

Site Name: Durham University Oriental Museum			
Site Code: DUROM	Conservator: Cathryn Harvey	Date: 22 Aug. 2017	Lab no: 2449
Small finds no: n/a	Context: n/a	Accession no: DUROM.1990.10	
<b>Object:</b> Arabian Dagger	Material: Cu alloy, Fe, wood	XR no: XR7080-XR7081, XR7169-XR7170	

**Description:** Arabian dagger with scabbard made of a stamped and beaten brass (copper-zinc alloy). The handle of the dagger is made of wood wrapped in the stamped and beaten brass, with a small nickel plated (probably Cu coin based on corrosion) coin with Arabic writing attached to the handle by a loop of wire (probably iron based). The coin dates to 1327 AH (Hijri calendar), which runs from 23 January 1909 to the 12 January 1910 in the Gregorian calendar. The dagger itself may be earlier than the coin suggests. The blade is curved, and is made of steel. The scabbard is made of the same stamped and beaten brass wrapped around two pieces of wood. Some kind of resin or adhesive may be holding the pieces of wood in place (causing corrosion). A belt loop is soldered to the back (this may be a later addition, as it appears to be iron based).

**Conservation Treatment:** The main problem with the object was that the dagger was stuck in its scabbard, so that was the main goal of the treatment.

- Having taken X-rays to examine why the blade may be stuck in the sheath, it was thought that the solder with which the belt loop was attached (a later addition, as it is of a completely different composition to the rest of the handle and the sheath) had seeped through the scabbard upon application and held the blade in the scabbard. It was consequently decided that the solder and belt loop should be removed in the hopes that removal of the solder would release the blade. To remove the solder, a soldering iron was used to heat the solder, which was drawn away with copper wick wire. The belt loop and most of the solder was removed in one session. The 'corrosion' on the scabbard start to soften and 'melt' as the scabbard heated from the soldering iron. Still some solder left to remove, but am starting to think that it is not the solder that is holding the blade in place, but rather the corrosion of the copper alloy, resulting from the reaction with the wood in the handle and the organic material on the inside of the scabbard. This should hopefully be removeable by acetone.
- 2. Tried to remove the rest of the solder with a vacuum solder remover, but this was not successful
- 3. Tried injecting the scabbard with acetone, but no effect.
- 4. Tried submerging the dagger in acetone for ~8hrs (one day, with regular checks), but it had no effect. Did remove most of the corrosion on the exterior of the scabbard. It appears to be the inner lining of the scabbard itself, and not the corrosion that is holding the knife in place.
- 5. Tried injecting the dagger with WD40, but unsuccessful
- 6. Corrosion on the exterior softened with acetone, then cleaned with a pin under a microscope in the deeper, corner areas, or a scalpel for the flatter areas.
- 7. Left it in a 60°C oven for 40 min (checking every 20 min) in an attempt to get the metal to expand, but the dagger did not budge, and corrosion began to seep out of the holes in the scabbard again.
- 8. The dagger was next submerged in Plus Gas A, a fast release lubricant (Petroleum based) for 8hrs, checked regularly, but this was also unsuccessful.
- 9. The dagger was immersed up to the bottom of the handle in an ultrasonic tank filled with acetone (level raised with two large stones). The tank was put on for 2 min (unsuccessful), then another 4min (twice), but again this was unsuccessful. The dagger was then left in the tank for a further 10min, after which it was removed from the tank, and with some brute force, finally came apart.
- 10. The blade was cleaned with medium-fine Garryflex to remove the remnants of the wood, other dirt,

and a small amount of corrosion. Also shined up the blade. Blade still sharp.

- 11. The blade was coated with Choji Oil (1% clove oil in a mineral oil), as used in Leeds Royal Armouries. This was done using a Gerstaecker 10 brush. Two coats were applied, and left overnight to dry, before wiping away the excess with a microfibre cloth. This was chosen since the blade was in excellent condition, with minimal corrosion, and Choji oil works well when part of the object is organic (wooden handle). It may however, need to be reapplied in future. This was done two weeks before the deadline, so should any corrosion or other complications arise, another coating may be used instead.
- 12. The corrosion on the coin was initially cleaned with acetone, then using acetone as a softener, a pin in a pin vice, and a scalpel was used to remove the majority of the corrosion. Despite being done under a microscope, it was not possible to remove all of the corrosion on the coin without causing serious damage to the metal, so as much as possible was removed.
- 13. The handle of the dagger was cleaned using the same method used on the scabbard, before being coated with a coating of 6% Paraloid B72 in acetone (for consistency with the scabbard). The coin and wire were also coated with the same. This coating was applied with a Gerstaecker 2 brush, and care was taken to avoid the Paraloid going into the wood. The museum accession number was reapplied using a layer of 20% Paraloid B72 in acetone, then black Indian ink, dried, then another layer of the 20% Paraloid B72.
- 14. The belt loop was cleaned with a stiff wire brush and acetone.
- 15. The belt loop was re-soldered to the scabbard using a soldering gun and CuPsol wire .5mm dia Cored with a melting temperature of 296°C (High melting point soft solder), as it was similar to the composition of the solder that remained on the scabbard, and was readily available in the lab.
- 16. The scabbard presents the most pressing problem, as the corrosion caused by the reaction of the brass with the wood is occurring on the interior that cannot be got at, and it is not possible to coat or treat the wood without causing serious damage and potential loss of the wood. It was decided to treat the corrosion through the holes in the scabbard (where the corrosion seeps through to the exterior), with localised application of 6% BTA in ethanol applied with a small brush (applied under a fume hood, with suitable PPE). Full immersion was not considered suitable, as the BTA would soak into the wood, and since it cannot be coated, create a serious health and safety risk. Localised application should minimise the amount absorbed by the wood lining. The scabbard was then coated with 2 layers of 6% Paraloid B72 in acetone.
- 17. A polythene box was used to store the dagger. A layer of thick plastazoate, with cut outs for the dagger and the scabbard was used to hold the object, then the rest of the box was filled with acid-free tissue to prevent upwards movement of the objects.

## Storage recommendations:

The dagger and the scabbard should remain separated, and always handle with gloves because of the BTA treatment.

It should be stored between 40-50% RH (45% ideal as compromise for both metal and wood). Temperature should avoid extremes and fluctuations, and light should be <200 lux on account of the wooden handle.

## Images:

**Before Conservation** 

