

AMM. Repat 3278
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Technical examination and analysis of some brooches and mirror fragments from Baldock, Herts.

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The three mirror fragments (AM 801910-12) were all deeply corroded with only small areas of the original grey surface visible which were mainly covered with a thin layer of soil. However they all appeared highly polished on one side and rougher on the other which suggested that they all came from mirrors which were originally mounted in a box or frame rather than on a handle as a hand mirror with both sides visible. The backs were in an 'as cast' state as only the front was polished up for use.

The fragments were analysed by an energy dispersive x-ray fluorescence (XRF) system. All were of similar composition, mainly copper and tin with a smaller amount of lead also present. Silver was not detected in any of them. The objects were so deeply corroded that comparisons with standards would have been unreliable. However, they all seem to belong to the group of high tin bronzes known as speculum metals which have this grey appearance and compositions in the range 20-30% tin. No difference was visible between the surfaces and the broken edges (where the metal was uncorroded) which supported the view that the fragments were of one metal throughout and were not plated. The surface cracks on AM 801910 were not due to a cracking off of a surface plating but to deep-seated corrosion in the metal expanding the core of the object. The metal has cracked and split off rather than bending as it is brittle. This, together with the shapes of the fragments, reinforces the view that the mirrors are of speculum metal which is very brittle.

The brooches examined were two dolphin brooches, three (?) Hod Hill type brooches, a trumpet brooch and four plate brooches, one of which was zoomorphic. All the analytical results below were obtained by energy dispersive XRF.

The first dolphin brooch (AM 7210426) had a highly decorated catch plate (~~see enclosed photo~~). The spring was held in the long semi-cylindrical cross-bar by three hooks, two of which were cast in one with the main part of the brooch. The hook at the right-hand end of the cross-bar appears to be a repair as it is a separate piece, flattened and shaped to fit the inside of the semi-cylinder and then emerging as a round wire through a hole which is in the same position as the cast hook on the left-hand end of the cross-bar. It is not possible to tell if the repair was made at the time of manufacture or later in the life of the brooch. Its composition is probably similar to the rest of the brooch (which appears to contain significant amounts of both

tin and zinc though not much lead) as it has corroded in a similar way.

The second dolphin brooch (AM 715556) appears to have zinc as the main alloying element though tin and lead were also detected. There was inlay on the bow of the brooch near the head and silver was detected in this area. The inlay could either be metallic silver or niello (a mixture of copper and silver sulphides). Most of the inlay is black (the colour of niello) but parts appear whitish grey so silver metal in varying states of decay seems the more likely description. The inlay is also harder than niello often is, which supports the metallic silver suggestion. A more definitive description might be possible if a sample of the inlay were removed and analysed by x-ray diffraction.

The three Hod Hill type brooches were examined primarily to identify the white metal platings on their front surfaces. The first (AM 7211121) was shown to be made of brass containing around 15% zinc. The pin was of a similar alloy and was held in position by an iron pivot pin. The white metal surface was shown to be tinned as signals for tin but not for silver were detected. The second brooch (AM 7211119) was also tinned and appeared to be of a similar bulk composition to that of AM 7211121 though a small amount of lead was also detected. The lead may be in the bulk metal of the brooch or the white metal may be a lead-tin alloy. The brooch pin was brass and was held in position by an iron pivot pin. The third brooch (AM 7211202) is more worn and only traces of the white metal plating survive. The bulk metal probably contained some tin and lead in addition to about 10% zinc and the pivot pin was again iron. As in AM 7211119 the white metal areas gave enhanced signals for both lead and tin so the tinning may be a lead-tin alloy.

The trumpet brooch (AM 794845) was decorated with enamel fields on the bow and a glass stud attached to the foot by a collar (or cup?) of sheet metal. The pin-spring-headloop assembly was made separately and attached to the brooch casting. The headloop had a chain attached to it. All the metal parts were of similar compositions, being basically brasses though all except the chain also contained some tin. The enamel field nearest the head of the brooch was a rectangle running along the bow which contained three blocks of glass, the centre one being a very pale opaque blue (almost white). The other two blocks were very deeply decayed, now appearing dark brown or black but it is not possible to suggest an original colour with any degree of certainty. The next field was a single square of the pale opaque glass flanked by two triangular fields containing more of the dark enamel, the band running across the bow. The final enamel field was another rectangle running along the bow containing six blocks of enamel, alternately dark and pale. The glass stud had a centre spot of palish opaque blue set in a very dark translucent blue surround.

The first plate brooch (AM 7211112) had a lot of decayed organic matter trapped on its corroded surfaces. Traces of white metal plating were visible on the front. This was tinning. The blue 'stone' was glass and the colourant in it, though not detected, was almost certainly cobalt.

The second plate brooch (AM 715574) also had a 'stone'. This was held in position by a tinned repousse metal plate which was fixed to the back plate of the brooch by a lead-rich solder. The 'stone' appeared a clear pinky-brown with a thin opaque whitish weathered surface. This weathering suggested that the 'stone' was glass rather than a semi-precious stone, though its asymmetric shape is unexpected if it is manufactured rather than natural. The colour is also not a common one for Roman period glass.

The third plate brooch (AM 7211203) was a gunmetal (zinc and tin as alloying elements) with a tinned front surface (both tin and lead were present in the white metal). There was no tinning in the groove near the edge of the brooch and none was noted in the depressed area around the central iron rivet. This rivet presumably once held a decorative boss or stone in the centre of the brooch.

The final plate brooch (AM 7210447) was a fairly naturalistic zoomorphic one of a dog(?) catching a rabbit. The front of the brooch had bands of dark coloured inlay across the beasts' bodies and the same inlay was used for their eyes too. There was a white metal surface between the inlaid stripes. Analysis showed the major elements present to be copper and zinc, showing that the brooch was brass. Lead and tin were also detected in much smaller amounts showing the white metal to be tinning. Despite a prolonged analysis no positive identification of silver could be made so the nature of the dark inlay remains uncertain. It looks like niello but, as has been noted above, this normally contains at least some silver. There is no direct evidence to show whether the plating or the inlay was applied first as no areas can be seen where one overlies the other. On theoretical grounds however one would expect the inlay to be applied first whether it is a metal or niello as its softening point would be higher than the melting point of tin or a tin-lead alloy.