



Mithras In Tróia (Portugal) An Art Historical and Archaeometric Analysis of the Roman Marble Bas-Relief with The Banquet of the Gods Mithras and Helios

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Abstract

In the early 1930s, archaeologist Marques da Costa reported the finding of a fragmentary marble bas-relief depicting the banquet of the gods Mithras and Helios in Tróia, where a Roman industrial settlement producing fish-salting goods evolved since the 1st century CE. Tróia is located on a sandy peninsula on the left bank of the river Sado on the southwestern Atlantic coast of Portugal.

Archaeometric analyses were carried out to determine the origin of the marble. A multi-method approach was applied to combine polarised-light microscopy, cathodoluminescence, X-ray powder diffraction, and stable C and O isotope analysis in order to determine the marble features. After their checking with the available analytical data-base, they perfectly match with the most important regional marble, the Lusitanian Estremoz Anticline (Portugal). The article aims to present the art historical study of the mithraic bas-relief and to contribute to a better understanding of how the identification of the marble can clarify and support questions about the workshop that would have produced the piece.

Keywords: Mithraic bas-relief from Tróia (Portugal); Art historical analysis; Estremoz Anticline; Archaeometry

Introduction

This study concerns a Roman marble bas-relief found in Tróia, municipality of Grândola (Portugal), in the second half of the 1920s. Tróia was the site of a Roman industrial settlement producing fish-salting goods since the 1st century CE, located on a sandy peninsula on the left bank of the River Sado on the southwestern Atlantic coast of Portugal opposite the city of Setúbal, the Roman

Caetobriga on the mainland. Although the bas-relief was found broken into five fragments, it is possible to identify a banquet scene and the participants, the god Helios or Sun, the god Mithras and the two helpers, the torchbearers-Cautes and Cautopates- core elements of the cult of Mithraism, or the Mysteries of Mithras. The most fragmentary part of the piece informs us of the bull's sacrifice

or the tauroctony. It is a significant scene, like the banquet in the Mysteries of Mithras that spread throughout the Roman Empire in the 2nd and 3rd centuries CE.

The iconographic value of the piece led scholars to hypothesise the existence of a Mithraeum in the place where it was found. Furthermore, an import from a workshop outside Lusitania and the Iberian Peninsula would explain the artistic quality of the relief. The results of the archaeometric analyses clearly point to the use of the white statuary variety with few pinkish veins, typical of the Estremoz Anticline quarries in the Alentejo (Portugal), leading us to consider that the piece was made in Lusitania and not imported from a foreign workshop. In this work, we will present and describe the bas-relief characterising the place where it was discovered, the Roman site of Tróia. We will relate the result of the archaeometric analyses with the location of the Estremoz Anticline quarries, where the “marble roads” would make this resource available to Tróia.

Despite being known for more than 100 years, much remains to be uncovered about the mithraic bas-relief. We hope to contribute to a better knowledge of Mithras in Tróia in Antiquity.

Materials and Methods

The bas-relief with the banquet of the gods mithras and helios

Description of the bas-relief from tróia

The bas-relief (CIMRM, number 798, fig. 217) was found broken into five fragments, but a 1946 photograph shows it with a further break in the banquet scene and with one of the original fragments missing [1]. In 1949 Garcia y Bellido reported the finding of the missing fragment [2]. The measurements of the bas-relief are maximum length =81,5 cm; maximum width =64,5 cm; thickness top =5/7cm, and thickness bottom=8 cm (Figure.1).



Figure 1: The marble bas-relief with the banquet of the gods Mithras and Helios (Tróia, Portugal). Photography by José Paulo Ruas (2022). ADF/DGPC.

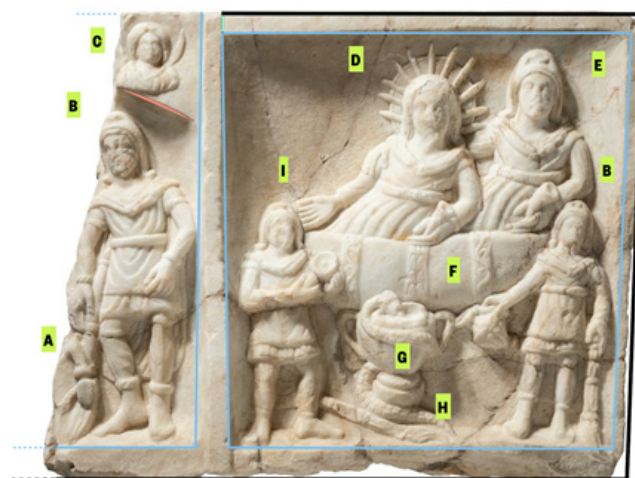


Figure 2: Identification of the panels and figures of the mithraic bas-relief from Tróia. The left-hand side panel (fragmented) possibly depicts the tauroctony; the right-hand side panel depicts the banquet of the gods Mithras and Helios.

The bas-relief is an incomplete piece featuring two scenes inserted with some depth, each on a panel. A straight profile protruding frame surrounds the perimeter of the right-hand side panel and runs along the bottom edge of the left-hand side panel, leaving the top frameless. The left-hand side panel is fragmented, remaining only a small portion of the depicted scene, and it possibly pictured Mithras killing the bull or the tauroctony. On the right-hand side, the entire panel of the relief registers the banquet of the Sun god and Mithras (Figure.2).

A scene develops in two contexts on the left panel's remaining part: under and above the vaulted roof. Beneath the domed line, on a flat background, a male figure stands in the front, slightly inclined to the right side where he looks. His legs are open in a contrapposto position, the right leg slightly bent and the left leg straight. His right arm extends along the body, holding the torch turned downwards. The torch's handle rests against the right side of his torso, between it and the arm. The left arm is bent with an open hand resting on the level of the pelvis. Both hands clearly show the fingers. We can see what could possibly be one of the front legs of the bull partially covering the inverted torch (Figure. 2A). The male figure wears a long-sleeved tunic above the knees' length adjusted to the wrists overlaid by another short-sleeved tunic visible in the arm. A thick belt -cingulum- fits the tunic to the body at the waist. The tunic's height to the knees falls in the body tightened a second turn by a hidden belt. The tunic falls on the body, forming a set of V-shaped folds. A long mantle - chlamys- falls over the shoulders and tights to the chest with a round brooch. The fabric's folding is noticeable in the background between the arm and torso and between the legs. He wears long trousers anaxarides-attached to the knees and the ankles connected by a fabric band running down the leg.

The footwear, possibly calcei, an ankle-length shoe, encloses the feet completely. A Phrygian cap covers the head tightly, wrapping around what may be hair but with no texture. At the top of the head, the cap's apex slightly protrudes and bends, whereas the side ends fall over the ears up to the level of the shoulders, curling outward. The male figure is Cautopates, (Figure. 2B), one of the torchbearers in the Mysteries of Mithras, sized much more prominently than when he appears in the scene on the right. Outside the vaulted space, a female bust looks ahead in the scene's upper right-hand corner. Her wavy hair frames the face and falls to shoulder length. The lunar crescent emerges from her left shoulder, combining with the nimbus that surrounds the head. The Moon wears a dress with a V-shaped neckline and a mantle over the shoulders (Figure. 2C).

The right-hand side panel of the bas-relief represents the banquet scene unfolding on a background with a slight texture. Two male figures are beside each other, slightly reclined to the scene's right side, looking straight ahead. They stand out for their larger size and central position as the two participants in the meal. The figure on the left has long hair, evidenced by the strands falling to the shoulders. A nimbus with eleven pointed rays projected beyond the circle crowns the head. This attribute identifies him as the Sun god (Figure. 2D). His right arm follows the body with an open hand; the palm faces upwards with visible fingers. The left arm, slightly bent, holds a rhyton in a clear conical profile fitted between the

thumb and the remaining fingers. The hand rests on the cushion in front of the two guests, moulding to the touch, revealing a soft consistency.

The Sun god wears a long-sleeved tunic showing V-shaped foldings adjusted to the chest by a thick belt. A mantle covers the shoulders and falls over the back. To the left side of the Sun god is another figure at a receding level raising his right arm and passing it over the Sun god's shoulder, where he rests his hand open with outlined fingers in a friendly attitude. Mithras wears a Phrygian cap fitted to the head, covering the ears and curling the ends outwards over the shoulders (Figure. 2 E). The apex bends lightly as two creases in the cap make clear. Mithras wears a folded tunic and chlamys similar in shape and texture to the Sun god's outfit. In his left hand, Mithras holds a rhyton between his thumb and the remaining fingers in a similar pose to that of the Sun god's left hand, an attitude that emphasises the parallelism of the two gestures . Sun god and Mithras sit next to a long couch or cushion - pulvinum - which may belong to a semi-circular or sigmatic bed like a stibadium (Figure. 2 F). The cushion's smooth surface displays in width three narrow decorated bands evenly spaced from each other. The band on the left repeats the one on the right: plant motifs in a half-volute stretching out and curving again. The motif in the middle band has a narrower band connected to three groups of laurel leaves, with the central veining. There is no table on the couch, and the meal is served at ground level where a large open two-handled container stands at the centre- a krater (Figure. 2 G). The foot of the vessel has two levels; the first is a plinth to which another curved profile support superimposes. A serpent with a scale coating starts to coil up from the vessel's left side, moving through its front and around behind until it reaches the top, laying the head down to drink from it (Figure. 2 H). Two torchbearers looking straight ahead attend the meal on either side of the couch, standing at the vessel level, their heads reaching the guests' hands.

The torchbearer on the left side, Cautes (Figure.2 I), who usually holds his torch facing upwards, has let it fall on the floor near the serpent to hand over something with both hands to the stretched hand of the Sun god. In his right hand, perhaps a loaf of bread. He holds a rhyton or a patera in his left hand, shown in a front perspective with a round shape and central dot. He dresses in a long-sleeved tunic, chlamys, long trousers and a Phrygian cap. However, the trousers appear plain without the vertical band found on Cautopates. His left leg is slightly bent, the foot in profile moving forward in a contrapposto position. The right leg remains straight.

The second torchbearer, Cautopates (Figure. 2 B), stands on the right-hand side of the banquet scene and, with his left arm along his body, holds the torch turned downwards. Two rings tighten the torch stick. Both legs are straight, and the feet are facing forward. The right arm is outstretched, raised towards the krater holding an oinochoë by its single handle. The oinochoë shows the mouth, neck and globular body with vertical ridges up to the foot.

The bas-relief conveys a vivid impression of the banquet of the Sun god and Mithras. The different treatment of the background of the left and right scenes shows that they would take place in two

different places and possibly in two different moments. The scene brims with textures, movement, volumes, and a taste for unique

detail, e.g. the hand of the god Mithras resting on the shoulder of the Sun god conveys both friendship and dominance (Figure. 3).



Figure 3: Detail the Mithras's hand over the Helios' shoulder on the right-hand side panel. Photography by Filomena Limão (2022).

García y Bellido [2] had already pointed out some originalities in the piece, such as the torchbearers serving the banquet, and Romero highlighted the naturalism of the narrative [3]. In addition to being the westernmost mithraic finding in the Roman Empire, as Alvar pointed out [4], the bas-relief from Tróia was the only one depicting the tauroctony in the province of Lusitania [3]. However, a recent review by the Museo de Arte Romano from Mérida of the pieces of mithraic content discovered on the Cerro de San Albin at the beginning of the 20th century allowed the interpretation of a fragment of the cloak (chlamys) worn by Mithras and the tail of the bull already transformed into an ear of wheat as mithraic and proof of the tauroctony. Romero eventually stated: "In this way, we

could claim that the great tauroctony of the Mithraeum of Mérida has finally been discovered [5].

The faces of the figures in the bas-relief reveal intentional damage: on the Cautopates' face in the incomplete left scene; on the right scene, on Mithras, Helios and Cautes' faces, whereas not so much on Cautopates'; intentional damage is also reported on the serpent's head. This observation by Margarida Santos while cleaning the piece at the Museu Nacional de Arqueologia (Lisbon) is in line with what archaeologist Marques da Costa mentioned in 1930-1931 [6]. We would like to comment on some disputed topics about the mithraic bas-relief from Tróia: the hypothetical reconstruction of the piece and its chronology.

Hypotheses for the reconstruction of the bas-relief



Figure 4: Measurements of the bas-relief and panels.

The bas-relief is composed of two panels, the incomplete left-hand side panel and the complete right-hand side panel. The remaining part of the left-hand side panel has a maximum length of 24-24,5 cm X 66 cm; the right-hand side panel measures 57 X 64.5 cm (Figure. 4). The thickness of the frame surrounding the right-hand side panel is 2,5 cm. It has been argued that the bas-relief could have been a triptych [2,4,6,8-11]. Recent studies point to the hypothesis of being a diptych supported by the close relationship between the two scenes - tauroctony and banquet - also noticeable

in other sculptural pieces [3,5,12,13].

The observation of the bas-relief shows two holes at two points on the upper edge of the piece. The first is in the direction of the vertical frame, which divides the left-hand-side panel from the right-hand-side panel and can be measured (1,5 cm X 2 cm diameter and 1,7 cm deep). Close to it is a metal clip that seems to be embedded in the stone. The second hole is not so clearly detected and is at the upper right-hand side of the banquet panel (Figure. 5).

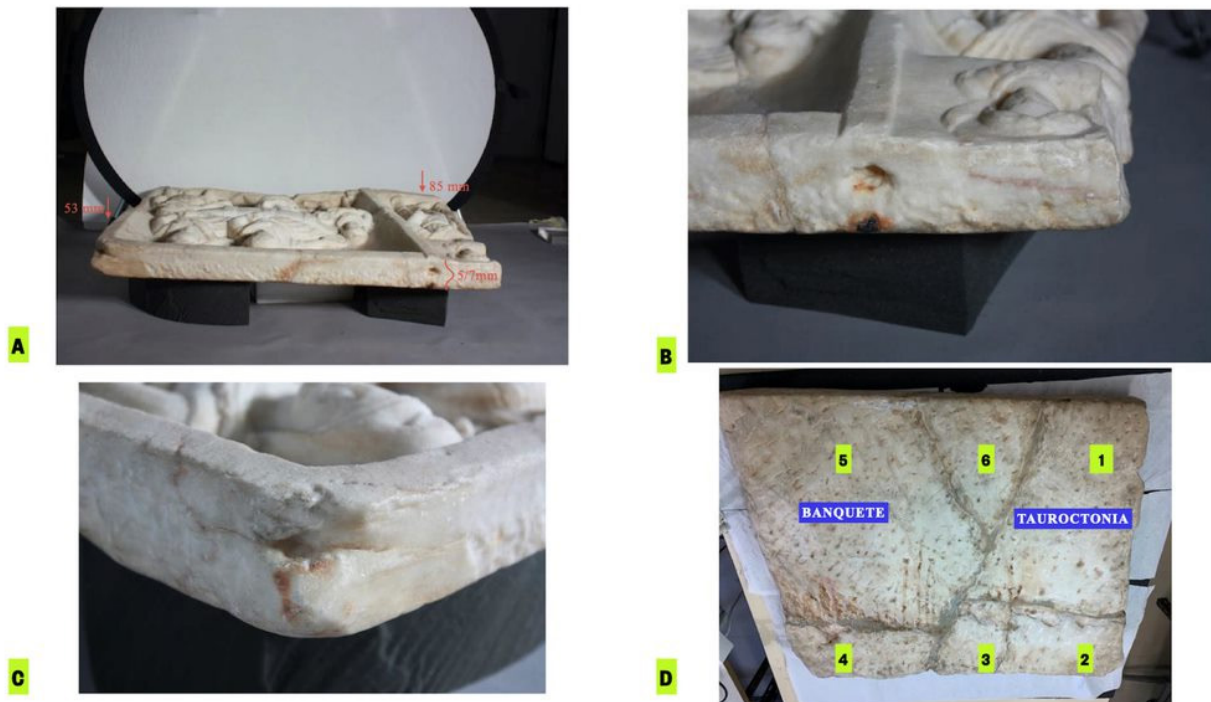


Figure 5: Details of the bas-relief from Tróia. A. Measurements of the thickness of the bas-relief; B. A hole and metal clip in the direction of the vertical frame dividing the two panels; C. A hole (?) at the upper right-hand side corner of the banquet scene panel. D. The six composing fragments of the bas-relief are visible on the back of the piece. Photography by Filomena Limão (2022).



Figure 6: Garcia y Bellido's proposal for reconstructing the bas-relief from Tróia (1949, p. 395).

In the face of this, we think the metal clip could be used to hold the bas-relief to a wall, for example. As to the hole close to the metal clip, like the other at the corner of the piece, we think they could be used to attach another panel to the bas-relief. This idea takes us to the proposal made by Garcia y Bellido in [2]. He considered that the piece would be part of a triptych, proposing that, above the upper edge of the piece, another panel of equal length and width should run with reliefs alluding to Mithras (Figure. 6). In the 1967 publication, Garcia y Bellido [7] explains his proposal more objectively: he thinks that the bas-relief would be part of a triptych that would be included in a set of multiple panels forming an altarpiece. We think that the idea of a triptych was widely spread by other authors after Garcia y Bellido and not so much the suggestion that it was a piece made up of several combined panels or complicated panels. Therefore, from observing the holes in the piece and with Garcia y Bellido's suggestion in mind, we propose that the bas-relief relief from Tróia would have had other panels attached to the top of it. To make our suggestion clearer, we made an experiment taking into account the piece's measurements and Garcia y Bellido's proposal of a tryptic and Romero's hypothesis of a diptych.

First hypothesis: Multiple panels and a tryptic (Figure.7). For

this proposal, the panel in the centre, the one with the tauroctony, would have to measure more than the banquet panel on the right-hand side. We experimented with this by giving the left-hand side panel (which would be in the centre) the same size as the right-hand side panel. It is noticeable that there would not be enough room for the complete scene of the tauroctony. Garcia y Bellido [7] had already stated that the fragmented scene on the left side, corresponding to Mithras tauroctonos, would be twice the size of the banquet scene on the right-hand side. If the bas-relief were a triptych, it would be a piece of substantial length (218 cm) and a relatively short width (64,5 cm). If we doubled the width according to Garcia y Bellido's suggestion, the bas-relief would be a very large piece (218 x 129 cm). However, it is essential to remember that Romero says that she does not know any triptychs in the mithraic repertoire [3, 12]. In this proposal, we keep the triptych as a basis because of the balance of the dimension of the panels: the right-hand side panel and left-hand side panel would measure the same, and the central panel would be more extensive. We highlight that the scene at the centre - possibly the tauroctony - has no frame at the top, i.e. above the depiction of the Moon as the right-hand side panel has. Does this point to a central scene that would continue to the top?



Figure 7: Hypothetical proposal for reconstructing the bas-relief from Tróia: multiple panels and triptych.

Second hypothesis: Multiple panels and a diptych (Figure. 8). This proposal builds on Romero's hypothesis that the bas-relief would be a diptych [3,5,12,13] based on the intrinsic articulation between the panels' themes, the tauroctony and the banquet and the comparison with the Fiano Romano bas-relief (Lazio Region,

Rome, 2nd c CE; currently at the Louvre Museum MA 3441). Here the two scenes appear on opposite sides of a reversible panel. However, the Tróia piece is not a reversible relief. The problem seems to lie in the unbalanced measures possibly given to the left-hand side panel and the right-hand-side panel. Nevertheless, we can conjecture that

the measures of the two panels would have been approximately the same. The comparison with the Fiano Romano relief is again strong: the reversible panels with the same scenes as the bas-relief from Tróia measure 62X67 cm, quite approximate to the measurements

of the Tróia's banquet panel. Considering the holes on the top thickness of this piece, could the basis of this piece be a diptych with more panels attached to the top of it?



Figure 8: Hypothetical proposal for reconstructing the bas-relief from Tróia: multiple panels and diptych.

One question remains: the left-hand side panel is different from the right-hand side panel because it has different frames (panel structure). This aspect would contradict the principle of structural homogeneity that should exist between one panel and another if the piece is a diptych. This homogeneity exists in the Fiano Romano relief.

The chronology proposed for the bas-relief

The chronology attributed to the bas-relief from Tróia has been the 3rd century CE. Once again, we realise that this chronology was given by Garcia y Bellido in 1949 and 1967 and followed by almost every author after him [4,10,11,13,14].

In 1949, Garcia y Bellido noticed that the ornamentation of the cushion on which the banquet guests are reclining is a reminder of "the large mattresses seen on the oriental sarcophagi of the 3rd century with reclining figures" [2]. In 1967 [7], he mentioned that there were no clear indications about the chronology of the bas-relief. He wrote: "According to the characteristics of the ruins of Tróia, it will be possible to date the bas-relief to around the 3rd century CE". Garcia y Bellido uses a decorative [2] and an archaeological [7] argument for the chronology of the piece. The decorative argument is interesting because Roman sarcophagi developed during the 2nd and 3rd centuries CE display a "kline type" (Awan, Metropolitan Museum, 2007) on the lid with the deceased reclining on mattresses decorated with bands evenly spaced. Examples: the Achilles sarcophagus, attic workshop (180-220 CE) at the Paul Getty Museum (95.AA.80.1); or the sarcophagus of Rapolla at the Melfi Museum, an Asian type of sarcophagus dated

to 170 CE [15]. The archaeological argument seems vague because the characteristics of the exact location of the discovery are not well known. The general assumption of most of the authors since Cumont's words in 1934 is that there would be a Mithraeum [16]. However, until now, no excavations have been made to attest to its existence.

Maciel [10] was one of the authors to consider the close resemblance of the bas-relief from Tróia with the Fiano Romano reversible marble piece as the element that could justify a revision of the chronology proposed for the piece. For him, the two reliefs seem to belong to the same period and follow the same model. Moreover, Romero accepts the attribution of the 3rd century CE to the bas-relief of Tróia but is keen to point out that: "the quality of the relief, the detail and the narrative character of this Lusitanian altar, link it with the Roman Fiano altar currently preserved in the Louvre Museum." [3]

Our view is that the grounds for the attribution of the 3rd century CE is a possibility that does not exclude the 2nd century or late 2nd-early 3rd centuries. The iconographic similarity with the Roman Fiano relief should not be forgotten, as well as the closeness of the measurements of its panels, namely the one on the right-hand side panel of the Tróia piece (see figure 8).

The place where the bas-relief was found: Tróia

The industrial complex of Tróia

The mithraic bas-relief was found in Tróia, currently, the Roman ruins of Tróia situated on a sandy peninsula with the same

name on the southwestern Atlantic coast of Portugal, on the left bank of the Sado river's estuary (Figure. 9). Tróia was a Roman industrial settlement producing fish-salting goods such as dried fish and sauces in workshops already labouring in Tiberian times

(1st century CE). It is located at the entrance of a lagoon called Caldeira, facing the city of Caetobriga (Setúbal) on the mainland and lay within the ciuitas of Salacia (Alcácer do Sal) in the province of Lusitania [16,17] (Fig.10).



Figure 9: The peninsula of Tróia on the southwestern Atlantic coast of Portugal between the ocean and the Sado river's estuary. Adapted Google maps.



Figure 10: The Roman settlement of Tróia. A. the Roman cities of Caetobriga and Salacia on the Sado river. B. Roman Tróia is located at the lagoon's entrance called Caldeira on the left bank of the Sado river. C. The Roman ruins of Tróia: 1- examples of the fish-salting workshops; 2- the runs of the mid-4th century CE early Christian basilica; 3- end of the 15th-century church of Nossa Senhora do Rosário. Adapted Google maps.

Geomorphological studies about the origin of the sandbank of Tróia show that it might have resulted from the combination of several islands along the estuary of the Sado River [18]. The peninsula we know today could have been an island in Roman times

and long before it. The 4th c CE poem *Ora Marítima* by Avienus, composed of texts from different ancient Greek sources [19], described the coastal regions of Mediterranean and Atlantic Europe. In verses 171 to 200, the author described the Atlantic coast between the

Roca Cape (north of the River Tejo/Tagus) and the river Sado's estuary [20]. At that point, he mentions Achale Island. There is a strong possibility, although not completely proven, that the island mentioned by Avienus was Tróia [17,18,20-23].

The name Tróia is not mentioned by ancient sources, and the first evidence of the use of the name Tróia appears in a Portuguese royal document dated 1476 [24]. On the contrary, Salacia is mentioned in 1st century CE authors Strabo and Pliny, the Elder. In contrast, in the 2nd century and early 3rd century sources, i.e. Ptolemy's Geography (2.5.1.) and the XII Antonine Itinerary, Caetobriga and Salacia are both referred to. In addition, Achale was not mentioned by these ancient authors either. Was this because the name Achale was not used in the first centuries of the Christian era?

The development of the city of Caetobriga became visible in the 2nd century CE, and Ptolemy mentioned it. Possibly, in Antiquity, the settlement of Tróia was naturally included when Caetobriga or Salacia was mentioned. Tróia could make part of one or the other or both. One in terms of the administration- Salacia- [22] and the other as a production/industrial settlement in Caetobriga's orbit [22,23,25].

Tróia was at its highest production capacity of dried fish and sauces exported to the Roman world in amphoræ produced in the kilns along the right shore of the Sado River during the 1st and 2nd centuries CE (22). It is estimated that in this period, the production of the fish-salting vats in Tróia would be enough to fill more than 40.000 Lusitanian amphoræ Dressel 14, mainly for exportation by sea. This type of amphoræ is frequently found in the 2nd century CE Ostia [23]. The economic importance of Tróia, a fish-salting production centre in Antiquity, was undoubtedly increased by or was an additional reason for the passage of a Roman road in Caetobriga and Salacia connecting Olisipo to Emerita Augusta, the capital of the province of Lusitania - the XII Antonine Itinerary. This factor must have accentuated the fish-salting products' draining capacity and enlarged the accessibility and arrival of resources and people to Tróia. The production suffered some disruption in the late 2nd-early 3rd-c CE, regaining vitality during the 3rd until the second quarter of the 5th century CE [22,26, 27]. The final decline dates back to the late 5th and 6th centuries.

Although the industrial facilities are the most remarkable testimony of life in Tróia, there are also a baths complex, insulae, diverse funerary monuments and an early Christian basilica with wall paintings dated to the mid-4th century CE [10,28]. These are the strongest testimonies of life in Troia during Late Antiquity. Tróia was slowly abandoned and eventually forgotten until the end of the 15th century.

The specific place of the finding of the bas-relief

Archaeologist Marques da Costa informs of the finding of the bas-relief in a work dated 1930/1031 and published in 1934, providing a drawing of the place. He studied Tróia since 1898, describing its geomorphological, historical and archaeological aspects [6,29-31]. Despite his explanations, it is not entirely clear where exactly this happened. Suppose we combine his indications with the most recent studies of the site's archaeology [16,22]. In that case, we can

state that the bas-relief was found on a site previously occupied by fish salting workshops and where an Early Christian Basilica would later be built (mid-4th century CE)(Figure. 10 c). Figure 11 shows that the place where the bas-relief was discovered may coincide with the apse of the Early Christian Basilica. Marques da Costa tells us that the first discoveries of the early Christian basilica and its frescoes on the walls were made by the Sociedade Arqueológica Lusitana in 1850 [6]

Marques da Costa does not provide an exact date for the discovery of the bas-relief. When we consult the MatrizNet of the Portuguese Directorate-General of Cultural Heritage (DGPC), the information is that its discovery occurred in 1925. What is the source of this information? We suppose it is Garcia y Bellido [2]. He states that it is impossible to specify the date of the discovery but that it would be approximately 1925. We suppose that this year is the result of an estimate made by Garcia y Bellido from Marques da Costa's publications on the Troia excavations carried out in 1923/1924, 1925/1926 and 1930/1931. It may be considered that the finding of the mithraic bas-relief occurred in Tróia in the second half or late 1920s.

In 1934, Cumont learned of the bas-relief found in Tróia, considering it of great interest [1]. For him, the place where the piece was found would be "the cella of a Mithra temple", and in 1935 he wrote that if the piece had considerable dimensions, it could be an image placed in the background of a Mithraeum. Cumont insisted on excavating the place to find the remaining parts of the bas-relief [1]. Such excavations have not (yet) been carried out.

It has been argued that the place where the piece was found would not be the original site or the Mithraeum but instead, the place where it was abandoned. To support this hypothesis are the large dimensions of the bas-relief demanding a more significant original location for the piece and its fragmentary state [3]. The before mentioned intentional damage of the figures of the bas-relief could be an additional argument in favour of the abandonment hypothesis. However, further excavations at the site would bring fundamental insights for studying the bas-relief.

The Marble Analyses

A multi-method approach combining polarised-light microscopy, cathodoluminescence, X-ray powder diffraction, and stable C and O isotope analysis was applied to identify the marble provenance.

Methodology

Several analytical techniques were applied to characterise this marble.

Polarised-light optical microscopy (OM) was used to examine the thin section to characterise the mineralogy, fabric, texture, grain boundary shape and to determine the Maximum Grain Size (MGS). However, to define this parameter, the whole artefact was taken into account due to its heterogeneity. These parameters have a particular diagnostic significance for discriminating the provenance of many ancient marbles, combined with other analytical results [32-35].

The possible presence of dolomite was checked by X-ray powder diffraction (XRPD) and under cathodoluminescence microscopy (CL). The first was carried out using an automatic Philips PW 1130/00 diffractometer (CuK α radiation at 40 kV, 20 mA; data recorded in the 3 σ -70 σ 2 θ range, 1 σ /min, 2s/step).

The latter was carried out with CL8200 Mk5-1 cold equipment coupled to a NIKON Eclipse 50iPOL OM from the ICAC institution in Tarragona. The electron energy was 15-20 kV, and the beam current was operated at 250-300 μ A. The observed luminescent colour, intensity and distribution in the sample were recorded with an automatic digital NIKON COOLPIX5400 camera. The CL images taken were automatically controlled (29 mm focal length, f/4.6 aperture, 1 s exposure, ISO-200) to obtain comparative images of the intensity that would be comparative with our CL data images from the Iberian marble database and the most important classical marbles, using the same equipment and identical analytical conditions. This is particularly important, as seen in different papers [36,38].

Oxygen and carbon isotopes were determined by isotope ratio mass spectrometry (IRMS) with Finnigan MAT 252 equipment of the Istituto di Geologia Ambientale e Geoingegneria, CNR, Rome. A Finnigan MAT Kiel II automatic preparation device was previously used (15 mg) for phosphoric acid digestion at 72 $^{\circ}$ C and CO $_2$ purification. The results were expressed in terms of usual delta notation (δ^{13} C and δ^{18} O) in ‰ relative to the international reference standard V-PDB. Analytical precision was better than 0.1 ‰ for both isotopic determinations. The results were compared with those of the main classical marbles reported elsewhere e.g., [33-35,39,40-

42], but Iberian isotope database was also used [32,43-45].

Results

From the macroscopic point of view, a rigorous inspection of the white marble revealed its heterogeneity with the presence of pinkish veins and lenticular small areas of higher recrystallisation, filling the porosity (Figure. 12 a). In spite of their fragmentation and evidence of superficial decay, in general, the material exhibits an exceptional state of conservation which highlights the technical quality of the marble used. Five small chips samples were discretely chiselled off for the analyses. In fresh cut, the white marble shows light cream-pinkish tone and medium to fine grain sizes (Figure. 12 b). However, examining the whole piece, its Maximum Grain Size (MGS) is greater than 2mm long. It exhibits a moderate strong translucence, letting light pass through but diffusing it (Figure. 12 c). Concerning its mineralogical features, the petrographic observation of the thin section (Figure. 13 a, b) revealed that the piece under consideration was carved on a pure calcitic marble, with slight heteroblastic texture and anisotropic fabric showing elongate shape grains of calcite and, in places, a preferred crystallographic orientation. Its crystal boundaries are curved to sutured, and accessory granular quartz as tiny particles are quite often observed. Its Most Frequent Size (MFS) measured in thin section is 1.2 mm. XRPD confirms its calcitic nature with the very rare presence of quartz and dolomite. The cathodoluminescence behaviour is heterogeneous in terms of distribution with dark reddish-orange and faint intensity (Figure. 13 c).



Figure 11: The place of the finding of the bas-relief at the lagoon's entrance. A. Fish-salting workshop n $^{\circ}$ 6 previously occupying the place; B. the specific place seems to correspond to the apse of the early Christian Basilica later built in the area. Google maps. Plan of the workshop and early Christian Basilica adapted from Pinto, 2019, p. 386-387, fig. 3.

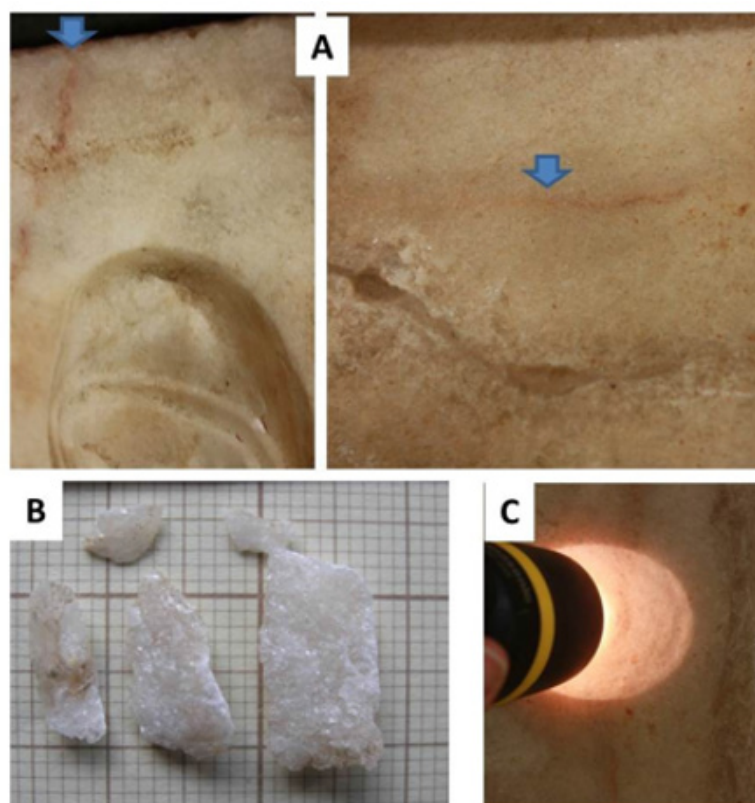


Figure 12: Macroscopic features of the marble. A) two different views showing its heterogeneity. B) Five small fragments collected for analysing. C). Close-up of the marble showing moderate strong translucence.



Figure 13: Representative photomicrographs of the marble. A) in plane polarised light. B) in crossed polarised light. C) CL-pattern.

Regarding the C and O isotopes, the values obtained are $\delta^{18}\text{O}$: -5.54‰ and $\delta^{13}\text{C}$: 1.80‰ (PDB-V). They fall into the Estremoz Anticline isotopic field defined in [46]. This has been plotted in the updated isotopic diagram for medium to coarse-grained calcitic marbles (MGS > 2mm) (Lapuente, 2022), which includes the most important marble districts used in Hispania in Roman times (Figure.

14). After comparison with the available analytical database, the results of all the analyses point to the use of the regional marble of the Estremoz Anticline, currently the Alto Alentejo (Portugal), whose use in Roman times was widespread, not only in Lusitania but also in the rest of Hispania and even in North Africa (Lapuente and Nogales-Basarrate, in press).

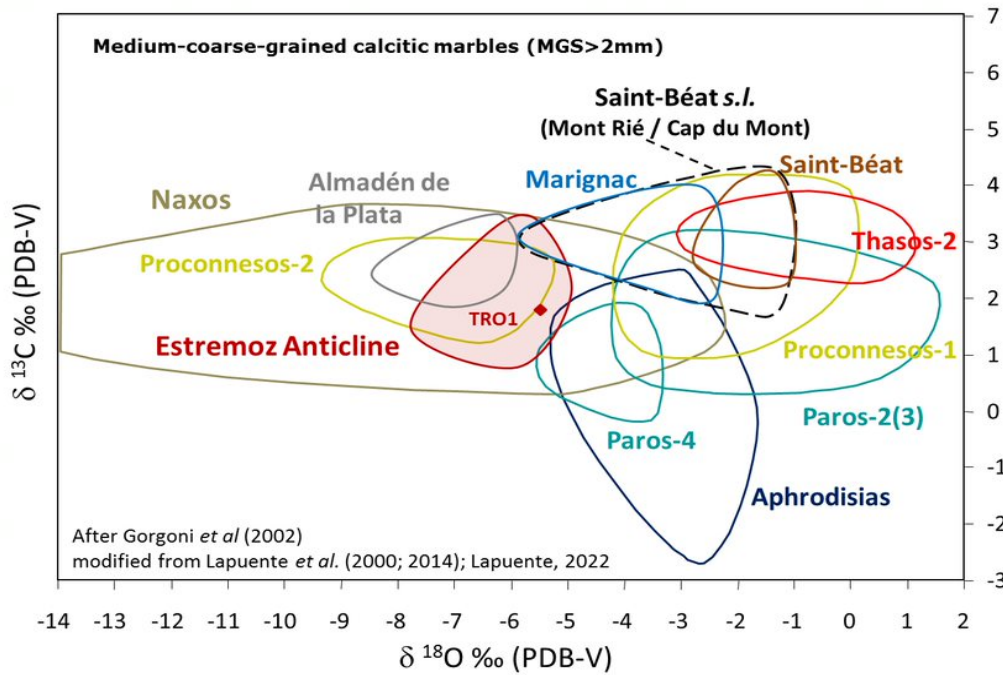


Figure 14: Isotopic signature of the marble sample under study (TRO1).

Results and Discussion

The marble roads

Although Cumont never saw the bas-relief itself-except in photos- he was the first to highlight its valuable contribution to the study of Mithraism, even offering to acquire it [1]. Since then, most researchers have considered it of excellent technical quality.

Consequently, they raised the hypothesis that it was produced in a workshop outside Lusitania and even the Iberian Peninsula, for example, in the Italian peninsula and brought to Troia's settlement [1,10,11]. Romero [13] considers that the similarity between the bas-relief from Tróia and the Fiano Romano piece point to an import of the first.

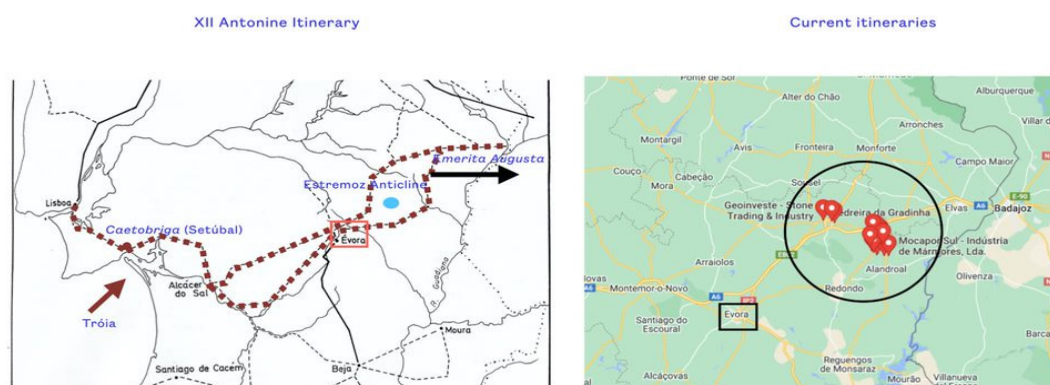


Figure 15: The "marble roads" surrounding the Estremoz Anticline and Tróia. The XII Antonine Itinerary on a map adapted from Alarcão, 1988, p. 56-57(left); Évora and the Estremoz Anticline quarries in a current Google map.

In this context, analysing the marble's provenance of the mithraic bas-relief from Tróia is of the utmost importance. The

study of the marble used in the sculpture gives us information about the resources, the workshops and the communication routes that

would allow the piece to go to its destiny. The Estremoz Anticline marbles are some of the best-known in Lusitania and the Iberian Peninsula. According to different authors, the Roman province of Lusitania, unlike other regions of the Iberian Peninsula, has used its resources since the Augustan period and imports few marbles, possibly due to the difficulty of unloading the ships and then transporting the material by land. [46-49]. The Estremoz anticline marbles continued in use during the 3rd and 4th centuries CE [49-52] and were mainly distributed by land transport [48]. In Roman times, the area of Estremoz Anticline was crossed by the roads of the XII Antonine Itinerary (2nd to early 3rd centuries CE) connecting Olisipo (Lisbon) to the capital of Lusitania, Emerita Augusta (Mérida), as the milestones prove it [53]. These so-called “marble roads” surrounding the Estremoz Anticline and cross-passing the city of Eborá (Évora) put the quarries in contact with Caetobriga and Tróia [47] and from there to other cities in Lusitania, such as Olisipo or Conimbriga (Figure 15).

Conclusion

The use of marble from the Estremoz Anticline in the production of the mithraic bas-relief from Tróia - according to the analyses described - strongly supports the hypothesis that the piece was made in a workshop in Lusitania that operated close to the quarries, although it could have been an itinerant workshop, and that the relief was not imported. This regional marble was accessible in Antiquity through overland routes throughout Lusitania.

The making of the piece suggests sufficient knowledge of the iconography of the Mysteries of Mithras and a particular way of working visibly in the details mentioned above/originalities of the piece’s narrative that could evidence a specific workshop. In this respect, it is essential to add that the recently reassessed two fragments found at San Albin in Mérida corresponding to the tauroctony have been published as made in marble from the Estremoz Anticline [5]. However, we do not know in which analyses this attribution was supported. Romero highlights that “the good quality of the technique of these pieces may allude to Demetrios, an artist who signed the San Albin Dadophore” [5] made certainly in marble from Estremoz Anticline [46]. These cases show that marble from Estremoz Anticline was used to sculpt pieces of mithraic content of good technical quality both in Mérida and Tróia, the two places connected by the “marble roads.”

While we do not know more about the workshop that produced the bas-relief from Tróia, it is significant that such a piece could be found in the westernmost part of the Roman Empire, the place of an industrial centre where a Mithraeum is likely to have existed. The geo-strategic position of Tróia as a harbour [25] between the ocean and the river in the vicinity of Roman itineraries explain its economic prominence and social dynamism, attracting many different people and influences to the settlement, among which certainly the followers of the Mysteries of Mithras[54-61].

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(F.L.) as the “courier” accompanying the bas-relief to Toulouse to be shown for the first time to the public at the “The Mystery Mithra. Immersion in the heart of a Roman cult” exhibition held at the Saint-Raymond Museum from May 14th to October 30th 2022. We would like to thank the director of the Museu Nacional de Arqueologia in Lisbon, Dr António Carvalho and Dr Patrícia Baptista and Dr Margarida Santos for their advice and support while the piece was transferred to Toulouse. The analyses carried out were sponsored by the Spanish MINECO/FEDER Project PID2019-106967GB-I00 SULMARE “Sulcato marmore ferro. Quarries, workshops, craftsmen and customers of artistic productions in stone from Hispania Tarraconensis.”

Conflict of Interest

There is no conflict of interest.

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