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**Conservation of a group of Roman coins and mineralised organics from the Millennium excavations, Carlisle**

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### **Summary**

A group of seven Roman coins was received corroded together, surrounded by mineralised organics. The organics were removed, examined and sampled for SEM examination. The coins were separated and stabilised.

### **Keywords**

Conservation  
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# Conservation of a group of Roman coins and mineralised organics from the Millennium excavations, Carlisle

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## Introduction

Carlisle Archaeology Unit (CAU) undertook large-scale excavations in front of Carlisle Castle between November 1998 and March 2001, as part of Carlisle City Council's Gateway City Millennium Project. The excavations were in advance of the construction of a footbridge over the Castle Way ring road, a new exhibition gallery for Tullie House Museum and a walkway beneath the road. The Millennium Project, including the archaeological dig, was funded through a partnership between Carlisle City Council, The Millennium Commission and local businesses. The excavation was located within the Roman fort of *Luguvalium*, which was founded in AD72/3.

Conservation of this group of coins was funded by English Heritage.

## Description and X-radiography

The small block containing Roman coins and mineralised organics (CAR99 MIL1 473 700Δ) from Trench 1 of the Millenium site, had been lifted by the excavators (CAU) along with some surrounding soil, and was received packed in a polythene box.

Some of the coins could be seen at the top of the soil block, lying against each other at a slight angle. The mineralised organics were distinguishable as an orange/brown deposit overlying and surrounding the visible coins. The colour of this organic deposit was in contrast to the darker brown soil around it (Fig 1)



*Fig 1: soil block, coins and organics*

The coin group was X-radiographed at different exposures, using Agfa Structurix D4Pb X-ray plates. Little detail was revealed by the X-radiographs. The coins were too dense, and were lying too closely together to produce X-ray images which could be used for identification by the numismatist. Neither was it clear from the dense X-ray image exactly how many coins were in the group. However, X-radiography confirmed that there were no other metal artefacts in the soil block.

## Examination and excavation

The soil block was examined under X16 microscopy before excavation began in the laboratory. The orange/brown mineralised deposit had a slight 'woody' structure in places, with some possible evidence of a weave. However, it was extremely soft - the same consistency or softer than the soil surrounding it.

It was found to be impossible to preserve the mineralised material as a coherent and separate artefact. It was so soft and lacking in structural integrity that it could not be separated from the coins and still maintain its shape and form. It was decided to remove and dispose of the organic material, while recording any structural or other details by means of photography.

During removal of the organics, a few very small fragments of material were recovered with the wood structure still intact. These were preserved wet to be used for species identification.



*Fig 2 : Fragment with woody structure (X16)*

Mineralised material was found all around and beneath the group of coins. Below the coins, it was darker in colour, and more compressed.

The bulk of the mineralised material surrounding the coins was removed, leaving only fragments in close contact with the coin surfaces. There were seven coins in the group, of two different sizes.



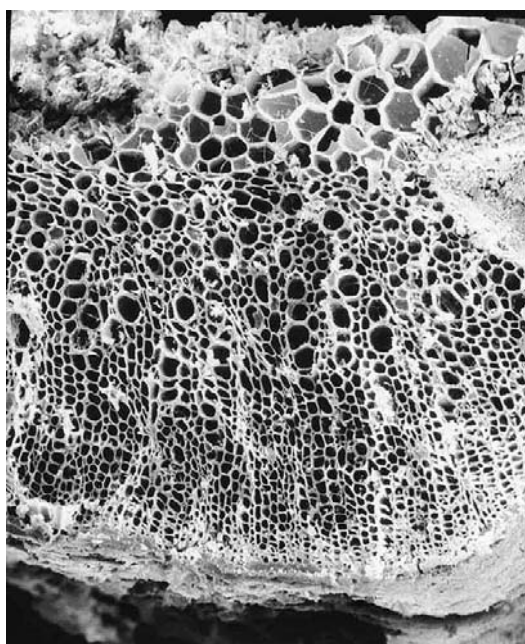
*Fig 3 : Coins still corroded together*

### **Identification of the wood**

The wood retained for identification appeared to be fragments of actual waterlogged wood. However, when attempts were made to cut sections using a razor blade the wood was found to be mineralised. As the organic component was lost, the material crumbled when cut, and an identification using light microscopy was not possible.

The wood sample fragment was allowed to air dry slowly, and then half was carefully broken and mounted for scanning electron microscopy (SEM) identification. The other half of the dried wood fragment was preserved intact. The three sections taken for SEM examination aimed to be transverse, radial and tangential. Breaking sections of hard and brittle material for SEM examination is preferable to cutting them, as the microscopic features are more likely to survive intact.

Examination using SEM showed several features in the wood which could be used towards a species identification. The transverse section was particularly clear, and showed a timber with one year's growth, with some of the large pithy cells in the centre intact. The radial and tangential sections were less clear, with fungal hyphae and other debris obscuring some of the visible features.



*Fig 4 : Transverse section of wood (SEM image)*

A firm identification of the wood species was not possible from the restricted range of anatomical features visible in the SEM images. However, the wood was identified as a hardwood with one year's growth, and all features observed were consistent with a tentative identification of Willow (*Salix* sp.), for the material used for the container surrounding the 7 coins.

### **Separation of the coins**

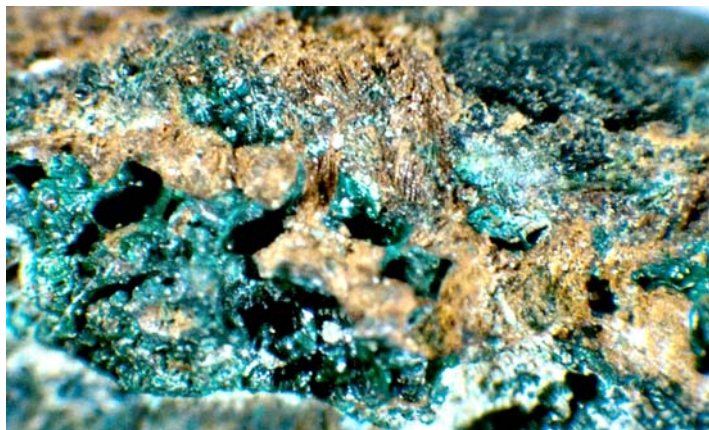
The coins were numbered from the top (701Δ) as they were removed from the pile.

Coins 701, 702 and 703Δ were separated quite easily from the group, following the



removal of copper corrosion products and soil from between them and around their edges. These coins were moderately corroded and stable, though their surfaces were disrupted in places where they had been in close contact with each other. At the contact points, the corrosion products tended to be red copper oxide, in contrast to the green (probable) copper carbonate of the rest of the surface.

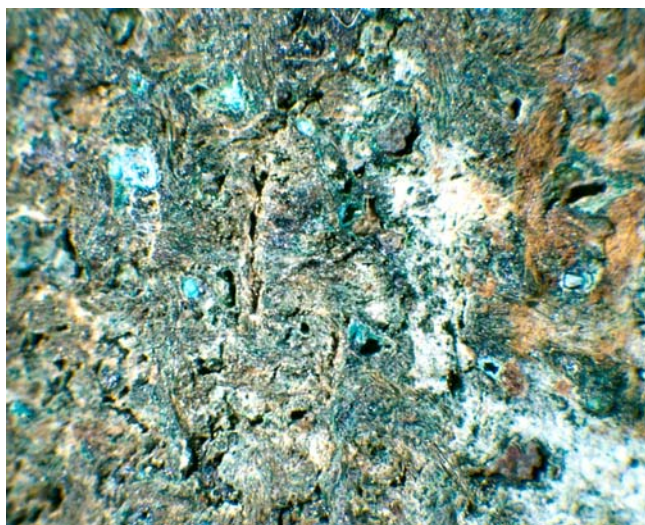
When the overlying corrosion products had been removed from coins 701-3Δ, it was observed that around the rims, and a little onto the reverse of coin 703Δ were traces of a mineralised organic other than wood. Under the microscope, bundles of largely copper-preserved twisted fibres could be seen, suggesting the remains of a textile.



*Fig 5 : mineralised threads on the edge of coin 703Δ (X16)*

On the underside of coin 705Δ, which jugged out slightly from the stack, there were fragments of mineralised wood containing evidence of a weave, and this was left *in situ* on the coin surface. There was also mineralised wood on the edge of the obverse of coin 706Δ, which was left *in situ*.

The underside (obverse) of the bottom coin in the stack, 707Δ, had a distinct area of mineralised textile, covering around half the coin's surface. Both the twist of the individual threads, and also the weave of the textile could be seen. Details were photographed, and it was left *in situ*.



*Fig 6 : Mineralised thread on the obverse of coin 707Δ (X16)*

The remaining coins 704-707 Δ were firmly corroded together. Both manual (scalpel) and mechanical (Vibrotol) means were used to separate them.

### Conservation of the coins

The surfaces of the separated coins were mechanically cleaned using handtools to remove obscuring corrosion products. The red copper oxide areas of the surface were in general found to be better at preserving fine detail, but were fragile and more easily damaged. The group consisted of two large coins (*Sestertii*) and five smaller coins (*Ases*).

The cleaned coins were individually X-radiographed again to provide more detail for the numismatist. They were then de-greased in industrial methylated spirits (IMS) and their surfaces coated with 5% Paraloid B72 in IMS to provide protection against handling.

The conserved coins were individually packed in pierced polythene bags with a polyethylene foam insert, and stored in a sealed polythene box with active silica gel.

The following mineral-preserved organics were left *in situ* on the coin surfaces:

701Δ: Very small mineralised textile fragments around the rim.

702Δ : As above

703Δ : As above

704Δ : As above

705Δ : Mineralised textile and wood around the rim and along part of the edge of the obverse, obscuring some of the legend.

706Δ : Mineralised wood around the edge of the obverse, obscuring some of the legend.

707Δ : Mineralised textile and wood around the rim, the wood overlying the textile in places. Also a large area of mineralised textile with visible weave on the lower half of the obverse, obscuring part of the design.



Fig 7 : coin obverses after conservation



## Discussion

The mineralised organics which surrounded this group of coins were of two sorts:

In close contact with the edges of several coins (701-4Δ) and on the obverse of coin 707Δ, were mineralised textile impressions, seemingly preserved by both copper and iron salts.

Overlying the textile in places (eg 707Δ), and forming the bulk of the orange/brown deposit around the coin group, was the remains of mineralised wood, with slight evidence of a weave in one or two places (eg obverse of 705Δ). This woody material was preserved solely by iron salts.

The iron and copper components of the mineralisation process derived either from the metals of the artefacts themselves (copper), or from precipitation of ions present in solution in the surrounding soil (iron).

The preservation of two different mineralised organic materials would suggest that when the coins entered the burial environment, they were wrapped in a piece of textile which closely followed the contours of the coin edges. The coins plus textile were then placed inside a (probably) woven container made of thin pieces of wood (possibly willow). This container surrounded the coins underneath, around the sides and possibly also over the top.