

EXAMINATION AND ANALYSIS OF SOME ROMAN SMALL FINDS FROM CAMELON

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Camelon was a Roman military site in Scotland, occupied in the late first and second century AD. The objects, all of copper alloy, were mainly brooches and enamelled trinkets, eg studs. All were examined under a low-power microscope and most were analysed qualitatively by X-ray fluorescence (XRF). This gives an indication of the alloy used to make the object but in cases such as these where the metal is deeply corroded it is not a good or infallible method as it is only the (corroded) surface that is analysed. Those brooches which were sufficiently large and solid were additionally sampled for quantitative analysis by atomic absorption (AA). About 10 mg of uncorroded metal was removed from the core of each object using a small drill.

The XRF analyses are given in tables 1 and 2. The AA results will be added when they become available. Many of the objects were decorated with either enamel or applied metals. This decoration is described individually below.

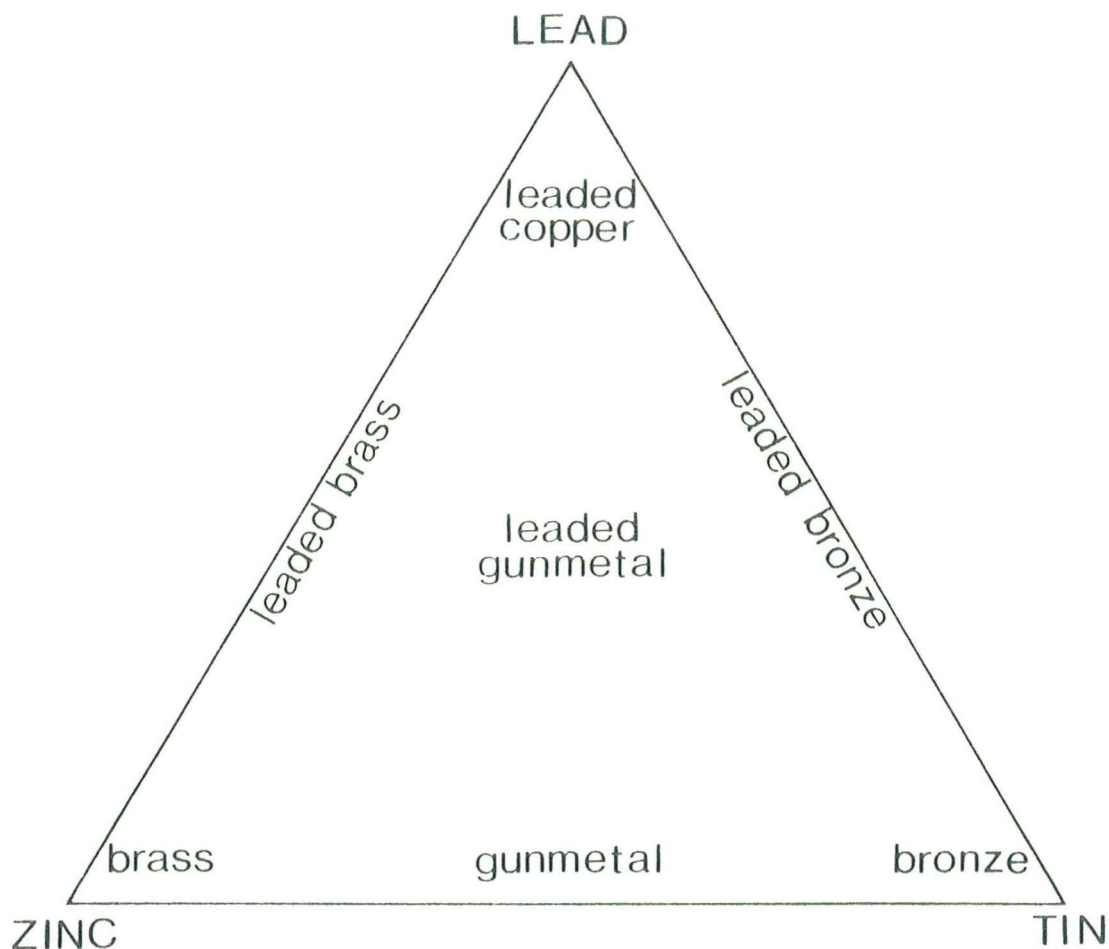
<u>Site No</u>	<u>Description/Discussion</u>
76 - 94	This brooch may have been tinned but the appearance of the surface is probably just a product of the way it has corroded.
76 - 78	The enamel band down the bow is of blue lozenges bordered by red triangles. The head stud is a ring of red enamel with a spot of reserved metal in the centre and the enamel panels on the crossbar are red with reserved metal lozenges in them. All the red enamel is rather decayed but sufficient remains for its original colour to be certain.
79 - 8	The foot has a field of white (?) enamel, the spots in it being reserved metal. It also has a strip of silver foil fixed in position with a lead-tin solder. The grey metal stripe and spots on the head part of the brooch are probably the remains of solder which would have fixed further silver foil decoration. They are also lead-tin.
76 - 15	No decoration.
75 - 21	The brooch was tinned all over, including its back.

<u>Site No</u>	<u>Description/Discussion</u>
76 - 250	This brooch may have been tinned but the appearance of the surface is probably just due to the way it has corroded.
76 - 141	No decoration.
75 - 27	No decoration.
76 - 162	No decoration.
76 - 44	The applied decoration has strips of silver foil across the spring case and down the bow and three pairs of silver discs on the sides of the bow. All the silver that remains shows signs of repoussé work and is held in place by a lead-tin solder. Where the silver has fallen off its original position is marked by traces of this grey metal.
76 - 109	Applied decoration of the type described above (76-44).
76 - 85	Traces of applied decoration cf 76-44.
76 - 49	Traces of applied decoration cf 76-44.
75 - 4	The brooch was tinned all over.
76 - 237	Traces of tinning widespread (? all over).
76 - 10	No decoration.
75 - 32	? Belt plate with three parallel bands of enamel. The centre one is opaque turquoise and the two outer ones opaque red.
75 - 44	No decoration.
75 - 80	No decoration.
76 - 35	Stud with two fields of enamel. The outer ring is made up of slices of a millefiori rod of a white spiral on a blue background. The enamel in the central field is badly decayed and now appears buff or pale green. It may originally have been red.
76 - 65	There is an area of black powdery material on this object but it does not look like decayed inlay or enamel. I cannot suggest an origin for it.
76 - 80	Stud without decoration. (The material adhering to the front of the stud is probably a mixture of mud and corrosion products consolidated in place).

<u>Site No</u>	<u>Description/Discussion</u>
76 - 81	Dress fastener with enamelled decoration. The centre spot is very decayed; it could possibly have been red though it is now impossible to be sure. Round this is a ring of ? white or 'colourless' translucent enamel. It is not truly opaque and its original appearance cannot be described with certainty though it would definitely have been a pale colour. The same enamel seems to have been used for 4 of the 7 'petals' in the outer ring of decoration and also for the fields between the 'petals'. Some of these background fields seem to have two distinct layers of enamel, one over the other. The colours cannot be determined with certainty but were probably in the green/turquoise/colourless/white semi-transparent range. The other three 'petals' were of opaque yellow enamel.
76 - 192	Handle with panels of inlay on both sides. The borders of the inlay panels and some of the patterns within them appear to be niello*. The other material in the inlaid panels now looks powdery and is pale green and black. Its original composition and appearance are difficult to suggest. *It is possible that the material identified as niello was in fact metallic silver which has corroded in such a way as to look like niello; the XRF analysis detected silver which would be there in either case.
76 - 239	? Buckle with enamel decoration. The enamel is in triangular fields, those with bases towards the middle of the object being in blue. The enamel in the alternating fields is less well preserved but in some cases was definitely red and in the other cases probably red, though green would also be a possibility. There seems to be no pattern in the distribution of definitely and probably red fields so the distinction is most likely to be due to the degree of decay.
77 - 18	Button with enamelled decoration. The centre spot and the inner ring were ? white or translucent turquoise while the enamel in the outer ring has completely disappeared.

Composition of the Brooches

A wide range of copper alloys were used for making brooches in Roman Britain but the compositions found within each typological group are far more restricted (Bayley and Butcher 1981). The diagram below shows the names applied to alloys containing varying amounts of tin, zinc and lead (the major alloying elements). There are no hard and fast divisions between the various alloys so some objects are described as eg "bronze/gunmetal", indicating an intermediate composition.



The two "headstud" brooches are not very alike in composition but consideration of a group of similar objects from Richborough shows a range of compositions which would easily include these examples.

Trumpet brooches are made of a large variety of different alloys; the composition of this one is not unexpected. The two pieces gave similar analytical results which confirms their association as parts of a single brooch.

The knee brooches from Richborough were all bronzes or gunmetals containing medium amounts of lead (5-10%). The examples from Camelon were of rather different sub-types but most of the undecorated ones were leaded bronzes. The exception was 76-15 which contained very little lead or tin but a considerable amount of zinc, making it a brass (or "brass/gunmetal"). The brooches with applied decoration had similar compositions to 76-15; they were brasses or gunmetals. These results might be taken to indicate two traditions or areas of manufacture for knee brooches, one using leaded bronzes or gunmetals and the other using low lead brass or gunmetal.

The penannular brooch and its pin were of similar composition and were bronze. These brooches are almost always made of low lead alloys but there seems no correlation between the various sub-types and the use of bronze, gunmetal or brass.

The fragment, 76-237, is a leaded bronze or gunmetal. This composition suggests it was part of a late first century or later type (eg Dolphin, Knee) rather than an earlier type (eg Langton Down, Rosette) as these are almost invariably brass.

Table 1: Analytical Results for the Brooches

<u>Site No</u>	<u>Type</u>	<u>Alloy (from XRF)</u>	<u>AA Sample No</u>
76 - 94	"Headstud"	Leaded bronze	905
76 - 78	"	Bronze/gunmetal	906
79 - 8	Trumpet with plate	Bronze/gunmetal	
76 - 15	Knee	Brass	
75 - 21	"	(leaded) bronze	907
76 - 250	"	Leaded bronze	
76 - 141	"	" "	
75 - 27	"	" "	
76 - 162	"	" "	
76 - 44	"	Gunmetal	
76 - 109	"	Brass/gunmetal	
76 - 85	"	Brass	
76 - 49	"	? Gunmetal	
75 - 4	"	Leaded bronze	
76 - 237	?	Leaded bronze/gunmetal	
76 - 10	Penannular	Bronze	

Table 2: Analytical Results for Other Objects

<u>Site No</u>	<u>Object</u>	<u>Alloy</u>	<u>Decoration</u>
75 - 32	Stud	Leaded bronze	Enamel
75 - 44	?	Leaded gunmetal?	
75 - 80	?	Brass/gunmetal	
76 - 35	Stud	Leaded bronze	Enamel
76 - 80	Stud/fastener	Leaded bronze/gunmetal	
76 - 81	Dress fastener	Bronze	Enamel
76 - 192	Handle	Leaded bronze	Niello +?
76 - 239	? Buckle	Leaded bronze	Enamel
77 - 18	Button	Leaded bronze	Enamel