

Metal Artefacts of Mediterranean Affiliation from Fraga dos Corvos Habitat Site (Eastern Trás-os-Montes, Portugal): A First Appraisal

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ABSTRACT

The hilltop settlement of Fraga dos Corvos has provided a collection of metal artifacts of Mediterranean affiliation from its Rock-Shelter 2 on the hilltop Western versant, already published (Figueiredo, *et al.* 2009). The 2011 field season provided further stratigraphical and artefactual evidence from the newly opened Sector M, allowing us to renew the discussion on the how and why of such an early inland and Northern cultural presence of Mediterranean influences.

Keywords: Late Bronze Age – Eastern Trás-os-Montes – Portugal – Archaeometallurgy – Artefacts of Mediterranean Influence.

RESUMO

O povoado de montanha da Fraga dos Corvos revelou, na respetiva vertente ocidental e provenientes do seu Abrigo 2, um conjunto de artefactos metálicos de filiação mediterrânica (Figueiredo, *et al.* 2009). A campanha de escavações de

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2011 veio fornecer novas evidências estratigráficas e artefactuais no recém-aberto Setor M que permitem retomar a questão do como e porquê de uma presença antiga de influências mediterrânicas no Nordeste Português.

Palavras-chave: Bronze Final – Trás-os-Montes Oriental – Portugal – Arqueometalurgia – Artefactos de Filiação Mediterrânica.

1. GEOGRAPHICAL AND GEOLOGICAL SETTING

The Bronze Age settlement of Fraga dos Corvos is located on the North-Western slope of Serra de Bornes, Eastern Trás-os-Montes (Macedo de Cavaleiros County, Bragança District). It rises at an altitude of 870 m, over the modern parish of Vilar do Monte (fig. 1). The site visually controls the Macedo de Cavaleiros basin and the traditional passes into and out of it where, in the 40's of the

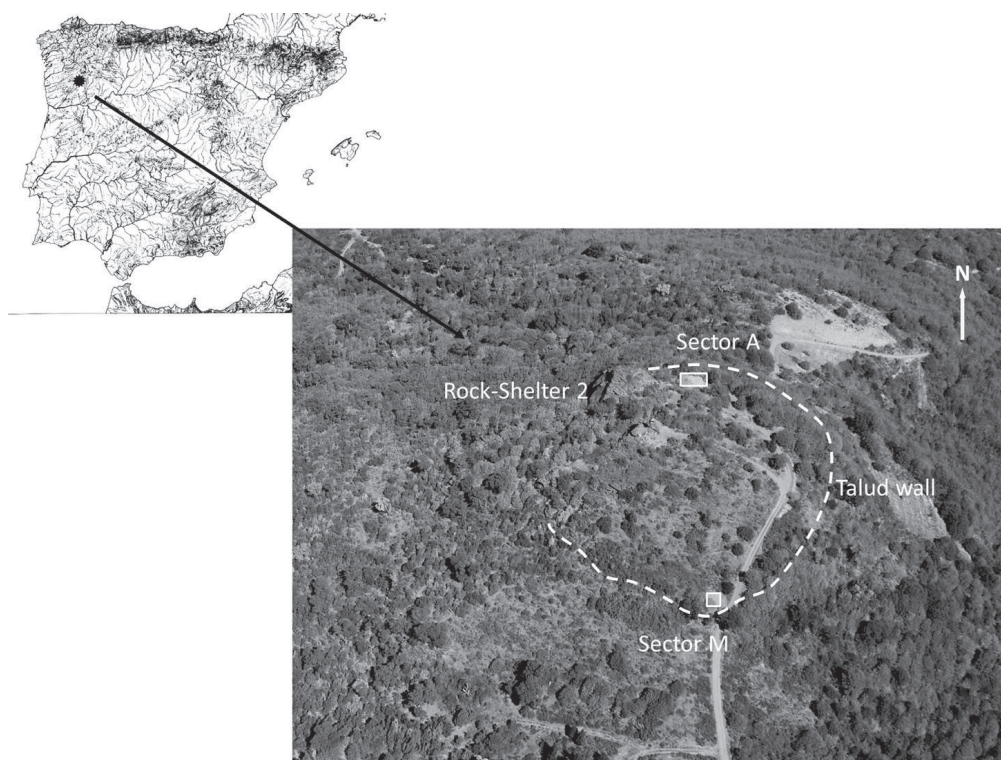


Fig. 1 – Fraga dos Corvos location in the Iberian Península and its different features mentioned in the present paper.

20th century, the celebrated deposits of Carrapatas type halberd copper blades where found (Bártholo, 1959).

In each side of the hilltop we can find two streams, Vale de Nogueira and Ribeirinha, which should have been the main water sources for the archaeological site.

The regional bedrock consists mostly of metamorphic schist, with some quartz and greywacke veins, resulting in very acid soils which tend to destroy most of the organic evidence in the archaeological record.

The Macedo de Cavaleiros basin has frequent alluvial placers where cassiterite (tin ore) can easily be found. Nevertheless, copper ores are rare, mainly under the form of secondary *gossams* with copper carbonates and oxides mineralizations which could well have been easily recognized by prehistoric communities for their bright and greenish tones (Geirinhas *et al.*, 2011).

The vegetation cover in late prehistoric times would mainly be a deciduous oak forest (Pyrenean oak, *Quercus pyrenaica wild*) with some presence of more southern perennial varieties (Holm oak, *Quercus ilex L. ssp. Rotundifolia*).

2. THE FRAGA DOS CORVOS HABITAT SITE

An early reference to the Fraga dos Corvos habitat site (from the national database of archaeological sites) reports it as an «Iron Age fortified habitat» or «Castro». Such an initial attribution was due to the presence of a «talud wall¹» that can be seen in aerial photographs and from the ground on several points of its circuit.

The term «Castro», formerly characterized as an elevated and fortified habitat, has changed during the development of Portuguese Archaeology. In a more recent understanding it has a specific chronological and geographical (for North and Central Portugal) meaning as a Late Iron Age fortified settlement, or even in a more restrictive form it can be applied only to the Late Iron Age Galician sites.

Nowadays, the designation of a settlement as a «Castro» implies its inclusion in the so called «*Cultura Castreja*» (Martins, 1990). We now know that walled settlements have existed alongside Western Iberia since the Chalcolithic and most of them were built during the Late Bronze Age (LBA), when settlement strategies significantly changed throughout Iberia.

The Fraga dos Corvos First Bronze Age (1stBA) habitat, located in the Northern platform of the site (Sector A – Senna-Martinez *et al.*, 2011b), represents the

¹ A «talud wall» is a very primitive form of terrain consolidation in order to monumentalize and emphasize platforms; it differs from a «normal» wall because it consists of an undressed stone crude revetment of an abrupt earth escarpment previously rectified. In North-Western Portugal this type of construction seems to appear by the end of the Late Bronze Age (Bettencourt, 2000).

first human presence there (fig. 1). In addition, the collection of metal artefacts of Mediterranean affiliation recovered at Fraga dos Corvos Rock-Shelter 2 (on the hilltop western versant – Figueiredo et al., 2009), together with four metal artefacts from secondary stratigraphic contexts from Sector A, hinted at a later occupation of the site during the LBA or even in the transition for the Iron Age (IA). Consequently, it was important to establish the chronology of the «talud wall» and its relationship to an eventually preserved stratigraphy in its inner side which could testify to such an occupation of the site.

During the 2008 fieldwork season we decided to undertake the cleaning and register of a preserved profile of this wall. This was done at its Southern extremity, where a section had been exposed since 1957 due to the opening of a field road through the settlement area (Senna-Martinez and Luís, 2009).

The main result of such endeavour was the definition of the exposed structure as a «talud wall». It is constituted of medium size undressed stone blocks, superimposed in its external face by a sloped layer of earth with some medium and mainly small stone fragments. These were interpreted as slope erosion sediments originating from the top of the structure and the upper part of the settlement.

The artefactual evidence recovered during this profile cleaning comprises: stratigraphically disturbed materials that can be attributed to the already known 1stBA occupation of the settlement (pottery sherds with *Cogeces* type decoration and a polished adze blade in amphibolite); and specially a spring and pin of an *Acebuchal* type fibula which come from a stratigraphical location under the base of the stone revetment. The last mentioned artefact (with a probable chronology close to the materials from the Western versant of the site Shelter 2) strongly hints to the construction of the «talud wall» during the LBA.

So we decided, in 2011, to excavate an area atop the Southern platform of the site adjacent to the «talud wall» (Sector M – Luís, Reprezas and Senna-Martinez, 2012). The opened area was a 13 m × 5 m rectangle disposed N/S, totalising 65 m².

This intervention allowed the confirmation of a preserved stratigraphy inside the «talud wall». This stratigraphy was disturbed in its upper levels by recent human actions during Serra de Bornes re-forestation works in the late 50's and early 60's of the 20th century. Under its upper levels it contained preserved realities. So, up to the end of the 2011 intervention, we were able to identify at least four different stratigraphic phases:

- Upper Disturbed stratigraphic units [SU] – Extensive to all the opened area.
- Upper Phase – Partially preserved habitat soils [SU10011, 10073 and 10076] cut by negative SU (corresponding to pits and post-holes). They are preserved only in the Northern half of the investigated area and the lower one [SU10076] is not yet excavated.

- Debris Phase – This phase corresponds to only one SU [10026=10032]; it was exposed and excavated in the Southern half of the area, and it looks like it goes under SU 10076, probably encompassing the whole opened area. This SU is almost sterile in what concerns archaeological materials and consists of a dense aggregation of stone (schist) debris of small and medium sizes in a very hard whitish matrix of clay and sand, almost like *breccia*.
- Lower Phase – Another occupation level [SU 10043] of black compact sandy-clay earth lies under SU 10026=10032. Its upper interface was exposed but SU 10026=10032 is not yet completely excavated. Contrasting with the Debris Phase its surface partial cleaning was enough to reveal a high concentration of archaeological remains (pottery sherds, bone fragments, and some metals).

Currently, and in the light of the available data we interpret the Debris Phase [SU 10026=10032] as possibly related to the building of the «talud wall». The horizontal disposition of its upper interface and almost constant depth strongly suggests the utilisation of construction leftovers for the artificial configuration of a platform over which the habitat soils of the Upper Phase were built. The strong evidence of intense human activity under this stratigraphic phase² also suggests a possible intentional covering of the area.

2. THE ARTEFACTUAL DATA

The artefactual collection under discussion here encompasses 27 metallic items (Table 1), distributed through the three areas mentioned above.

2.1. Artefacts from Rock-Shelter 2

The Fraga dos Corvos Rock Shelter 2 was excavated between 2004 and 2007 (Senna-Martinez, Ventura and Carvalho, 2005; Senna-Martinez *et al.*, 2006 and 2007). The metallic items here discussed come from several disturbed SU; however, the typology of the six artefacts found of Mediterranean cultural affiliation (fig. 2 – a double spring fibula, two needles, a cosmetics spatula, a decorated pendant, and a fragment of a Tartessian belt hook) suggests that they are part of one set of artefacts, probably of a funerary deposit belonging to a late period of the LBA. Besides this set, fragments of two bracelets and an open ring were found. The typological integration of these three items in the LBA is probable so we decided to include them in the present study.

² Due to the abundant presence of organic and inorganic archaeological remains observed during the definition of its upper interface.

| Area | N° | Stratigraphy | Item |
|----------------|-------|---------------------------|---|
| Rock-Shelter 2 | 181 | Disturbed SU | Double spring fibula |
| | 252 | | Pendant |
| | 361 | | Cosmetic spatula |
| | 188 | | Needle |
| | 457 | | Needle |
| | 473 | | Tartessian belt hook frag. |
| | 120 | | Open Ring |
| | 362 | | Ribbon-like Bracelet frag. A |
| | 364 | | Ribbon-like Bracelet frag. B |
| | 475 | | Ribbed Bracelet frag. |
| | 206 | | Bar frag. |
| | 208 | | Bar frag. |
| | 215 | | Bar frag. |
| | 474 | | Nodule |
| Sector A | 3004 | Disturbed SU | Fibula spring and bow of Bencarrón type |
| | 3009 | | Pendant or torc terminal frag. |
| | 3091 | | Pendant or torc terminal frag. |
| | 1520 | | Iron [knife?] blade |
| Sector M | 4036 | Under Talud Wall | Fibula spring and pin of Acebuchal type |
| | 10478 | <i>Upper Disturbed SU</i> | Iron knife blade with bronze rivets |
| | 10147 | | Fibula spring of Acebuchal type |
| | 10532 | | Fibula bow and foot of Acebuchal type |
| | 10463 | | Fibula bow and foot of Bencarrón type |
| | 10798 | Upper Phase | Small iron bar |
| | 10666 | | Tweezers |
| | 10949 | | Fibula bow of Hispanic Annular type (?) |
| | 10781 | Lower Phase | Fibula spring and pin of Bencarrón type |
| | 10284 | | Fibula spring and pin of Acebuchal type |

Table I – Metal Artefacts from Fraga dos Corvos Later Settlement

– *Double spring fibula* FCORV-A2 181 – This fibula (figs. 2 and 3) belongs typologically to the first generation of such artefacts in the Iberian area. It is made from a very thin single bronze wire (less than 1 mm of diameter), flattened in one extremity to make the foot, and then composed by the first spring (with five turns), the straight bow, the second spring (six turns), having most of the pin missing. It is formally very close to the exemplar from Coroa do Frade LBA settlement (Évora, Alentejo – cf. Arnaud, 1979). The dating of another similar exemplar from the LBA settlement of Outeiro dos Castelos de Beijós (Carregal do Sal, Beira Alta – cf. Senna-Martinez, 2000) enables a proposal for a (Phoeni-

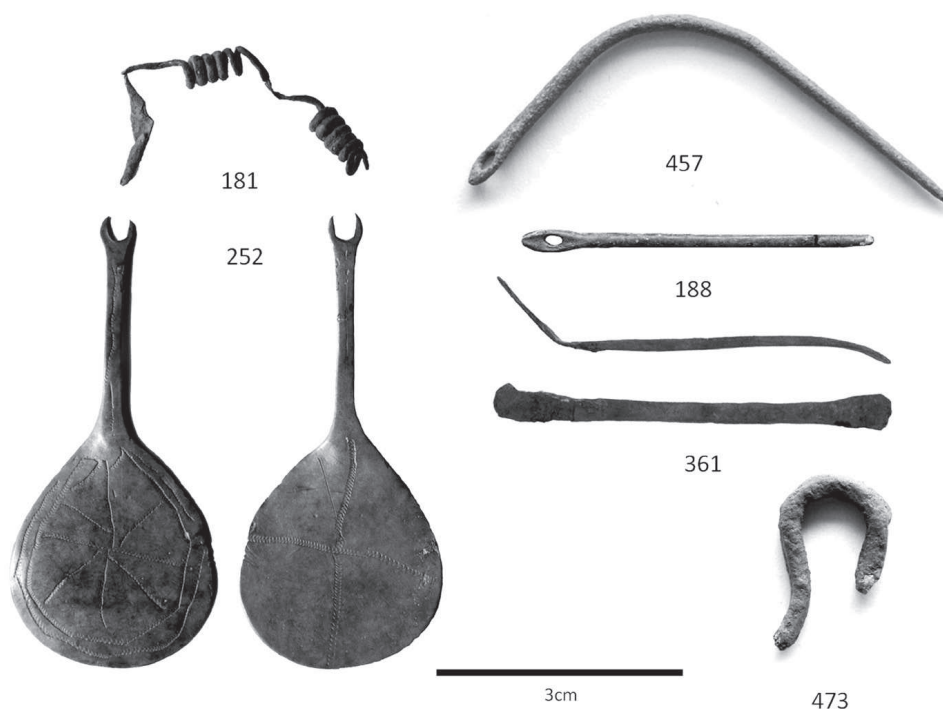


Fig. 2 – Artefacts of Mediterranean affiliation from Fraga dos Corvos Rock-Shelter 2.



Fig. 3 – Double spring fibula (FCORV-A2 181) from Rock-Shelter 2.

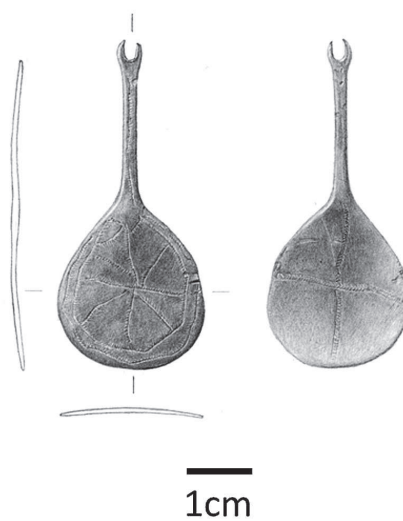


Fig. 4 – Decorated pendant (FCORV-A2 252) from Rock-Shelter 2.

cian?) introduction of this type of artefact in Southern Iberia around the end of 9th beginning of the 8th century BC.

– *Needles* FCORV-A2 188, 457 – The two needles (fig. 2), a small one about 4.3 cm long and a bigger one, curved, about 6.8 cm in length, have parallels in some Phoenician settlements of Southern Iberia (e. g. La Fonteta – González Prats, 1999-2000).

– *Cosmetics spatula* FCORV-A2 361 – This thin *spatula* (5.2 cm long and 5 mm wide at the slightly enlarged extremities – fig. 2), probably used for cosmetics handling, has not many parallels in the Iberian Peninsula. In Portugal we know a possible similar artefact from the LBA site of Castro da Senhora da Guia de Baiões (Figueiredo *et al.*, 2010). Cosmetic «kits», comprising different artefacts (including *spatula* of different types) united by a ring, are well known from the end of the Orientalizing period in Southern Iberia (6th to 5th centuries BC), mainly from necropolis as: Cancho Roano (Celestino Pérez and Zulueta de la Iglesia, 2003), La Joya (Garrido and Orta, 1970), Los Villares (Blánquez Pérez, 1990) and, in Southern Portugal, at Palhais (Beringel, Beja – Santos *et al.*, 2009).

– *Pendant* FCORV-A2 252 – This pendant (figs. 2 and 4) has no direct parallels in LBA sites of Iberia. With a total length of 5.5 cm and relatively thin (1 mm maximum) its large ovoid shaped terminal area (2.7 cm × 1.6 cm) is decorated, in both sides, with very fine dotted lines made with a small punch: the front exhibits a double perimetral line opened at the top of the area which circumscribes an asterisk-like cross (fig. 5); the back only features a single simple cross obtained with two intersecting dotted lines (fig. 6). The pendant decoration has close parallels in known orientalisng *graffiti* on pottery (namely on the grey ware of Medellín – Almagro Gorbea, 2004).

– *Tartessian Belt Hook fragment* FCORV-A2 473 – This wire fragment with an omega shape (fig. 2), broken in both ends, is interpreted as a fragment of a female part of a Tartessian belt-hook. This type of belt hook is well known mainly from orientalisng funerary contexts, dated within the 7th and 6th centuries BC, e. g. the complete one from Les Casetes cemetery, grave 18 (fig. 7 – García Gandía, 2009), and the fragment (identical to our exemplar) from Torre de Palma (MNA 2001.5.70 – Mataloto, Langley and Boaventura, 2008, fig.5).



Fig. 5 – Detail of the decorated area on the front of pendant FCORV-A2 252.



Fig. 6 – Detail of the decorated area on the back of pendant FCORV-A2 252.



Fig. 7 – Tartessian belt hook from Les Casetes cemetery, grave 18 (adapted from García Gandía, 2009).

– **Bracelet fragments** FCORV-A2 362-364 – The two fragments from a thin (about 1 mm thick) ribbon-like bracelet with a total length of 11 cm have no direct parallel in known Portuguese LBA sites. Nevertheless, it looks like of simple manufacture as revealed by metallographic analysis (Figueiredo *et al.*, 2009) compatible with a LBA chronology.

– **Bracelet fragment** FCORV-A2 475 – This fragment (fig. 8) probably belongs to a large open ribbed bracelet similar to the ones known from the LBA settlement of Senhora da Guia de Baiões (Silva, 2007, p. 655).

– **Open Ring** FCORV-A2 120 – The open ring (fig. 9) is 1.8 cm wide and it has a long list of parallels in Central and Northern Portugal LBA sites as, for instance, in the Baiões/Santa Luzia Cultural Group (Senna-Martinez *et al.*, 2011a; Valério *et al.*, 2004).

2.2. Artefacts from Sector A

The preserved levels of Sector A are attributed to the First Bronze Age (Senna-Martinez *et al.*, 2011b). However, we think that four metal artefacts (from several disturbed SU) belong to the present discussion (Table 1): a fibula, two pendants or torc terminals, and an iron blade.

– **Fibula spring and bow** FCORV-A 3004 – This fibula fragment (fig. 10) is well preserved, the pin and foot are missing and the bow shows only some distortion. It is very similar in structure to the exemplar from the habitat of Coto da Pena (Caminha, Minho – Silva, 2007) or one of the exemplars from Conímbriga (Correia, 1993, p. 262), and can thus be attributed to a variant of the *Bencarrón* type. Another recently published parallel comes from the Almaraz settlement (Almada – Valério *et al.*, 2012, fig.1).

– **Pendants or torc terminals** FCORV-A 3009 and 3091 – These two pieces are similar in the overall conic shape (fig. 11): 3009 is a simple campanula open at the base (1 cm high and 1.5 cm wide) and linked by the apex to a broken axis of sub-circular section ($\varnothing=3$ mm) with 7 mm of its length preserved; 3091 is more complex with the connection of the campanula (1 cm high and 1.5 cm wide) apex to the round axis ($\varnothing=5$ mm) reinforced and emphasized by a rib. Our initial thought as to their typology was that they could pos-

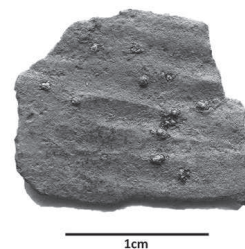


Fig. 8 – Ribbed bracelet fragment (FCORV-A2 475) from Rock-Shelter 2.

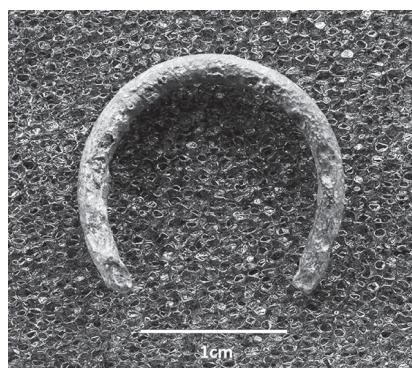


Fig. 9 – Open ring (FCORV-A2 120) from Rock-Shelter 2.



Fig. 10 – Fibula spring and bow of Bencarrón type (FCORV-A 3004) from Sector A disturbed SU.

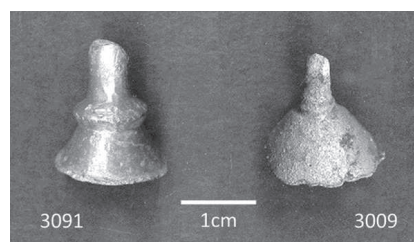


Fig. 11 – Pendant terminals (FCORV-A 3091 and 3009) from Sector A disturbed SU.



Fig. 12 – Iron [knife ?] blade fragment (FCORV-A 1520) from Sector A disturbed SU.

sibly be torc terminals. Unknown parallels for this kind of bronze artefact in Iberia LBA and the fact that the preserved part of the axis is straight reminded us of the two pendants from Coto da Pena (Silva, 2007), one of which is complete, and whose terminals are very similar in shape and

dimensions to our 3009 exemplar. So we tend to view these two items as pendant terminals, and thus with a probable Mediterranean affiliation.

– *Iron [knife?] blade* FCORV-A 1520 – This fragment of an iron blade 5.6 cm long and 1 cm wide (fig. 12) is, as much as we can tell from macroscopic analysis, made of a forged iron plaque folded upon itself in a way similar to the earliest iron blades known from Iberia (Senna-Martinez, 2000; Vilaça, 2008). This type of artefact is well known from pre-Phoenician (before 10th century BC) contexts onwards in the Portuguese Beiras and Estremadura. The fragment from Fraga dos Corvos Sector A is too small to allow a precise typological attribution but in view of the other data here discussed we decided to include it in the present paper.

2.3. Artefacts from Sector M

The ten metallic artefacts from Sector M (Table 1) comprise an iron knife blade with bronze rivets, seven fibula fragments, a pair of tweezers, and a small iron bar, distributed between the four stratigraphic situations mentioned above.

From under the «talud wall» (see above) comes a fibula spring and pin:

– *Fibula spring and pin* FCORV-M 4036 – This exemplar comprises the complete pin (approximately 5 cm long), a large unilateral spring with 20 turns (5 cm long) and a spring interior axis. As proposed in fig. 13 it looks like made from a single wire ($\varnothing \approx 3$ mm) that provides the axis, then would form a double bow and foot and, finally, the spring and pin. We attribute it to a variant of the *Acebuchal* type and it has also the closest geographical parallels in exemplars from Coto da Pena (Caminha, Minho – Silva, 2007) and Conimbriga (Correia, 1993, p. 262).

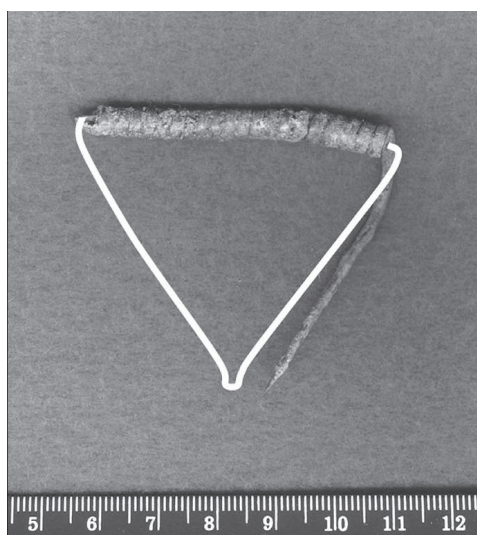


Fig. 13 – Fibula spring and pin of Acebuchal type FCORV-M 4036 from under the stone revetment of the «talud wall».

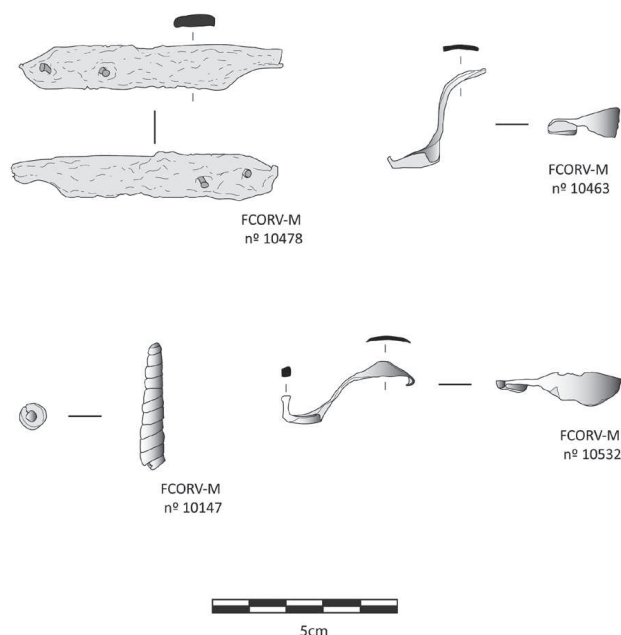


Fig. 14 – Metallic artefacts from disturbed SU of Sector M, Fraga dos Corvos LBA settlement.



Fig. 15 – Iron Knife Blade with bronze rivets (FCORV-M 10478) from disturbed SU of Sector M of Fraga dos Corvos LBA settlement.

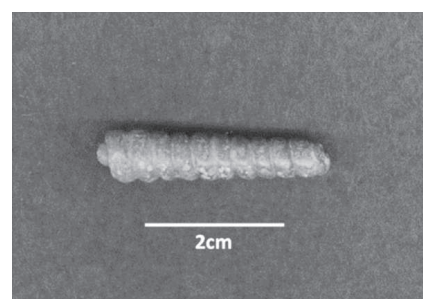


Fig. 16 – Fibula spring fragment of Acebuchal (?) type (FCORV-M 10147) from disturbed SU of Sector M, Fraga dos Corvos LBA settlement.

Four items come from the Upper Disturbed SUs of Sector M:

– **Iron knife blade with bronze³ rivets** FCORV-M 10478 – This exemplar is composed of an iron blade slightly curved (*afalcatada*⁴) and 6.7 cm long, with two rivets still in place (figs. 14 and 15). As above mentioned about the iron blade fragment from Sector A the type is reminiscent of the earliest iron blades known from Portuguese LBA contexts (Senna-Martinez, 2000; Vilaça, 2008). It is, nevertheless, a bit shorter in length and the presence of rivets is unknown in earlier exemplars.

– **Fibula spring fragment** FCORV-M 10147 – This partial spring and axis (3.4 cm long) of a fibula (figs. 14 and 16) is made of a single wire ($\varnothing \approx 3$ mm) with the spring coming directly from and around the axis. This detail, identical to the unilateral spring of FCORV-M 4036, leads us to think that it is probably part of a variant of an *Acebuchal* type fibula.

– **Fibula bow and foot** FCORV-M 10532 – In this exemplar only the foot and the bow survived (fig. 14). It is 3.6cm long and probably forged from a single wire. The bow is leaf-shaped, tapering to the foot and to where it would attach to the missing spring and pin. The foot finishes by a small vertical end with a square section. We attribute it to a variant of a *Acebuchal* type fibula.

³ A preliminary surface EDXRF determination has shown that the rivets are made of bronze.

⁴ The designation «afalcatada» that usually designates the first iron blades found in Iberian LBA contexts comes from a 2nd Iron Age weapon: a curved sword or falcata.

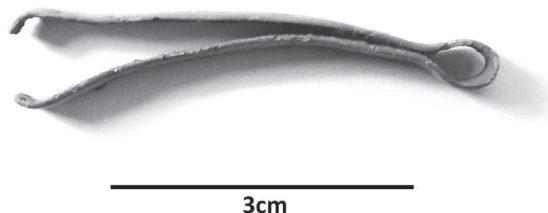


Fig. 17 – Pair of tweezers (FCORV-M 10666) from the Upper Phase of Sector M of Fraga dos Corvos LBA settlement.



Fig. 18 – Fibula bow (?) (FCORV-M 10949) from the Upper Phase of Sector M of Fraga dos Corvos LBA settlement.

– *Fibula bow and foot* FCORV-M 10463 – As in the previous exemplar only the foot and about half of the bow remained (fig. 14). It is 3.5 cm long and probably forged from a single wire. The partial bow is leaf-shaped and tapering to the foot, which is simply flattened and folded into a short and open tubular shape. We attribute it to a variant of a *Bencarrón* type fibula with a parallel in a Santa Olaia more complete exemplar (Ponte, 2006, no. 2932).

Three items come from the Upper Phase SUs of Sector M:

– *Small iron bar* FCORV-M 10798 – This small iron curved bar (10.2 cm long), with a quadrangular section ($\approx 6 \times 6$ mm²) and heavily corroded doesn't make a typological attribution possible. Nevertheless, it documents another early iron presence in Sector-M, this time in a preserved stratigraphical situation.

– *Tweezers* FCORV-M 10666 – The pair of tweezers is very well preserved (fig. 17). It is 4.5 cm long and made of a folded thin strip of metal (<1 mm thick and 5 mm wide), probably forged from a small bar. This type of artefact is common enough in LBA Portuguese contexts, one obvious parallel being the identical exemplar from Roça do Casal do Meio (Calhariz, Sesimbra – Spindler *et al.*, 1973-74).

– *Fibula bow (?)* FCORV-M 10949 – If this D-shaped fragment (fig. 18), 3.6 cm wide and with an ellipsoidal section (1 cm \times 0.5 cm in the middle and, respectively 0.6 cm \times 0.3 cm and 0.4 cm \times 0.3 cm in the extremities), is indeed part of a fibula, it is of difficult typological attribution. We think, with some reservations, that it can be the bow of an early Hispanic Annular type fibula.

Finally, two items from the Lower Phase SUs of Sector M:

– *Fibula spring and pin* FCORV-M 10781 – Complete spring and pin (fig. 19); the pin, 5.9 cm long, is bent at 90° in the middle. The shape of the spring is very similar

to FCORV-A 3004 so, we attribute this exemplar also to a variant of the *Bencarrón* type fibula.

– *Fibula spring and pin*
FCORV-M 10284 – Partial unilateral spring (6 turns) and pin (distally broken), made of a single wire ($\varnothing \approx 3$ mm – fig. 20). The wire thickness, the unilateral spring and the general aspect of this fragment strongly suggest that it can be part of an *Acebuchal* type fibula like FCORV-M 4036.

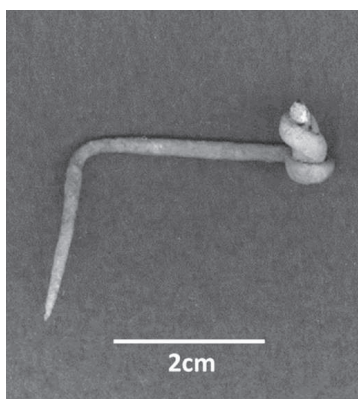


Fig. 19 – Fibula spring and pin of Bencarrón type (FCORV-M 10781) from the Lower Phase SUs of Sector M.

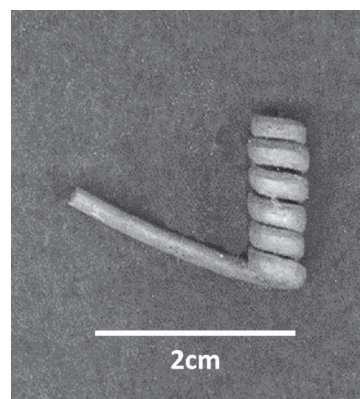


Fig. 20 – Fibula spring and pin of Acebuchal type (FCORV-M 10284) from the Lower Phase SUs of Sector M.

3. CULTURAL AND ARCHAOMETALLURGICAL QUESTIONS

Let's begin by discussing the data from Rock-Shelter 2. In a previous paper (Figueiredo *et al.*, 2009) besides the above mentioned set of artefacts of Mediterranean or «indigenous» LBA typological affiliation, three small bars and a nodule, also found in disturbed SU, were included. The complete metal collection from Rock-Shelter 2 was thus treated as a whole.

The absence of a sure stratigraphic context and typological affiliation, as well as the existence of two clear cut and excavated cultural phases in other sectors of the site (both with bronze artefacts) raise a problem with the bars and nodule. We don't know, *a priori*, if they belong to the 1st BA or the LBA. Nevertheless, the absence of any metal in the preserved 1st BA levels of the rock-shelter militates in favour of its integration in the LBA sample as does their archaeometallurgical study (Figueiredo *et al.*, 2009).

All the metallic items from Fraga dos Corvos Rock-Shelter 2 (Table 2) were subjected to EDXRF analyses on non prepared surfaces which showed that, with exception of the Tartessian belt hook, they are made of bronze with some lead (Pb). Lead content of the nodule (FCORV-A2 474) seemed to be higher than in the other bronze artefacts, while the Tartessian belt hook fragment (FCORV-A2 473) is made of copper with some impurities.

Small samples were taken for metallographic examination from bracelet fragment A (FCORV-A2 362), the open ring (FCORV-A2 120), the three bar fragments (FCORV-A2 206, 208 215), and from the metallic nodule (FCORV-A2 474). On three other artefacts (needle FCORV-A2 457, cosmetic spatula FCORV-A2 361, and Tartessian belt hook fragment FCORV-A2 473) a small area of the surface was cleaned from superficial corrosion and polished without sampling. All items

| No. | Item | Composition (wt.%) | | | | | | | Method of fabrication | Phases present |
|-----|----------------------------|--------------------|-----------|-----------|----------|-------|-----------|-------|-----------------------|----------------|
| | | Cu | Sn | Pb | As | Sb | Fe | Ni | | |
| 181 | Double spring fibula | +++ | ++ | + | n.d. | n.d. | + | n.d. | | |
| | | 87.4±4.1 | 11.2±3.9 | 0.65±0.24 | <0.1 | - | 0.57±0.14 | n.d. | | |
| 252 | Pendant | +++ | ++ | + | n.d. | vest. | vest. | n.d. | | |
| | | - | - | - | - | - | - | - | | |
| 361 | Cosmetic spatula | ++ | ++ | ++ | n.d. | vest. | + | vest. | (worked) | α |
| | | 89.9±0.8 | 8.9±0.9 | 1.2±0.2 | n.d. | - | 0.05 | n.d. | | |
| 188 | Needle | ++ | ++ | ++ | n.d. | vest. | + | vest. | | |
| | | 87.4±1.7 | 11.1±1.5 | 1.1±0.3 | 0.1±0.0 | - | 0.09±0.03 | n.d. | | |
| 457 | Needle | ++ | ++ | ++ | n.d. | vest. | + | n.d. | C+D+T+D | α |
| | | 82.8±4.6 | 12.2±0.8 | 4.9±4.1 | 0.1±0.0 | - | <0.05 | n.d. | | |
| 473 | Tartessian belt hook frag. | +++ | + | + | vest. | vest. | + | vest. | C+D+T+D↓ | α-copper |
| | | 98.4±0.1 | 0.73±0.14 | 0.36±0.07 | 0.20±0.0 | - | 0.11±0.03 | 0.28 | | |
| 120 | Open Ring | +++ | + | + | n.d. | vest. | + | n.d. | C+D+T+D | α |
| | | 87.1±0.5 | 11.8±0.5 | 0.86±0.22 | <0.1 | - | 0.05±0.04 | n.d. | | |
| 362 | Bracelet frag. A | +++ | ++ | n.d. | vest. | n.d. | + | vest. | C+D+T+D | α, δ↓ |
| | | 89.4±0.1 | 10.5±0.15 | n.d. | n.d. | - | <0.05 | n.d. | | |
| 364 | Bracelet frag. B | +++ | ++ | n.d. | vest. | n.d. | + | n.d. | | |
| | | - | - | - | - | - | - | - | | |
| 475 | Ribbed bracelet frag. | ++ | ++ | ++ | n.d. | vest. | + | vest. | (worked) | α-corroded |
| | | - | - | - | - | - | - | - | | |
| 206 | Bar frag. | +++ | ++ | ++ | n.d. | vest. | + | n.d. | C+D↓+T+D↓ | α |
| | | 89.2±0.5 | 8.6±0.5 | 2.0±0.3 | n.d. | - | <0.05 | n.d. | | |
| 208 | Bar frag. | ++ | +++ | ++ | n.d. | vest. | + | n.d. | C+D↑+T+D↓ | α |
| | | 88.4±0.4 | 10.1±0.5 | 1.3±0.1 | <0.1 | - | 0.05 | n.d. | | |
| 215 | Bar frag. | ++ | ++ | ++ | n.d. | vest. | + | vest. | C+D↓+T+D | α |
| | | 89.7±0.6 | 8.1±0.2 | 1.7±0.64 | <0.1 | - | 0.05 | n.d. | | |
| 474 | Nodule | ++ | ++ | ++ | n.d. | n.d. | + | n.d. | (dendr) | α, δ |
| | | 88.3±0.78 | 5.5±0.4 | 6.1±0.7 | n.d. | - | <0.05 | n.d. | | |

+++ >50%; ++ 10-50%; + 1-10%; vest. (Vestiges) <1%; n.d. not detected
C cast; D deformation/forged; T heat treatment/annealed; ↓ low amount; ↑ high amount

Table 2 – Fraga dos Corvos Rock-Shelter 2 – Summary of the experimental results on the copper-base metallic items (EDXRF results are given in a semi-quantitative way since the analysis were performed over corroded surfaces; the composition of the alloy is given by average of three micro-EDXRF analyses (± standard deviation) performed over prepared surfaces). Adapted from Figueiredo, *et al.* 2009: Table 2

were examined by OM for microstructural study and micro-EDXRF analyses were conducted on all prepared surfaces, as well as on areas with recent fractures of the double spring fibula (FCORV-A2 181) and the needle (FCORV-A2 188) for determination of the alloy composition. Table 2 summarizes the experimental results.

The micro-EDXRF analysis showed that most of the items have 8–13% Sn and Pb <2% (average 10.1 ± 1.5 % Sn and 1.1 ± 0.6 % Pb). The high standard deviation for Pb registered for the needle (FCORV-A2 457) points towards the usual heterogeneous Pb distribution in bronze alloys, or can be related to the strong intergranular corrosion in the area analysed as revealed by microstructural examination. The same reasoning applies to the relatively higher standard deviations determined for the tin contents in the needle (FCORV-A2 188) and fibula

(FCORV-A2 181) which is probably related to the presence of a heterogeneous surface layer, as the micro-EDXRF analyses were performed over recent fractures. This is also corroborated by the higher Fe contents in these artefacts, as a result of the presence of a patina enriched in soil particles. As previously suggested by the EDXRF analyses, the metallic nodule (FC-474) is made of a different alloy, with a higher Pb and a lower Sn content, distinct from all the other bronzes.

The Tartessian belt hook fragment (FCORV-A2 473) can be considered as an unalloyed copper with various impurities (Sn, Pb, As, Sb, Ni and Fe). A similar fragment was found in the LBA settlement of Canedotes (Vila Nova de Paiva – fig. 21-6) which belongs to the Baiões/Santa Luzia cultural group, the southern neighbour of the area addressed here. Analysis of the Canedotes fragment (no. 1816 – Valério, Araújo and Canha, 2007, fig. 10) shows that it is also made of unalloyed copper, but with a slightly different impurity pattern: traces of Sn (0.85 %) and As (0.53 %) and less than 0.05 % Fe. The higher impurity pattern in the FCORV-A2 473 can be due to a different origin of ores, a different supply of metal, or, given the typological features of most of the assemblage and the higher Fe content, it can be an indication of a new and more efficient smelting process incorporated during the Orientalising period in places better related with the Phoenicians (Valério *et al.*, 2012).

The reference to the Baiões/Santa Luzia cultural group (fig. 21) in relation to this type of artefact is important. In fact, this is the only area in Western Iberia where evidence of gilding by thermo-diffusion technique was found (a technique originating in Eastern Mediterranean areas – Figueiredo *et al.*, 2010b). The technique implies that the piece to be gilded is made of copper and not of bronze. So, as we argued elsewhere (Senna-Martinez *et al.*, 2011a, p.415), the fact that the present two examples of Tartessian belt hook fragments are made of copper could be related to the ability of gilding techniques. Otherwise, the recent publication of a *Bencarrón* type fibula and a cauldron handle made of «unalloyed» copper (Valério *et al.*, 2012), from the «Phoenician» site of Almaraz⁵ (fig. 21-7), concurs to the idea that prestige and ornament items could be produced in copper in contexts where «indigenous» and «orientalising» metallurgical traditions mix.

Binary bronzes constitute the majority of the analysed copper based artefacts from Southern and Western Iberia LBA, as shown for the so called deposit from Ría de Huelva (Rovira, 1995), the Beira Interior and the Baiões/Santa Luzia cultural groups (Vilaça, 1997; Senna-Martinez *et al.*, 2011a). Even if 85 % of the artefacts from Rock-Shelter 2 fall in this category, the tendency to slightly higher

⁵ This is not the place to discuss the problematic of the chronology and modalities of Phoenician presence in the Almaraz settlement. Regarding this issue see Arruda (1999-2000) which proposes an occupation between the late 8th and the 6th centuries BC.

Pb contents and lower Sn contents of the sample (Figueiredo, 2010, p.123-124), in comparison to the above mentioned cultural areas, can either refer to a local/regional tradition⁶, or be part of the tendency of artefacts already resulting from an orientalising influence into local metallurgies be poorer in tin and showing higher lead contents (Figueiredo *et al.*, 2011), as has also been recently confirmed for the Southern Portuguese «Phoenician» site of Almaraz (Valério *et al.*, 2012). Furthermore, the only bronze item in the set under discussion that completely fits into low tin leaded bronzes is the nodule (FCORV-A2 474 – with ~5.5 % Sn and ~6.1 % Pb) that can be perceived as a possible smelting droplet (Figueiredo *et al.*, 2009, p.953). It thus hints either of a local or regional production of leaded bronze or of raw-material import.

The tendency of LBA Fraga dos Corvos metallic finds to an affinity towards a Southern (Mediterranean) influence, strongly suggested by the study of its Rock-Shelter 2 artefacts, now gets another dimension with the finds from Sectors A and M.

The total number of fibulae (fragments) recovered is now of nine and the excavation of Sector M (with seven exemplars found) has just begun. These fibulae comprise 1 of double spring type, 3 probably of *Bencarrón* type, 3 probably of *Acebuchal* type and the more problematic bow of a Hispanic Annular type one.

Recent elemental analysis and microstructural observations on fibulae FCORV-M-4036 and FCORV-M-3004 and pendants FCORV-A 3009 and 3091 have been performed, and results are summarized in Table 3.

It can be observed that both the fibulae and the pendants are made of a bronze with some Pb content (generally around 2 %) and low amounts of impu-

| No. | Item Cu | | Composition (wt.%) | | | | | | | Method of fabrication | Phases present |
|------|---|-------------------|--------------------|---------|---------|-------|-------|-------|------------|--------------------------|-------------------|
| | | | Sn | Pb | As | Sb | Fe | Ni | | | |
| 4036 | Fibula | spring and pin | +++ | ++ | + | n.d. | n.d. | + | n.d. | | |
| | | axe | 88.2±0.2 | 9.2±0.1 | 2.5±0.2 | <0.10 | - | <0.05 | n.d. | C+(D+A)+D | α |
| 3004 | Fibula | | ++ | ++ | ++ | n.d. | vest. | + | n.d. | | |
| 3009 | Pendant or torc terminal 88.9±0.5 | | +++ | ++ | + | n.d. | vest. | + | n.d. | | |
| | | | 9.5±0.2 | 1.4±0.3 | <0.10 | - | <0.05 | n.d. | C+(D+A)+D↓ | α | |
| 3091 | Pendant or torc terminal 86.0±0.2 | | ++ | ++ | ++ | n.d. | vest. | + | n.d. | | |
| | | | 11.6±0.3 | 2.3±0.3 | n.d. | - | <0.05 | n.d. | C+(D+A)+D↓ | α | |

+++ >50%; ++ 10-50%; + 1-10%; vest. (Vestiges) <1%; n.d. not detected
C cast; D deformation/forged; T heat treatment/annealed; ↓ low amount; ↑ high amount

Table 3 – Fraga dos Corvos Sector A and M - Summary of the experimental results on the copper-base metallic items (EDXRF results are given in a semi-quantitative way since the analysis were performed over corroded surfaces; the composition of the alloy is given by average of three micro-EDXRF analyses (± standard deviation) performed over prepared surfaces).

⁶ Since they are predominant in the Galician area and Western Douro basin (Rovira, 2004).

rities, such as As, Sb, Ni and Fe. These results show that their compositions are in general agreement with the composition of the metals previously studied from the Rock-Shelter 2.

The fibulae, as well as the other artefacts from FCORV-A2 orientalising set, the two iron blades (Sectors A and M) and the tweezers from Sector-M upper phase fit into a broad chronological interval between the 8th and the 6th centuries BC. This is the same interval attributed to Phase 1B of Coto da Pena settlement (Caminha – Silva, 2007, fig. 21-1) from which the two already mentioned Coto da Pena fibulae, respectively of Bencarón and Acebuchal types, come from, described as a local LBA site with external influences, namely orientalising pottery (Silva, 1990, p.144).

The presence of Mediterranean influences in Coto da Pena, situated on the extreme North of the Portuguese littoral, might be explained as resulting from contacts alongside the coast with the Phoenicians. Nevertheless, the closest point of certain Phoenician presence on the coast is Santa Olaia, in the Mondego Ria (fig. 21-4), 190 km southwards (Arruda, 1999-2000). The question of such an influence at Fraga dos Corvos is compounded by its geographical location (figs. 1 and 21-3), roughly 150 km inland in the extreme Portuguese Northeast. If we turn to the nearest Southern neighbour LBA cultural area, the Baiões/Santa Luzia one (fig. 21), we find abundant evidence for early Mediterranean influences (11th-10th centuries BC – Senna-Martinez *et al.*, 2011a).



Fig. 21 – Location in continental Portugal of the LBA and EIA sites mentioned in the text: 1– Coto da Pena (Caminha); 2– Cervos (Montalegre); 3– Fraga dos Corvos (Macedo de Cavaleiros); 4– Santa Olaia (Figueira da Foz); 5– Castro da Senhora da Guia (S. Pedro do Sul); 6– Canedotes (Vila Nova de Paiva); 7– Almaraz (Almada). The light shaded area corresponds to the territory of LBA Baiões/Santa Luzia Cultural group.

For its late phase (9th-7th centuries – *Id.*) the evidence gets more scarce as this culture group nears the collapse (7th-6th century BC – Senna-Martinez, 2011, p. 293). However, it comprises the iron blade with an over-casted bronze socket from Castro da Senhora da Guia de Baiões (Silva, Silva and Lopes, 1984), the double spring fibula from Outeiro dos Castelos de Beijós (Senna-Martinez, 2000) and the Tartessian belt hook fragment from Canedotes, previously discussed (Valério, Araújo and Canha, 2007).

We recently defended that the early Mediterranean influences in the Baiões/Santa Luzia cultural area could be linked to tin acquisition (Senna-Martinez *et al.*, 2011a; Senna-Martinez, 2011). The presence of such cultural influences in Trás-os-Montes can probably be explained the same way.

The inception of LBA in Iberian areas south of the Tagus River in the last quarter of the second millennium BC will accompany the generalization of binary bronze production in respect to the earlier copper metallurgy. Such a technological change supposes the possibility of regular access (even if in small scale) to tin ore. This metal is available, under the form of cassiterite (tin oxide), mostly in the alluvial placers found from the Portuguese Beiras to the Iberian Northwest. The main route of tin circulation southwards, in the form of cassiterite crystals⁷, could probably follow the so called «stele route» (Nunes 1960; Nunes and Rodrigues 1957; Ruiz-Gálvez and Galán Domingo 1991; Galán Domingo 1994). This route was supposed to end in the Sabugal area, at the frontier between the Beira Interior and Beira-Alta (home to the Baiões/Santa Luzia cultural group). However, a new stele was recently found and published for the Trás-os-Montes Montalegre area (figs. 21-2) close to the Tâmega river basin, a natural South-North regional route (Alves and Reis, 2011). Thus, it looks like that the inland network of tin circulation could be more extensive.

The present authors, together with other colleagues, are currently developing projects that will make possible to address several of the questions raised here, as all the discovered artefacts from Fraga dos Corvos LBA settlement are intended to be investigated. The recent opening of a research line involving Pb isotope ratios determinations at IST-ITN will allow giving some answers on the artefacts provenance in several Portuguese cultural areas including Trás-os-Montes. Very recently, preliminary studies on lead isotope ratios have been performed in selected artefacts with Mediterranean affiliation from Fraga dos Corvos, namely the fibula fragment FCORV-M 4036 (from under the «talud wall»), the pendant FCORV-A 3091 (from Sector A), and the nodule FCORV-A2 474 and bar fragment FCORV-A2 206 (both from the Rock-Shelter 2). The results which are presented in fig. 22 show that the fibula fragment FCORV-M

⁷ The discussion of the why and how of this form of circulation can be found in Senna-Martinez *et al.*, 2011a.

4036, the nodule FCORV-A2 474 and the bar fragment FCORV-A2 206 have similar Pb isotope ratios which are clearly different from the lead isotope ratios determined on the pendant FCORV-A 3091. Results suggest that artefacts were locally produced (given the similar ratios among some of the artefacts and the nodule which is a metallurgical debris) and that the pendant FCORV-A 3091 might have a different origin or it was produced with different ores than the other studied artefacts. In a near future, other research focusing on Southern Iron Age metallurgy (namely EIA orientalisising products) will make possible to cross reference among Northern and Southern contexts.

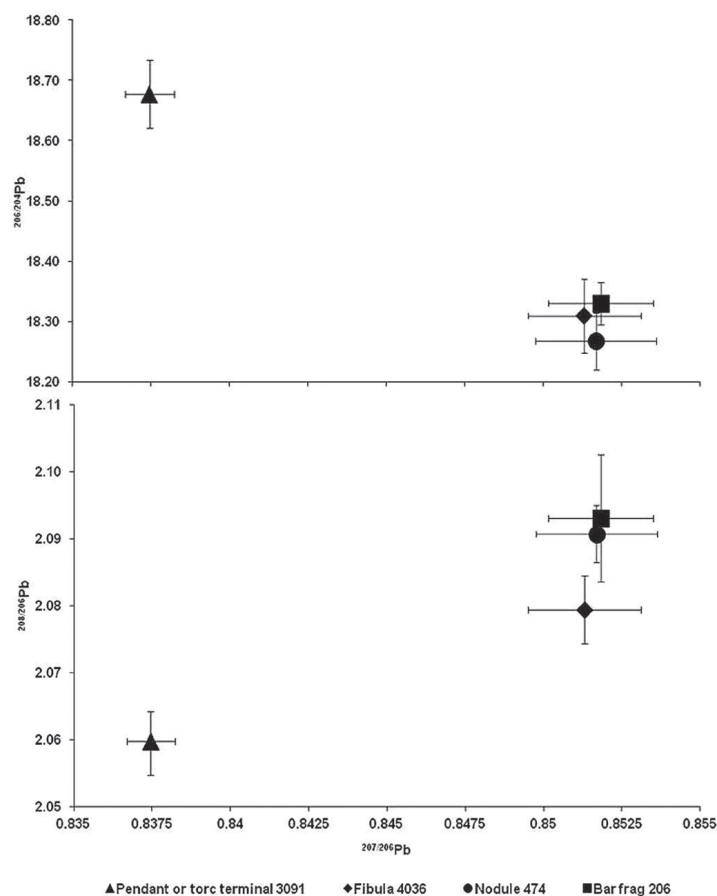


Fig. 22 – Lead isotope ratios of the four items analysed.

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