

CONSERVATION TREATMENT RECORD

Lab number: 8780

Brief description: Small, decorated Roman brooch with pin.

Name of owner: Tim Schadla-Hall/S.Thomas

Owner's number: 505866 – 471149 NCL B38853

Name of student: Flavia Ravaioli

Date allocated: 7/12/2011

Date completed: 1/5/2012



Figure 1. Picture of the object after treatment.

Material type: Copper alloy**Dimensions:**

Length 40 mm

Width at foot 17 mm
at bow, in the middle 4 mm
at crossbow 14 mm**Colour:** 2.5 BG 6/4 of the Munsell Chart**Weight:**

before 6.2 g after 6.12 g

Technology

The object is a small brooch, of a type that has been described as “Celtic fan-tailed brooch with fixed head loop” (Bayley and Butcher 2004, 101). The pin is hinged on a copper alloy axis which fits into a short tabular crossbar. The attachment type is shown in figure 3. The pin is asymmetric at the perforated end so the corner presses into the body of the brooch. The crossbar is surmounted by a loop which seems to be part of the main casting. The middle bow is narrow and undecorated. The foot is flat and triangular, and decorated with a reserved metal motif. Brooches of this type have been found to be decorated with enamel on the fan-tail (Bayley and Butcher 2004, 101). Traces of enamel have been found on the tail. One fragment has been identified as having a glass composition through analysis with SEM (see Appendices).

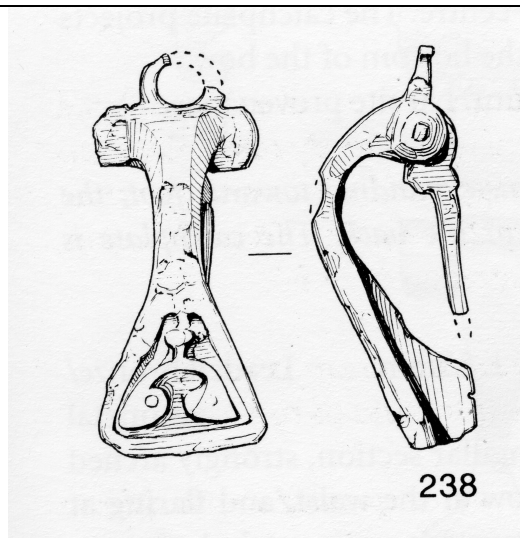


Figure 2. Common brooch type of the 1st century AD, described as “Celtic fan tailed brooch” (after Bayley and Butcher 2004, Fig. 238, 101).

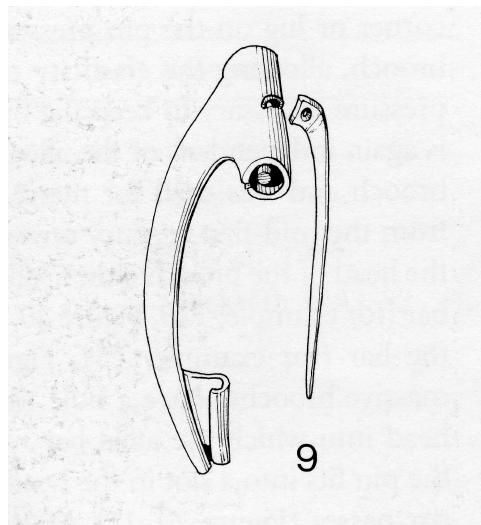


Figure 3. The drawing shows the type of pin attachment of the brooch (after Bayley and Butcher 2004, Fig. 20.9, 33).

The standard composition of Roman copper alloys is zinc up to 30%, tin under 15% and lead up to 25% (Bayley and Butcher 2004, 14). Bayley and Butcher analysed Roman brooches from Richborough and found most of them to be brass (30%), and leaded (20%) and unleaded (18%) bronzes (Chapter 2, 2004). This brooch was analysed using portable XRF and was found to be a leaded bronze, with 45% copper, 18% lead, 30% tin.

The brooch was probably cast. This was a common manufacturing technique for this type of object in Roman times. The metal was melted in a crucible and poured into a mould of fired clay. For small objects a disposable piece mould would be used (Bayley and Butcher 2004, 27). The pin was probably worked as a solid metal, as wrought pins are common on cast Roman brooches (Bayley and Butcher 2004, 29). The decoration of the tail is probably engraved, and contained enamel, as was confirmed by SEM analysis.

Pre-treatment condition

The entire surface showed a greenish-blue corrosion product (2.5 BG 6/4 of the Munsell Chart), and was partially covered in dark brown burial deposit prior to treatment (Fig. 4). After removing the soil, it became apparent that many areas of the surface suffered from “bronze disease”. This name is traditionally given to a corrosion process occurring on copper alloys which is characterised by the rapid formation of spots of light-green powder (Selwyn 2004, 12). It is generally associated with excavated objects (Selwyn 2004, 68).

The metal is slightly deformed, the pin is bent and the bow is slightly twisted. The bow might have been more curved originally, as this would have allowed the pin to close. In some areas a white substance is visible, which is probably chalky material from burial.



Figure 4. Picture of the object before treatment.

Significance

The object (Fig. 1) is a small, decorated Roman brooch with attached pin. It was found on the ground near Thwing, in Yorkshire, on the site of a Roman house. It was then brought to the IoA for conservation by Tim Schadla Hall. Once treated, the object will return to its owner, who will display it in his home.

The brooch may be identified as Roman from the site on which it was found, and through comparison with other examples found in the literature on the jewellery of Roman Britain. It appears to be of a type which was common in the later 1st century AD. Very similar brooches are found in a catalogue by Bayley and Butcher (2004). The greatest similarity is found with object 238 of the catalogue (2004, 101), which is shown in figure 2. It is described as:

Celtic fan-tailed brooch. L 39mm. Bronze, enamel. The head consists of a short tabular crossbar in which the pin is hinged (on a copper alloy axis) surmounted by a loop, which is part of the main casting. The middle bow is narrow, with cross-grooves as the only decoration; below this the brooch flares to a flat triangular foot. This bears a reserved metal motif of a double trumpet or a bud shape outlined by an enamelled field: traces of red enamel remain [...] This is the standard type of the later first century. (Bayley and Butcher 2004, 101).

In the current context of the IoA conservation laboratory, the object is used for teaching and training.

Examination

The object was examined using optical microscopy at 20 and 30x magnification. This revealed two green fragments on the regressed decoration of the tail. Their surface texture and position suggested that they may be fragments of enamel. This led to further examination using a more powerful microscope. Pictures were taken at 10x magnification (Fig. 5).

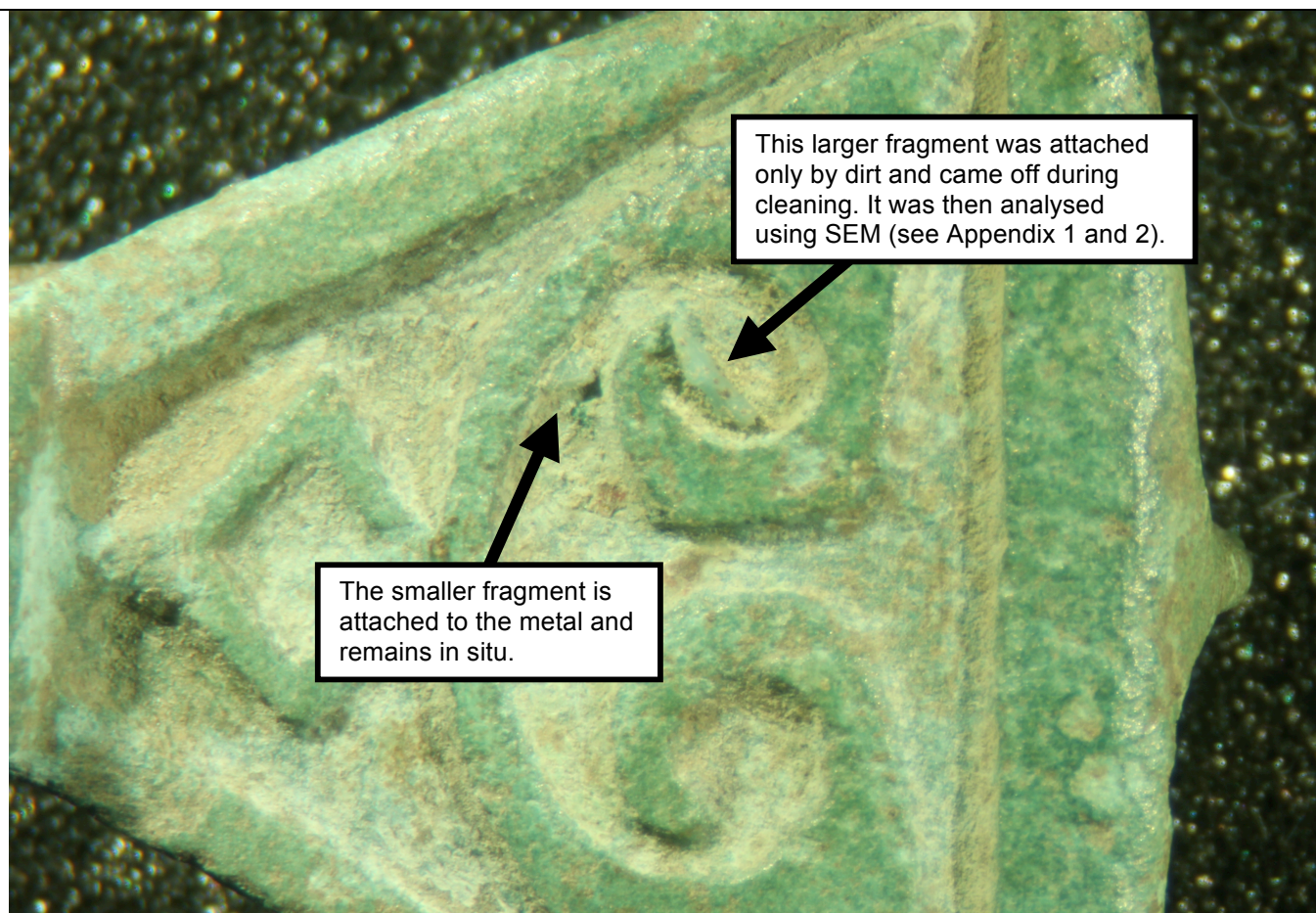


Figure 5. Picture of the tail of the brooch taken at 10x magnification. The arrows indicate the fragments of enamel.

Tests / analysis

The larger fragment of enamel, which had become detached during cleaning, was mounted and analysed using Scanning Electron Microscope. Firstly two areas of the tail were tested and their composition compared: the relief decoration and the engraved area of the tail. No significant difference could be found in their composition, so if enamel was present in the engraved area traces of it cannot be detected using SEM (Appendix 1). Subsequently the fragment was analysed and its composition compared to that of the two areas of metal which had been previously tested (Appendix 2). Their composition appeared completely different. The high percentage of silica (68.8%) present in the fragment indicates that it is enamel. The image acquired through Gaseous Secondary Electron provides good details of the surface texture, which is smooth and glass-like (see Appendices).

Spot cleaning was carried out on the inside of the tail to test the effectiveness of the proposed cleaning method. I used wooden sticks to remove the burial deposit, and cotton swabs with IMS to clean the surface. A scalpel was used to spot clean a small area by removing a thin layer of corrosion. The underlying surface was found to be of a darker, blue colour. In some pits the corrosion was powdery and came off readily, exposing an orange-brown surface underneath. This is the cuprite layer, which will not be uncovered during cleaning as it is unstable.

Justification for treatment

The object will be stored or displayed in a domestic environment. Thus, the treatment has aimed to return the object in stable conditions that will withstand daily variations in RH and temperature.

The presence of the burial deposit represented an issue as it was a potential source of moisture and salts. It has therefore been removed, and the object coated in order to avoid further corrosion of the metal.

Cleaning

The burial deposit was removed from the object using a sharpened stick and swabs of cotton wool with IMS. This was done under the microscope at 10x magnification. The green layer of corrosion was not removed, as this is considered to be a protective and stable patina for copper objects.

Stabilisation

The pits of "bronze disease" were not excavated because this would have been disfiguring for the object, since the pits were quite deep and present in many areas of the surface. Instead I treated the whole object by immersion in a solution of 3% w/v Benzotriazole ($C_6H_5N_3$; corrosion inhibitor) in IMS. As Benzotriazole may be harmful the entire

surface was coated after treatment to prevent contact with any residues of this substance. First a layer of 5% w/v Paraloid B-44 (methyl-methacrylate) in toluene was applied using a fine brush. Subsequently a thin layer of microcrystalline wax was applied. The wax layer is more resistant to mechanical shock and cracking than the Paraloid B-44 (methyl-methacrylate) layer. It was therefore added as an extra precaution, in order to protect the Paraloid B-44 (methyl-methacrylate) layer.

Packaging

An air-tight Stewart box has been used for packaging (Fig. 6). I have placed a polyethylene bag with silica gel (anhydrous silicon dioxide) at the bottom to absorb any moisture present in the box. On top I have placed a carved layer of Plastazote (polyethylene foam) covered in Tyvec (high-density polyethylene fibers) to provide a smoother surface. This is where the brooch is placed. Acid free tissue and another layer of Plastazote (polyethylene foam) provide protection on top. The carved area on the foam is deep enough for the brooch to sit in it with only the bow rising above the surface. This allows the object to be lifted by its strongest element.

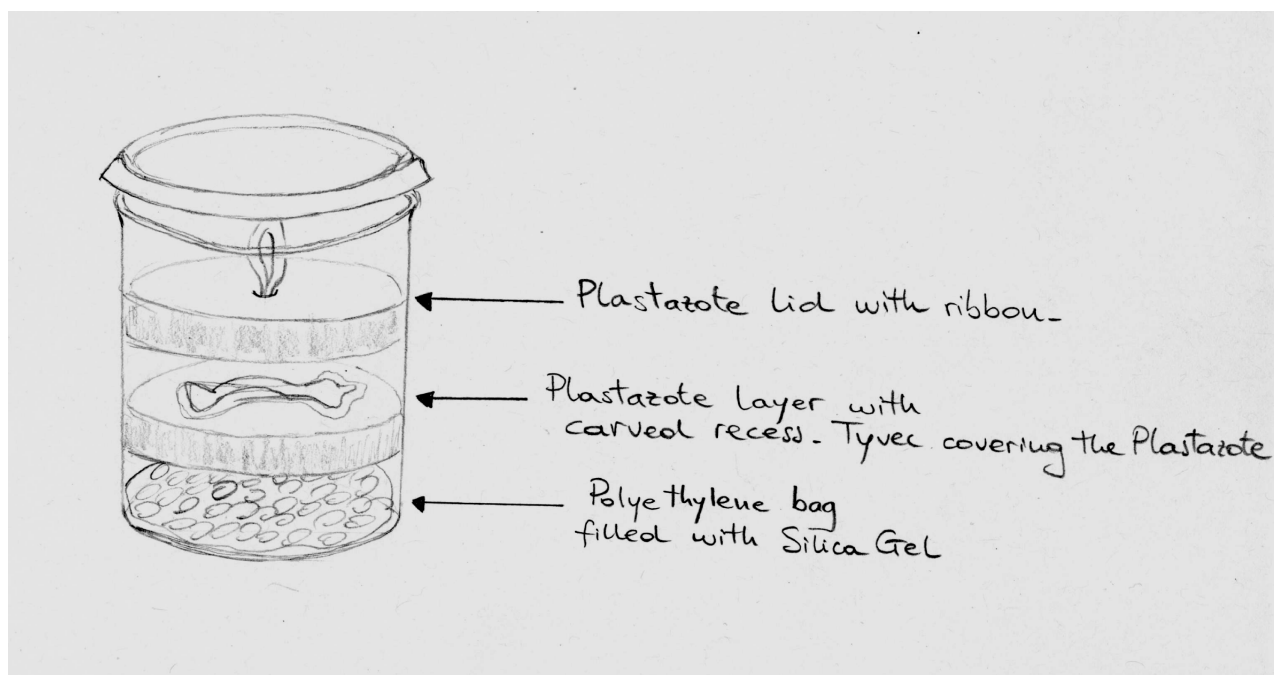


Figure 6. Diagram showing how the packaging was made.

Condition after treatment

The object is clean and its conditions appear stable. Further "bronze disease" corrosion should be prevented by the Benzotriazole ($C_6H_5N_3$; corrosion inhibitor) treatment and by the protective coatings. No attempt has been made to reshape the object or the bent pin.

Student evaluation of treatment

The treatment has achieved its principal aim: to provide a clean and stable object which will withstand minor environmental fluctuations such as those which are likely to occur in a domestic environment. The aesthetic value of the object has been preserved by the choice of not excavating the areas affected by "bronze disease". The two layers of coating protect the object from further corrosion and ensure that it is safe to handle.

The object has been analysed prior to treatment and this has provided valuable information on its original appearance. The analytical results confirm that the object belongs to a common and well documented Roman brooch type with decorated and enamelled fan tail. A detached fragment of enamel has been conserved and is available for further investigation. The results of SEM analysis are provided in the appendices.

Recommendations for further care

The object should be kept indoors, preferably in a heated and dry environment. It is safer to keep the brooch in the packaging which has been provided, as this is airtight and aimed to buffer external variations in RH which could be harmful to the metal. The bag underneath the object contains silica gel (anhydrous silicon dioxide), which absorbs any moisture present in the Stewart box. The silica gel will turn green when it is saturated with moisture. When this occurs, it should be removed from the bags and dried by heating in the microwave until it turns yellow again. After this has been done 3-4 times the silica gel should be replaced. The object should be handled with gloves due to fact that it has undergone BTA treatment.

References

Bayley, J. and Butcher, S. 2004. Roman Brooches in Britain: A Technological and Typological Study based on the Richborough Collection. London: The Society of Antiquaries of London.

Selwyn, L. 2004. *Metals and corrosion. A handbook for the conservation professional*. Ottawa: Canadian conservation institute.

Photography / other illustrations

Colour slide and print included.

Other documentation (analytical, object report, etc)

Results of SEM analysis included as appendices.

Student signature

Date 1/5/2012

Staff signature

Date