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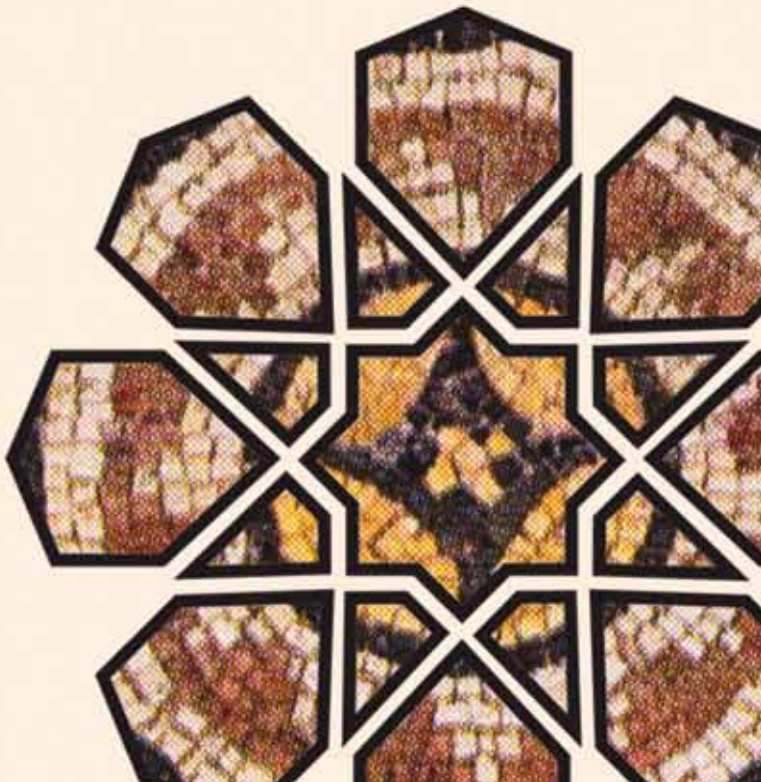

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Funerary Mosaic Found in Northern Syria
Kuzey Suriye'de Bulunan Mezar Mozaiği

Komait ABDALLAH*

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Abstract

A mosaic was discovered in 2007, in a funerary chamber at Frykia village in northern Syria, by the excavation service of the Directorate of Antiquities and Museums of Syria. This mosaic presents an interesting scene consisting of two columns with a pair of animals facing each other next to a fruit tree. The study of the decor suggests that this mosaic belongs to the 6th century B.C. and that the iconographic theme is inspired by Isaiah 11:6 concerning the animal kingdom of peace and is rendered according to the Syrian tradition of mosaic art from the 6th century. The representation of this topic in a mosaic belonging to a funerary chamber has a significance, regarding the Christian interpretation of life after dead.

Keywords: *Mosaic, Syria, Idleb, funerary, Byzantine.*

Öz

2007 yılında, Suriye Eski Eserler ve Müzeler Müdürlüğü tarafından, Kuzey Suriye'deki Frykia köyündeki bir mezar odasında gerçekleştirilen kazıda bir mozaik bulunmuştur. Bu mozaik üzerinde, iki sütun arasında, bir meyve ağacının yanında durur şekilde birbirine doğru bakan bir çift hayvanın betimlenmiş olduğu ilginç bir sahne yer almaktadır. Bu dekor çalışması, bu eserin İ.S. 6. yüzyıla tarihlendirilebileceğini düşündürmektedir. Ayrıca bu ikonografik tema hayvanlar alemindeki barışın üzerinde duran Isaiah 11:6'dan esinlenilmiş olup 6. yüzyıl Suriye mozaik sanatı geleneği ile yorumlanarak betimlenmiştir. Bir gömü odasına ait olan mozaik üzerindeki bu tür bir betim Hıristiyanlık'ın ölümden sonraki yaşamla ilgili yorumlarını yansıtması bakımından oldukça önemlidir.

Anahtar Kelimeler: *Mozaik, Suriye, Idleb, mezar, Bizans.*

The mosaic was discovered in 2007 by the Antiquities Section in northern Syria at Frykia village in Idleb. Currently it is preserved *in situ*. It is a floor mosaic from an ancient room used by the owner of the neighbouring house as a stable. Following the excavation, it was determined that this room belongs to the Byzantine Period and that it was reused and restored many times during the Medieval Period[1]. This room eventually became a funerary chamber, including many *sarcophagi* made of limestone. The *sarcophagi* are located at three sides of the chamber. Some of the sarcophagi were destroyed while others have been conserved and decorated with cross sculptures in medallions. The entrance to the room was located in the western wall preceding a staircase composed of three grades. The floor of the room was paved with a rectangular mosaic panel that measures 5,80 x 4,60 m. The *tesserae* are made from limestone and measure 1 cm on each side; the colours used are: white, black, brown, grey, red, and pink. The mosaic is composed of three frames and a figured panel.

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[1] A preliminary report of the discovery of a mosaic in Frykia village: DGAM 2007. The excavators did not provide in their report the reasons for the proposed dating.

Mosaic description

We observe the first external frame (Fig. 1), which surrounded the grades and was located between the sarcophagi. It is separated from the second frame by a white row and decorated in a chessboard-pattern with a nested square polychrome pattern of alternating brown and grey (Décor I: pl. 115b). The second frame (Fig. 2) surrounded the figured panel. It included a polychrome row of outlined tangent circles and horizontal spindles (Décor I: pl. 22i). The circle is coloured in with white and contains another circle in pink and a smaller circle in white, in the middle of which there is a black spot. A black triangle outlined the space of the frame, which is ensconced between the circles and the spindles. Each grey spindle includes a smaller spindle, in white, ornamented with a vertical lozenge in red.

The main subject (Fig. 3) consists of animal figures arranged vertically in two columns: all the figures are portrayed against a white background. There are four scenes, each scene is composed of a fruit tree separating a pair of animals facing each other, one wild and the other peaceful. In front of each animal there is a

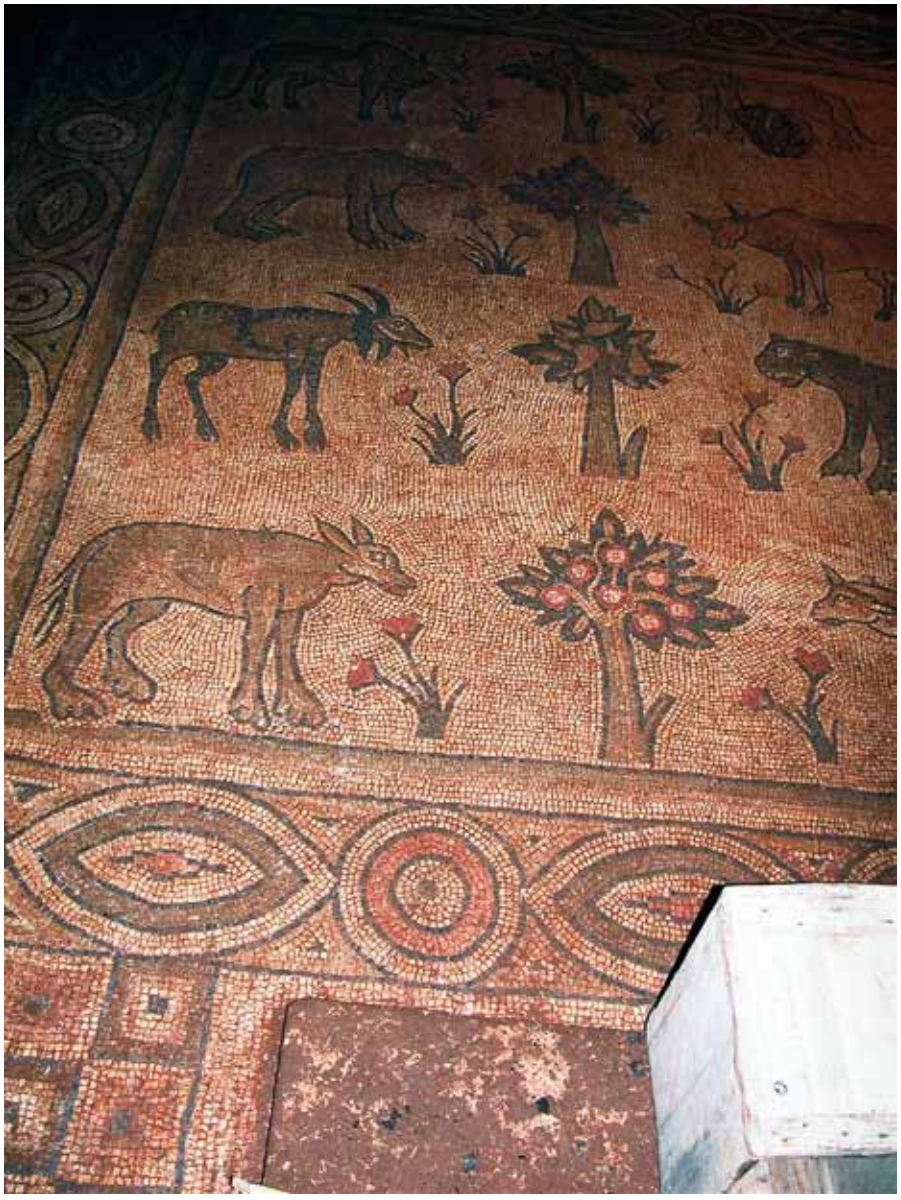

Figure 1
DGAM archive, Syria.

Figure 2
DGAM archive, Syria.

Figure 3
DGAM archive, Syria.

flower plant. The *tesserae* of the background have been irregularly disposed. We can read the scene starting from the lower register, which is the first scene at the entrance to the room. We find a lamb in the right side confronting a wolf on the other side. At the centre, a tree with round fruits (probably apples) is depicted (rendered in red *tesserae* and bordered by white *tesserae*). In the second register from above, a leopard is represented at the right facing a goat depicted at the left-hand side. The tree depicted at the centre is a pear tree. The third register

contains a cow on the right-hand side in front of a bear at the opposite side. The tree in the middle bears round fruit, rendered in red *tesserae*. In the upper register, a lion is portrayed at the right-hand side facing a bull, at the left-hand side, and a grenadine tree separates the two animals.

Geometric motifs

The first geometric motif of the frame, decorated in a chessboard-pattern with a nested square polychrome, is a rare motif. The only example to compare it with is found in the mosaic of the Houad church, in Syria (Abdallah 2009: pl. XXXI, 2), dated to 568/569 A.C. The difference between the two mosaics is found in the colours used, but the treatment of the chessboard-pattern is very similar.

The second motif of the frame is the row with a polychrome pattern consisting of outlined tangent circles and horizontal spindles. We can see these geometric elements in the frames of the mosaic of the church of Tell Ar (Abdallah 2009: pl. LX, 2), in northern Syria (434/435 A.C.), and of the mosaic of Kafer Sajneh (Abdallah 2009: pl. CXVI, 1), of the mosaic of the Rams' Heads (Levi 1947: pl. CXXXIII, c) at Antioch (5th century A.C.), and of the frame of the central nave of the church of Beit Mery (Donceel-Voûte 1988: 340 fig. 324) in Lebanon (second third of the 5th century A.C.). But, in these two cases, the circles and the spindles are interloped tangentially in asymmetrically shaded bands. In the Marret An-Nouman Museum, we have an example very close to our motif that we can see in the panel exposed at the portico (end of the 5th and beginning of the 6th century A.C.), which was conserved in Canada (Abdallah 2009: pl. C, 1). The frame of this mosaic is ornamented exactly like the frame of our mosaic, by a polychrome row of outlined tangent circles and striped horizontal spindles. The difference is observed in the colour and the motif filling the spindle. In the mosaic at Marret An-Nouman, there is a lozenge in the spindle that is not depicted on our mosaic. Another example that receives the same treatment is the frame of a mosaic conserved at the İznik Museum in Turkey (Şener 2011: 875 fig. 2).

Iconography

In this mosaic, we find many types of scenes that are characterised by a landscape background characterised by trees and flowers or flower motifs. In the landscape, both wild and domesticated animals are represented and are horizontally or vertically disposed. Sometimes the animals are depicted fighting each other and other times they are depicted in harmony. In this mosaic, we see four pairs of animals, represented vertically in two columns, carnivorous animals and herbivores. We observe a similar scene in the panel of the main nave of the church of Houad, dating from 568/569 (Donceel-Voûte 1988: 141). In this panel there are also two columns of animals disposed according to their nature, but they do not confront each other nor are they separated by a tree, as in our case. The flowering plants placed in front of each animal, in our mosaic, are dispersed irregularly in the background of the panel of Houad. In addition, there are bird figures on the Houad panel, and we find that an eagle flanked by a phoenix dominates all animals, but such figures do not occur in our scene.[2] Another example that is iconographically close to our scene is found in a panel conserved in the Hama museum, belonging probably to the second half of 6th century (Abdallah 2014: 302 fig. 7). In this example, we see opposing animals, depicted

[2] For this mosaics, the scene is probably inspired from the Genesis (1, 7 et 2,7, 18-23) and was interpreted as the figure of the new world inaugurated by Christ, symbolised by the eagle (Abdallah: 2009: 18).

in a peaceful atmosphere, but they are arranged in three columns and there are no trees or flowers to separate the animals. It is clear that the scene from our mosaic is unique. Although this kind of scene is quite common in Syrian mosaics, our case is very peculiar compared to the others. We can see the representation of fruit trees between two animals in front of one another, but in the majority of cases, the animals are identical, making an asymmetrical composition (Abdallah 2009: 372). Concerning the flowering plant depicted facing each animal, we can find some examples of this in northern Syrian mosaics, but we observe that the flowering plant is just accompanying the pacific animals, as can be seen in the Frykia mosaic exposed in the Marret An-Nouman museum, dated to 511 A.C. (Abdallah 2009: pl. XVI, 1); in the mosaic of Alqassabiat (Abdallah 2009: pl. CXI, 1, CXII, 1-2); and in the mosaic of Maar Zita (Abdallah 2009: pl. CXXV, 1-2). We have some mosaics in Jordan that include a plant between two identical pacific animals, such as the mosaic of the church of Apostles at Madaba, dated to 587 A.C. (Piccirillo 1993: 106 fig. 89). The mosaic of the chapel of the Theotokos in Mont Nebo, belonging to the first decades of the 7th century, presents a flowering plant in front of a gazelle (Piccirillo 1993: 151 fig. 200). In another mosaic, that is the floor of the church of Sergius at Umm Al Rassas and dating from 587/88 A.C., we can see two flowering plants in front of two sheep facing each other in a medallion (Piccirillo 1993: 243 fig. 365). In the mosaic of the chapel of the Tawl family at Madaba, we also find a lion and a bull facing each other and separated by a plant (Piccirillo 1993: 128 pl. 139).

Rendering

Concerning the mosaic of Idleb, the animals are drawn in a simple style. Even though each animal is identifiable, the overall quality of the figures is poor. Their bodies are determined by a thick outline in black *tesserae*. The mosaic artist employed two colours for marking the volume of the body. At the same time, the artist tried to identify each animal by selecting a specific colour in which to render its skin. This schematic way to represent the animals is due to the degradation of the quality of 6th century mosaic workers. In some examples of animal figures represented in the mosaics of northern Syria in the 6th century, we observe the use of a thick outline for the body and two colours to evoke the skin. We find this peculiar treatment in many animal figures on the mosaic of the northern church of Marrata (Abdallah 2009: pl. IX) in northern Syria, probably dating to the second half of the 6th century A.C., as well as in the mosaic dating to 668/669 A.C. of the south collateral of the church of Houad (Donceel-Voûte 1988: 141 fig. 110).

Concerning the trees, it can be observed that they have been treated in a schematized manner. Each tree is characterized by a reduced size compared with the animal figures, the disproportion between the trunk and the branches bearing fruits, and the use of black outlines for rendering all parts of the tree. The trunks are coloured with one light colour with many branches forking outwards to support the pear-shaped leaves rendered against a dark background along with a trunk (this can be observed in three trees). The fruits are rendered in two forms, one is rounded and coloured in red, or in red and white (three trees), and the other is pear-shaped (one tree). We find this schematised manner in the treatment of the fruit trees on the mosaic of the southern church of Marrata in northern Syria, dating to the second half of the 6th century (Abdallah 2009: pl. X-XI). The flowering plant is composed of a stump forking into many stems, two or three of which bear a flower. The stump and the stems are rendered in grey and

black *tesserae* and the flower is pink and triangular in shape. We have several examples of plants bearing flowers in Syrian mosaics dating from the second half of the 5th and 6th centuries. The type of plant depicted on our mosaic is similar to those of the church of Oum Hartein in the centre of Syria, dating to 500 A.C. (Donceel-Voûte 1988: 194-195 fig. 170-172), and in the mosaic of the church of Houeidjit Halaoua, situated in northeast of Syria, and dated to 471 A.C. (Donceel-Voûte 1988: 146 fig. 119).

Interpretation

The mosaicist's choice to represent both wild and domesticated animals in a peaceful environment evokes the passage of Isaiah 11: 6-7 regarding the kingdom of peace where animals live together serenely. Comparing the biblical text with the mosaics, we find that these scenes are inspired by the Isaiah passage, but they are treated in a particular manner that follows traditional iconographic forms, known in Syria in the 6th century. The animals portrayed and the hierarchy of the scene in this mosaic reflect the passage from Isaiah. In this mosaic, the animals portrayed from the lower register to the upper are: a wolf and lamb, a leopard and goat, a bear and cow, and a lion and bull (or an ox). In the Isaiah passage, we read:

> «The wolf shall dwell with the lamb,
> and the leopard shall lie down with the young goat,
> and the calf and the lion and the fattened calf together
> and a little child shall lead them.
> The cow and the bear shall graze; their young shall lie down together and the lion shall eat straw like the ox.» (Isaiah 11: 6-7).

Only the third phrase in the text is not depicted. In addition, the representation of the flowering plant and the fruit tree with the animal figures do not correspond to the description in the text.

According to Campbell (Campbell 1995: 125) there are five examples of this subject in mosaics in early Byzantine churches, discovered in many regions, especially in Turkey, Corsica and Jordan. In these mosaics there are many scenes, which demonstrate the peaceful kingdom of Isaiah, represented in different ways, all of these scenes are accompanied with inscriptions from the Isaiah passage.

Three examples are found in southern Turkey. The most complete depiction of them is found in the church of Karlık (Gough 1974: 416-419). In this mosaic, all the pairs of animals described in the Isaiah passage are rendered with fidelity, even to the point of the description of the actions of each pair. It is possible that the elephant and stag are the whim of the mosaicist (Campbell 1995: 128). Thus, there is a difference compared to our mosaic, where the mosaicist did not respect the details of the textual description and chose only four pairs of animals and represented them facing each other separated by a tree and not according to the attitude that distinguish the animals as they are described in the biblical text, and as they figure in the Karlık mosaic. The second example from Turkey is a fragment of mosaic from the church of Koryos, in front of the apse (Campbell 1995: 182). This fragment shows a lion, a leopard and a ram with a short inscription in Greek, taken from the verses in Isaiah. The third mosaic from Turkey is the mosaic located in front of the apse in the Anemurium (Russell 1987: 70-74), and we find just a leopard and a kid separated, as in our mosaic, by a tree. Nevertheless,

they are not preceded by a flowering plant, as is mentioned in the inscription above them, which is an excerpt from the verses of Isaiah.

In a church discovered in Corsica, we have a mosaic showing the rest of an ox and a manger with straw with a Latin inscription citing a passage from Isaiah (Campbell 1995: 128). Similarly, at Ma'in, in Jordan, we have a fragment of an ox with a Greek inscription, identifying the lion eating straw, like the ox, as we read in the passage from Isaiah (Piccirillo 1989: 81).

We have also some examples in mosaics from early Byzantine churches, from Jordan and Syria, which contain representations of animal pairs (predators and prey), depicted in pacific postures. This representation evokes the peaceful kingdom of Isaiah. For example, the paradise mosaic of the Farid Elmasri house (Piccirillo 1993: 78) that includes a lion and an ox facing each other on either side of a plant. In Syria, the Jarjinaz mosaic, displayed at the Marret An-Nouman museum, we observe a bear eating fruit near a gazelle in a landscape (Abdallah 2009: pl. LXXVI, 2). Another example from Syria would indicate that the peaceful kingdom is found in a mosaic exhibited at the Hama Museum (Abdallah 2014: 302 fig. 7). In this mosaic, both predator and prey are portrayed vertically without a discernable order and in a peaceful position.

It is clear that our mosaic is distinguished by the manner of representation of the peaceful kingdom depicted in Isaiah, which is characterised by the figures of predators and prey in peaceful positions and by the introduction of paradisiac elements, such as fruit trees and flowers. The particularity of the mosaic is demonstrated also by the architectural context, which is a funerary chamber. It is evident that the subject depicted in the mosaic is linked to the function of the room. Funerary mosaics are very rare in Syria in the early Byzantine era. One of the first examples was found in a catacomb at Homs, dated to the 6th century A.C. (Balty 1977: 144-145). But in this mosaic, there is figuration of the deceased with two others personages. In North Africa, we have many funerary mosaics dating to Late Antiquity, which include epitaphs. These mosaics are decorated with motifs suggesting paradisiac happiness (Duval 1976: 65). The motifs include a flower, a vase, a palm tree, a vine scroll, and fruits such as grenadines, apples, grapes, and figs. There are also representations of different birds, as well as fish and lambs (Duval 1976: 62-66). Many funerary mosaics, which date to Late Antiquity, are known from Spain, Italy, and Croatia. All of these mosaics include epitaphs and are similar to those found in North Africa (Duval 1976: 72-76). Christian funerary iconography from Late Antiquity was especially marked by motifs evoking a paradisiac atmosphere. Vegetal elements (such flowers, vine scrolls, and palms), birds, lambs, and crosses are elements mainly representative of paradise. The figures of the deceased along with saintly figures, and some narrative scenes inspired by the Bible, such as Daniel fighting the lion, or the arc of Noah with the animals, or the good shepherd with predators and prey depicted abiding peacefully are also themes that appear habitually (Zebawi 1998: 229-230).

It is evident that paradisiac and eternal peace is the most significant iconographic element in the funerary art of early Christianity. The figurative or narrative scene of paradise evokes this notion of eternal life. The Idleb mosaic includes a representation of paradise that is likely the peaceful kingdom as it is described in Isaiah. Theodoret of Cyrus[3] interprets this theme in his commentary on Isaiah,

[3] Theodoret of Cyrus is a syrian theologian of the school of Antioch. He was a bishop of Cyrrhus (in northern Syria) between 423-457 AC.

as the vision of the end of days where animal that are natural enemies, will be at peace with each other. It is the messianic reign of peace, foretold by Isaiah and effectuated by Christ who promised to provide it as a gift to the faithful[4].

These types of paradisiac figures are especially depicted, as we have mentioned above, in church mosaics from the early Byzantine period. For the scene in the Karlık mosaic, Gough has indicated that it represents the peace promised by Christ to the believers as a special gift and may symbolise the reconciliation between opposing Christian fractions in the 5th and 6th centuries A.C. (Gough 1974: 419). According to Campbell who has worked on the iconography of the peaceful kingdom in mosaics, the relation of this iconographic theme to the Christological controversies of the 5th and 6th centuries does not provide a satisfactory solution. Campbell attempted to provide an explanation of this scene by linking it to the rite of Baptism that was highly important in the early Byzantine period (Campbell 1995: 129-130). In our example, the relation between the function of the funerary chamber and the subject depicted in the mosaic is very clear. The paradisiac reference in the image is indisputable. The main subject of Christian funerary iconography in Late Antiquity was the eternal life motif with a peaceful connotation. It is obvious that the funerary iconography is linked with the Christian interpretation of life after death. In reality the iconography that we find in Christian tombs in Late Antiquity corresponds to the exposition of the believers' fate in the afterlife, as it is described in the biblical text and in the apostolic constitution. The peaceful kingdom is the messianic kingdom of paradisiac peace promised by Christ to the true believers (Gough 1974: 417). It exemplifies the role of the pious and the righteous and those who see the glory of Christ (Metzger 2003: 240-243). Thus the explanation of the scene includes a figurative representation of paradise based on the biblical text of Isaiah and represented according to the mosaicist's vision. According to this vision, the addition of fruit trees and flowering plants can be considered as paradisiac elements.

Dating and Conclusion

The representation of the animal scene with geometrical frames is frequently used in the mosaics of northern Syria from the second half of the 5th and 6th centuries A.C. The comparative study for the geometrical motifs of the frames and the quality of animals figures suggest that this mosaic could be dated to the second half of the 6th century A.C.

The Idleb mosaic is an exceptional example in comparison with the Syrian mosaics of the early Byzantine period, especially as regards the iconographic themes and the architectural context in which the mosaic was laid. On the one hand, it presents an obvious illustration of a biblical passage that is not very frequently represented in Syrian mosaics. On the other hand, it paves the floor of a tomb, which is very rare for Byzantine Syria. In addition, this iconography provides us with an idea about Christian theology concerning the afterlife and funerary practices in the villages of northern Syria in the early Byzantine period.

4 Théodoret de Cyr, commentaire sur Isaïe 11: 6-7, 415-440.

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Etude pétrographique comparée des tessellata de quelques mosaïques romaines des sites archéologiques de Volubilis et Lixus (Maroc)

Fas'taki Volubilis ve Lixus Arkeolojik Yerleşimlerine ait Çeşitli Roma Mozaikleri Tesseralarının Karşılaştırmalı Petrografik Çalışması

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Abstract

Most of Roman archaeological sites in Morocco contain many mosaics, it offers significant pavements decorated with the majority of architectural buildings components different archaeological sites of Morocco.

Petrographic and mineralogical analyses of tesserae coming from some of Roman mosaics in Volubilis, and Lixus, archaeological sites have revealed the petrographic nature of the rocks used in the decoration of different tessellata. The knowledge of petrographical characteristics of these tesserae represents an essential step to understand mechanical properties of the used materials, their weathering processes and the location of their origin.

This comparative study carried on natural materials used in roman mosaics tesselata in some archaeological sites give us ideas about the provenance of building materials and the movement of materials in Morocco and in the Mediterranean region.

This study will also provide solutions to guide professionals in the choice of interventions related to the restoration and conservation.

Keywords: *petrography, mineralogy, provenance, Lixus, Volubilis, mosaic, Morocco.*

Öz

Fas'ta yer alan Roma Dönemi'ne ait arkeolojik alanların büyük bir kısmı pek çok mozaik barındırmaktadır. Fas'ta yer alan pek çok farklı arkeolojik alanda, üzerinde mimari yapı bileşenlerinin betimlendiği dikkate değer mozaikler görülmektedir.

Volubilis ve Lixus'taki Roma Dönemi'ne ait bazı mozaiklerden alınan tessera örneklerinin petrografik ve mineralojik analizi ile mozaikler üzerinde kullanılan farklı kayaç türleri belirlenmiştir. Tesseraların üretildiği kayaç türlerinin belirlenmesi, materyaller üzerinde kullanılan teknik, ufalanma süreçleri ve kaynaklarının belirlenmesiyle ilgili olarak önemli bir adımdır.

Roma mozaiklerinden alınan doğal örnekler üzerinden karşılaştırmalı bir çalışma gerçekleştirilmesiyle yapılarda kullanılan hammadde kaynakları ile hammaddelerin Fas ve Akdeniz'deki yayılımları hakkında fikirler edinilmiştir.

Bu çalışma aynı zamanda profesyoneller için restorasyon ve konservasyon esnasında uygulanacak olan müdahalelerle ilgili çözüm önerileri getiren bir rehber niteliği taşımaktadır.

Anahtar Kelimeler: *petrografi, mineraloji, kaynak, Lixus, Volubulis, mozaik, Fas.*

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Introduction

Le Maroc a connu la succession de différentes civilisations à travers le temps qui ont marqué son histoire. Parmi ces civilisations, la civilisation romaine est célèbre par le nombre et la particularité de ses sites archéologiques qui subsistent jusqu'à nos jours. Parmi ces sites on note ceux de Volubilis, Lixus et Banasa dans la plaine du Gharb. Ces sites sont connus pour leurs monuments historiques majestueux et pour leurs mosaïques qui traduisent la mythologie et le style de vie romaine.

A Lixus, la majorité des mosaïques ont été déposées et exposées dans des musés archéologiques. En revanche, une grande partie des mosaïques du site de Volubilis sont restées en place ce qui a permis à ce site d'attirer jusqu'à nos jours un grand nombre de visiteurs.

Les mosaïques *in situ* subissent en fonction du temps une altération des pavements et *tesselatum* se traduisant par la formation de lacunes qui portent atteinte à la beauté de la mosaïque. Afin d'entreprendre des opérations de conservation et de restauration de ces mosaïques, une parfaite connaissance de leur structure et des matériaux naturels de base ayant servi à leur construction s'avère nécessaire. Ainsi, l'objectif de ce travail est d'étudier les caractéristiques pétrographiques, minéralogiques des *tessellata* de quelques mosaïques romaines des sites de Volubilis et Lixus. La détermination des matériaux utilisés dans les mosaïques qui décoraient les différentes demeures est nécessaire pour l'identification des formations géologiques et des carrières ayant fourni ces matériaux (Fig. 1).

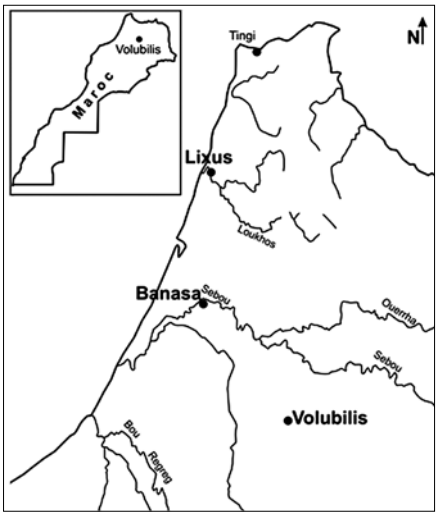

Figure 1
Situation des sites archéologiques de Volubilis, Banasa et Lixus au Maroc

II. Les sites antiques du Maroc

a) Volubilis

Le site antique de Volubilis est situé à environ 30 km au nord de la ville de Meknès, il se situe sur un plateau de moyenne altitude, proche de la ville de Moulay Idriss Zerhoun (Fig. 2).

Il s'agit du site archéologique le plus célèbre et le mieux conservé du Maroc. Son extension fut progressive, le premier noyau de la ville date du II^{ème} siècle avant J.-C. sa superficie était alors estimée à douze hectares, elle faisait partie du royaume mauritanien qui se formait en Afrique du Nord. Après l'annexion du Royaume de Maurétanie à l'Empire romain en 42 après J.-C., la ville fut élevée au rang de municipe et connut une extension urbaine importante. En 285 après J.-C., l'administration et l'armée romaine évacuent la ville. Les Volubilitains se replient vers l'ouest pour défendre la ville. Volubilis fut abandonnée après la chute de l'Empire romain. Volubilis renferme des monuments politiques, religieux, des demeures et des thermes décorés avec des mosaïques et des fontaines. La particularité de ces mosaïques réside dans le fait qu'elles sont restées *in situ* et que, malgré leur longue exposition aux différents agents d'altération, la plupart d'entre elles demeurent bien conservées (maison de Vénus, maison d'Orphée, maison des Quatre-saisons, etc.).

b) Lixus

Le site de Lixus est situé à 5 km de la ville de Larache, il est bâti sur une petite colline (Fig. 3).

Lixus est considéré comme l'un des sites les plus anciens d'occident avec Cadix et Utique, il fut fondé par des navigateurs phéniciens vers 1100 avant J.-C.

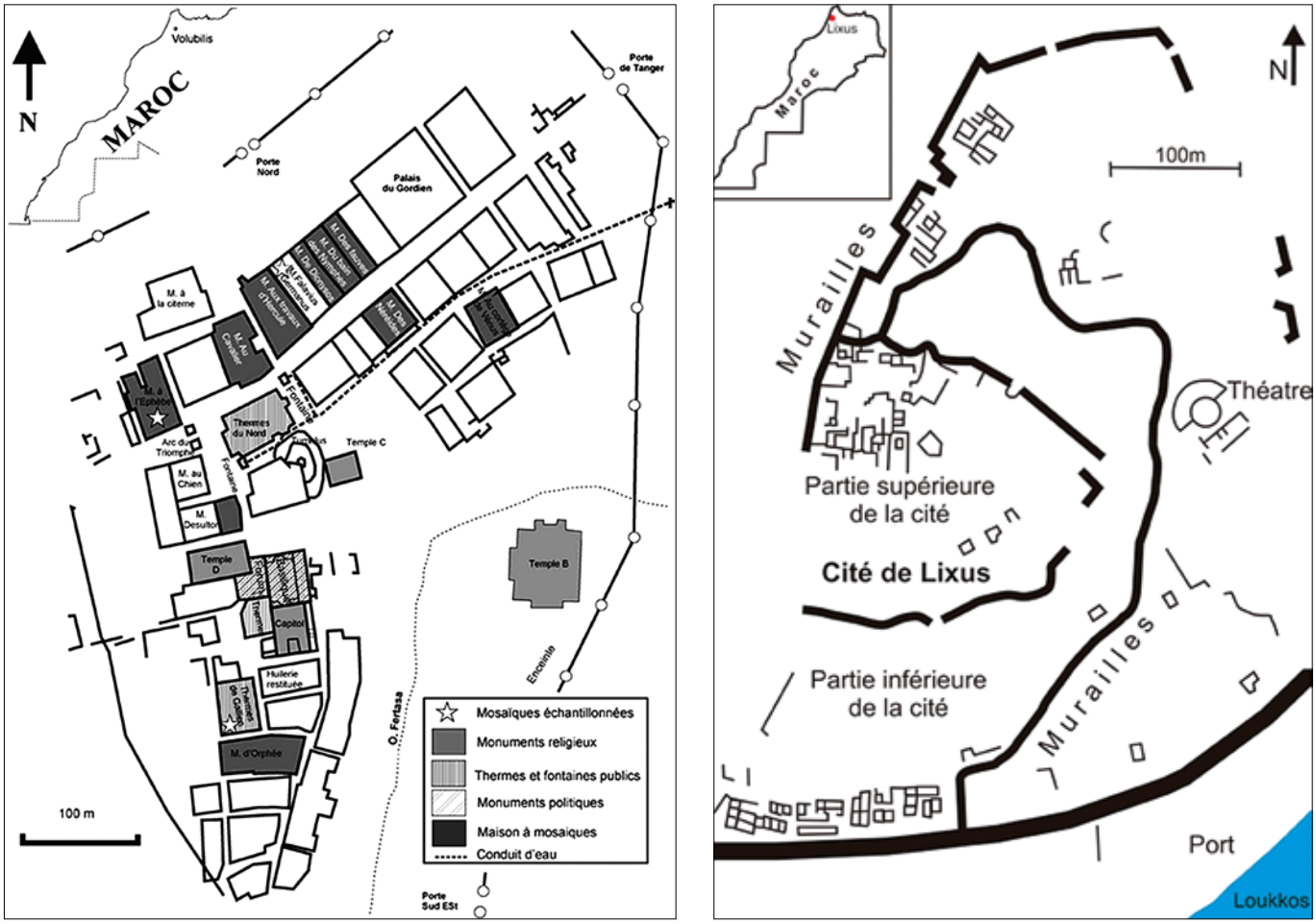

Figure 2
Carte du site de Volubilis et localisation des mosaïques échantillonnées (Panetier 2002)

Figure 3
Carte du site de Lixus (Ponsich 1966)

L'histoire réelle de la ville commence au VIII^{ème} avant J.-C. A partir de 42 de l'ère chrétienne, Lixus devient colonie romaine, et connait un grand développement économique et urbain de la ville. La pêche et les industries de salaisons font de Lixus une métropole économique en Méditerranée occidentale. La ville se dote à cette époque de plusieurs monuments publics (théâtre-amphithéâtre unique en Afrique, quartier des temples, quartier industriel, thermes, basilique, forum) et des demeures privées (maisons à péristyle central avec bains privés) richement décorées de fresques et de mosaïques de bonne facture actuellement réputées pour leur qualité technique et artistique et pour la variété des motifs tant figurés que géométriques. Ces mosaïques romaines qui datent du II^{ème} et III^{ème} siècles après J.-C. et qui ont été pour la plupart déposées et exposées au musée archéologique de Tétouan comptent parmi les plus belles réussites de *l'opus musivum* en Maurétanie tingitane.

III. Matériels et Méthodes

Les échantillons de tesselles, objet de cette étude, ont été récoltés dans les mosaïques d'Ephèbe et de Flavius Germanus à Volubilis. Les autres tesselles errantes ont été récoltées près de la mosaïque du dieu Océan à Lixus et montées en lames minces.

Les observations pétrographiques ont été réalisées sous microscope optique couplé à une caméra pilotée par le logiciel PCTV.

IV. Analyse pétrographique des tesselles des mosaïques étudiées

a) La Mosaïque des Néréides (Maison à l'éphèbe / Volubilis)

Cette mosaïque constitue le pavement du triclinium de la maison à l'éphèbe du site antique de Volubilis, demeurée *in situ*, elle a été découverte en 1932 lors du déblaiement de la maison à l'éphèbe. Elle mesure 2,60 m sur 3,75 m. Le motif principal se compose de quatre médaillons circulaires placés aux quatre angles et reliés entre eux par quatre médaillons ovales. L'ensemble est orné de poissons. Au centre, dans un médaillon octogonal, figure une néréide assise sur la croupe d'un cheval marin. En dessous du groupe, entre les jambes de la nymphe et celles de sa monture, un dauphin nage dans le sens inverse (Limane 1998).

Des échantillons de tesselles à base de roches (blanche, rouge brique, marron rose, noire, blanc onyx), de terre cuite et de verres artificiels (gris, vert foncé, vert, bleu et jaune), représentatifs de l'ensemble des matériaux utilisés dans la décoration, ont été récoltés dans la mosaïques des maisons de Flavius Germanus et de l'éphèbe.

La surface des mosaïques est formée par l'assemblage de tesselles, de tailles et de couleurs différentes. En effet, la taille de ces tesselles varie de quelques millimètres pour celles à base de marbre et de verre à 1 cm pour celles à base de calcaire.

Les tesselles qui composent les mosaïques des demeures, sont d'autant plus petites que les schémas artistiques sont plus complexes. En revanche, les tesselles qui composent les mosaïques des thermes et des passages entre les demeures, là où l'architecture des mosaïques est simple, la taille en est grossière.

Globalement, les tesselles de couleur blanche sont les plus abondantes dans les différentes mosaïques. Ces tesselles sont généralement taillées dans des calcaires oolithiques de type packstone. On y observe des oolithes de quelques centaines de microns de diamètre, de forme radiale, et des pelotes noires ovoïdes, liés par un ciment blanc sparitique (Fig. 5a).

Figure 4
mosaïque de l'Ephèbe
(Volubilis)

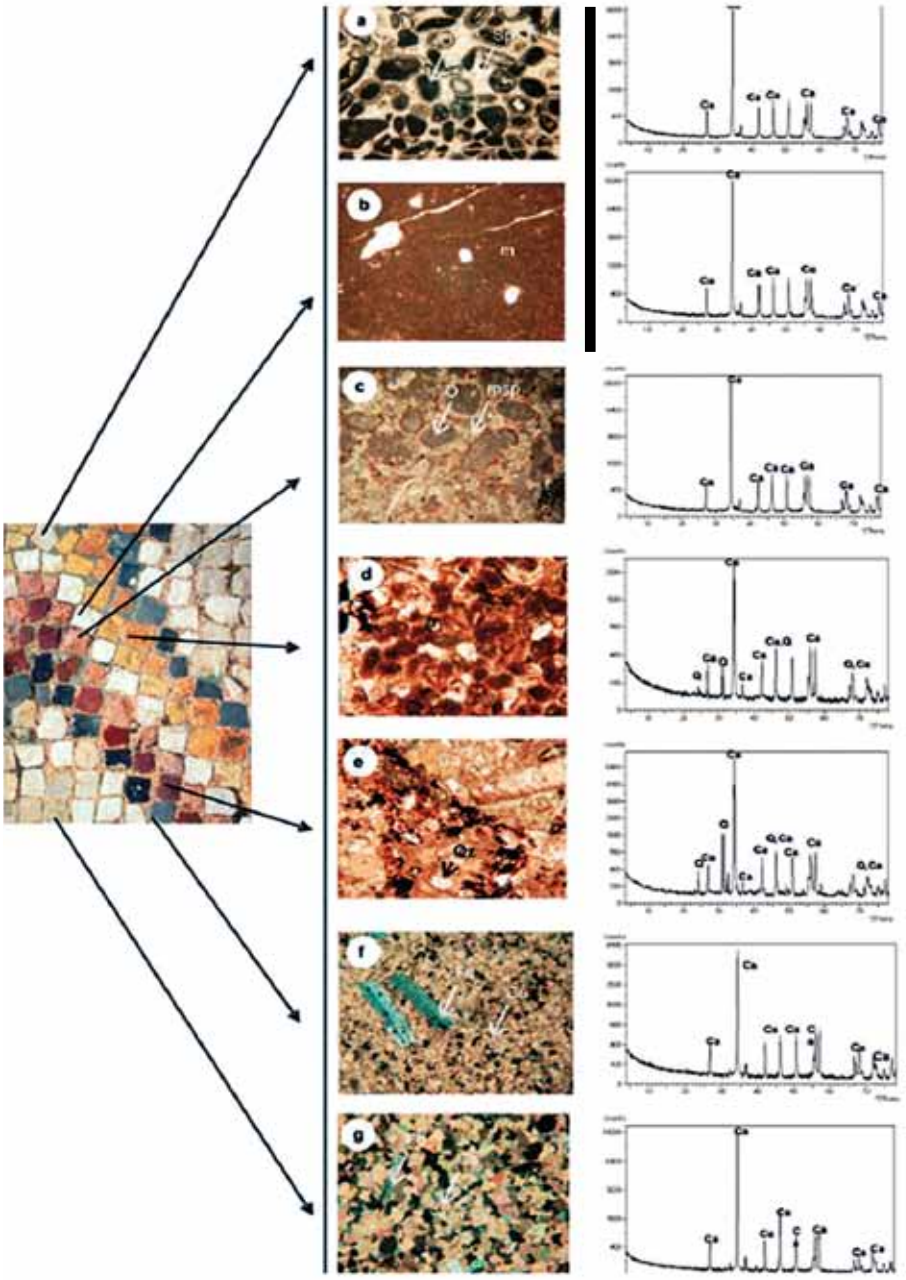

Figure 5
Analyse pétrographique
des tesselles de la mosaïque
de l'Ephèbe à Volubilis
(Dekayir et al. 2004)

Des coquilles de foraminifères ont également été révélées. D'autres tesselles, à base de calcaire blanc mat, sont aussi présentes dans ces mosaïques. Elles sont peu abondantes et représentées par du calcaire micritique de type mudstone (Fig. 5b).

Les tesselles de couleur rose sont également des calcaires oolithiques. Les oolithes, de taille plus grande, sont cimentés par de la microsparite à enduit ferrugineux (Fig. 5c) qui donne à ces tesselles leur couleur rose. Des restes de gastéropodes sont présents.

Les tesselles de couleur marron sont à base de calcaire. Les oolithes y sont mal individualisés. Le ciment sparitique primaire ainsi que les oolithes sont complètement imprégnés d'oxydes de fer, probablement liés à des circulations diagénétiques tardives (Fig. 5d). Cette imprégnation ferrugineuse est responsable de la couleur de ce calcaire.

Les tesselles de couleur rouge brique sont formées d'un calcaire gréseux ; celui-ci est constitué de grains de quartz anguleux, liés par un ciment calcaire brun, avec localement des taches brun noirâtre très riches en hématite, ce qui confère la couleur rouge brique à ce faciès. Il s'agit d'un faciès très fossilifère, avec des restes de mollusques (Fig. 5e).

D'autres tesselles rouges à base de terre cuite ont été utilisées.

Les tesselles noires et blanches proviennent de marbres. Les tesselles noires contiennent essentiellement des minéraux de calcite de petite taille, entourant quelques minéraux de feldspath alcalin (Fig. 5f). Les tesselles de couleur blanche sont faites de marbre, constitué principalement de calcite à grains grossiers et de rares minéraux de feldspath alcalin et de muscovite (Fig. 5g) ; comparé au marbre noir, le faciès blanc est plus riche en Mg et en Al (Dekayir et al. 2004).

b) La mosaïque du dieu Océan (Thermes de l'Amphithéâtre / Lixus)

La mosaïque du dieu Océan orne les thermes de l'amphithéâtre du site antique de Lixus, cette mosaïque demeurée *in situ* a été découverte en 1964 à l'occasion des fouilles du théâtre. Elle mesure 10,4 m de long et 6,1 m de large, ce qui fait d'elle une des plus vastes mosaïques du Maroc.

La mosaïque est composée de médaillons ornés de motifs floraux et de lignes géométriques d'une grande richesse de coloris entourant un emblèma central presque carré de 1,53 m de long et 1,5 m de large qui représente une tête du dieu Océan (Ponsich 1966).

Les échantillons des tesselles sont récoltés de matériaux utilisés dans la décoration géométrique de la mosaïque du dieu Océan resté *in situ* à Lixus jusqu'à nos jours (Fig. 6).

Malgré la grande taille des tesselles qui ont servi à son exécution, le dessin est délicat et le trait précis. Le matériau choisi est en grande partie le marbre. Il est blanc pour le fond rehaussé de vaguettes stylisées de marbre noir. La barbe et les cheveux sont faits de marbres blanc, bleu, gris rose et vert. Seule les teintes ocres

Figure 6
Mosaïque du dieu Océan à Lixus

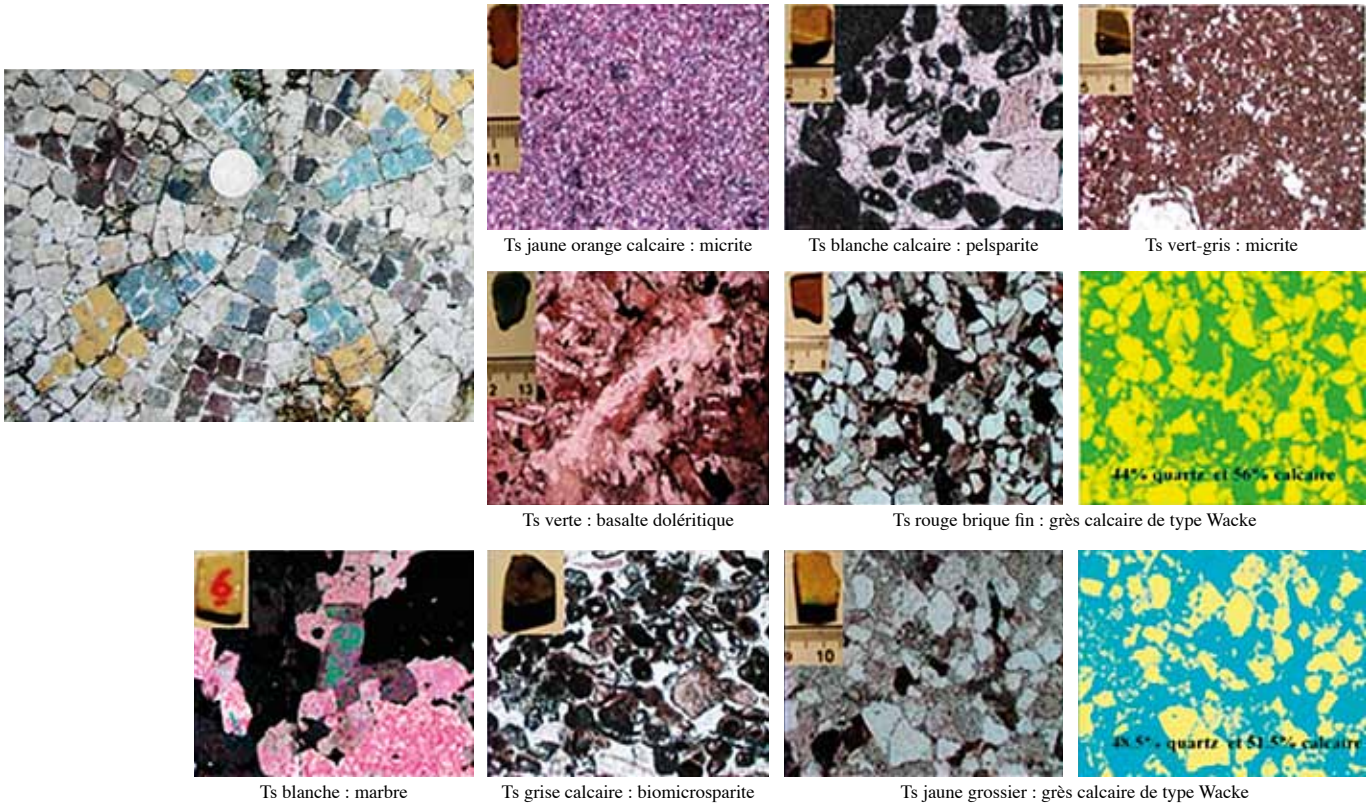

Figure 7
Pétrographie des tesselles de la mosaïque du dieu Océan à Lixus

et rouges de la bouche et des ombres du visage sont obtenues avec des grès fins ou de la céramique (Ponsich 1966).

La mosaïque du dieu Océan est de type *opus tessellatum*. Elle est formée de tesselles taillées dans des roches de natures pétrographiques différentes (Fig. 7). L'analyse pétrographique par microscopie optique montre que la plupart des roches utilisées dans la décoration du *tessellatum* sont représentées par des faciès calcaires (Ts blanche et beige : pelsparite et micrite) (Folk 1962) et de grès à grains fins et à grains grossiers (Ts rouge brique et orange) (Dott 1964). La couleur verte est assurée par une roche d'origine volcanique représentée par le basalte doléritique du Trias (Ts de couleur verte). Des faciès de marbre de couleur blanche ont été retrouvés aussi.

V. Comparaison des tessellata des mosaïques étudiées

a) De point de vue typologie

Les deux échantillons de Volubilis et Lixus proviennent des pavements de mosaïques de type *Opus tessellatum* polychrome géométrique et figuré. La taille de leurs tesselles varie de quelques millimètres à 1 centimètre. Bien que les tesselles constituant la mosaïque du dieu Océan soient plus grossières puisqu'elles sont destinées à orner les mosaïques des thermes ; au contraire celles qui ornent les maisons sont plus fines, comme dans les mosaïques de volubilis.

L'échantillon provient quant à lui d'un pavement de mosaïque de type *opus tessellatum* polychrome géométrique, la taille des tesselles est la même que celle des tesselles de Volubilis.

La palette des couleurs des tesselles des deux échantillons est très large allant des blanches qui sont les plus abondantes au beige, rose, rouge brique, jaune, gris et noire, en plus des tesselles vertes qui sont spécifiquement présentes dans la mosaïque de Lixus.

b) De point de vue pétrographique

La nature des tesselles qui ont servi à la réalisation des pavements est diversifiée. Les matériaux employés sont le marbre, la pierre calcaire, la terre cuite et la pate de verre utilisée essentiellement pour orner les visages des personnages dans les pavements de mosaïques.

L'étude pétrographique comparée (Tableau 1) des tessellata provenant des pavements de mosaïques citées ci-dessus, montre qu'à Volubilis, l'essentiel du *tessellatum* est formé de roches calcaires de couleurs différentes (blanche, rouge brique, marron et rose) plus les tesselles blanches et noires taillées dans des marbres.

A Lixus, les tesselles sont taillées dans des faciès calcaires (Folk 1962 ; Dunham 1962) et de grès à grains fins et à grains grossiers (Dott 1964). La couleur verte est assurée par une roche d'origine volcanique représentée par le basalte doléritique du Trias. Le marbre de couleur blanche et quant à lui taillé dans des faciès de marbre.

Tableau 1 : Tableau comparatif des caractéristiques pétrographiques et minéralogiques des tesselles de quelques mosaïques romaines des sites de Volubilis et de Lixus.

Volubilis		
Tesselles	**Faciès**	**Minéraux**
Blanche	Calcaire oolithique	Calcite
Blanche	Marbre	Calcite, Feldspath, Muscovite
Rouge Brique	Calcaire gréseux	Quartz, Calcite
Rose	Calcaire oolithique	Calcite
Marron	Calcaire oolithique	Calcite
Noire	Marbre	Calcite, Feldspath, Muscovite

Lixus		
Tesselles	**Faciès**	**Minéraux**
Blanche	Calcaire (pelsparite)	Calcite
Blanche	Marbre	Calcite, feld, muscovite
Rouge Brique	Grès calcaire de type wacke	Calcite
Jaune Orange	Calcaire micritique	Calcite
Jaune Grossière	Grès calcaire de type wacke	Calcite + Quartz
Grise	Calcaire (biomicrosparite)	Calcite
Vert – Grise	micrite	Calcite
Verte	basalte doléritique	Pyroxène, Feldspath, Calcéoine, OxFe

c) De point de vue de la provenance des matériaux

En comparant les lithofaciès des tesselles et des formations géologiques environnantes on peut conclure que les mosaïstes romains ont utilisé principalement les matériaux géologiques des terrains environnants des sites ou bien ils les ont importés d'autres sites avoisinants (Tableau 2).

Tableau 2 : Tableau comparatif des zones de provenances des matériaux de construction au niveau des sites de Volublis et Lixus.

	Couleur des tesselles	Provenances
Volubilis (Fig.8)	Blanche-grise	Calcaires gris du Domérien (saxa quadrata) de Moulay Idriss
	Rouges brique et ocre	Jbel Lekouar au N de Volubilis,
	Marron	Calcaire bioclastique d'âge Aalénien qui affleure a proximité du site
	Roses	Dolomies roses d'âge plio-quaternaires qui affleurent même à Volubilis,
	Blanches à calcaire oolithique	Calcaires oolithiques de Jbel Zerhoun (Faugères 1978).
	Marbres	importés de Grèce, Turquie, Italie et Portugal (Antonelli et al., 2009).
Lixus (Fig.10)	Rouge brique à base de grès	Calcarénites côtières d'âge récent
	Blanche	Terrains calcaires, se trouvant près du site
	Beige	Les grès jaunes sur lesquels le site repose,
	Verte	Basaltes de Trias dont les terrains se présentent sous forme de pointements et qui se trouvent à proximité du site.

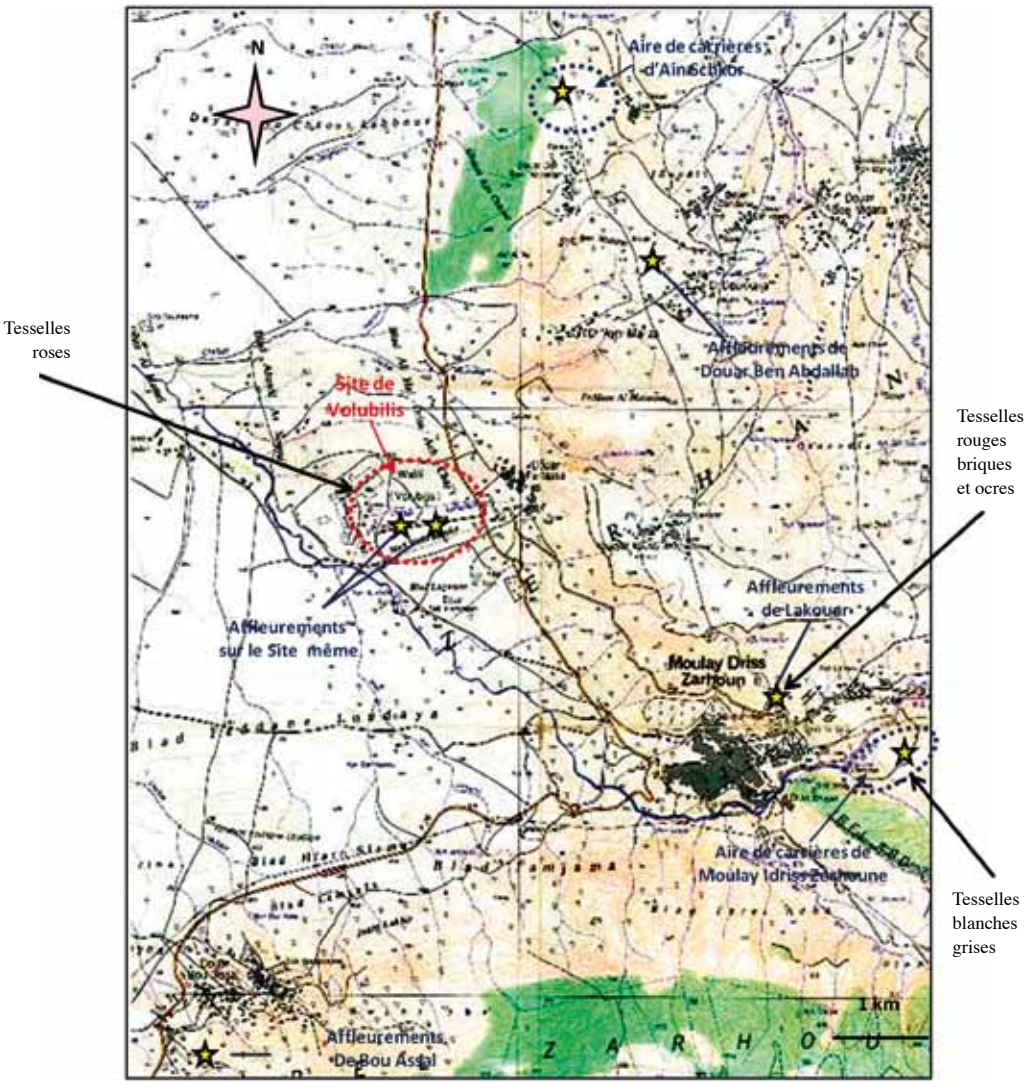

Figure 8
Carte d'emplacement des anciennes carrières et des affleurements considérés (Dessandier et al. 2008)

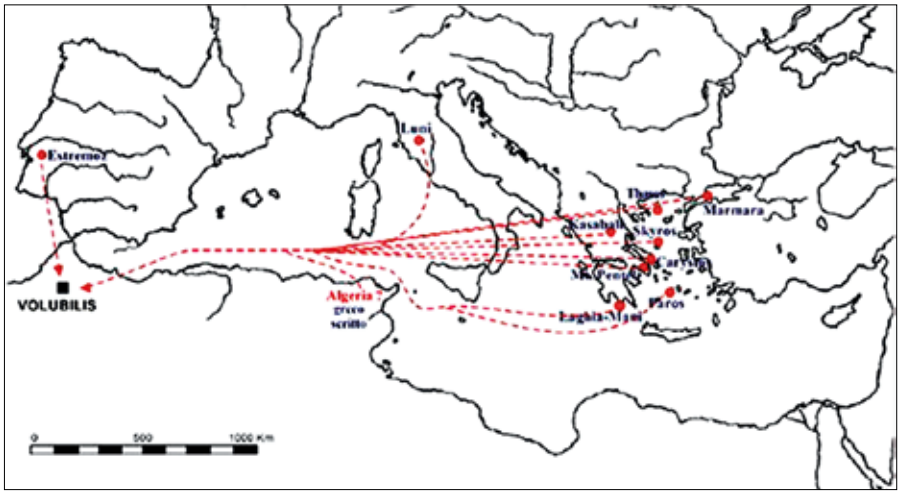

Figure 9
Carte de provenance
du Marbre
(Antonelli et al. 2009)

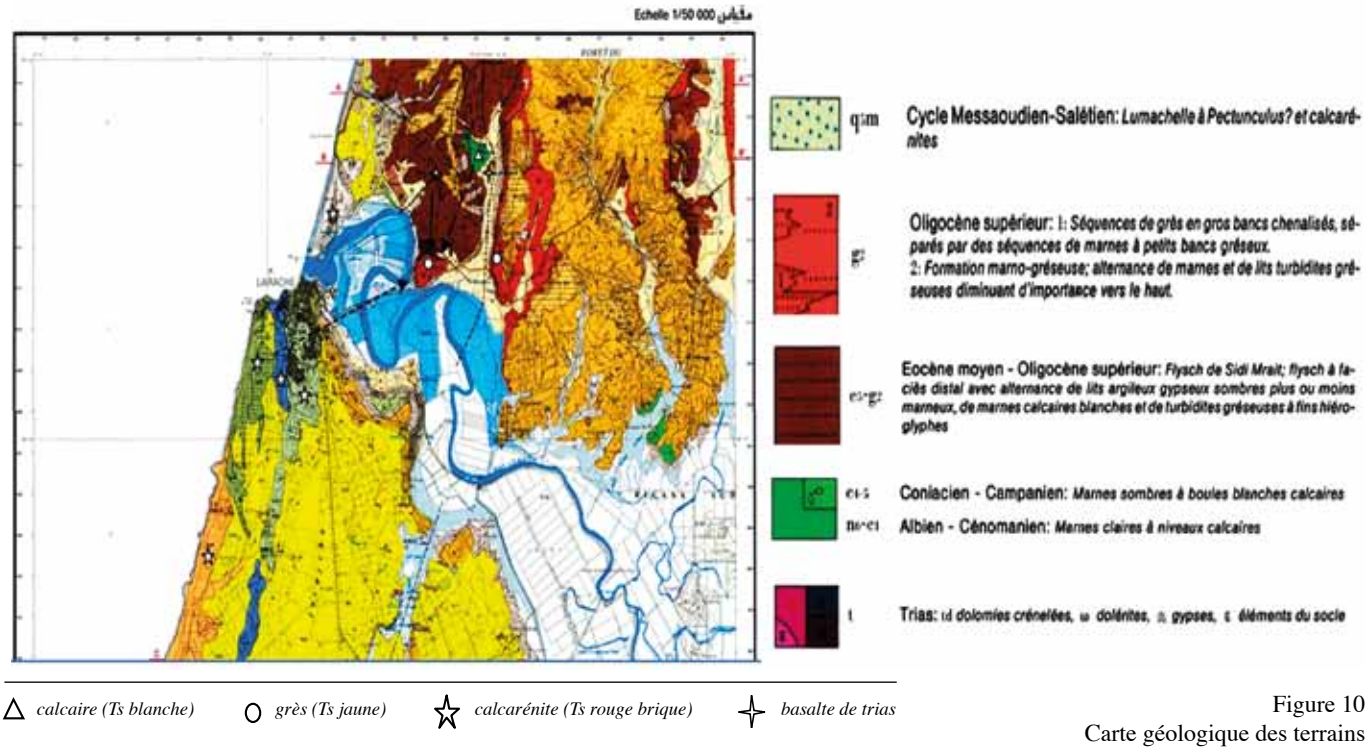

Figure 10
Carte géologique des terrains avoisinant le site de Lixus représentant probablement les sources potentielles des différents matériaux retrouvés dans le *tessellatum* étudié

Conclusion

A L'issue de cette étude pétrographique des tesselles originaires de quelques mosaïques romaines des sites archéologiques de Volubilis et de Lixus, on remarque qu'il y a une grande similitude entre les *tessellata* des mosaïques étudiées aussi bien pour leur type que pour leur composition minéralogique. Il ressort bien que la nature des terrains géologiques environnants influence de manière directe la pétrographie et la minéralogie des faciès utilisés dans la décoration des *tessellata*.

A Lixus, la présence de certains faciès de calcaires oolitiques proches de ceux utilisés à Volubilis, laisse penser à un échange de matériaux de Volubilis vers Lixus. En revanche les marbres utilisés dans les deux sites ont été probablement importés de l'Est méditerranéen et du Portugal (Antonelli et al. 2009) alors que les grès et les basaltes triasiques sont des faciès puisés sur place ou aux alentours du site.

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The Athena Domus at Apollonia (Albania): A Reassessment

Apollonia'daki (Arnavutluk) Athena Domus'u: Yeniden Değerlendirme

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Abstract

The city of Apollonia, located to the South-west of modern Albania, was founded in 588 B.C. by Corinthian and Corcyrian people, and was later described by Cicero as an admirabilis urbs. In 44 B.C. when Augustus and Agrippa were studying rhetoric in Apollonia, they got to know of the killing of Caesar and were helped by the local people to return to Rome and take the power back.

The city, located on the right bank of the river Aoos, only 12 km from the sea, was a crossroads and a filter for different cultures: Illyrians, Macedonians, the Greeks and the Romans have inhabited the territory over the centuries.

The domus, dated between 2nd and 3rd century A.D., represents the connection of the "residential fashion" present at the East and West of the Adriatic Sea. The domus is known in the literature as the "Athena house" because of the statue discovered by the archaeologists inside of it, but also as the "D house" because it was unearthed in "Sector D" of the excavation.

The first goal of the research is to analyse the architectural and decorative aspects of the house to understand the tastes of this site. The second goal is to understand the needs of the customer's social and economic self-representation and the skills of the craftsmen who worked there.

Keywords: *Apollonia, Albania, domus architecture, mosaic, Roman Period.*

Öz

Arnavutluk'un güneybatısında yer alan Apollonia kenti İ.Ö. 588 yılında Korinthliler ve Corcyrialılar tarafından kurulmuş olup, daha sonraları Cicero tarafından "admirabilis urbs/hayranlık uyandıran" olarak tanımlanmıştır. İ.Ö. 44 yılında Augustus ve Agrippa Apollonia'da retorik/söz sanatı üzerine çalışırlarken, Caesar'ın ölümünü haber almışlar ve Roma'ya dönüp iktidarı yeniden ele almak için yerli halkın yardımını almışlardır.

Kent, denizden 12 km uzaklıktadır ve Aoos Nehri'nin hemen sağ kıyısındaki konumu ile farklı kültürler için hem bir kavşak hem de bir sınır niteliği taşımaktadır: Illyrialılar, Makedonyalılar, Yunanlar ve Romalılar yüzyıllar boyunca bölgeyi iskan etmişlerdir.

Domus, İ.S. 2-3. yüzyıllara tarihlenmektedir ve Adriyatik Denizi'nin doğusunda ve batısındaki "konut modası'nın" bağlantısını yansıtmaktadır. Arkeologlar tarafından odanın içinde bulunan Athena büstü nedeniyle domus literatürde "Athena Evi" ve kazı sırasında D kısmında bulunmuş olmasından dolayı da "D Evi" olarak bilinmektedir.

Bu araştırmanın ilk amacı evin mimari ve dekoratif öğelerin analiz edilmesiyle kentin beğenilerinin anlaşılmasıdır. İkinci amaç ise ev sahibinin sosyal ve ekonomik olarak kendini temsil etme ihtiyacını ve burada çalışan zanaatkarların becerilerini anlayabilmektir.

Anahtar Kelimeler: *Apollonia, Arnavutluk, domus mimarisi, mozaik, Roma Dönemi.*

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1. The site of Apollonia

Apollonia is one of ancient and modern Albania's better known sites. Nowadays, the whole area of the ancient city is protected and organized by the Government as an Archaeological Park with a small Museum, where objects and materials discovered during the excavations are exposed (Fig. 1).

With its long history the city was an important economic and cultural centre. According to Strabo (Strab. VII, 7, 4) this city was founded in 588 B.C. by a small group of Corinthians and Corcyrians that were escaping from their lands; according to Stephanus of Byzantium (Steph. Biz. 'Απολλωνία) when the settlers arrived in *Apollonia*, they found there the indigenes belonging to the Taulant tribe. On the other hand, *Pausanias* (Paus. V, 22, 3-4) writes that the founders of the settlement had previously consulted the oracle of the temple of Apollo at Delphi, erecting a monument with an inscription in honour of the deity Apollo, the patron of the exiles, and named the town *Apollonia*.

Archaeological research conducted on the eastern wall of the city has opened a great debate among scholars on the date of the founding of the city. The pottery discovered inside of the wall, dating back to 620 B.C., leads us to think that the first settlement dates about thirty years later than the date supplied by Strabo (588 B.C.), which means that *Apollonia* should have been founded only seven years later *Dyrrachium*. The question is still open (Ceka 2005: 8).

The reason why the settlers from Corinth and Corcyra chose the hill of *Apollonia* of Illyria /Epirus and near to the Adriatic coast is given by its geographical position. The city was built on a hill overlooking a fertile plain, not so far from the sea, and was a safe route to the commercial traffic. The original position was 60 *stadia* (12 km) from the Adriatic Sea and 8 *stadia* (1,6 km) from *Aoos* river, which flows to the south of the hill, making of *Apollonia* a safe river port, with easy access both from the sea and the hinterland (Ceka 2005: 7-9).

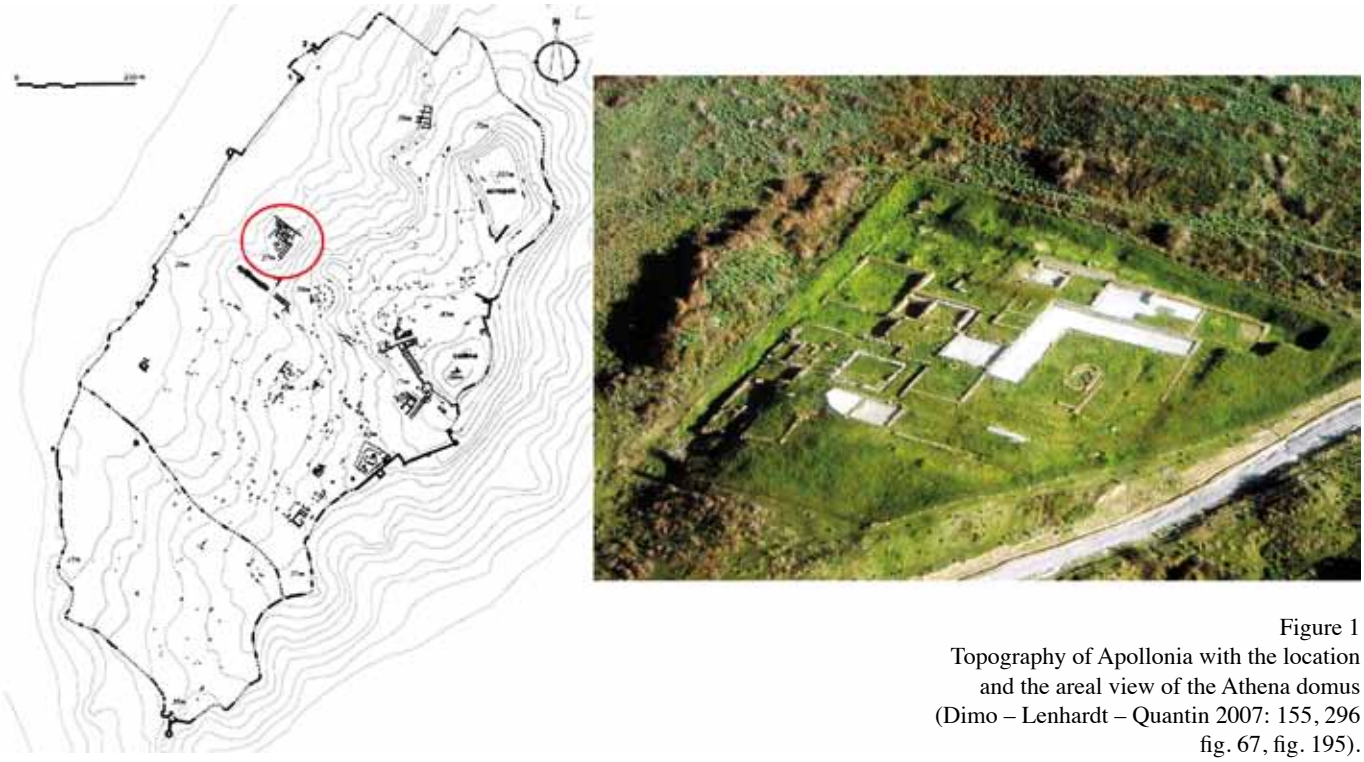

Figure 1
Topography of Apollonia with the location and the areal view of the Athena domus (Dimo – Lenhardt – Quantin 2007: 155, 296 fig. 67, fig. 195).

Over the centuries, *Apollonia* went through periods of peace and war, sometimes reaching a great economic and cultural development, in particular in the 4th century B.C. and then from the 2nd and the 4th century A.D. This last period corresponds to the era when the city was part of the Roman Empire. Rome puts her legions from the Illyrian wars (229 - 146 B.C.).

In the 1st century B.C. native people helped Julius Caesar in the war against Pompey, and Caesar, who knew the city well, sent his nephew Octavian, the future emperor, to study rhetoric there. Octavian and Agrippa were here when Caesar was killed and the two men with the help of local government return to Rome to retake the power. When Octavian became emperor, grateful for the support received, confers independence to *Apollonia*, which means the exemption from the taxes to Rome (Mano 2006: 33-34; Omari 2009: 45-48).

Under the Roman domination the city enjoyed a long period of peace and freedom, during which the wealth and prestige of the city grew also thanks to the building of the *Via Egnatia*. According to Polybius (Polyb. XXXIV, 12, 2-5) this road led to Rome on an ancient route and started from the two most important Albanian cities, *Apollonia* and *Dyrrachium* (Durrës). The *Via Egnatia* connects East with West and brought to the city merchants, artisans, soldiers, emperors, peoples with different traditions and languages that blended in with the locals (Braccesi 2014: 169-171). An example of the fusion of those different cultures is the Athena *domus*, which was later described from both the architectural and decorative points of view. Investigating the choices made by the customers and artisans helps us to understand the tastes displayed here. At the same time, by investigating the influences of the various cultural traditions we can make comparisons between this *domus* and other similar constructions in Albania, Greece and Italy.

E. OMARI

2. The history of the excavations and of the studies on the site

In the 4th century B.C. the inhabited area of *Apollonia* stretched for more than eighty hectares and was enclosed by walls for four km occupying all the western side of the hill. The area featured two hills: one to the north, where the acropolis with the Zeus temple was situated, and one on the south, where the Apollo temple used to stand (Ceka 1958; Ceka 2005: 10; Dimo – Lenhardt – Quantin 2007: 3-23).

From the printed materials published until now it is possible to understand that *Apollonia* developed like all the other Balkan cities. Inside protection walls in the heart of the settlement were the *agorá* with the public structures (the *stoà* with two floors, the *prytanéion*, the *themenos*, the theatre) and the private structures (the houses, the shops, etc.). Some years later, as was said at the beginning, the roman structures were built on the Hellenistic buildings, thus changing the city planning slightly. Nowadays in the *agorá* there are other public Roman buildings i.e. the library, the *odeion*, the *buleuterion*, while in the surrounding areas entire neighbourhoods were built with shops and large residential *domus*, with indoor gardens or a peristyle.

How was *Apollonia* discovered? Based on the descriptions by the ancient sources, in June 1436 the humanist *Ciriaco d'Ancona* made the first archaeological "inspection", followed in the 19th century by many other curious travellers, such as the French F. Pouqeville and the British M. Leake. Thanks to the books with

their descriptions and impressions we have a valuable record of the still visible ruins (Dimo – Quantin – Vrekaj 2007: 25-26).

The first archaeologist who drew the map of the city and some sculptures was the French L. Heuzey, in 1861. In 1904 the Austrian archaeologist K. Patsch wrote a more complete book on the site, thus providing the first archaeological investigations in 1914-'18 directed by C. Praschniker. During the excavations Praschniker identified the Athena *domus* and the excavations were edited in the text "*Muzakhia und Malakastra*" (Praschniker 1922-24: 23-63). In 1924 a second excavation campaign started, this time by a French team led by L. Rey, which did not last long, because a few years later Italy occupied Albania and the management of the excavations were passed on to C. Sestieri. He enlarged the investigated areas and identified the *gymnasium* to the south of the byzantine monastery.

The systematic excavations took place in 1947 with an expedition of the Archaeological Institute of Tirana under the direction of the Albanian archaeologist H. Ceka e S. Islami (Ceka 1959). There followed an international mission of Albanians and Russians directed by V. Bllavatski, who carried out a two-year massive campaign (1958-60). These excavations led to the discovery of the Diana temple in the agorá, a small part of the city walls, the Roman district with the road and the houses and the Athena *domus* (Bllavatski – Islami 1960: 67-81).

Albanian archaeologists continued the researches alone until 1992, when the cooperation between the Institute of Archaeology of Tirana and some French universities started: Xth of Paris and Grenoble directed by N. Ceka, B. Vreka e P. Cabanes e J. L. Lamboley. Nearly twenty years of research and excavations have been now collected in the first Archaeology and History Atlas on the site of *Apollonia* (Dimo – Lenhardt – Quantin 2007). One hundred years and five generations of archaeologists have followed each other to highlight only five per cent of the ancient city. As rightly argued by Ceka, the Latin saying *ars longa*, *vita brevis* suites well to *Apollonia*. For this reason, in this study it was decided to analyse only one private building, the Athena *domus*, which up until now has been excavated and only partially studied. The discussion of the history of the development of private buildings in *Apollonia* will not be dealt with here.

E. OMARI

3. The architecture of the Athena domus

In the western sector of the city, not far from the theatre, the hills that characterize the cityscape of *Apollonia* descend in a gentle slope, suitable to be regularized, without great effort, to erect private buildings.

A urban plot of *hippodamian* flavour used to overlap this area already in the Hellenistic period, with intersecting right-angle streets forming large rectangular blocs of 60x120 m (Ceka 1994: 280-281; Dautaj – Lenhardt – Quantin 2007: 341-345). Here the Athena *domus* was built (Fig. 2), the largest house discovered in the city, but only a part of it, 2500 sq., has been brought to light so far (Prendi – Skënderaj 2007: 294). Other spaces are concealed below the ground, and it is likely, therefore, that they occupy, at least, half of a block (Ceka 2005: 66-67).

The chronological dating of the house seems to be supported by the results of a survey conducted on the masonry wall that borders the square block to the north-east, along the public way. The archaeological materials found inside of the wall,

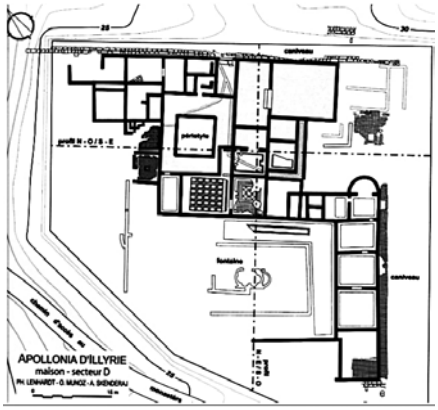

Figure 2
Plan showing the Athena domus (Dimo – Lenhardt – Quantin 2007: 295 fig. 194).

among which black painted pottery, ensure that the outer perimeter wall was not raised before the 3rd-2nd century B.C. (Blawatsky 1962: 284). However, the wall fragment preserved within the structure that has undergone extensive renovations over time must have been almost entirely reorganized in the Roman period. The *opus quadratum* characterizes only the perimeter wall, while the techniques of other structures vary: *opus incertum*, *opus mixtum*, bricks and vestments (with reused materials). Although Altin Skenderaj has carefully examined each of these techniques and has initially proposed to assign them different construction phases, in reality a stratigraphy does not exist which could substantiate this hypothesis and provide support for a cogent chronology. Conversely, all the three techniques, different from *opus quadratum*, can be generally traced back to the Roman period, as Skenderaj admits in the conclusion of his meticulous research (Skënderaj 2004: 312-313 and 316). After all, in the imperial age it is common to find different techniques used at the same time in the same building, especially in buildings belonging to high-social-level people, and therefore characterized by a large number of rooms, as it was demonstrated by the Roman houses in Greece (Bonini 2006a: 158).

On the basis of these considerations, it is not clear why this courtyard should be dated back to the Hellenistic period, while it is rational to bring the organization of the spaces of the house of Athena, as can be appreciated even today, to a unified design of the Roman imperial period, where not even the subsequent changes at the 4th century A.D. upset the setting (Prendi – Skënderaj 2007: 297-299). They are limited to marginal interventions, such as the fragmentation of the larger rooms and the partial closure of the porticoes of the peristyle, according to a well-known dynamic which is present in many large houses of the Late Antique period (Ellis 1988: 567-569).

Hence our review of the architecture of the Athena *domus* in the imperial age will be the object of the discussion, to comprehend the extent to which the apollonian aristocracy is faithful to the Hellenistic tradition, in what measure and what the typical ideas were adopted from the Roman world.

In fact, in Illyria and Epirus the residences focused on a plurality of perystiles are uncommon, such as the house of the "two peristyles" of *Phoinike* (De Maria – Gorica 2012: 67-71). This is so because the main category in the Hellenistic period accords to the classical model, which involves a single courtyard, monumentalised by columns, as evidenced in the houses "A" and "B" in Byllis (Ceka – Muçaj 2005: 35-37 e 58-59) and the house 8 in *Antigonea* (Budina 1972: 316-318). This is a common tendency all over the Hellenistic world, which, however, started to change when the customers began to feel the need for a larger home, not only to improve their lifestyle, but most likely to accept the challenge of the Roman aristocracy that used the house for the purpose of social competition since the Republican age.

The organization of the house around two courtyards allowed for the separation of the domestic spaces in different blocks. Where the rooms are aggregated around its own courtyard, this solution enabled one to increase the room numbers, to adequately ventilate and light them up, to develop the various functional areas of the house with fewer constraints, with the clear advantage of offering more articulated fruition paths in a representative fashion.

Also the Athena *domus* of *Apollonia* fully meets these purposes and can be put at the same level as the homes of the urban élites in the Roman provinces. Here, the substantial narrowness of the main peristyle (8x8 m) stands out which is

much smaller than the *peristyle* of the Roman houses in Africa and in the East (Blawatsky 1962: 284; Meyer 1999: 107). Similar data, about peristyles, are also found in the Roman houses in Greece, which, therefore, seems to be a Balkan peculiarity (Bonini 2006a: 52-53). Typical of the Hellenistic tradition is also the modesty of the lining of the façade of the home situated on the public way, where a series of rectangular rooms of various sizes are located. Here, the access routes for fruition are not entirely clear, but it seems reasonable that these undecorated modest rooms were used as service areas and, in a few cases at least, as workshops independent from the rest of the dwelling (Ceka 2005: 67). The position and the size of the two largest rooms, located in correspondence of the Eastern angle of the block, make us hypothesize their destination as a barn, shed or warehouse of carts (Bonini 2006a: 102-104; De Maria – Gorica 2014: 192). In this way the architect intends to exploit the economic potential of the view on the road and at the same time ensure greater tranquillity to the residential rooms, located towards the centre of the building lot. This is a trick which was already often present in the classical era in the Balkans and the Aegean (Hoepfner 1999: 561-575; De Maria – Gorica 2014: 190-192), extensively widespread in the entire Mediterranean (Wallace Hadrill 1994: 134-142; Hirschfeld 1995: 98-99; Bonini – Rinaldi 2003: 203-207). The entrance to the house does not present any sign of monumentality on the facade, and although due to its size it is potentially habitable, it actually acts as a simple passage, as it used to in Greece from the Classic to the Roman age (Bonini 2006a: 48-49). Such a narrow space can hardly have been the scene of ceremonies for the reception of *clientes*, which was common in the houses with peristyle in Western Mediterranean areas, where the entrance halls in small part performed the functions of the *atrium* of the house in the age of the Roman republic (Thébert 1986: 269-270; Meyer 1999: 108-111). However, it is not possible to think that patronage and its rituals did not exist in the culture of the Hellenistic province. It is the very sources that deny this idea (Plu., *Mor.*, 94A-B; Rouland 1979: 499-578; Alcock 1993: 114-15). In contrast, it is rather likely that such ceremonies were held elsewhere, probably in the main courtyard of the house, as Plutarch writes explicitly (Plu., *Mor.*, 814D-E). The *peristyle*, although of no exceptional size, is the physical and functional heart of the home. As already noted above, the courtyard expresses a "public" value, the capability of receiving guests and clients in programmatically performed luxury, well beyond the owner's common decoration of living spaces previously reported, and exhibits a "public" value, suitable for the reception of guests and clients. The arcades were decorated with polychrome frescoes and stucco, as indicated from the abundant remains found by the archaeologists, while elegant marble statues were proudly displayed including one of Athena, which gives the name to the house, one of Apollo and a statue of a magistrate (Blawatsky 1962: 285). Also the architectural setting looks elaborate, because it presents a round of Ionic pillars on double order which implies, at least for this portion of the building, the existence of an upper floor. In the end, a special drainage channel prevents the stagnation of the rainwater in the open area of the courtyard, which was perhaps improperly defined *impluvium* (Prendi – Skenderaj 2007: 296). This term is absolutely misleading as it refers to the italic model of the *domus* with *atrium* that has nothing to do with the courtyard of the house of Athena, or with the morphology or distribution of the environments.

Indeed, the representative rooms are not located along the axis that starts from the entrance, but in both sides of the courtyard, according to a centralized system, rather than an axial one, which is typical of the eastern Mediterranean sea (Gros 2001: 214-215). It is not clear where the entrance to the rooms situated

further south around the second *peristyle* was, which was bigger than the former (23x13 m) and had arcades and mosaics (Prendi – Skënderaj 2007: 296). It is definitely the residential sector in the dwelling, where the living environments of the owner's family are situated, including several rooms, currently very damaged, heated by means of hypocaust typical of the Roman period (Ceka 2005: 67).

While it cannot be excluded that the duplication of the courtyards found its roots in the tradition of *gynaikonitis* as a separate space, as already discussed in regard to the house with two peristyles in *Phoenike*, it is difficult to think that in the imperial age the house of Athena at *Apollonia* (and Greek house in the world in general) presented a strict separation, which already in classical times was fading away (Nevett 1999: 154-155; Ceka 2005: 67; De Maria – Gorica 2012: 71). It is possible to think that the duplication of the courtyards is carried out by the architects to give more privacy to the representative rooms, which is a consequence of the progressive necessity even in the Greek world to use one's own dwelling as a self-representation.

Moreover, the entire area of the second peristyle has a distinctly Western flavour, as also reflected in the garden of the discovered area and the ornamental fountain which is similar to the one found in the House of Antonino at Nicopolis (Bonini 2006a: 131). The introduction of plants in the heart of the residence, denies its functional value to the courtyard, which for centuries had characterized the Hellenistic tradition, thus transforming it in an amusement area along a style that is spreading in the Greek provinces brought by Romans (Bonini 2006b). Therefore, also the Athena *domus* reflects the trend already outlined for Roman Greece in the imperial age, where the owners have a growing need for space and for displaying their wealth. This departing from the Hellenistic tradition can be explained by the search for greater comfort. However, it cannot be denied that the upper classes are beginning to assign a key role to the house for social competition, according to a logic which is now far from older and traditional habits and according to a typically Roman use. In the East like in the West the notables who aspire to an important social promotion and have the financial ability to attain it need to share a codified system of signs which enables them to assert their prestige in front of their subordinates. In this way they show their adherence to the empire and participate in its management in the local area, be it real or presumed. In private buildings these signs are traditional in form, but are used in a representative logic that develops and is accentuated because of the influence of Rome. This gives rise also in Illyria to a peculiar architectural style of the privileged classes, which almost act as a bridge between East and West, and whose culture and imaginary could perhaps be better investigated through the analysis of the decorations.

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4. The floor decorations

As we can see from the description of the architecture, the *domus* is a landmark building with two peristyles around which thirty rooms are located, where in some cases floor decorations are preserved. To summarize, the current situation is as follows: ten *opus tessellatum* floors, two flagstone floors, one *opus sectile* floor and one brick floor. Based on data collected from the edited and archived material, in this house the floor decorations are mainly with united coverage, which means that the coating covers the space of the floor evenly, without architectural and decorative partitions. Only one of the floors contains more

decorative units. It is an apse that constitutes an architectural division which is functional to the use of the room.

Now, it goes without saying that the room with rich decorations (columns and statues) and static decorations (mosaics and frescoes) are prestigious environments for the house, and play an important role in the development of the dwelling inside of the structure. Another element for the identification of the function of the rooms, beyond the dimensions of the compartment, is the decorative technique that has to be functional and representative. We know that mosaics are conceived to remove moisture from the houses, but over the centuries they have become important elements to identify a given social class which flaunts its wealth and its culture (Dunbabin 1999: 65-68). This is also reflected in the Athena *domus*, where the floor mosaics, like the architecture, are an expression of the culture of the customer, who stressed the distinction between public and private representative rooms (both luxuriously decorated) and the room of service through the floor decorations.

Once the entrance is passed, it is possible to access the first peristyle (15x12.5 m) where the open area still preserves the fragments of paved marble, maybe in white colour, as is the case of the room located in north-west of it. The archive pictures, taken in black and white during the excavations of the 1958-'60, do not allow us to give a definitive opinion on the colour of the floor decorations and the marble sizes (Omari 2009: 103-107) (Fig. 3).

Not surprisingly, the larger environment of the house (9.10x7.75 m), which is the only room decorated with *opus sectile* marble slabs of various colours and size, faces exactly this peristyle. The pattern used has been defined by the scholar Guidobaldi: "great criss-cross pattern with simple elements", identified with the acronym "SD" which means Square with Disc. This type of decoration, as explained by the researcher, is known thanks to three very important constructions in Italy: one at the Trajan's Forum in Rome (Basilica Ulpia and North-East *exedrae*), one at the Pantheon and one in Pompeii (Sanctuary of the Public Lares) (Guidobaldi 1985: 174-177).

Without any doubt it follows that for the owner of the Apollonia house this room is the display room par excellence in the *domus*. Additionally, also the room located in the eastern side, besides being of significant size (7.25x7.25 m), it presents fragments of wall decorations with *opus tessellatum* marble and polychrome floor decorations. This means that the decoration, as we mentioned

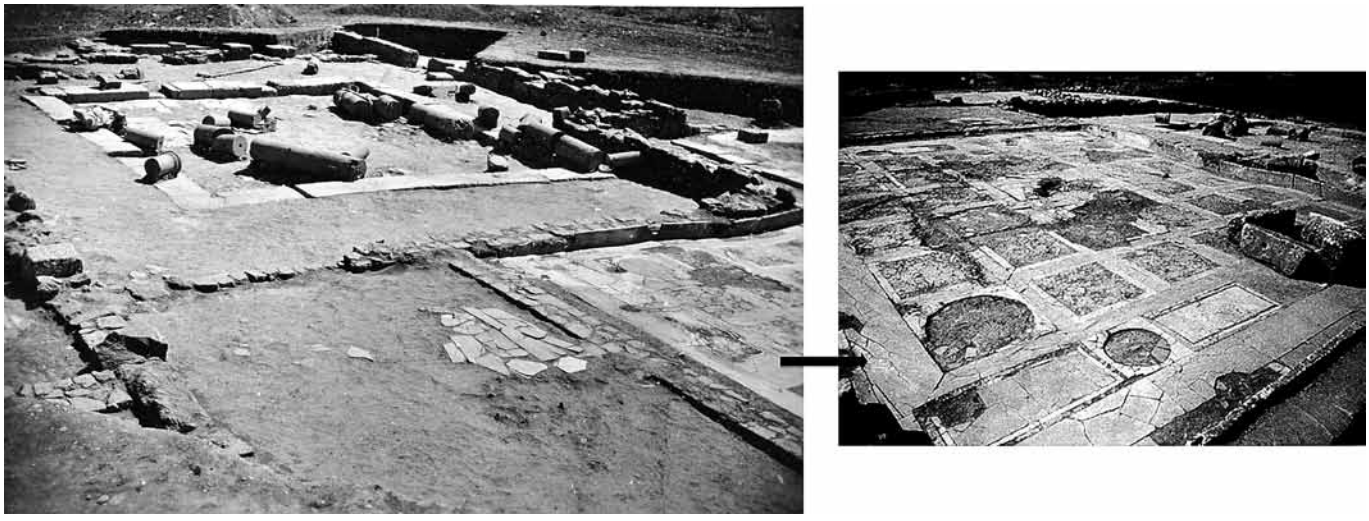

Figure 3
First peristyle and porticoes with the rooms paved with marble, looking east (Courtesy of Archaeological Institute Tirana).

Figure 4
View of the room, looking south, and Nereid mosaic (Courtesy of Archaeological Institute Tirana).

above, was conceived as a single carpet within the same frame, but with two juxtaposed panels, according to a typical taste in this historical phase in both the Greek and Roman traditions (Dunbabin 1999: 38-52).

Despite the lack of sufficient elements to define the function of the environment, this room was probably the *triclinium* of the public part of the *domus*. Although the size of the room was significant, it does not necessarily allow a strict functional differentiation, because these environments can be configured either as *triclinia* spaces or as receptions. In our case, given the general tendency in the 3rd-4th century A.D. to magnify the reception environments and given the composition of the mosaic, it is possible to consider it as the room used for receptions and banquets. This statement is supported by the decorative themes: the first carpet in front of the entrance is a geometric, long and narrow panel with an orthogonal composition with adjacent squares; the second carpet is a geometric-figurative panel with marine elements (hippocampus and a Nereid on a dolphin) surrounded by wide edges on which the *clinai* were placed (Fig. 4).

In Albania, where studies on the matter are lacking, it is difficult to find private areas where the identification of their function is carried out through the analysis of the floor decoration. This is testified by the *domus* with double peristyle in *Phoinike* and the house "B" in *Byllis*, both of which date back to the Hellenistic period which, while undergoing renovations in the 3rd century AD do not identify the *triclinium* (Omari 2011: 677-680). However, in the Aegean and Adriatic area the testimonies are many, both for the Roman houses in Greece (at Athens and Delos) and in Italy (at Aquileia and Cisalpina) (Bonini 2003: 212; Ghedini – Novello 2009: 117-122).

Continuing with the description of the floor decorations in this courtyard, other rooms built in the east and in the west of the first peristyle preserved polychrome mosaics with geometric themes, made with care and in a "rigid" style and ordered like the Roman tradition, i.e. with edge and inside of it the carpet which is sometimes interrupted by a pseudo-emblem (Fig. 5) (Dunbabin 1999: 66-68).

In the absence of the precise identification of the function of these rooms we cannot but say that these rooms are generally connected to the public life of the *dominus* and to his working activities. A clue is found in one of the mosaics where the four seasons are represented (Fig. 6), perhaps to highlight the customer's work activities which take place throughout the year, during all the seasons. This hypothesis also originates from the location of the rooms, placed immediately after the structures considered by archaeologists as environments related to trade (shops, warehouses, stables, etc.), close to the house direction and open

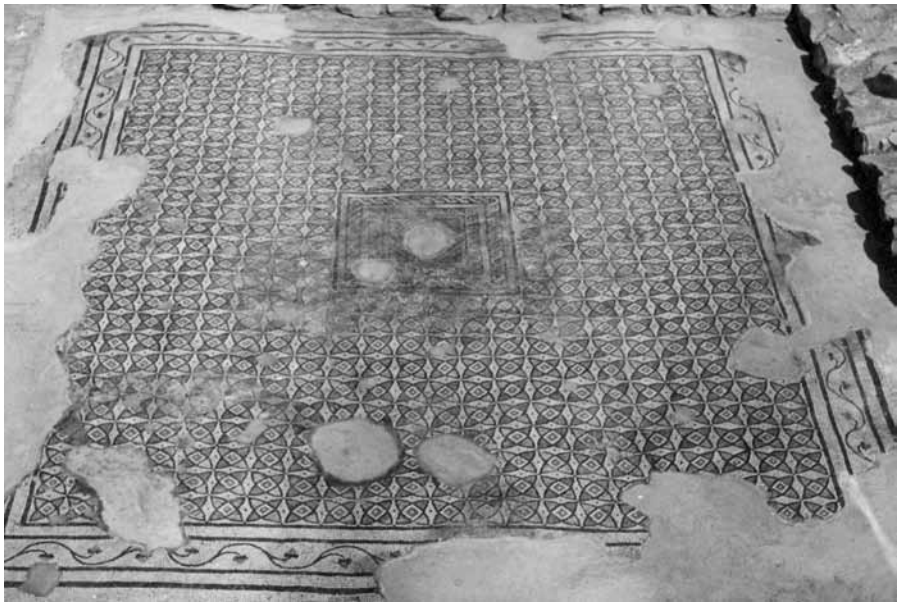

Figure 5
The geometric mosaic with pseudo-emblem (Courtesy of the Archaeological Institute Tirana)

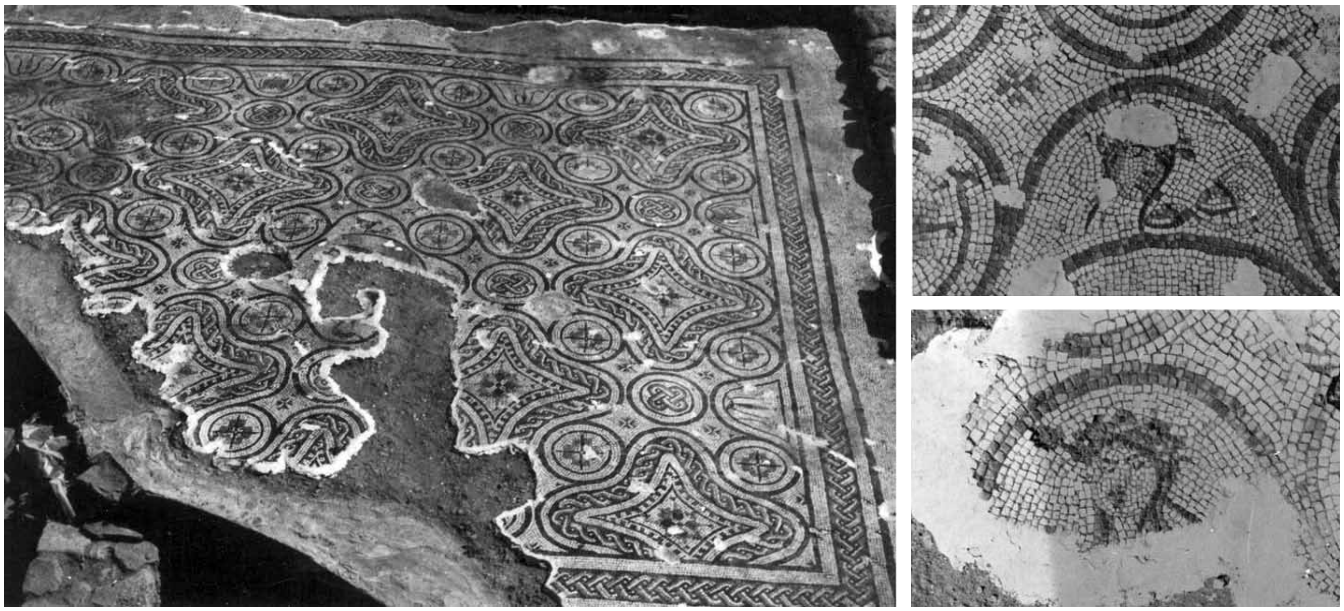

Figure 6
The geometric mosaic with seasons (Courtesy of Archaeological Institute Tirana).

to the street. The analysis of the floor decorations enables us to confirm that the first peristyle and the environments around it performed the "public" function of receiving guests (Skënderaj 2004: 311-316).

Moving on to the rooms overlooking the second courtyard with the fountain, we see that they were intended for private use and were the places where banquets were held with the family and the most intimate guests.

Even in the absence of reliable indications regarding access to the second peristyle rooms, located to the southeast of it, on the basis of openings doors found in the walls of the rooms (Fig. 2) and the analysis of the dimensions and the mosaics, the paths inside the *domus* stand out clearly. In this part of the house it can be seen that all the rooms face the only one apsed room and permit the flow to it. This apse was discovered and described for the first time in 1914 by Praschniker. Its floor is slightly higher than the floor of the square room which faces it (5x5 m), and is decorated with a mosaic with a white background presenting a cantharos from which were born and developed ivy branches (Fig. 7).

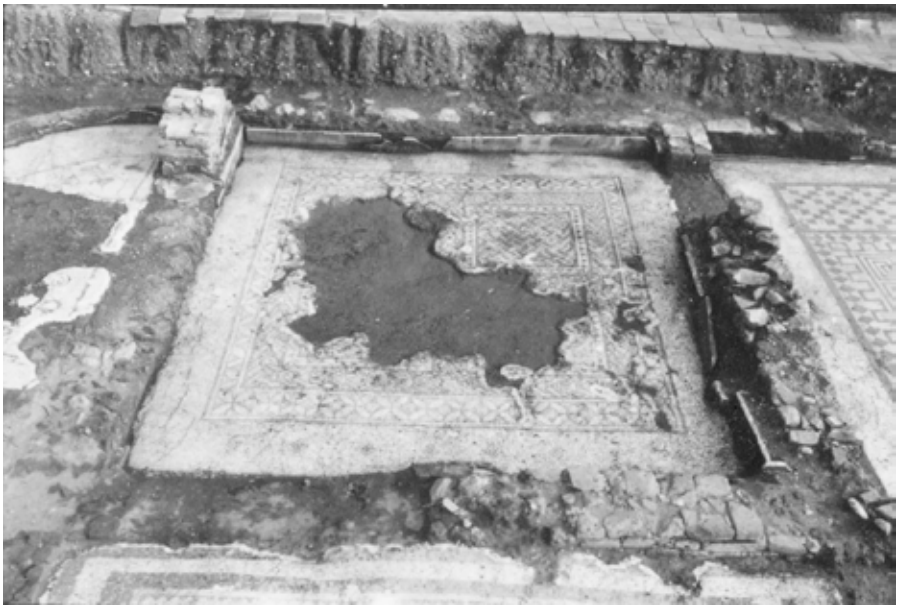

Figure 7
The apsidal room
with mosaics floor
(Courtesy of Archaeological
Institute Tirana).

During the 3rd-4th century throughout the empire A.D. it was fashionable to expand the traditional spaces with apsed endings that articulated their volumes, thus providing a more sumptuous setting for the ritual associated with the owner's self-representation. This is typical of Roman culture and is known in Albania in relation to the Triconch Palace in Butrint, as well as in Italy and in the provincial area (Ghedini – Novello 2009: 177-119; Bowden et al. 2011: 14-19). With most probability our costumer could not distance himself from this tradition. Whether the room with apse was the *cubiculum* of the house is hard to tell.

All the other rooms located to the south of this room have the same dimensions (4.80x5.20 m), and only one, which lies half way through, presents a figurative mosaic. Archaeologists call this room the "Achilles' room", because of the mosaic carpet scenes represented there of the battle between Achilles and Penthesilea (Amanali – Adhami 1974: 22-25; Ceka 2005: 67-70; Çikopano 2006: 174). The iconographic theme has a long tradition both in the archaic-classic pottery and in the mosaics of the Mediterranean area (Ghedini 1997: 58-61; Pushimaj 2012: 232-235).

Figure 8
The Achilles mosaic
(Courtesy of Archaeological
Institute Tirana).

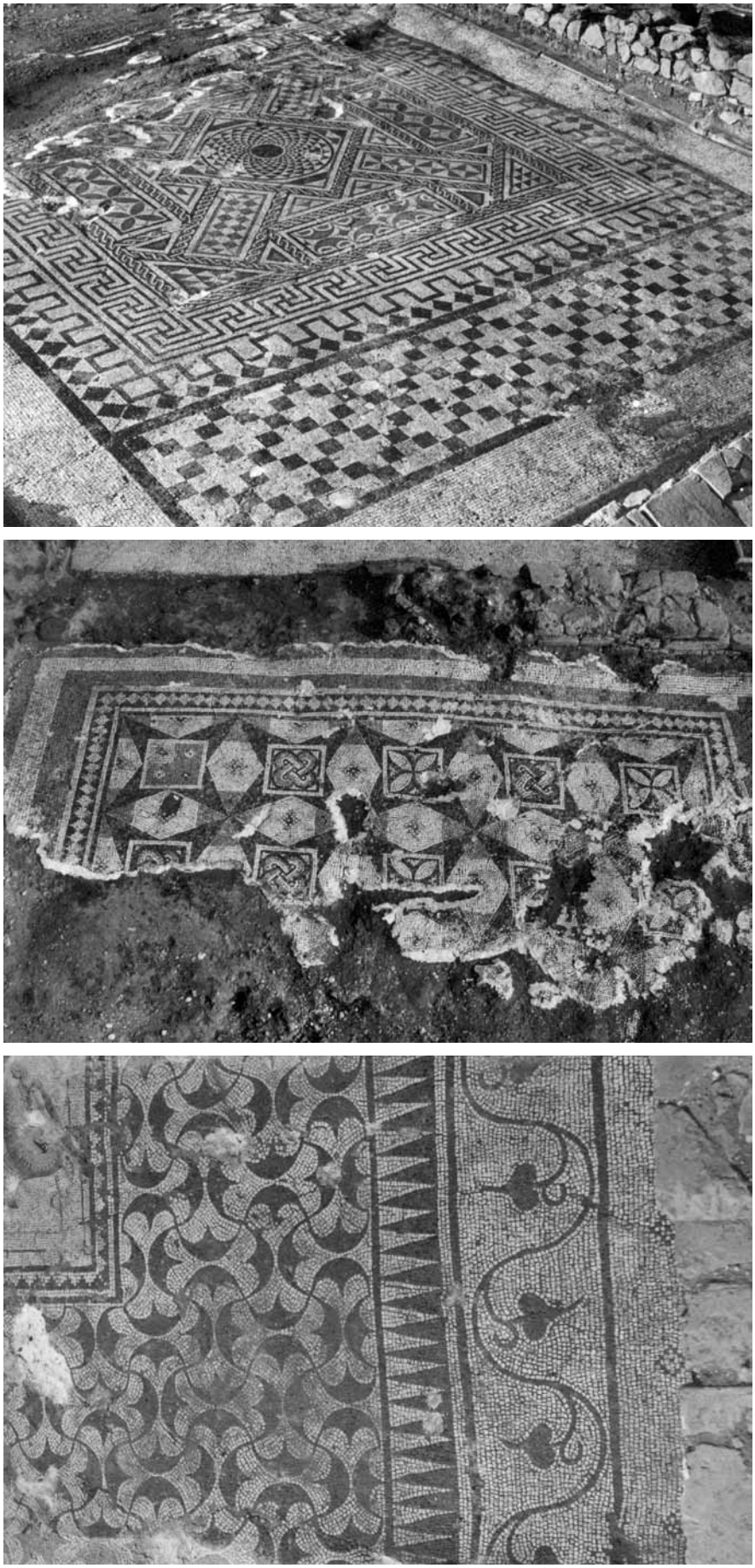

Figure 9
The geometric mosaics of the second perystile of the Athena domus (Courtesy of Archaeological Institute Tirana).

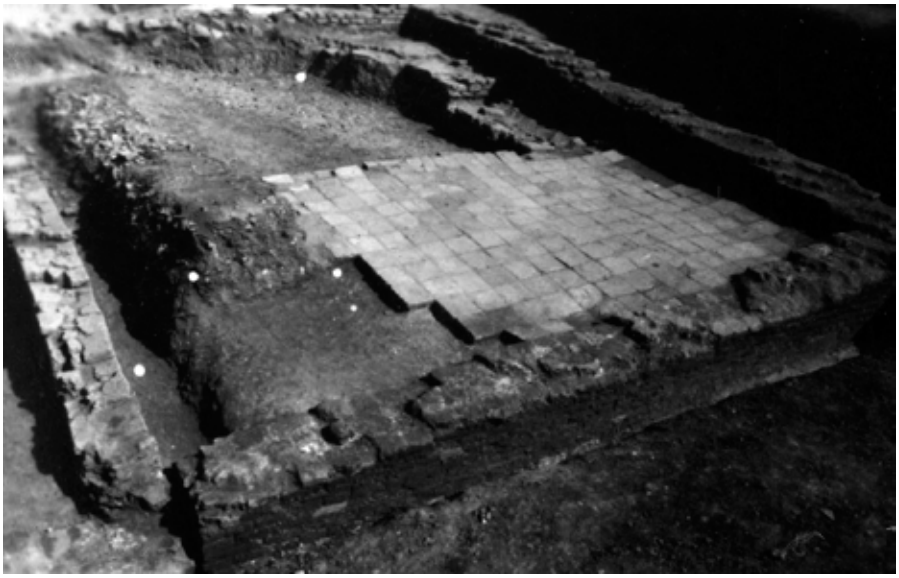

Figure 10
Service room of the private area of the *domus* with brick floor (Courtesy of Archaeological Institute Tirana).

In the mosaic representing Achilles the figures are arranged at the sides of the carpet following a centrifugal trend and according to the Italic black-and-white mosaic tradition, while in the other parts of the carpet, which was found in a very fragmented state, there appear scattered weapons (Fig. 8). As claimed by the archaeologists, in this mosaic the craftsman wanted to focus the viewer's attention on Pelide' gaze, which is turned towards his dying beloved, and not towards the battle which is taking place behind him, as commonly represented in the iconographic tradition. This variation is rooted in the Attic archaic-classic pottery iconography, and also in this case we have a mix of cultures, i.e. a subject dear to the Romans of the Late Antiquity is revisited following oriental patterns. Just like in the archaic-classic iconography, in which gazes meet, also in this case the craftsman and the costumer looked at and took inspiration from both the East and the West. In this part of the house the peristyle and the rooms are decorated with polychrome geometric mosaics, so as to emphasize the costumer's wealth and their representative importance (Fig. 9). In addition to the spaces for reception and residence, the Athena *domus* offers a readable element of the utilitarian spaces that made up the necessary equipment for the family life and that were characterized by the different kinds of fruition. The service rooms are recognizable because of the utilitarian character of the flooring, for their dislocation inside of the house and for the presence of infrastructure related to their use. The service room, which was functional to private banquets, is surely the one located to the south of the second peristyle end is paved with bricks (in orange colour and 10x10 cm in size), as it used to be customary for kitchens in the Hellenistic and Roman age (Fig. 10) (Guidobaldi – Gregori 1996: 247-260).

However, in our case what is not clear about the typical service rooms is the identification of the thermal bath. Three are the reasons why it was not discovered: the thermal bath is probably still lying under the ground waiting to be discovered; maybe it was destroyed over the centuries; near the house there might have been a public, not yet identified, thermal bath.

Moreover, it seems possible that in this house a thermal bath was present, especially on the basis of the rich architectural and decorative elements and of the fact that in this period (3rd-4th century A.D.) it was common among the Roman aristocracy in Italy and in the province to build a thermal bath inside of the *domus*. In Albania this practice is reflected in the Triconch Palace of Butrint,

in the *domus* of Vrina and Diaporit, all dated between 2nd and 4th century A.D., not to mention the rest of the empire where the examples are many and varied (Bowden – Përzhita 2007: 102-104; Bowden et al. 2011: 33-37; Greenslade 2013: 129-138).

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5. Conclusion

To conclude, it can be said that the study of the Athena *domus* in *Apollonia* has enabled us to identify some of the characteristics of Roman houses in the Balkan area. This has confronted us with various types of problems. The *domus* under investigation is an architectural structure that has provided indications about the organization, the functionality and the static structure of the rooms, and about the construction techniques and the materials used. The analysis of mosaics has made it possible to open a window on the economic and cultural level of the customer, as well as to identify, wherever possible, the use of the rooms.

The Athena domus, like all the houses in the imperial age, was the scene of the owners' social and private life, and provides an insight into the contemporary society. The present research has allowed us to learn about ancient engineering in the Illyrian-Epirus area and about the development of this structure, the customer's trade and economic capacity, and about his willingness to conform to the solutions which were popular in Rome and in the rest of the Empire.

From the architectural point of view, the way the dwelling is set up continues and also enriches the Hellenistic house building tradition, which is characterized by houses centripetally ordered around a peristyle. However, there are distinctly Western solutions, an example of which is the garden with heated rooms, which confirms the master's adherence to a fully Roman lifestyle.

The decoration of the rooms, be they on the walls or on the floors, denote two artistic trends that influence the customer: the Roman tradition with mosaics that are well organized in their layout, and the Greek tradition characterised by walls and flagstone floors. From the Augustan age to the late antiquity, this latter technique became fashionable throughout the empire and developed into what is known with the term *opus sectile*. Such decoration, although very expensive because of the raw materials that have to travel on land and water to reach their final destination, is required by private people who want to show off their wealth.

Although many floors in the Athena *domus* have disappeared or are kept in very bed conditions, what remains of them leads us to interpret this building as a structure belonging to a wealthy customer. He is embedded in the local Balkan tradition, but at the same time looks at Rome to learn about the fashions of the capital city. He tries to interpret them, and gives directions to his craftsmen as to how to build his home as the "mirror" of his life and culture. The artisans have the task to execute the costumer's choices with great meticulousness and mastery.

The fact that *Apollonia* is a city located halfway through the East and the West enables us to hypothesize the presence of craftsman from abroad. This assumption is supported by several elements, for example the architecture, the mosaics and the sculptures that are the result of the exchanges and relationships in the city, that is one of the most important centres of the political and economic life of the Empire. It is in the light of this central role that the need of the local élites should be interpreted, namely the need to adjust their residences to the more meaningful models to achieve social and economic self-representation.

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Geometric Analysis of the Mask Mosaic in Metropolis

Metropolis Mask Mozaiğinin Geometrik Çözümlemesi

Ali Kazım ÖZ – Erhan AYDOĞDU*

(Received 27 October 2015, accepted after revision 8 November 2016)

Abstract

The present article refers to the geometric analysis of the floor mosaics in a Reception Hall of the ancient city of Metropolis. In the course of this analysis a geometric plan of the mosaic frame was elaborated, while at the same time the geometric shapes and the geometric origin of some floral pattern were revealed and its standard drawing procedure was determined. Using a theoretical argument for the relation between the geometric plan and its execution as well as for the figures' construction order, preliminary assessments were performed before the measurement. As a consequence significant differences between the ratios of the planned and the measured lengths of the pavement could be detected. It was with the use of these ratios that an estimation of the mosaic sections' construction order was made. Furthermore, there were observed the reflection of mathematic knowledge in the mosaic, the relation between the repeated figures and the Pythagorean theorem as well as the relation between artistic functions and reasoning methods. It is obvious that mosaic artisans skilfully based their work on a profound knowledge of geometry. In this article is shown that through the geometric analysis of mosaics further scientific results within the fields of mosaic research, restoration and conservation, history of art, history of mathematics and archaeological studies in general can be achieved.

Keywords: *Metropolis, mosaic, mathematic, geometry, analysis.*

Öz

Bu çalışmada, Metropolis antik kentinde bulunan Resepsiyon Salonu taban mozaiği geometrik olarak analiz edilmiş ve geometrik planı ortaya çıkarılmıştır. Geometrik şekillerin yanı sıra, bazı bitkisel motiflerin de geometrik kökeni ortaya çıkarılmış ve standart çizim metodu belirlenmiştir. Geometrik plan ve uygulama arasındaki ilişkiler ve figürlerin yapılış sırası teorik olarak tartışılarak ölçüm öncesinde ön değerlendirmeler yapılmıştır. Figürlerin planlanan uzunlukları ile ölçülen uzunluklar arasında anlamlı orantılar bulunduğu tespit edilmiş ve bu oranlar kullanılarak, mozaik bölümlerinin inşa ediliş sırası tahmin edilmiştir. Matematik bilgisinin mozaik eser üzerindeki yansımaları, tekrarlanan figürlerin Pisagor teoremiyle ilişkisi ve sanat operasyonlarıyla akıl yürütme metotları arasındaki ilişki değerlendirilmiştir. Bu sayede mozaik sanatçılarının geometri bilgisini ustalıkla kullandıkları anlaşılmıştır. Mozaik eserler üzerinde yapılacak geometrik analizlerin mozaik araştırmaları, konservasyon çalışmaları, sanat, matematik tarihi ve arkeoloji çalışmaları için oldukça kullanışlı bilgiler üretme potansiyeline sahip olduğu sonucuna varılmıştır.

Anahtar Kelimeler: *Metropolis, mozaik, matematik, geometri, çözümleme.*

1. Introduction

The floor mosaics in the so-called Reception Hall in the ancient city of Metropolis (Fig. 1-2) have been chosen as the principal subject of this study. The need to proceed with the research and interpretation of the aforementioned mosaics arose as there are so many geometric patterns and human figures on the mosaics but no systematic surveys

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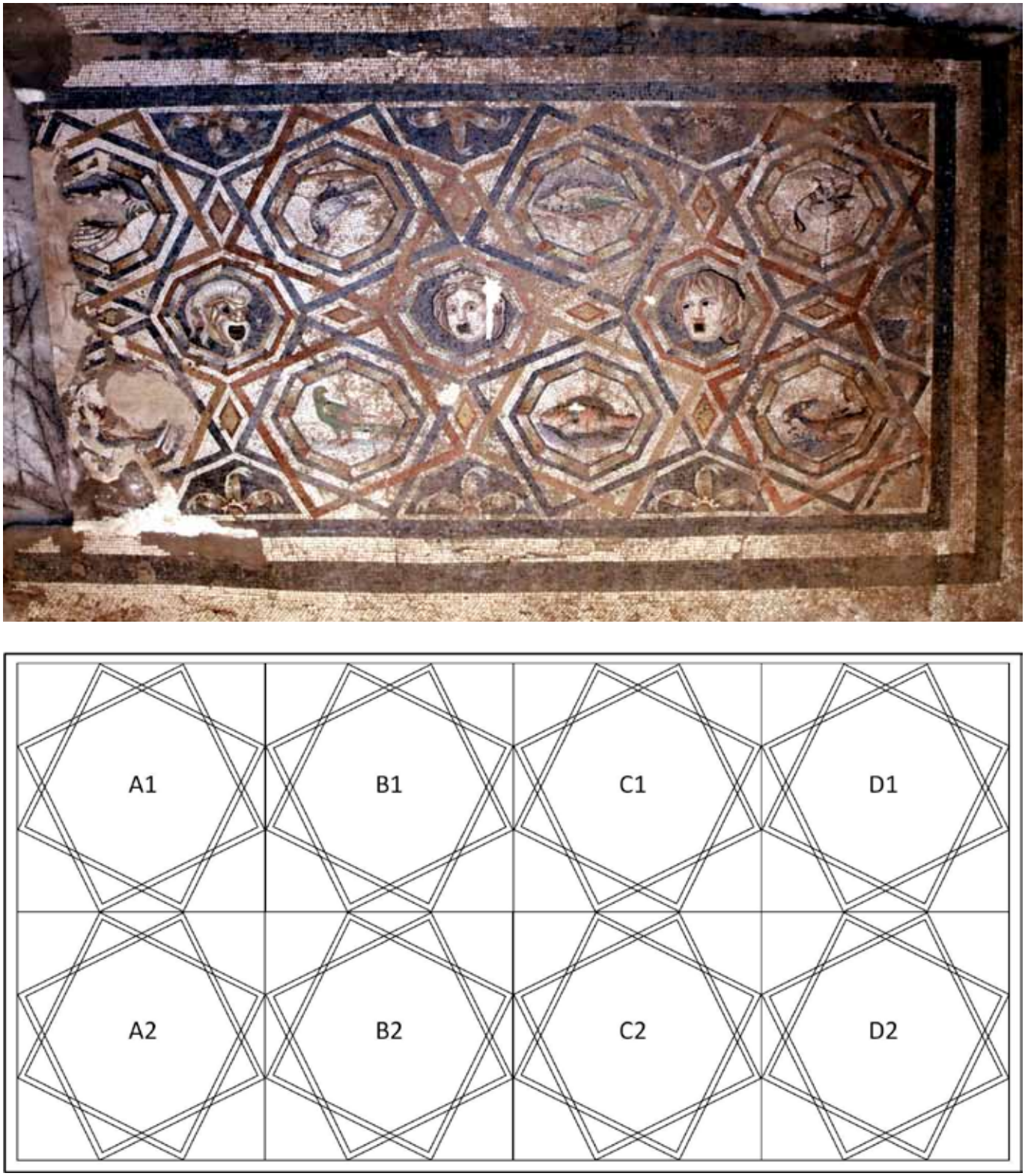


Figure 1, 2
Geometric floor mosaic in the Reception Hall of Metropolis (Öz 2012b)

of the construction of geometric patterns. Furthermore, there was also a strong need to shed a light on the construction process of the mosaics that could lead the way to suitable conservation methods.

It is quite difficult to study the geometric patterns in an appropriate chronological context, as the same pattern has been formed by different masters in different periods and used to decorate the interiors. The main objective is to prove that,

especially in the Roman period, the applications used in the process of designing a mosaic were based not only on experience, but also on the knowledge of geometry. Therefore, the mosaic design method applied in the ancient period will be revealed by determining the dominant organization process in patterns, the element modules and the geometric rules used in organizing the whole of the mosaic. Another subject to be studied, as an important design principle, is the pattern diversification and the pattern expansion applications through their repetition in variable rhythms –which is considered to be a progress in decoration– achieved by the reassessment of the motif repetition.

The geometric analysis of mosaics includes examination of its mathematical plan and application methods, establishment of the connections with the construction process, interpretation and measurement of the results of this research in terms of archaeology, art and mathematics. At this point it is important to note that geometrical studies and methods do not cause any harm to the monuments.

1.1. Metropolis Mask Mosaic

Metropolis is an important ancient city located in the center of the Western Anatolia coast –which was named Ionia in the ancient period– between Smyrna and Ephesus. It has proven to be just as important as the rest of the cities in the same area, as the quality of its ruins and finds which came up during recent excavations shows. City's real establishment and development took place in the Hellenistic period as it was influenced by the Kingdom of Pergamon and enhanced significantly during the Roman period (Aybek et al. 2009: 39). Although there are technical and stylistic differences in each one of these mosaics, it can be generally assumed that the mosaic tradition in Metropolis was enriched during the 3rd and 4th centuries A.D. (Öz 2012a: 147).

The building, identified as the Reception Hall of the Theater because of its theatrical symbols (Meriç 1999: 336), is located on the east side of the Theatre and its floor is decorated with panel mosaics. In fact, the mosaic floor consists of two different panels, one at the center and one on the eastern border. The eastern panel (2,02 x 3,48 m sized) is important since it conveys an impression of a Reception Hall. Eight out of the eleven figures on this panel consist of bird and fish depictions, while the remaining three figures are theatre masks located in the center of the panel. This way the aforementioned symbols are related to both theatre and banquet. The annexes, which functioned as a cellar or a kitchen, highlight the function of the building. Similar examples of this building are found in the Terrace House of Ephesus (Lang-Auinger 1996: 205) and the Bau Z in Pergamon (Radt 1988: 102).

The middle panel is surrounded by a frame consisting of a 2,70 x 3,78 m sized, intertwined square, which is divided into six equal parts. There is one part in the southeastern area which is not preserved, but the other five parts reveal a very high quality workmanship with figural mosaics (Öz 2012b: 703). Many different ideas and suggestions have been presented for the interpretation regarding the motive and the dating of the five figures on the middle panel. According to Recep Meriç, who was the first person to excavate this place, the panels have figures relating to Dionysus (Meriç 2004: 99) or the Four Seasons (Parrish 2007: 19) and can be dated back to the 2nd – 3rd century A.D.

2. Geometric Analysis and Comparison

2.1. The Theoretical and the Real Measurements

The ABCD square, within which there are two square drawn, is the primary mosaics pattern and constitutes the geometric frame of the mosaics (Fig. 3). Other geometric figures, apart from the primary pattern's square trio, are incorporated naturally while at the same time bringing together the element forms successively. The square is considered to be one of the simplest concepts in mathematics. In fact, in every method including a set of application of geometry rules a square drawing procedure needs to be followed. First, a carrier square named ABCD square must be drawn and then there is a special drawing process of two more squares with their corner points on the carrier square. The accurate determination of those corner points is a delicate work, because smoothness of the octagon frames, which portraits will be placed into them, require the identity of this two squares.

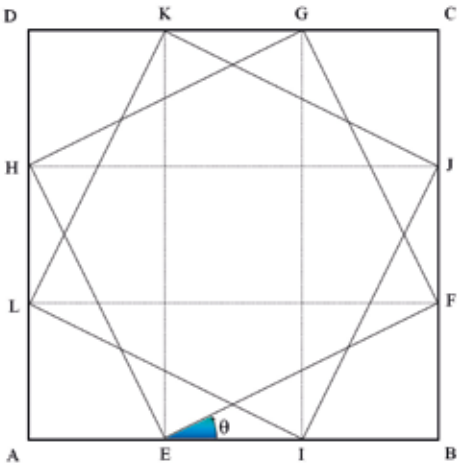


Figure 3
Primary pattern
of mosaic

In order for the design and construction phase of the primary pattern to be easier, a suitable method would be to divide each edge of the carrier frame into three equal parts or conversely to preconceive the edge length of the carrier frame as three units. Another method would be to determine the corner points of the inner squares with the use of a ruler or a compass. In the first method, the tanθ rate measured is approximately 1/2 ($\theta=26{,}6^0$), while in the second method, the tanθ rate measured is different from 1/2 and there are no three equal parts on the edge of the carrier frame.

The ABCD square has been used repeatedly, but due to workmanship defects and variable sizes of little stones, deformation has occurred in the mosaic figures during tessellation process. In fact, the rate of this deformation may be used as an indication of the quality of workmanship. Actually, the section whose size is closer to the size of the element ABCD square, must be the part of the mosaics to be constructed in advance during the construction process, because as the construction progresses, deformation increases and the size of the square shaped parts of the mosaics diverges from its correct or original measurement. So patterns whose initial shape is square cease to be squares and turn into ordinary rectangular, with their 90 degrees angles increasing or decreasing.

There are eleven octagon frames in the mosaics. The smoothness of these frames depends on the smoothness of the ABCD square and the smoothness of the other two squares which constitute the content of the ABCD square. The octagon frames are actually the intersecting sides of these squares. If the squares are deformed, the octagons are also deformed. It should be noted that as much as an octagon is deformed chances are that this octagon was most recently constructed.

The edge lines of the ABCD square are the starting lines for the tessellation process. The stones are placed in rows from the edge lines towards the inner side of the square frame and if this process is done in an incorrect direction, then deformation occurs. There are dark stones used to give a shadow impression in-between the telescopic octagon patterns which actually show that the method been used is the parallel shifting method.

The vertices of the triangles are under the portraits, which indicates that the stones were laid in rows from the edge lines towards the inner side of the octagonal frame. On the other hand, stones were laid out right from the outline of the portraits. According to this tessellation logic, portraits cannot be placed into mosaics if there is not a geometric frame ready beforehand. Therefore, it can be concluded that portraits were most recently placed into the space allocated to them.

2.2. Identification of Deformation Theorem

When planned patterns are being built, deformations occur as a result of both labor and material. A deformation can be identified as the ratio between the product of measured lengths and planned measures. Deformation rates can be positive, negative or zero. Positive rates is an indication that planned lengths are greater than the measured lengths, whereas negative rates indicate that planned lengths are smaller than the measured ones. Zero rates is an indication that the plan was perfectly implemented, in other words that there is actually no existing deformation.

It has been observed that in repeat domains the carrier square of the primary pattern was been divided into approximately three equal parts. The lengths of these parts are concentrate around 26,00 cm. Consequently, the primary pattern should initially have been planned to be a 78,00 cm sized square pattern. Finally, the mosaic frame should have been a 156,00 - 312,00 cm sized frame and each edge of the octagons should have been a 19,30 cm sized edge. However, the short edge of the mosaics frame is measured to be a 149,00 cm sized edge. This incomplete measure is the first source of any deformation affecting all of the mosaics' square patterns which loose their square features in order to compensate for this incomplete measure.

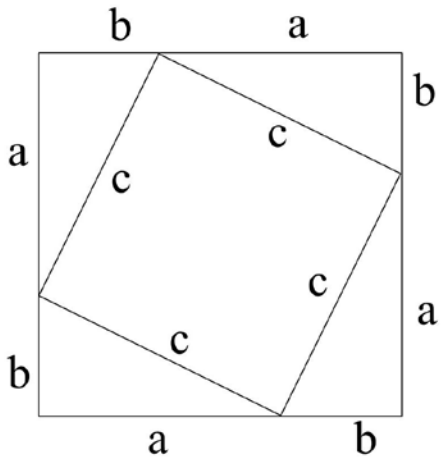
The deformation rates of repeat domains differ from each other and that there is an internal consistency between the rates. These rates make it possible to compare between repeat domains. The domain with the smallest deformation rate among the repeat domains is the D2, as it is seen that the rates are steadily increasing from D2 to A1. The D2 domain is located in the corner of the venue.

Figure 4
D2, first constructed section of the mosaic panel

When geometric features and deformation rates are evaluated together, it can be understood that the D2 domain must have been the first section of the mask mosaic to be constructed (Fig. 4). Although there is a partial pattern absence in the A2 and A1 domains and the measurement process cannot be executed completely because of this absence, measurements made on surviving parts of lost patterns indicate that the domains C2, B2, A2, D1, C1, B1, A1 must have been constructed respectively after the D2 domain.

2.3. The Primary Pattern and the Mathematical Theorems

There are about 400 different proofs of the Pythagorean theorem. One of them is known as the Chou-pei Suan-ching proof, which came from China circa 250 B.C. (Lietzmann 1966; Nelson 1993; Veljan 1993: 259-272; Beryozin 1994: 25-28). As it can be seen the square duo figure of the primary pattern and the geometric figure used in the Chou-pei Suan-ching proof are the same (Fig. 5). The date of the proof figure precedes the construction date of the mosaic. This is an expected consistency, which leads to the conclusion that the proof figure had gained prominence in places far away from its source.



$$(a+b)^2 = c^2 + 4.\left(\frac{ab}{2}\right) \Rightarrow a^2 + b^2 = c^2$$

Figure 5
A mathematical proof of primary pattern (Lietzmann 1966)

The hypothesis of this paper is that there is a solid relation between the beauty concept and the mathematic rules. As it can be seen the mosaic patterns had been designed and constructed in accordance with a strict geometric plan and the mosaic artists had actually studied to be design engineers. This conclusion supports the idea that original portraits located in mosaic works could be made to adhere completely to a geometric plan and leads the way to studies aiming to examine mosaic portraits in terms of geometry.

One of the famous problems of the ancient era was known as the trisection of an angle with the use of only a measureless ruler and a compass (Heath 1921: 235). Because, according to the information provided by Vitruvius, mosaic masters were working using only ruler, compass and spirit level (Vitr. VII.I.3). The use of geometry knowledge in mosaic figures shows that the studies aiming to solve this ancient problem and determining the drawing facilities of the ruler and the compass had brought mosaic artists to the point of drawing each figure with the use of ruler and compass. The conscious use of geometric subjects as patterns shows that basic mathematical concepts were applied in the arts.

The construction of a whole mosaic with the use of a primary pattern can be considered as an induction application. Algorithm generating activities executed with the repetition of a particular operational procedure are parallel to the primary pattern repeating activities. The differential and integral concepts of modern mathematics are based on the idea that a change occurring in one part induces changes on the whole and there is a ratio between the changes occurring in the part and on the whole (Boyer 1949: 187). There are specific examples of the interaction between the part and the whole in the design and construction phases of the mosaic works.

In this paper, it is shown that the creation of complex patterns was achieved with the use of a primary pattern within a specific order. Presently, the idea that there is an order within anything chaotic is being studied within the framework of the chaos theory (Wiggins 2003). This theory supports the idea that there are rooted mental processes, whose traces can be found in the arts. These applied, tested, grasped and accustomed processes are subject to man's creative thinking in the field of mathematics, in a way that mathematics knowledge reflects on the arts.

3. Conclusion

In the ancient times, in the absence of a common symbolic language in mathematics, the transfer of mathematical knowledge, the discussion of problems and the finding of solution methods was achieved with the help of symbols (Heath 1921: 26-64). However, on account of the fact that grasping mathematical concepts and processing mathematical knowledge only with the use of symbols can be quite difficult, designed geometric figures were also been used. As in the case of the Pythagorean theorem representation by a right triangle and the representation of the square duplication problem by a square duo, mathematical knowledge was fictionalized and encoded by figures.

In order to shed light on the history of mathematical studies and the knowledge level of ancient communities, it is important to study art works with direct and indirect reflection of mathematical knowledge. This study draws attention to the connections that can be revealed by basic geometric figures reflected into art while at the same time sheds light on conscious applications of mathematical knowledge in the mosaic arts. It provides specific examples which may be used in studies questioning the relation between art history and mathematics.

The conclusion being drawn is that famous figures and mathematical methods have been used as a tool in search of beauty, harmony and aesthetics, just like in the case of famous mythological figures and their stories. Mathematical knowledge has been hidden in colour transitions, in optical illusions and symmetries. The order has been hidden in chaos and the artistic result has come to the foreground. All mosaics with a geometric pattern can be analyzed and common aspects of these mosaics can be determined. Furthermore, mosaics conservation studies may be supported by this geometric model.

This study has revealed the existence of a deformation concept with the use of a simple theoretical relation between the geometric plan and its application. Evidently, the deformation concept has quite significant results and can be a quite useful tool for mosaic researches. Measurement works and a formulated approach provides a set of digital data and becomes a meaningful factor. Because of the fact that geometric studies can also provide significant knowledge as far as measurement units used in the ancient era is concerned. Furthermore, it is also estimated that the knowledge obtained by geometric studies on mosaic floors can be really useful for conservation works.

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De la nécessité d'identifier précisément le décor géométrique d'une mosaïque. Une étude de cas

Bir Geometrik Mozaik Dekorunun Doğru Bir Şekilde Belirlenmesi Gereği Üzerine Bir Vaka Çalışması

Bernard PARZYSZ*

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Abstract

In published articles, the description of geometric mosaics is generally confined to the Décor's typology, which is of course indispensable but not always precise enough to identify their geometric properties accurately. However these properties allow an access to the craftsmen's knowledge in that domain, and beyond that to their professional gestures. Undertaking a sharp geometric study is the only way to reach this goal, but it requires the knowledge of an extensive catalogue of theoretical models including, together with the 'regular' types, approximate versions whose implementation was frequently more economical (regarding involved knowledge, time and finally cost). For the chosen example (a mosaic from the Roman villa of Milreu (Portugal), of which only a few fragments remain), the regular geometrical model is confronted with an alternative model already itemized. Then some easily achieved observations about angles and alignments make it possible to decide between the two models, with the possibility of restoring the setting as a consequence.

Keywords: *Typology, geometric mosaic, model, check, restitution.*

Öz

Yayınlanan makalelerde, geometrik bezemeli mozaiklerin tanımlaması genellikle Decor'un tipolojisine dayanmaktadır ve bu durum elzem olmakla birlikte her zaman geometrik bezeme düzenlerinin belirlenmesinde yeterli olmamaktadır. Halbuki bu özellikler zanaatkarın o alandaki bilgilerinin ve bunun ötesinde de kendine has mesleki işaretlerinin anlaşılması için anahtar rol oynamaktadır. Teorik bilgiler ile «sıradan» tiplerin de yer aldığı detaylı bir katalog ve kimin uygulamalarının daha çok ekonomik olduğunun (bilgi birikimi, zaman ve masraf göz önünde bulundurularak) yaklaşık olarak yorumlanmasını kapsayan net bir geometri çalışması bu amaca ulaşmanın tek yoludur. Seçilmiş örnekte Milreu - Portekiz'deki bir Roma villasından sadece bazı kısımlarının günümüze ulaştığı bir mozaik, sıradan geometrik bir model daha önceden ayrıntılandırılmış alternatif bir başka modelle birlikte kullanılmıştır. Açılar ve sıradüzen ile ilgili bazı basit gözlemler iki model arasında karar verilmesini ve çıkarımsal olarak bezeme düzeninin yeniden kurgulanmasını mümkün kılmaktadır.

Anahtar Kelimeler: *Tipoloji, geometrik mozaik, model, kontrol, restitüsyon.*

1. Introduction

Lorsqu'on étudie une mosaïque figurée, l'identification, de façon aussi précise que possible, de la scène représentée peut être riche d'enseignements sur le commanditaire de l'oeuvre : quels étaient son statut, ses habitudes, ses croyances... Pour y parvenir on peut en général s'appuyer sur des textes, afin de retrouver sur l'objet archéologique divers éléments décrits par le mosaïste : scène mythologique, pratique religieuse ou sociale, etc.. Ceci permet le plus

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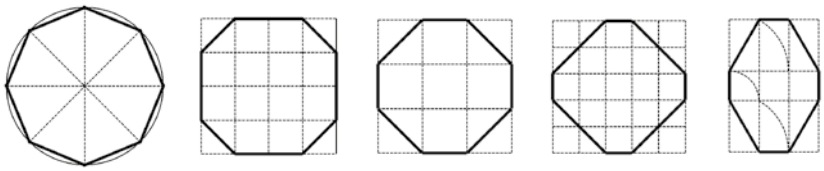
souvent d'établir des liens entre l'objet étudié et d'autres similaires, en mettant en évidence leurs analogies et leurs différences, et d'en tirer des conséquences. Il n'en va pas autrement pour une mosaïque géométrique, avec cependant un handicap majeur : l'absence de textes de référence, et le plus souvent l'absence de tracés préparatoires visibles. Ici, c'est surtout le mosaïste qui sera en cause : identifier exactement la composition du décor – c'est-à-dire le modèle géométrique ayant servi à son élaboration – pourra bien sûr permettre, non seulement de rattacher sans risque d'erreur la mosaïque considérée à d'autres, aux fins d'établir des comparaisons comme pour les mosaïques figurées. Mais ceci nous renseignera aussi sur les connaissances de géométrie pratique nécessaires à sa conception, et éventuellement sur les procédures ayant pu présider à sa mise en place et sur les gestes professionnels du mosaïste, dépassant ainsi le niveau descriptif de l'étude – celui de l'ouvrage de référence : *Le décor géométrique de la mosaïque romaine*[1] (Décor I - II) – pour accéder au niveau structurel, et peut-être même au niveau procédural.

La recherche que j'ai entreprise depuis maintenant plusieurs années vise, non pas à récuser le niveau descriptif – car dans un premier temps il est incontournable –, mais à l'affiner, de façon à pouvoir accéder à la structure profonde de l'objet matériel, c'est-à-dire à identifier, dans le cadre de la géométrie euclidienne de la règle et du compas, l'objet représenté. Par exemple, lorsqu'on parle d'« octogone » de quoi s'agit-il exactement ? En mosaïque, on rencontre sous ce nom des objets différents : l'octogone régulier, bien sûr, mais aussi plusieurs sortes d'octogones « irréguliers », ce qualificatif étant à lui seul insuffisant pour l'identification, puisqu'il y a maintes façons d'être irrégulier.



A pl. 164 C | **B** pl. 166 A | **C** pl. 166 D | **D** pl. 170 A | **E** pl. 172 A

Figure 1
Octogones variés représentés dans le Décor

Sur la Figure 1 ont été représentés quelques octogones figurant dans le *Décor* :

A : octogone régulier, inscrit dans un cercle et obtenu par bissections successives.

B, C, D : octogones irréguliers, inscrits dans un carré et construits sur un réseau carré (respectivement 4×4, 3×3 et 5×5).

E : octogone irrégulier, construit sur un réseau orthogonal, uni-modulaire en largeur, de module 1, et bi-modulaire en hauteur, de modules 1 et $\sqrt{3}$ (soit environ 7/4).

La nature précise de l'octogone peut en général être déterminée par l'étude de la composition d'ensemble du décor, que ce soit par des mesures ou par des considérations particulières, comme par exemple la présence d'un réseau.

Pour illustrer ma problématique, j'ai pris comme objet d'étude – parmi de nombreux autres possibles – une mosaïque de Milreu (Portugal) dont ne subsistent que quelques fragments.

[1] Dans la suite, il sera abrégé en *Décor*.

2. La mosaïque 31 de la villa romaine de Milreu

Il s'agit d'une mosaïque (Fig. 2), datée de la première moitié du 3e siècle A.D., qui constitue le n° 31 du corpus « Algarve Este » (Lancha – Oliveira 2013). Elle pavait, dans le compartiment i du secteur A2, un *cubiculum* de 4,15 m sur 3,07 m, et ne nous est malheureusement parvenue qu'à l'état fragmentaire : « *Sont conservés huit fragments de dimensions diverses sur le côté ouest, trois fragments sur la bordure sud et un sur la bordure nord*. »[2] (*op. cit.*/ Lancha – Oliveira 2013 : 238). Ces fragments ont été consolidés et conservés *in situ*.

Dans le corpus précité, la structure géométrique du décor du champ de cette mosaïque est indiquée comme identique à celle d'une mosaïque d'Anse (Rhône, France) (Fig. 3), référencée dans le *Décor* (Décor I: pl. 178d), où elle est ainsi décrite : « *composition orthogonale d'étoiles de huit losanges cantonnées de carrés, tangentes par deux carrés* (*déterminant des losanges et des octogones*.) ». Ce motif correspond à l'Oktogonsystem VI de G. Salies (Salies 1974: no 43)[3].

Figure 2
Milreu, mosaïque 31
(3e siècle A.D.).
Fragments conservés
du côté nord
(Lancha – Oliveira 2013:
pl. XLVa)

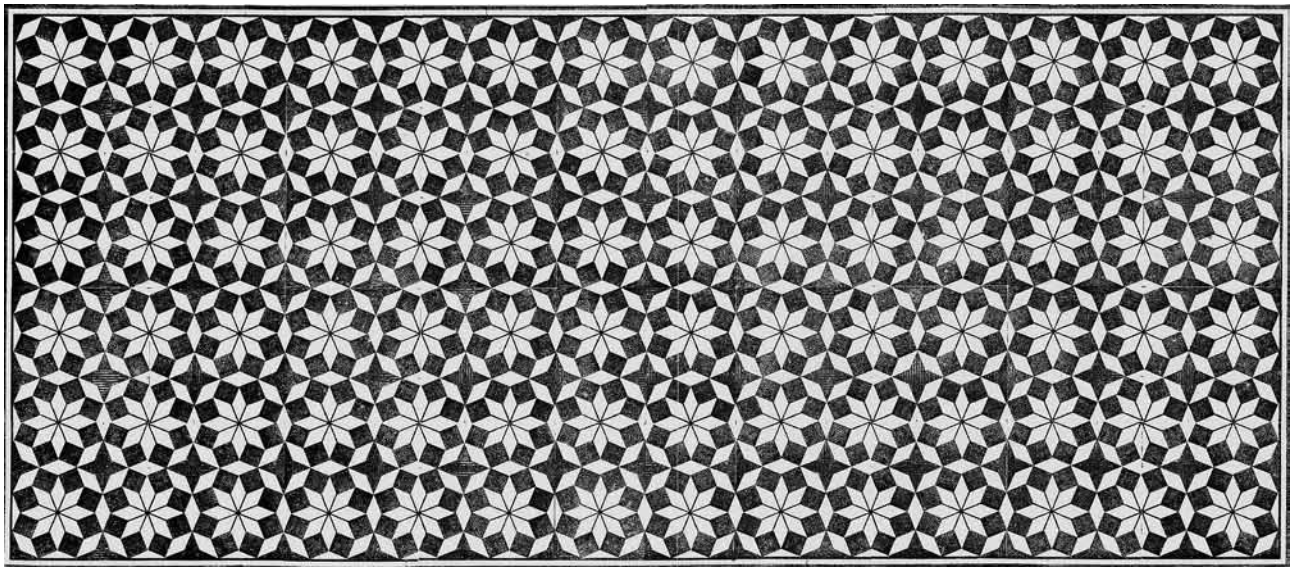


Figure 3
Mosaïque d'Anse
(milieu du 2e siècle A.D. ?)
(Lavagne – Tenu 1985: fig. 13)

2 Conservam-se oito fragmentos de dimensões desiguais no lado oeste, três fragmentos na bordadura sul e um na bordadura norte.

3 Salies recense 45 mosaïques présentant ce décor, datées du 4e au 6e siècle A.D.

Le décor consiste en un pavage résultant de la juxtaposition de 84 (14×6) carrés égaux contenant un même motif modulaire, constitué d'une étoile de huit losanges entre les branches de laquelle s'insèrent des carrés (Fig. 4).

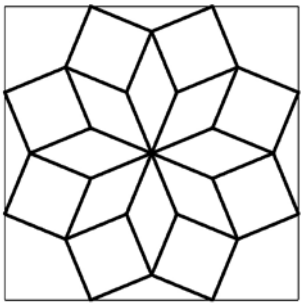


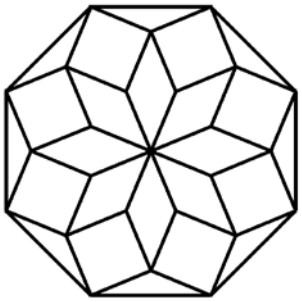
Figure 4
Anse. Le module

Ce motif est attesté à l'état isolé (composition centrée), inscrit dans un octogone régulier (Fig. 5 A), par exemple à Langres (France) (Décor II: pl. 374b) ; il s'obtient alors aisément à partir de l'octogone étoilé (voir plus loin). Il existe un autre motif très voisin, qui se présente avec une étoile à huit pointes, soit à l'état isolé dans un octogone régulier (Fig. 5 B), soit en pavage : (Décor II: pl. 315c - 411a).

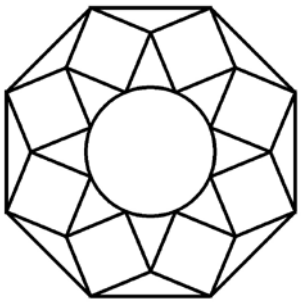
Sous l'hypothèse d'égalité de tous les losanges, leurs angles ont pour mesures 45° et 135°.

Concernant la structure géométrique de la configuration modulaire d'Anse, des considérations de symétrie permettent de démontrer, entre autres, que :

- les sommets des carrés extérieurs qui sont situés sur le carré initial sont les sommets d'un octogone régulier ;
- les côtés extérieurs des carrés sont portés par les deux carrés ayant pour sommets les sommets de l'octogone ;
- les « pointes » de l'étoile centrale sont les sommets de l'octogone d'intersection des deux carrés.



A
Décor II: pl. 374b



B
Décor II: pl. 315c

Figure 5
Motifs voisins

3. Mise en place de la mosaïque d'Anse

Bien évidemment, les techniques que j'envisage ici ne font appel qu'aux moyens matériels disponibles chez les artisans de l'antiquité, à savoir le simbleau (cordeau), suffisant en principe pour réaliser toutes les opérations, mais qui peut être accompagné, par commodité, d'instruments « rigides » : règle, équerre, compas…

Sur le terrain, la première opération de traçage consiste à installer le réseau carré dans lequel viendront s'insérer les modules, comme le signale R. Hanoune :

> *L'implantation des tapis est en général soignée et même rigoureuse ; elle est caractérisée par le rattrapage de l'irrégularité de la pièce grâce à une bande de raccord variable et par le dessin de motifs géométriques complets sur la base d'un quadrillage sous-jacent…*
>
> (Hanoune 1994: 281)

S. Tebby précise, quant à elle, que la méthode la plus commode pour mettre en place une mosaïque géométrique est de « *diviser le périmètre d'un carré ou d'un rectangle en unités égales et à relier les points sur les côtés opposés* »[4] (Tebby 1995: 277).

La mise en place du réseau ne nécessite donc qu'une seule technique : le report d'une même longueur, à l'exclusion de toute mesure (ici, 14 fois sur la longueur et 6 fois sur la largeur). Cette technique devait être analogue à celle observée par M. Alberti chez les Toradja d'Indonésie (Alberti 2013) : pour subdiviser une longueur en n parties égales, on commence par marquer une première estimation de la longueur de la partie sur une règle, puis on la reporte *n* fois sur la longueur à subdiviser ; on estime alors le quotient par n de la différence constatée à l'arrivée, puis on ajoute ou soustrait, selon le cas, ce segment différentiel à la première estimation, et on réitère l'opération de report. L'auteur précise

4 "*…dividing the perimeter of a square or rectangle into equal units and connecting the points on opposite sides*".

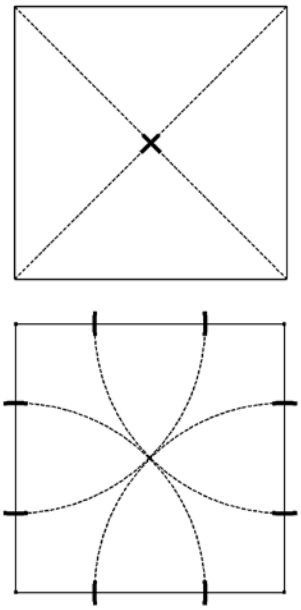


Figure 6
Construction de l'octogone inscrit dans un carré

qu'« *aucune mesure n'était prise ni aucun calcul explicitement effectué* » (*op. cit.* : 115) et que les artisans observés « *agissaient si rapidement qu'il était difficile de voir quelles étaient leurs références.* » (*ibid.*). L'expérience montre que cette méthode converge très rapidement, et qu'il suffit en pratique de deux ou trois essais pour parvenir à un résultat tout à fait satisfaisant.

Une fois le réseau installé, il s'agit d'imaginer une procédure permettant de réaliser la configuration de la Figure 4 dans l'un des carrés ainsi délimités. Il en existe plusieurs, mais je n'en donnerai qu'une – qui me paraît la plus simple – à titre d'exemple.

On commence par placer les huit points de la configuration qui sont situés sur les côtés du carré, selon la construction classique de l'octogone régulier inscrit dans un carré (Fig. 6) :

1° tracé des diagonales du carré (au cordeau ou à la règle) ;

2° à partir des sommets du carré, report sur les côtés de leur distance au centre (au cordeau ou au compas).

Il s'agit ensuite d'inscrire la configuration modulaire dans cet octogone, toujours à l'aide du cordeau ou de la règle, en utilisant les remarques faites plus haut (Fig. 7) :

1° tracé des deux carrés ayant pour sommets ceux de l'octogone ;

2° Tracé de l'octogone étoilé ayant pour sommets les intersections de ces deux carrés.

Il ne reste plus alors qu'à compléter le tracé de l'étoile centrale[5].

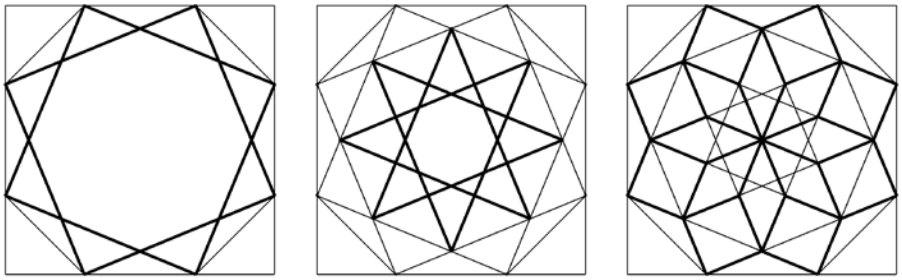


Figure 7
Anse. Construction du module

On constate (Fig. 8) que la juxtaposition des modules fournit effectivement le décor de la Figure 3, en y ajoutant dans les octogones vides – toujours au cordeau

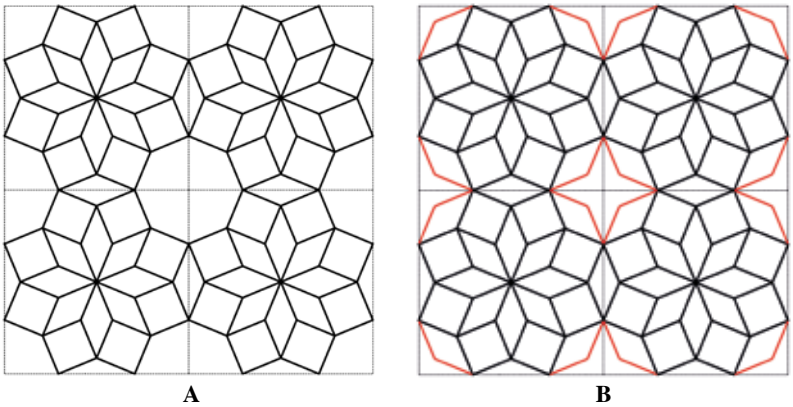


Figure 8
Anse. Mise en place et achèvement du décor

[5] Deux schémas-clés interviennent successivement ici : l'octogone régulier inscrit dans un carré, puis l'étoile de huit losanges obtenue à partir de l'octogone étoilé.

ou à la règle – les étoiles à quatre pointes obtenues à partir des octogones étoilés (Fig. 9).

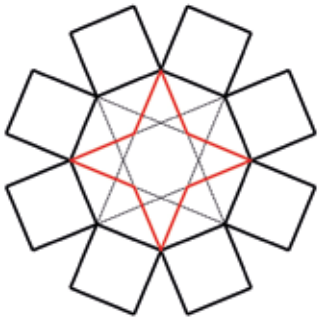


Figure 9
Anse. Construction des étoiles à quatre pointes

4. Confrontations

À Milreu, un relevé tesselle à tesselle (Lancha - Oliveira 2013: pl. XLVI) permet d'évaluer, au degré près, certains angles aigus des losanges. Les sept mesures effectuées nous[6] ont fourni les résultats suivants (Fig. 10) : 35° 37° 38° 51° 52° 53° 54°.

Ceci conduit à opérer une bipartition de ces mesures : de 35° à 38° d'un côté, et de 51° à 54° de l'autre. On est ainsi amené à considérer qu'il existe, dans le modèle du décor de Milreu, deux sortes d'angles : « petits » (35° à 38°) et « grands » (51° à 54°). Cette constatation est incompatible avec le modèle précédent, où tous les losanges sont égaux et ont des angles aigus de 45°.

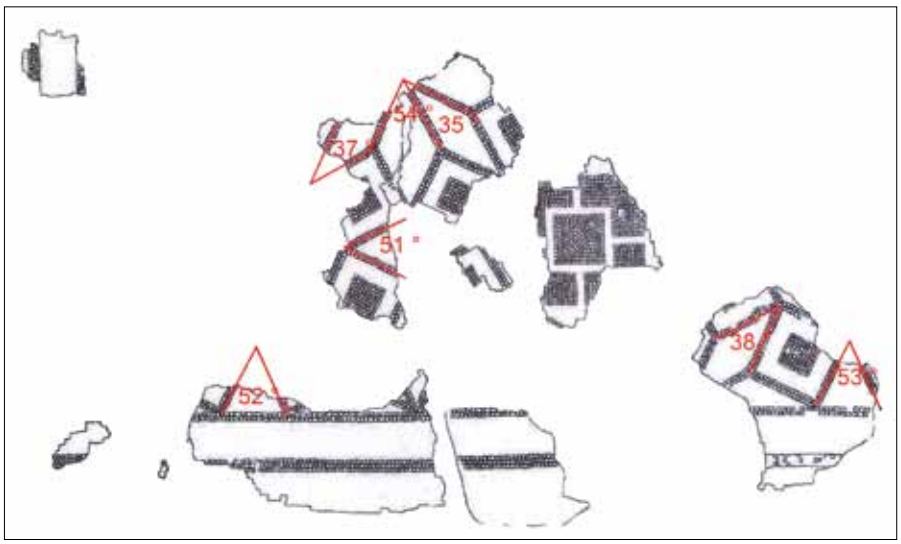


Figure 10
Milreu. Angles mesurés sur le relevé tesselle à tesselle (d'après Lancha – Oliveira 2013: pl. XLV)

Il existe cependant un modèle avec lequel les données de Milreu sont compatibles : il s'agit du décor 5 B de la « famille du cavalier » (Parzysz 2011: 741). Traité en réseau, ce module produit un décor analogue à celui d'Anse (Fig. 11).

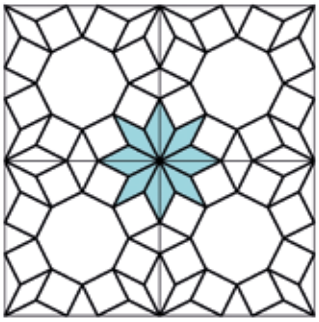


Figure 11
Etoile de huit losanges cavalière

Il en diffère cependant fondamentalement, car il repose sur un réseau secondaire carré de 10 × 10 (Fig. 12) et ne nécessite par conséquent aucune construction géométrique, dès lors que le réseau est mis en place (voir plus haut, § 3).

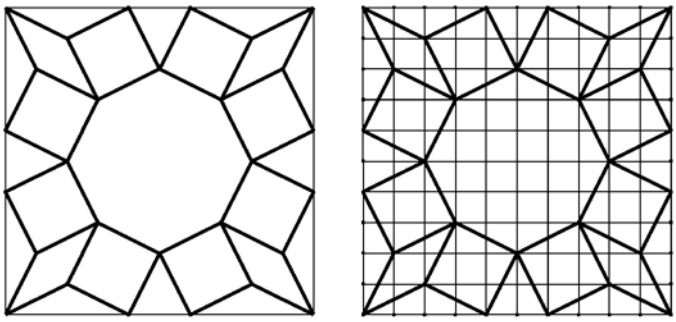


Figure 12
Module octogone cavalier

6 À l'aide du logiciel Cabri-Géomètre II Plus.

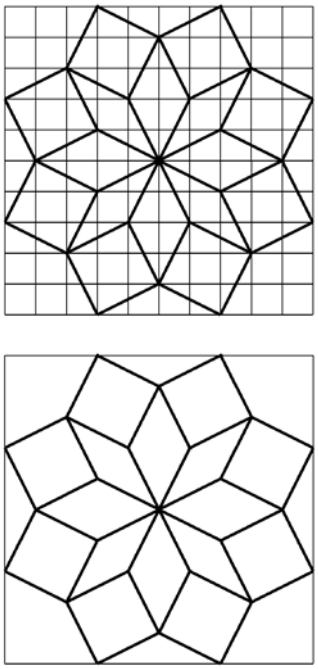


Figure 13
Etoile cavalière duale
de l'octogone

Avec l'octogone cavalier on a encore des étoiles de huit losanges, mais ces losanges sont alternativement de deux types, « larges » et « étroits ». Notons au passage que le même pavage peut s'obtenir à l'aide de l'étoile de huit losanges cavalière (Fig. 13), forme duale de l'octogone cavalier : les deux formes sont, l'une par rapport à l'autre, en décalage diagonal d'un demi-module.

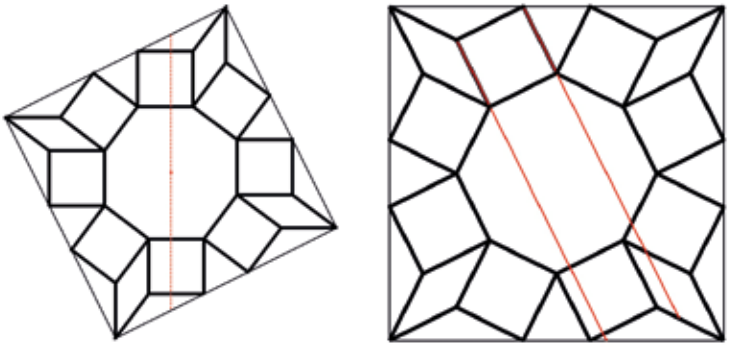
Dans les losanges étroits, l'angle aigu a pour mesure en radian 2*arctan* (1/3), et dans les losanges larges elle est de 2*arctan* (1/2), ce qui correspond à des mesures en degrés d'environ 37° et 53° respectivement. On voit donc que – contrairement à la version envisagée au début – ce modèle est tout à fait compatible avec l'observation.

Qui plus est, le site même de Milreu présente ce même décor cavalier sur deux autres mosaïques (Fig. 14) : le n° 52 et le n° 58.

A - Mosaïque 52, fin du 3e siècle A.D. (Lancha – Oliveira 2013: pl. XCII)

Figure 14
Milreu. Autres décors
à octogones cavaliers

A - Mosaïque 52, fin du 3e siècle A.D. (Lancha – Oliveira 2013: pl. XCII)



A
non symétrie

B
non alignement

Figure 15
Particularités
du modèle cavalier

On distingue bien, sur les clichés, les deux sortes de losanges. Pratiquement, deux critères simples permettent de distinguer le modèle régulier et le modèle cavalier :

- on peut chercher les axes de symétrie de l'octogone : dans le modèle régulier ils sont au nombre de 8, tandis que dans le modèle cavalier ils ne sont que 4 (Fig. 15, à gauche) ;
- on peut aussi rechercher si, autour des octogones, les carrés qui se font face sont dans le prolongement l'un de l'autre : c'est le cas pour le modèle régulier, mais pas pour le modèle cavalier (Fig. 15, à droite).

On voit que, par rapport à la version régulière, les écarts du décor qui apparaissent éventuellement ne peuvent pas être attribués à un éventuel manque de soin ou d'adresse du mosaïste, mais qu'ils sont inhérents au modèle utilisé pour réaliser la mosaïque.

Il n'en demeure pas moins que, visuellement, l'écart entre les deux modèles est faible, pratiquement imperceptible (Fig. 16). C'est en fait le caractère systématique et non aléatoire des minimes différences constatées – et non pas l'aspect visuel global – qui peut donc orienter vers le modèle alternatif (à condition, bien sûr, d'y être sensibilisé).

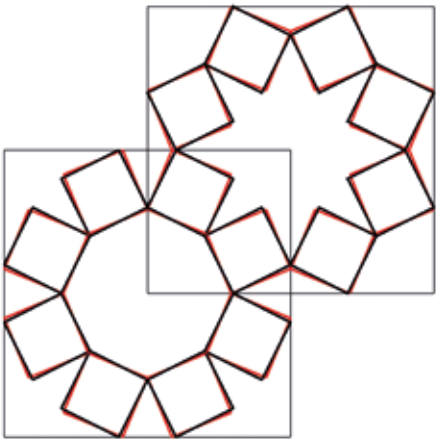
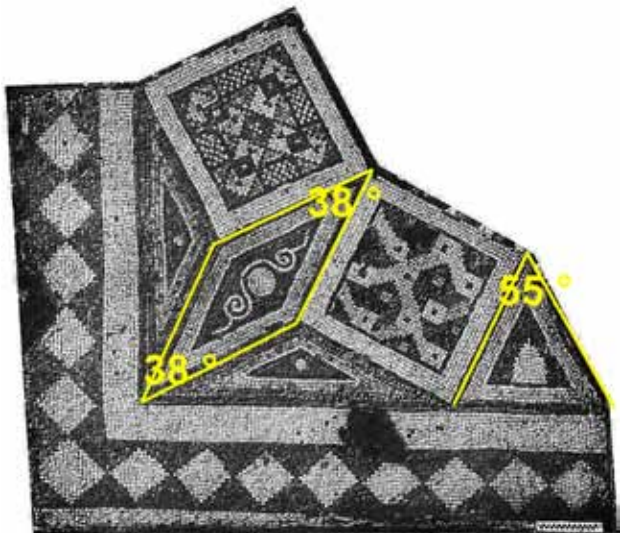


Figure 16
Comparaison des modèles :
en rouge Anse, en noir Milreu

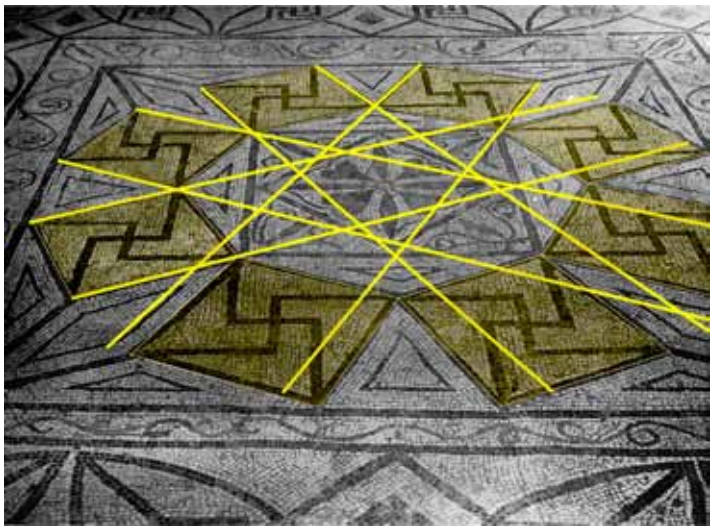
Une composition centrée très analogue au module cavalier de la Figure 11 est répertoriée dans le Décor (Décor II: pl. 373), avec trois exemples, provenant respectivement d'Antioche (Turquie), d'Apamée (Syrie) et d'Itálica (Espagne). La description qui en est donnée est « *composition centrée, dans un carré et autour d'un octogone sur la pointe, de 8 carrés latéraux adjacents à l'octogone, et 4 losanges en encoignure contigus à ce dernier et adjacents aux carrés, déterminant des triangles latéraux* ». Sur chacun de ces dessins, les octogones centraux apparaissent réguliers[7] et on ne relève dans aucun les particularités de la Figure 15. Pourtant, si on consulte les clichés originaux[8], on s'aperçoit que, dans les trois cas, c'est vers le modèle cavalier qu'il convient de s'orienter (Fig. 17).

[7] Ce que confirme l'absence du qualificatif « irrégulier », qui accompagne généralement la description d'un polygone irrégulier dans le *Décor*.

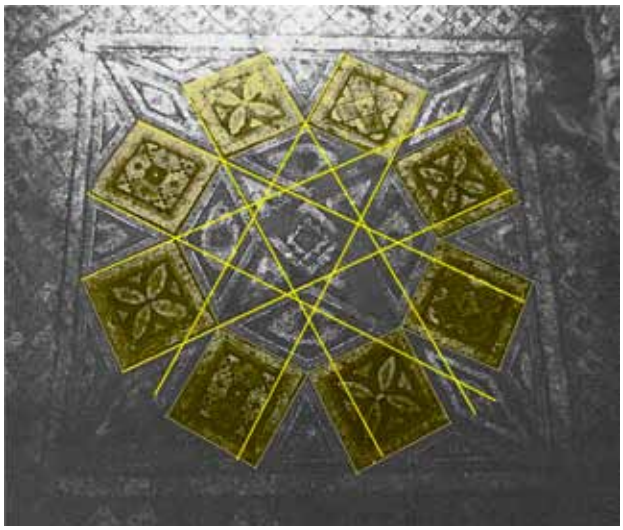
[8] Notons au passage que, si la mesure des angles exige une vue orthogonale de la mosaïque, le repérage des alignements peut se faire sur une vue quelconque, en raison du fait que la perspective photographique conserve les alignements. Il en résulte en particulier que, si des points ne sont pas alignés sur le cliché, alors ils ne sont pas alignés dans la réalité.



A - Antioche
(milieu du 4e siècle A.D.)
(Levi 1971: pl. CXI a)



B - Italica, 2e siècle A.D. (Blanco Freijeiro 1978: pl. 48)



C - Apamée, 4e siècle A.D. (Gisler – Huwiler 1984: pl XXVII/2)

Figure 17
Régulier ou cavalier ?

5. Milreu : essai de restitution partielle

En s'appuyant sur le relevé tesselle à tesselle de la Figure 10, on peut maintenant superposer certains fragments de la mosaïque au modèle cavalier théorique. Et la comparaison des résultats (Fig. 18) permet de constater que le fragment de droite devrait être un peu plus écarté des autres qu'il ne l'est, d'une quinzaine de centimètres environ.

Néanmoins, si l'on s'intéresse aux alignements en se reportant au cliché de la planche XLV (Fig. 19), on s'aperçoit que la position relative des deux fragments in situ est conforme au modèle. S'agirait-il alors d'une erreur de relevé ?

D'autre part, on voit sur la Figure 18 (en bas) que les limites nord et ouest du champ correspondent à des bords du module octogone cavalier ; c'est également le cas pour les mosaïques n° 52 et n° 58 rencontrées plus haut (Fig. 14). Cette remarque incite tout d'abord à penser que c'est bien l'octogone, et non pas l'étoile, qui constitue le schéma-clé sur lequel s'est fondé le mosaïste antique ; d'ailleurs, si – comme on vient de le voir – l'octogone cavalier est attesté à l'état isolé (composition centrée), il semble que ce ne soit pas le cas de l'étoile cavalière : notamment, le *Décor* n'en présente pas. Elle montre ensuite comment la

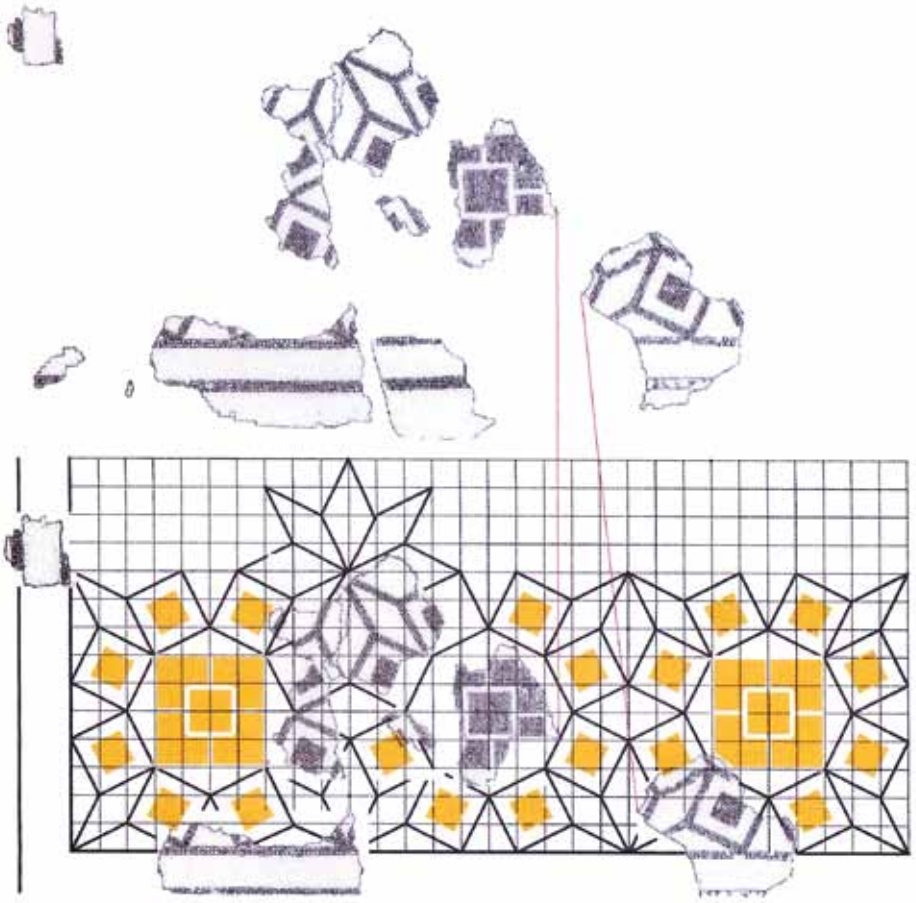
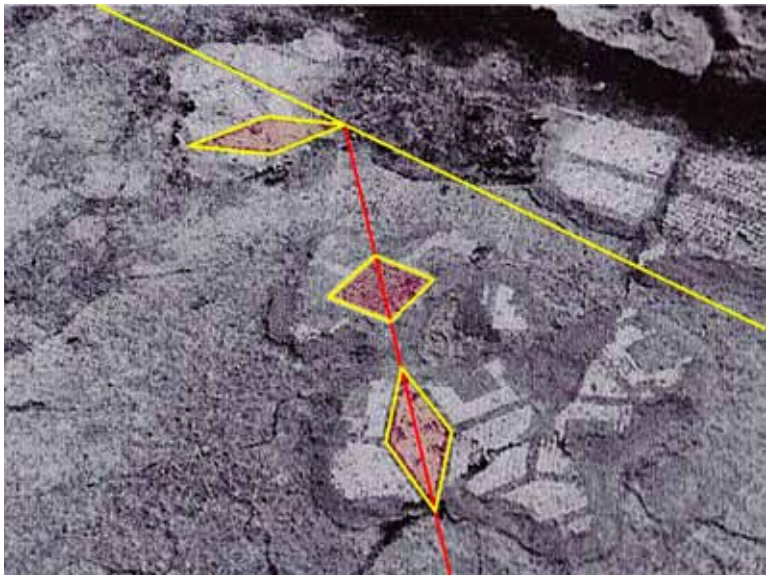
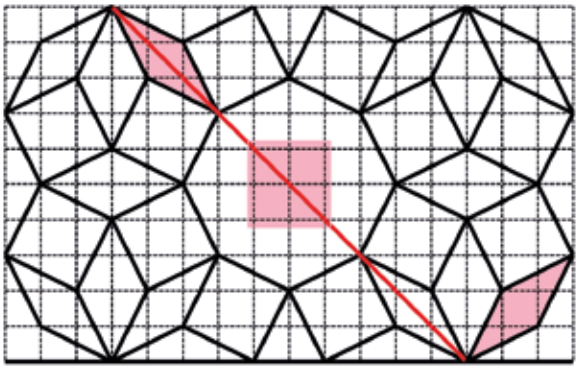


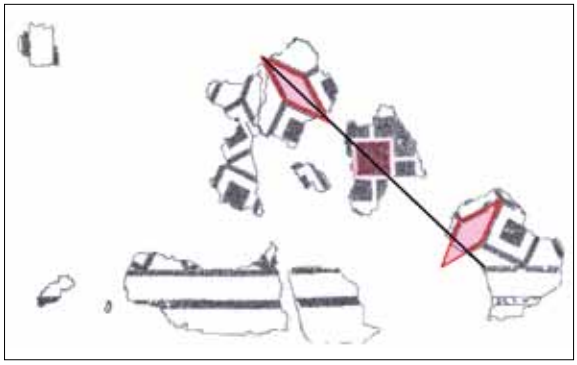
Figure 18
Milreu. Relevé (en haut) et configuration rectifiée (en bas)



A - Alignement observé *in situ*



B - Alignement théorique



C - Non alignement sur le relevé

Figure 19
Positions relatives des fragments

référence au modèle géométrique permet de restituer le réseau primaire (ici, les carrés contenant le module), ainsi que le réseau secondaire (ici, la subdivision des carrés en 10 × 10 petits carrés), donc finalement l'ensemble du décor.

6. Conclusion

L'exemple de Milreu montre que la reprise de l'étude d'une mosaïque géométrique, à la lumière de la connaissance de *modèles voisins* de décors identifiés et répertoriés, peut apporter un nouvel éclairage sur le modèle utilisé par le mosaïste et, partant, sur les moyens mis en oeuvre pour le réaliser *in situ*. Dans le présent exemple, il s'agit plus précisément d'une configuration pour laquelle l'observation fine fait apparaître des écarts par rapport à un modèle « régulier » présupposé – écarts qui, par leur cohérence, peuvent difficilement être attribués aux imperfections liées aux aléas de la mise en place des tracés ou à la pose des tesselles –. À ce modèle vient s'en substituer un autre, reposant cette fois sur un réseau carré, modèle certes moins « parfait » au sens de la géométrie, mais bien plus facile à mettre en oeuvre. En dehors de la possession d'une image mentale opératoire du module[9], la seule compétence requise est en effet l'installation d'un réseau carré. En effet, la réalisation du module ne fait intervenir que la diagonale du « double carré » (Fig. 20) : tous les segments du module relient deux noeuds du réseau et sont de ce type (cf. fig. 12), ce qui facilite grandement sa mémorisation et son implémentation.

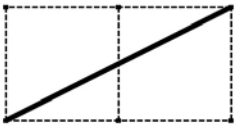


Figure 20
Diagonale
du double carré

En outre, nous avons également vu que l'identification du modèle peut servir à guider la restitution du décor, en mettant en évidence les lignes directrices qui permettront un positionnement précis des fragments.

Cette étude pose également la question de l'existence, à côté de la version « régulière » – au sens géométrique – d'un décor donné, de versions « approchées » (ici, la version cavalière), dont l'existence peut facilement passer inaperçue lorsqu'on n'y est pas sensibilisé[10]. Reste à déterminer pourquoi et quand ces versions alternatives sont apparues. On peut invoquer le désir du mosaïste de réaliser un décor relativement complexe de façon plus simple, donc plus « économique », c'est-à-dire plus rapide et, partant, moins coûteuse. Une construction ne nécessitant que la mise en place d'un réseau carré répond à ces critères, et en outre elle offre une grande « robustesse » par rapport aux imprécisions inhérentes à la réalisation matérielle. En effet, si les mailles du réseau ne sont pas exactement carrées, la construction n'en sera pas modifiée et, l'effet de perspective aidant, les imperfections passeront totalement inaperçues. Les études ultérieures – notamment celles portant sur la chronologie et la diffusion des modèles – permettront sans doute d'apporter quelque lumière sur ces questions.

Un autre enseignement de cette étude est qu'il convient de se méfier des dessins. À l'insu même de leur auteur :

- des erreurs matérielles, notamment issues des reports de mesures, peuvent s'y glisser ;
- ils représentent parfois, non pas la configuration qui a servi de modèle à l'objet que le dessinateur a sous les yeux, mais l'idée qu'il s'en fait.

« Der Teufel steckt im Detail », dit-on en Allemagne. Et c'est bien le cas ici, car négliger des écarts qui *a priori* paraissent anodins conduit à s'orienter vers un

9 Image pouvant être mémorisée et ayant pour fonction de suggérer une procédure de construction, que j'ai appelée *schéma-clé* (Parzysz 2009).

10 Dans le de décor n° 43 de Salies, l'octogone central est apparemment régulier.

autre modèle, et par suite à faire fausse route, risquant ainsi d'attribuer au mosaïste antique des savoirs et des savoir-faire dont il ne disposait pas. Il apparaît donc fondamental d'identifier de façon précise[11] les modèles implémentés dans les mosaïques si l'on veut accéder aux connaissances, géométriques et techniques, des artisans qui les ont conçues et dessinées. Ce sont en effet les propriétés géométriques du modèle représenté qui le définissent et qu'il est nécessaire de rechercher et d'identifier, dans le but d'en déduire des procédures de mise en place possibles au moyen de l'outillage de l'époque, qui pourront ensuite être éprouvées par des reconstitutions en vraie grandeur. Pour ces diverses raisons, il me semble important que les auteurs ne se contentent pas, en publiant une mosaïque, d'indiquer une simple référence à un numéro du *Décor*, mais s'attachent à contrôler sa conformité au modèle supposé en repérant si les écarts constatés par rapport audit modèle ont un caractère aléatoire ou systématique, et en les signalant.. Ce contrôle sera d'autant facilité qu'on disposera d'un répertoire de modèles alternatifs, eux aussi précisément définis et répertoriés.

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11 C'est-à-dire en donner une définition procédurale qui, partant d'un élément pré-construit (segment, cercle, carré …), permet sans aucune ambiguïté la réalisation de l'ensemble de la configuration.

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Mimicking ‘marble’ in Roman Mosaics in Conímbriga (Condeixa-a-Velha – Portugal) Discovered Between 1938 and 1941 in the Time of Professor Vergílio Correia (1888-1944): A Reflection

1938-1941 Yılları Arasında Professor Vergílio Correia (1888-1944) Döneminde Conímbriga’da (Condeixa-a-Velha–Portugal) Keşfedilmiş Roma Mozaiklerindeki ‘Mermer’ Taklidi: Bir Yansıma

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Abstract

Mosaic that imitates marble, which is the subject of this reflection, is evidence that takes us back to the stylistic currents of several periods of the Roman Era. The representation of this ornamental rock containing rudists harks back to remote geological periods of the Earth’s history. In addition, the way the mosaicist goes about his work, choosing the most elaborate geometric motifs and imitating a kind of ornamental rock with a ‘fossil signature’, reveals contacts, influences and technical resources that only a College of Arts can provide.

This museological action is an initiative of the Movement to Promote the Candidature of Conímbriga for inclusion on the UNESCO World Heritage List, under the programme to link up Conímbriga, Alcabideque, Chão de Lamas, Rabaçal, Santiago da Guarda and Tomar in a single area of interest. This initiative is the outcome of local, national, international and intergenerational cooperation, on a volunteer basis.

Keywords: *Conimbriga, Roman mosaics, Low Empire, Rudists.*

Öz

Bu yansımanın konusu olan mermeri taklit eden mozaikler, bizi Roma Çağı’nın bazı dönemlerinde görülen üslup akımlarına geri götürmektedir. Süs/dekor olarak kullanılan bu rudistik kayaya kulak verildiğinde Dünya’nın jeolojik dönemlerine doğru bir yolculuk yapmak mümkündür. Buna ek olarak, mozaik sanatçısının işini yapma şekli, en özenli ve ayrıntılı geometrik motifleri seçmesi, “fosil imza” ile dekoratif bir taşı taklit etmesi anlaşılabileceği gibi, bağlantıları, etkileşimleri ve sadece bir Sanat Okulu’nun sağlayabileceği teknik imkanları da gözlemlemek mümkündür.

Bu müzecilik hareketi Conímbriga’nın Unesco Dünya Mirası Listesi’ne eklenmesi hareketini destekleme girişimi olup, Conímbriga, Alcabideque, Chão de Lamas, Rabaçal, Santiago da Guarda ve Tomar’ı aynı ilgi alanı altında toplama programıdır. Bu girişim; gönüllülük esasına dayanan ve yerel, ulusal, uluslararası, bölgeler arası işbirliğinin bir sonucudur.

Anahtar Kelimeler: *Conimbriga, Roma mozaikleri, Çökmüş İmparatorluk, Rudistler.*

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Introduction[1]

It has often been said that ancient civilisations freely used ornamental stone to decorate both monumental public buildings and their more elegant residences, and they did so with grandeur and technical skill. As marble and other similar stone are rare in nature and their extraction and transport very costly, they were regarded as a luxury product. This technical expertise in the embellishment of buildings can be seen in Conímbriga, for example, *in situ*, in the centre of the *triclinium* of the House of Cantaber, discovered in the time of Professor Vergílio Correia[2] between 1930 and 1934[3] (Figs. 1-2), and *ex situ*, in the remains found in the *forum* between 1964 and 1969 (Alarcão – Etienne 1977: 27-39, 87-133; Tavares 1977: 271-273; Alarcão – Etienne et al., 1979: 241-242) (Fig. 3).

The craftsmen and artists who designed and executed the *crustae marmoriae* in the workshops of Conímbriga endowed the city with an authentic school of arts. This is borne out by the scrupulous choice of materials, the refined

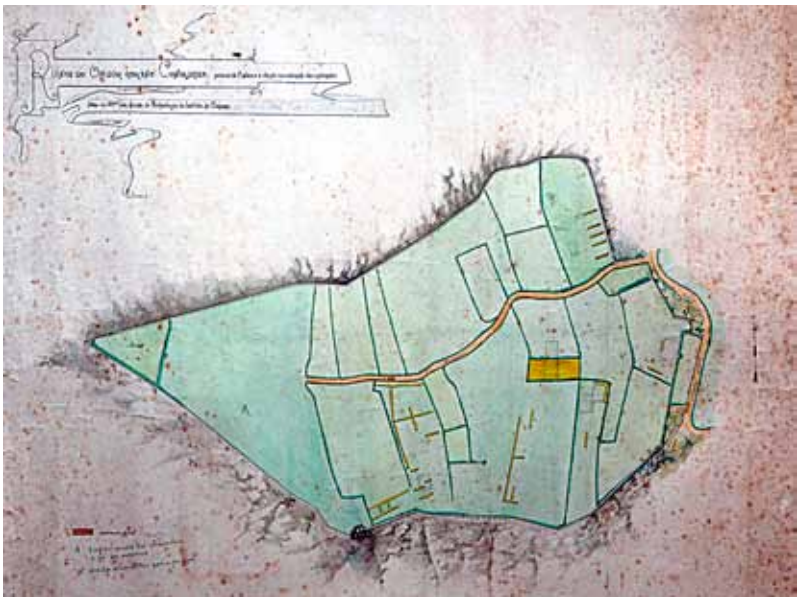

Figure 1
Map of Conímbriga, *Almedina* of Condeixa-a-Velha
Indian ink and watercolour drawing on sheet of cardboard, with the surveys carried out in 1899 marked by António Augusto Gonçalves (Pessoa - Rodrigo 2005: 186 fig. 1a). The blue arrow indicates the area where the House of Skeletons was found, Zone B, between 1938 and 1941. Collection: Museu Monográfico de Conímbriga Archive. Photograph: Francisco Pedro. 2005. Author: Eduardo Belo Ferraz. 1899

1 Salutation: "The study and preservation of an archaeological site is a cultural and social project of searching and showing respect for the men and women who created, preserved, enjoyed and are enjoying it and trying to pass it on to future generations!"

2 It was Vergílio Correia who discovered 76 of the 93 known Roman mosaic floors in Conímbriga, which are preserved in situ and on view to the public and scholars. These 76 floors were all found between 1930 and 1941, with 40 being in the House of Fountains (Olerio 1992: 37-82 no. 19 1.25, 83-141 no. 2 to 16), 12 in the House of the Swastika (Oliveira 2005: 32-41 no. 17.1 to 24.1), 4 in the House of Skeletons (Oliveira 2005: 44-47 no. 25 to 28), and 24 in the House of Cantaber (Oliveira 2005: 50-68 no. 29-31, 33-53). In 1899 António Augusto Gonçalves (Oliveira 2005: 51 no. 32; 84 no. 60; 85 no. 61; 86 no. 62), had coordinated excavations that had revealed 4 mosaic floors. These were taken to the Museu do Instituto de Coimbra and later, in 1911, to the Machado de Castro National Museum (they came back to Conímbriga when the Monographic Museum was built, in1962). In the 1950s, the General Directorate of National Buildings and Monuments (DGEMN) was responsible for the discovery of 4 more mosaic floors in the House of the Trident and the Sword (Oliveira 2005: 72-74 no. 54-56). And then, between 1964-1971, Jorge de Alarcão and Robert Etiénne led a joint Portuguese-French team in excavations that unearthed a further 5 floors (Oliveira 2005: 78-79 no. 58, 59, Fragmento A and B; 82 Fragmento C). Over 254 sites in Portugal with Roman mosaics have been inventoried (Abraços 2005: 15).

A considerable part of the bibliography on Vergílio Correia has been referenced in works coordinated by Maria Teresa Pinto Mendes (1970), Jorge de Alarcão (1972, 1979) and João Manuel Bairrão Oleiro (1973, 1992).

3 Correia 1935: 16 - page brochure, updated and re-edited in 1936 and 1938. Idem, 1941: 263; Oleiro – Moutinho – Alarcão 1963: 25; Correia 2001: 108; Sala C 20; Pessoa – Rodrigo 2005: 214-217, 260-261; Oliveira 2005: 58 no. 40.

Figure 2
Map of Conímbriga, *Almedina* of Condeixa-a-Velha
Oil on canvas, second drawing dated 1899. It was altered between 1930 and 1936 to highlight the discoveries inside the walls, coordinated by Vergílio Correia, with the map in Figure 1, on which the surveys conducted by António Augusto Gonçalves in 1899 were marked, being extended (Pessoa – Rodrigo 2005: 192-197 fig. 2c). The blue arrow indicates the area where the House of Skeletons was found, Zone B, between 1938 and 1941. Collection: Museu Monográfico de Conímbriga Archive. Photograph: Francisco Pedro. 2005. Author: Eduardo Belo Ferraz. 1899

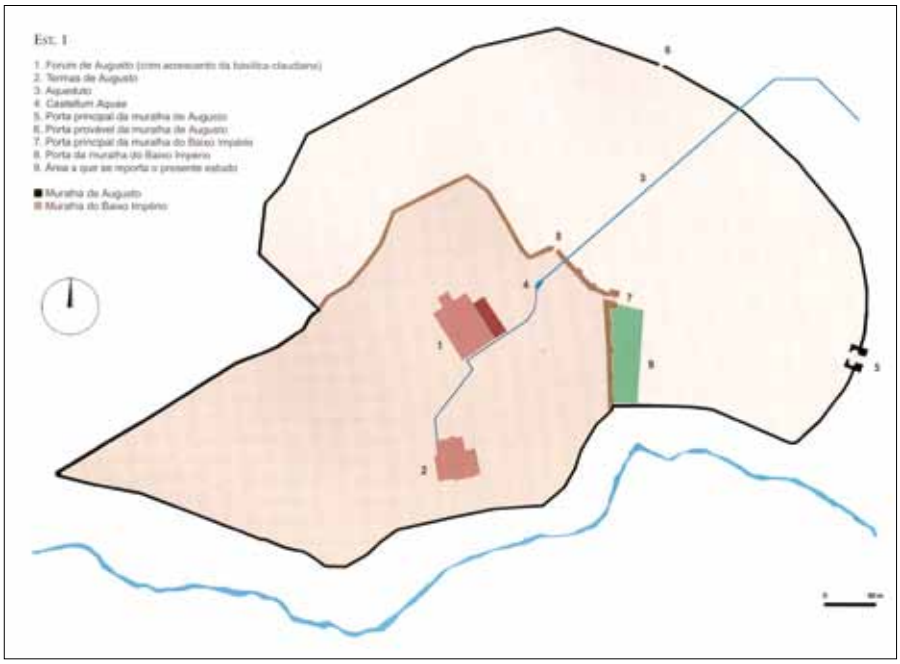

Figure 3
General map of Conímbriga
Location of Zone B (Alarcão - Madeira 2010: 8, Print 1). The blue arrow indicates the area where the House of Skeletons was found, Zone B, between 1938 and 1941. Author: José Luís Madeira. 2010

finish of the pieces and the skilful layout of the spaces to be decorated. Further proof can be found in the decorative stone panels preserved *in situ*, such as the panel inlaid in the mosaic in the centre of the *triclinium* in the House of Cantaber, Zone C (Correia 2001: 108 Room C 20) (Fig. 4), and in the temple of the Flavian *forum*, under the project to extend the Augustan *forum* (Alarcão – Etienne 1977: 83-111; Tavares 1977: 275-276) (Fig. 3). And still more examples can be seen in the permanent exhibition of the Conímbriga Museum, through an ensemble containing every kind of stone-type material capable of being cut and polished, used in ornamental stone panels discovered here (Alarcão – Ponte 1994: 25, 31, 88, 89 no. 216 Inventário 67.484, 101 no. 282 1-6) (Figs. 5, 6, 7).

This is mentioned because we want to stress that not only are bichrome and polychrome stone artefacts, sometimes in the form of inlaid panels, widespread in Conímbriga (Tavares 1977: 271-273; Correia 2001: 108 C 20)[4], but

[4] We find embedded marble panels and bas-reliefs used as wall coverings in the territory of the ciuitas of Conímbriga (Pessoa 2005: 365 Fig. 1), in the palace of the Roman Villa of Rabaçal (Pessoa et al. 2004: 19-43 no.1-67; Lima – Vilarigues 2011: 66-68).

Figura 4
Map of Zone B, in Conímbriga.
Location of the *triclinium*, B 21 (blue arrow), in the House of Skeletons, and the *triclinium*, C 20 (green arrow), in the House of Cantaber (Alarcão – Madeira 2010: 10 Print 2). Author: José Luís Madeira. 2010

so, too, are imitations of them[5]. Interesting examples of imitation ornamental stone incorporated into wall paintings have survived to the present day, related to the first Pompeian style, which, according to Vitruvius (Maciel 2006)[6], is

[5] The general layout of the composition of wall painting that mimics opus sectile, in Sala 29, House of Fountains, in Conímbriga, is practically the same for all the panels on the four walls: a rectangle delimiting an inner area on which rest horizontal lozenges, sometimes extended in other smaller interiors with a longer vertical axis. These are marbleised imitations composed of straight, curved and wavy veins, isolated in a field or used to supplement other geometric shapes such as circles, ovals, etc. (Pedroso 1992: 161 est. 71.1). From simple shapes, inscribed in rectangular panels, with strongly linear characteristics that were in evidence in the 1st century (Idem 164 Notes 11, 12, 13) to the examples found (Idem Notes 14, 15, 16) in the 4th century A.D., the variety is huge and the use constant (Idem).

[6] Vitrúvio – Tratado de Arquitectura: Tradução do Latim, Introdução e Notas, p. 272, 7. 5. 1. "… In fact, painting shows us an image of what is or can be, … Thus the Ancients who established the principles of finishes first imitated the varieties and applications of marble panels and then explored various

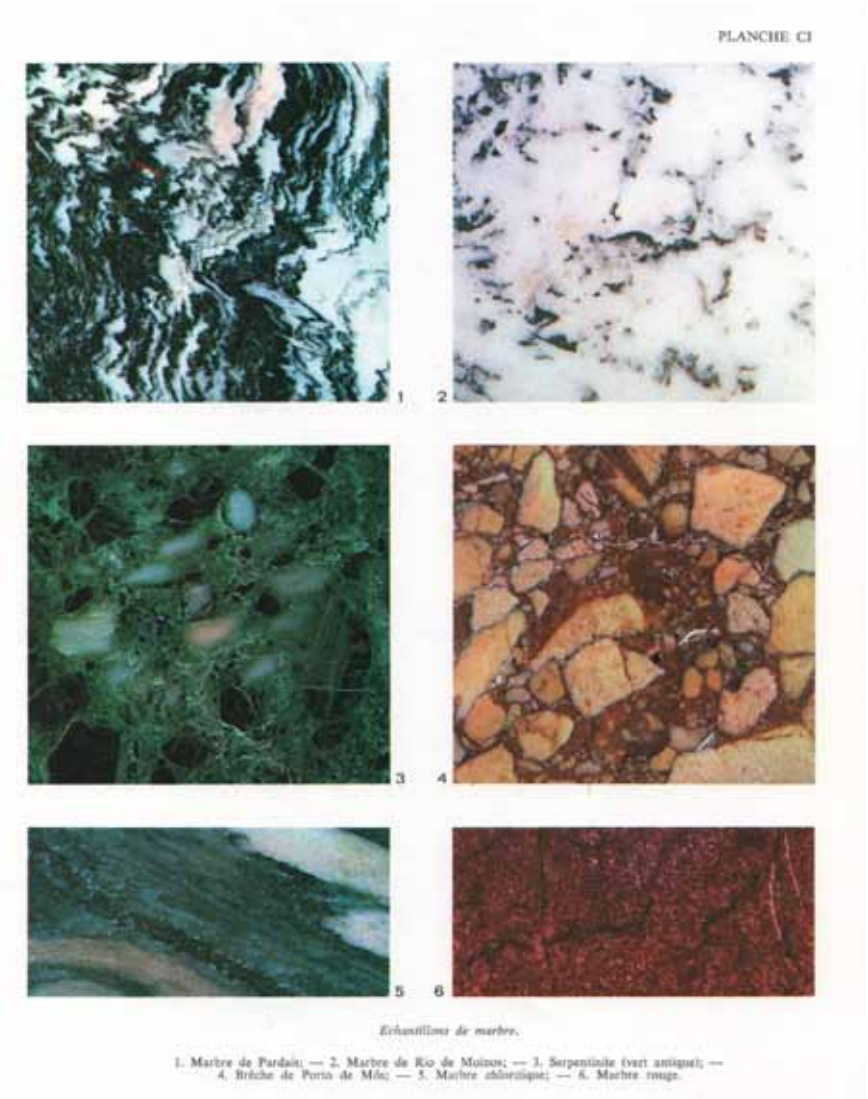

Figure 5
Samples of polished ornamental stone from Conímbriga
Collected during the Portuguese-French excavations, between 1964-1971 (Tavares 1977, in Alarcão - Etienne 1977: 271-273 pl. CI)

Figure 6a, 6b
Elements for wall covering. White marble and slate (6a). Reconstruction of decorative motif in ornamental stone (6b).
This illustrates the quatrefoil motif, in white marble from Estremoz-Vila Viçosa, confined by four scales, with a double-lobed side. The material is slate, delimited by small profiles in white marble with greyish veins, from Rio de Moinhos, Borba. Collected during the Portuguese-French excavations, between 1964-1971 (Tavares 1977, in Alarcão – Etienne 1977: 271-273 pl. XCIX, 7; Alarcão – Ponte 1994: 88-89 no. 216 inventário 67.484).
Computer drawing.
Author: José Augusto Dias. 2013

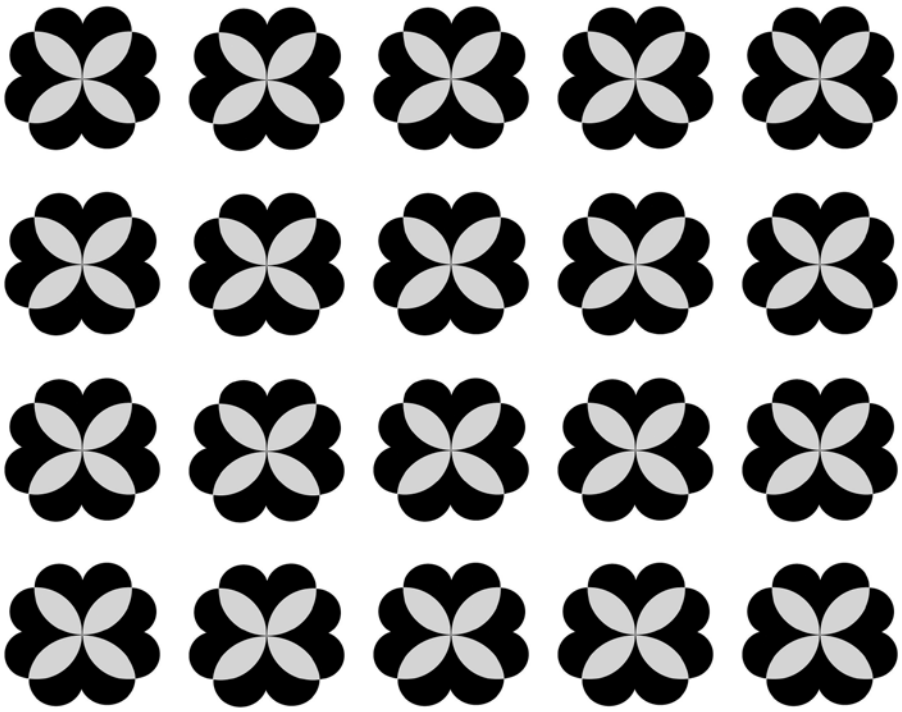

Figure 7
Reconstruction of a panel based on decorative motif in ornamental stone
Alarcão – Ponte 1994: 88-89 no. 216 inventário no. 67.484.
Computer drawing.
Author: José Augusto Dias. 2013

Figure 8
Photograph. Aerial view of Conímbriga.
Photograph taken after the conclusion of the discovery of the Zone within the walls, between 1930 and 1936, coordinated by Vergílio Correia; the works are marked on the map in Figure 2. This picture was used to illustrate the article on Conímbriga published by Vergílio Correia in the *Grande Enciclopédia Portuguesa – Brasileira*, Lisbon – Rio de Janeiro, VII, 1941: 444-445. The arrow indicates the area where the House of Skeletons was discovered, Zone B, between 1938 and 1941. Private Collection. 1937

Figure 9
Photograph of women, men and young people working
Excavation of the House of Swastikas, House of Skeletons and the baths outside the walls of Conímbriga, beside and under the public road marked on Figures 1 and 8, in the area outside the walls, beside the Late Empire wall, as shown in Figure 8. Foto Rasteiro. 1938 (Pessoa – Rodrigo 2005: 229-230 fig. 12). Collection: Museu Monográfico de Conímbriga Archive.

characterised by mimicking *opus sectile*. They were incorporated into a mosaic floor, too, as we shall see later. Painting was, in fact, the most significant artistic expression of stonework in the context of mimicry. It was very useful for painting walls that should have been made of stone, but the high cost made this impractical. The same has has happened in quite recent times (Coutinho 2010: 446) and it even happens today. There are several examples of painting in imitation of 'marble' in Conímbriga. They are 'composed of straight, curved or wavy veins, alone in a field or added to other geometric forms such as circles, ovals, ovoids, etc.' in the House of Cantaber, the House of Fountains (Oleiro 1992: appendix II 164 pl. 71.1; Pedroso 1992; Sales 2006: 79-81) (Fig. 10a)[7] and in

possibilities of cornices, mouldings and separating bands". Note 69 – When referring to the pictorial imitation of marble panels, the author evokes the first Pompeian style.

7 The decorative paintwork in the Roman Villa of Caldelas (Tomar-Sellium) also has remarkable examples of faux marble (Felix et al. 1992: 177). We find an interesting variation on the topic of

Figure 10 a
Photograph. Painted wall panel in the Deer Hunting Mosaic room, in the House of Fountains, Conímbriga.
Painting with faux marbling of various kinds, where the motif in the centre of the composition is an imitation of rudist limestone (Sales 2006: 79-81).

Figure 10 b
Representation of technique of filling the flat areas, marking decorative motifs, with contrasting coloured paste, now red, now black, bearing in mind the traces of painting found on fragments of bas-reliefs discovered in the Roman *Villa* of Rabaçal, in 1987
Pessoa et al. 2004: 29 no. 3.
Collection: Mosaics from the Roman *Villa* of Rabaçal, Penela, Portugal:
Graphics and computerisation:
José Luís Madeira. 2009

Figure 11
Photograph of the mosaic in the *triclinium*, in the House of Skeletons, Conímbriga
Oliveira 2005: 45 no. 26 – Floor with T+U arrangement of panels.
Author: Danilo Pavone. 2005

Figure 12
Photograph of the central panel of the mosaic in the *triclinium*, in the House of Skeletons, Conímbriga
Panels 1, 2, 3.
Author: Danilo Pavone. 2005

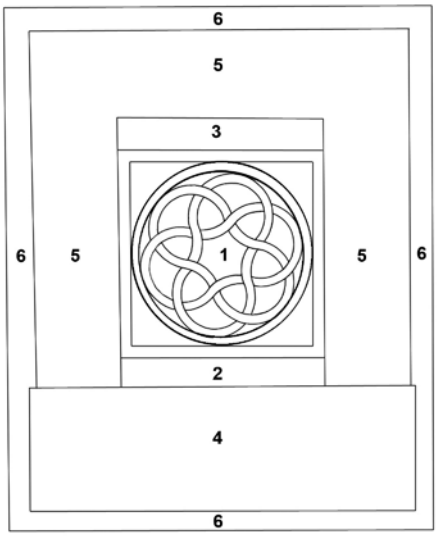

Figure 13
Drawing of the scheme of the panels of the mosaic in the *triclinium*, House of Skeletons, Conímbriga
Entrance panel (4), central panel (1, 2, 3), area for the lecti (5), and outer border (6).
Record and computerisation: José Augusto Alves Dias. 2013

a mosaic in the House of Skeletons (Figs. 8, 9, 11, 12). This is the *leitmotiv* of this reflection.

The Mosaic Floor of the *Triclinium*, in the House of Skeletons, Zone B, Outside the Walls

That said, we can see the general composition of the mosaic in the *triclinium* of the House of Skeletons (Figs. 11, 13). We can perhaps see similarities with various kinds of mimicking of the decoration in the technique of producing works with inlaid stone, either polychrome or bichrome. This idea seems to reinforce the choice of the decorative theme of the mosaic floor in the centre of the room, that is, the representation of panels of ornamental stone, cut and polished in the

painting and 'marble' wall covering in the decoration of some fragments of bas reliefs friezes of the wainscoting in Estremoz - Vila Viçosa marble, that embellish the peristylum and triclinium of the Roman palace of Rabaçal, Penela. Here, the technique involves filling the flat, background, parts of the pattern of motifs with paste of a contrasting colour, sometimes red (inside the central band) and sometimes black (parallel bands of chequered squares) (Figure 10b) (Pessoa et al. 2004: 29 no. 30).

technical style of *opus sectile*, highlighting the natural geometric motif of shells, with a more or less conical shape of rudists, in a cross section (Fig. 12).

This close relationship of the geometric-based compositions with identical decoration in *opus sectile* was highlighted by Bairrão Oleiro, for example, in his study on geometric mosaics, discovered in Conímbriga in 1899, in the days of António Augusto Gonçalves (Fig. 1), on permanent display in the Museum since 1962. It dates from the first half of the 2nd century (Gonçalves 1903: 359-365; Oleiro 1973: 130 mosaic no. 4; Alarcão – Ponte 1994: 156 no. 508; Oliveira 2005: 80 mosaic 62; Pessoa 2013: 47).

Outer Border

The outer border of the mosaic in the *triclinium* of the House of Skeletons (Figs. 11, 12, 13-6, 14c) has a band of white tesserae embellished with a line of small squares in steps, equally spaced, standing on their tips (Décor I: pl. 5a Antioch, Turkey; Décor II: 39).

U Panel

The U panel (Figs. 11, 12, 13-5, 14a) covers the largest surface area of the mosaic. It is an orthogonal bichrome composition in black and white, with adjacent octogons that define squared of opposite colours (Décor I: variant of pl. 163b Lucera, Italy), which reminds us of the *opus sectile*. There are parallels in various groups of mosaics in the wealthy residences in Conímbriga.

The Entrance Panel

The rectangular panel at the entrance of the *triclinium* in the House of Skeletons, on the general level of the T/U layout of the mosaic panels, on the beam of the T (Figs. 11, 12, 13-4, 14c), has a grid of opposing non-contiguous sinusoids in a two-strand polychrome plait on a black background, arranged obliquely relative to the sides of the panel, forming a composition of adjacent concave and convex squares (Décor I: pl. 251c Bardo Museum, Tunisia).

Central Panel

Now let us look at the rectangular central panel of the mosaic (Figs. 10, 11, 12, 13-1, 2, 3, 14c). Given the general layout of the floor mosaic in a T/U arrangement, panels 1, 2, 3 occupy the surface of the shaft of the T. At the top of it we can see bands (Figs. 13-2, 3) with vases and shells and, in between, a geometric composition that we think consists of three intertwined eights, centred in a circle inscribed in a square panel on whose background we find an imitation of inlaid polychrome stone, which is, as we know, the *leitmotiv* of our reflection. Nowhere outside Conímbriga[8], in the mosaics of Spain and Portugal, do we find other representations of either the three intertwined 8s[9] or the background motif of the composition that mimics inlaid polychrome decorative stone, or 'imitation marble' (Figs. 15, 16), as in the background of this composition. Similar instances of either motif, taken as parallel, can be found in north Africa and in its sphere of influence, in Sicily, as we shall see.

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8 The three figure-eight motif is found in Conímbriga, in Mosaic 1.21 of the peristylum of the House of Fountains, dating from the 3rd century AD. (Oleiro 1992: 75 est. 22).

9 We see the representation of this motive in the mosaic 204.5 of the Villa of Keynsham, in Somerset, South-west Britain, dated from the late third – or early fourth-century. See Roman Mosaics in Britain, Vol. II, Cosh – Neal 2005: 236 nº 229.

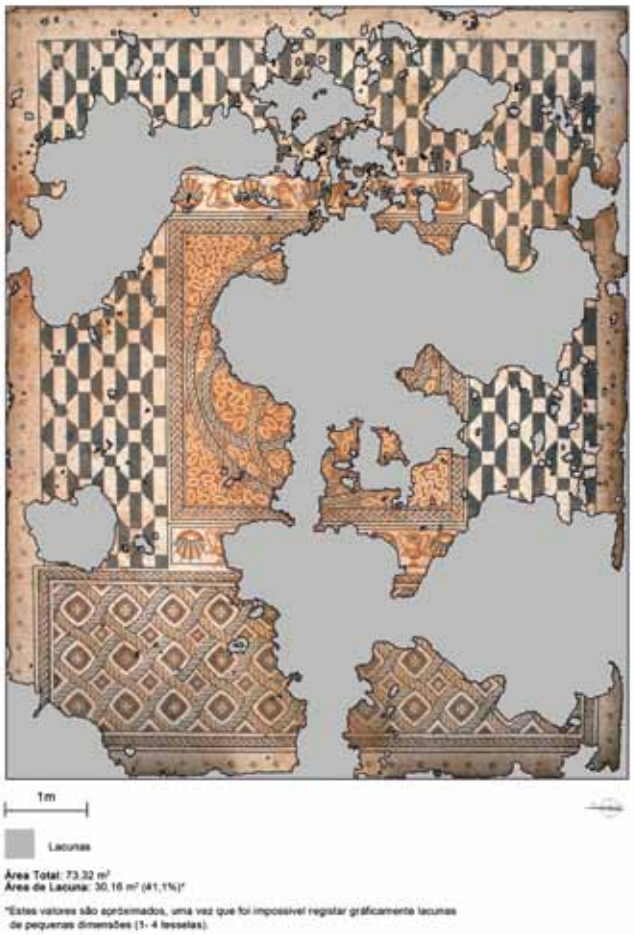


Figure 14 a
General layout of the gaps in the mosaic floor of the *triclinium*
Drawing on photograph. Room B 21, in the House of Skeletons, Zone B, in Conímbriga. Panels 1, 2, 3, 4, 5 and outer border 6 – B 21. Total dimensions: length 9.40 m; width 7.80 m. Total area: 73.32 m^2. Area of gaps: 30.16 m^2 = 41.1 %. Record and computerisation: Ana Ravara Mendes. 2013

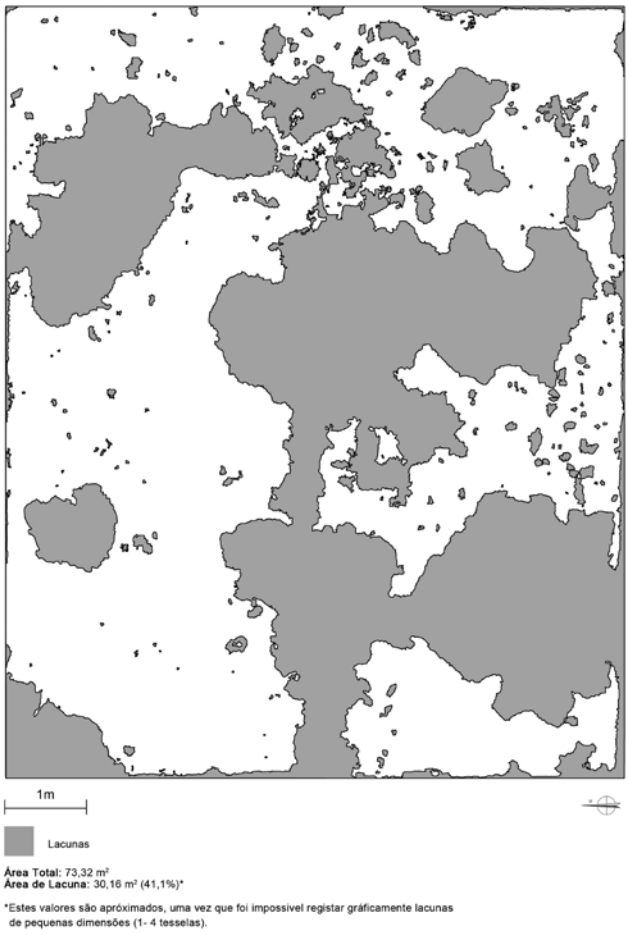


Figure 14 b
General layout of the gaps in the mosaic floor of the *triclinium*
Black and white drawing. Record and computerisation: Ana Ravara Mendes. 2013

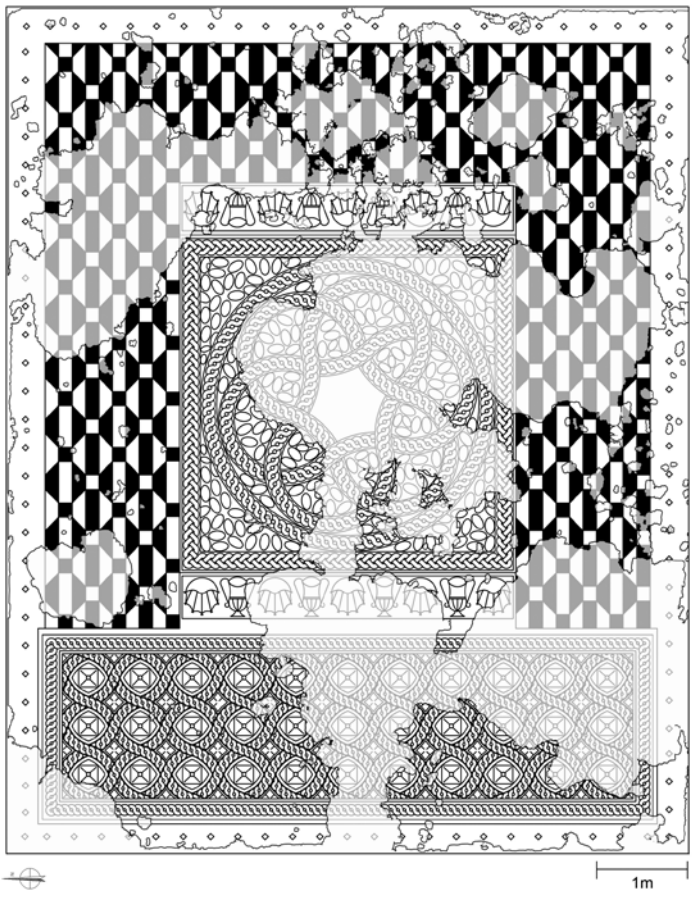


Figure 14 c
Black and white drawing. Graphic reconstruction of the composition, motifs and gaps.
General layout of the gaps in the mosaic floor of the *triclinium*. Record and computerisation: Ana Ravara Mendes. 2013

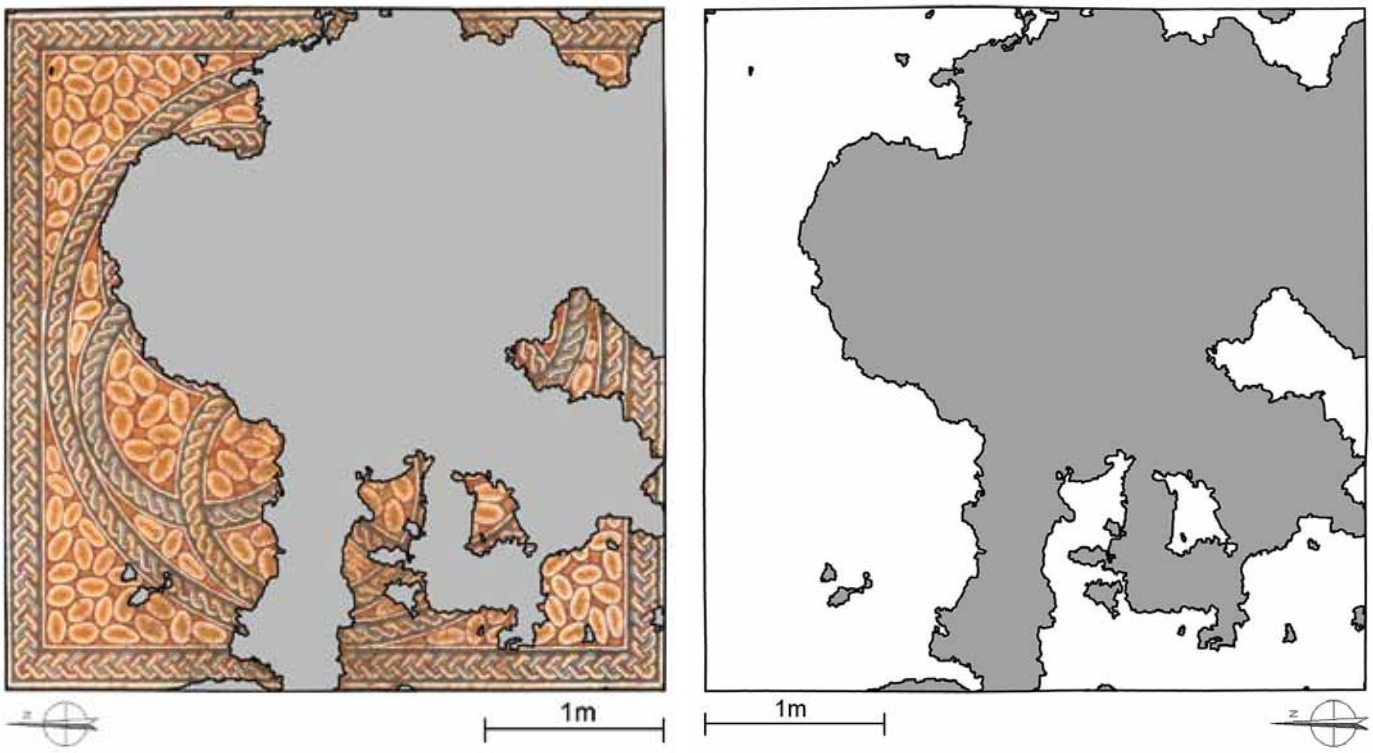
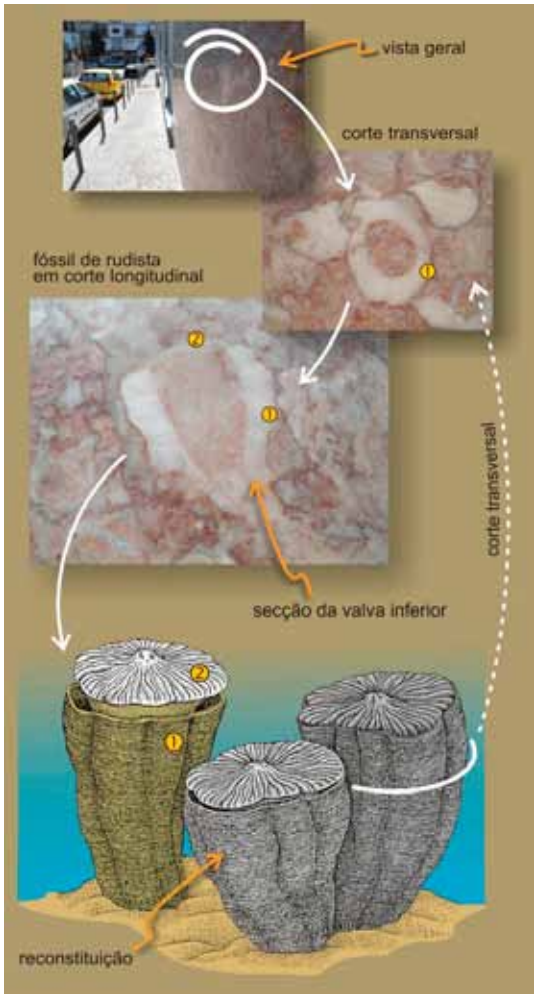


Figure 15 a **Layout of the gaps in the centre of the mosaic in the *triclinium***
Drawing on photograph. House of Skeletons, Zone B, in Conímbriga. Detail of rectangular panel 1 – B 21. Dimensions: length 3.72 m; width 3.72 m. Total area: 13.84 m^2. Area of gaps: 7.43 m^2 = 53.40 %. Record and computerisation: Ana Ravara Mendes. 2013

Figure 15 b **Layout of the gaps in the centre of the mosaic in the *triclinium***
Black and white drawing. Record and computerisation: Ana Ravara Mendes. 2013

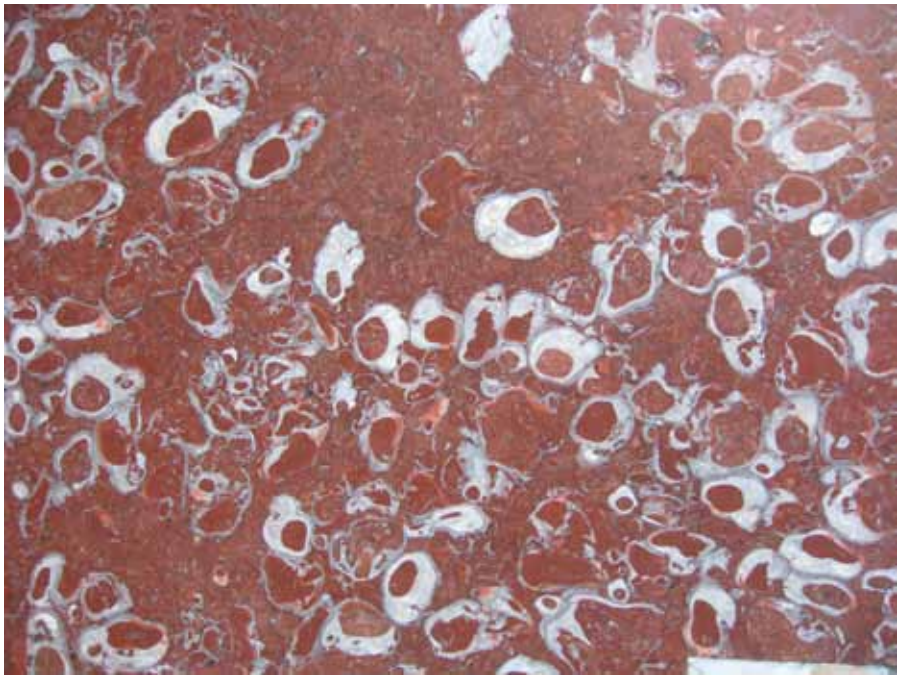
The use of ornamental stone is a way of decorating 'in a pictorial manner'. It exploits the intrinsic motifs of the actual material by assigning it to benches, laminating and polishing stone panels based on the original quarries, which brings us closer to the source of inspiration of the mosaicist who decorated the floor of the *triclinium* in the House of Skeletons. Note that the limestone breccia (Tavares 1977: 272 pl. CI 4; Alarcão – Ponte 1994: 101 no. 282.6) is a rock formed by angular fragments bound together with cement, whereas the fragments in rudist limestone are rounded[10].

[10] There is an interesting resemblance between the combination of elements of the mosaic panel in situ in the triclinium, room C20 in the House of Cantaber, in which part of the back of the room has been preserved, and the layout we can see in the mosaic panels of the triclinium in the House of Skeletons, both in Conímbriga. A black and white geometric composition was chosen for both floors, to surround a central embedded panel with ornamental rock inlays. What we see in the mosaic in the House of Cantaber are original polished panels of limestone breccia from Alvados – Porto de Mós (Tavares 1977: 272), applied using the technique for inlaying polychrome stones, or opus sectile (Correia 2001: 108 Sala C 20), whereas in the House of Skeletons, instead of a floor in opus sectile we have a mosaic floor that mimics opus sectile. It should also be noted that what is mimicked in the floor of the House of Skeletons is a panel of ornamental polychrome rock, inspired by 'lioz' (a kind of limestone), and what we see in the House of Cantaber are panels of breccia limestone, from Alvados – Porto de Mós. Actually, the two floors are linked to one another, but the mosaicists opted for creativity in terms of aesthetic effect and avoided repeating themselves by means of 'variations on a theme' (Correia 1941: fig. 2a; Pedroso 1992: 161). It is thus clear that 'the output from the Conímbriga workshops, at the western extremity of the Empire, while it undoubtedly shows influences from other regions, nonetheless has its own features which bestow an individuality on certain compositions' (Oleiro 1986: 111. 'Golden breccia', yellow ochre, conjures up contexts of quarried from the western part of the Empire, whether from Africa, Italy or Gaul. The cipolino verde, evokes the eastern part, or pars graeca of the Empire (Darmon 2011: 419).



a

c



b

Figure 16 a
Panels of limestone covering with rudists in the façade of a house
General view, cross section and longitudinal section of rudist fossils, showing the lower valve, and a reconstruction (Silva 2008: 1. http://paleoliva.fc.pt/almafossil/Radiolit/Radiolit 01.htm – Viewed on 6 February 2014)

Figure 16 b
Photograph. Detail of rudist limestone panel.
Floor of the entrance to St Peter's Basilica, in the Vatican.
Author: Miguel Pessoa. 2013

Figure 16 c
Photograph. Detail of wall covering panel in rudist limestone.
Crypt of the church of Santa Maria Maggiore, in Rome. Ornamental stone known as *lumacellione* or *occi di pavonne*, according to Federico Guidobaldi it is probably from the vicinity of İstanbul, Turkey.
Author: Miguel Pessoa. 2013

d

Figure 16 d
Photograph. Showing the variety of decorative covering panels from the side entrance of St Mark’s Basilica, in Venice
Two kinds of fossil-bearing limestone used as ornamental stone for the floors of the inside of this mediaeval monument have been identified. They are from Asia Minor with roots in the tradition of using material from quarries that were exploited in the Roman era (Vio 2012: 83, *Lumachela da Megalodon* – bivalve *Megalodon* sp.; p. 87, *Occhio di pavone* – bivalve, order Rudista). Author: Miguel Pessoa. 2013

e

Figure 16 e
Photograph. Detail of polished rudist limestone or lioz limestone panels.
Polychrome inlays, using various kinds of cretaceous limestone, and the blue limestone from Sintra. Background shaded with yellow and red. Preserved in situ in the floor of the corridor on the west side of the 1st floor of the National Palace of Mafra. It resembles the one preserved in the floors of the Estrela Basilica (Aires-Barros 2001: Vol. I 93, Photo 29). Author: Miguel Pessoa. 2013

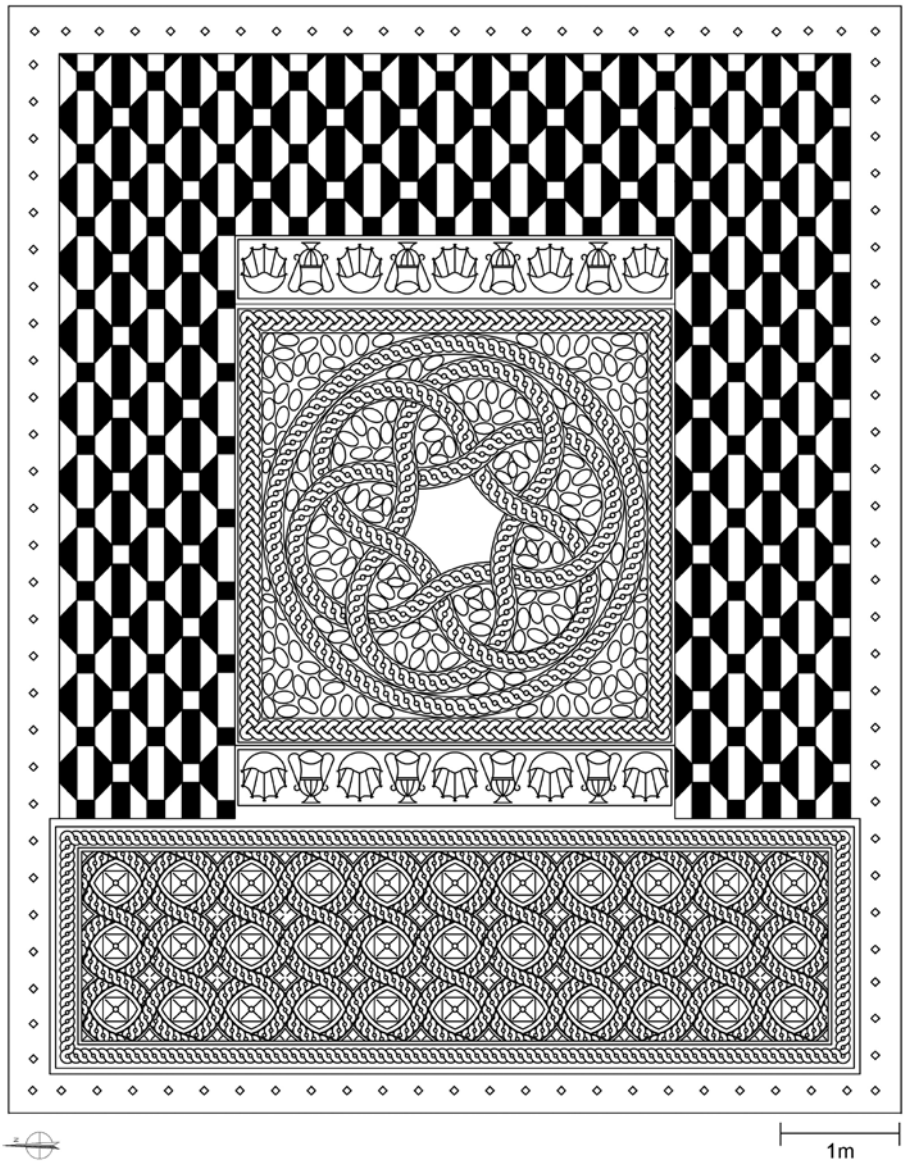


Figure 17
Drawing, reconstruction of the composition and motifs
Mosaic floor in the *triclinium*, in the House of Skeletons. Record and computerisation: Ana Ravara Mendes. 2013

Figure 19
Photograph. Mosaic in the House of Fountains, Conímbriga, with motif of three intertwined eights.
Composition of a circle circumscribed in a square and inlaid geometric motif composed of a knot of three intertwined eights, defined by a border decorated with a two-strand plait. Oleiro, J. M. Bairrão, 1992 = CMRPI, 1, – *Corpus dos Mosaicos Romanos de Portugal:* I – *Conventus Scallabitanus*, 1 – *Conímbriga, Casa dos Repuxos*, Instituto Português dos Museus – Museu Monográfico de Conímbriga, Lisbon, p. 74-75, Mosaic 1.21, Print 22

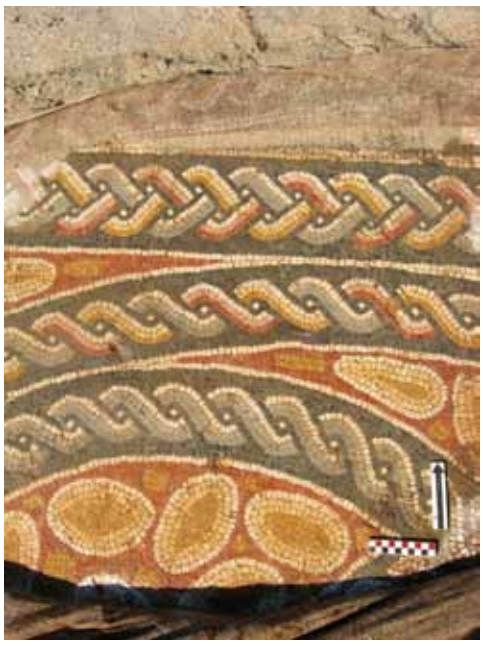
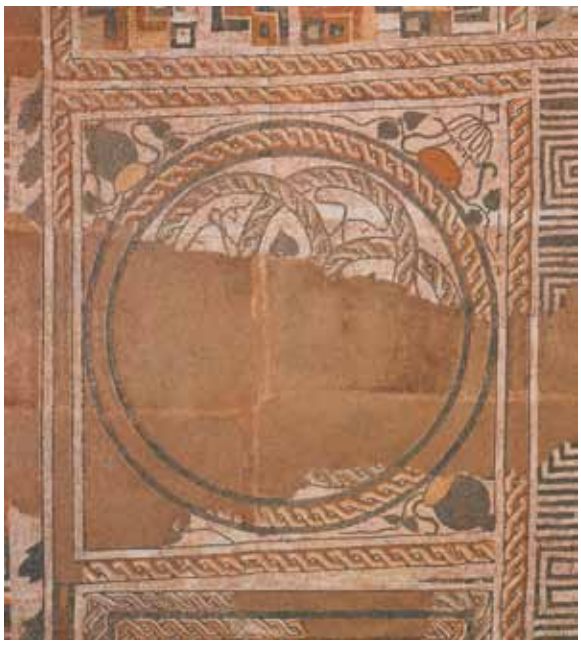


Figure 18
Photograph. Set of colourful two- and three-strand plaits.
Detail of the mosaic floor in the *triclinium*, House of Skeletons, in situ, protected with geotextile fabric and a layer of river sand (Sales 2014: 52). 2013



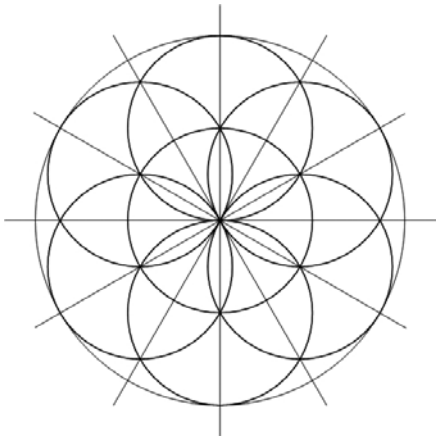


Figure 20
Interpretation of basic design of the knot motif, with three intertwined eights
Circle divided into twelve spokes with six inscribed circles to form a central six-petal rose, doubly inscribed in a hexagon with curved sides and a circle.
Record and computerisation:
Miguel Bandeira Pessoa. 2013

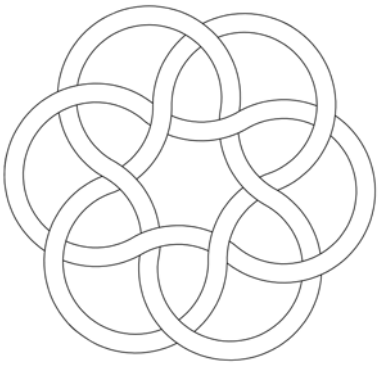


Figure 21
Design of the three intertwined eights motif
Blanchard et al. 1973: no. 603;
Décor II 290 c, 290 and, Timgad, Algeria.
Record and computerisation:
José Augusto Dias. 2013

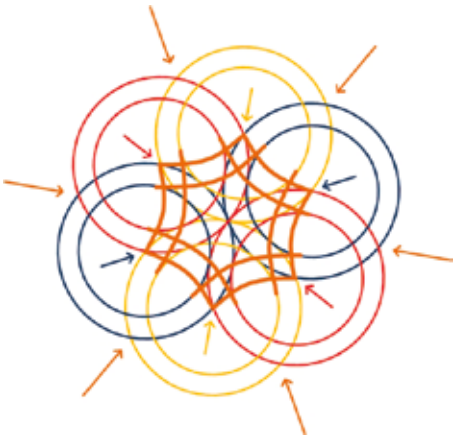


Figure 22
Basic design of the knot motif, with three intertwined eights
Six inner and six outer circles underlying the marking of the three figure-eight knot. The arrows show the position of the compass point of the mosaicist when outlining the basic or preliminary design.
Record and computerisation:
Miguel Bandeira Pessoa. 2013

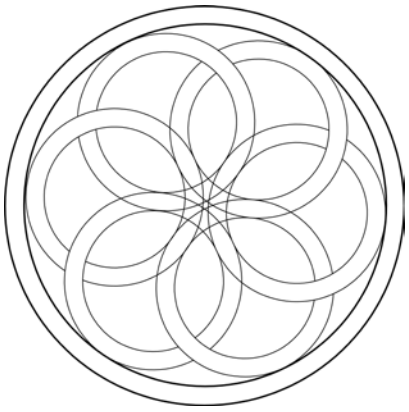


Figure 23
Design of the three intertwined circles motif
Décor II: no. 310 b,
Clunia, Spain, variant.
Record and computerisation:
José Augusto Dias. 2013

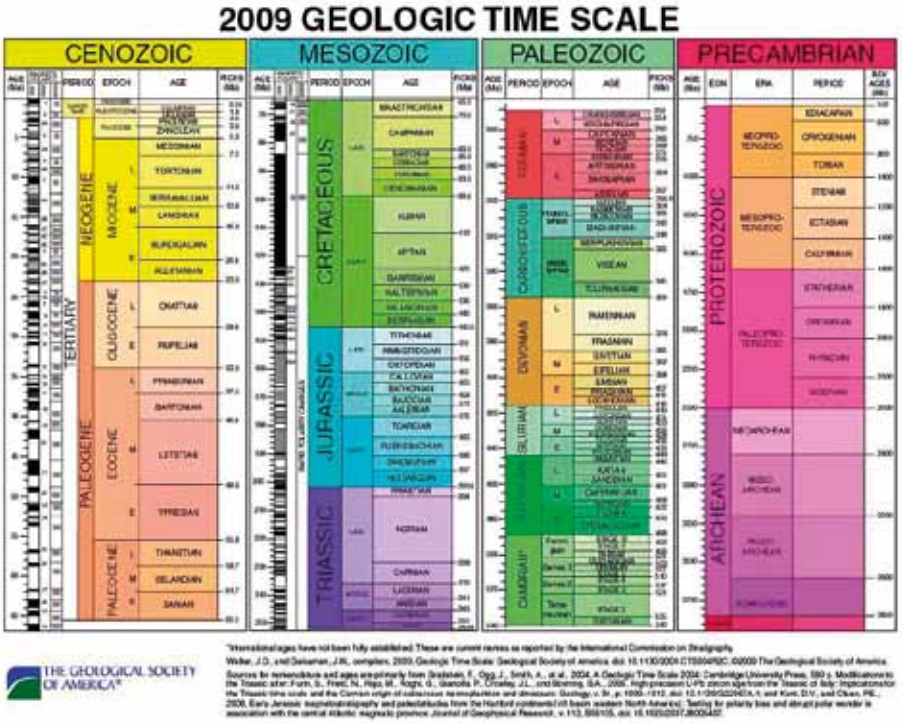


Figure 24
Table with dates of the Earth’s Geological Periods
Walker, J. D., and Geissman, J. W. compilers 2009, Geologic Time Scale: Geological Society of América, doi: 10.1130/2009. CTS 004 R2C

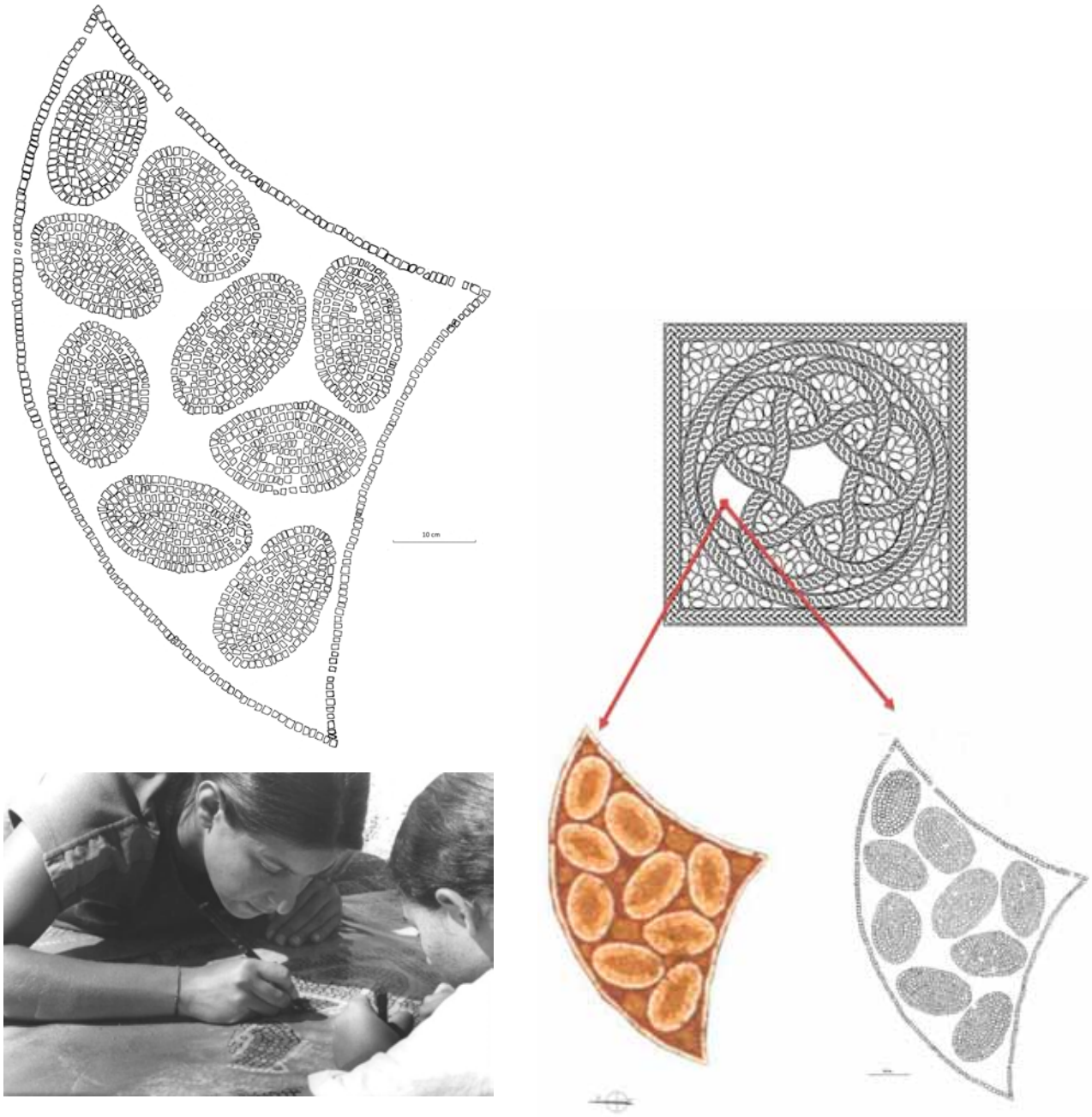


Figure 25
Examination and recording, by tracing directly, tessera by tessera, the design of rudist motifs (ovals and egg-shapes)
Detail of the central panel in the *triclinium*, in the House of Skeletons. 2003. Computerisation: Ana Ravara Mendes. 2014

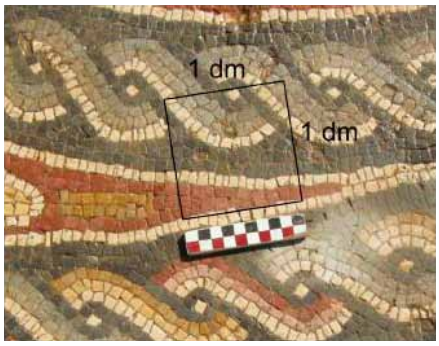
The panel that contains the mimicked 'marble' motif on the floor of the *triclinium* in the House of Skeletons (Fig. 25) has the highest density of tesserae (Figs. 26-1, 2, 3, 4, 5, 6). As we see in *Bulla Regia* in Tunisia (Fig. 27), this conjures up the first Pompeian pictorial style. As far as we know this was confined to mimicking the marble inlays, as occurred throughout the Roman world in general.

Architectural representation in this style is rare and where it does exist it goes no further than an addorsed pilaster, frieze, and so forth. Actually, 'imitation marble' cannot be dated, as such. As mentioned earlier, the wall paintings in the House of Fountains in Conímbriga (Fig. 10a)[11], with fresco imitations of *opus sectile*, are hard to date because there are both black and white and polychrome examples from the first four centuries of our era[12].

11 Oleiro 1973: 130. Pedroso in Oleiro 1992: 164. See Fig. 10b.

12 Idem.

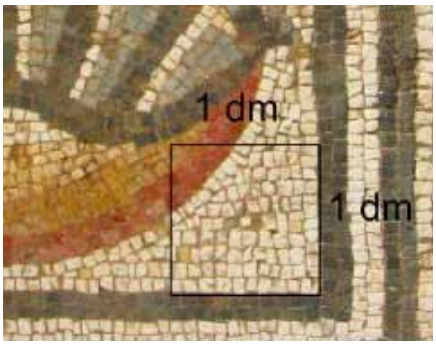
Tapete 1



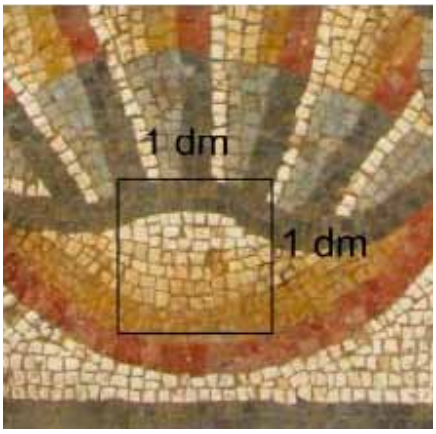
Densidade (dm²) ≡ 105 tesselas

Densidade (dm²) ≡ 122 tesselas

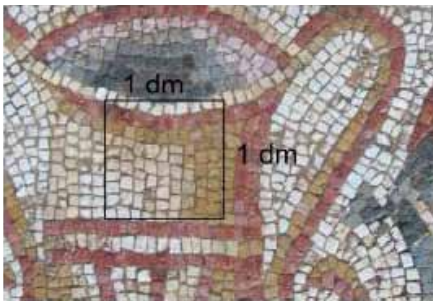
Tapete 2



Densidade (dm²) ≡ 109 tesselas

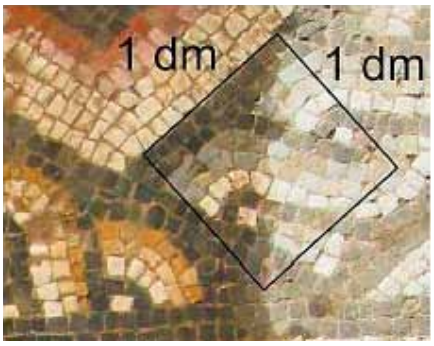


Densidade (dm²) ≡ 132 tesselas



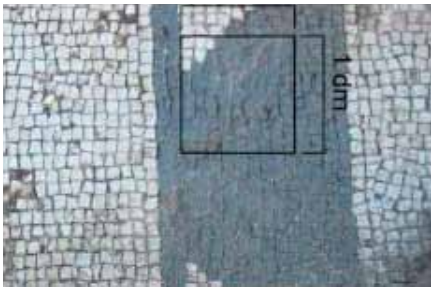
Densidade (dm²) ≡ 82 tesselas

Tapete 4



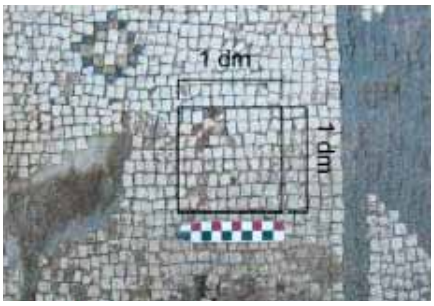
Densidade (dm²) ≡ 93 tesselas

Tapete 5



Densidade (dm²) ≡ 86 tesselas

Orla de remate 6



Densidade (dm²) ≡ 77 tesselas

Figure 26
Recording density of tesserae per dm²
Central panel 1 – 105 / 122 tesserae per dm². 2 and 3 – Central panel – 82, 109, 132 tesserae por dm². 4 – Entrance panel – 93 tesserae per dm². 5 – U panel – 86 tesserae per dm². 6 – Outer border, 77 tesserae per dm².
The need for greater detail when representing mosaic motifs (vases, shells and rudists) led to the inlaying of smaller pieces which resulted in a higher concentration of tesserae per dm².
Collection and computerisation: Ana Ravara Mendes. 2014

Figure 27
Photograph. Mosaic panel in the New Hunt room, in *Bulla Regia*, Tunisia.
Mimicry of rudist limestone
(Darmon 2011: 414 fig. 4)

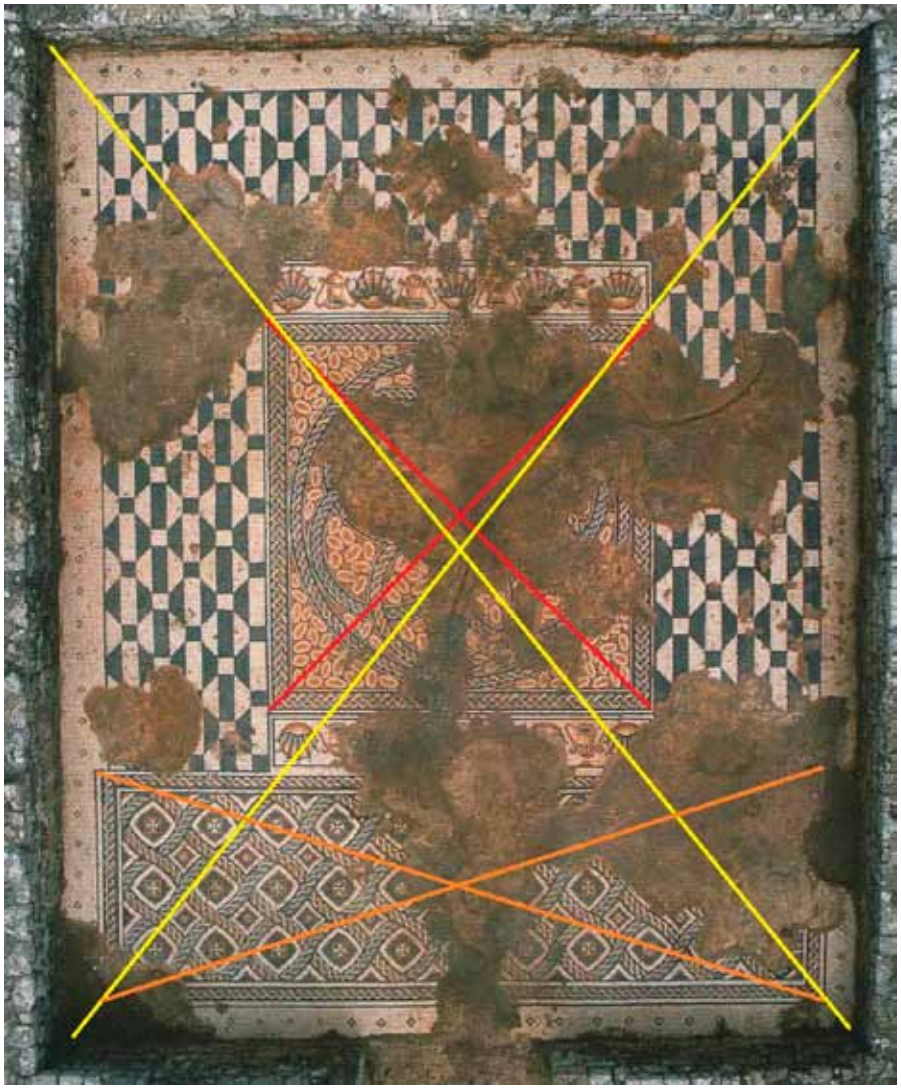


Figure 28
Diagnostic marking on the mosaic in the *triclinium*, House of Skeletons, Conímbriga
Diagonals on the total area of the room, in yellow (1, 2, 3, 4, 5, 6); on the rectangular entrance panel, in orange (4) and on the square central panel, in red (1).
Computerisation: Miguel Bandeira Pessoa. 2013

Considerations

The themes chosen for discussion (*kantharoi*/*canthari*, scallop shells, rudist fossil shells, *opus sectile* in black and white, *opus sectile* with mimicry of coloured 'marble') reveal an attachment to traditional culture (Oleiro 1992: 171). The meticulous technical execution of the design of this mosaic, it motifs and the vibrant effect of the colours are a fine illustration of a period of strong development and dissemination of mosaic art in Conímbriga, throughout the 2nd century A. D. In this period, the Italian tradition is refreshed by the North African schools and by artistic streams from the Near East, indicating economic growth and a taste for life in the *urbs*.

While mosaic is 'one of the most typical, most interesting, most widespread and richest forms of Roman art', the mosaic in the *triclinium* in the House of Skeletons seems to corroborate the statement that the output of the Conímbriga workshops has its own characteristic features and individuality (Oleiro 1986: Alfa, 111).

It should be noted that we are looking at a Conímbriga mosaic that shows that there really was a School of Arts in the city. Furthermore, this is also demonstrated in the fresco wall paintings, the marble incrustations, the civil and

military architecture, the monumental and domestic architecture, the bas-reliefs, the stonework, the epigraphy, the glass-ware, the metallurgy, the metalwork, the gold and silver work and the sculpture. This is all reflected in the ability of the artists and craftsmen and their knowledge of how to execute motifs inspired by nature, as we find in the schools of North Africa[13] or their area of influence[14], and how they search for colour effects, with influences from the Middle East. Similarities are seen in mosaics from Zeugma and Antioch, for example (Cimok 2005: 48-49; Önal et al. 2007: 189, 197). The recreation of models found in other artistic areas, such as *opus sectile* and wall paintings, is a sign that the artists and clients from Conímbriga knew about trends in the decorative arts and, at the same time, were able to create new artistic programmes.

In the field of preservation and restoration, too, this mosaic in the *triclinium* is in an excellent state, apart from some fairly large gaps, and it has only needed minor consolidation work, mostly on the peripheral strands of the tessellation. This mosaic floor is a benchmark in terms of assessing the performance of techniques for protecting mosaics *in situ*, exposed to the open air (Sales 2014: 52).

According to some authors, the mosaic is from the middle of the 3rd century (Alarcão – Madeira 2010: 47), while others believe it dates from the 3rd-4th century (Correia 2003; Oliveira 2005: 45 mosaic 26 triclinium B21).

We submit that the chronological evolution of the mosaics in the site within the area *Conimbriga – Aeminium* and Vale do Mondego, in the territory of *Conuentus Scallabitanus* (Pessoa 2011: 209-216), indicates seven major phases, non equally represented. Some of them will be mentioned here in their relationship based on this mosaic, we are discussing today, as a sign that 'art born of the spirit of an age also shapes the culture of that age and the times that follow' (Upjhon et al. 1965: 28).

Given that the range of influences is evidence of the volatility and interlinking of styles[15], we would say that the outer border of the floor in the *triclinium* in the House of Skeletons (Figs. 13-6, 14 c), may be more related to the First Phase, from the 1st century B.C., or even earlier. Some examples of floors from this period, with an incipient decorative pattern[16] are known in the Augustan Baths and House of Cantaber, in Conímbriga (Alarcão – Etienne 1977: 43, 44; Oliveira 2005: 78 no. 58, 59; South Baths – Augustan building; 57 no. 38; Zone C – House of Cantaber. *Idem 2006: 282 Conímbriga*). This phase is represented in Roman-era Portugal by some fragments of *opus Signinum* floor with encrusted tesserae, in simple geometric motifs, in Beja and Aljustrel, for example (Oleiro 1986: 112 no. 142, 150, 118; Oliveira 2006: 286 Praça da República e Fonte das Figueiras, Beja).

Although we are far from reconstituting in this paper the chronological phases of the mosaicists who worked in Conímbriga as we would wish, in accordance with purely stylistic, but nearly always inaccurate, criteria, it seems clear that

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13 Bulla Regia, Tunisia (Darmon 2011: 415 fig. 4), Cyrene, Libya (Michaelide 1981-1983 : tav. 1, 4. This is the composition that most closely resembles that in the House of Skeletons, given that it features the combination of a three figure-eight knot and the mimicked opus sectile.

14 Michaelides 1981-1983, Agrigento, Sicily, Italy, Idem, Tav. 2, 3; Bir-Chana, Tunisia, Idem, Tav. 3,1; Sousse, Tunisia, Idem, 3, 2; Thina, Tunisia, Tav. 4.2, 4.3, 4.4.

15 As happens in nature, Natura non facit saltus (loc. Lat.), 'nature does not jump', that is, there are other intermediate steps that link the most rudimentary to the most complex (Leibniz).

16 See the example of this in mosaics in the Villa of the Mysteries, in Pompei (Darmon 1976: 30).

the geometric pattern on the U panel (Fig. 13-5) does evoke floors from earlier times. These would have been favoured by the mosaicists and clients of Conímbriga between the first half of the 1st century AD and continuing into the 2nd century. This corresponds to the Second Phase of the site within the *Conimbriga – Aeminium* and Vale do Mondego area, when the floors were wholly, or almost wholly, bichrome with older, rather plain, motifs (Oleiro 1973: 130 mosaic 4; Oliveira 2006: 282).

However, the polychrome panels discussed here (Figs. 13-1, 2, 3, 4; 18), clearly show the adoption of a much richer and more varied decorative scheme, one that is concerned with colour enrichment and diverse motifs and themes, even in the 2nd century AD (last quarter) and the beginning of the Severian period (first quarter of the 3rd century AD) (Oleiro 1992: 168-169). Panels 2, 3, and 4 may correspond more to what we deem the Third Phase of the chronological evolution since it displays a great development in mosaic art, with the emphasis on polychrome and the introduction of small panels in the decorative scheme, seen here in a line of vases and scallops (Figs. 13-2, 3)[17].

It may be that the choice of original or unusual motifs, as seen here in the knot of three intertwined eights and the background that mimics *opus sectile*, on panel 1 of the mosaic we are discussing (Fig. 13-1)[18] corresponds to the Fourth Phase of the chronological evolution of mosaic production in Conímbriga. This is in the post-Severian period, the time of the soldier emperors, when geometric decoration again predominates and the loss of symbolism of the decorative elements throughout the 3rd century AD, which is offset by the variety of colours (Pessoa 2011: 211) (Figs. 11, 13-1, 2, 3, 4).

It is, in fact, in the **Fifth Phase** that we find the increase of colour in the motifs of the polychrome panels in all its splendour. It is less common in the European parts of the Empire but far more widely used in the mosaics in North Africa and the Middle East. This influence must have come to the provincial, peripheral workshop of Conímbriga in the period of Severus. It contains features that continue into the next phases[19], in which, for example, there is an attempt to return to mythological themes, as seen in the group of mosaics of Torre de Palma, dating from the end of the 3rd and early 4th century AD (Lancha – André 2000: 306).

It is in the **Sixth Phase** of the chronological evolution that we see the renewal of the geometric, plant and figurative decorative schemes. While it denotes a tendency to schematise the motifs and for them to lose their symbolism, the new style nonetheless leads to the production of work, in this period, that is extremely rich in oriental-style decorative features. These are introduced from the middle of the 4th century AD onwards (Pessoa 2011: 212), as we see in the territory of the *ciuitas* of *Conimbriga*, in the mosaics in the Roman *Villae* of Rabaçal,

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17 Mosaics with figurative themes and those inspired by classical mythology belong to this phase – mosaics with mythological themes would represent a luxury category of floors, like those exhibiting a taste for real-life representations (Oleiro 1992: 171).

18 This option of decorating a showy room with faux opus sectile in mosaic is the only one known so far in mosaics in Portugal and Spain. It could be a means of identifying the people involved in either the conception or execution of the work, and other examples of their work may come to light in the future.

19 In this case, the choice of the three figure-eight knot motif leads us to include it as one of the features of the Fourth Phase. On the other hand, the colourful treatment might indicate that the mosaic from the triclinium could belong to the Fifth Phase of the chronological and stylistic evolution that may have arisen in an advanced stage at the end of the 3rd century (cutting through the period of containment of the Empire's frontiers, initiated by Aurelian between 270-275 and consolidated by Diocletian from 285, in the period of the tetrarchs, who managed to impart a new sense of security throughout the Empire) and continuing in the first half of the 4th century, as part of the constantinian Renaissance.

S. Simão and Santiago da Guarda. This phase is regarded as a harbinger of the division of the Empire into West and East, deeply influenced by the latter and its capital, Constantinople, today's Istanbul. The figures dressed in the manner of the ladies of the court that are preserved in the mosaics of Rabaçal, displaying ornaments and jewellery, testify to an environment of luxury that was part of life in an imperial palace in the Byzantine East.

Meanwhile, the restoration of the mosaics in certain floors of the House of Fountains (Oleiro 1992: 45 mosaic 1.4, 73 mosaic 1.20), and in some floors of the Roman *Villa* of Rabaçal (Pessoa 2011: 213) would belong to the **Seventh Phase**. This relates to the 'most recent time limits of this decorative art used for centuries in the territory that today is Portugal' (Oleiro 1986: 118, 127), that is, in the 5th, 6th and 7th centuries AD (*Idem:* 213-215), after the creation of the new, so-called barbarian, kingdoms in the Iberian Peninsula from 411 AD, in the wake of Rome's effective loss of control over this area. In the latter period we find examples of extraordinary renewal of the decorative schemes, such as those in the mosaics at Tongobriga and the baptismal complex of Mértola (Oliveira 2006: 287; Lima 2012: 51; Lopes 2008: 32-41), and in some mosaics in the Roman *Villa* of Rio Maior (Oliveira 2005: 85 mosaic no. 5, 105 mosaic no. 7). The new schemes often have a Christian religious content (the *crismon* is depicted in a mosaic floor in the Roman *Villa* of Quinta das Longas, in Elvas). Some of them may be contemporaneous with the effective establishment of the Byzantine administration in southern Hispania, between 551 and 624 AD, and they have a more complex design with geometric motifs, based on the traditional repertoire. Such linkages and interweaving were to inspire the prodigious geometric variations of the 7th century, transposed using stucco, in the Umayyad dynasty, of Damascus (Lavagne 1977: 81 note 5).

The mosaicist's work has come down to us as testimony of the Greco-Roman and other civilisations. Mosaic is regarded as an inlay technique, like the encrustation of panels of varying shape, carved in ornamental stone using the *opus sectile* technique (Maciel 2011: 35-40). Like the mosaics that have survived, albeit on a smaller scale and in *opus sectile* and not only geometric compositions such as those depicted here (Alarcão – Ponte 1994: 88-89 no. 216, Inventário no. 67.484), but of a vegetal nature and even components of scenes, with a prominent place in Roman art, as we see, for example, in Milreu (Teichner 2008: 263 Abb. 136) and many other places (Guidobaldi 2003: 15-75). Other examples may come to light as excavations continue in Conímbriga.

Having considered this Roman mosaic floor discoverd in Conímbriga in the days of Vergílio Correia, between 1938 and 1941, we can pose two questions. Do we have an example of the mosaics of Conímbriga of marked originality? Do the 'mosaicists of this peripheral workshop use common themes and motifs and group them, combine them or modify them in such a way that they create an individual style that is clearly distinct at a global level'? (Oleiro 1992: 172)

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A Newly Discovered Mosaic from Myrleia
Myrleia'dan Yeni Keşfedilen Bir Mozaik

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Abstract

Previously unknown parts of the ancient city of Myrleia which today is located in Mudanya in the province of Bursa, have begun to appear gradually in recent excavations. In 2015 – 2016, excavations were started on the site which was previously declared a third degree site by the Bursa Archaeology Museum Directorate. As a result of the trial trenchings, in addition to structural remains that can be defined as workshops, residential structures built up on the slopes have been determined. These residential buildings on the hillside consist of a row of rooms and provide valuable information about the late period house architecture of the ancient city. The floor of one of these partially uncovered houses is covered with a geometric patterned mosaic floor. In addition to geometric designs on this mosaic, motifs such as kantharos, guilloche, wave pattern and ivy leaves are used together to create a highly visual and artistic composition. The mosaic floor is dated approximately to the 4th century BC.

Keywords: *Myrleia, Roman villa, geometric mosaic, opus tessellatum.*

Öz

Günümüzde Bursa'nın Mudanya ilçesinde yer alan Myrleia antik kenti ile ilgili bilinmeyenler, son dönemde yapılan kazılar neticesinde yavaş yavaş ortaya çıkmaya başlamıştır. 2015-2016 yıllarında Bursa Arkeoloji Müze Müdürlüğü tarafından daha önce 3. Derece sit alanı ilan edilen arazide kazı çalışmaları başlatılmıştır. Sondaj kazıları sonucunda işlik olarak tanımlanabilecek yapı kalıntılarının yanı sıra yamaca yerleştirilmiş konut yapıları tespit edilmiştir. Yamaç üzerinde bulunan bu konut yapıları, bir sıra oda dizisinden oluşmaktadır ve kentin geç dönem ev mimarisi hakkında oldukça değerli bilgiler sunmaktadır. Kısmen ortaya çıkartılmış bu evlerden birinin zemini geometrik desenli mozaik döşeme ile kaplıdır. Mozaik üzerinde geometrik desenlere ilave olarak kantharos, örgü bant, dalga deseni, sarmaşık yaprakları gibi motifler bir arada kullanılarak son derece görsel ve sanatsal bir durum ortaya konmuştur. Mozaik döşeme yaklaşık olarak M.S. 4. yüzyıla tarihlenmektedir.

Anahtar Kelimeler: *Myrleia, Roma villası, geometrik mozaik, opus tessellatum.*

Introduction

The ancient city of Myrleia is located in Mudanya which is one of the districts of Bursa. There was barely any information about the ancient city because of its state, as it was mostly buried under fields of olive trees (Fig. 1). However the last excavations have exposed more of the area since the summer of 2015, when the Archaeological Museum of Bursa was first asked to explore the site by the owners of the fields. The museum has carried out 18 trial trenchings of the 3rd degree protected area in order to decide whether the ruins are ancient or not to determine whether to build housing on it (Fig. 2)[1]. In the southern part of the same area it has previously been determined

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Figure 1
Aerial view of the excavation area
(Uludağ University, Department
of Archaeology Archive)

Figure 2
Aerial view of the excavation area
(Uludağ University, Department
of Archaeology Archive)

by the museum that the ancient city's port facilities are located here from the excavations. However it has been decided to close the area by covering the ruins with a glass roof by the property owners and building a shopping mall on it. The previous studies of the shore heve led us to guess that there must be ruins of the ancient city of Myrleia on the Northern part of the district as well. Therefore it was not a surprise for us to discover more ancient ruins under the olive tree fields in Mudanya.

The extent of the excavation had to be limited because the area surrounding the excavation is also on private property. The subject of our studies considers two houses, one of them is near the drainage channel (Fig. 3). Unfortunately some part of the second house is on another private property, therefore it was not possible to excavate and study that area (Fig. 6).

Figure 3
Aerial view of the excavation area (Uludağ University, Department of Archaeology Archive)

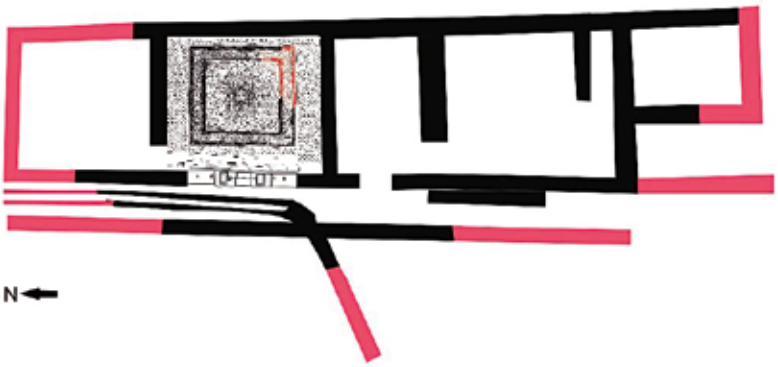

Figure 4
Plan of the house with mosaic (drawn by H. Çıtakoğlu)

Architecture

The structure has been exposed in Myrleia, after the excavation studies carried out by the Museum of Bursa Headship. The structure lies on a hill which has an incredible view of the sea and has a series of rooms, which give a good idea of the architecture of the city in the late antique period. That structure also provides much information about high class architecture of that period by its large portico and surrounding rooms. The drainage system which is just in front of the structure must connected to the house's latrine. This structure has been partially unearthed, revealing only one room floored with mosaic (Fig. 3-4).

The West side of the structure's entrance has two steps. On one of the steps there are two column base which form the entrance. On the rear part of the entrance to the structure, a terracotta canal has been discovered 295 cm deep. On the rear of the east wall a pipe system has been unearthed 60 cm under the floor, which is 430 cm long and has a diameter of 11 centimeters. The mosaic was found three meters deep because it had been buried by soil slipping down the slope. The archaeological deposit was found below alluvium approximately two meters deep. Hellenistic and Roman fragments of everyday pottery have been found in the archaeological deposit, mostly red and black glazed pottery (Fig. 5). Cooking pots for everyday use, pieces of amphora and glass fragments have also been discovered. The position on an unstable hillside caused the structure to be covered with earth. Because of the lack of an archaeological context, it was not possible to date the structure precisely.

Figure 5
Hellenistic and Roman plain - ware ceramic fragments (Uludağ University, Department of Archaeology Archive)

Figure 6
The mosaics of another house from the excavation area (Uludağ University, Department of Archaeology Archive)

Other structures with similar plans and mosaic floors can be seen in the same field. Another floor with a geometric design was unearthed after one of the drills (Fig. 6). Unfortunately only part of the mosaic could be unearthed since the other part belongs to another private property. The part that has been unearthed shows that it must have belonged to a large space and has two colours, white and navy. The design has an orthogonal pattern of intersecting circles, forming saltires of quasi-tangent solid spindles and concave squares with a concave squares including an alternately larger and smaller concave square (Décor I: pl. 237g). The architecture could not be determined as it was not possible to excavate the structure completely.

Mosaic Pavement

After the mosaic was found in trench S1 by the Archaeology Museum, the trench was enlarged around the pavement (Fig. 7). The excavations located the east, west and south walls of the structure. There was an entrance with a marble step.

Figure 7
Aerial view of the excavation area (Uludağ University, Department of Archaeology Archive)

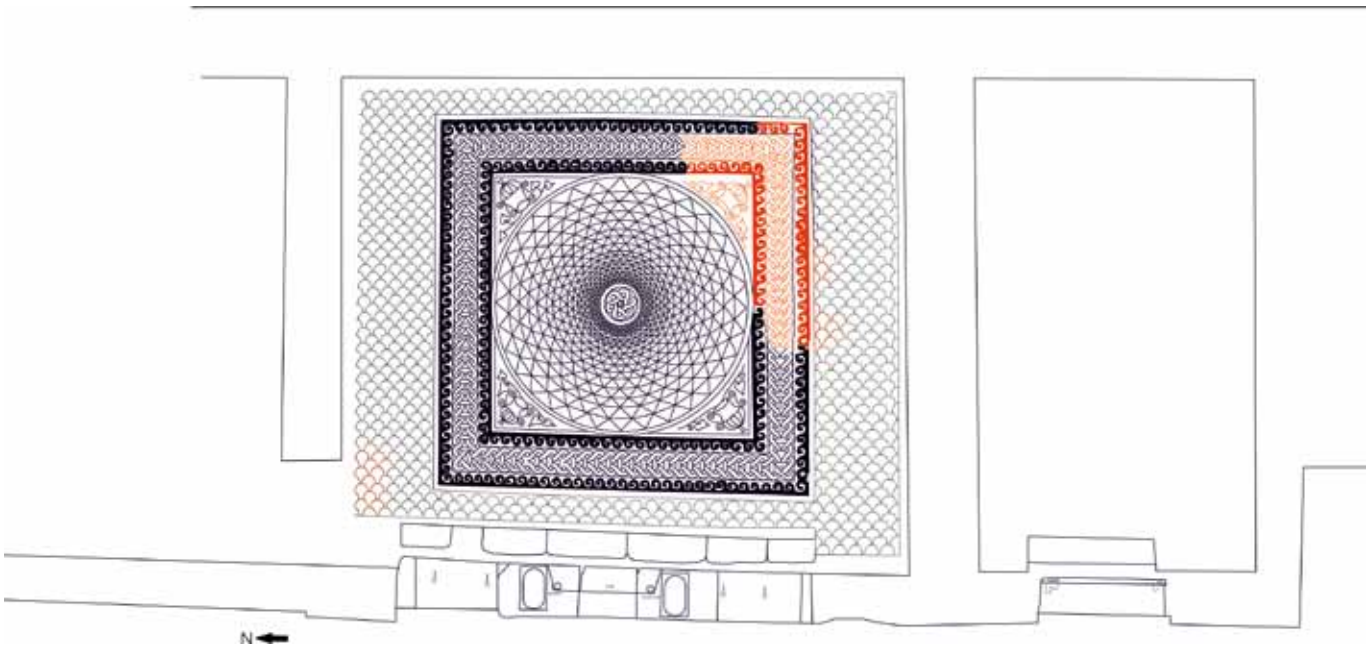

Figure 8
Drawing of the mosaic (drawn by H. Çıtakoğlu)

Figure 9
General view of the mosaic
(Uludağ University, Department
of Archaeology Archive)

Figure 10
General view of the mosaic
(Uludağ University, Department
of Archaeology Archive)

The mosaic which covers the floor of the structure was made of opus tessellatum (Fig. 7-8). The colours of the tesserae were black, white, yellow, red, pink and green which were approximately 1-2 cm big. In addition to the geometrical motifs, kantharos, guilloche, wave pattern, adjacent scale and ivy leaves have been used. In that way the appearance of the floor seems more artistic and interesting (Fig. 9). The pavement is surrounded by adjacent scale motifs. The width of border is 50 cm on the east, 46 cm on the west and 120 cm on north and the south. The motifs used on the west and south have a black contour on the outside and inside is yellow, green, red and white.

On the east and south, yellow, red and white colours have been used, different from the others. There is a 6 cm wide white strip adjacent to that adjacent scale

Figure 11
Detail of the kantharos
(Uludağ University, Department
of Archaeology Archive)

design. Next to that strip there is a guilloche design in the middle of the two strips of wave pattern. The width of the wave pattern is 20 cm and it is made of red and white colours. The central border of guilloche in between the two strips of wave pattern has a width of 35 cm. The guilloche design of polychrome round-tongued double guilloche opened to form eyelets (Décor I: pl. 75b) has a black contour and is made of red, pink, yellow and white tesserae.

The perspective view illustrated by using different sized and coloured triangles placed next to each other is actually called a shield of triangles design (Décor II: pl. 329a-b) (Fig. 10). That central motif is inside a square frame made of three lines of white tesserae and is 5 cm in width. The diameter of the central motif is 338 cm. The triangles have been made of black, white, yellow, red and green tesserae.

There is a knot of two curvilinear triangles (Décor ll: 43) design in a circle at the center of the motif of a line made of triangle lines. That circle has a black contour and is white in colour with a 5 cm wide frame and diameter of 44.5 cm. In the middle of the circle there is a six-looped knot motif with a black contour, and colours of red, yellow and white.

Kantharos figures and ivy leaf motifs have been placed on the corner spaces of central flower shaped sphere motif and the wave motif which surrounds it (Fig. 11). The area in which the southwestern corner kantharos is placed is 65 cm long. The kantharos has been placed on a white coloured ground. It has a conical form of base with volute handles and sharp profile. The outer contours have made with black coloured tesserae. The body of the kantharos has been designed with five segments. The colours of the middle segments are red with white inside, white and green for the two side ones, and white, pink and red on the edge. On the neck part the colour scheme goes from dark to light (with red on the edges, then yellow and white in the middle) which gives a shadow effect created by the tesserae. The spaces either side of the kantharos have been decorated with black-contoured, green-coloured ivy leaves. The kanthari on the southeast, northwest and northeast are similar.

The Place of the Myrleia Mosaic in the Decorative Repertory of Bithynia Province

The city of Bursa and its towns, which are in South Bithynia, have an important archaeological potential. The mosaics in this area are made by using the techniques of opus tessellatum and opus sectile. Generally geometrical designs were depicted on the mosaics. Figures of birds, kanthari, peacocks, human faces, the zodiac and personifications of the seasons have been used as well as geometrical shapes (Çıtakoğlu 2015: 81-87).

The shield of triangles design, which is the main panel depiction on the Myrleia mosaic, is a very different and new pattern for South Bithynia. The general border designs show similar pattern and colour. For example, the border of the Yerkapı mosaics in Prusia ad Olympum has a design of polychrome round-tongued double guilloche opened to form eyelets (Décor I: pl. 75b; Okçu 2009: 37-38; Çıtakoğlu 2015: 11, 13). The exact same design can be seen in the Myrleia mosaic border. Also the same wave pattern can be seen in both, Myrleia and Yerkapı mosaics. The other motif that we can compare is the kantharos. The kantharos has been used as a central motif in the Yerkapı mosaics (Okçu 2009: 37; Çıtakoğlu 2015: 11), where in Myrleia it has been used in the spandrels as a supplemental element (Fig. 12).

Figure 12
Yerkapı Mosaic
(Uludağ University, Department of Archaeology Archive)

When we compare the depiction of the kanthari, we can see similar features in both mosaics. The sharp profiled kantharos has a base of conical form and with a voluted handle. The outer contour of vessel was depicted with black tesserae. The body of the kantharos has been designed with five segments. On the neck part the colour scheme goes from dark to light which gives a shadow effect by tesserae. The difference in the Myrleia mosaic is there are vine leaves emerging from the inside of the kantharos. The other example that can be compared is in Bursa Archaeology Museum (Çıtakoğlu 2015: 38, 41) (Fig. 13). The design of trichrome orthogonal pattern of shaded adjacent scales (Décor I: pl.219a), in counterchanged colours on the Myrleia mosaic, can also be seen on two panels in the museum. Even though the colours differ in both mosaics, the main composition is similar.

One of the important criteria for determinining the workshop is the border composition. Because of the same design it can be said that the mosaics of Myrleia and Yerkapı might have come from the same workshop, but the Yerkapı mosaics are dated to the early Christian period and have Christian motifs of shield-shaped

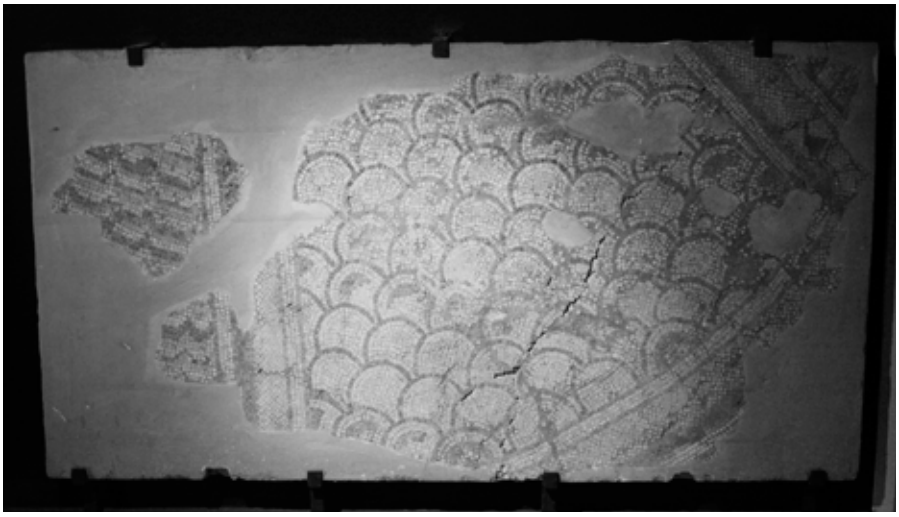

Figure 13
Mosaic panel from Bursa Archaeology Museum (Uludağ University, Department of Archaeology Archive)

cross and bird. According to the archaeological context, the Myrleia mosaic can be dated to the Roman period. Therefore they can-not have come from the same workshop. However we can say that the similar designs in that area have been continued to be made throughout that time.

Figure 14
Mosaic floor with head of Medusa, J. Paul Getty Museum (Belis 2016: 6.)

Conclusion / Dating Through Iconography and Possible Parallels

The shield of triangles design has been used since the second century in all Roman provinces and can also be seen in the late period. During the centuries the only thing that changed was the centre of the design depending on the time and the location. Examples can be seen in Antandros where there is a kantharos and peacocks in the centre of the mosaic, in Korinth where there is a head of Dionysos, and in Myrleia where a knot design has been used. Otherwise the basic pattern is similar to each other. This suggests that there was a main pattern used in workshops which made some changes according to the wishes and needs of the patron.

Figure 15
Mosaics of Antandros (http://www.antandros.org/sectors/yamac-ev.html)

A prototype of the shield of triangles design can be seen in a mosaic from Rome dated to the second century, where there is a Medusa head in the centre and kanthari in the corners of the mosaic (Belis 2016: 7) (Fig. 14). The head of Medusa is made with colourful tesserae and the other parts have been made of black and white tesserae. A similar example can be seen in a Roman villa at Corinth, where the centre includes a head of Dionysos and is polychrome. Like the other examples in this one ivy scrolls emerge from the kanthari in the corners, which is dated to the second half of the second century (Dunbabin 1999: 212-213). The structure in Myrleia shows similar features to the late antique Villa of Antandros in its plan and mosaic design (Polat et al. 2008: 470 Plan 1) (Fig. 15). The structure in Antandros is dated by scholars to the end of the third century, and with some restoration to the structure it was used until the seventh century (Polat 2003: 21-22).

The mosaic of Myrleia is a floor mosaic placed on the ground of a Roman villa in the city and is comprised of a single panel which is a Roman feature. The composition is placed in a square mosaic. Unfortunately, excavation finds cannot be utilized in order to date the mosaics because it is not known whether there will be artifacts above the ground that will provide dates in an excavation to be performed in this area. On the other hand, it is beyond any doubt that the mosaic has to be in a Roman villa in terms of its location and craftsmanship. Since there is no possibility of dating the mosaic according to excavation finds, we can only date it on the basis of similar examples. The mosaics of Antandros have been dated to the period between the end of the third and the beginning of the fourth century for the date of the mosaic of Myrleia most likely we have a terminus post quem of the end of the third century A.D.

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Opus Signinum, *Terrazzo*, Mortier et Béton de Sol : Un Etat de la Question

Opus Signinum, *Terrazzo*, Harç ve Beton Kaplama: Sorunsal Durum

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Abstract

After a brief presentation of the various materials used in these pavements and the description of their decorative repertoires, we discuss the question of vocabulary. Indeed, for several years, many problems of terminology divide the scientific community. The study of ancient texts and the different interpretations of the De Architectura of Vitruvius, rather than clarifying the study of this type of pavement lead to make it more confusing. A detailed commentary of the new terminology defined by Italian researchers, shows that it is not easy to standardize the descriptions. Further difficulties arise when it comes to translate a word in another language, as interpretation often generates new ambiguities. I consider mortar pavements as the most suitable general term for this pavement type, because mortar is the basic component and at the same time the most neutral term. Finally, it seems appropriate to revisit the term of terrazzo-signinum used widely, (perhaps wrongly) in the French archaeological literature.

Keywords: *Greco-Roman world, mosaics, mortar, Vitruvius, Pliny the Elder.*

Öz

Döşemelerde kullanılan farklı hammaddelerin kısa bir tanıtımı ve bezeme repertuvarlarının tanımlamalarının yapılmasının ardından terminoloji sorunu tartışılacaktır. Gerçekten de, birkaç yıldır terminolojik sorunlar bilim dünyasını bölmüş durumdadır. Antik Çağ metinlerinin ve Vitruvius'un De Architectura'sının farklı yorumları bu tür bir döşeme ile ilgili sorulara ışık tutmaktan çok daha da karmaşık hale getirmektedir. İtalyan araştırmacılar tarafından tanımlanan yeni terminolojiye dair detaylı bir yorumlama, betimlemelerin standardize edilmesinin kolay olmadığını ortaya koymaktadır. Daha büyük bir sorun ise bir kelimeyi farklı bir dile çevirirken ortaya çıkan zorluktur ki yorumlamalar sık sık belirsizlikleri üretmektedir.Beton kaplamanın bu tür bir döşeme için genel olarak en uygun terim olduğunu düşünüyorum. Çünkü "beton" böyle bir döşemenin en temel bileşenidir ve aynı zamanda en tarafsız terimdir. Son olarak Fransız arkeoloji yazınında (belki de yanlış olarak) sıklıkla kullanılan terrazzo-signinum teriminin ele alınması uygun olacaktır.

Anahtar Kelimeler: *Greko-Romen Dünyası, mozaikler, beton, Vitruvius, Yaşlı Plinius.*

Le dossier des revêtements de sol antique est particulièrement compliqué depuis ces dernières années. Les nouvelles découvertes archéologiques en Italie et en Gaule, ainsi que l'apport des analyses chimiques qui participe à la caractérisation des matériaux, ont permis de mieux identifier les éléments composant les pavements. Dans le contexte du programme européen Marie Curie, New Archaeological Research Network for Integrating Approaches to Ancient

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Material Studies (NARNIA)[1], il a été possible en étudiant les matériaux à l'aide des nouvelles technologies, de reprendre le dossier des revêtements de sol en mortier, qui regroupe de manière générique un certain nombre de pavements, comme ceux connus sous le nom d'*opera signina* (Vassal, *in print*).

Après une présentation succincte des différents éléments qui constituent ces sols et la description de leurs répertoires décoratifs, nous évoquerons la question du vocabulaire. En effet, depuis plusieurs années, de nombreux problèmes de terminologie partagent la communauté scientifique. L'étude des textes antiques et les différentes interprétations du *De Architectura* de Vitruve, plutôt que de clarifier l'étude de cette typologie de pavement conduisent à la rendre plus confuse. Un commentaire détaillé de la nouvelle terminologie définie par les chercheurs italiens, présentée lors du XI^e^ colloque de *l'Associazione Italiana per lo Studio e la Conservazione del Mosaico* (*AISCOM*) (Grandi – Guidobaldi 2006) montrera qu'il n'est pas aisé d'abandonner les termes antiques. De nouvelles difficultés apparaissent lorsqu'il s'agit de traduire un mot dans une autre langue, l'interprétation générant souvent de nouvelles ambiguïtés. Enfin, il paraît opportun de revenir sur les termes *terrazzo* ou *terrazzo-signinum* utilisés très largement, peut-être à tort, dans la littérature archéologique pour définir les types de revêtement difficiles à identifier. La dénomination *terrazzo*, vient du nom *terrazzo alla Veneziana* utilisé pour définir des pavements élaborés au XVI^e^ siècle au nord de l'Italie, constitués d'un mortier où étaient semés et battus des fragments de pierre naturelle et de marbre colorés.

Nous nous efforcerons dans cet article de préciser quels sont les matériaux utilisés dans la production des mortiers, quelles sont les difficultés que peuvent poser les sources textuelles et les terminologies modernes concernant l'identification et la dénomination des sols antiques.

Définition

L'*opus signinum* tel que je le définissais dans ma thèse (Vassal 2003), définition conservée en 2006 lors de la publication parue au British Archaeological Reports (Vassal 2006), était un mortier fabriqué à partir d'un mélange d'eau, de chaux, de poudre de tuileau qui lui donnait une couleur rouge / orangé. Il possédait des propriétés imperméables et pouvait être uni, parsemé de tesselles de couleurs ou d'éclats de marbre créant des motifs géométriques. Parfois, une couche de "peinture rouge" était appliquée en surface pour rehausser la couleur.

Dans le même ouvrage, je précisais (Vassal 2006: 13) qu'en aucun cas il ne fallait utiliser le terme "ciment" pour définir ces sols, terme largement employé dans les publications archéologiques du XX^e^ siècle (Christophe – Pelletier 1967: 89-90; Bruneau 1982: 639). En effet, étymologiquement, *caementum* désigne des pierres brutes que l'on mêlait à un liant afin de confectionner des maçonneries. L'*opus caementicium* définit une technique de construction, le terme "ciment" est donc impropre pour la description d'un pavement (Adam 1984: 76)[2].

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[1] Narnia : Programme européen dont l'objectif est de déterminer les techniques de fabrication et d'identifier les matières premières employées dans la culture matérielle de la Méditerranée orientale.

[2] "(…) le liant le plus commun étant devenu la chaux, il y a eu une confusion, puis un transfert de vocable, le ciment devenant le mortier puis le liant seul. Comme il convient de respecter la terminologie maintenant strictement définie par la technique, il faut réserver ce mot à la désignation du ou plutôt des ciments, qui sont des mélanges artificiels de chaux avec de l'argile et des sels métalliques (généralement oxydes de fer et oxydes de manganèse) : de tels mélanges étaient évidemment inconnus des Romains aussi le terme ciment est-il totalement à proscrire".

Dans cette étude, l'utilisation des mots "béton" ou "mortier" fut privilégiée en s'appuyant sur les définitions déjà établies par René Ginouvès et Roland Martin (Ginouvès – Martin 1985: 50-52) :

> "Mortier: mélange d'un ou de plusieurs matériaux rocheux meubles (maximum 5 mm) et d'eau, durcissant à la suite d'une réaction chimique, et ainsi susceptible d'assurer la liaison entre des éléments rocheux solides".
>
> "Béton: mélange, comme les mortiers composés, de plusieurs matériaux rocheux et d'eau, durcissant par réaction chimique; mais, ici, les éléments servant d'agrégat ont des dimensions supérieures à 5 mm (ou 8 mm) d'après certaines autres normes modernes)"[3].

Pour préparer un mortier "d'*opus signinum*" de qualité, il est nécessaire de se procurer de la chaux que l'on mélangera à du tuileau ou de la pouzzolane. Selon (Furlan – Bissegger 1975: 166-178), les premiers emplois de tuileaux remontent au Xe siècle av. J.-C.:

> "Ailleurs, à défaut de roche volcanique, on utilisait de la tuile ou de la brique pilée, ainsi qu'en témoigne la coloration rose de certains enduits extérieurs. Le premier emploi connu de tuileau remonte à l'époque de la construction des citernes de Jérusalem, sous Salomon, au X^{e} siècle av. J.-C. Cet usage semble avoir été introduit par des ouvriers phéniciens qui connaissaient donc empiriquement les propriétés des matériaux qu'on appelle aujourd'hui pouzzolanes artificielles".

Selon ce texte, les premiers enduits hydrauliques à l'origine de la technique de l'*opus signinum*, qui se développera principalement dans le monde occidental romain, proviendraient de Phénicie et de Palestine.

Au V^{e} siècle av. J.-C., on remarque des pavements de mortier de tuileau à Kerkouane en Tunisie et parallèlement, en Grèce, se développent des enduits à caractère étanche qui recouvrent des baignoires et des piscines comme à Olynthe et Corinthe. R. Ginouvès témoigne de l'usage de ces enduits à Olympie et à Gortys d'Arcadie (Ginouvès 1962: 106)[4], tout comme (Chamonard 1924: 394-395)[5] ou (Bulard 1908: 185-186)[6] à Délos.

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[3] Voir également pour la granulométrie Coutelas 2009: 13-14 : "On parle de "mortier" lorsque les grains sont de la dimension des sables (0,063 et 2 mm), et de "béton" lorsque les grains de la taille des graviers sont présents en nombre".

[4] "On rencontre aussi dans l'établissement thermal un enduit hydraulique, partout où la maçonnerie devait être en contact avec l'eau ; ainsi, pour la bordure et les bancs des cuves de G, pour le fond de la cuve etc. L'enduit, un béton de tuileaux, contient une assez grande quantité de terre cuite, qui donne une couleur rosâtre et en augmente l'imperméabilité". Ou pour Némée : Ginouvès 1962: 129 : "A Némée on s'est contenté de stuquer le sol avec un béton hydraulique."

[5] "C'est un véritable mortier hydraulique, confectionné avec une chaux hydraulique très analogue à celle du mortier qui sert d'enduit aux citernes et renfermant, comme elle, beaucoup d'alumine et peu de silice. Son rôle était évidemment le même que celui de cet enduit : il protégeait contre toute infiltration le bas des murs des habitations lors des pluies abondantes, dont les eaux, ne pouvant s'écouler par les égouts, devaient ruisseler sur le sol de ces rues étroites. [...] Cette mosaïque économique, et qui se prêtait mal à l'effet décoratif, ne paraît pas avoir été d'un usage très répandu en dehors de petites salles des communs, comme les latrines (III E, N, - VI H, J) et les cuisines (IV A c - maison de l'Inopos). On la rencontre pourtant dans deux cours (II D, -VI F) et dans une salle, dont la décoration exclut l'identification avec une salle de service (II E I). Elle peut être, comme dans ce dernier cas, recouverte d'une sorte d'enduit, probablement hydraulique, mélangé sans doute d'argile cuite, qui lui donne un ton rougeâtre."

[6] "L'*opus signinum* sous sa forme la plus ancienne, c'est-à-dire se présentant comme un ciment où entrent dans des proportions définies la brique pilée et la chaux mélangées, de manière à constituer un pavement d'une extrême dureté, ne se trouve pas à Délos. Toutefois peut-être faut-il rapprocher l'enduit moins consistant, mais de composition analogue, qui recouvre le sol d'une petite salle dans une maison du quartier du Théâtre [Quartier du Théâtre, Insula II, maison E, salle I]. L'*opus signinum* prend

Avant d'aller plus loin dans la description des mortiers[7], très largement utilisés pour confectionner des sols disposés dans les lieux humides, mais également dans des pièces de prestige comme les *triclinia*, il nous faut comprendre les transformations physiques et chimiques des différents matériaux ainsi que leurs interactions.

Les Différents Matériaux Rocheux et Meubles

Le cycle de la chaux

La chaux est obtenue à partir d'un calcaire très pur, porté à une température de plus de mille degrés. Il se produit alors une réaction chimique, le calcaire se décompose en chaux vive et en gaz carbonique, c'est ce que l'on nomme calcination. Après cuisson, la chaux vive conserve le même aspect physique, mais sa masse volumique apparente est devenue plus faible. La chaux vive est avide d'humidité. Elle réagit au contact de l'eau avec un fort dégagement de chaleur, puis se transforme en une poudre blanche appelée chaux éteinte, c'est l'extinction. Enfin, la chaux éteinte, lorsqu'elle se combine avec le gaz carbonique, redevient calcaire, c'est la carbonatation.

Carbonatation de la chaux

La chaux, dont la formule chimique est $Ca(OH)_2$, se carbonate par absorption du dioxyde de carbone de l'air. Il se forme alors du carbonate de calcium $CaCO_3$, ce processus n'est possible qu'en présence d'eau. Cette réaction se déroule par exemple sur les murs passés à la chaux, ce qui forme une croûte superficielle de carbonate de calcium. Quand le mur se craquelle, la chaux sous-jacente se retrouve en contact avec l'air et se carbonate; le mur s'auto-régénère.

Argiles calcinées ou tuileaux pilés

La présence d'argiles calcinées ou de tuileaux pilés, appelés *testa* dans les textes antiques, confère au mélange une certaine étanchéité. Ces argiles proviennent en nombre de poteries cassées, de briques pilées et parfois de coquillages comme le murex. En fonction des mélanges issus des contraintes géographiques, la granulométrie et les couleurs des pavements peuvent varier.

Les argiles calcinées sont des matériaux riches en silice réactive. Ces éléments réagissent avec la chaux et l'eau pour former des silicates de calcium et d'alumine. La céramique donne à la chaux des propriétés hydrauliques, la rendant capable de se solidifier dans les zones humides en lui conférant une plus grande résistance.

Pouzzolane

Les liants hydrauliques peuvent également être produits en ajoutant des matériaux pouzzolaniques naturels à la chaux aérienne. Les Grecs anciens utilisaient la pierre ponce et d'autres matériaux volcaniques de l'île de Théra (Wilski:

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le plus souvent, à Pompéi et ailleurs, un aspect un peu différent. Afin de le rendre à la fois plus élégant et plus résistant, on y insère, au moment où le ciment est encore frais, des fragments de matière dure qui font corps avec lui, et que l'on dispose en sorte que la surface du pavement demeure parfaitement unie. Ce procédé se retrouve fréquemment à Délos, où il produit des effets différents suivant la matière employée."

7 Par convention nous utilisons parfois le terme *opus signinum*, mais nous privilégions le mot mortier pour définir ces sols constitués de chaux, de poudre de tuileau et d'agrégats.

1902-1903)[8], aujourd'hui dénommée Santorin, tandis que les Romains utilisaient des matériaux volcaniques des monts Albins et de Pouzzoles en Campanie[9]. La pouzzolane est un tuf gris foncé trachytique[10] qui a la capacité de réagir chimiquement avec le liant, lui conférant des caractères d'étanchéité et de résistance mécanique. La présence d'une grande quantité de silicate d'alumine permet au mortier de résister à l'eau et de faire prise en milieu très humide.

Agrégats ou granulats

Il s'agit de matériaux inertes, le plus souvent d'origine minérale (silice, calcaire), entrant dans la composition des mortiers, pour former la "charge": sables, graviers, cailloux roulés issus du lit des rivières ou concassés provenant de carrières. Les éléments inertes modifient les propriétés du mortier, comme la résistance mécanique, la porosité, la granulométrie, la morphologie, la texture superficielle et la composition.

Sable

Le sable est le granulat le plus commun dans les mortiers. Il peut être extrait de rivière, de milieu marin ou de sablière. Dans les textes anciens, l'utilisation de sable marin n'était pas recommandée, en raison de la présence de sel qui nuisait au processus chimique. Il est cependant attesté que les sables pouvaient être lavés afin de supprimer les impuretés (Coutelas 2009: 70). Le bon sable devait contenir des grains de taille homogène, mais de forme angulaire et sphérique. Il avait un rôle de dégraissant.

Gravillons ou graves

La surface de ces éléments détermine la quantité proportionnelle nécessaire de liant. Afin de préparer un mortier résistant, il faut avoir des agrégats de différentes tailles, trop grands, le liant est fragilisé, les espaces vides permettant à l'eau de s'infiltrer. Les agrégats doivent être calibrés.

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8 Selon cette étude allemande, réalisée au début du XX^{e} siècle, il existait en Grèce trois sortes d'enduits, ceux composés de sable marin, ceux de *testa* (tuileau, terre cuite) et ceux de pierre ponce. Ces trois ingrédients mélangés à des doses à peu près similaires de carbonate de calcium et de "terre de Santorin" donnaient trois enduits. Le premier, très solide et scintillant, servait au revêtement des citernes. Le deuxième à base de tuileau était imperméable et il fut employé dans les bains de la *stoa* et sur la terrasse du temple d'Apollon Karneios à Théra. Mais, il existe peu de tuileau dans cette région. Il était forcément importé, donc cher. C'est certainement pour cette raison que l'on réalisa un troisième enduit à base de pierre ponce.

9 Vitr., *De arch*. II, 6, 1: " Il existe une espèce de poudre à laquelle la nature a donné une propriété admirable. Elle se trouve au pays de Baïes et dans les terres des municipes qui entourent le mont Vésuve. Mêlée avec la chaux et le moellon, non seulement elle donne de la solidité aux édifices ordinaires, mais encore les môles qu'elle sert à construire dans la mer acquièrent sous l'eau une grande consistance. "

Est etiam genus pulueris, quod efficit naturaliter res admirandas. Nascitur in regionibus Baianis ‹et› in agris municipiorum, quae sunt circa Vesuuium montem. Quod commixtum cum calce et caemento non modo ceteris aedificiis praestat firmitates, sed etiam moles, cum struuntur in mari, sub aqua solidescunt. (Trad. L. Callebat [CUF], 2000).

Plin.nat XXXV, 166 : "Mais la terre elle-même fournit d'autres ressources. Qui en effet pourrait assez s'étonner de voir la partie la plus vile de la terre, appelée pour cette raison poussière, et que l'on trouve sur les collines de Pouzzoles, former barrière aux flots de la mer et devenir, dès l'immersion, un bloc de pierre massif, inattaquable aux eaux et durcissant de jour en jour, surtout si on le mêle à de la pierraille de Cumes ? "

Verum et ipsius terrae sunt alia commenta. Quis enim satis miretur pessumam eius partem ideoque puluerem appellatam in Puteolanis collibus opponi maris fluctibus, mersumque protinus fieri lapidem unum inexpugnabilem undis et fortiorem cotidie, utique si Cumano misceatur caemento ? (Trad. J.-M. Croisille, [CUF], 1985).

10 Pouzzolane : l'origine du mot vient du latin *pulvis puteolana*.

Certains matériaux sont à proscrire dans la composition du mortier, notamment les schistes qui gonflent à l'humidité et sont donc gélifs (ils se délitent après avoir subi l'action de la gelée) peu stables, ils ne conviennent pas pour les espaces extérieurs. Le gypse, le charbon et les scories sont également néfastes, car ils réagissent chimiquement en attaquant les calcaires. Enfin, le bois, la paille et d'autres éléments organiques peuvent détériorer le liant en changeant de structure et de volume sous l'action de l'humidité.

Eau

L'eau utilisée dans le mélange destiné à la réalisation du mortier, ne doit pas contenir en solution ou en suspension, des impuretés qui pourraient interférer avec l'adhérence entre le liant et les agrégats. La teneur en sels (sulfate, chlorure et nitrate) doit être faible, ces derniers pouvant ralentir le séchage du mortier, ce qui provoque la formation d'efflorescences superficielles. Une forte teneur en sel peut également affaiblir la résistance mécanique du mortier ainsi que son durcissement.

La quantité d'eau dans le mélange doit être de nature à produire un mortier plastique homogène. Un excès d'eau augmente la maniabilité du mortier, mais ralentit la prise du liant et diminue la résistance mécanique du produit final.

Additifs

Un additif est une substance ajoutée à un liant qui améliore ses propriétés. Il en est fait mention dans les textes de Cetius Faventinus[11] et Palladius[12] pour les enduits, mastics et mortiers. Une première différenciation des additifs utilisés dans l'antiquité sépare les additifs de nature protéique, comme les huiles et les graisses, et les matières albuminoïdes qui jouent un rôle essentiel dans le développement des êtres vivants: l'albumine de l'oeuf, la kératine qui est un constituant de la peau, la caséine du lait, la fibrine du sang. Les substances protéiques, souvent décrites dans les textes sont fort peu observées dans la réalité archéologique. Il n'y a que depuis quelques années que les analyses chimiques permettent de déceler des traces d'oléagineux sur les pavements, comme celles effectuées à Faenza en Italie (Guarnieri 2000: 177-178). L'ajout d'huile dans le mortier va lui donner des propriétés hydrophobes et par conséquent le rendre plus résistant contre la détérioration.

Le mortier doit sa bonne tenue au soin apporté au mélange, qui doit être le plus homogène possible. La préparation est réalisée à côté du lieu où vont être

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11 Suite à une première édition de l'*Architecturae compendium* anonyme parue à Paris en 1540 chez Michel de Vascosan, fut imprimée à Bordeaux une nouvelle édition du texte, attribuée par Élie Vinet (1509-1507) à l'agronome latin Palladius. Il s'agit en réalité du traité de Faventinus. Vinet a utilisé un manuscrit autre que celui de 1540 : les chapitres ne sont pas numérotés, les titres sont pour la plupart différents. Il comporte des chapitres supplémentaires, des interpolations, notamment le chapitre trente, *De maltis diuersis*, divisé en deux parties : "*De compositione maltorum et solidamentorum*" et "*Item compositio maltorum*". Voir Marías 2009: 96. Les éditions modernes (Cam 2002) suivent le découpage et les titres de l'édition parisienne de 1540 sans faire mention des interpolations.

12 Le mastic pour les bains (zones humides), Palladius, *Opus Agriculturae*, XL, "S'il s'agit d'eau chaude, on mélangera ensemble de la poix dure, un poids égal de cire blanche, de l'étoupe, de la poix liquide pesant la moitié du total, de la brique pulvérisée et de la fleur de chaux, et l'on fera colmater les joints avec le mélange. Autre recette : broyer dans un mortier de la gomme ammoniaque liquéfiée, des figues, de l'étoupe et de la poix liquide, (…). Autre Recette : mélanger de la fleur de chaux avec du sang de taureau et de l'huile […]. On peut aussi broyer ensemble des figues, de la poix solide et des coquilles d'huitres sèches […]. S'il s'agit d'eau froide, on broiera ensemble dans un mortier du sang de boeuf, de la fleur de chaux et du mâchefer, de manière à en faire une sorte de cérat, dont on se servira comme enduit" (Texte établi par R. Martin, [CUF], 1976).

entrepris les travaux, sur un espace au sol dégagé. Le sable, disposé en forme de cratère mélangé à la chaux était brassé deux ou trois fois. Aussitôt obtenue une couleur homogène, il fallait creuser une nouvelle fois le monticule en cratère et verser l'eau prévue, puis faire tomber peu à peu les bords du cratère dans l'eau pour humidifier le mélange. Comme pour la préparation à sec, il fallait déplacer la préparation plusieurs fois afin de l'homogénéiser puis on ajoutait les agrégats.

Les matériaux qui composaient ce mortier étaient importants, car ils réagissaient entre eux de manière chimique pour donner un mortier extrêmement résistant et possédant des propriétés imperméables, caractéristique principale de cette technique. Il est évident que le savoir-faire des artisans était indispensable. Ces derniers devaient posséder une grande maîtrise des techniques et des matériaux, une capacité à s'adapter aux contraintes imposées par le terrain et le climat.

En Orient et en Occident, la diffusion de cette technique n'a pas eu les mêmes répercussions. Dans le monde de la Méditerranée orientale, ce sont surtout les enduits hydrauliques qui sont attestés pour les citernes et les baignoires. Les pavements de mortier sont très rarement décorés ; cependant, quelques témoignages sont attestés à Mieza (Allamani – Misailidou 1992: 208-212, fig. 2-4). Au lieu-dit Kamara, un bâtiment daté de l'époque hellénistique a permis de mettre au jour des sols en *opus signinum*. En comparant ces pavements avec ceux conservés à Délos, les archéologues ont suggéré que ces sols avaient peut-être été réalisés par des artisans venus d'Italie. Les motifs sont variés: un labyrinthe, dont la partie centrale est décorée d'une composition losangée d'écailles oblongues, tandis que dans une autre pièce se déploie un simple quadrillage losangé.

À Délos, dans la Maison de Fourni, plusieurs pavements en *opus signinum* sont attestés, notamment un semis de croisettes datant du dernier tiers du IIe siècle av. J.-C. De nombreuses autres traces ont été découvertes dans l'agora des Italiens, dans le quartier du théâtre, ainsi que sur des structures d'étages aujourd'hui effondrées (Bruneau 1972: 22-23).

Dernièrement, un pavement a été découvert à Sparte: il s'agit d'un mortier rose dans lequel sont insérés des tesselles et des éclats irréguliers de marbre, formant une bordure de postes influencée par les décors hellénistiques. Le tapis central représente une série de carrés emboîtés, contenant chacun une tesselle[13].

En Égypte, un pavement situé sur l'ancien terrain du Consulat britannique à Alexandrie a été découvert en 1996 (Fig. 1). Ce dernier décorait un *andron*; il est composé de deux tapis, un tapis principal dont le panneau central représente un fleuron (en galets) qui se détache sur un fond de tapis en mortier de tuileau et, un tapis de seuil décoré d'un damier de losanges composé de galets noirs et blancs. La surface du mortier a été égalisée, puis sans doute lissée par l'adjonction d'une fine couche de lait de chaux. L'intérêt de ce pavement est le mélange des trois techniques : des tesselles de terre cuite pour la bordure du tapis de seuil, le mortier de tuileau pour le fond du tapis et la mosaïque de galets pour le panneau central. Le tapis de seuil quant à lui est décoré d'un damier de losanges. Le pavement date de la première moitié du III^{e} siècle av. J.-C (Guimier-Sorbets 1998: 188). Il s'agit d'un type de sol mal connu et d'un témoignage rare pour la Méditerranée orientale.

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13 Je remercie chaleureusement Anastasia Panagiotopoulou pour ses informations et sa documentation. Un autre sol a été également découvert au Cap Ténare par Maria Tsouli.

Figure 1
Alexandrie (Egypte). Mosaïque à la rosace (1ère moitié du IIIe siècle av. J.-C.). © *Cl. A. Pelle, Archives CEAlex*.

En Occident, le développement est différent, les tesselles carrées sont déjà en usage pour décorer les sols en mortier de tuileau dans les colonies puniques de Sicile et en Afrique du Nord dès le début du IIIe siècle av. J.-C.

Des échanges ont certainement eu lieu en Sicile dans le courant du IIIe siècle av. J.-C. entre Grecs et Puniques. Cette période est riche en expériences, différentes techniques se mêlent, d'autres se développent plus ou moins rapidement, probablement en fonction des besoins et des matériaux. La technique du mortier de tuileau ou *signinum* s'est progressivement diffusée dans le bassin méditerranéen au cours du IIe siècle av. J.-C. en Italie à Pompéi, en Espagne dans la ville grecque d'Ampurias et au sud de la Gaule, signe dans cette région, d'une romanisation précoce. L'iconographie utilisée dans les différents pays est variée, comme en témoigne le répertoire décoratif.

Les Motifs Decoratifs

Les motifs décoratifs des pavements de mortier peuvent parfois être élaborés et complexes, comme certaines compositions de six-feuilles (Fig. 2) ou de motifs végétaux ainsi que dans de très rares exemples figurés, dauphins ou bucrane. On trouve en Occident des inscriptions et des motifs plus traditionnels, comme les semis réguliers et irréguliers de tesselles, d'éclats ou de croisettes. À ces compositions de surface, on peut ajouter les quadrillages losangés, les méandres de svastikas et carrés, les compositions d'écailles ou d'hexagones. On observe également des inscriptions dédicatoires, augurales ou de salutation, dans toutes les régions. Elles sont souvent en grec et parfois en langue indigène, mais elles sont presque toujours la preuve d'un rattachement à une certaine forme d'hellénisation (Vassal 2009: 87-89) (Fig. 3).

C'est en Afrique du Nord aux IVe et IIIe siècles av. J.-C, qu'apparaissent les plus anciens pavements à décor de simples semis. D'autres motifs à caractère apotropaïque sont disposés à l'entrée des pièces, comme les signes de Tanit (Fig. 4).

En Sicile de l'Ouest les premiers témoignages datés de la fin du IVe et du début du IIIe siècle av. J.-C. sont en grande majorité des pavements en mortier de tuileau, certainement parce qu'il s'agissait d'une technique facile à réaliser. On trouve également en Sicile les premiers pavements d'*opus tessellatum*,

Figure 2
Carthagène (Espagne).
Fleuron et dauphins
(fin I^er siècle av. /
début I^er siècle apr. J.-C.).
© *Cl. V. Vassal*.

Figure 3
Morgantina (Sicile).
Maison du Chapiteau
dorique (III^e-I^er av. J.-C.).
© *Cl. I. Faccenna*.

Figure 4
Kerkouane (Tunisie). Maison de la rue
de l'Apotropaïon, signe dit de Tanit
(III^e siècle av. J.-C.). © *Cl. V. Vassal*.

très souvent associés aux pavements de mortier. On a souvent pensé que le mortier de tuileau était une technique utilisée uniquement dans les villes à faible revenu économique, ce qui n'est pas le cas de Morgantina et de bien des cités où l'on trouve ce type de revêtement en quantité. Le développement de *l'opus tessellatum* au I^er siècle av. J.-C. et au III^e siècle apr. J.-C. est certainement dû à une abondance de matériaux premiers, avec le développement des carrières. Il est cependant certain que les pavements de mortier étaient extrêmement appréciés et qu'il ne s'agissait pas d'une technique exclusivement réservée aux pièces secondaires des maisons.

D'autres pavements significatifs datés du IV^e - III^e siècle av. J.-C. ont été retrouvés au Monte Iato, à Naples et à Buccino (Fig. 5). Certains motifs de ces pavements rappellent le répertoire grec, par l'utilisation de postes, de rinceaux ou de six feuilles. À partir du II^e siècle av. J.-C., on trouve en Italie, des pavements d'*opus signinum* dont les motifs décoratifs sont ceux élaborés au III^e siècle av. J.-C., et peut être même avant. Les cités vésuviennes permettent d'observer un grand nombre de pavements dans des pièces dont on connaît la fonction, ce qui permet de penser que l'*opus signinum* était une technique très largement utilisée pour décorer les pièces de réception.

En Espagne, l'introduction de l'*opus signinum* semble dater du II^e siècle av. J.-C. On constate la présence de cette technique dans les colonies d'origine grecque comme Ampurias, mais aussi dans celles d'origine carthaginoise comme Carthagène. Le répertoire est traditionnel, de nombreuses inscriptions, des semis et des quadrillages losangés se déploient sur la surface des sols. Ampurias fournit un grand nombre de pavements en *opera signina* relativement élaborés pour lesquels l'influence grecque est certaine. Il semble que la technique perdura jusqu'aux I^er-II^e siècles apr. J.-C. avant d'être supplantée par l'*opus tessellatum*.

Figure 5
Buccino (Italie). Salle de banquet (dernier quart du IVe siècle av. J.-C.).
© *Cl. V. Vassal*.

Figure 6
Marseille (France).
Sol découvert rue de la République (Ier siècle av. J.-C.).
© *Cl. B. Sillano, Inrap*.

La diffusion de l'*opus signinum* en Gaule et en Espagne a été plus lente qu'en Italie. Les pavements sont en général datés aux alentours du I^er^ siècle av. J.-C. (Fig. 6), mais certains exemples, à Marseille, sont datés de la fin du III^e^ siècle av. J.-C. Ces sols sont d'influence grecque, ce qui s'explique par le fait que Marseille est un *emporion* grec (CAG Marseille 2005) et que la cité entretien des contacts multiples et croisés avec la Grèce (Bats 2012: 145).

Il semble que la Sicile fut le creuset du développement de l'*opus signinum*. Les Grecs apportèrent avec eux leur savoir-faire ; au contact d'autres civilisations comme les Puniques, la technique de l'*opus signinum* se serait enrichie de décors. Les Puniques comme les Grecs connaissaient la technique des mortiers hydrauliques, mais sa diffusion dans cette partie du monde venait certainement d'Orient, ce que l'on peut déduire de l'existence d'une citerne attestant cet emploi à Ta'annak en Palestine ancienne dès le deuxième millénaire.

Il semble tout à fait probable que la même technique se soit développée dans deux régions différentes. Les artisans utilisaient les matériaux locaux pour répondre aux besoins des habitants : construction de citernes, installation de bains pour le confort et la santé. C'est surtout dans les cités installées près des côtes que l'on observe ces installations. Ce sont ces mêmes cités qui partirent commercer ou coloniser d'autres terres, dont la Sicile. Les apports grecs et puniques se mêlèrent certainement dans cette région du monde, l'*opus signinum* s'y développant au III^e^ av. J.-C. avant de se diffuser vers l'Italie, la Gaule et l'Hispanie.

Les Textes

Une longue tradition d'études archéologiques définit les pavements de mortier rose contenant de la terre cuite pilée, avec ou sans insertion de tesselles, comme étant des *opera signina*. Ces informations nous sont données par les textes de Vitruve et de Pline l'Ancien. Et c'est justement le désaccord entre la description vitruvienne de l'*opus signinum*, où l'auteur ne précise jamais la composition du liant, et l'affirmation de Pline, où la présence de terre cuite est clairement désignée dans les sols d'*opera signina*, qui a fait naître un débat entre spécialistes. En effet, les problèmes de terminologie autour de ce terme latin ont conduit certains chercheurs italiens à définir, ces dernières années une typologie de pavements appelée "*cementizi*", et sur laquelle nous reviendrons plus tard.

Selon une longue tradition justifiée par l'interprétation de certains passages du *De Architectura* de Vitruve et de l'*Histoire Naturelle* de Pline, on considérait dans la littérature archéologique que le terme antique "*opus signinum*" et le terme moderne "*cocciopesto*"[14] définissaient la même technique. Il s'agissait d'un mélange de chaux, d'eau et de poudre de tuileau, utilisé la plupart du temps pour imperméabiliser les pièces humides comme les cours extérieures et les bains (Gros 2003: 144)[15]. Cette question du vocabulaire est importante, car il est indispensable de définir avec un terme précis une réalité archéologique.

Il faut signaler que la présence du terme *signinis* dans les textes antiques, qui a donné lieu au terme *opus signinum*, apparaît dans le *De Archictectura* de Vitruve au livre VIII (6, 14) avec l'occurrence "*signinis operibus*", chez Palladius dans le *Traité d'agriculture* (I, XVII, 1) avec l'occurrence "*signinis parietibus*" et

14 "*coccio*" correspond à la "terre cuite" et "*pesto*" au verbe "piler".

15 "La définition, assortie de variantes formelles peu signifiantes, se retrouve dans presque tous les ouvrages classiques, et beaucoup d'auteurs ne précisent pas du reste s'ils entendent par "*opus signinum*" un mortier servant d'enduit ou une maçonnerie complète, en d'autres termes un "*cocciopesto*" ou un "*calcestruzzo*" enrichi de morceaux de briques ou de tuile".

chez Cetius Faventinus dans l'*Abrégé d'architecture privée* (IV, 2) avec l'occurrence "*signinis operibus*". Dans certains passages, la technique est définie par un mortier du nom de "*signia*" comme chez Pline (*H. N.*, XXXV, 165) et Columelle, *Economie rurale* (IX, 1, 2) ; d'autres passages décrivent un mode de préparation sans nommer le procédé, mais en utilisant le terme "*testa*" comme chez Caton (*De l'Agriculture*, 18, 7).

Les auteurs antiques mentionnent les termes *opus signinum* et *testa*, et précisent le choix des différents matériaux pour la réalisation des pavements et la construction des citernes : (Vitruve, *De architectura*, II, 4, 3; II, 4, 20; II, 6, 1; V, 11, 4; VII, 1, 3-4; VII, 1, 5-6; VII, 4, 1-5; VIII, 6, 14-15; Pline l'Ancien, *H. N.*, XXXV, 165; XXXVI, 173; Varro*n, Res rusticae*, I, 11; III, 11, 2; Columelle, *De l'Agriculture*, I, 6, 12; IX, 1, 2; Cetius Faventinus, *Abrégé d'architecture privée*, IV, 2; IX; XVII; XVIII; XIX, 2; XXIV; Palladius, *Traité d'agriculture*, I, IX, 4; I, X; I, XVII, 1; Festus, *De Verborum significatu quae supersunt cum Pauli Epitome*, P. 314-316 Th.; Isidore de Séville, *Etymologae*, XIX, 10, 25-29).

L'Architecte romain Vitruve écrit son traité d'architecture, le *De Architectura*, aux alentours de 25 av. J.-C. Dans cet ouvrage, l'auteur décrit les techniques architecturales de son temps. Selon un désir pédagogique, il expose dans chacun de ses livres un aspect différent de l'architecture. Parfois, il ne juge pas opportun de revenir sur certaines informations qui lui paraissent acquises alors que celles-ci n'ont été que suggérées dans les livres précédents, créant ainsi des problèmes de compréhension pour le lecteur contemporain.

Il évoque à plusieurs reprises dans son ouvrage, un revêtement à base de tuileau sans jamais le nommer: pour les sols imperméables dans les lieux intérieurs; pour les sols imperméables dans les lieux humides et pour une maçonnerie.

Le sol imperméable (*De Arch.* VII, 1, 3-4)

Vitruve consacre à ce sujet tout le premier chapitre et une partie du chapitre quatre du Livre VII. En suivant les indications de l'auteur, il est possible de mettre en évidence les différentes couches qui constituent un sol.

Selon les prescriptions du *De Architectura*, il est nécessaire en premier lieu, de mettre en place un *statumen*, fondation de cailloux posés à sec, en hérisson, afin de faciliter les écoulements des eaux d'infiltration. Sur cette fondation on applique une première couche composée de chaux, de sable et de graviers, qui constitue un blocage épais, le *rudus*. Cette couche est enfin damée pour être rendue plus compacte.

Vitruve précise que les proportions sont différentes selon que l'agrégat est frais ou qu'il s'agit d'un remploi. Dans le premier cas, 3/4 d'agrégat (sable et gravier) et ¼ de liant (chaux); pour le remploi, 2/7 de chaux et 5/7 d'agrégat. La chaux en proportion plus importante augmente la cohésion du mélange.

Au-dessus du *rudus*, on pose une dernière couche appelée *nucleus*, composée de "*testae*" et de chaux, *testa nucleus inducatur*. Le *nucleus* a une épaisseur d'environ six doigts, c'est-à-dire à peu près onze centimètres.

Enfin un lit de pose, généralement en fin mortier, le *pauimentum tesseris*, laisse apparaître des éclats de céramique, des fragments de marbre, des tesselles réparties aléatoirement ou disposées géométriquement avec plus ou moins de recherche. La surface est finalement polie, afin qu'il ne subsiste aucune aspérité, aussi bien sur le liant que sur les éléments disposés à la surface.

Le sol imperméable dans les lieux humides, terrasses et salles à manger d'hiver (Vassal 2006: 18-19) (*De Arch*. VII, 1, 5-7 et VII, 4, 1-5)

Il s'agit de la deuxième évocation d'un sol de mortier dans le texte de Vitruve (*De Arch*. VII, 4, 1-5)[16]. L'auteur ne mentionne pas clairement le nom de la technique, seul le mot *testa* et l'expression *testaceum pauimentum*, sont utilisés. Ce passage a très souvent été identifié comme la description d'un *cocciopesto* (Voir Gros 2003: 147)[17].

Une maçonnerie pour les citernes (De Arch. VIII, 6, 14)

Vitruve utilise le terme de *signinis operibus* (*De Arch*., VIII, 6,14 : ouvrages maçonnés à la manière de signia) au livre VIII, sans préciser la composition de la structure. Il s'agit de la seule mention de l'auteur concernant une maçonnerie (Gros 2003: 145; Vassal 2006: 19) exceptée la technique de bétonnage sous l'eau au livre V (V, 12, 2).

Les différentes interprétations de ce passage ont conduit depuis le début du XX^{e} siècle à générer deux courants de pensée, ceux qui reconnaissent, dans le terme *opus signinum*, une technique de revêtement de sol composée de *testa*, et ceux qui comme Cairoli F. Giuliani (Giuliani 1990: 172-174), concluent que "l'*opus signinum*" est un conglomérat utilisé dans la construction des citernes. L'interprétation de Giuliani peut être tout à fait recevable, si l'on s'attache au texte fourni par les éditions modernes. Cependant, une étude très précise du texte de Vitruve par Pierre Gros relativise cette hypothèse (Gros 2003).

En effet, le traité de Vitruve nous est parvenu grâce à une seule copie du texte, dépourvue d'illustration, provenant des îles britanniques. Le document qui suscita un intérêt exclusivement philologique fut rapporté à la cour de Charlemagne par le savant et religieux Alcuin. Il fut reproduit en plusieurs exemplaires à partir de la copie originale aujourd'hui perdue. D'autres copies sont attestées en Italie à la fin du XIV^{e} siècle.

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16 4.1. *Quibus rationibus siccis locis tectoria oporteat fieri, dixi ; nunc quemadmodum umidis locis politiones expediantur, ut permanere possint sine uitiis, exponam. Et primum conclauibus, quae plano pede fuerint, in imo pauimento alte circiter pedibus tribus pro harenato testa trullissetur et dirigatur, uti eae partes tectoriorum ab umore ne uitientur. [...] His perfectis, paries testa trullissetur et dirigatur et tunc tectorio poliatur.* 4.1. "Je viens d'indiquer la méthode à suivre pour faire les enduits dans les lieux secs ; je vais exposer maintenant comment on exécute les revêtements dans les lieux humides, pour qu'ils puissent durer sans s'altérer. Et d'abord, pour les pièces qui sont à rez-de-chaussée, dans le bas des murs, au-dessus du pavement, sur une hauteur de trois pieds environ, on emploiera pour le gobetage et les couches dressées un mortier de tuileau au lieu du mortier de sable, afin que cette partie des enduits ne soit pas gâtée par l'humidité. [...] Cela fait, ce mur recevra, au mortier de tuileau, le gobetis et les crépis dressés ; après quoi l'on passera les couches de finition." (Trad. par B. Liou, M. Zuinghedau, [CUF], 1995: 20).

3. *Tum autem calce ex aqua liquida dealbentur, uti trullissationem testaceam non respuant [...] Trullissatione inducta, pro harenato testa dirigatur, et cetera omnia uti supra scripta sunt in tectoriorum rationibus perficiuntur.* 3. "On passera alors sur ces tuiles un badigeon au lait de chaux, afin que le gobetis au mortier de tuileau puisse s'y accrocher ; [...] Une fois étendu le gobetis, on appliquera les crépis dressés en employant le mortier de tuileau au lieu du mortier de sable ; le reste du travail se fait comme il a été dit plus haut à propos des enduits." (Trad. par B. Liou, M. Zuinghedau, [CUF], 1995: 21).

5. *Foditur enim intra libramentum triclinii altitudo circiter pedum binum, et solo festucato inducitur aut rudus aut testaceum pauimentum ita fastigatum ut in canali habeat nares. [...].* 5. "On creuse en dessous du niveau de la salle à manger jusqu'à deux pieds de profondeur environ, et, après qu'on a damé le sol, on étend un béton ou un pavement de tuileau dont la pente débouche sur un drain." (Trad. par B. Liou, M. Zuinghedau, [CUF], 1995: 22).

17 "Le mot important est bien sûr ici "testa", en ce qu'il permet de comprendre, de Vitruve à Cetius Faventinus, que son emploi ou celui de l'adjectif dérivé, "*testaceus*", associés aux notions de "*pavimentum*" ou même d' "*opus*" désignent des formes de "*cocciopesto*" c'est-à-dire des mortiers de tuileau utilisés comme revêtement d'étanchéité sur des constructions, des dallages ou de parois. Dans ces conditions l'équivalence avec l' "*opus signinum*" apparaît non seulement autorisée mais tout simplement inévitable."

Pour P. Gros :

"C'est Fra Giocondo qui, dans son édition fondatrice de 1511, à laquelle nous sommes redevables de tant de corrections palmaires, a cru devoir transformer "*testis*" en " *tectis*", et ajouter un "*aut*" pour obtenir le texte suivant, de son point de vue plus satisfaisant : "*tunc signinis operibus ex tectis aut a superioribus locis*, etc." En d'autres termes, la mention des tuileaux ("*testae*") qui figurait dans la formule originelle et complétait utilement comme une précision technique le mot "*signinum*" a disparu pour laisser place à la description redondante des "toits et autres endroits élevés" d'où l'eau est censée ruisseler vers les citernes" (Gros 2003: 450).

Pline qui reprend dans son *Histoire Naturelle* le texte de Vitruve, donne une description précise de la construction des citernes mais ne nomme pas le procédé (XXXVI, 173). Plus loin, il affirme que "l'*opus signinum*", employé en revêtement mural ou en pavement, se caractérise par la présence de menus fragments de terre cuite (XXXV, 165). Pline valorise l'emploi de ce matériau en utilisant la diatribe de type moral et argumente afin de mettre en relief le savoir-faire des artisans et leurs oeuvres. Il met en valeur la tradition latine et condamne le luxe. Pline suit le texte de Vitruve, pour tout ce qui concerne l'architecture.

> "La démarche de Pline était semble-t-il facilitée par le fait qu'il disposait, pour la description des "*opera signina*" du livre VIII de Vitruve (VIII, 6, 14), un texte certainement plus précis que celui que nous lisons aujourd'hui" (Gros 2003: 149).
>
> "Si Vitruve ne mentionne pas le terme *opus signinum* pour les revêtements composés de tuileaux, c'est certainement parce qu'à l'époque, il n'était pas nécessaire de le préciser." […] "Au livre 2, 4, 3 l'auteur décrit un mortier à base de sable de rivière, il précise que la nature "maigre" de ce matériau garantit sa solidité après polissage, comme c'est le cas avec le "*signinum*". Il écrit exactement "*uti signinum*", "comme le *signinum*" selon un mode, qui permet de comprendre, au moyen d'un exemple, de quoi il parle en renvoyant à une réalité technique supposée bien connue et donc non décrite." (Gros 2003: 147).

Cette rapide synthèse sur les problèmes de terminologie en fonction des traductions qui ont été établies, présente assez clairement les différentes interprétations qui peuvent être données du texte de Vitruve. Il semblerait donc approprié de renoncer au terme antique "*opus signinum*" afin de supprimer toute confusion et d'essayer d'établir une terminologie claire.

Nouvelles Classifications

Dès 1985 (Guidobaldi 1985: 272-281), puis en 1995, le professeur Federico Guidobaldi proposait, lors du second colloque de l'AISCOM de travailler sur une nouvelle terminologie des pavements antiques (Guidobaldi 1995); successivement, plusieurs autres communications mirent en évidence ces problèmes de terminologie notamment pour les *opera signina*, et une première définition fut donnée : "*pavimento cementizio*" (Grandi Carletti 2001; Grandi 2001).

En 2003, lors du travail effectué durant ma thèse (Vassal 2003) traitant des *opera signina*, les problèmes de terminologie sur l'emploi du terme *opus signinum* ont été récurrents. Dans l'ouvrage publié en 2006 (Vassal 2006), j'expliquais une nouvelle fois, comme d'autres chercheurs l'avaient fait avant moi, la nécessité d'établir une nouvelle classification (Cagnat – Chapot 1920: 35-36; Blake 1930: 23; Morricone Matini 1971; Bruneau 1972: 22-24; Dunbabin 1978:

Tableau 1
Classification des pavements en mortier et béton.
D'après Vassal 2006 : 7.

MORTIER	BETON
Mortier de tuileaux	Béton de tuileaux
Mortier de tuileaux peint	Béton de tuileaux peint
Mortier de tuileaux à éclats	Béton de tuileaux à éclats
Mortier de tuileaux à plaquettes	Béton de tuileaux à plaquettes
Mortier de tuileaux à tesselles	Béton de tuileaux à tesselles
Mortier de tuileaux à tesselles et plaquettes	Béton de tuileaux à tesselles et plaquettes
Mortier de chaux	
Mortier de cendre	

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Tableau 2
Classification des pavements "cementizi" avec traduction V. Vassal. D'après Guidobaldi et al. 2014, T. II, Tabella I.

COMPOSITION DU LIANT	INSERTIONS
CEMENTIZI A BASE FITTILE (c. d. cocciopesto) *« Cementizi » à base de terre cuite*	(sans insertions) avec des tesselles avec des insertions de pierres ou de roches artificielles avec des tesselles et des insertions de pierres ou de roches artificielles avec des insertions de marbres avec des insertions mixtes (pierre et marbres)
CEMENTIZI A BASE LITICA Sono inclusi quelli a base lavica *« Cementizi » à base de pierre* *Sont inclus ceux à base de lave*	(sans insertions) avec des tesselles avec des insertions de pierres ou de roches artificielles avec des insertions de marbres avec des insertions mixtes
CEMENTIZI A BASE MARMOREA *« Cementizi » à base de marbre*	(sans insertions) avec des tesselles avec des insertions de pierres ou de roches artificielles avec des insertions de marbres avec des insertions mixtes
CEMENTIZI A BASE MISTA* *« Cementizi » à base mixte*	(sans insertions) avec des tesselles avec des insertions de pierres ou de roches artificielles avec des insertions de marbres avec des insertions mixtes

* Il serait utile de préciser les différents matériaux

169-180; Fernandez Galiano 1982: 235-244; Lancel 1985: 157-170; Dunbabin 1987: 30-31, n. 14; Dunbabin 1999: 53 n. 3). Après l'étude de plus de 1000 pavements du monde méditerranéen, répertoriés dans ma base de données[18], une première tentative de classement avait été proposée en définissant quatorze types de sol (Tableau 1), (Vassal 2006: 6-7). Je précisais l'importance de la taille des éléments dans la composition du béton de tuileau, que je différenciais du mortier de tuileau en suivant les définitions du Dictionnaire de R. Ginouvès et R. Martin, mais je ne tenais pas compte de la nature des éléments (comme l'ont fait très justement les Italiens dans le corpus d'Herculanum (Guidobaldi et al. 2014: 16-20).

En 2005, lors du XI[e] colloque de l'AISCOM fut présentée, essentiellement à l'attention de la communauté scientifique italienne, une nouvelle terminologie des pavements antiques (Tableau 2), (Grandi – Guidobaldi 2006).

[18] Fromageot-Laniepce, Vassal, *in print* : "*Opus signinum* in the Ancient Mediterranean Basin. The area under study covers both the Western (Italy, Spain, Gaul, Tunisia, etc.) and the Eastern part of the Mediterranean (Greece, Egypt, Libya, etc.) The chronological framework ranges from the 4th and 3rd centuries BC to the 3rd century AD. Project Director: Dr. V. Vassal. Year of Creation: 1998. Contents: 1500 mosaic records, 900 digital pictures."

Ce type de classification, très détaillée, qui certainement s'est montré très utile pour le très beau travail réalisé sur les pavements d'Herculanum (Grandi – Guidobaldi 2007 et pour des références plus complètes, Guidobaldi et al. 2014: 395-413) est cependant difficile à appliquer lorsque la documentation est issue de comptes rendus de fouilles, d'anciens corpus dans lesquels les informations sont souvent peu nombreuses. Nous disposons rarement de bonnes photographies qui permettraient de préciser la nature des éléments composant les sols.

"*Cementizi*"

Depuis quelques années, le terme "*Cementizi*" est utilisé par convention pour définir des pavements de mortier, principalement dans l'environnement de l'AISCOM. L'élaboration et la justification de la classification de Federico Guidobaldi en collaboration avec Monica Grandi trouvent leur point de départ dans les travaux réalisés au cours de la première moitié du vingtième siècle (Guidobaldi 2010: 207), par la scientifique anglaise Marion Elizabeth Blake. Cette dernière classa les pavements connus sous les noms de *cocciopesto*, *opus signinum*… sous la dénomination de "*cements pavements*" (Blake 1930: 23-24)[19].

F. Guidobaldi et M. Grandi reprirent, en italien, ce terme générique de "*pavimento cementizio*". M. Grandi précisait dans l'un de ces articles :

> "*Per tutte queste ragioni ritengo sia opportuno utilizzare la definizione "pavimento cementizio", specificandone di volta in volta brevemente le caractteristiche salienti (colore, materiali, etc.) : mi sembra infatti che l'aggettivo, derivando da un termine che identificca un tipo di conglomerato ("cemento" in senso lato), costituito principalmente da un legante ed aggregati di varia natura e dotato di particolari compattezza e resistenza, bene ne rappresenti la specificita tecnica, peraltro immediatamente ed oggetivamente individuabili. Questa mia scelta trova del resto un importante riscontro nella terminologia di alcuni autorevoli studi, ai quali rimando per ulteriori approfondimenti*[20]."

D'autres chercheurs (Vassal 2006) remettent en cause cette définition pour des questions de terminologie liées aux traductions, par exemple "*cementizi*" ou "ciment" ne peut convenir en français pour décrire des sols constitués de liant et d'agrégats. En effet, il faut rappeler que le mot, "*caementum*" désigne des pierres brutes que l'on mêlait à un liant afin de confectionner des maçonneries et non le liant lui-même... Comme l'explique (Ginouvès – Martin 1985: 45):

> "Ciment : matériau obtenu par calcination d'un calcaire marneux, contenant de 20 à 30 % d'argile. Il convient d'éviter dans la littérature archéologique, l'emploi du mot ciment dans un sens plus large (comme équivalent de "liant") et de le remplacer chaque fois par le terme technique convenable (c'est souvent le mortier), en réservant le mot ciment pour le matériau dont l'origine vient d'être précisée".

C'est justement le choix inverse qui a été fait par le chercheur italien, même si M. Grandi précise qu'elle trouve plus adaptée d'utiliser l'adjectif "cementizio"

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19 "*I have preferred to use the general term cement for all floors in which one still feels conscious of the matrix of lime and its aggregate, in spite of any foreign matter which may have been inserted in it*."

20 Grandi 2000: 191 et n. 29; Blake 1930: 22 : "*cement pavements*"; Ginouvès – Martin 1985: 51, n. 274; Dunbabin 1987: 30-31, n. 14 : "*I have continued to use the term signinum here for convenience, through recognising its unsatisfactory nature ; I should prefer "cement pavements*"…

plutôt que le substantif "cemento", dont les caractéristiques techniques et chimiques sont très différentes des mélanges réalisés dans l'Antiquité (Grandi Carletti 2001: 191 n. 28).

M. Grandi (Grandi Carletti 2001: 191), comme il a précédemment été mentionné, cite comme référence M. E. Blake, qui naturellement utilise le terme anglais "cement" pour définir des pavements extrêmement solides, composés d'un liant de chaux et contenant des agrégats. L'auteur se réfère également au Dictionnaire Méthodique (Ginouvès – Martin 1985: 51 n. 274) pour justifier l'utilisation du mot "ciment" en français:

> "Cet OPUS SIGNINUM n'est pas un BETON DE TUILEAUX, avec lequel on le confond souvent dans la littérature archéologique. On voit par ailleurs comment la communauté de propriétés avec le CIMENT explique l'expression *fr.*, fréquente chez les archéologues et attestée dans le Littré, "ciment de tuileaux".

Or si l'on reprend le Littré et l'entrée "ciment", on lit la définition suivante (Littré 1974 (nouvelle édition): 936):

> "Poudre de tuiles et de briques pilées, qu'on mêle avec de la chaux, pour lier les pierres des murs et des autres bâtiments (…)".

Si l'on se réfère à cette description, il est fait mention de maçonnerie mais jamais de pavements.

La référence continue ainsi :

> "Ciment romain, sorte de mortier, ainsi nommé bien que les Romains ne l'aient jamais connu, qui possède à un degré supérieur toutes les propriétés des chaux hydrauliques (…)."

Il existe bien un ciment naturel, mais qui n'était pas utilisé pour la réalisation des sols. Quant au ciment artificiel, il est découvert au XIX^{e} siècle par Louis Vicat (1786-1861) et ne pouvait pas être connu des Romains. C'est pour ces raisons que le nom "ciment" en français ou le substantif "cementizio" en italien ne doivent pas être utilisés afin d'éviter les malentendus entre liant ancien et moderne qui risquent d'engendrer de nouvelles imprécisions sur la nature des sols.

Les inertes ou agrégats

Les "inertes" ou agrégats à l'intérieur du mélange, définissent en français plusieurs types de liant en fonction des différents degrés de granulométrie.

Selon la définition du *Dictionnaire Méthodique*, l'*opus signinum* est un :

> "mortier fait d'un mélange de chaux, d'eau, de sable et de poudre de tuileaux" (Ginouvès – Martin 1985: 51).

On peut, en s'appuyant sur cette définition, dire que l'*opus signinum* est un mortier de tuileau dans la composition duquel entrent d'autres éléments comme la chaux et le sable. La poudre de tuileau est un élément important, puisque cette poudre est le matériau qui permet de différencier le mortier du béton. L'*opus signinum*, tel qu'il est défini dans le *Dictionnaire*, ne contient pas d'agrégats, le tuileau est réduit en poudre. En revanche, le béton de tuileau, qu'il ne faut pas confondre avec le mortier de tuileau, est composé "d'agrégats, dont la taille est supérieure à 5 millimètres" (Ginouvès – Martin 1985: 51).

L'enduit (Ginouvès – Martin 1985: 136)[21], le mortier (Ginouvès – Martin 1985: 50)[22] et le béton (Ginouvès – Martin 1985: 51)[23] se différencient par leur composition et la granulométrie des agrégats, les Italiens ne font pas cette distinction. Une fois encore, il ne semble pas envisageable d'utiliser cette terminologie en français. En effet, si nous nous fondons sur la classification italienne "*cementizi*", il faudrait pour harmoniser l'identification des pavements et faciliter les descriptions, choisir d'utiliser un terme général, qui bien entendu réduirait le sens lexical du mot en français.

Classification

Les scientifiques italiens définissent quatre groupes sans tenir compte de la granulométrie des agrégats à l'intérieur du liant, par contre ils précisent la nature des éléments (Tableau 2):

> "*dobbiamo innanzitutto proporre una suddivisione in funzione del tessuto o impasto di base, cioè, in pratica, del tipo di inerti che sono dispersi omogeneamente nella matrice cementizia*" (Grandi – Guidobaldi 2006: 34; Guidobaldi et al. 2014: 16-20, 471 tab. 1).

Les auteurs privilégient la nature des éléments plutôt que leur taille.

Les marbres et les pierres

Généralement, on classe dans la catégorie des "*Lapidei*": les roches magmatiques (basaltes, granits), les roches sédimentaires (sable, calcaire) et les roches métamorphiques (marbres et schistes)[24].

Pour la terminologie italienne, les auteurs divisent la catégorie "*Lapidei*" en deux autres catégories:

"*Marmorei*" qui regroupe les roches susceptibles d'être polies et très résistantes à l'usure comme les calcaires métamorphiques, mais également la brèche, le granit, l'albâtre ou les porphyres… (Grandi – Guidobaldi 2006: 34; Guidobaldi et al. 2014: 17).

"*Non marmorei*", soit tous les matériaux tendres ou "*Litici*" qui regroupent des roches moins dures comme le palombino, l'ardoise, l'obsidienne, le schiste…

Lorsque les auteurs mentionnent que ces matériaux n'ont pas les mêmes caractéristiques que les précédents:

La difficulté première réside dans l'identification des roches, car il n'est pas aisé pour des non-spécialistes de les reconnaître et de les identifier.

Peut-être faudrait-il conserver une seule catégorie "*Lapidei*" qui regrouperait les différentes roches magmatiques, métamorphiques ainsi que sédimentaires et préciser, lorsque cela est évident, le type de matériaux : marbre, obsidienne… Cependant, dans le cas des pavements traités dans le volume d'Herculanum,

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21 "Enduit, revêtement semi-liquide ou pâteux que l'on étend par couches sur une surface où il se fixe en séchant, jouant un rôle de décoration et/ou de protection".

22 "Mortier, mélange d'un ou de plusieurs matériaux rocheux meubles, d'eau et d'agrégat (jusqu'à 5 mm)".

23 "Béton, mélange comme les mortiers composés, de plusieurs matériaux rocheux et d'eau, mais les éléments servant de granulats ont des dimensions supérieures à 5 mm".

24 Ces dernières sont formées par la recristallisation et la déformation de roches sédimentaires ou de roches magmatiques. Ces roches sont modifiées sous l'action de la chaleur et de la pression, qui croissent avec la profondeur dans la croûte terrestre.

la distinction entre "*marmorei*" et "*non marmorei*" se justifie parfaitement et permet d'établir une chronologie (Guidobaldi et al. 2014: 18-19).

Dans la classification des "*non marmorei*", les auteurs ajoutent les matériaux artificiels (Guidobaldi et al. 2014: 18).

Roches artificielles et terre cuite

Le terme descriptif proposé par les Italiens pour définir les roches artificielles (terre cuite, pâte de verre, émaux…) est celui de "*litoidi*" ou en français "lithoïde" (qui a l'apparence de la pierre). Dans le cas particulier des terres cuites et des briques, les auteurs donnent également un autre terme, "*fittili*", dont la traduction française est "argile".

Il s'agit peut-être d'une subtilité linguistique, mais il serait opportun que les auteurs précisent les différences entre "*litoidi*" et "*fittili*" lorsqu'ils l'emploient pour définir la terre cuite, car dans leur texte la différence n'est pas claire:

> "*mentre quelli artificiali (terrecotte, paste vitree, smalti…), pur se di uso talvolta simile, vengono detti litoidi o, nel caso specifico dei laterizi o delle terrecotte, anche fittili*."

La terre cuite semble apparaître dans les deux définitions "*litoidi*" et "*fittili*", quelles sont les différences ? S'agit-il d'éléments en argile crue, en terre cuite ?...

Afin de pouvoir traduire ces termes dans d'autres langues sans ambiguïté, il serait important de les clarifier.

En conclusion, il semble que cette terminologie, pour qu'elle puisse être adaptée et traduite dans d'autres langues, doive être modifiée sur quelques points.

Il faudrait préciser en italien et dans les autres langues la définition des marbres et des pierres et pas simplement de manière conventionnelle (Guidobaldi et al. 2014: 18). Le terme "*cementizi*" ne peut être utilisé en français même avec un sens générique ; nous lui préférerons les termes "mortier" ou "béton" tout en convenant que des précautions oratoires sont à prendre. Il semble nécessaire de préciser la granulométrie et la qualité des pavements, fins, moyens, grossiers. Enfin, il s'avère nécessaire de préciser en italien l'utilisation des termes "*litoidi*" et "*fittili*" pour la terre cuite afin que cela ne conduise pas à des erreurs d'interprétation dans d'autres langues.

Terrazzo et terrazzo-signinum

Nous nous sommes concentrés jusqu'ici sur l'utilisation du terme *opus signinum* pour la description de certains pavements. Qu'en est-il des termes *terrazzo* et *terrazzo-signinum* utilisés de manière régulière dans les comptes rendus de fouilles, dans les publications scientifiques et qui regroupent des pavements très différents : mortier de chaux, de sable, de tuileau ..., comprenant des éléments variés insérés à l'intérieur du liant, mais aussi disposés en surface. Ce terme, utilisé dans les publications archéologiques depuis le XX^{e} siècle[25], est inspiré par la technique du *terrazzo alla veneziana*, technique réalisée par une corporation d'artisans frioulans constituée au XVI^{e} siècle, les "*terrazzeri*" (Fig. 7). L'architecte Antonio Rusconi (1520-1587) publia un traité d'architecture, *I dieci*

[25] Comme nous l'a rappelé Henri Lavagne, c'est à Klaus Parlasca que nous devons l'utilisation de ce terme définissant les sols recouvrant les terrasses [information orale]. Petit à petit, l'expression a été plus largement utilisée pour les sols de béton et mortier avec ou sans décor.

Figure 7
Aquarelle de Giovanni Grevembroch, *Gli abiti dei veneziani*, Museo Correr (Venezia).
D'après Antonio Crovato, *I pavimenti alla veneziana*, Treviso 2002: 12.

libri d'architettura. Secondo i precetti di Vetruvio, novamente ristampati, & accresciuti della prattica degl'horologi solari ou selon un mode abrégé : *Della Architettura di Gio* (Fig. 8). L'auteur suit dans cet ouvrage les prescriptions de Vitruve. La particularité de l'oeuvre de Rusconi réside dans le développement de techniques de construction typiquement vénitiennes, inspirées par les techniques antiques. Son travail peut être considéré comme unique par rapport aux autres traités de la Renaissance.

Figure 8
Page de titre.
D'après A. Rusconi, *Della Architettura di Gio*, 1590.

Le terrazzo alla veneziana (Fig. 9) également appelé "*battuto*" décrit par Rusconi est composé de poutres en bois sur lesquelles on dispose des planches de trois centimètres d'épaisseur, puis on répand des fougères afin que ces dernières protègent le bois. La couche suivante est constituée d'un mélange de chaux éteinte et de débris de briques, d'une épaisseur de dix à vingt centimètres, appelée "fond" ou "*sottofondo*". Ce sol était ensuite compressé à l'aide d'un rouleau (souvent les vestiges de colonnes antiques), et damé à l'aide d'outils de bois pour le centre et de longues tiges de fer pour les côtés. Quand le sol commençait à sécher, que le damage ne laissait plus aucune trace sur la surface, il était temps de laisser reposer le sol, afin qu'il puisse sécher complètement. La couche reposait environ six mois.

L'ancrage était un processus réalisé avec un instrument tranchant comme une pioche ou le bord d'une pelle : on disposait de petits trous sur la surface lisse, à une distance d'environ trente centimètres. Ces trous servaient de point d'ancrage à la couche suivante, que l'on appelait "la couverture" ou "*coperta*" composée de briques et de chaux pilées, d'éclats de marbre d'Istrie (en Croatie). Une fois que cette couche était sèche, elle était polie, puis on disposait sur la "couverture" la dernière strate "d'enduit", de deux à quatre centimètres d'épaisseur, appelée "*stabilitura*", cette dernière pouvant avoir différents aspects:

- Le "*pastellone*" qui était composé de chaux et de poudre de marbre, auxquelles on ajoutait du cinabre, beaucoup plus rarement du jaune ou du vert. Une fois sèche, on disposait sur la couche de l'huile de lin. Le polissage était effectué à l'aide d'un chiffon de toile de jute, jusqu'à l'obtention d'une surface brillante. Le plus souvent le "*pastellone*" était uni.

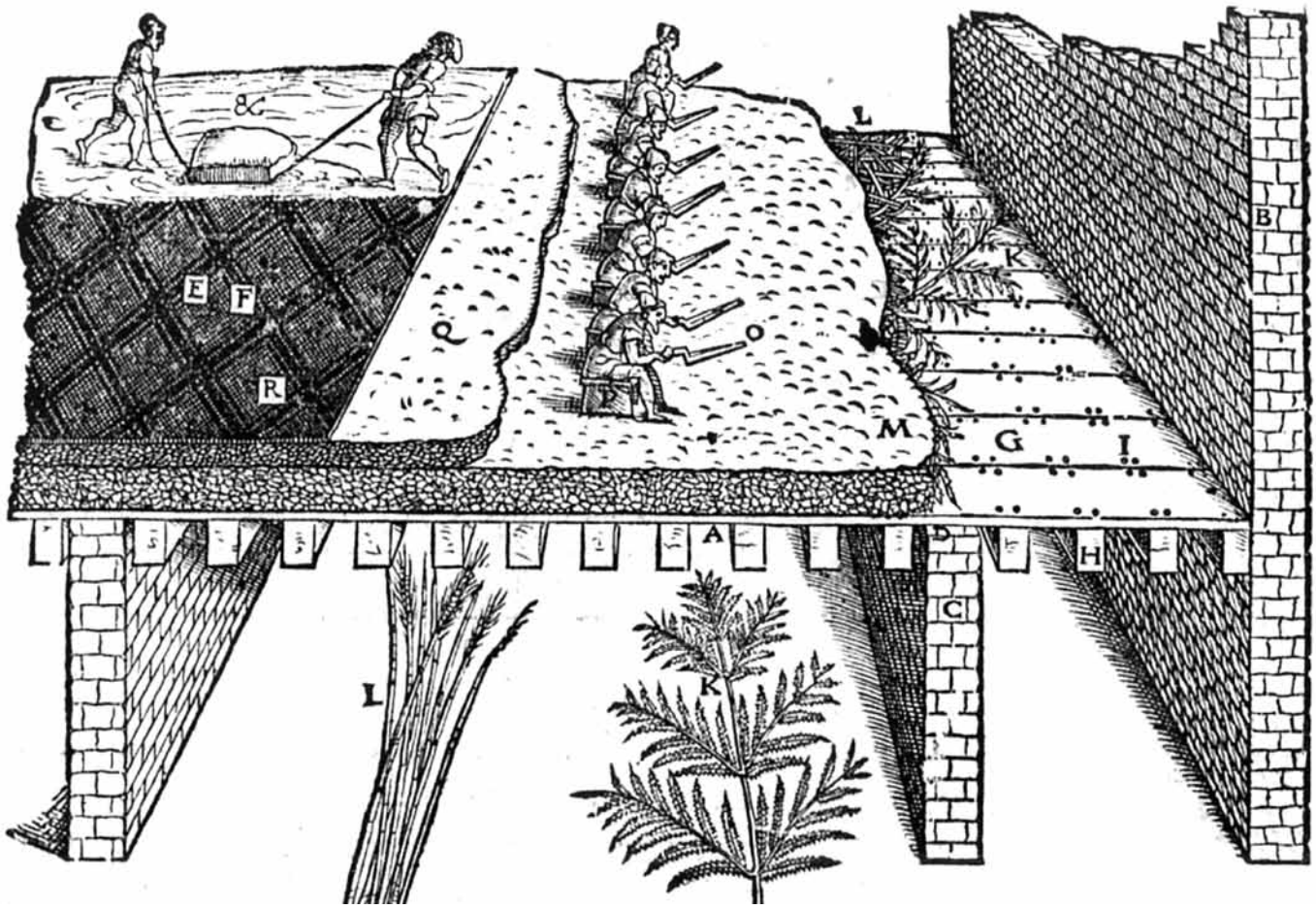

Figure 9
Construction d'un sol.
D'après A. Rusconi,
Della Architettura di Gio,
1590: 99.

- L'autre type de décor était appelé "*seminati*" (Fig. 10) qui, comme son nom l'indique, présentait des éclats de marbres en semis dans un mélange de chaux et de sable d'une épaisseur de un à deux centimètres. Le tout était ensuite poli à l'aide de "l'*orso*", long bâton avec une pince spéciale à laquelle était attaché le matériau abrasif, une pierre ponce naturelle. Cet outil était appelé "ours", probablement à cause du bruit particulier qu'il produisait lors du ponçage, qui ressemblait au grognement d'un ours. Puis de nouveau on passait les fers et le rouleau sur la surface du sol.

L'usage de ces divers outils servait à comprimer les différents éléments qui constituaient le pavement, afin de le rendre plus résistant. La dernière opération consistait à passer un liquide, la "*saponata*", composé d'un mélange d'eau chaude, de savon de Marseille et d'huile d'olive sur la surface. Ce liquide servait à durcir la chaux (grâce à la présence de glycérine) et permettait le polissage de la surface. Enfin, on passait plusieurs couches d'huile d'olive afin de l'imperméabiliser.

Bien que ces pavements s'inspirent des techniques antiques, l'exposé des différentes étapes de composition du *terrazzo alla veneziana* montre bien les spécificités de ce revêtement. Ce dernier est principalement construit sur des sols de bois, l'utilisation de matériaux organiques étant particulièrement développée. La référence récurrente à ce mot par la communauté scientifique afin de définir les sols de mortier de chaux, d'éclats, de bétons est commode, mais imprécise. Comme pour le mot latin *opus signinum*, il conviendrait de l'abandonner au profit d'un langage descriptif, s'appuyant sur des caractéristiques techniques que les acteurs impliqués dans ces questions pourraient aisément identifier.

Figure 10
Terrazzo alla Veneziana, seminati.
© *Cl. V. Vassal*.

Conclusion

La technique connue sous le nom d'*opus signinum* a longtemps été considérée comme une technique réservée aux pièces secondaires des maisons, souvent négligée dans les études scientifiques. L'absence de décor figuré et la reprise systématique de certains motifs géométriques n'ont pas suscité la curiosité des chercheurs. L'*opus signinum*, jouant principalement sur des effets de bichromie, ne permettait pas de rendre la perspective ni le modelé réalisé à l'aide de dégradés, comme le fait la mosaïque. Son étanchéité, due à la présence de terre cuite dans le mortier, sa solidité et son caractère isolant étaient ses principales caractéristiques. L'apport de l'archéométrie et le développement des publications autour de ce thème ont relancés depuis quelques années l'intérêt des chercheurs pour ce type de sols. Aujourd'hui, la caractérisation des matériaux permet de réfléchir sur la circulation des matières premières, l'apport des savoir-faire et la mise en place des techniques.

Bien que l'*opus signinum* ne soit pas une technique aussi "élaborée" que l'*opus tessellatum*, nous savons qu'elle décorait très largement de luxueuses demeures surtout au III^{e} siècle av. J.-C. Il est donc erroné de penser que cette technique n'était utilisée que dans les pièces de moindre importance, comme les cours et les couloirs. L'aménagement de ces pavements impliquait une organisation technique, mais aussi l'élaboration d'une composition en accord avec l'architecture.

La question du vocabulaire latin qui définit les revêtements de sols est importante. Il subsiste en effet de nombreuses incertitudes quant à la définition des pavements et notamment sur le terme *opus signinum*. Il semblerait donc approprié de renoncer au terme antique "*opus signinum*" afin de supprimer toute confusion. Les chercheurs sont conscients qu'ils n'ont pas la même familiarité avec les réalités évoquées dans les textes anciens que les lecteurs auxquels s'adressaient les auteurs antiques. Cela entraîne des difficultés de compréhension des différents passages de textes concernés et l'interprétation controversée de certaines réalités archéologiques. Malgré de nombreuses tentatives destinées à clarifier les

différents termes livrés à la communauté scientifique, de nouvelles ambiguïtés naissent de ces propositions.

La mise en place d'une nouvelle terminologie implique la question de la traduction. Il semble difficile de traduire un mot d'une langue dans une autre tout en gardant la précision scientifique nécessaire. Une collaboration plus étroite entre chercheurs internationaux permettrait de remédier à un certain nombre de difficultés. Il serait bon de créer, comme cela existe pour le décor géométrique de la mosaïque romaine (Décor I - II), un langage technique et descriptif qui traduise le répertoire des pavements en différentes langues, permettant à tous les acteurs de l'archéologie d'accéder facilement à une terminologie précise.

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Journal of Mosaic Research yıllık olarak yayınlanan hakemli bir dergidir. Dergiye yayınlanmak üzere gönderilecek olan makaleler aşağıda belirtilen kurallara göre hazırlanmalıdır. İlginiz ve katılımınız için teşekkür ederiz.

Bu dergideki makalelerde kullanılacak olan kısaltmalar Alman Arkeoloji Enstitüsü yayın kuralları, Bulletin de l'Association international pour l'Etude de la Mosaique antique, AIEMA-AOROC 23.2013, La Mosaique Greco Romaine IX ve Der Kleine Pauly dikkate alınarak yapılmalıdır.

Editör ve yazım kurulu dergiyle ilişkili bilimsel içerik ve yazım kurallarıyla ilgilenir. JMR, arkeologlar, tarihçiler, epigraflar, bilim insanları, kültür mirası yönetimi uzmanları, restoratörler, konservatörler, modern mozaik sanatçıları ve mozaik buluntularıyla ilgilenen kişilere ulaşmayı hedeflemektedir. Kazılar, yüzey araştırmaları ve laboratuar araştırmalarından elde edilen bilgilere ek olarak JMR bünyesinde, mozaik konusundaki teknik ve metodolojik çalışmalar, kitap eleştirileri gibi konular da yayınlanabilir.

Makaleler JMR dışında bir dergiye eş zamanlı olarak yayınlanmak üzere gönderilmemelidir. Başka bir yerde yayımlanan makalelerin çevirileri JMR'de yayınlanmak üzere kabul edilmez. Yazarlar, JMR'nin içerisinde yer alan materyallerin telif hakkının JMR dergisine ait olduğunu bilmelidirler.

Tüm makaleler hakem değerlendirmesi sürecine tâbi tutulacak, gerektiği takdirde derginin bilim kurulunda ele alınacaktır. Hakemlerden gelecek yorumlar yazarlara iletilir ve gerektiğinde yazarın makalesini tekrar gözden geçirmesi istenir.

Metin ve fotoğraflar, bir CD veya USB bellek içerisinde ve orijinal metnin basılı bir kopyası ile birlikte gönderilmelidir.

Özler ve Anahtar Kelimeler

Makaleler İngilizce, Almanca, Fransızca ve Türkçe dillerinde yazılabilir. Makalenin başlığı orijinal dilinin yanı sıra Türkçe ve İngilizce dillerinde de olmalıdır. Özet, makalenin amacını, yöntemini, değerlendirme ve sonuç kısmını içermelidir. Makale özeti 200 kelimeyi geçmeyecek şekilde Türkçe ve İngilizce dillerinde yazılmalıdır. Özet bölümü, metin veya figür referansları, alıntı veya dipnot içermemelidir.

Özetin altında beş anahtar kelime yer almalıdır. Anahtar kelimeler Türkçe ve İngilizce hazırlanmalıdır.

Yazım Kuralları

Makalenin ilk sayfası, makale başlıkları, yazar isim(ler)i, özetler, anahtar kelimeler ve dipnot olarak yazarın adresi ve iletişim bilgilerini içermelidir. Metin, Times New Roman fontunda, 12 punto, baştan sona 1,5 satır aralıklı yazılmalıdır. Her iki yandaki kenar boşlukları, üst ve alt kenar boşlukları en az 3 cm olmalıdır.

Dipnotlar sayfa sonunda ardışık olarak yer almalı, Times New Roman fontunda, 10 punto, tek satır aralıklı olarak yazılmalıdır.

Dijital metin Word formatında olmalıdır. Figürler ".tiff" veya ".jpeg" dosyası halinde ve uygun çözünürlükte olmalıdır: Fotoğraflar için 300 dpi ve çizimler için 600 dpi genellikle yeterli olmaktadır. Figür dosyalarının isimleri yazarın soyadı ile başlamalı ve sırasıyla numaralandırılmış olmalıdır. Örnek: Akurgal_01.tiff, Akurgal_02.tiff, Akurgal_03.tiff vb.

İsa'dan önce ve sonraki tarihleri belirtmede "İ.Ö." ve "İ.S." ifadeleri kullanılmalıdır.

Referans ve Alıntılar

Metin içerisinde atıf yapılan her bir yayın kaynakçada yer almalıdır. Aynı şekilde sadece metin içerisinde atıf yapılan kaynaklar kaynakça da yer almalıdır.

Metin içinde yapılan atıflar parantez içerisinde kısaltma olarak verilmelidir. Örnek: (Dunbabin 2002: 181-183). Bütün alıntılarda özgün sayfa numaraları belirtilmelidir.

Üç ve daha fazla yazarlı yayınlarda kısaltma olarak "vd." ifadesi kullanılmalıdır. Örnek: (Akurgal vd. 1984: 80).

Bir yayındaki figür veya çizime yapılan atıflar "(Akurgal 1996: Resim 5, Çizim 1)" şeklinde belirtilmelidir. JMR'ye yayınlanmak üzere gönderilen orijinal metin içerisindeki figür ve çizim atıflarında sadece "Resim" ve "Çizim" gibi ifadeler kullanılmalıdır. Örnek: (Resim: 1, Çizim: 3). Bir numara altında birden çok resim olduğu takdirde, resim veya çizim numarasının yanına küçük harf kullanılmalıdır. Örnek: (Resim: 10a)

Yayınlanmak için kabul edilmiş, fakat henüz yayınlanmamış olan bir yayına yapılan atıflarda yazar soyadından sonra "baskıda" ifadesi kullanılmalıdır. Örnek: (Jobst baskıda). Metin içerisindeki kaynakça atıflarında "baskıda" ifadesi normalde yayın yılının bulunduğu yerde olmalıdır.

Antik yazarlara yapılan atıflarda "Der Kleine Pauly" kısaltma listesi dikkate alınmalıdır. Kısaltma listesi JMR web sayfasından edinilebilir.

İlk yazarın soyadı ile kısaltılan yayınlarda yazarların tümünün isimleri, yayın başlıkları, makaleler için sayfa numaraları, kitaplar ve monografiler için yayın yılı ve yayın yerinin yer aldığı atıflar metin sonunda yer alan kaynakçada ayrıntılı olarak belirtilmelidir. Kaynakça aşağıda verilen örneklere göre düzenlenmelidir.

Makale

Barringer 1991 — Judith M. Barringer, "Europa and the Nereids: Wedding or Funeral?", AJA 95, 657-667.

Kitap

Dunbabin.1999 — Katherine M.D Dunbabin, Mosaics of the Greek and Roman World, Cambridge, Cambridge University Press.

Yayınlanmamış Tezler

De Puma 1969 Richard De Puma, The Roman Fish Mosaic, Yayınlanmamış Doktora Tezi, Bryn Mawr College, Pennsylvania.

Yayınlanmış Tezler

Reitz 1979 — Elizabeth J. Reitz, Spanish and British Subsistence Strategies at St. Augustine, Florida, and Frederica, Georgia, between 1563-1783. Doktora tezi, University of Florida, Gainesville. Ann Arbor: University Microfilms.

Monografiler

Jobst 1978 — Werner Jobst, Römische Mosaiken aus Ephesos I, Die Hanghäusern des Embolos, Corpus der antiken Mosaiken in der Türkei I. Forschungen in Ephesos 8, 1, Vienna.

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Abadie-Reynal 2006 — Catherina Abadie-Reynal, "Roman Domestic Architecture at Zeugma," in R. Ergeç, ed., International Symposium on Zeugma: From Past to Future. Gaziantep: Gaziantep University Press, 1-6.

Tekrar basımlar

Cobo 1964 — Bernabe Cobo, Historia del Nuevo Mundo. (Orjinal basım yılı 1653.) Biblioteca de los Autores Españoles, vols. 91, 92. Madrid: Ediciones Atlas.

Resimler ve Tablolar

1. “Resim” ifadesi makalede yer alan bütün fotoğraflar, haritalar, tablolar için kullanılır. Her bir görsel için bir resim numarası verilir. Her resmin metin içerisinde bir karşılığı olmalı ve ilgili atıflar sıralı bir şekilde gitmelidir (“Resim 1, 2, 3,” şeklinde “Resim 1, 3, 2” değil).
2. Eğer bir harita kullanılacaksa, Resim 1 makalenin konusu olan bölgenin veya çalışma alanının coğrafi konumunu belirten harita olmalıdır. Resim 1’in tasarımı yapılırken JMR dergisinin uluslararası bir okuyucu kitlesine sahip olduğu göz önünde bulundurulmalıdır. Alan raporlarının yer aldığı makalelerde kazı alanı ve çevresini gösteren en az bir fotoğraf yer almalıdır.
3. Resimlerin yanında, gerekli durumlarda bir ölçek kullanılmalıdır. Resim başlığı olarak “3×” ya da “1:50.000” şeklinde ifadeler kullanılmamalıdır. Resim üzerinde bir nesnenin yer aldığı ve ölçek bulunmadığı durumlarda Resim başlığında söz konusu figürün ölçüleri yazılabilir.
4. Resimler Listesi’nde “Resim” kelimesi her başlığın ilk ifadesi olmalıdır.

Resim 1. Bursa Suriçi ve çevresini gösteren harita. ”Harita: Nur Deniz Ünsal”.

Resimlerle ilgili ayrıntılar “(Resim: 6c-f)” örneğinde olduğu gibi belirtilebilir. Söz konusu ayrıntıların her birine metin içerisinde atıf olmalıdır.

Tablo ve Özel Fontlu Yazılar

Tablo ve özel font kullanılan yazıların kolaylıkla orijinal düzenleri bozulduğu için her bir tablo veya yazılı metnin, ayrıca “.pdf” formatında basılı bir örneğinin gönderilmesi gerekmektedir.

Kitap Eleştirileri

Eleştirilerin hazırlanması

JMR’de yayınlanacak olan eleştiriler en fazla 2500 kelime olmalı ve eleştiriler başlığı altında yayınlanabilmesi için analitik bir kritiğin yapılması umulmaktadır. Editörden talep edilen araştırma raporu niteliğindeki kitap eleştirilerinde, bir makalenin hazırlanmasındaki tüm detaylara gerek duyulmaz. Referanslarda yukarıda verilen sisteme uyulmalıdır. Dipnot ve resim kullanılmamalıdır. Eleştiri konusu olan kitaplar aşağıda verilen örneğe göre belirtilmelidir. Bu örneği metin yazarının ismi ve mail adresi izlemelidir.

Mosaics of the Greek and Roman World,

Katherine M.D. Dunbabin, 357 sayfa, 318 resim, 8 tablo, 3 levha, 10 ek, kaynakça, indeks. Cambridge University Press, 2002. $40.50. ISBN0-521-00230-3.

Ayrıbasım Gönderimi

JMR her yazara makalesinin bir örneğini “.pdf” formatında göndermeyi taahhüt eder.

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