

CONSERVATION TREATMENT RECORD

Lab number: 8145
 Brief description: Chisel fragment
 Name of owner: Portable Antiquities Scheme via Sally Worrell
 Owner's number: N/A

Name of student: A. Shackle
 Date allocated: 18 Oct 2006
 Date completed: 11 June 2007

Material type
 Copper – tin alloy

Dimensions 30.9mm x 18.7mm

Weight before 9.80g after 9.79g

Technology

The chisel fragment is of a copper alloy composition. It is likely that it is a bronze (Copper and tin) due to the time period and area with which it has been associated.

The chisel appears to have been cast. The copper and its alloys would have been heated in a crucible to a fluid consistency and then poured into a mould and allowed to cool.

It is rectangular in shape, with the edges of the sharper end flaring out. According to S. Worrell (2007 pers. comm. 29 Jan) the black surface may have been a coating such as linseed oil used during the time of manufacture.

Condition

Before Treatment (See Illustrations and App. 2 for Images)



The chisel did not appear to be actively deteriorating. There was no evidence of active corrosion. It appeared to be completely intact with no broken or missing pieces. (However, it would have had a handle attachment which was no longer present). There was no evidence of previous attachment and the edges were heavily worn on all sides. All surfaces exhibited minor scratches and areas of pitting due to corrosion. All surfaces exhibited moderate dirt accretions (Munsell – 2.5Y 8/4). Both sides exhibited moderate corrosion products (see drawing). There were various shades of green corrosion products - (Malachite - $\text{Cu}_2\text{CO}_3(\text{OH})_2$) (Munsell – 5G 8/6, 5G 7/2, 5G 6/2). The conservation surface was visible as a shiny, black solid colour (Munsell – GY – G 2/10G).

After Treatment (See App. 3 for Images)



The object is stable and free of soil encrustations. It has a protective coating to deter corrosion. The appearance is not affected by the coating.

Significance (See App. 1 for Comparative examples)

The object has been identified as a fragment of a Late Bronze Age (1100 BC – 700 BC) chisel. This object was found while field-walking in Thwing, East Yorkshire, England.

The Late Bronze Age in Great Britain was a time of climate change (more specifically, colder and wetter weather), which forced people into the valleys, which were less easily defensible. The society during this time period has been defined as agricultural with a dependence on livestock (Pendleton 1999). Social groups were probably tribal in nature, but were growing in complexity and hierarchy. Burial of the dead was becoming more individual and personal and cremation also appears during this time period (Wikipedia 2006a). Technology improved during the later part of the Bronze Age resulting in a wider range of implements.

Chisels from this time period tend to have been used in leather-working (Pendleton 1999).

References:

Pendleton, C. 1999. *Bronze Age Metalwork in Northern East Anglia: A Study of its Distribution and Interpretation*. British Archaeological Reports, Oxford.

Wikipedia 2006a. *Bronze Age*. Retrieved from the World Wide Web 20 Feb 2007: http://en.wikipedia.org/wiki/Bronze_age

Examination

- The object was examined with a Vickers Limited binocular light microscope (magnification x10) and bamboo skewer.

Tests / analysis

- X-Rays were performed to determine the presence of anomalies and manufacturing techniques (See attached).
- X-Ray Fluorescence (XRF) was performed with a Spectro XLab 2000 Pro (P) ED-XRF to identify the alloys and black coating (See App. 5). The alloy was determined to be copper-tin. The black coating remains unidentified, but is not an organic.
- Scanning Electron Microscopy (SEM) was performed with a Philips XL30 ESEM to identify the alloys and black coating (See App. 4). It was determined to be a copper-tin alloy. The black coating remains unidentified, but is not an organic.

Justification for Treatment

- Sally Worrell, Portable Antiquities Scheme, has requested that a minimal amount of work be performed on the object. She would like the black coloured surface to remain completely intact, with little to no cleaning performed on the corrosion products. Ultimately, this object will become part of a site archive for a local museum and it is unlikely that it will go on display. She requested that the coating on the conservation surface be identified.
- Only the soil encrustations were cleaned due to the request of S. Worrell (see above).
- The object was given a protective coating as it will most likely go into storage. This coating will provide it with protection from further deterioration and corrosion. The fumed silica (silicon dioxide) was added to help matte the appearance of the object. The wax was added to provide a vapour barrier.

Cleaning (See App. 3 for Images)

Cleaning. The object was cleaned with a soft brush and air puffer. Then, all surfaces were cleaned with a #10A scalpel blade under a binocular microscope (x10 magnification) and air puffer.

Stabilisation (See App. 3 for Images)

Protective Coating. The object was coated with two layers of a 5% w/v Paraloid B48N® (methyl methacrylate copolymer) in Xylene solution with a soft brush. It was then coated with one layer of a 5% w/v Paraloid B48N® in Xylene solution with fumed silica. The final coat consisted of microcrystalline wax with a large stipple brush. Excess wax was cleaned with a #10A scalpel blade and stiff brush.

Reconstruction / repair

No reconstruction techniques were performed.

<p>Loss compensation</p> <p>No loss compensation techniques were performed.</p>	
<p>Other</p> <p>N/A</p>	
<p>Student evaluation of treatment</p> <p>This treatment was particularly straightforward. The cleaning was simple and went quickly. I was slightly uneasy about not using a protective coating after initial discussions with S. Worrell (2007 pers. comm. 29 Jan). She expressed an interest in the black coating and a desire for future research. However, since the object was going into storage, I was nervous that it would only further corrode (especially with the removal of the soil). Upon further email communication with S. Worrell (2007 pers. comm. 5 June), a protective coating has been decided as appropriate for this object.</p>	
<p>Packaging</p> <p>The object was placed in a polyethylene box large enough to contain silica gel. Layers of Plastazote® (Polyethylene foam) were adhered with hot glue. The shape of the chisel fragment was cut out of the Plastazote® for stabilised packaging. 50 grams of silica gel were placed in a polyethylene bagged with subsequent holes poked through. This was placed under the foam. Acid-free tissue paper was used to provide further stability by keeping the Plastazote® in place. Finally, a Relative Humidity (RH) indicator strip was placed in a visible location within the box.</p>	
<p>Recommendations for Further Care</p> <p>The object should be handled with care. Gloves should be worn while handling. Pick the chisel fragment up by its sides and support the broad side of the body. The recommended relative humidity (RH) should be kept below 35%, while the temperature should be kept between about 10 and 20°C. They should be kept in a stable environment with little to no fluctuations in RH and temperature. The silica gel should be replaced or regenerated as necessary (<i>i.e.</i> change in colour).</p>	
<p>Photography / other illustrations</p> <p>Ink and coloured pencil drawings</p> <p>Colour slide – Before and after treatment. Digital – Before and after treatment. Print - Before and after treatment.</p>	<p>Other documentation (analytical, portfolio report, etc)</p> <p>Examples of other Late Bronze Age chisels, XRF results, SEM results, and X-rays.</p>
Signature of student	Date
Signature of practical tutor	Date