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Insect remains from the Roman fort at Papcastle, Cumbria

by

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Summary

Thirteen samples from deposits at the Roman fort at Papcastle, Cumbria were examined for insects. Most of the samples were taken from waterlogged Phase 1 deposits dated to the late 1st - early to mid 2nd century AD. The remaining two samples, from Phase 3, dated to the 3rd century, were barren of insect remains.

Assemblages obtained were typical of those which have been recorded from Roman deposits elsewhere. Grain pests were abundant, clearly indicating that grain was present; this may have originated in horse feed as there were hints of an insect fauna of stable manure. A large proportion of the insects appear to have been 'background' fauna.

Keywords: Papcastle; Cumbria; Roman; fort; insects; beetles; grain pests; stable manure

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Introduction

Excavations were carried out in 1984 at the Roman fort at Papcastle in Cumbria by the Cumberland and Lancashire Archaeological Unit, under the direction of A. C. H. Olivier. The site was divided into phases as follows: Phase 1, dating from the late 1st to early to mid 2nd century AD; Phase 2 from the early to mid 2nd century; Phase 3 dating to the 3rd century; and Phase 4 from the mid to late 3rd century. Phase 1 deposits included material with anoxic waterlogging and were the only ones extensively sampled for insects.

Methods

Samples for biological analysis were taken mainly from waterlogged deposits on the site. From these, eleven 1 kg 'test' subsamples were processed by paraffin flotation to extract insect remains (using methods of Kenward *et al.* 1980 and Kenward *et al.* 1986). The residue from two samples which had already been processed for extraction of plant macrofossils was also subjected to paraffin flotation, but as the original treatment involved sieving to 500 microns some of the smaller insect remains may have been lost.

The principles involved in the interpretation of the insects were fundamentally as described by Kenward (1978), with modifications as outlined by, for example, by Kenward (1982; 1988) and Hall and Kenward (1990). All Coleoptera and Hemiptera (beetles and bugs) in the samples were recorded fully quantitatively (see Kenward 1992). Numbers of taxa and numbers of individuals (N) in each sample were counted, and taxa were also divided

into broad ecological groups which are given by Hall and Kenward (1990). Other insects, and macro-invertebrates other than insects, were recorded if present but were not identified to species.

The data archive

Insect records were recorded on the VAX-cluster mainframe computer at the University of York, and was processed using a PASCAL program, written by HK, which produced ordered lists and statistics of value in interpretation. The system also created database files, initially for analysis in the DATATRIEVE data interrogation program.

All statistics are stored in hard copy at the Environmental Archaeology Unit (EAU), University of York, and copies have also been deposited with the Cumbria and Lancashire Archaeological Unit and the Ancient Monuments Laboratory of English Heritage. All lists and statistics obtained are also stored in the EAU's computer database system.

The insect assemblages

The samples are considered below in chronological order. Sediment descriptions made in the laboratory are given for each. All but two of the samples analysed were from Phase 1. A full list of the insect taxa present in the assemblages is given in Table 1. Some statistics of the combined assemblage for the site as a whole are listed in Table 2. Main statistics and species lists by sample are given in the Appendix.

Table 1. List of invertebrate taxa recorded from Roman deposits at Papcastle, Cumbria. Conventions: 'sp(p)' - indicates probable additional taxon or taxa; 'sp(p). indet.' - indicates may be (or include) previously listed taxon or taxa. Remains are of adults unless indicated. Order and nomenclature for Insecta follow Kloet and Hincks (1964; 1977).

OLIGOCHAETA	<i>Acritus nigricornis</i> (Hoffmann) [rt]
Oligochaeta sp. (egg capsules)	Histerinae sp. [u] <i>Ochthebius</i> sp. [oa-w] <i>Ptenidium</i> sp. [rt] <i>Acrotrichis</i> sp. [rt] <i>Silpha atrata</i> Linnaeus [u] <i>?Lesteva</i> sp. [oa-d] <i>Omalium caesum</i> or <i>italicum</i> [rt] <i>Xylodromus concinnus</i> (Marsham) [rt] <i>Coprophilus striatulus</i> (Fabricius) [rt] <i>Carpelimus ?bilineatus</i> Stephens [rt] <i>Carpelimus pusillus</i> group [u] <i>Carpelimus</i> sp. [u] <i>Platystethus arenarius</i> (Fourcroy) [rf] <i>Platystethus ?nodifrons</i> (Mannerheim) [oa-d] <i>Anotylus nitidulus</i> (Gravenhorst) [rt-d] <i>Anotylus rugosus</i> (Fabricius) [rt] <i>Anotylus sculpturatus</i> group [rt] <i>Anotylus tetracarinated</i> (Block) [rt] <i>Oxytelus sculptus</i> Gravenhorst [rt] <i>Stenus</i> sp. [u] <i>?Lathrobium</i> sp. [u] <i>Othius</i> sp. [rt] <i>Gyrophypnus fracticornis</i> (Müller) [rt] <i>Xantholinus ?linearis</i> (Olivier) [rt] <i>Xantholinus linearis</i> or <i>longiventris</i> [rt] <i>Neobisnius</i> sp. [u] <i>Philonthus</i> sp. [u] Staphylininae spp. indet. [u] <i>?Mycetoporus</i> sp. <i>Tachyporus</i> sp. [u] <i>Tachinus ?signatus</i> Gravenhorst [u] <i>Falagria</i> or <i>Cordalia</i> sp. [rt] <i>Aleochara</i> sp. [u] Aleocharinae spp. [u] <i>Geotrupes</i> sp. [oa-rf] <i>Aphodius ?prodromus</i> (Brahm) [ob-rf] <i>Aphodius</i> spp. [ob-rf] <i>Phyllopertha horticola</i> (Linnaeus) [oa-p] <i>Dascillus cervinus</i> (Linnaeus) [oa-p] <i>Dryops</i> sp. [oa-d] Elateridae sp. [ob] <i>Anobium punctatum</i> (Degeer) [l] <i>Ptinus ?fur</i> (Linnaeus) [rd] <i>Ptinus</i> sp. indet. [rd] <i>Meligethes</i> sp. [oa-p] <i>Omosita colon</i> (Linnaeus) [rt] <i>Cryptolestes ferrugineus</i> (Stephens) [g]
DERMAPTERA	
Dermaptera sp.	
HEMIPTERA	
<i>Drymus sylvaticus</i> (Fabricius) [oa-p] Cimicidae sp. [u] Heteroptera spp. [u] <i>Auchenorhyncha</i> sp. [oa-p] Hemiptera sp. [u]	
DIPTERA	
Diptera spp. Diptera spp. (puparium)	
SIPHONAPTERA	
Siphonaptera sp.	
HYMENOPTERA	
Proctotrupeoidea sp. Parasitica spp. Formicidae sp. Hymenoptera sp.	
COLEOPTERA	
<i>Dyschirius globosus</i> (Herbst) [oa] <i>Dyschirius</i> sp. indet. [oa] <i>Pterostichus</i> sp. [ob] <i>Agonum albipes</i> (Fabricius) [oa-d] Carabidae sp. [ob] Hydroporinae sp. [oa-w] Colymbetinae sp. [oa-w] <i>Helophorus</i> sp. [oa-w] <i>Cercyon analis</i> (Paykull) [rt] <i>Cercyon atricapillus</i> (Marsham) [rf] <i>Cercyon haemorrhoidalis</i> (Fabricius) [rf] <i>Cercyon</i> sp. indet. [u] <i>Megasternum obscurum</i> (Marsham) [rt] Hydrophilidae sp. [u]	

Oryzaephilus surinamensis (Linnaeus) [g]
Cryptophagus ?scutellatus Newman [rd]
Cryptophagus spp. [rd]
Atomaria spp. [rd]
Ephistemus globulus (Paykull) [rd]
Lathridius minutus group [rd]
Corticaria ?punctulata Marsham [rt]
Corticaria spp. [rt]
Corticarina sp. [rt]
Corticarina or *Cortinicara* sp. indet. [rt]
Typhaea stercorea (Linnaeus) [rd]
Palorus ratzeburgi (Wissman) [g]
Alphitobius diaperinus (Panzer) [rt]
Anthicus sp. [rt]
Phyllotreta nemorum group [oa-p]
Longitarsus sp. [oa-p]
?Psylliodes sp. [oa-p]
Halticinae spp. [oa-p]

Chrysomelidae sp. [oa-p]
Apion sp. [oa-p]
?Barynotus sp. [oa-p]
Sitophilus granarius (Linnaeus) [g]
Ceuthorhynchidius troglodytes (Fabricius) [oa-p]
Ceutorhynchus contractus (Marsham) [oa-p]
Rhinoncus sp. [oa-p]
Curculionidae sp. [oa]
?Scolytidae sp. [l]
Coleoptera spp. [u]

ARACHNIDA

Acarina spp.
Aranae sp.

Table 2. Main statistics for the combined assemblages of adult beetles and bugs from subsamples from Papcastle, Cumbria. For PNOB etc.: Px - percentage based all individuals recorded from the site. α values have not been calculated for assemblages of less than 20 individuals. Note the small number of cases available. Abbreviations for main statistics: N - number of individuals (MNI); S - number of taxa; alpha (α) - index of diversity (alpha) of Fisher et al. (1943); α OB - index of diversity of 'outdoor' component; α RT - index of diversity of decomposer component; PNOB - percentage 'certain' and probable outdoor individuals; PNW - percentage of aquatic individuals; PND - percentage of damp ground/waterside individuals; PNP - percentage of strongly plant-associated individuals; PNM - percentage of heathland/moorland individuals; PNRT - percentage of decomposer individuals; PNRD - percentage of 'dry' decomposer individuals; PNRF - percentage of 'foul' decomposer individuals.

Parameter	Value	Number of estimates
Number of assemblages	13	
Mean N	29.0	
Mean S	18.0	
Where SE alpha < alpha:		
Mean alpha	36.8	8
Mean alpha OB	-	0
Mean alpha RT	27.6	3
Where SE alpha < alpha/2:		
Mean alpha	33.5	7
Mean alpha OB	-	0
Mean alpha RT	27.6	3
Total number of individuals:	377	
Site PNOB	18.6	
Site PNW	2.7	
Site PND	1.6	
Site PNP	7.2	
Site PNM	0.0	
Site PNL	1.1	
Site PNG	37.7	
Site PNRT	32.9	
Site PNRD	13.3	
Site PNRF	6.1	

Phase 1 (late 1st to early - mid 2nd century AD)

Phase 1 consisted of all the features present on the site prior to the laying down of a clay and stone platform in Phase 2. It was divided into sub-phases.

Sub-phase 1a(i), structure and occupation
Sub-phase 1a(i) consisted of features associated with an initial rammed pebble layer sitting directly on a clay subsoil. These deposits were waterlogged and were all sealed by later deposits. Three samples were examined for insects.

Sample 25/T, context 150

This sample was taken from a possible occupation layer. Only 0.75 kg of sediment was available, that being the residue from plant macrofossil extraction, and the concentration of insect remains was low. Twenty beetle taxa were recorded, and half of the 32 individuals were contributed by four grain pest species. The remaining taxa were represented by single individuals. This group may have been entirely 'background' fauna derived from the surroundings during the time when deposition was taking place, rather than being insects living in the deposit as it formed, but there were hints that it may have been a stable manure group (see for example Large *et al.* 1994 for a discussion of this characteristic group of insects).

Sample 33/T, context 188

This sample was obtained from the fill of an industrial work area which had been filled during or after use. The sediment was a mid to dark grey, moist, plastic, homogeneous, sandy clay silt with some pale clay or silt inclusions.

A small assemblage of 28 beetles and bugs of 20 taxa was recovered. Although typical of Roman material, it could not be interpreted with certainty. However, subjectively, this might have been a stable

manure assemblage, something which is supported by the presence of a 'shrivelled' (i.e. newly emerged) weevil, *Apion* sp., perhaps from vetches or clover originally brought in hay.

Sample 30/T, context 154

This sample was taken from an occupation lens containing wood shavings. The sediment was a dark grey-brown, moist, homogeneous, slightly sandy clay silt. Very small stones, clay flecks, and twig and wood fragments were also present.

Only 48 beetles of 23 taxa were present. Over half of the individuals were grain pests (%N G = 54), and the other taxa were represented by only a few individuals. Subjectively, there were hints of a stable manure component - perhaps only insects originating as background 'scatter'.

Sub-phase 1a(ii), destruction and abandonment

Sample 24/T, context 139

Taken from an abandonment horizon, the sediment was a mid grey-brown, moist, plastic, homogeneous, silty clay. Finer silty clay nodules made up a third of the bulk and very small stones were common.

Few beetles, only 25 individuals of 21 taxa, were present; 11 of these were 'outdoor' forms (making up nearly half of the individuals) and the assemblage probably consisted of randomly accumulated 'background' fauna.

Sample 26/T, context 153

The sediment from this abandonment layer was a dark grey, wet, plastic, fairly homogeneous, slightly sandy clay with lighter more clayey patches. Some very small stones were also present.

Eighty-two individuals were recorded, over half of them being grain pests (%N G =

54). There were 34 taxa. The residual assemblage after subtraction of grain pests was, obviously, small, but was dominated by decomposers (%N RT = 68). This group was typical of Roman urban deposits. Subjectively there were hints of an element of 'house fauna' which, with the abundant grain pests, perhaps suggests stable manure.

Summary of Phase 1a

These insect assemblages appear to have included a substantial 'background' component, perhaps a mixture of stray individuals and remains in redeposited sediments. The fauna was very similar to that from other Roman urban or military sites which have been examined in detail, for example in York (Hall and Kenward 1990) and Carlisle (Kenward and Morgan 1985; Kenward and Large 1986), and at Ribchester (Large *et al.* 1994).

The 'outdoor' forms (those not able to live within buildings of some kind) were very typical of urban material, and the evidence suggests that there was little vegetation close to the accumulating deposits.

The abundance of grain pests shows that grain was present nearby - as has been the case with a large majority of Roman horizons so far examined for insects. Decomposers were constantly well represented in the assemblages, and the range of species are those typically found on sites associated with human occupation where at least some organic debris was allowed to accumulate. These decomposers and grain pests, and indeed some of the plant-feeding 'outdoor' insects, may have originated in stable manure, as postulated for other Roman sites, where such an interpretation has sometimes been strongly supported by botanical evidence.

Phase 1b

This sub-phase relates to the continuation of industrial activities at the far north of the site. Six samples were examined for insects.

Phase 1b (i)

Sample 17/T, context 163

The sediment was described as being a dark grey-brown, moist to wet, plastic to crumbly, slightly sandy clay silt with some clay flecks.

Only three beetles of two taxa were recorded.

Phase 1b (ii)

Sample 12/T, context 118

Taken from an abandonment horizon, the sediment was a dark grey-brown, moist, crumbly, homogeneous, humic, silty clay with some plant fragments including mosses.

There were 22 beetle taxa and a single bug; N = 33. Apart from the proportionally abundant grain pests (%N G = 30) the assemblage was undistinguished when set against the background of typical Roman sites with intensive occupation.

Sample 18/T, context 174

This sample was from a pitfill. The sediment was a mid grey-brown, moist, plastic, homogeneous, silty clay with abundant organic matter, possibly straw.

A small assemblage of beetles and bugs was recorded: 48 individuals of 35 taxa. Nearly a third (31%) of the individuals and 43% of the taxa were 'outdoor' forms. There was no evidence that any species (apart perhaps from the *Corticaria* sp. at rank 1) bred in the pit fill, and it is likely that the pit was open either in midwinter (improbable if the outdoor taxa invaded the deposit *in situ*, but possible if they were redeposited with the fill) or, more probably, that it was backfilled rather quickly, acquiring 'background fauna' and remains introduced with the dumped organic matter. The latter *may* have been stable manure.

Sample 22/T, context 019

This context may have been a destruction or abandonment horizon. The sediment was a mid to dark grey-brown, moist, plastic to crumbly, fairly heterogenous clay silt, with both paler siltier and blacker patches.

Few insects were recovered - a single puparium and 19 individuals of 17 beetle taxa. Such a small assemblage is not interpretable, but subjectively it appears to have been randomly accumulated in the open.

Sample 23/T, context 142

The deposit sampled was an occupation lens. The sediment was a dark grey-brown, moist, crumbly, homogeneous, sandy silt with abundant clay flecks and charcoal.

The flot contained some charred grain. The only insect was a single, unidentifiable, beetle leg.

Sample 60/T, context 353

This deposit was an abandonment horizon which formed the fill of ditch recut 385. The sediment consisted of mid to dark brown (dark brown internally), moist, crumbly to brittle, layered, fairly homogeneous, herbaceous detritus, with mid brown silty clay as a minor matrix component.

The assemblage of beetles and bugs obtained was of modest size - 38 taxa contributing a total of 58 individuals. Seventeen individuals were grain pests (%N G = 29). The remaining assemblage had no strong character, and included species from natural and artificial habitats. Some of the plant-feeders may have originated from plants growing on or near to the forming deposit.

Summary of Phase 1b

The concentration of insect remains varied substantially between samples, but no

layers examined were rich in insects. Preservation was generally not bad, so low input and lack of breeding communities, rather than post-depositional decay, is the likely explanation for the low concentration of remains. It is possible that few insects were present in the surroundings during the time the deposits were formed, but this seems unlikely in view of the mixture of remains present in most layers.

Phase 3 (B4) (3rd century)

This phase relates to the building of a large structure or monument. Two samples were examined for insects.

Sample 37, context 302

The original sample had been taken from the fill of a construction trench. The only material available was 0.4 kg of residue from plant macrofossil extraction. No beetles or bugs were present. The flot consisted almost entirely of fragments of modern roots.

Sample 50, context 017

This sample from a platform layer was barren of insects. The sediment was a mid brown, wet, plastic to crumbly, homogeneous, clay silt with some medium sized stones.

Summary of Phase 3

Not untypically, samples from these later Roman deposits had no preservation of insect remains.

Concluding remarks

The insect remains from Papcastle fit comfortably into the picture established from Roman deposits formed by intensive occupation at a number of sites in Britain - for example at Carlisle, London,

Ribchester and York (Allison and Kenward in press; Allison *et al.* 1991 a; b; de Moulins *et al.* 1990; Hall and Kenward 1990; Kenward *et al.* in press a; b; Kenward *et al.* 1991; Kenward *et al.* 1986; Kenward and Large 1986; Kenward and Morgan 1985; Large *et al.* 1994). The present group included no rich decomposer assemblages like those found at sites in, for example, York and Carlisle. The number of samples is much smaller than from those sites (tens as opposed to hundreds) and few of the features examined were inherently likely to provide such faunas, so this absence is unsurprising. The assemblages from the Roman fort at Ribchester (Large *et al.* 1994) perhaps provide the most appropriate comparison.

Taken as a whole, the Papcastle insect assemblages suggest the presence of stable manure, a material identified much more clearly and in large quantities at some of the sites mentioned above.

The present study has been on too limited a scale to provide more than hints of the environment and activity in and around the Roman fort at Papcastle. Substantially more information was obtained from a more extensive study of a larger body of samples from the fort at Ribchester (Large *et al.* 1994). Work of this kind relies on happy chance as well as informed choice to discover the contexts giving good preservation - hence the adoption of rapid recording techniques applied to large numbers of samples (Kenward *et al.* 1986; Kenward 1992); the site at Tanner Row, York provides an example of the benefits of such large scale work, especially when integrated with a range of other environmental techniques (Hall and Kenward 1990).

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