

A SARDINIAN EARLY 1ST MILLENNIUM BC BRONZE AXE FROM MOTYA*

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An Iron Age bronze axe was found in Motya (Sicily, Italy) in a prehistoric layer dating from the 10th century BC underneath the 4th century BC patrician residency known as “Casa dei mosaici”. The axe belongs to the double-looped socketed type well known in central Mediterranean in the time span 1200-900 BC, and it is comparable with some coeval Sardinian specimens. The bronze has been characterised using the backscattering electron signal of a SEM (Scanning Electron Microscope) and EDX (Energy Dispersive X-ray Spectroscopy). The resulting composition of the metal alloy is Cu-Sn-As with an addition of Pb in some specific spots.

Keywords: bronze axe; Motya; Sardinia; Iron Age; Mediterranean exchanges

1. DISCOVERY

During the XXVIII season (2018) of excavations at Motya by Sapienza University of Rome and the Sicilian Superintendence of Trapani, works were resumed in the so-called “Casa dei mosaici” (“House of mosaics”; figs. 1-2),² a 4th century BC patrician residency on the eastern side of the island, not far away from G. Whitaker Museum, already excavated by J.I.S. Whitaker and other archaeologists.³

A stratigraphic probe (Sounding I) was sunk under the floor of room L.7530, a small chamber on the eastern side of the residency central courtyard, between walls W.7501, to the north-west, W.7507, to the north-east, and W.7503 to the south-east. Several occupational layers were distinguished in the stratigraphy from Period Motya III to Motya VIII.⁴ At the bottom of the sequence a pre-Phoenician layer was reached at an elevation of 1.36 m a.s.l., consisting of a burnt stratum. In this filling, a bronze axe was found, which is the object of the present article.

1.1. Context

Since the first half of the 2nd millennium BC, before the Phoenician stable, Motya was a landing berth for Levantine seamen on the route to Sardinia and its mines. A prehistoric village occupied the acropolis on the eastern shallow mound of the island, with dwellings

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² Nigro 2018, 275.

³ Whitaker 1921, 194-202; Acquaro 1986; 2015; Acquaro - Savio eds. 2004; Acquaro ed. 2011.

⁴ Nigro 2018, tab. 1.

and communal buildings sparse over an area of about 10 ha.⁵ Around 800 BC, a group of Phoenicians founded the colony which prospered and became a free port-city within the first quarter of the 7th century BC.⁶ Since this period, the Phoenician harbor had important commercial relationships with the motherland and the other port-cities of central and western Mediterranean fully included in the exchange network arisen on the sea-routes to metals.⁷

The reconstruction of this historical scenario from the point of view of Motya was made possible by a series of discoveries made on the island by Sapienza University of Rome in the last decades. A new conceiving of the prehistory of Motya and of its importance as landing place during the 2nd millennium BC was due to finds in the area of the prehistoric settlement on the acropolis (Zones B, D, E and L) and in the Area of the so-called 'Kothon' (Zone C), as well as on the northern shores of the island where the prehistoric necropolis was located.⁸ These renewed studies allowed to outline the prehistoric occupation of the island and to establish its periodization on the basis of stratigraphy, distinguishing two main periods (Motya II and Motya III) each one subdivided into two sub-periods.⁹ The last sub-period, Motya IIIB (1100-900 BC), to which the context of the find dealt with in this article belongs, is that preceding the Phoenician settlement (Motya IVA).

The axe was found embedded in burnt layer F.7502 (fig. 3), attributed to a mature stage of Period Motya IIIB, buried under several strata of the Phoenician colony.¹⁰ The approximate date of the context should be the 10th century BC basing upon the examination of pottery and stratigraphy.

2. AXE MCM.18.200

MCM.18.200 is a bronze two-looped socketed axe (figs. 4-6). It is 7.1 cm long, and has a width of 0.24 cm (min), and 4 cm (max). The thickness is 2 cm, at the socket it is 0.39 cm (min) and 0.56 cm (max). The axe weights 170.7 g.

The blade of the axe is completely preserved up to the two symmetrical loops which characterizes this type (fig. 5), where it is broken, although their original presence is clearly distinguishable. The bronze weapon can be reconstructed with a slightly fan-shaped blade ending in a bold ridge with two symmetrical loops (fig. 5), and a flattened rectangular socket to host the handle. The breakage in correspondence of the loops might be intentional, and connected with some ritual use of the weapon.¹¹

⁵ Nigro - Spagnoli 2017.

⁶ Nigro 2018.

⁷ Amadori *et al.* 2016, 13925.

⁸ Nigro - Spagnoli 2017, 59, fig. 31.

⁹ Nigro 2016, tab. 1.

¹⁰ Nigro 2016, 353-355.

¹¹ This is a well attested to tradition both in the Levant and in Greece and the Aegean, in funerary and religious contexts (Grinsel 1961; Harrell 2015; Lloyd 2015; Anderson 2018, 225). In the case at issue, the axe MCM.18.200, on the base of comparison with the Sardinian and Aeolian hoards, might be part of a sort of communitarian offer (Bernabò Brea - Cavalier 1980, 738; Lo Schiavo 2008, 428). For this reason, the retrieval of the axe in the deep and narrow Sounding I should suggest to extend the exploration.

Casting smears visible on the surface were smoothed by hammer on both sides along the junction line of the two moulds.

2.1. *Typology*

The axe belongs to a distinguished type, that of two-looped socketed axes, which dates back from the last century of the 2nd millennium BC,¹² and to the very beginning of 1st millennium BC.¹³ This type is attested to in several sites of the Mediterranean (§ 2.2.), namely in the Aeolian island, in Sardinia, and in the Iberian Peninsula, which apparently is the homeland of the earliest prototypes.¹⁴ It falls, within the formal classification by L. Monteagudo, in types 41 and 42.¹⁵

The type with rectangular socket and double-loops was produced by means of stone mould, usually made of sandstone, including an inner core of refractory material, held in place by two lateral supports, as it is suggested by a mould found in Cannatello.¹⁶ The axe from Motya has confirmed the use of this technique.

Weapons of the kind of MCM.18.200 are usually employed in symbolic contexts (cult, ritual, funerary contexts as insignia of power), broken and buried in votive deposits and hoards, and are technologically characterized by the presence of surface lead globules functional to facilitate the creation of the loops. Loops appear in fact as the distinctive formal elements of this typology.

2.2. *Comparisons*

Axe MCM.18.200 finds comparisons in Sardinia, in hoards of Monte Sa Idda at Decimoputzu¹⁷ (Cagliari), a long-lasting context that can be dated to Final Bronze,¹⁸ and of Funtana Janna - Bonnanaro (Sassari),¹⁹ and in Sicily, with a single-looped axe from the Acropolis of Lipari,²⁰ dating back to Ausonio I (figs. 7-8).²¹ Both periods are compatible with the Motya IIIB horizon.

The hoard of Monte Sa Idda was brought to light by two shepherds at the end of 1914 in the area of the Nuraghe village on the top of the mountain²². Few days later, at the beginning of 1915, A. Taramelli documented the discovery and collected the metal finds. The hoard was concealed into two vases, one inside the other, found on the floor of a small

¹² Pallottino 1950, fig. 23:d.

¹³ Lo Schiavo 2013, 123.

¹⁴ Coffyn 1985; Begemann *et al.* 2001, 48-49; Lo Schiavo 2008, 426; Depalmas - Fundoni - Luongo 2011, 250; Cardoso 2015.

¹⁵ Monteagudo 1971, pls. 117-120.

¹⁶ Albanese Procelli 2008, 408-409, fig. 13.

¹⁷ Taramelli 1921, fig. 27.

¹⁸ Ialongo 2010, 322.

¹⁹ Begemann *et al.* 2001, 49, fig. 5:10714; Lo Schiavo 2003, 159; 2013, fig. 8:3. The specimen from Bonnanaro is dated to the Late Bronze Age on the base of comparison with Monte Sa Idda (Begemann *et al.* 2001, 49).

²⁰ Bernabò Brea - Cavalier 1980, 76, pl. 284:25.

²¹ There is a type of socketed axe widespread between the end of the Bronze Age and the beginning of the Iron Age in Adriatic and Balkan areas, named Manduria Type, but with only one loop, differently from what seems to be in the case of Motya's specimen (Carancini - Peroni 1999, 20-21).

²² Taramelli 1921, 7-8.

room, re-used as catchall and buried with a menhir-like slab on top (Su Para granite monolith).

The repertoire of Monte Sa Idda hoard is composed by selected metal items intentionally broken. Only one fragment for each broken item was collected in the hoard.²³ A similar feature was noticed also in the hoard of the acropolis of Lipari.²⁴ The hoard from Monte Sa Idda is almost exclusively composed of Iberian-style weapons and tools: axes, swords, daggers, spears, borers, saws.²⁵ The hoard also included personal ornaments made of copper and bronze, as rings and hair needles, equestrian equipment, a bronze figurine and vases.²⁶ In the vast axes repertoire, among simple, with lateral spikes, one-loop palstaves, double-looped palstaves, also ten socketed axes were collected. Eight of these are ridged or plain axes with two loops. In particular, the two-looped socketed axe from Motya exhibits some features comparable with two socketed specimens with two loops and plain blade (n. 34, inventory n. 36269; n. 35, inventory n. 36266) of the hoard of Monte Sa Idda. Axe n. 34 has a rectangular socket, a fan-shaped blade, as like as axe MCM.18.200, and a slight central rib and a bulged mouth; axe n. 35 shows a fan-shaped blade, a plain body, as axe MCM.18.200, and a simple mouth to fix the handle.

A second counterpart is an axe found in 1951 at Bonnanaro (Sassari). It was part of a hoard discovered by chance in a field by some workers. Unfortunately, only a few items survived, namely some truncated-conical and plano-convex ingots, double axes, blades and one two-looped socketed axe. The latter exhibits three horizontal ribs along the socket, one vertical rib along the blade, resembling the two above mentioned specimens from Monte Sa Idda,²⁷ a fan-shaped blade and proportions similar to those of the Motya axe. The socketed axe from Bonnanaro is 93% copper.²⁸

A third counterpart is the axe found in 1980 on the Acropolis of Lipari, within a hoard of bronzes contained in a vase buried under the wall of hut α dated to Ausonio II. However, further studies suggested that the axe, like other pieces of the hoard, might belong to an earlier phase, as also indicated by its typology, thus pushing it back to Ausonio I.²⁹ The hoard consisted of weapons, such as swords, daggers, spears, knives, of tools, like axes, saws, chisels, of ornaments and personal items, as fibulae, brooch, razors, and of other artifacts, as like as laminae, fragments of bull-shaped and plano-convex copper ingots, together with lumps of copper or bronze.³⁰ The socketed one-loop axe from Lipari has a fan-shaped blade and plain body, making it very similar to axe MCM.18.200 from Motya.

²³ Lo Schiavo 2008, 428; 2013, 121.

²⁴ Bernabò Brea - Cavalier 1980, 738-739.

²⁵ Lo Schiavo 2005a, 344.

²⁶ Taramelli 1921, 14.

²⁷ Taramelli 1921, figs. 29-30.

²⁸ Begemann *et al.* 2001, tab. 3.

²⁹ Lo Schiavo 2005a, 308; 2008, 422.

³⁰ Bernabò Brea - Cavalier 1980, 736-739.

3. ANALYSES ON AXE MCM.18.200

Analyses on the axe from Motya were carried out in the labs of the Center of Nanotechnology for Engineering of Sapienza (CNIS), using a Zeiss Auriga electron microscope, equipped with a Quantax Bruker X-ray Microanalysis.

Analyses were conducted on MCM.18.200, inspecting the edges and internal areas of both sides of the object, by using the backscattering electron signal in order to observe changes in the composition of the axe, and the EDX to identify the chemical elements present in a particular area.

3.1. *Metallographic features of axe MCM.18.200*

The exam has shown that axe MCM.18.200 is composed by a Cu-Sn-As alloy with Pb and a low presence of Fe and Ni.

The surface, due to the decuprification and destannification processes, is affected by a moderate porosity and Pb enrichment.

One side is more affected by chlorine degradation products respect the other one, which has suffered less severe corrosive phenomena. Thus, some areas rich in lead, recognizable in needle-like structures at SEM, alternate others darker where copper corrosion prevails. The weapon exhibits a pattern alternatively composed by white sphere, due to Sn-Pb-As inclusions, and copper veins (figs. 9-11).

In areas where copper is not degraded, a Cu value of 83.92 wt.% was detected (tab. 1).

Cu content in the matrix is quite homogeneous. Metallic matrix shows numerous brighter inclusions different shape and size (1 μm - 200 μm) are heterogeneously distributed in the alloy. Lead does not participate to the formation of the alloy with Cu and Sn but occurs as globules or needles.³¹

El	AN	Series	norm. [wt.%]	Atom. [at.%]	(1 Sigma) [wt.%]
Cu	29	K-series	83.92	93.09	1.81
Pb	82	L-series	10.41	3.54	0.36
Sn	50	L-series	5.67	3.37	0.21
Total			100.00	100.00	

Tab. 1 - Punctual analyses of an area of axe MCM.18.200 rich in copper.

Metallographic analyses thus have shown that lead was used to make the metal malleable and to produce the loops which are typical features of this kind of weapons.

³¹ Bernabale *et al.* 2019.

4. CONCLUSION: THE BRONZE AXE FROM MOTYA IN THE MEDITERRANEAN EXCHANGE NETWORK OF THE EARLY FIRST MILLENNIUM BC

The bronze axe found in Motya belonging to the double-looped socketed type³² due to its typology and dating illustrates intensified interactions between Sicily, Sardinia and Iberia, between the Late Bronze Age and the Early Iron Age.³³ This intensification in trade and raw materials exchanges developed when the need of metals destined to warfare in the Levant increased and prompted the search for them in the West.³⁴

One of the major issues dealing with such historical scenario is to understand if these contacts were direct or mediated through Sardinia, which had a central role in the transmission of technologies, and prototypes in metallurgical manufacturing.³⁵ Different typologies of metal weapons and tools spread both on Sicily and Iberia, and attested also in Sardinia, are the so-called ‘Huelva type’ swords, the axes with lateral spikes, the axes with a spike and a loop, one-loop palstaves, and double-looped palstaves.³⁶ With the retrieval of the Motya specimen, which has a chronological setting in the 10th century BC fully compatible with the described exchange panorama, also looped socketed axes can be included among these widely shared types across central and western Mediterranean.

Furthermore, imported pottery can be used to reconstruct this cultural exchange – being ceramics less subjected to re-use and hoarding typical of metals. Pottery may be an interesting indicator of economic and social interactions between Phoenician Sicily, Sardinia, North Africa³⁷ and Iberian Peninsula in the same time span (12th-9th century BC).³⁸

The discovery of axe MCM.18.200 represents a significant increase of the attestations of such a type in central Mediterranean. It is not surprising at all, as the central and final stages of the Bronze Age are still little known in Western Sicily. Further investigation of late 2nd and early 1st millennium BC sites and strata could reserve other surprises and may meaningfully change the panorama of stable contacts and sea-routes in the network of exchanges between central and western Mediterranean at the beginning of the Iron Age.

³² Monteagudo 1971, pls. 117-120; Lo Schiavo 2013, 123.

³³ Bernabò Brea 1953-1954, 178-180, 211-213; Lo Schiavo 2003, 159; Albanese Procelli 2008, 411-415; Fundoni 2009; Usai - Lo Schiavo 2009; Botto 2015; Jiménez Ávila 2015, 398-399; Nigro 2016, 359; Giardino 2017, 149.

³⁴ Ferrarese Ceruti - Vagnetti - Lo Schiavo 1987, 27; Albanese Procelli 2008, 413; Lo Schiavo 2013, 126-127; Vilaça 2013, 14, 32.

³⁵ Begemann *et al.* 2001, 72-74.

³⁶ Lilliu 1963, 190, 193; Albanese Procelli 2008, 413.

³⁷ Guirguis 2019.

³⁸ Types traded or exchanged in this early or pre-Phoenician period are: Nuragic askoi (Zucca 2017, 46-47; in general about Nuragic askoi in Mediterranean: Lo Schiavo 2005b) from Sardinia, e.g. found at Motya (MC.06.1592/18, ML.07.56/4; Motya IIIB; Lo Schiavo 2005c, 590, fig. 1; Nigro 2010, 13, fig. 11; 2016, 356, fig. 20:3), Lipari (Ferrarese Ceruti 1987, 433; Paglietti 2013, 179) and Dessueri-Monte Maio (Panvini ed. 2003, 168); vases *à chardon* (Spagnoli 2017, 97, fig. 53) again from Sicily, Sardinia and Iberian Peninsula, although in a more recent phase (Motya IVA); and trumpet-neck amphorae with geometric painted decoration, descending from Mycenaean prototypes (Nigro 2017, 60, fig. 37; Zucca 2017, figs. 22-23; Spagnoli 2019, 24).

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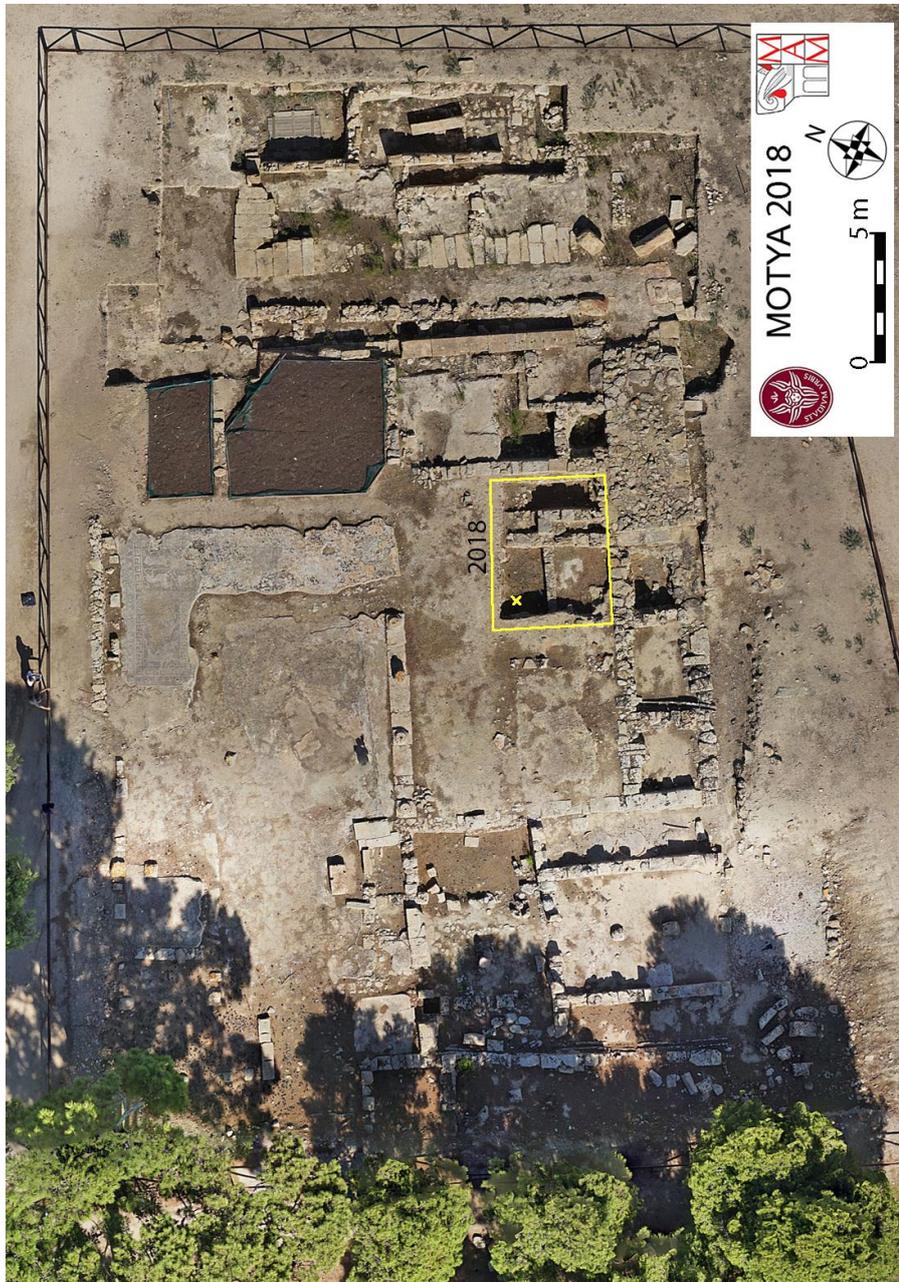


Fig. 1 - Orthophoto of the area of “ House of mosaics” at Motya.



Fig. 2 - General view of the area of the " House of mosaics" .



Fig. 3 - Stratigraphic sounding in L. 7530 where axe MCM.18.200 was found.

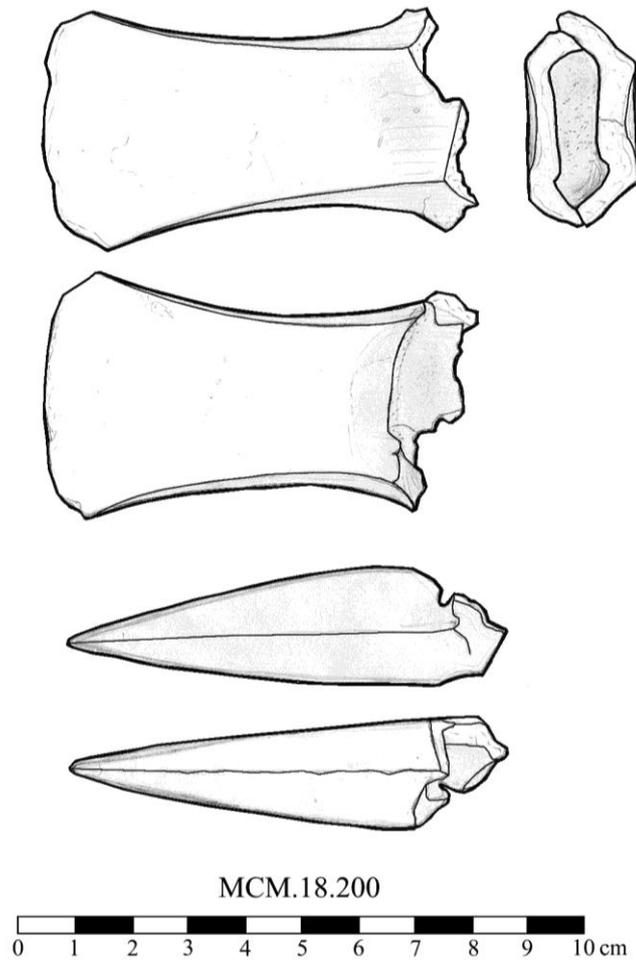


Fig. 4 - Drawing of the bronze two-looped socketed axe MCM.18.200.

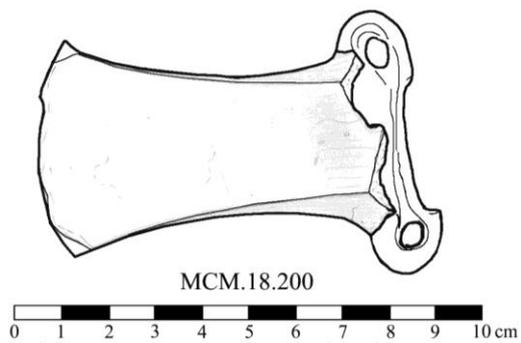
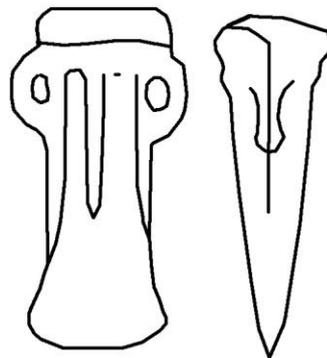
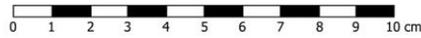
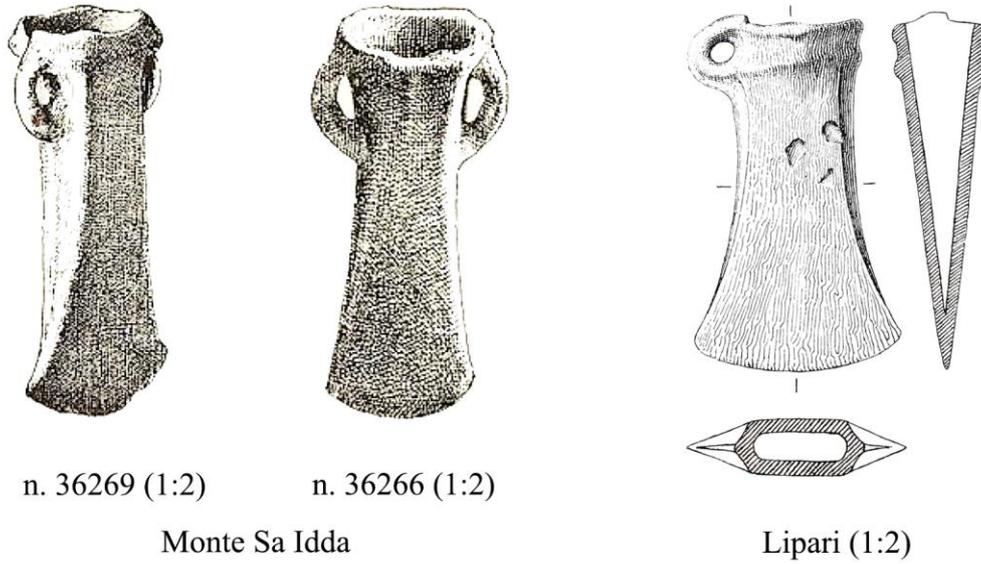


Fig. 5 - Reconstructive drawing of the bronze two-looped socketed axe MCM.18.200.



Fig. 6 - Photo of the bronze two-looped socketed axe MCM.18.200.



Bonnanaro (not at scale)

Fig. 7 - Looped socketed axes of comparison to axe MCM.18.200: ns. 36269, 36266 from Monte Sa Idda (after Taramelli 1921, figs. 34-35); from Lipari (after Bernabò Brea - Cavalier 1980, 76, pl. 284:25); from Bonnanaro (after Begemann *et al.* 2001, 49).

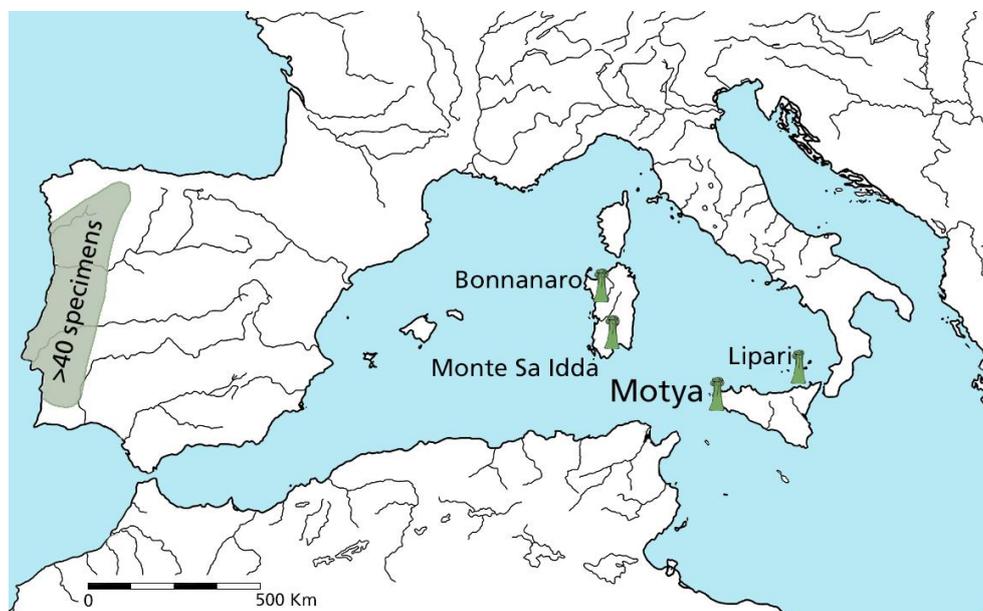


Fig. 8 - Distribution area of two-looped socketed axe in the Iberian peninsula and Iberian-style axes in the Central-Western Mediterranean (after Cardoso 2015, fig. 8).

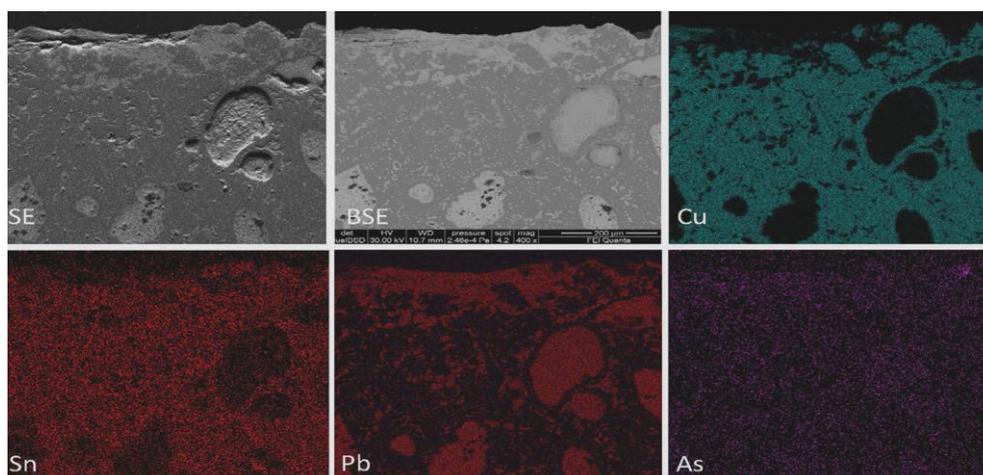


Fig. 9 - SE, BSE images and EDX element maps, which show the distribution of alloy's components (Cu, Sn, Pb, As) in MCM.18.200.

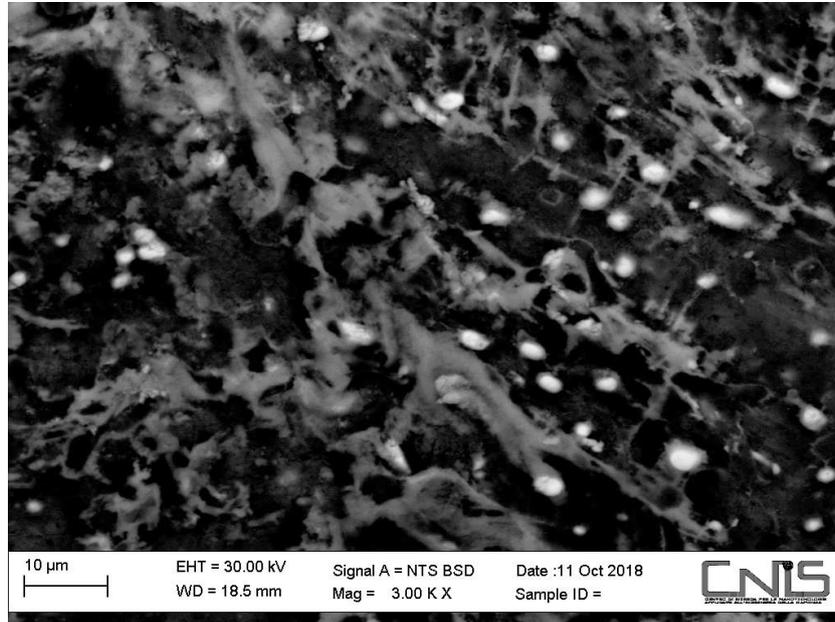


Fig. 10 - FESEM photo of white sphere composed of Sn-Pb-As inclusions.

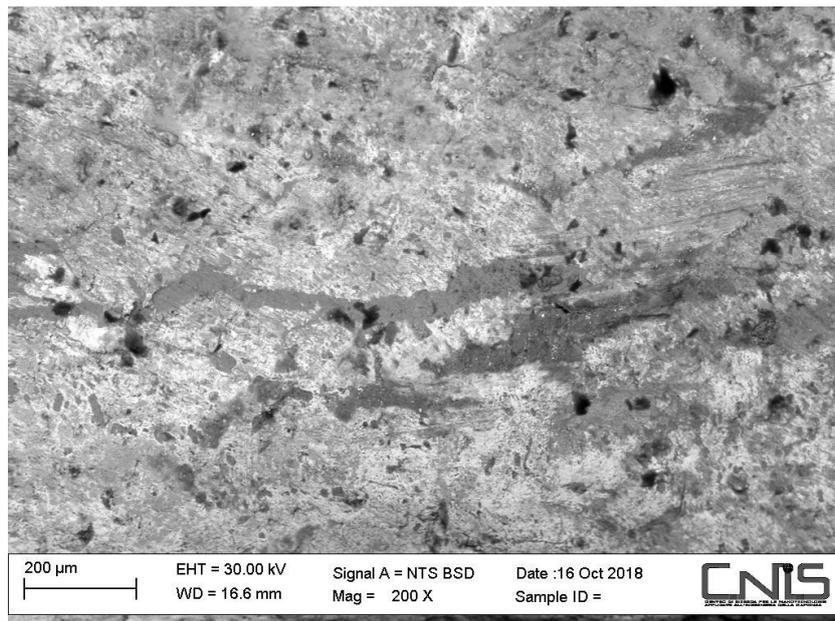


Fig. 11 - FESEM photo of a Cu vein.