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# Insect and other macrofossil remains associated with a copper alloy brooch from the Viking-Age boat burial at Scar, Sanday, Orkney, 1992: Technical report.

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## Summary

Macrofossil remains from a series of sediment samples from around a viking-age brooch from the boat burial at Scar, Sanday, Orkney have been extracted and examined. Plant remains were extremely rare and poorly-preserved; most plant matter appears to have become completely humified. Invertebrate macrofossils were present in moderate numbers, although the less robust material was poorly preserved and not easily identifiable. Some flies and beetles appear to have become established within the burial, with a food chain perhaps based on decomposer fungi utilising wood and other plant matter. Flesh-feeding flies and other insects associated with corpses were not recognised.

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## Introduction

Fourteen small sediment samples from excavations at Scar, Sanday, Orkney (AOC project code 191) were submitted to the EAU by AOC for analysis. They represented the cleanings from both surfaces of the gilt copper alloy brooch (Lab. No. 911511) found in the Viking boat burial.

## Methods

All the samples bore the code 911511. While the various sample containers (polythene bags, plastic boxes and gelatin capsules) generally were accompanied by descriptions indicating the position from which they had been removed from the brooch, individual numbers had not been assigned and so, for ease of record-keeping during processing, the letters A - N have been used here. The descriptions are appended in brackets in the results section.

Sample N consisted of material from a gelatin capsule only, while samples B and G included material in addition to that in the capsules. With the exception of material in the capsules, the samples were transferred to 75 x 25 mm specimen tubes, covered with 50 g/l sodium pyrophosphate solution and set to disaggregate in an ultra-sound bath for two hours. A few drops of the liquid fraction were placed on slides for parasite analysis following the rapid method of Dainton (1992). The samples were then washed on a 300 $\mu$m sieve, and the retent stored in IMS in 120 ml glass jars for subsequent examination under the binocular microscope following the scan technique of Kenward *et al.* (1980; 1986) and Kenward (1992). Arthropod remains were temporarily transferred to damp filter paper for study.

## Results

None of the prepared slides contained any parasite eggs. Insect preservation was not very good. The more robust remains (such as most of the beetles) were somewhat pale, but preservationally labile fossils were usually fragmentary, with identification characters difficult to make out. Small numbers of plant fragments were generally present, but these were very decayed and, although plant matter appears originally to have been present, and indeed probably plentiful, most of it had humified almost completely.

The samples produced arthropod remains as follows. Insects were adults unless otherwise stated. M - many (probably 10 or more); S - several (probably between 4 and 9).

**Sample A** [A single lump of material in an unlabelled box.]

The sample consisted mostly of very fine amorphous organic material, some of which remained in lumps after processing. There were traces of fine sand and some well-rotted plant fragments, none identifiable more closely. Some fungal cleistothecia (probably Gymnoascaceae) were noted. Very few insects were found, and these were extremely poorly preserved.

| | |
|---|---|
| 1 | *Quedius* sp. pronotum (very 'filmy') |
| 2 | very fragmentary fly puparia |
| 1 | mite |

**Sample B** [Loose fragments from initial cleaning round rivet area.]

The gelatin capsule contained shell sand with some plant tissue fragments and tiny pieces of metal.

Most of the processed sample consisted of shell sand with lumps of dark brown amorphous organic material and rotted orange-coloured wood fragments. There were a few ?Gymnoascaceae cleistothecia, some seed fragments of *Stellaria* sp. and a few rootlets. Some metallic fragments were also present.

| | |
|---|---|
| 2 | *?Heterodera* sp. cysts |
| S | larval fragments (probably fly or beetle) |
| 1 | *Aphodius* sp. leg |

**Sample C** [Loose soil etc from vicinity of boss 10. Found with boat rivet/wood.]

Mainly rotted orange-coloured wood and lumps of fine, amorphous organic matter with some shell sand, a piece of poorly-preserved moss and pieces of copper corrosion product. Fungal cleistothecia were abundant.

| | |
|---|---|
| S | *?Heterodera* sp. cysts |
| M | larval heads, perhaps *Cryptophagus scutellatus* |
| *1* | *Aleocharinae* sp. |
| 1 | ?fly larval head |
| 2 | mites |

**Sample D** [Sand etc. from back of brooch]

After processing the retent was predominantly shell sand with

some plant fibres, rootlets, soft lumps of amorphous organic material and rotted wood fragments. There were also fragments of metal, small lumps of copper corrosion product and a piece of mineralised textile. Some evidence of possible iron staining.

| | |
|---|---|
| *1* | *Heterodera* sp. cyst |
| S | insect larval fragments |
| 1 | Staphylininae sp. abdominal segment |

**Sample E** [Black organic material and good section of yellow fibrous material.]

The retent consisted of small compressed lumps of amorphous organic material, some unidentified plant fibres and lumps of copper corrosion product. Traces of fungal cleistothecia were recorded.

| | |
|---|---|
| 2 | *?Heterodera* sp. cysts |
| M | larval heads, perhaps of *Cryptophagus scutellatus* |
| M | other larval fragments |
| M | mite |

**Sample F** [Soil lumps with yellow (?bone/wood) and ?peat.]

The sample disaggregated to give a retent consisting mostly of fine plant fragments and lumps of amorphous organic/peaty material with some shell sand.

| | |
|---|---|
| S | unidentified larval fragments |
| S | larval heads, perhaps *?Cryptophagus scutellatus* |
| 3 | fly puparia |
| 1 | Nematode cyst, probably *Heterodera* sp. |
| 2 | mites |
| 1 | weevil, undiagnostic tibia and elytral fragment with scales |
| 1 | *Xylodromus concinnus* |
| M (10+) | *Cryptophagus scutellatus* |
| 1 | *Anobium punctatum* |
| 2 | Aleocharinae sp. |

**Sample G** [Cleaning top debris from broken-off piece.]

The capsule contained a few plant fibres, some shell sand and lumps of copper corrosion product.

After sieving there were lumps of peaty/amorphous organic material, plant fragments and shell sand with pieces of copper corrosion product, a little rotted bone and a small quantity of fungal cleistothecia (?Gymnoascaceae). Also some fragments of metal - some apparently fused and tiny pieces of mineralised

textile.

| | |
|---|---|
| 1 | *?Heterodera* sp. cyst |
| M | larval heads, perhaps *?Cryptophagus scutellatus* |
| 3 | *Cryptophagus scutellatus* |
| S | mites |
| M | unidentified insect larval fragments |

**Sample H** [Soil from back of large piece.]

After processing the sample consisted mainly of a mixture of rotted wood and other fine organic material together with shell sand, copper corrosion products and fragments of metal (?iron). There was possible iron staining - sometimes cementing clumps of sand grains. There were also a small piece of mineralised textile and a few tiny fragments of rotted bone. Small amounts of fungal cleistothecia from ?Gymnoascaceae were also identified.

| | |
|---|---|
| 4 | *?Heterodera* sp. cysts |
| 1 | *Cryptophagus scutellatus* |
| 1 | *Anobium punctatum* |
| 1 | weevil (an undiagnostic femur) |
| 1 | *Cercyon* sp. |
| M | insect larval fragments |
| M | fragmentary fly puparia |

**Sample I** [Black organic soil(?) from above boss 6.]

The retent consisted of some shell sand, particles of copper corrosion products and a couple of metal fragments with some plant fibres, but was mostly undisaggregated fine amorphous organic material.

| | |
|---|---|
| 1 | *?Heterodera* sp. cyst |
| M | larval heads, possibly *?Cryptophagus scutellatus* |
| S | undiagnostic insect larval fragments |
| M | mites |
| M (17+) | *Cryptophagus scutellatus* |
| 2 | *Xylodromus concinnus* |
| 1 | Aleocharinae sp. |
| 1 | fly (crumpled head) |

**Sample J** [No description of sample.]

Most of the processed sample consisted of fine, amorphous organic matter (?well-rotted wood) with some lumps of rotted wood, rootlets, fungal cleistothecia (?Gymnoascaceae), a piece of moss, some rotted spongy bone fragments and a few *Stellaria* sp. seed fragments. Some shell sand, pieces of copper corrosion product, metal flakes and slag-like metallic lumps were noted.

| | |
|---|---|
| S | *?Heterodera* sp. cysts |
| M | fly puparium fragments |
| S | *Cryptophagus scutellatus* |
| 2 | mites |

**Sample K** [Black organic material from detached piece of rim.]

Processing produced a retent largely consisting of fine, amorphous organic lumps with some well-rotted plant tissue fragments and rootlets. There were also a little shell sand and a small piece of rotted rib bone.

| | |
|---|---|
| M | mites |
| 1 | insect larval head capsule |
| 1 | larval head, possibly *?Cryptophagus scutellatus* |
| M (10+) | *Cryptophagus scutellatus* |
| 1 | *Xylodromus concinnus* |

**Sample L** [Black organic layer from above boss 13.]

A few peaty/fine amorphous organic lumps and rotted plant fragments, with some fungal cleistothecia. The prepared slide gave a single ?moss spore.

| | |
|---|---|
| 1 | weevil (joined femur and tibia) |
| 1 | *Cryptophagus scutellatus* |
| M | larval heads, perhaps *?Cryptophagus scutellatus* |
| M | fragments of indeterminate insect immatures |
| 1 | mite |
| 1 | fragmentary pupa, probably of Coleoptera or Lepidoptera |

**Sample M** [Soil cleaned from top surface main piece.]

A few plant fibres, a piece of moss, some shell sand, copper corrosion product fragments, flakes of metal and slag-like metallic lumps. No insects were found.

**Sample N** [Yellow fibrous material above central boss (capsule only).]

A very small quantity of shell sand, copper compound lumps and plant fibres were present in the capsule. No insect remains were found.

## Discussion

A summary of the arthropod remains recorded from the samples is given in Table 1. The quantification is an approximate minimum number of individuals for all the remains amalgamated.

It appears that the beetle *Cryptophagus scutellatus* bred inside the burial chamber; the large number of individuals recorded cannot have arrived accidentally and there were larval head capsules which may also have been this species. *C. scutellatus* is a typical component of assemblages of archaeological insects from deposits formed within wooden buildings, and is frequently referred to in the literature of stored products insects. It is almost certainly a fungus feeder. Doubtless it found ample food within the burial chamber, in fungi growing on decaying timber and clothing. The predatory staphylinid *Xylodromus concinnus* is also a typical insect of archaeological 'house' assemblages and frequently found in buildings and stored products. The absence of other species typically associated with these two beetles is probably a result of difficulty of invasion rather than the lack of suitable habitats within the chamber. The *Quedius* sp. did not appear to be the rather subterranean *mesomelinus*.

Of the other beetles, *Anobium punctatum*, the woodworm, is very common in deposits on archaeological occupation sites. The specimen(s) found may have just strayed into the chamber or, more probably, have originated in the timber within it. The remaining beetles may also have been strays; they were too infrequent to allow any speculation as to their origin in material brought into the chamber.

The flies may have been attracted to rotting flesh or to other organic matter near the body. The puparia were very poorly preserved, and not identifiable within the constraints of the present project; the other insect immatures, similarly, could not be identified without unacceptable expenditure of time.

Nothing was recorded which corresponded with the 'worms' recorded in the conservation report, and the 'lemon-shaped capsules' appear to have been the cysts of *Heterodera* sp., which are, however, at least an order of magnitude larger than the eggs of intestinal parasitic nematodes. *Heterodera* is a nematode parasitic upon plant roots, and it quite possibly infested the roots represented by rootlets in the samples. It is also worth noting that closer inspection of the organic sediment suggests that it was not 'adipocere' but had an organic origin in plant matter, perhaps largely wood.

*Table 1. Arthropod taxa recorded from the samples of material associated with the Scar brooch, with an approximate indication of abundance. S - several; M - many.*

| Taxon | abundance |
|---|---|
| *Heterodera* sp. cysts | S |
| Acarina spp. | M |
| Diptera sp. (adult) | 1 |
| Diptera spp. (puparium) | M |
| *Cercyon* sp. | 1 |
| *Xylodromus concinnus* | S |
| *Quedius* sp. | 1 |
| Staphylininae sp. | 1 |
| Aleocharinae sp. | 2 |
| *Anobium punctatum* | 1 |
| *Cryptophagus scutellatus* | M >50 |
| Curculionidae sp. | 1 |
| Coleoptera sp?p. larvae (perhaps including *C. scutellatus*) | M |

## References

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