

CONSERVATION TREATMENT RECORD

Lab number: 8149
 Brief description: Copper Alloy Cosmetic Mortar
 Name of owner: Portable Antiquities Scheme
 Owner's number:

Name of student: He Huang
 Date allocated: 13/12/2006
 Date completed: 15/03/2007

Material type	Dimensions
Metal	6.2cm x 0.8cm x 0.8cm
Copper Alloy	Weight before after
Technology	
<p>The object (Figure 3, 4, 5) is an end-looped cosmetic mortar which belongs to Portable Antiquities Scheme. It is 6.2cm long and approximately 0.8cm high. The widest part is 0.8cm, while the narrowest is 0.2cm. It has a curved and end-looped shape. The diameter of the loop is 0.7cm. The hollow part in the middle is the container of cosmetics and pigments. It is about 3.7cm high, 0.6cm wide and 0.3cm high.</p> <p>The cosmetic mortar is made of copper alloy. The X-ray of the object shows some air bubbles in the structure of the object (Figure 2), which possibly tells that it is cast made. Because if the mortar is hammered, the copper will be very tight and will not have the loose parts shown in the X-ray.</p>	
Condition	
<p>The corrosion details of the copper alloy cosmetic mortar are shown in Figure 6. There are several layers of corrosion products. The green layer on the top is likely to be malachite, copper (II) carbonate hydroxide, $\text{Cu}_2\text{CO}_3(\text{OH})_2$. There are two products underneath, a dark green one and an orange one. The dark green one might be another kind of copper carbonate. The orange one is possibly cuprite, copper (I) oxide, Cu_2O. The cosmetic mortar is mainly covered with the malachite layer. Little dark green copper carbonate and cuprite is shown on the surface as well. No active corrosion is found. The cosmetic mortar is in a good condition.</p> <p>The surface is covered with some soil and dirt in some areas. There are signs that the object might be cleaned before. Some scratches (Figure 8) are found on the surface of the mortar, possibly owing to some previous careless treatment. Some cotton wool is found in the area to contain pigment and cosmetic, which is likely due to the previous cleaning as well. On one side of the mortar (near the loop), some possible organic remains are detected under optical microscope (Figure 7).</p>	
Significance	
<p>The copper alloy cosmetic mortar was found by a field-walker in Thwing, East Yorks, UK. There would also have been a pestle. The mortar and the pestle works as a set to grind cosmetics and pigments. The mortar is dated to the Late Iron Age to the early Roman period. It contains high historic value and is a good sign for the social life at that time.</p>	
Examination	
<p>Investigative cleaning for removing the soil on the surface of the cosmetic mortar is done by scalpel. At most areas the soil can be easily removed. But in few areas near the loop, the soil is a bit harder.</p> <p>Investigative cleaning for removing malachite is done by scalpel on a very small area. Malachite is very soft so that it can be easily removed by scalpel.</p>	
Tests / analysis	
<p>X-ray is done for the copper alloy cosmetic mortar. The air bubbles on the surface indicates that the object is possibly cast made (Figure 2).</p> <p>A test is raised to examine the effect of 5% Paraloid B-44 in toluene and 5% Paraloid B-48N in toluene as a coating. It turns out that both of them have a good result and none of them change the appearance significantly.</p>	
Justification for Treatment	
<p>The copper alloy cosmetic mortar is brought to the conservation lab of Institute of Archaeology, UCL, for conservation treatment. After it is treated, it will be sent back to Portable Antiquities Scheme and the information of the object will be recorded on its website. The object will be kept in the storage.</p> <p>There is some soil on the surface of the cosmetic mortar, which needs to be removed. The extent of the cleaning of the object has been discussed and it is agreed to leave most of the malachite patina for aesthetic reasons. Some malachite needs to be removed to get a smooth surface.</p> <p>As the condition of the storage after the treatment of the object is not known, the cosmetic mortar might be threatened by the environment. Coating is needed to prevent it from environmental attack such as water and</p>	

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oxygen. Good packaging is also important to keep the cosmetic mortar in a good condition.

Cleaning

The cleaning of dirt and soil

Brush the surface of the copper cosmetic mortar first, use bamboo sticks to remove some soft soil, and then combine scalpel with white spirit for removing the hard soil.

Brush is used to clean the superficial dirt. Bamboo stick is good to remove soil which does not stick to the surface. While both scalpel and IMS can remove the soil effectively, I prefer mechanical method than chemical one. This will prevent from unnecessarily introducing chemicals to the object. For those areas where the soil is hard, white spirit can be used for softening the encrustation. Then it can be removed by scalpel successfully.

The surface dirt of the cosmetic mortar is removed by brushing. Bamboo stick is used to remove some soft soil. Scalpel is carefully used under microscope to take off some hard dirt. In some certain areas on the loop of the mortar, white spirit is applied on the sticky soil with cotton wool swabs, in order to soften the soil. Then the soil is successfully cleaned by scalpel. The cotton wool in the area to contain pigment and cosmetic, which is possibly owing to the previous careless cleaning by somebody else, is removed with the help of brush and bamboo stick.

The cleaning of corrosion products

The malachite layer on the surface of the copper alloy cosmetic mortar is giving a pleasant appearance. The patina is in a good condition and no active corrosion is found. The organic remains might be damaged if the malachite layer has to be removed. It is important to retain the information. Because of the aesthetic reason, the good condition, and the concern for the organic remains, it is decided to leave the malachite layer on the surface of the object. However, some work is required to smooth the surface in order to get a better appearance.

Scalpel is used carefully to smooth the surface. Then glass bristle is applied to make it more even. Great care should be taken because the glass bristle is very abrasive and very easy to leave scratches on the surface. After the surface is smoothened, brushing and IMS are used to clean the surface.

Stabilisation

Coat the mortar with 5% Paraloid B-44 in toluene.

Coating is used to prevent the object from environmental attack when it is stored in the future. As there is no active corrosion, BTA is not needed and it might lead to some health and safety problems if the object is handled. Both 5% Paraloid B-44 in toluene and 5% Paraloid B-48N in toluene have a good result which do not change the surface of the object significantly. Because Paraloid B-44 has a higher glass transition temperature ($T_g=60^\circ\text{C}$) than Paraloid B-48N ($T_g=50^\circ\text{C}$), it is less likely to attach dirt. Toluene is chosen as the solvent because it evaporates more slowly than acetone.

Two layers of 5% Paraloid B-44 in toluene are brushed onto the surface of the cosmetic mortar. It doesn't bring any significant changes and end up with a satisfying finish (Figure 9, 10, 11).

Reconstruction / repair

n/a

Loss compensation

n/a

Other

Student evaluation of treatment

The treatment is straightforward and the result is satisfying.

The treatment for the object has to be considered thoroughly. The way of cleaning and the reason for coating have to be fully supported.

Glass bristle is very abrasive and it is easily leaving scratches on the surface of the object. Prevent using it if possible. While using glass bristle, special care has to be taken and the work has to be carefully done under microscope.

Packaging

An air tight polyethylene box is used to contain the cosmetic mortar. Some silica gel is placed at the bottom of the box to control the relative humidity at a low level, which will prevent the cosmetic mortar from corroding. A relative humidity strip is placed to monitor the RH value. A layer of foam is placed underneath the object to support it. Another layer of foam is cut into shape of the cosmetic mortar and the object is placed into the foam, so that it is well supported and is prevented from moving. Acid free tissue paper is placed between the two layers. Another

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layer of foam is put at the top as a cover.

Recommendations for Further Care

When the cosmetic mortar is stored in the future, try to control the relative humidity in a low level. Try to avoid fluctuations of RH as small as possible. If the silica gel no longer takes effect, it has to be changed. Check the coating and the condition of the object regularly. If the coating no longer protects the object or active corrosion is found, some further treatment might take place.

Photography / other illustrations <i>Colour slide/digital/ print</i>	images attached slides attached	Other documentation (analytical, portfolio report, etc)
Signature of student		Date
Signature of practical tutor		Date