AB Site No 308

Ancient Monuments Lab Report No 4398

Analyses of some Roman brooches from Henley Wood (Yatton), Somerset

Justine Bayley

November 1984

The non-ferrous brooches were all analysed qualitatively by x-ray fluorescence. The results are given in the table. In most cases tin, zinc and lead were detected in addition to copper, but in very variable amounts. This variation in composition is a reflection of the use of different alloys. Figure 1 illustrates the relationship between the alloy types and the metals they contain, eg brass is mainly zinc added to copper while leaded bronzes contain significant amounts of both tin and lead (they lie between the tin and lead corners but far away from the zinc corner). The figure also shows that there are no hard and fast divisions between different alloy types; one merges into the next as the composition gradually changes.

As a guide, Roman brasses contain about 10-25% zinc, bronzes 5-15% tin and gunmetals at least several percent of both tin and zinc. Objects not described as leaded may contain a percent or two of lead but above this threshold it is not possible to differentiate with the analytical method used here; the "leaded" alloys may contain from a few percent up to over 20% lead.

The two first century hinged bow brooches were both bronzes; AM 734852/734859 was tinned on its front surface.

The south-western T-shaped and headstud brooches were mainly leaded bronzes, though two contained enough zinc to be reclassified as leaded gunmetals. Most of the brooches of this range of types are leaded bronzes (Bayley and Butcher 1981, Fig 7) but gunmetals are not unknown. AM 730943 is tinned all over.

The trumpet-headed and knee brooches are also both leaded bronzes. Trumpet brooches are found made of wide range of alloys while knee brooches are usually leaded bronze (ibid, Fig 8).

The P-shaped, sheath-footed brooch was made of silver which was fairly pure but contained traces of copper, zinc and gold.

The plate and disc brooches are of a range of different types so not surprisingly they are made from a range of different alloys. They are decorated in a variety of ways. Two are enamelled; AM 730941 has eight enamel fields which are either blue or red and there is tinning on the reserved metal between the fields on the bird's body and in a band surrounding them. The enamelled disc brooch (AM 730937) had two concentric bands of enamel and a circular central field too. Traces of enamel survive in the two annular fields, that in the outer one being dark olive green which would have looked black when it was complete.

AM 734847 had a repoussé decorated sheet soldered onto its front. This sheet was probably brass and the solder was the usual lead-tin mixture.

The last two disc brooches have both lost the glass 'gem' which would have occupied the central setting. The surrounding metal was gilded as is normal for this type. It appears however that AM 542023 was mercury gilded while AM 642026 was leaf gilded; it could not have been satisfactorily mercury gilded as its bulk metal contained too much lead. Both gilding techniques are known on other brooches of this type. In addition AM 642023 was tinned on its back, a feature found on some brooches of this type.

One final object, a swastika-shaped plate (AM 730947), was also analysed although it did not at first sight look Roman. It was of silver containing a fair amount

of copper as well as traces of zinc, lead and gold. The presence of gold is usually an indicator of antiquity as modern silver, in this country at any rate, normally has any gold in it removed. The silver is also baser than sterling. A further indicator of antiquity is the presence of the remains of lead-tin solder on the back of the object which may once have held eg a pin and catchplate in place; modern practice would be to use a hard, silver-based solder rather than a soft solder like this.

Reference

Bayley J and Butcher S (1981) Variations in alloy composition of Roman Brooches. Revue d'Archéométrie, supplément, 29-36.

Table of Results

AM No	Brooch type	Alloy type	Decoration
734858	Early hinged	Bronze	
734852) 734859)	" "	Bronze	Tinned
734860	South-western T-shaped	Leaded bronze	
684631	" Headstud	Leaded gunmetal	Enamelled (now all lost)
734845	" T-shaped	Leaded bronze	
730943	" "	Leaded bronze	Tinned
642035	" "	Leaded gunmetal	
734841	" "	Leaded bronze	
684638	Trumpet head	Leaded bronze	
734844	Knee	Leaded bronze	
730948	Sheath footed	Silver	
730941	Eagle plate	Leaded gunmetal/brass	Enamelled
734847	Disc	Leaded bronze	Brass repoussé plate soldered on
730937	"	Leaded bronze/gunmetal	Enamelled
684636	"	Leaded gunmetal/brass	
642023	"	Gunmetal	Gilded. Inset glass gem (now lost)
642026	Disc (oval)	Leaded gunmetal	Gilded. Inset glass gem (now lost)
642037	Penannular	Gunmetal	
734862	"	Copper	
734846	"	Gunmetal	
734863	"	Bronze/gunmetal	
684633	"	Bronze	

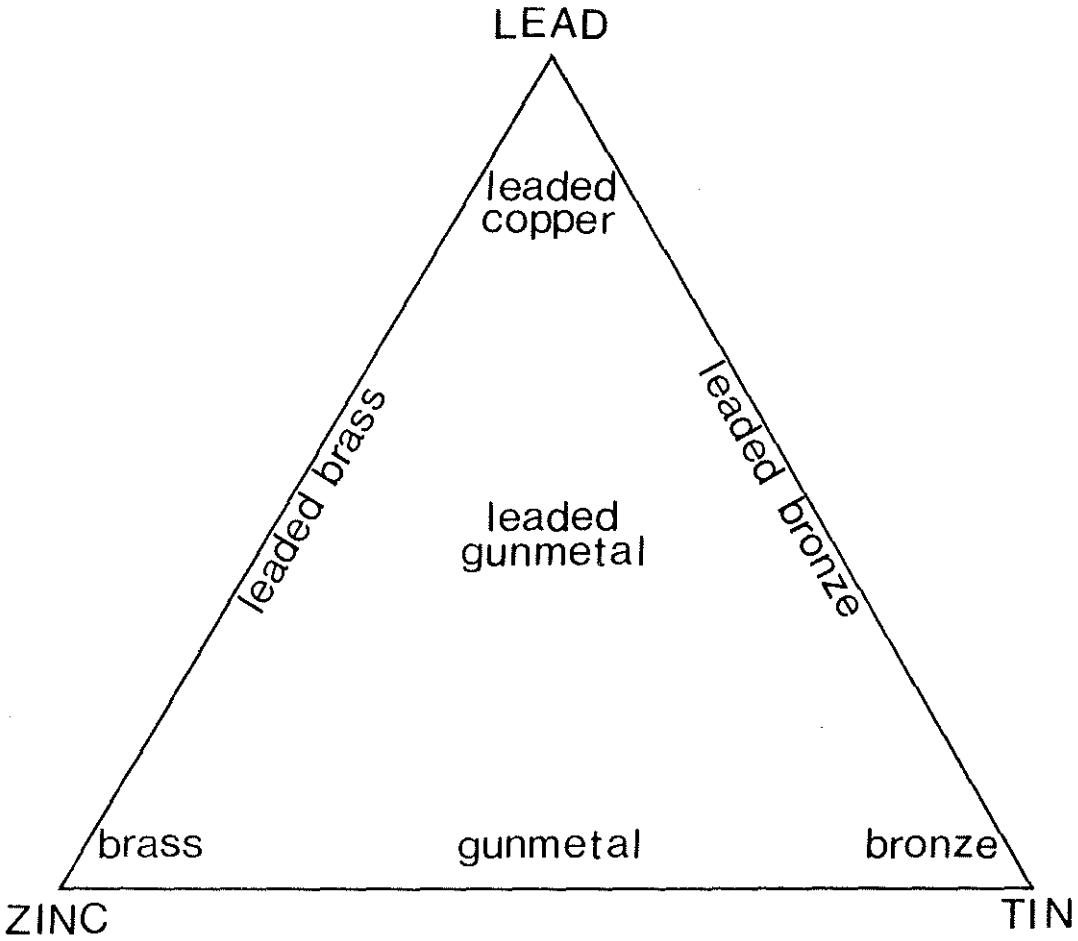

Figure 1 - The composition of copper alloys