynchus rugifrons (Gyll.)																		1			1												
Otiorhynchus ovatus (OL.)									1																								
Otiorhynchus spp.																																	
Liophloeus tessulatus (Mull.)																				1													1
Phyllobius spp.	4		1																		1												

Polydrusus sp.	3								1																								
Barypeithes sp.								1																									
Barynotus sp.											1			1																			
Strophosoma capitatus (Geer.)																																	1
Sitona cylindricollis (Fahrs.)	3																		2														2
Sitona spp.	3	1	3	1		1	2						1		1									1						1		1	1
Hypera sp.	3						5						1																				
Tanysphyrus lemnae (Payk.)	5						2				2																						
Acalles ptinoides (Marsh.)																																	1
Acalles roboris Curtis								1																									
Dorytomous spp.					1																												1
Notaris acridulus (L.)	5									1	2																						
Notaris sp.	5						2	1						1																			
Thyrogenes sp.	5									1																							
Cidnorhinus quadrimaculatus l.	3										1		1																				
Ceutorhynchus pervicax Weise.	3		1		1																										1	1	
Ceutorhynchus contractus (Marsh.)	3						1								1															1			
Ceutorhynchus resedae (Marsh.)	3				2										1									1			1					1	
Ceutorhynchus spp.							1						1		3					1	1				1				1				
Baris sp.											1																						
Mecinus pyraster (Hbst.)	3	1					3							1												2						1	2
Gymnetron pascuorum (Gyll.)	3																		1	1													
Gymnetron spp.	3													1					1												2	1	1
Rhynchaenus spp.	4		1				1																										1
Rhamphus pulicarius (Hbst.)	4		1							1					1																		
Scolytidae																																	
Scolytus multistriatus (Marsh.)	4							1																									
Scolytus rugulosus (Mull.)	4																						1										
Hylesinus oleiperda (F.)	4																																1

Leperisinus varius (F.)	4																															1
Hemiptera					1																		1									
total number of individuals		45	64	73	101	41	142	42	26	33	22	16	26	32	45		4	13	15	60	16	7	4	17	12	13	75	28	1	4	15	16	37	63

	Ecological Codings (Robinson 1991; 1993)
1	Aquatic
2	Pasture/dung
3	Meadowland
4	Wood and trees
5	Marshland and aquatic plants
6a	General disturbed ground/arable
6b	Sandy/dry disturbed ground/arable
7	Dung/Foul rotting organic material
8	Lathridiidae
9a	General synanthropic
10	Especially structural timbers
11	On roots in grassland

Table 2: Ecological codings, as used in Figure 1.

The Middle Bronze Age

Twelve insect faunas were recovered from features of middle Bronze Age date.

	17032	16050	17075	17076	29039	29047	29060	29062	29065	29118	29135	29140
1	4.4%	4.7%	6.8%	15.8%	4.9%	3.5%	57.1%	65.4%	45.5%	4.5%	18.8%	19.2%
2	46.3%	15.0%	49.2%	32.1%	92.3%	43.4%	25.0%	22.2%	18.8%	5.9%	61.5%	9.5%
3	12.2%	10.0%	6.6%	10.3%	2.6%	11.6%	0.0%	33.3%	0.0%	5.9%	15.4%	33.3%
4	2.4%	11.7%	0.0%	2.6%	0.0%	4.7%	6.3%	0.0%	6.3%	0.0%	15.4%	4.8%
5	4.4%	1.6%	9.6%	6.9%	0.0%	5.6%	4.8%	0.0%	6.1%	18.2%	0.0%	0.0%
6a	2.4%	3.3%	0.0%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.8%
6b	2.4%	3.3%	0.0%	0.0%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	7.3%	1.7%	21.3%	6.4%	0.0%	5.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8	2.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9a	0.0%	1.7%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	0.0%	8.3%	0.0%	3.8%	0.0%	3.1%	0.0%	0.0%	12.5%	58.8%	7.7%	0.0%

Table 3: The ecological groupings from the middle Bronze Age features

Sample 17032, context 527081, pit 527078 and sample 16050, context 526040, waterhole 510047.

Sample 17032 was recovered from the lower fill of a pit cut by a later ditch system. Sample 16050 came from a disturbed clay deposit from a middle Bronze Age waterhole.

The insect assemblages from samples 17032 and 16050 are essentially similar to each other. Both samples are characterised by the recovery of large numbers of Scarabaeidae or 'dung beetles' and taxa associated with open grassland (ecological groups 2 and 3 respectively). The 'dung beetles' include *Onthophagus similis* and *O. ovatus, Colobopterus erraticus*, *Aphodius rufipes* and *Aphodius coenosus* all of which are found in dung, on open and sandy ground (Jessop 1986). Many of the Carabidae or 'ground beetles' from these samples are also found on open sandy grassland including *Amara aenea*, *Asaphidion pallipes* and *Anisodactylus nemorivagus* (Hyman 1992, Lindroth 1974, 1985, 1986), the elaterid *Agrypnus murina* is also found in sandy, dry meadows and heath (Koch 1989b). Several of the taxa recovered are associated with open grassland (ecological group 3). Typical of this type of landscape are the *Sitona* spp. 'clover weevil', *Mecinus pyraster* which is associated with plantain (*Plantago* spp.) and the Apion spp. which are often found on a range of leguminous plants. The presence of disturbed ground is also suggested by *Brachypterus urticae* which feed upon nettle (*Urtica* spp.).

In contrast, other carabids recovered such as *Pterostichus cupreus* and *Pterostichus nigrita*, are associated with damper meadows and moist clay soils (Lindroth 1974, 1985, 1986). Comparatively few aquatic taxa were recovered perhaps suggesting that the ditches concerned only contained shallow or temporary bodies of water.

Sample 17075, context 557039 (upper fill) and Sample 17076, context 557029 (lower fill) from pit 557027.

These samples are from consecutive fills of a middle Bronze Age pit and are thought to represent backfill. The deposit contained potsherds and bone which suggests the back fill possibly contained domestic waste.

The landscape around the pit seems to have been open grassland grazed by large herbivores. This is suggested by the relatively large proportion of 'dung beetles' (ecological group 3) recovered such as *Geotrupes*, *Onthophagus* and *Aphodius*

species. Indicators for the nature of the surrounding vegetation again indicate disturbed ground. This includes insects such as the 'leaf beetles' *Chrysolina fastuosa,* which is found on dead and hemp nettles (*Lamiun* and *Galeopsis spp.*) and hemp nettle, and *Hydrothassa* spp. which is found on buttercups (Ranunculacae) (Koch 1992). The weevil *Ceutorhynchus pervicax is* found on cuckoo flower (*Cardamine pratensis*) (Koch 1992) a species of plant with is particularly associated with damp pasture (Stace 1991). *Sitona* spp. are normally found on clover (*Trifolium* spp.), vetches (*Vicia* spp.) and wild pea (*Lathyrus* spp.) (Koch 1992).

There are limited indications that domestic or settlement rubbish may have entered this deposit during backfilling. A number of taxa recovered, such as the histerid 'pill beetles', *Ceryon* spp and a range of small staphylinids such as *Anotylus rugosus*, *A. nitidulus* and *A. sculpturatus* are all associated with decaying settlement waste and materials but can also be found in animal dung (Hansen 1987; Tottenham 1971). Similarly, a single individual of the 'common woodworm,' *Anobium punctatum* also was recovered, but this species is not restricted to human settlement and can occur in the dry deadwood of isolated trees in the countryside.

Sample 29118, Context 836054, waterhole 836052.

This waterhole has been dated to the Middle Bronze Age, but is located in a cluster of later Bronze Age/ Iron Age features. The fauna was dominated by 'dung beetles' such as *Onthophilus striatus*, *Geotrupes* spp. and *Aphodius* spp. which indicate the presence of grazing land and meadows, as does the large numbers of the 'click beetle' *Agrypnus murina* recovered. The larvae of this latter species are commonly found in the roots of grass in rough pasture. Similarly, the presence of disturbed ground is also suggested by the weevils *Apion urticarium* and *Cidnorhinus quadrimaculatus* since these are both associated with nettles, whilst species of the *Barynotus* genus are found in a variety of environments in grassland.

The recovery of two specimens of *Tanysphyrus lemnae* in this feature may suggest that it contained standing water since it is found on duckweed (*Lemna* spp.) (Koch 1992).

The recovery of 'the common woodworm' from this deposit does not necessarily suggest that settlement was present in the area. This species is often recovered in low

numbers within natural environments, where it lives in dry deadwood in old and isolated trees.

Sample 29135, Context 823191, waterhole 823181

This sample produced a small and restricted assemblage. Despite this, the recovery of a number of Geotrupes 'dor beetles' and the *Onthophagus ovalis* suggest that pasture and grazing animals were present in the area. Meadowland is also suggested by the recovery of the 'garden chaffer' *Phyllopertha horticola* and the 'click beetle' *Agriotes* spp. both of which are associated with meadow and grassland.

Sample 29140, Context 835061 waterhole 835044

This small but well preserved assemblage was dominated by species of open and disturbed ground. This is clearly suggested by the recovery of *Apion urticarium* and *Cidnorhinus quadrimaculatus* which are associated with nettle, and by the *Sitona* species which are associated with vetches (*Vicia* spp.), clovers (*Trifolium* spp.) and trefoils (*Lotus* spp.) (Koch 1992). Similarly, the carabid *Calathus fuscipes* is found in open meadows and pasture and *Bembidion guttula* is also characteristic of lush, low growing vegetation such as grasses and sedges (*Carex* spp.) on floodplains (Lindroth 1974). The pselaphid, *Bryraxis bulbifer*, is also found in damp grassland and sedge fen (Pearce 1957).

A small suite of species from the hygrophilous Hydraenidae family also indicates damper conditions. This group of species, which includes *Hydreana* spp., *Octhebius* spp. and *Helophorus* spp., are found at the muddy periphery of a variety of water bodies and in muddy ephemeral and seasonal pools (Hansen 1987).

Other phytophagous beetles are associated with a variety of plants commonly found in both meadows and disturbed ground. This includes weevils of both the *Apion* and *Sitona* genera.

Sample 29039, Context 821066, pit 821063

This sample produced a poorly preserved and fragmentary assemblage, almost solely composed of 34 individuals of the 'dor beetle' *Geotrupes*. this does at least clearly suggest the presence of grazing animals.

Sample 29047, Context 816049, waterhole 816042

This sample was from an organic, secondary fill of a middle Bronze Age waterhole and produced an exceptionally well-preserved and interpretable assemblage. The majority of the taxa recovered are associated with grazing and meadowland (ecological group 2). This includes large numbers of 'dung beetles' such as the 'Dor beetle' *Geotrupes* spp. as well as *Aphodius rufipes, Aphodius fimetarius* and *Aphodius ater* , all of which are associated with animal dung standing in the open (Jessop 1986). Coleoptera associated with rotting manure and other foul, rotting, organic material were also found in some numbers (ecological group 7). This includes several taxa from Kenward's 'Oxyteline association' (Hall and Kenward 1990) and a substantial group of Histeridae 'pill beetles such as *Paralister purpurascens, Hister merdarius* and *Hister cadaverinus*.

The presence of meadow and waste ground is suggested by a number of the phytophage species recovered. *Apion urticarium* and *Cidnorhinus quadrimaculatus* are found on nettles (*Urtica* spp.). *Apion aeneum* is associated with mallows (Malvaceae) and *Mecinus pyraster* with plantains (*Plantago* spp.) (Koch 1992). Members of the Bruchidae family were also abundant in the fauna and are normally associated with wild and cultivated peas beans and vetches (Koch 1992). Further indicators of the wider environment are also present and include species of drier grassland such as the carabids *Microlestes maurus* and *Agonum marginatum* (Lindroth 1974) and the elaterid *Agrypnus murinaus.* Rough grassland is also suggested by the presence of the 'garden chaffer' *Phyllopertha horticola* (Jessop 1986).

There are indications that the water hole may have been surrounded by water side vegetation and soft wet ground. This is suggested by the relatively high occurrence of a range of 'ground beetles that are associated with these conditions. This includes *Pterostichus anthracinus, Pterostichus diligens*, and *Pterostichus niger* (Lindroth 1974). Though water beetles are not present in large numbers both *Agabus bipustulatus*, a dytiscid found in marshes and detritus filled ponds (Nilsson and Holmen 1995) and *Tanysphyrus lemnae*, a weevil associated with duck weed (*Lemna* spp.), would suggest that periodically, deeper pools of water could be found in the feature.

Sample 29060, Context 827096, waterhole 815041.

The assemblage from this sample includes substantially more aquatic and hygrophilous or 'water loving' species than the previous samples. These include the 'diving beetles' *Hydroporus* spp., *Graptodytes* spp. and *Agabus* spp., the hydreanids *Ochthebius* and *Hydraena* as well as a single individual of the 'whirligig beetle' '*Gyrinus* spp. This suggests that the water in this feature may have been more permanent than in the other pits at this site.

Indicators of the wider environment are scant; the carabids, *Dyschirius globosus* and *Bembidion doris* are both associated with damp, muddy areas and relatively low growing vegetation such as grasses and sedges (*Carex* spp.) (Lindroth 1974) as is the weevil *Barypeithes* spp. (Koch 1992). Phytophages are restricted to the weevil *Acalles roboris*, which is associated with a variety of deciduous trees, including oak (*Quercus* spp.) and beech (*Fagus* spp.) (Bullock 1993). A further indicator of deciduous trees is the scolytid, *Scolytus multistriatus*, which is found on elm (*Ulmus* spp.) (Bullock 1993).

Sample 29062, Context 827096, waterhole 815041

The insect fauna from this feature was relatively small but well preserved and suggests that similar conditions to that seen in context 29060 were present. Again, the assemblages largely consist of small numbers of 'water beetles' such as the Gyrinidae and Dytiscidae, snf Hydraenidae families of beetles that are normally associated with still or stagnant water (Hansen 1987; Nilsson and Holmen 1995). There are few indicators for the environment surrounding the feature;however *Apion urticarium* is found on common nettle (*Urtica dioica*) and *Otiorhynchus ovatus* is found on bare and sparsely vegetated soils.

Sample 29065, context 830060, waterhole 830056

Sample 29065 produced a small but interpretable assemblage similar to the fauna from both samples 29060 and 29062, with a number of water beetles indicating standing water, probably subject to periodic drying. There is also evidence for stands of waterside vegetation since the weevils *Notaris acridulus* and *Thyrogenes* spp, are both associated with sedges (*Carex* spp.) sweet grass (*Glyceria* spp.) and rushes (*Juncus* spp.) (Koch 1992). A further curculionid, *Ramphus pulicarius*, is found with willows (*Salix* spp.).

Discussion

The insect assemblages from the Middle Bronze Age features clearly indicate that the environment at the site during this time was usually dry, open grassland used for grazing and animal husbandry. The presence of species associated with damper, clay soils from samples 17032 and 16050 may indicate episodes of overbank flooding, or that some areas of the site were relatively low lying or adjacent to the ancient course of the river Colne. The majority of the beetle faunas from excavation area TEC05 (Samples 29118, 29039 and 29047) also contain abundant scarabaeoids, or 'dung beetles' suggesting that the land surrounding these features were also grazed, that this landscape was used for animal husbandry and that the waterholes probably were used for the watering of livestock.

In contrast, dung beetles are virtually absent from samples 29140, 29135, 29060, 29062 and 29065, suggesting that none of these features was used as a waterhole for livestock. Considering that *Aphodius* spp. are ready fliers (Jessop 1986; Kenward 1978) this would seem somewhat unusual, particularly since samples 29039 and 29047, which are thought to be contemporary, contain an abundance of both genera and were located in features which were in close proximity to waterholes 835044 (sample 29140) and 823181 (sample 29135). Recently, modern work has shown that dung beetle populations can actually be quite sensitive in the degree to which they can reflect the size and concentration of animal herds in the archaeological record (Smith and Whitehouse 2010). This may suggest that the use of the waterholes and the pasture surrounding them may have been periodic, seasonal or selective.

There are, however, several other possible explanations for the marked differences in the abundance of dung beetles; it is possible that the fills of waterholes 836052 (sample 29118) and 816042 (sample 29047) together with pit 821063 (sample 29039) relate to a later less intense use of the landscape during the Late Bronze Age. However, it is also possible that some of the features, notably waterholes 835044 (sample 29140) and 823181 (sample 29135) were deliberately kept cleaner.

There are very few species of insect that are associated with trees and woodlands suggesting that at this time a cleared environment, devoid of tree cover, was present.

Direct evidence of human habitation, or the deliberate dumping of settlement waste, is extremely limited in most of these deposits, suggesting that dumping of settlement waste or deliberate backfilling did not occur very often. This is even the case with samples 17076 and 17075 which contained considerable amounts of pottery and other domestic waste.

Aquatic conditions also vary significantly between the groups of features: in samples 29039 and 29047 aquatic and hygrophilous taxa are virtually absent, while the limited assemblage of distinct aquatics and hygrophilous species in samples 29140 and 29135 also suggests that these deposits were not directly formed under waterlain conditions. In samples 29060, 29062 and 29065 the aquatic component is by far the most substantial constituent, comprising 57.1%, 65.4% and 45.5% respectively (Table 3) of the entire assemblage in comparison to a total absence in pit fill sample 29039 and 3.5% in waterhole sample 29047. The aquatic insects in samples 29060, 29062 and 29065 would suggest that the features contained a permanent, standing body of water for much of the year. In contrast, the insect evidence would suggest that pit 821063 (sample 29039) never contained standing water.

There is little comparative palaeoentomological material from similar field systems for the middle Bronze Age. In the Upper Thames Valley this is restricted to sequences from Shepperton and Yarnton (Robinson 2002, 2006, unpublished) and previous work from the Terminal 5 site at Perry Oaks (Robinson 2006). Whilst poorly preserved, the insects from Staines Road Farm, Shepperton, clearly indicate a waterhole which was used by grazing animals and which was located in an open, grassland landscape (Robinson unpublished). A similar assemblage was recovered from Perry Oaks, again suggesting an open, grazed landscape (Robinson 2006). The Perry Oaks assemblage also contained a small synanthropic fauna which clearly indicated human habitation and settlement waste (Robinson 2006). Recent work at the Kingsmead Quarry, Horton from a number of middle Bronze Age waterholes produced essentially the same faunas as recovered from the Terminal 5 excavations (Smith 2009). This suggests that much of the landscape surrounding Heathrow during the Bronze age was used for pasture and stock raising. Further evidence strongly suggests that agricultural intensification during the middle Bronze Age is restricted to the Thames Valley (Yates 1999, 2001).

The Middle or Late Bronze Age and Late Bronze Age

	17002	29100	27238	24051	27184	27185	27305	29130
1	15.4%	3.1%	22.2%	0.0%	0.0%	23.3%		7.7%
2	18.2%	63.3%	0.0%	100.0%	26.7%	11.4%		58.3%
3	18.2%	13.3%	16.1%	0.0%	13.3%	18.2%		0.0%
4	0.0%	0.0%	6.5%	0.0%	0.0%	4.5%		8.3%
5	0.0%	3.1%	8.9%	0.0%	0.0%	3.3%		0.0%
6a	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
6b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%
7	9.1%	0.0%	9.7%	0.0%	13.3%	6.8%		0.0%
8	0.0%	0.0%	0.0%	0.0%	0.0%	2.3%		0.0%
9a	0.0%	0.0%	0.0%	0.0%	6.7%	0.0%		0.0%
11	18.2%	6.7%	3.2%	0.0%	0.0%	4.5%		0.0%

Table 4: The ecological groupings from the Middle or Late Bronze Age, Late Bronze Age and Late Bronze Age or Early Iron Age features.

Of the samples from waterholes which have been dated as being either Middle or Late Bronze age, Late Bronze Age and Late Bronze Age or Early Iron Age, several produced very small insect assemblages which are difficult to interpret (particularly samples 24051, 27184, 27154, 27155, 27158, 29130). The remaining samples produced small but interpretable insect faunas.

Sample 29100, Context 835029, waterhole 833123. Middle or Late Bronze Age.

This sample was taken from a waterlain deposit at the base of the feature. It produced a small, fragmentary, but interpretable assemblage. The fauna is dominated by the Scarabaeidiae, particularly *Geotrupes* spp. and *Aphodius* spp. A further group of 'decomposer' taxa including the hydrophilid, *Cercyon haemorrhoidalis*, the histerid, *Onthiophilus striatus* and species from the Silphidae family indicate an accumulation of foul, rotting organic material such as animal dung and possibly carrion.

Indicators of the surrounding environment are present, these include the carabids *Amara* spp. and *Nebria* spp. which are found on drier, sandy soils (Lindroth 1974) and the elaterid, *Agrypnus murina*, which is also found in drier pastures and meadows (Koch 1989a). There is evidence that the area around the waterhole may have been disturbed. This is suggested by the phytophages recovered such *Apion urticarium*, which feeds on the common nettle (*Urtica dioica*), and *Mecinus pyraster*, which feeds on ribwort plantain (*Plantago lanceolata*) (Bullock 1993).

Sample 27238, context 724002, ditch 724018. Middle or Late Bronze Age.

Sample 27238 from the clay fill of a linear boundary feature, possibly accumulated from eroded topsoil, produced a relatively large insect fauna. The hydraenids *Hydraena testacea* and *Ochthebius minimus* are both found at the muddy edges of stagnant, standing or slow moving water bodies often with lush riparian vegetation (Hansen 1987). *Corylophus cassidoides* is also found amongst tall reeds (*Phragmites* spp.) and sedges (*Carex* spp.) on swampy and boggy ground (Koch 1989). Again both the nitidulid *Brachypterus urticae* and the curculionid *Apion urticarium* suggest the presence of nettle and therefore disturbed ground (Bullock 1993).The elaterid *Agrypnus murina* and the throscid *Throscus* spp. are found in damp or dry, weedy grassland (Koch 1989a)

Sample 27305, context 685035, waterhole 685032.

This sample was recovered from the secondary fill of a Bronze Age waterhole, which contained the remains of a log ladder. The matrix is likely to derive from eroded topsoil.

The assemblage from this sample is composed of species associated with open grassland, disturbed ground, dung and other foul, rotting organic material.

The carabids *Bembidion guttula* and *Trechus quadristriatus* are both found in open grassland. The former is strongly associated with damper meadows amongst sedges (*Carex* spp.) and grasses particularly around bodies of water, the latter in drier conditions with light vegetation, particularly docks (*Rumex* spp.). A further group found on docks and sorrels are the curculionid family *Apion* spp. (Koch 1992, Lindroth 1974, 1985, 1986). Other species associated with disturbed vegetation, probably growing around the waterhole include the nitidulid *Brachypterus urticae*

found on nettles (*Urtica* spp.) and the curculionid *Mecinus pyraster* found on plantain (*Plantago* spp.) (Bullock 1993). Drier grassland species were recovered including the elaterids *Athous* spp. and *Agriotes* spp. and a further group of curculionds, *Sitona* spp. that feed upon vetches (*Vicia* spp.) and clover (*Trifolium* spp.) (Koch 1992).

There is no evidence from the aquatic taxa that this deposit accumulated in waterlain conditions. Aquatic and hygrophilous taxa are restricted to the Hydraenidae, majority of which are associated with muddy ephemeral pools surrounded by lush vegetation (Hansen 1987).

Sample 17002, context 529014, ditch 583160. Late Bronze Age.

Sample 17002 was recovered from a secondary ditch fill from a field boundary and the deposit is thought to have accumulated largely from eroded topsoil. The insect fauna from this sample is essentially similar to those from middle Bronze Age samples 17032 and 16050 (above). Numbers of Scarabaeidae or 'dung beetles' and taxa associated with open grassland were present (ecological groups 2 and 3 respectively). The 'dung beetles' include *Onthophagus similis and Geotrupes sp.* which are found in dung, on open grassland and sandy ground (Jessop 1986), suggesting grazing animals were present aroud the ditch. The presence of disturbed ground is also suggested by *Brachypterus urticae* which feed upon nettle (*Urtica* spp.). Several individuals of the 'rose chaffer' *Cetonia aurata* were also recovered. This species is normally, as an adult, associated with a range of flowering plants often in areas of scrub and hedging (Jessop 1986).

Samples 27184 and 27185, context 726006, pit 726001. Late Bronze Age

The samples have been recovered from a secondary fill of a pit of uncertain function. The sampled context is derived either from eroded topsoil or alluvium from over bank flooding of the River Colne. It is also possible that this alluviation is a result of abandonment and disuse. The samples have been recovered from a context directly below an inhumation of a juvenile human.

Sample 27185 produced large numbers of dung beetles as well as species found in accumulated rotting material (ecological groups 2 and 7). There are also a number of indictors for dry grassland and disturbed ground such as the elaterids, throscids and apionids including *Apion urticarium,* which feeds upon nettle and the curculionid *Sitona suturalis,* which feeds upon vetches (*Vicia* spp.) (Bullock 1993). The

assemblage from sample 27184 was much more sparse; those beetles which were present again indicate dry open, pasture and with limited evidence for disturbed and waste ground.

Water beetles were also abundant in sample 27185, suggesting the presence of standing water at the time of deposition. Several of the aquatic taxa, such as the gyrinids, prefer permanent, stagnant, standing or slow moving water bodies (Hansen 1987, Nilsson and Holmen 1995). Coleoptera associated with the vegetated margins of standing water include the carabids *Agonum thoreyi* and *Bembidion clarki*. The former is found at the margins of standing water with tall reeds such as bulrush (*Typha* spp.), clubrush (*Schoenoplectus* spp.) and bur-reed (*Sparganium* spp.), the latter is found in lush vegetation in swamps and bogs (Lindroth 1974).

Two individuals associated with Kenward's 'house fauna' were found in this sample, the *Lathridius minutus* and the 'common woodworm' *Anobium punctatum* which are associated with human habitation. *Lathridius minutus* is particularly associated with drier, rotting material such as straw and hay (Koch 1989a). *Anobium punctatum*, the common woodworm, is found in dry, well-seasoned wood such as furniture and structural timbers (Koch 1989b). However, both taxa are also encountered in the countryside and in such low numbers do not necessarily indicate the presence of settlement or settlement wastes.

Sample 24051, context 663175, waterhole 663167. Late Bronze Age.

The material was recovered from the ditch which encloses the mid/late Bronze Age 'D' shaped enclosure ditch. The deposit contains large quantities of pot, almost certainly deliberately placed in the ditch. A whole pot was recovered from the base of the ditch and has been interpreted as a votive offering. A human inhumation was found close by.

The small insect assemblage from this large sample is entirely restricted to species of Scarabaeidae, clearly suggesting grazing animals nearby. No evidence was recovered to provide information pertaining to the vegetation around the feature or the aquatic regime.

Late Bronze Age or Early Iron Age

Sample 29130, waterhole 834034.

This sample produced a small assemblage of well preserved insects. The largest component, once again, are several individuals of the *Geotrupes* spp 'dor beetle'. Aquatic taxa were also recovered and included single individuals of the dytiscid, *Hydroporus* spp. and the hydraenid, *Limnebius* spp., the limited number of distinctly aquatic species would suggest that the feature was not filled with water at the time of deposit formation although it may have contained standing water on a seasonal basis.

Discussion

Land use in the area of Terminal 5, during the later Bronze Age, was clearly dominated by pasture and grazing with moister areas of grass and reed dominated vegetation surrounding the ditches and waterholes. There is also some evidence for the presence of disturbed ground around the various waterholes based on the stands of stinging nettle that appear to be present. This is a common feature of meadow and grazing land was the cattle are able to graze for some time and the ground becomes 'scuffed'. There is no evidence to suggest that any of the contexts examined here contained settlement or domestic waste, as Kenward's 'house fauna' (Hall and Kenward 1990, Kenward 1997, Kenward and Hall 1995) and other possible synanthropic taxa are usually absent except for the two individuals from sample 27185. This again suggests that little settlement waste entered these waterholes either during dumping or as deliberate back fill.

The insect faunas recovered from the site of Terminal 5 from the Middle and /or Late Bronze age features suggest that the cleared landscape dominated by pasture and meadow continued throughout the majority of the Bronze Age. This landscape at Terminal 5 is presumably part of the same pattern of land use that seems to have widespread in this area of the Middle Thames Valley at this time. Certainly the contemporaneous set of waterhole and pits at Perry Oaks (Robionson 2006) produced essentially similar fauna, though there does appear to be more evidence at this location for the presence of adjacent settlement or the dumping of settlement waste in some features. The insect remains recovered from the Late Bronze age ditch deposits at the site at Kingsmead Quarry, Horton and from the waterhole at the Imperial

College site, Harlington have also produced an essentially similar insect fauna to those seen here and at Perry Oaks. A notable absence from these deposits at Terminal 5 is that there are no finds of the honey bee (*Apis mellifera*), despite their presence at the Perry Oaks site.

The environment surrounding these features is similar to those during the Late Bronze Age/early Iron Age at Mingies Ditch, Oxfordshire, which are dominated by Coleoptera found on grassland, coupled with a large number of dung beetles which suggest the land was predominantly used for pastoral purposes (Robinson 1993b).

Probably Bronze Age

Sample 27135, context 712002 and 1L incremental samples 27154-27158, context 712002. Pit 712001.

A suite of samples were extracted from the primary fill of a single pit close to an inhumation, the pit cuts a Bronze Age enclosure ditch. Though located close to a cluster of Middle Bronze Age features, the pit can only be dated as "probably Bronze Age" since Iron Age ceramics were recovered from lower fill 712002 (Table 1 and 5). The pit contained woody fragments including a stake and smaller twigs. The deposits are thought to consist of eroded topsoil or to be filled with domestic waste.

Bulk sample 27135 and all four incremental samples 27154/55/57/58 produced well preserved but limited insect assemblages. With the exception of sample of the upper sample in this sequence (27158), the remaining four samples all suggest similar environments and will hence be discussed together.

	27135	27154	27155	27157	27158
1	18.8%	14.3%	0.0%	11.8%	33.3%
2	15.4%	20.0%	25.0%	13.3%	12.5%
3	7.7%	20.0%	0.0%	13.3%	37.5%
4	15.4%	0.0%	0.0%	6.7%	12.5%
5	0.0%	14.3%	0.0%	0.0%	0.0%
6a	0.0%	0.0%	0.0%	0.0%	0.0%
6b	0.0%	0.0%	0.0%	0.0%	0.0%
7	7.7%	20.0%	0.0%	0.0%	0.0%
8	0.0%	20.0%	0.0%	0.0%	0.0%
9a	0.0%	0.0%	0.0%	0.0%	0.0%
11	7.7%	0.0%	0.0%	6.7%	12.5%

Table 5: The ecological groupings from the pit 712001 assemblages

Sample 27135, context 712002, samples 27154/55/57, context 712002

The four incremental samples through fill 712002 all produced very small insect faunas that are difficult to interpret. This is not surprising given the small volumes of material processed. However, all four samples contain *Aphodius* 'dung beetles' and phytophages such as *Apion* spp. and *Sitona* spp. that are common in rough grassland. Again there are also indicators for disturbed ground since The throscid *Throscus* spp. is found in both damp and dry meadowland and weedy places (Koch 1989a) whilst the *Apion urticarium* is found on nettles and *Gymnetron pascuorum* is found on plantains (*Plantago* spp.) (Koch 1992).

Sample 27158, *context 712002*

The assemblage from sample varies little from the lower three incremental samples in this sequence, however conditions are significantly damper than the lower samples. Two species, the dytiscid *Hydrorporus* spp. and the hydrophilid *Hydrobius fuscipes* are both found in permanent, standing water (Hansen 1987, Nilsson and Holmen 1995). A lone scolytid, *Scolytus rugulosus* was also found in this sample, this species is found on fruit trees such as apple (*Malus* spp.) and pear (*Pyrus* spp.) (Bullock 1993).

Discussion

This series of samples, together with those from the Middle Bronze Age - Early Iron Age discussed above, suggests a landscape of pasture and meadow. Similar landscape and land use is seen through out this period at a number of other near by sites such as the Perry Oaks site (Robinson 2006), the Kingsmead Quarry site at Horton (Smith 2009) and Imperial College site at Harlington (Smith 2010).

Comparable palaeoentomological evidence is available from several sites in the Upper Thames Valley region. Work at Mingies Ditch by Robinson (1993) indicates similar environments to those at Heathrow. Grassland with indicators herbaceous taxa associated with waste and disturbed ground. Large numbers of dung beetles suggest that this grassland was used as pasture (Robinson 1993). Evidence also suggests elevated water tables at Mingies Ditch during the middle Iron Age, distinct aquatic and waterside species were recovered from the deposits, suggesting conditions are significantly wetter than those at Heathrow (Robinson 1993). A further similarity between Heathrow and Mingies Ditch is evidence of increased sedimentary deposition and siltation within the features at both sites.

The Late Iron Age

Sample 18368, context 593201, waterhole 593207.

This single sample came from a later Iron Age waterhole which lies in the heart of later Iron Age activity. The deposit was heavily waterlogged and the pit contained the remains of two complete pots. The pots were recovered from the middle of the deposit stratigraphy and are thought to have ritual or votive significance.

A large, well-preserved and relatively diverse insect assemblage was recovered. The insect assemblage suggests open grassland with areas of disturbed ground and that large herbivores were pastured at the site. A variety of scarabaeoids occur, from the *Geotrupes, Onthophagus* and *Aphodius* genera. *Onthophagus ovatus* and *Aphodius rufipes* are commonly found in dung in on heathland and on open, sandy ground (Jessop 1986). A further scarabaeoid, *Oxyomus silvestris*, the staphylinids *Stilicus rufipes* and *Tachinus rufipes* and the histerid *Hister unicolor*, all are commonly

associated with accumulations of foul, rotting material. *Oxyomus silvestris* is seldom found with dung in meadows or pasture (Jessop 1986, Koch 1989b). Other grassland indicators include the elaterids *Athous* spp., *Agriotes* spp. and *Agrypnus murina* (Koch 1989a).

A small number of species indicate disturbance, probably resulting from cattle or other grazing animals scuffing up or trampling the ground around the waterhole. This is indicated by taxa such as *Apion urticarium* and *Mecinus pyraster*, which feed on nettles and plantains respectively.

Discussion

The feature which contained this sample lies in the very heart of later Iron Age activity at Heathrow. The land around this feature is clearly being used for the grazing of large herbivores and it seems likely that was used as a water-hole, however, there is no evidence to suggest that this deposit is water lain. Aquatic insects are limited to those of muddy, ephemeral pools and water bodies; no aquatic taxa associated with deeper, more permanent pools were recovered.

The insect assemblages provide no further information on possible ritual activity. The insect assemblage normally associated with domestic waste and human activity (*sensu* Kenward and Hall 1995) is absent which suggests material was not being dumped into the waterhole. The lack of aquatic taxa does support the view that hydrological conditions in the feature were changing; evidence certainly suggests it had become dry. A proposed hypothesis is that the intact bowls placed within the feature are due to the water source drying up and the lack of aquatic taxa would certainly support this view. It is also suggested that the water hole may have either been used specifically for ritual purposes or possible human water consumption. The volume of dung beetles in this assemblage and certainly those associated with accumulated rotting organic matter and dung would infer that animals also used this water hole; it is possible that this occurred after the feature fell into disuse.

Comparable palaeoentomological data for the Middle Thames Valley for the late Iron Age is limited at present. The Iron age settlement at Mingies Ditch in the upper Thames valley had been abandoned, probably due to elevated water tables and increased waterlogging which precipitated peat-forming activity (Robinson 1993b)

however this pattern of landscape abandonment is not seen at Farmoor (Robinson 1979) and a range of other Iron Age sites in the Upper Thames Valley where pasture and meadowland persist throughout the Iron age.

The Romano-British Period

	18363	18384	18385	18386	18388	18389
1	4.0%	17.9%	0.0%	0.0%	6.7%	18.8%
2	38.2%	14.3%	100.0%	50.0%	14.3%	0.0%
3	16.2%	19.0%	0.0%	0.0%	14.3%	36.4%
4	0.0%	0.0%	0.0%	0.0%	7.1%	9.1%
5	5.3%	7.1%	0.0%	0.0%	0.0%	12.5%
6a	1.5%	0.0%	0.0%	0.0%	7.1%	0.0%
6b	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	7.4%	0.0%	0.0%	25.0%	14.3%	9.1%
8	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9a	0.0%	4.8%	0.0%	0.0%	0.0%	0.0%
11	5.9%	4.8%	0.0%	0.0%	0.0%	0.0%

Table 6: The ecological groupings from the early Romano British assemblages

A suite of samples for archaeo-entomological analysis were recovered from a single, Romano-British feature.

Samples 18384/86/88/89, context 617177, circular pit 617178. Early- Mid Romano-British.

Six one litre incremental samples from a Romano-British rubbish pit were examined. The assemblages from these samples are relatively well preserved but species abundance and diversity are limited due to the small volumes of material examined. With the exception of sample 18386, the remaining three assemblages are similar in composition and will hence be discussed together.

As with the pits from the previous periods at this site, the insect assemblages from these features suggest open pasture. However, the taxa found with dung and accumulations of foul, rotting material or domestic waste are sometimes lower than in the earlier features from this site.

The carabids found in these samples are all found on dry, open grassland. *Calathus fuscipes* and *Trechus quadristriatus* are both found on drier open ground and sandy soils, often with a clayey component, the latter species is also associated with herbaceous taxa of disturbed ground such as docks and sorrels (*Rumex* spp.) (Lindroth 1974, 1985, 1986). Further species of Carabidae found on damper, open ground include *Clivina fossor* and *Nebria brevicollis* (Lindroth 1974, 1985, 1986). Again a range of 'dung beetles' such as the 'Dor beetle' *Geotrupes* spp. and *Aphodius* spp. suggest that grazing land surrounded the feature. A number of the Phytophages recovered from this feature suggest the presence of rough grassland. *Sitona* spp. are mainly associated with clover (*Trifolium* spp.) and *Gymnetron* spp. with plantains (*Plantago* spp.). Other indictors of disturbed ground and grassland include *Apion urtIcarium* and *Apion aeneum*, the former feeding on stinging nettle and the latter on mallows.

Species associated with human habitation, domestic or stable wastes are restricted. Woody remains were also found in these samples; some appear to have been infested by *Anobium puntactum*, the common woodworm. This taxon is associated with dry, seasoned and worked wood (Koch 1989a) though it can occur in the countryside where it can infest dry deadwood on standing trees or in hedgerows.

Sample 19187, context 527347, waterhole 527388. Middle-late Romano-British.

A single sample from the Mid to late Romano-British period was recovered from a feature associated with the second phase of Romano-British activity *c.* 2nd or 3rd century AD. The feature was probably used as a water hole and the deposit is thought to have formed relatively slowly in standing water.

The assemblage from feature was well preserved but restricted. Many of the species are those of disturbed ground, few species suggest the nature of hydrological conditions within the ditch during deposit formation.

Water conditions within the ditch are ambiguous: two distinctly aquatic taxa were recovered, the dytiscid, *Hydroporus* spp. and the hydraenid *Limnebius* spp. However single specimens of these species are not sufficient to suggest a deep, permanent water body (Hansen 1987, Nilsson and Holmen 1995).

The environment surrounding the ditch appears to have been vegetated by herbaceous species of disturbed ground such as nettle, the host of *Apion urticarium*. A second

apionid *Apion aeneum* feeds upon mallow, an herbaceous species also associated with disturbed ground and wayside places (Koch 1992, Stace 1991).

Dung beetles and other taxa found amongst accumulations of foul rotting material were also found in relatively large numbers. *Aphodius granarius* is usually associated with muddy localities with dung and rotting vegetation (Jessop 1986). Other indicators of foul, rotting material are present such as the histerids *Onthophilus striatus* and *Hister unicolor* (Koch 1989a).

Discussion

Palaeoentomological evidence indicates that these deposits were not water-lain. The limited nature of the aquatic assemblage suggests a seasonal or ephemeral water-body, subject to episodes of drying out. The land around the water holes in the Roman period was clearly being used for grazing and it seems likely that the local animal population used the waterhole during the period of deposit formation.

Other insect faunas examined from the Middle Thames Valley, in the area around Heathrow, also suggest that grazing land was present throughout the Romano-British period. Similar insect faunas to these were recovered in waterholes and ditches of this period at Perry Oaks (Robinson 2006) and also at Kingsmead Quarry, Horton and at the Imperial College site, Harlington (Smith 2010). In the upper Thames Valley, At Appleford, Farmoor and Barton Court Farm, palaeoentomological evidence indicates a prolonged period of grazing, with possible episodes of abandonment during the later Romano British period (Robinson 1981). It is also possible that pastoral farming occurred at Love's Farm throughout much of the Romano-British period, further radiocarbon dating will clarify this issue further (Tetlow 2006).

The Medieval Period

Only one medieval sample was analysed, from a clay deposit described as the first deposit accumulated by natural silting within waterhole 529139.

	17059
1	15.9%
2	23.4%
3	31.9%
4	6.4%
5	9.5%
6a	0.0%
6b	0.0%
7	0.0%
8	0.0%
9a	0.0%
11	4.3%

Table 7: The ecological groupings from the medieval assemblage

Sample 17059, context 529149, waterhole 529139.

The waterhole from which this sample was recovered is thought to have been in use for some time and the deposit accumulated relatively slowly and in standing water.

The environment indicate by the insects from this sample is not significantly different to those from the previous period, the number of Scarabaeidae and species associated with rotting, foul and decaying organic matter is broadly similar. The majority of the species recovered are indicators of the surrounding vegetation, suggesting a mix of open grassland, heath, wayside and wasteland.

The most striking species in this sample are the scolytids *Hylesinus oleiperda* and *Leperisinus varius*, both species are most commonly found on ash (*Fraxinus excelsior*) (Bullock 1993). A further taxon associated with woodland from this sample is the curculionid *Dorytomous* spp., a genus found on willows (*Salix* spp.), aspen and poplars (*Populus* spp.) (Koch 1992). Other species of Apionidae and Curculionidae are associated with vegetation characteristic of wayside and waste places such as *Apion aeneum*, which is found on mallows, *Liophloeus tessulatus* which is found on a variety of Umbelliferae and ivy (*Hedera helix*) and *Mecinus pyraster* which lives amongst plantains (Bullock 1993).

A small component is indicative of heathland, the curculionds *Strophosoma capitatus* and *Acalles ptinoides* are both found on dry sandy heathland with pines and heather (Hyman 1992, Koch 1992).

Several large water-beetles suggest that this deposit was water lain. The hydrophilid *Hydrobius fuscipes* is found in stagnant, standing water with lush vegetation (Hansen 1987), whilst the dytiscid *Agabus* spp. is found in a variety of ponds, pools and slow moving waters (Nilsson and Holmen 1995). Both species prefer relatively deep, permanent water bodies.

Discussion

Vegetation surrounding this feature appears to comprise a mosaic of heathland, waste or disturbed ground and grassland. Two species of Scolytidae clearly indicate the presence of ash trees. Aquatic species also suggest a permanent pool of standing or slow moving water. Whilst dung beetles are present in relatively large numbers, those of fouler rotting material are virtually absent. This, coupled with the relative abundance of taxa which provide information on vegetation surrounding the feature, suggests that the deposit formed relatively slowly.

The heterogeneous nature of this fauna is not easy to explain in terms of the surrounding landscape; it seems unlikely that such a variety of habitats existed in such close proximity to the feature and it is more likely that some of these insects, such as those associated with heathland, have been transported to the site by animal or human agency and that the source of the assemblage is part allocthonous, part autochthonous.

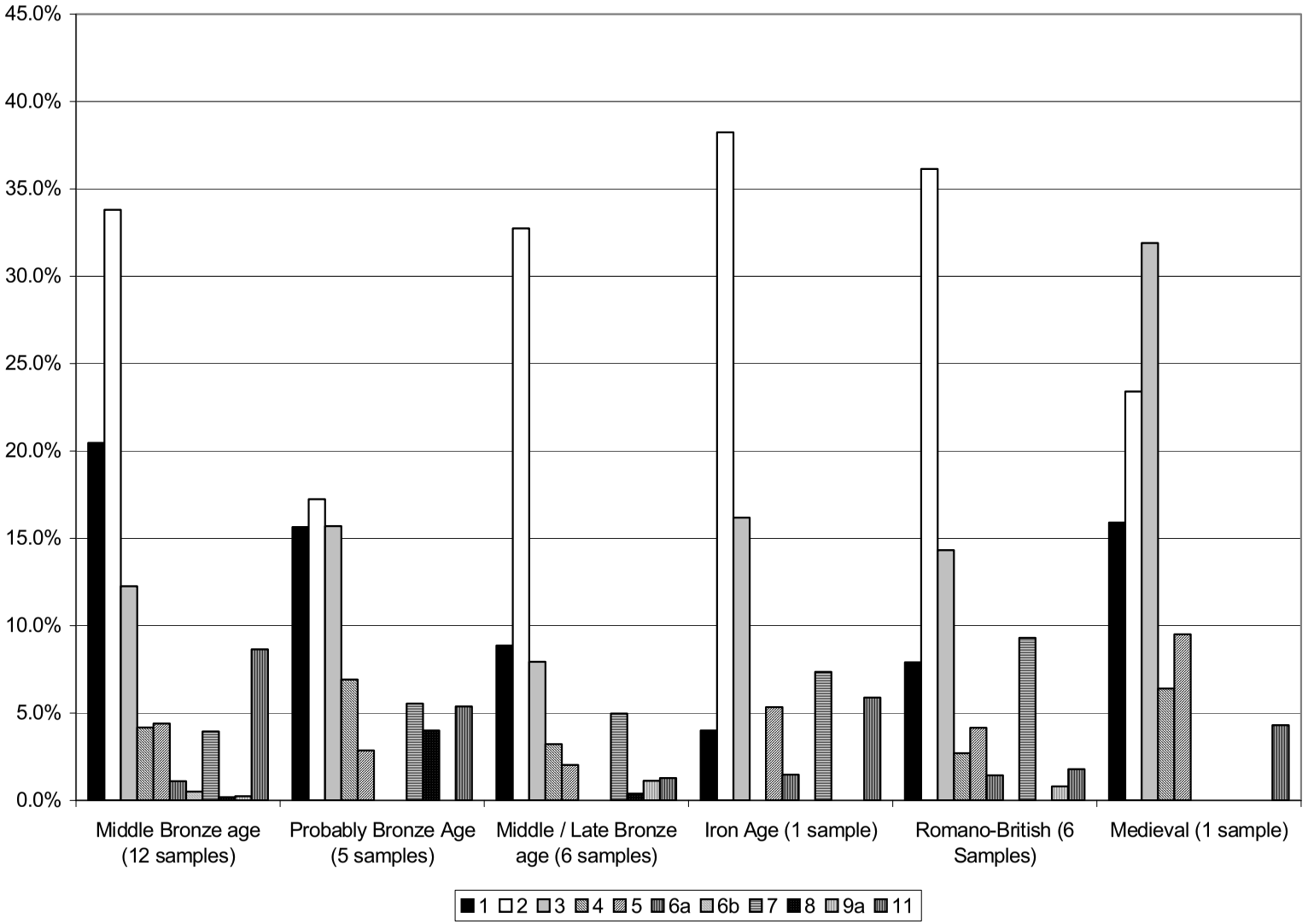
Conclusion

Palaeoentomological evidence indicates that land use changed very little throughout later prehistoric and Romano-British occupation at the site; the land was clearly used for grazing purposes .Comparable palaeoentomological evidence for such multi-period enclosure sites is scant. Numerous Bronze Age field systems have been recorded e.g. Didcot, Datchett, Reading and Dorchester on Thames (Yates 1999), comparable data from these and other sites is currently unavailable. The earliest

comparable data is from Runnymeade, Mingies Ditch and Willington which do not suggest such intensive early pastoral activity as that at Heathrow (Needham 2000, Robinson 1993, Smith and Tetlow 2005).

Palaeoentomological evidence also indicates possible periods of abandonment during the mid Iron Age and the late Iron Age/early Romano-British period, which corresponds with abandonment at other sites in the Thames Valley such as Farmoor and Barton Court Farm (Robinson 1981). However the insect data from Heathrow does not hint at possible reasons for this abandonment.

Figure 1: Ecological groupings of the Coleoptera from Heathrow Terminal 5 by archaeological phase (after Robinson 1991)



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