

Roman military equipment and the beginnings of the Roman use of brass in Europe

Introduction

An unusual sword scabbard with net-like fitments was found in the River Ljubljana, Slovenia at the beginning of the 1990s (Fig. 1)¹. It was classified as Roman, and on typological grounds, was dated to the very late Republican period (c. 50–30 BC)². Analysis showed that the fitments were made of brass: an alloy of copper and zinc³. Although brass occurs very frequently on Roman decorative military metalwork, its use on the scabbard from Ljubljana was surprising, because the beginning of any extensive Roman use of brass has generally been associated with the reign of Augustus⁴. For these reasons, our research interest focused on the dating of the beginning of the use of brass in Europe⁵.

Previous research

From published evidence, the following is apparent. It was most probably the Romans who had spread the use of brass (*aurichalcum* or *orichalcum*) through Europe⁶. Presumably, they had encountered it in Asia Minor, where the deliberate production of brass had probably commenced at the beginning of the 1st century BC, and where, from about 50 BC, it was frequently used for coinage⁷.

A clear indication of the Roman use of brass in the pre-Augustan period emerged as early as the beginning of the 20th century, when four analyses of two issues of late Republican brass coins were published⁸. According to Rodolfo Martini, the issues, with the legends *C. Clovius* and *Q. Oppius*, belonged to the last years of Caesar's dictatorship, from c. 45 BC, and were probably minted in Rome⁹. Grant suggested that we may assume that these brass issues, like all financial enterprises of the period, were planned and

¹ The author is indebted to Dr. Vivien Swan who edited the English.

² J. ISTENIČ, A late-republican gladius from the River Ljubljana (Slovenia). *Journal of Roman Military Equipment Stud.* 11, 2000, 1 ff.; ID., A Roman late-republican gladius from the River Ljubljana (Slovenia). *Arh. Vestnik* 51, 2000, 171 ff.

³ Ibid.; Ž. ŠMIT/P. PELICON, Analysis of copper-alloy fitments on a Roman gladius from the river Ljubljana. *Arh. Vestnik* 51, 2000, 183 ff.

⁴ cf. A. GIUMLIA-MAIR, Roman copper-based finds from a Slovenian settlement. *Bull. Metals Mus.* 25, 1996 48 ff. see 52.

⁵ The paper is a modified and revised version of a longer article (J. ISTENIČ/Ž. ŠMIT, The beginning of the use of brass in Europe with particular reference to the southeastern Alpine region. In S. La Niece/D. Hook/P. Craddock [eds], *Metals and Mines: Studies in Archaeometallurgy* [London 2007] 140 ff.) written from an archaeometallurgical viewpoint, which also included all the details of the analyses.

⁶ E. R. CALEY, Orichalcum and related ancient alloys: origin, composition and manufacture with special reference to the coinage of the Roman Empire (New York 1964) 31; P. T. CRADDOCK, The composition of the copper alloys used by the Greek, Etruscan and Roman civilizations, 3. The origins and early use of brass. *Journal of Arch. Science* 5, 1978, 1 ff. see 8 f.

⁷ A. M. BURNETT/P. T. CRADDOCK/K. PRESTON, New light on the origins of orichalcum. In: T. Hackens/R. Weiller (eds), *Proceedings of the 9th International Congress of Numismatics 1* (Louvain-la-Neuve, Luxembourg 1982) 263 ff.

⁸ M. BAHRFELDT, Die Münzen der Flottenpräfekten des Marcus Antonius. *Num. Zeitschr.* 37, 1905, 9 ff. see 42; ID., Die letzten Kupferprägungen unter der römischen Republik. *Num. Zeitschr.* 42, 1909, 67 ff. see 84.

⁹ For other suggestions for the dating as well as the mint location, with relevant bibliography, see R. MARTINI, Le emissioni bronzee di Iulius Caesar a nome dei prefetti C.CLOVIUS e Q.OPPIUS. Note introduttive. *Glax* 7, 1991, 369 ff.



1 Late republican sword in its scabbard from the River Ljubljanica. Not to scale. – Photo: Archive of the National Museum of Slovenia (T. Lauko).

supervised by the central administration of Balbus, and authorised by Caesar himself¹⁰. He, and those minting the coins, are likely to have made a hefty profit from the *aurichalcum* issues, since brass coins were significantly overvalued.

Caesar's introduction of brass into the Roman coinage, shortly before his death, remained one of his unaccomplished projects, until Augustus took over the idea. He seems to have been aware of the great potential of a token coinage, and the particular advantages of the new alloy, *aurichalcum*. He introduced it as a new base metal at the Rome mint, probably in 23 BC. With this reform, the *sestertii* (valued at 4 *asses*), *dupondii* (valued at 2 *asses*) and *semisses* (valued at half an *as*), were made of brass, and the *asses* were made of copper¹¹. From the Augustan period, brass was also widely used for military equipment, especially for various fittings on the scabbards of swords, belts and horse-trappings, buckles on belts and the *lorica segmentata*, and inlaid decoration¹² as well as the brooches of Aucissa and other types¹³.

Research strategy and analytical methods

We decided to centre our research on the pre-Augustan Roman use of brass for other finds than coins. Brooches seemed to be a suitable sample, as they are quite numerous and have also been relatively well classified. The territory of present-day Slovenia was assumed to be an appropriate geographical framework for this research. It was, in fact, the immediate north-eastern neighbour of Italy, where the first Roman brass production in Europe could be expected, and its western and central parts were already under

¹⁰ M. GRANT, *From imperium to auctoritas: a historical study of aes coinage in the Roman Empire, 49 B.C.–A.D. 14* (Northampton 1969) 13 ff. see 87 ff.

¹¹ BURNETT/CRADDOCK/PRESTON 1982 (note 7); A. BURNETT, *Coinage in the Roman world* (London 1987) 54.

¹² J. ISTENIČ, *An Early Roman dagger from the vicinity of Štanjel*. In: G. TIEFENGRABER/B. KAVUR/A. GASPARI (eds), *Keltske studije 2. Studies in Celtic Archaeology. Papers in honour of Mitja Guštin*. *Protohist. européenne 11* (Montagnac 2009) 331 ff.

¹³ J. BAYLEY, *The production of brass in antiquity with particular reference to Roman Britain*. In: P. T. CRADDOCK (ed.), *2000 years of zinc and brass*. *Brit. Mus. Occasional Paper 50* (London 1990) 7 ff. see 3 ff.; J. BAYLEY/S. BUTCHER, *The composition of Roman brooches found in Britain*. In: *Acta of the 12th International Congress on Ancient Bronzes, Nijmegen 1992*. *Nederlandse Arch. Rapporten 18* (Nijmegen 1995) 113 ff.; ID., *Roman brooches in Britain: a technological and typological study based on the Richborough Collection* (London 2004) 209 ff.; P. CRADDOCK/J. LAMBERT, *The composition of the trappings*. In: I. Jenkins, *A group silvered-bronze horse-trappings from Xanten (Castrum Vetera)*. *Britannia 16*, 1985, 141 ff.; R. P. J. JACKSON/P. T. CRADDOCK, *The Ribchester hoard: a descriptive and technical study*. In: B. Raftery (ed.), *Sites and sights of the Iron Age: essays on fieldwork and museum research presented to Ian Mathieson Stead* (London 1995) 75 ff. see 89 ff.; M. J. PONTING, *Roman military copper-alloy artefacts from Israel:*



2 Almgren 65-type brooches subject to analysis. All were of (leaded) bronze, except the example at the bottom, which was of brass. Not to scale. – Photo: Archive of the National Museum of Slovenia (T. Lauko).



3 Alesia-group brooches subject to analysis. All were of brass except the three in the upper left corner, which were of bronze, and the fragmentary brooch in the middle of the second row from the bottom, which was of gunmetal. Not to scale. – Photo: Archive of the National Museum of Slovenia (T. Lauko).

Roman control or influence in the middle of the 1st century BC¹⁴.

For the sake of comparison, we included in our research brooches of seven different types dating to the 1st century BC: the south-eastern ‘Alpine Palmettenfibeln’ (eight brooches), ‘Schüsselfibeln’ (three brooches), as well as the Nauheim (eight examples), Almgren 65 (13 examples, Fig. 2), Jezerine I

(two examples), Jezerine II (25 examples) and Alesia type brooches (14 examples; Fig. 3)¹⁵.

Additionally, three coins of the *prefectus Clovius* series (Fig. 4) were submitted for analysis, since only two coins had previously been analysed¹⁶.

Two non-invasive techniques were used to investigate the material from which the brooches were made: EDS XRF (Energy Dispersive Spectroscopy

questions of organization and ethnicity. *Archaeometry* 44, 2002, 555 ff.; J. Riederer, Die Berliner Datenbank von Metallanalysen kulturgeschichtlicher Objekte. III Römische Objekte. *Berliner Beitr. Archäometrie* 18, 2001, 139 ff. see 225 ff.; *id.*, Die Metallanalyse der Funde aus Kupferlegierungen von Haltern. In: M. Müller, Die römischen Buntmetallfunde von Haltern (Mainz 2002) 109 ff.; *id.*, The use of standardised copper alloys in Roman metal technology. In: A. Giunlia-Mair (ed.), *I bronzi antichi: produzione e tecnologia* (Montagnac 2002) 284 ff. see 286 ff.

¹⁴ J. HORVAT, Roman Provincial Archaeology in Slovenia Following the year 1965: Settlement and Small Finds. *Arh. Vestnik* 50, 1999, 215 ff. see 218 f.

¹⁵ For details see ISTENIČ/ŠMIT 2007 (note 5) 141 ff.

¹⁶ cf. BAHRFELDT 1905 (note 8) 42; 1909 (note 8) 84.



4 Coins of the C. Clovius series subject to analysis. Not to scale. – Photo: Archive of the National Museum of Slovenia (T. Lauko).

X-ray Fluorescence) and PIXE (proton-induced X-ray emission)¹⁷.

Results

The EDS XRF analyses of the three coins of the *perfectus C. Clovius* series (Fig.4) confirmed that they were made of brass incorporating c. 21 per cent zinc¹⁸.

The ‚Palmettenfibeln‘, ‚Schüsselfibeln‘ and Nauheim-type brooches were all made of bronze or leaded bronze. Twelve brooches of the Almgren 65 group were made of bronze and one example was of pure brass (Fig.2). Brooches of the Alesia group included 14 examples made of brass, three made of bronze and one made of gunmetal, an alloy of copper

with zinc and tin (Fig.3). Both Jezerine I brooches were made of brass, whereas out of the 25 Jezerine II brooches subject to analysis, 15 were made of bronze, seven were of brass and two of gunmetal¹⁹.

Discussion

The ‚Palmettenfibeln‘, ‚Schüsselfibeln‘ and Nauheim brooches, all of them most probably made by the non-Romanised population²⁰, were made of (leaded) bronze which is an alloy with a long prehistoric tradition²¹.

The earliest group of brooches in which brass appears is Almgren 65. Brooches of this group were manufactured in large quantities in Italy, and widely

¹⁷ ISTENIČ/ŠMIT 2007 (note 5) 141 ff.

¹⁸ Analyses of the surface of the coins showed 21 per cent of Zn for the two coins which have no surface patina (National Museum of Slovenia, Inv. Nos. LJ551, LJ552), and 6 per cent of Zn for the coin with a green patina (Inv. No. LJ 30065).

¹⁹ For details see ISTENIČ/ŠMIT 2007 (note 5) 144 f. table 1; Alesia group: J. ISTENIČ, Brooches of the Alesia group in Slovenia. Arh. Vestnik 56, 2005, 187 ff.

²⁰ ST. DEMETZ, Fibeln der spätlätene- und frühen römischen Kaiserzeit in den Alpenländern. Frühgeschichtl. u. provinziälrom. Arch. 4 (Rahden/Westf. 1999) 64 ff., 76 ff.

²¹ cf. A. GIUMLIA-MAIR, Studi metallurgici sui bronzi della necropoli di S. Lucia – Most na Soči. Aquileia Nostra 69, 1998, 29 ff.; B. JERIN, Čolničaste fibule v Sloveniji. Degree thesis. Oddelek za arh., Filozofska fakulteta, Univerza v Ljubljani (Ljubljana 2001); N. TRAMPUŽ OREL, Archaeometallurgic investigations in Slovenia. Arh. Vestnik 50, 1999, 407 ff.

distributed through the medium of trade, especially to Celtic *oppida* in Central Europe. Their production is not well dated. Demetz assumed that they began to be made between c. 90 and 70 BC, culminating in the Caesarean period, and that the latest examples, which already exhibited some of the characteristics of the 'Flügelfibeln', were post-Caesarean²². In fact, the only example made of brass, out of the 13 analysed (Fig. 2), had typologically late characteristics. The use of (leaded) bronze, as opposed to brass, for the rest of the brooches subject to analysis seems to suggest a dating earlier than that proposed by Demetz, with the peak of their production in the period preceding Caesar's Gallic wars (see below).

Brass occurs extensively in Alesia-type brooches. These were an explicitly Roman class of brooch, the earliest type to have had a new mechanism, – that is a hinge instead of the spring which characterised all previous brooches. They were worn by Roman soldiers, who are thought to have been the most important factor in their wide geographic distribution. Alesia-group brooches date roughly from the period of Caesar's Gallic wars, 59–51 BC, to the period of the civil war following his death in 44 BC. Their production most probably ceased in the early years of the reign of Augustus at the latest²³. The bronze or gunmetal brooches in this group were presumably imitations of the regular Alesia-type brooches.

The use of brass for the two very small Jezerine I brooches subjected to analysis accords well with the assumption that they were produced in Italy, in the post-Caesarean to early Augustan period²⁴.

The same applies to the use of brass for the Jezerine II brooch-group, which probably came into production in northern Italy in roughly the same time as the Jezerine I brooches and continued in the

Augustan period²⁵. The high proportion of bronze and gunmetal brooches in this group supports the assumption that they were also produced in the south-eastern Alps and the Balkans²⁶, where the non-Roman communities could imitate the brooch form, but were unable to obtain the brass.

Conclusions

Brooches of Alesia-type, local copies aside, dating from about 60 BC onwards, constituted the oldest group of brooches for which the new alloy, brass, was used exclusively, except for the presumed copies. In the author's opinion, it is highly probable that brass was used for this group from the inception of its production, as the brooches also incorporate an entirely new device in their construction. By chance, independent of our research but synchronous with it, some indirect support for this assumption emerged from a research programme on the coins of the *Arverni*²⁷. Six of them were made of brass. They were of the same type as the contemporary gold staters, and two of them bore the name of Vercingetorix, the leader of the Gaulish revolt in 52/51 BC. Most probably they had been struck at Alesia during the Roman siege of 52 BC, and brass had been used because of a shortage of gold. Presumably the source of the brass had been re-cycled Roman brass objects comprising brooches²⁸. Thus, the coins of *Arverni* provide firm evidence for the Roman use of brass during the period of Caesar's wars in Gaul and support our assumption that Alesia-type brooches were made of brass from the beginning of their production.

²² DEMETZ 1999 (note 20) 27 ff.

²³ V. BROUQUIER-REDDÉ/A. DEYBER, Fourniment, harnachement, quincaillerie, objets divers. In: M. Reddé/S. von Schnurbein (eds), *Alésia* (Paris 2001) 293 ff. see 295, 298 pl. 91,48; J. ISTENIČ, Evidence for a very late Republican siege at Grad near Reka in Western Slovenia. *Carnuntum-Jahrb.* 2005, 77 ff.; ISTENIČ 2005 (note 19); J. A. OCHARAN LARRONDO/M. UNZUETA PORTILLA, Andagoste (Cuartango, Álava): un nuevo escenario de las guerras de conquista en el norte de Hispania. In: A. Morillo Cerdán (ed.), *Arqueología militar Romana en Hispania* (Madrid 2002) 311 ff. see fig. 2,10.

²⁴ cf. DEMETZ 1999 (note 20) 99 ff.

²⁵ *Ibid.*

²⁶ *Ibid.*

²⁷ S. NIETO, Monnaies arvernes (Vercingétorix, Cas) en orichalque. *Rev. Num.* 160, 2004, 5 ff.

²⁸ The percentages of zinc (10–15 %) and lead (an average of 1.2 %) in the brass of these coins indicate that Roman pure brass, for which about 20 % zinc and very little lead and tin are characteristic (cf. JACKSON/CRADDOCK 1995 [note 13], 93 f.; CRADDOCK/LAMBERT 1985 [note 13], 164) had been melted down and perhaps slightly diluted with lead. The percentage of zinc in the brass diminished in the process of re-melting, because of the high volatility of zinc.

The single Almgren 65 brooch in brass can be explained as a late product in the series, for which the use of brass had been influenced by the Alesia-type brooches. The absence of brass among the classical Almgren 65 brooches might indicate that the peak of production of classical brooches of this group should be dated to before the Gallic wars.

Brass was also used for the Jezerine group of brooches, probably manufactured in northern Italy from c. 50–40 BC onwards. The use of bronze and gunmetal indicates that they were also produced in non-Roman communities where brass was not available with the exception of imported Roman objects, which could be used as scrap.

In conclusion, it seems that the Romans introduced the use of brass to Europe in about 60 BC. On the present evidence, brass was used initially in a military milieu: for brooches that can be connected with Roman soldiers (Alesia-type) and for other types of military equipment, such as the sword-scabbard from the River Ljubljanica. More than a decade later, brass was also used for provincial coin issues, which were probably controlled by Caesar. It seems that the introduction of brass into Roman coinage came to a halt for about two decades because of Caesar's death, and was resumed by Augustus in c. 23 BC. In the Augustan period, brass was also widely used for military equipment and brooches.

Caesar presumably controlled the use of brass for coinage, and perhaps the use of brass in general. As brass was also employed for military equipment, this would imply centrally controlled production, possibly by the military, of at least some of the military equipment in this period.

A Roman state monopoly on the production of brass has been assumed by a number of researchers, but has never been widely discussed²⁹. This assumption would correspond to the wide use of brass for military items in principate, as well as to the evidence of military equipment production by the military in this period³⁰. In the light of this suggestion, an in-depth investigation into the employment of brass in the Augustan period and the 1st century AD, particularly its use in different spheres, might add to our knowledge of the organisation of the production of military equipment in this period.

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²⁹ CRADDOCK/LAMBERT 1985 (note 13); JACKSON/CRADDOCK 1995 [note 13]; T. REHREN, Small size, large scale: Roman brass production in Germania inferior. *Journal of Arch. Science* 26, 1999, 1083 ff.

³⁰ cf. M. C. BISHOP/J. C. N. COULSTON, Roman military equipment from the Punic Wars to the fall of Rome (Oxford 2006) 233 ff.