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Analysis of Roman Copper Alloy Objects from Chelmsford Temple, Essex

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Nine Roman copper alloy objects (AM852625-33) from Chelmsford Temple were analysed elementally using qualitative energy dispersive X-ray fluorescence analysis. The aim was to determine the alloy types used in the objects and where possible to identify any inlays and platings on the objects.

The objects are described individually below, but some general points concerning the analyses should be made. The compositions of the copper alloys are described using the following terms:

Bronze - a copper alloy containing significant amounts of tin, but only relatively low levels of zinc (if any).

Brass - a copper alloy containing significant amounts of zinc but at most relatively low levels of tin

Gunmetal - a copper alloy containing significant amounts of both tin and zinc

All the objects also contained small amounts at least of lead. If the level was high enough to suggest that lead was probably added to the alloy deliberately the object is described as leaded. Where an object is described as containing a small amount of an element it implies that although the element was detected, the alloy almost certainly only contained a few percent or less. All the objects contained small amounts at least of lead. Inlays and platings are described in as much detail as possible, although where they contained the same elements as the base metal it was not always possible to determine their compositions with confidence.

AM852625 - this ring was bronze but also contained small amounts of zinc. No visual or analytical evidence for an inlay in the bezel of the ring was found. The material in the bezel appeared to be entirely corrosion products.

AM852626 - this strip was leaded bronze. Rather higher tin levels were detected in the white metal plated area, but the presence of lead in the base metal made it impossible to be certain whether the plating was tin or a tin-lead alloy. From its position, it

seems likely that the plating was a solder, in which case it would probably have contained some lead.

AM852627 - this strip was gunmetal. The white metal area contained higher levels of tin and lead than the base metal and was almost certainly a tin-lead solder.

AM852628 - this object was gunmetal. The white metal plated area contained higher levels of lead and tin than the base metal. The plating was a tin-lead (?solder) alloy.

AM852629 - this sheet was gunmetal. The white metal plated area contained higher levels of lead and tin than the base metal and was almost certainly solder.

AM852630 - this stud was brass, and also contained a small amount of lead. The appearance of the inlay suggested that it was niello but it was not possible to confirm the identification analytically.

AM852631 - this bracelet was gunmetal. Slightly higher levels of tin were detected in the plated areas at the terminals and the plating was probably tin although it is possible that it also contained lead.

AM852632 - this fitting was bronze, but it also contained a small amount of zinc.

AM852633 - very high levels of both tin and lead were detected on analysing this box hasp. It was white metal plated on, almost certainly, both the back and front which made it difficult to determine the composition of either the base metal or the plating with certainty. However the levels of tin and lead detected strongly suggest that the plating was a tin-lead alloy. The base metal was probably bronze (?leaded), but could have been copper, and also contained a small amount of zinc.