USE OF MARMORA IN THE ORNAMENTAL PROGRAM OF LAS PIZARRAS ROMAN SITE (ANCIENT CAUCA, SEGOVIA, SPAIN)


Abstract
This paper offers an overview of the characterization of the marmora used at the Late Hispano-Roman site of Las Pizarras (Coca, Segovia). This site has been under study for ten years and, during this period, marmora remains provided important data to the archaeological record, not only due to their wide variety and density, but also because of the remote provenance of a significant part of them. Due to the huge number of pieces recovered, a macroscopic observation and identification has been only possible for most of them, yet petrographic and cathodoluminescence (CL) analysis has been carried out to characterize a selected sample whose provenance was not clear. Although most of these remains come from secondary contexts (i.e. they were moved away from their original layout or re-used in latter structures), there are nonetheless outstanding examples of ornamental stones. Among them, those intended for revetments and elements of the ornamental architecture stand out. Likewise, the varied morphology of the pieces found at Las Pizarras offers essential information about their use. When this is taken into account, together with the provenance of each marble type, it reveals certain aspects and even common patterns.

Keywords
Marmora, crustae, lithostroton, petrographic characterization, cathodoluminescence analysis, Late Roman, Cauca, Hispania, Theodosius the Great.

Brief location and context
The Roman town of Cauca (modern Coca) is located in the northwest area of the province of Segovia (central Spain), in the Meseta Norte, and is surrounded by the Eresma and Voltoya rivers (Fig. 1). The first settlement dates back to the Iron Age and Classical writers such as Appian, Pliny or Frontinus mention the indigenous city it in their texts (Blanco 2002, 144). Yet, the most important references to Cauca were mentioned by Zosimus and Hydatius, who affirm that it was the birthplace of emperor Theodosius the Great (Pérez and Reyes 2007a, 149).

Las Pizarras is a Late Roman building complex erected in a natural platform situated northwards from Coca (Fig. 1). It owes its name to the fact that, because of the general absence of stone in the area, slates from Las Pizarras Roman building were largely salvaged and reused by the locals after it was abandoned. In fact, not only the building materials but also the prized elements of the revetments were extracted from their original place. The marmora remains found at Las Pizarras consist on a large assemblage of pieces of both marble and other ornamental stones that covered the floors (pavements) and panelled the walls, as well as architectural elements that supported the structural weight of the building complex, such as columns or capitals.

Obviously, the lack of most of the marmora that originally decorated the building is an important drawback to interpret it. However, the analysis of the traces left by the slabs and crustae on the soil preparations as well as the fragments of these elements that were found in secondary contexts during the recent excavations, play a significant role to understand it.

The site of Las Pizarras and the marmora contexts
Since 1999, IE University has undertaken an integral research project at Coca, including not only the site of
Las Pizarras but also other parts of its territory. In fact, fragments of the above mentioned *marmora* elements were recovered in archaeological levels of the Roman town of Cauca, most probably from the suburban area. Their presence in contexts away from the noble parts of the building at Las Pizarras, shows its value and confirms that they were removed from their original location.

In 2008, the large amount of marbles already discovered during the excavations campaigns led to the collaboration between the IE University and the Unit of Archaeometric Studies of the Institut Català d’Arqueologia Clàssica (ICAC). The first results of this cooperation are presented in this paper.

From the beginning, the enormous density of *marmora* found in situ and in secondary contexts has been astonishing. Although most of the *marmora* remains were discovered in secondary contexts, there are outstanding examples of these materials which and provide important data to the archaeological record, not only because of its great density and wide variety, but also due to the remote and luxurious provenance of many of the ornamental stones.

The first area of the archaeological site of Las Pizarras where *marmora* were found was a plot located in the *pars rustica* of the complex, which was excavated at the very beginning of the project, in 2000 (Pérez and Reyes 2003, 217) (Fig. 1). It was also then that the *marmora* fragments reused in the probable suburban area of ancient Cauca were found.

Since 2001, work has focused on the excavation of the Late Roman building. The results so far give an overview of an impressive residential complex. It has a large ornamental pond (*stagnum*) surrounded by a 4500 m² *peristyle*, and the rest of the building is structured around it. The floors of the rectangular corridor, as well as the pond, were covered with lavish materials. Indeed, it has been possible to reconstruct the monumental decoration scheme of these pavements: they were composed of large marble slabs (*lithostrota*) surrounding polychrome emblems composed by square modules of geometrical design (Reyes and Pérez 2011, 945). One of them consists of a particular motive of elongated hexagons and squares (in a sort of honeycomb pattern) that is associated with the 4th century (Fig. 2), when small shaped *opera sectilia* were developed in the Eastern territories of the Empire and northern Italy (Guidobaldi 1985, 231).

Despite the almost total absence of architectural elements found in situ at the porticoes that opened to the *peristyle*, the few fragments of capitals and other evidences found in secondary contexts show that they were sumptuously decorated with such *marmora*. Indeed, the abundance of *lithostrota* and the diversity of geometric *crustae* registered offers an extraordinary view of coloured walls and/or floors, panelled with *marmora* from remote quarries: Egypt (porfido rosso), Turkey (pavonazzetto), Greece (porfido verde di Grecia or serpentino, rosso antico, portasanta) and North Africa (giallo antico) among others; they were combined with other ornamental stones that, even though most of them still have to undergo archaeometric analysis, are likely to be of Spanish origin. Even though not a single fragment of these designs has been preserved, the *marmora* remains make it possible to picture splendidous, multi-coloured compositions for this building, with possible parallels such as Faragola, a luxurious 4th-6th centuries AD Roman villa at Apulia (ancient Ausculum, southern Italy) (Volpe et al. 2006).

Such a luxurious atmosphere should certainly had an impact on the visitor, especially from 6.5 m wide porticoes, with an opened view to the pond surrounded by a white polished marble slabs.

This wealthy *marmora* repertoire was also applied to certain rooms on the long axis of the *peristyle* that define special reception or high status areas. Indeed, all the architectural and ornamental elements adopted a decorative language with a reception and representation function. Therefore, the complex achieved a monumental scenography hardly seen in the Hispania, which expressed the *dignitas* of the *dominus*.

1. This has been possible thanks to the interdisciplinary research projects: “Proyecto integral de investigación Cauca” (since 1999) and “Proyecto de Investigación Cauca. Las Pizarras 2006-2009 Coca (Segovia)” (2006-2009), with the collaboration of Junta de Castilla y León and IE University (Code project: CYL-1A-40057.0002.01) and under the direction of Prof. C. Pérez. The study of the *marmora* was developed within the framework of this second project (see below).

2. A formal agreement in order to study the *marmora* of Las Pizarras was established, and thus it was undertaken within the framework of the previously mentioned project, under the direction of Prof. C. Pérez, and the project “Explotación, uso e intercambio de materias primas inorgánicas entre el norte de Hispania, el sur de la Gallia y Puertos de Roma” (HAR2008-04600/HIST), under the direction of Prof. I. Rodà.

3. The study of these compositions (involving a thorough analysis of each *crustae* and fragment as well as the comparison of these pieces with the negative imprints preserved at the floors and wall remains) is a line of research that will be followed in the future.
The assemblage

An attempt to discern what *marmora* were put to use and their role in the building has been endeavoured. Thus, a first macroscopic identification, which included all the fragments recovered during the archaeological excavation, was carried out at the same site or the nearby facilities (at Coca). The second step of the study focused on a small sample of the whole set due to the time and cost constrains. It involved two types of observations: macroscopic characterization (stereomicroscope) and analysis by optical microscopy (petrographic microscope)\(^4\). Nevertheless, their response to the cathodoluminescence: macroscopic characterization (stereomicroscope) and analysis by optical microscopy (petrographic microscope)\(^4\). Nevertheless, their response to the cathodoluminescence (CL) analysis was also considered. Provenance determination is based on the petrographic comparison to our own samples collection\(^5\) and CLmicrofacies were checked with those available applied to several classical quarrying areas in Greece, Italy and Turkey (Barbin et al. 1989, 1991, 1992a, 1992b) and in Hispania (Lapuente et al. 2000; Lapuente and Blanc 2002; Álvarez et al. 2009). Isotopic analysis was required on two samples as it was impossible to provenance them on the basis provided by the petrographic and CL analysis\(^6\).

Two main groups of *marmora* were identified at Las Pizarras: those of Spanish origin and the foreign ones.

Coloured *marmora*

The coloured *marmora* of Las Pizarras is of foreign provenance and cover a broad geographic spectrum. Regarding ownership, a significant part of the whole assemblage came from imperial quarries. Even though other types of ornamental stones were also identified at Las Pizarras\(^7\), we focus here on the six types that are most abundant at the villa and that seem to be part of a single decorative program undertaken at same time.

Red porphyry or porfido rosso (*lapis Porphyrites*)

Numerous pieces at Las Pizarras belong to one of the most luxurious noble stones from the past: the red porphyry from Mons Porphyrites. Unfortunately, all the fragments were found in secondary contexts; it is thus impossible to identify the combinations of the revetment from where they were prizzed off before the building collapsed.

However, the pieces show a tendency towards geometric forms cut in small plaque modules *opus sectile* especially designed to be used in *opus sectile*. A significant number of small, rectangular pieces of this highly decorative stone from the quarries of Krokeai have been uncovered at Las Pizarras. Again, they can be divided into two large groups according to their morphology: rectangular and elongated-rectangular *crustae*. Only two examples of complete pieces belonging to both groups have been recovered\(^10\). The variety of sizes, together with the uncommon strong colour of this stone, suggests that they were probably intended to delimit the compositions.

However, porfido verde was not exclusively used for rectangular small *crustae*. Scarce non-rectangular *crustae* have been also discovered: they are circular, rhomboid, triangular, semicircular, arch-shaped and, the most particular, drop-shaped with an overall size of around 7 to 8 cm. Among these unusual examples, we should mention

---

4. The equipment used to carry out the macroscopic observations is a binocular microscope ZEISS Stem 2000-C equipped with light arms ZEISS KI 500 LCD. The preparation of thin sections was carried out at the Preparation of Thin Sections Laboratory, Department of Geology at the Universitat Autònoma de Barcelona (UAB). To perform the microscopic observations and descriptions, a polarized light microscope Nikon Eclipse 50iPOL was used. The microphotographs were undertaken by using a camera Nikon COOLPIX5400 coupled to the previously mentioned microscope via an adapter Lens Nikon COOLPIX MDC. An Optical Cathodoluminescence CL 8200 MK5 connected to a microscope has been used to perform the cathodoluminescence analysis.

5. LEMLA (Laboratory for the Study of Lithic Materials in Antiquity) of the Universitat Autònoma de Barcelona (Spain).

6. It was carried out at the Isotopic Laboratory of the Dipartimento di Science Della Terra of the Università di Roma “La Sapienza” (Italy).

7. They consist of isolated examples or residual material whose incidence on the whole assemblage cannot be yet ascertained.

8. They are 0.8 to 4 cm thick (that could be part of wall *opus sectile*) but occasional 2.5 to 4 cm thick *crustae* have been found as well.

9. The rectangular ones are usually 7 to 9 cm wide, but pieces of a more stylized-shape (elongated-rectangular pieces) of 2.5 to 4 cm wide were also recovered; the length of these pieces cannot be guessed due to their high degree of fragmentation. The triangular and trapezoidal ones are less common and have very different sizes, making thus difficult to establish any size parameter.

10. The ones belonging to the first group (rectangular) are 24 x 8.5 x 3 cm and the sizes of those belonging to the second type (elongated-rectangular) 13 x 2.2 x 2 cm. However, the complete examples are rare and thus we can only point out the variations of width and thickness recorded for both groups: the rectangular *crustae* are 7 to 14 wide and 2.2 to 2.5 thick while the elongated-rectangular *crustae* are 0.8 to 4 cm wide and 1.3 to 2.2 cm thick.
few isolated fragments of mouldings and frame-like pieces, such as one with their sides cut at 45º angle. Again, this seems to point to a very specific use for these pieces; indeed, the width of these pieces matches that of the rectangular small plates (7 cm or above) seems to suggest that those second ones were maybe used to separate or limit panels or areas on the *opera sectilia*.

**Giallo antico** (*marmor Numidicum*)

The renowned yellow limestone from near Chemtou (ancient Simitthu) is also present in the assemblage. Indeed, crustae elaborated with all the varieties of giallo antico have been identified. They tend to be small-size, rectangular crustae.

The selection of small geometric forms in giallo antico pieces is worth mentioning. Next to the more common semicircular, triangular, rhomboidal, squared and arch-shaped crustae we have found lanceolate-shaped or spike-shaped, heart-shaped, geminated-circle-shaped and crescent-shaped ones. They were most likely used for the same purposes as the previous *marmora*, i.e. all these pieces were probably part of a same decoration.

**Portasanta** (*marmor Chium*)

This Greek ornamental stone is very scarce at Las Pizarras and the pieces made from it are, fundamentally, lanceolate-shaped and, in lower number, rectangular-shaped. In fact, the role of this ornamental stone in the assemblage is difficult to assess due to the very few examples of crustae on the archaeological record.

**Pavonazzetto** (*marmor Docinium, Phrygium or Synnadicum*)

This variety of the white marble from Afyon is, without doubt, the most abundant imported marble at the villa of Las Pizarras. It is found with most diverse sizes and range of shapes but it is especially common in rectangular crustae. Other shapes recorded in pavonazzetto are: lanceolate, laurel leaf, square, triangular and rhomboidal; yet pieces showing other outlines, which are found exclusively in Afyon pieces, such as the multilobate crustae, have been also recovered (Fig. 3).

Similar to what has been already set out for the Late Roman cist-type grave, was a great breakthrough (125 x 33 x 5 cm).

The fact that rosso antico played an important part to the embellishment of the complex is worth mentioning. Both the homogeneous and the brecciated varieties of *marmor Taeinarium* arrived at Cauca. Among the small pieces of rosso antico found, the vegetable motive-shaped crustae (palm leave) stands out yet they were all found out of stratigraphic context and thus their position remains unknown.

**Rosso antico** (*marmor Taeinarium*)

Another *marmor* used not only for small module elements but also large slabs is rosso antico. The dimensions and lateral cutting of these *lithostrota* indicate that their layout was horizontal, which perfectly matches the negative traces left by the floors. In 2005, the find of a large slab showing these features, reuses as the upper part of a Late Roman cist-type grave, was a great breakthrough (125 x 33 x 5 cm).

Proof of this Turkish marble at Las Pizarras is evident and is in keeping to what has been already seen in other Late Roman large villae or complexes of central Spain, such as Carranque (García-Entero and Vidal 2007, 2008, 2011) and Noheda.

11. Again, the length of the pieces cannot be inferred because they are very fragmented, but their width ranges from 1.1 to 2.7 cm and their thickness varies from 1 to 2.2 cm.

12. They are very rare and, in some cases, of a very small size: their dimensions never go beyond 7 x 4 x 2 cm except for the rhomboidal pieces, which are 6 to 19 cm long x 3 to 9.2 cm wide x 1.3 to 2.3 cm thick.

13. There is a wide range of dimensions of rectangular and elongated plates. Some of them are completely preserved (5 x 1.9 x 1.03 cm; 11 x 2.3 x 2 cm, 5 x 3 x 1.2 cm, 10 x 5.5 x 1.8 cm, 10 x 10 x 1.8 cm, 17 x 6.05 x 2 cm, 10 x 6.5 x 1.5 cm, or 23 x 12.5 x 2.5 cm) which gives an idea of their sizes, even though some larger ones have been also registered.

14. Proof of this are the triangular crustae (from 6.5 x 3.5 x 1 cm to 16 x 8 x 2.3 cm) that have a curved base, in order to be juxtaposed to circular-shaped crustae.

15. *Lithostrota* over 1.5 x 0.5 x 0.05 m.

16. We do not know the length, but they are 6 to 8 cm wide and 2 to 5 cm thick.

17. A first preliminary assessment of the *marmora* of this site will be presented in the X ASMOSIA Conference, in Rome (May 2012).
White marbles

On the other hand, both foreign and Hispanic white marbles were used at Las Pizarras. As already stated, it has only been possible to analyse a sample of the whole assemblage, and therefore the possibility of the presence of other marbles cannot be dismissed\textsuperscript{18}. However, the results of the archaeometric analysis so far are nonetheless significant.

Proconessian marble (\textit{marmor Proconnesium})

Another example of imported \textit{marmor} is that of the white marble from Proconessus. At Las Pizarras, it is quite rare; we only have small fragments that hardly allow us to identify its shape but they seem to be always associated to very specific shapes (Corinthian capitals) such as the one found at the nearby site of Villagonzalo de Coca (Fig. 4)\textsuperscript{19}.

Petrographic characterization and cathodoluminescence analysis of one of these fragments from Las Pizarras (sample CCA-0476)\textsuperscript{20} revealed that it is a coarse-grained marble (MGS 2,5 mm) with a carbonate composition and heterogranular, granoblastic texture (mortar-type). The calcite crystals have subidiomorphic shapes and irregular (sutured) boundaries. There are no signs of intragranular deformation. There are small rounded grains of quartz. Its cathodoluminescence has very homogeneous distribution with a extremely low intensity and garnet with slightly blue hue colour (Fig. 5).

Hispanic marbles

Marble from the Iberian Peninsula at Las Pizarras site is represented basically by different varieties of marble from the Estremoz Anticline. Samples\textsuperscript{21} included fragments of homogeneous white colour (CCA-475, CCA-480 and CCA-482) (Fig. 6), white with grey veins (CCA-479) (Fig. 7), one fragment of the grey variety.

\textsuperscript{18} In fact, two samples of the archaeometric analysis had not been conclusive and the granulometry and macroscopic aspect of a number of non-analysed pieces as well as the fact that Carrara marble was widely used in several areas of Hispania (Pensabene 2005, Gutiérrez García-M. and Rodà in press) prevents us to rule out the presence of this type of Italic marble at Las Pizarras. Therefore, more analysis are needed.

\textsuperscript{19} The example found at Villagonzalo de Coca, about 4Km from Coca (Blanco 1997, 390-391, Fig. 1), might be related to the reuse of capitals from Las Pizarras, but this hypothesis cannot be confirmed with the data currently available.

\textsuperscript{20} Taken from a possible fragment of capital (inv. num. 256/06-SG/314/M1).

\textsuperscript{21} All of them from large slab fragments.
Fig. 5. Photomicrograph of sample CCA-476: under crossed polars (left) and cathodimicrofacies (right).

Fig. 6. Photomicrograph of sample CCA-480: under crossed polars (left) and cathodimicrofacies (right).

Fig. 7. Photomicrograph of sample CCA-479: under crossed polars (left), and cathodimicrofacies (right).
Among these samples, both fine- and coarser-grained varieties were included. Yet the petrographic characterization and CL analysis demonstrate that they all are varieties of the marbles from the same geological formation. They are all calcitic marbles with a granoblastic inequigranular texture, usually isotropic but in some cases slightly or even strongly anisotropic (CCA-482 and CCA-483, respectively). The fine-grained varieties show a MGS ranging from 0.6 to 1.5 mm$^2$ while in the other two samples are fine to medium grain size (1.3 mm MGS)$^{23}$ and medium-coarse (2.0 mm MGS even though the medium size does not over 0.5 mm)$^{24}$. The calcite crystals are subhedral and they have predominantly irregular boundaries, with the only exception is that of the grey, fine- to medium-grained variety (CCA-482). They present polysynthetic twinings which are slightly deformed in samples CCA-475 and CCA-480 while all the other samples do not show any deformation. Also, a clear orientation (or at least slight orientation in some cases) of the crystals can be observed. Small subrounded grains of quartz are present in all samples; there are also idiomorphic micas in association with the bedding planes, those of smaller grain-size veined samples (CCA-478, CCA-479 and CCA-483).

Their cathodoluminescence have heterogeneous distribution and show evidences of recrystallisation, except for one sample (CCA-475), which has a dark garnet colour and low intensity luminescence. The other samples show two types of luminescence: very low to medium intensity with dark garnet to red areas (CCA-477, CCA-479, CCA-482 and CCA-483) and medium to high intensity with red to orange colours (CCA-478 and CCA-480). There are no luminescent points corresponding to the small quartz crystals.

24. Sample CCA-482.
Exceptionally, isotopic analysis was carried out in sample (CCA-475) in order to obtain further data that might help to achieve a clearer ascription. Its $\delta^{13}C$ and $\delta^{18}O$ isotope values match those of fine-grained Estremoz marbles (Lapuente et al. 2000) (Fig. 10).

All these features point to different varieties of marbles from the Estremoz Anticline, which is not surprising given the extension of the outcrop. The fine- to medium-grained samples with very low to medium intensity show features matching those of the area of Pardais25 while, according to their higher intensity luminescence and petrographic traits, two of the other samples may come from the VilaViçosa region26.

Estremoz marble was used mainly in large slabs, such as large lithostrota. Nevertheless, there were also smaller pieces such as rectangular and triangular crustae or small listels. Indeed, there is a great diversity in which this marble was employed at Las Pizarras complex: not only small-sized rectangular crustae similar to those elaborated with other marmora but also hexagonal, octagonal and square pieces have been found. They all seem to have been part of opus sectile pavements (honeycomb, square grids and octagons combined with grey Estremoz squared pieces).

This Hispanic marble was also used for the slabs found around the ornamental pond and that seem to have made up a sort of enclosure. According to their morphology and degree of fragmentation, we can infer that it consisted on a combination of fish scales and oblique grid pattern.

Conclusions

Both the macroscopic observation and archaeometric characterization of the marmora from Las Pizarras help to get an accurate picture of the wide variety of coloured ornamental stones and white marbles used. This is a reflect of the importance of this building, which was not only exceptional in its architecture but also integrated a decorative program including a large collection of marmora not only from Hispanic territories but also from the central and in particular the Eastern provinces of the Roman Empire.

The extraordinary abundance of the marmora collection seems to comprise the remains of two main decorative elements: opera sectilia (from which the small geometric or figurated crustae belonged) and less elaborated revetments (lithostrota and large slabs). The well-preserved negative traces of these slabs on the preparation layer of the pavements are an especially outstanding evidence.

On the other hand, the fact that most of the marmora come from the foremost imperial quarries, must be taken into account. Indeed, this architectural complex, which was erected on the second half of the 4th century AD, must have played an important role in Late Roman Hispania. Again, the constant references to the Eastern provinces, through various elements.

Although it is difficult to evaluate how much marble and ornamental stone was used at this building on this stage of the research, it is clear that while most of the imported marmora were mainly used in small-size pieces for compositions, due to their chromatism and high value,

Barbin, V.; Ramseyer, K.; Décrouez, D.; Burns, S.J.; Chamy, J.; Maier, J.L. 2002b: “Cathodoluminescence from the imperial quarries, which implies access to a highly restricted market, as well as the abundance of the marble elements show an intention of expressing a status and power of dominus (Otiña 2009, 314). Indeed, the combination of the architectural and the ornamental program provided a scenography and luxury beyond the hopes of most noble Hispanic families of the time. At this point, we must remember that emperor Theodosius was born in Cauca and, although there is no direct evidence of him being the proprietor of this residence, the extent of the ornamental richness and the use of imperial marmora strongly suggest that this building was somehow connected to highly powerful personage. In any case, it is only natural to consider that this residence might have served as a reference, or a model, during the second half of the 4th century AD when other large and wealthy complexes were erected at central Hispania.

Finally, we want to emphasize that this paper is not a conclusive one. It is only a first approach to this outstanding site and research will undoubtedly advance as the excavation campaigns progress (and provide new data that will complement what is known so far) and as new lines of research opened (such as the reconstruction of the decorative wall/floor patterns or designs as well as the possible existence of workshops were the final touches were given to the architectural and decorative elements). Indeed, what we have presented here comes from a small part of the whole site and therefore we can foresee that new and abundant evidences to help us understand the building and its function will follow in the near future.

References


27. The Palatium at Carranque (García-Entero and Vidal 2007, 2008, 2011) or the recently discovered villa of Noheda are outstanding examples.


