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Ellipses, Cushions and Bells. A Family of -Mostly- North African Mosaic Pavements

Elipsler, Yastıklar ve Çanlar. -Çoğunlukla- Kuzey Afrika Mozaiklerinde Yer Alan Bir Familya

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Abstract

The purpose of this article is to characterize a family of geometric mosaic decors which are especially well represented in North Africa (17 pavements on 24) and especially in Tunisia (14 pavements), extending from the second to the fourth century AD. Their common feature is to include three shapes not very frequently found in mosaic, namely the so-called "ellipse", "cushion" and "bell". We assume that these "ellipses" are in fact ovals, similar to those used for building the Roman amphitheaters. In the present case they are inscribed in a square and most often carried out following a same process, quite easy to implement (23 pavements). The general pattern of these pavements is set on a grid of bands, the ovals being inscribed in the larger squares of the grid. The other arcs of circles, delineating the cushions and bells, are also carried out in close relationship with this grid. A major element of −relative− variability is the ratio between the widths of the two sorts of bands, thus leaving more space or less for the bells and cushions, and consequently for their respective inner decors.

Keywords: *North Africa, grid of bands, ellipse, cushion, bell.*

Öz

Bu makalenin amacı, İS 2. yüzyıldan 4. yüzyıla kadar uzanan dönemde, özellikle Kuzey Afrika'da (17 döşeme üzerinde 24) ve özellikle Tunus'ta (14 döşemede) iyi temsil edilen bir geometrik mozaik familyasını karakterize etmektir. Bu mozaiklerin ortak özelliği genelde mozaikler üzerinde çok sık rastlanmayan üç şekli, yani "elips", "yastık" ve "çan"ı içermeleridir. Bu "elipslerin" aslında Roma amfi tiyatrolarının yapımında kullanılanlara benzer ovaller olduğu varsayılmaktadır. Mevcut durumda, bunlar bir kare içinde yer almaktadır, çoğu zaman aynı işlemi izleyerek gerçekleştirilir ve uygulanması oldukça kolaydır (23 döşeme). Bu döşemelerin genel deseni, bir şerit kafesi üzerine kuruludur, ovaller kafesin daha büyük karelerine işlenmiştir. Yastıkları ve çanları betimleyen diğer daire yayları da bu kafesle yakın ilişki içinde yürütülür. Göreceli değişkenliğin önemli bir unsuru, iki tür bandın genişlikleri arasındaki orandır, böylece çanlar ve minderler ve dolayısıyla ilgili iç dekorları için daha fazla veya daha az yer bırakır.

Anahtar Kelimeler: *Kuzey Afrika, şerit kafesi, elips, yastık, çan.*

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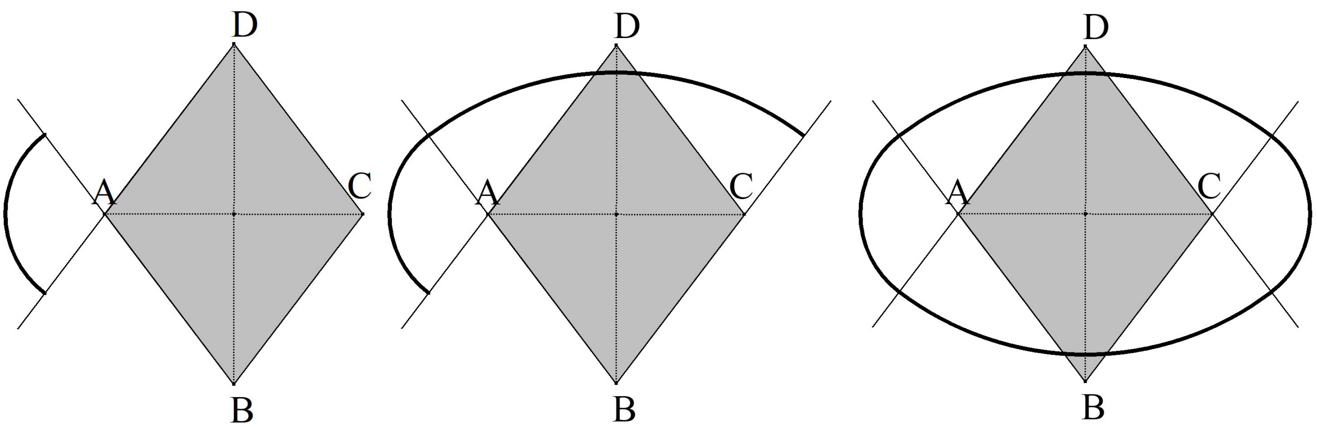
The closed surfaces which are to be found in Roman mosaic geometrical decors are mainly polygons and circles. This is connected with two facts: on the one hand, the 'scholarly' geometry of the time −*i.e.* Euclid's− referred only to rule and compass constructions; on the other hand, a universal tool for the *pictor* was the (chalk)line, an instrument allowing drawing straight lines and circles, and also transporting lengths. A much rarer shape to be found in mosaics is the closed curve named 'ellipse' by the collective reference book *Décor* (Décor II: 34). The subject of this article is to identify and characterize −as we did some time ago for another one (Parzysz 2012a)− a family of decors based on a "*centralized pattern, in a square, of four ellipses in the corners, along the diagonals, and four lateral bells, these motifs adjacent and forming an irregular concave octagon in the center*" (Décor II: pl. 363c). More precisely, for a corpus constituted by 24 mosaics[1] answering this definition, for which reliable graphic documentation could be obtained, the question was to try to bring out and characterize the set. By the way we could state that this family is particularly well represented in Tunisia (14 items), and more especially in Thysdrus−El Jem (6 items).

1. Ellipse or Oval?

The reasons justifying the fact that the so-called Roman 'ellipses' are in fact ovals have already been made explicit elsewhere (Golvin 2008; Parzysz 2008, 2012 b). Let us just recall here that a four-centered oval is a closed curve constituted of four arcs of circles linked up with each other and centered at the vertices of a lozenge. The construction process runs as follows (Fig. 1).

A lozenge ABCD being given, let us begin with drawing an arc of circle centered at A between the sides AB and AD. Then, let us draw a second arc connected with the first one between the sides BA and BC, centered at B[2]. The same process is then repeated from C and D, producing this way a closed curve having the same symmetry axes as the initial lozenge (that we shall name the *source lozenge* of the oval).

Figure 1
Construction of an oval.



One can see that this process has nothing to do with anyone used to construct an ellipse, though an oval curve is indeed very close to an elliptic one. The oval has a worthy advantage, which proves very useful for mosaicists (and for architects as well): with the same source lozenge and the same process, just by changing the radius of the initial circle, one gets another oval, equidistant with the first on *all its circumference*, which is not the case with an ellipse, for which one has to

1 See Annex for list and references.

2 The alignment of the centers of the circles with the common point of the arcs ensures the smoothness of the connection.

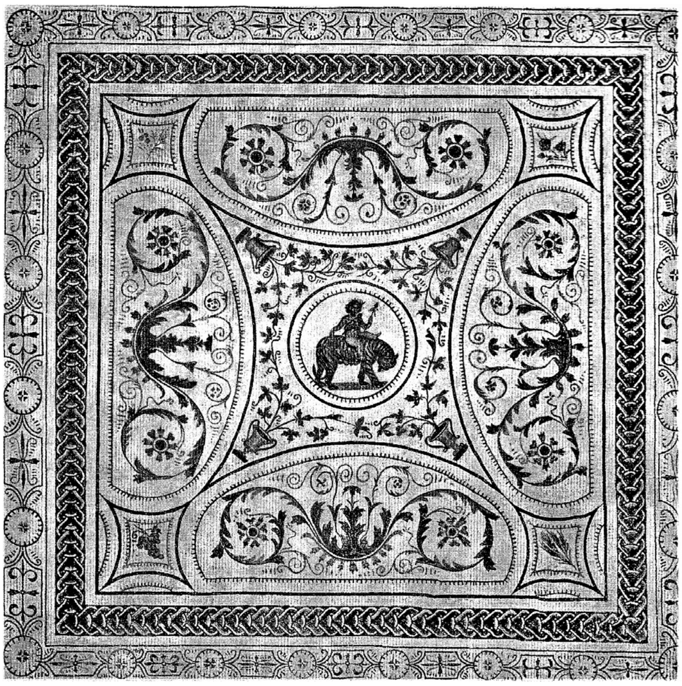
find new foci. For this reason –most useful for designing bands and guilloches, together with a simpler construction process– we shall assume that the "ellipses" found on Roman mosaics are in fact four-centered ovals, and the following study will contribute to strengthen this assumption.

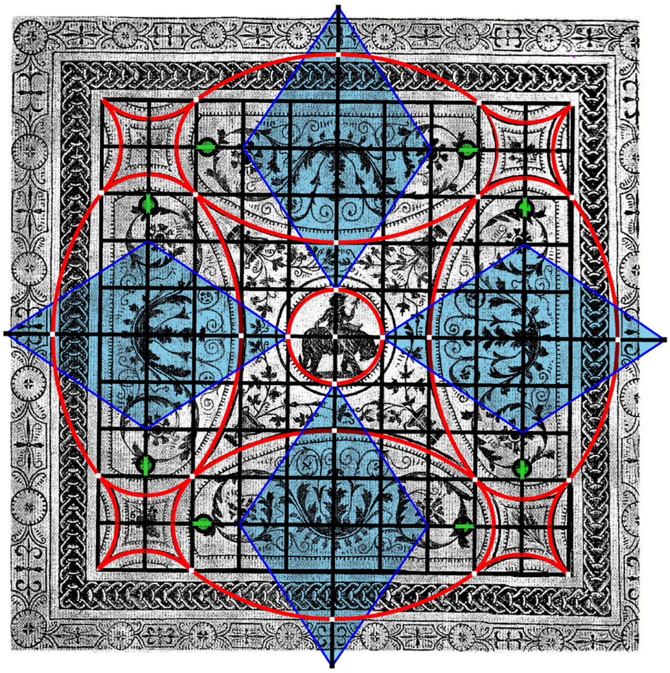
2. First Example. Child Dionysus Mosaic (Thysdrus, Tunisia)

To illustrate and justify the above assumption, let us consider the Child Dionysus mosaic of Thysdrus, dated to the reign of Antoninus Pius (Fig. 2 A), and show that the elongated curved shapes surrounding the central figurative subject are parts of ovals. Preliminary research undertaken with the help of a geometry software led to make the hypothesis that the entire square panel is built on a grid obtained by dividing its sides into 10. This is confirmed by the fact that each one of the large curves passes through 5 knots of the grid, making its drawing quite easy. Assuming that these curves, which can easily be completed by symmetry (Fig. 2 B), are ovals, one notices that the vertices of their source lozenges (in blue on the figure) are also located on knots of the net. If now one assumes that these curves are ellipses, one can see that their foci (in green) are not located on specific points related to the net. This strengthens both the relevancy of the grid for the setting up of the decor and the curves being most probably parts of ovals, not ellipses. This assumption is reinforced by the curves being outlined by two parallel lines (see above).

Figure 2 A
Thysdrus (Child Dionysus). Geometry of the panel (proposal). General view (Yacoub 1995: fig. 9).

Figure 2 B
Thysdrus (Child Dionysus). Geometry of the panel (proposal). Ellipses vs ovals.





3. Second Example. Orpheus and Arion Mosaic (La Chebba, Tunisia)

This mosaic from the third century AD (Fig. 3) will be used as an introduction to the family of decors which are the subject of this article. It is displayed in Tunis, in the Bardo museum, and its measures are about 4.0 m by 3.4 m (not including the borders). Its decor can be described as "*outlined grid-pattern of adjacent cushions and recumbent [ovals], adjacent (the cushions at the intersections), forming irregular concave octagons*" (from Décor I: pl. 253f).

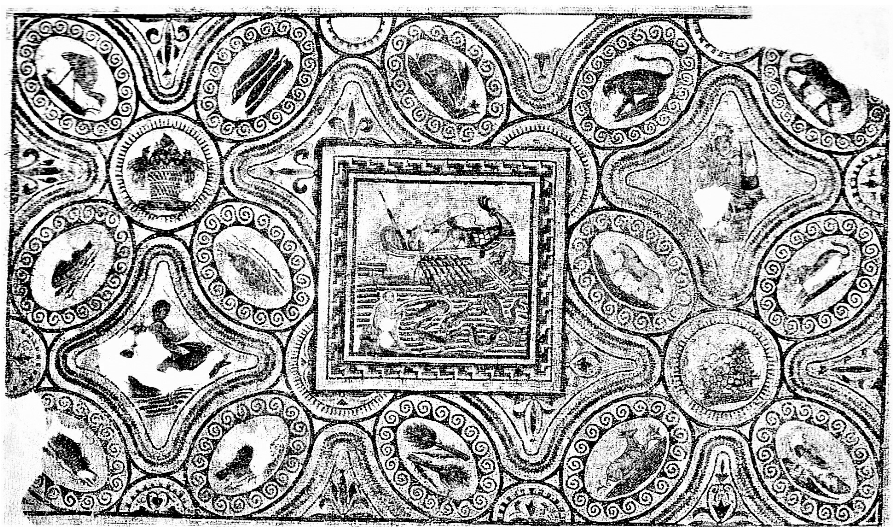


Figure 3
La Chebba. Orpheus and Arion mosaic (Yacoub 1995: fig. 60).

3.1. Grid of Bands

This mosaic appears to be built on a grid of bands, the length of the broader bands being twice that of the narrower ones (Fig. 4). More precisely, the grid is based on a unit subdividing the length of the field into 14 and its width into 8. By the way we can notice that the central scene is perfectly inserted into this grid, since it is inscribed in a square, the side of which is 4 units. This corroborates the fact that this figurative scene was most probably set up together with the rest of the decor, thus strengthening Picard's assumption refuting Gauckler's idea that the central scene was "*an addition subsequent to the rest of the pavement*"[3] (Picard 1968: 120).

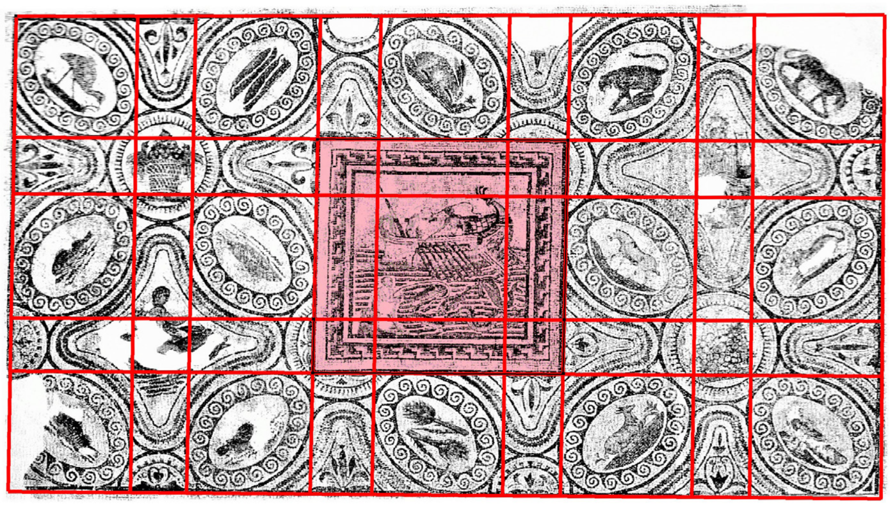


Figure 4
La Chebba. Grid of bands.

This type of decor constitutes the Kreissystem VII as defined by Salies: "*On the whole the pattern rests on a sequence of [concave octagons] set along diagonals, constituting the basic elements of the decor. But in the intervals there are not circles but ellipses*"[4] (Salies 1974: 17). Relying most certainly on the axes of the 'ellipses', she considers the structuring element of the pattern to be a diagonal grid of bands, each band including alternately concave octagons and ellipses.

3 My translation.

4 "*Das Gesamtbild des Schemas ist ebenfals durch die in der Diagonalen aufeinanderfolgenden sphärischen Quadrate bestimmt, die bei der Dekorierung als Haupfelder gelten. Dazwischen aber liegen statt der Kreise Ellipsen.*"

This general reference to a diagonal grid (Fig. 5 A) contradicts the above analysis of the pattern of La Chebba, but at least in this discussed case the overall pattern seems to be more in accordance with a longitudinal grid, if only for the knots of the diagonal grid and its intersections with the edges, which do not appear to be noticeable points (Fig. 5 B). Moreover, as we shall see, what we brought out about the structure of the ovals of the entire corpus reinforces the idea that the associated grids are not diagonal.

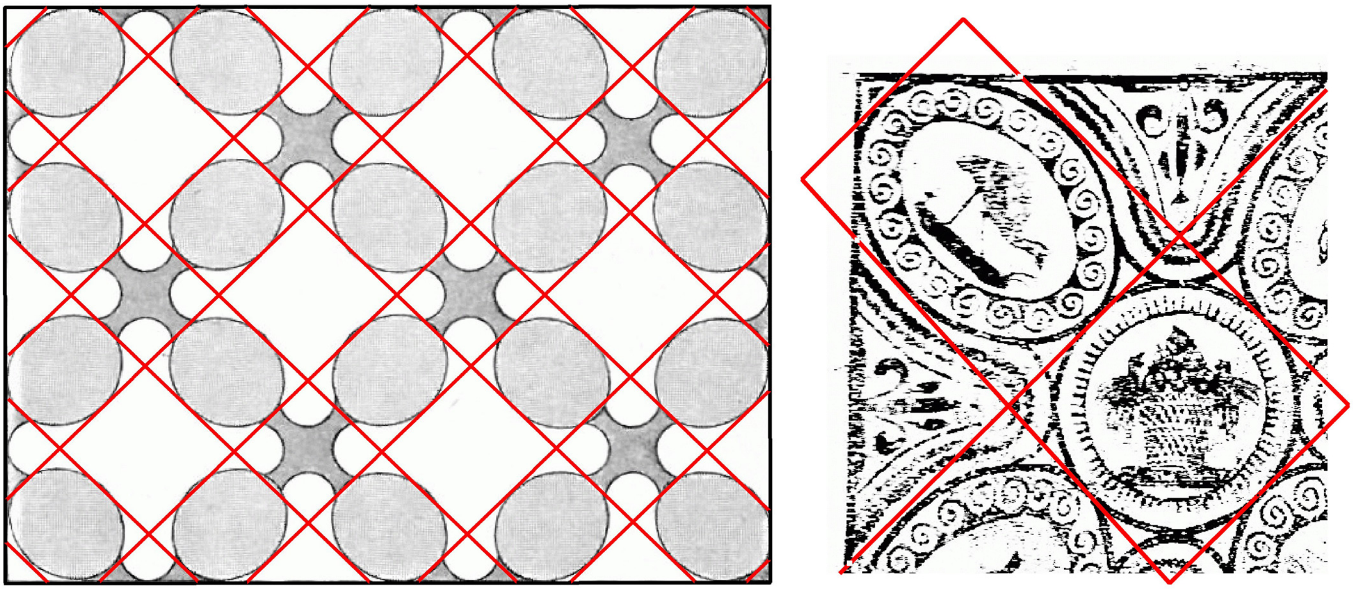


Figure 5 A
A diagonal grid for La Chebba?
From Salies 1974: 64 pl. IV.

Figure 5 B
A diagonal grid for La Chebba?
Adaptation to La Chebba.

3.2. Ovals

As seen above (Fig. 4), the grid of bands, except for the central part, includes 14 large squares, an oval being inscribed in each of them.

N.B. The inscription in a square implies that the axes of the source lozenge are the diagonals of the square.

All the ovals are identical. We have undertaken experimentally to determine their characteristic elements, the conclusion being that the contact points of the inscribed oval with the square were located at the third on each side (Fig. 6 A). This led us to subdivide the square into 3×3 smaller squares (Fig. 6 B). Then, looking for the centers of the circles constituting the oval, we found that the source lozenge was in fact the central square of this 3×3 grid (Fig. 6 C). In other words, the vertices of the source lozenge are the points dividing the diagonals of the square into three equal parts[5]. (Fig. 6 D).

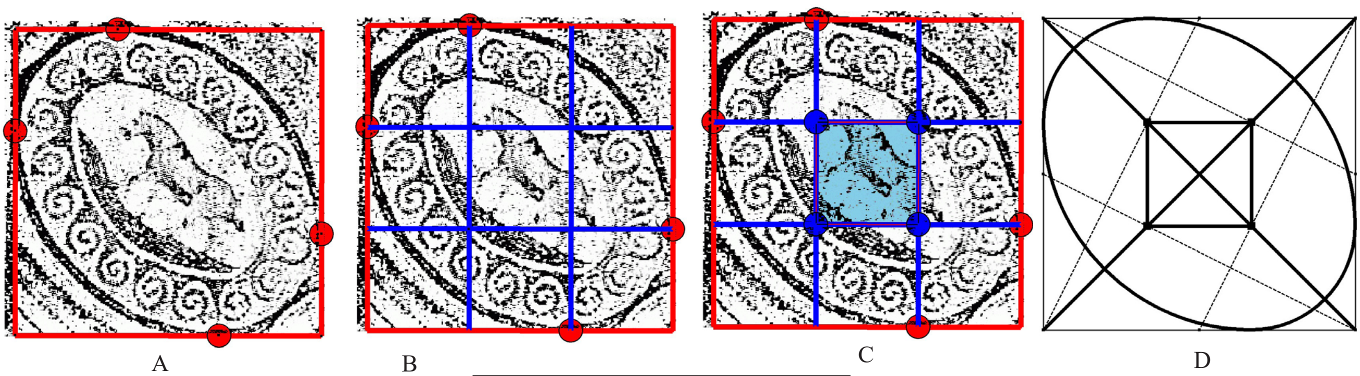


Figure 6
La Chebba. Determining the source lozenge of an oval (in blue).

5 Finding these points is quite easy (see fig. 6D), and most mosaicists certainly knew this construction.

3.3. Cushions and Bells

The overall decor of La Chebba is an alternance of two different square motifs, partially overlapping. They both have four ovals in their corners: one of them includes a central 'cushion' and the other one four lateral 'bells' (Fig. 7). They can be considered dual of each other, since any one of them can be deduced from the other.

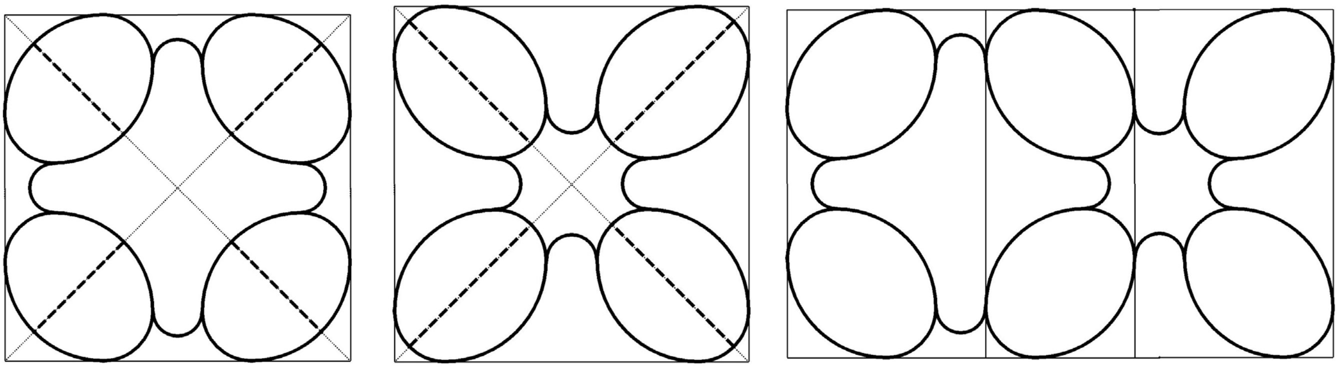


Figure 7A
La Chebba. The two dual square motifs. 'Cushion' square.

Figure 7B
La Chebba. The two dual square motifs. 'Bell' square.

Figure 7C
La Chebba. The two dual square motifs. 'Cushion' + 'bell'.

4. Generalization

4.1. Ovals

General case

Ovals identical to those of La Chebba are by far the most widespread in our corpus (20 items on 24). Let us recall that such an oval is characterized by two elements:

- it is inscribed in a square belonging to the net from which the entire panel is built;
- its source lozenge is a square, the vertices of which are located at the thirds on the diagonals of the circumscribed square (Fig. 8).

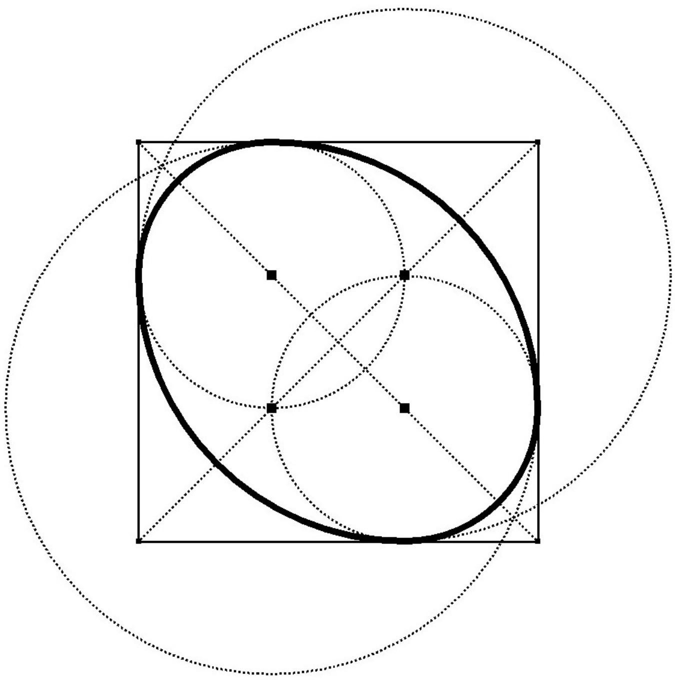


Figure 8
La Chebba. Construction of the ovals (proposal).

N.B. Figure 6 D can be considered a 'key diagram' of the oval (Parzysz 2009), *i.e.* implicitly showing how it can be constructed in a square.

As seen above with the mosaic of Thysdrus, the ovals may sometimes be incomplete, but nevertheless recognizable as such. This is namely the case for a mosaic of Timgad, in which the ovals show only their larger arcs, the smaller ones 'vanishing', so to speak, within an exuberant vegetal decoration (Fig. 9).

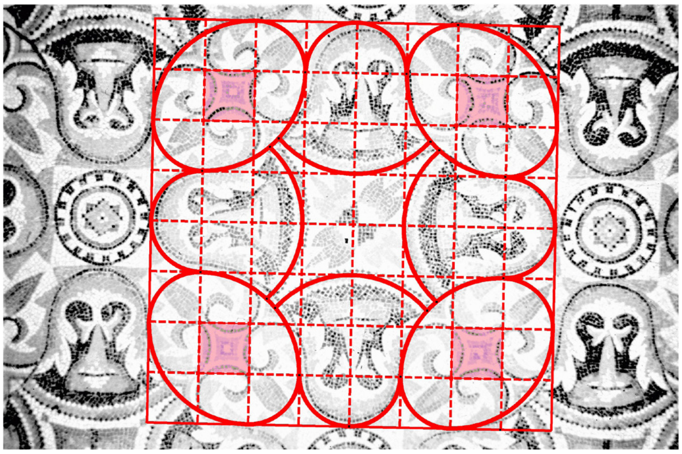


Figure 9A
Timgad. Connection with the studied corpus.
Photo: A.A. Malek.

Figure 9B
Timgad. Connection with the studied corpus.
Superimposition of the model.

Particular Cases

A rectangle (possibly square) being given, let us now notice that, in spite of this, the inscribed oval is not determined. For instance, on Figure 10 the blue and red ovals (respectively associated with the blue and red source lozenges) are both ‒among an infinity of others‒ inscribed in a same rectangle.

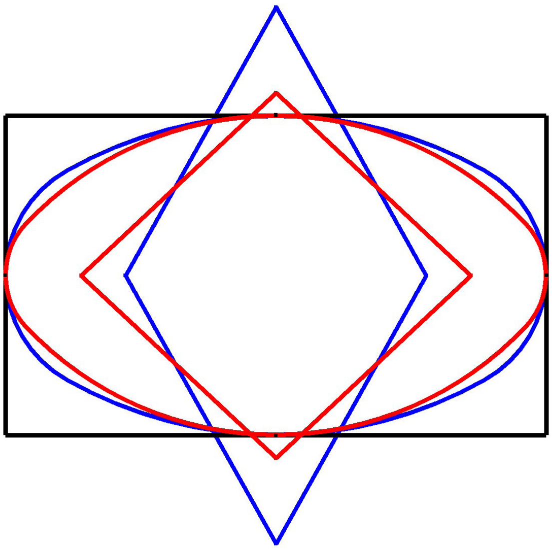


Figure 10
Two ovals inscribed in a same rectangle.

In fact, although inscribed in squares, the ovals of two of the elements of our corpus are obviously of a different type, since they are visibly thinner. One of these two pavements comes from Volubilis, Morocco, and the other from Thuburbo Majus, Tunisia.

Preliminary tests on several ovals of the Labours of Hercules mosaic (Volubilis) showed that the vertices of their source squares were most probably located, not at the thirds of the diagonals, but at the fourths[6] (Fig. 11).

6 This, joined to the fact that the width of the narrower bands of the grid is half that of the broader ones, suggests for the entire panel an overall 22×22 square grid.

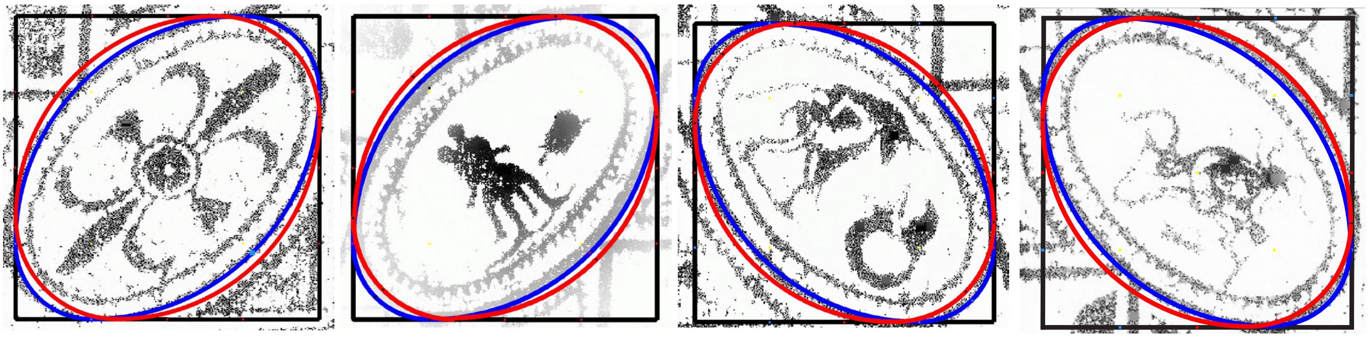


Figure 11
Volubilis. Search for the shape of the ovals (photos from Thouvenot 1948: pl. 11) (red = vertices located at the thirds of the diagonals; blue = vertices located at the fourths).

A similar study undertaken on the ovals of the Bound Animals mosaic pavement (Thuburbo Majus), dated to the first half of the third century AD, led to suggest −with reservation− a different construction process, in which (Fig. 12):

- the smaller arcs would belong to circles inscribed in the triangles bounded by a diagonal
- the larger arcs would belong to circles centered at points located at the sixth of this same diagonal.

N.B. Contrary to all the other mosaics of the corpus, in this last case the source lozenge would not be a square.

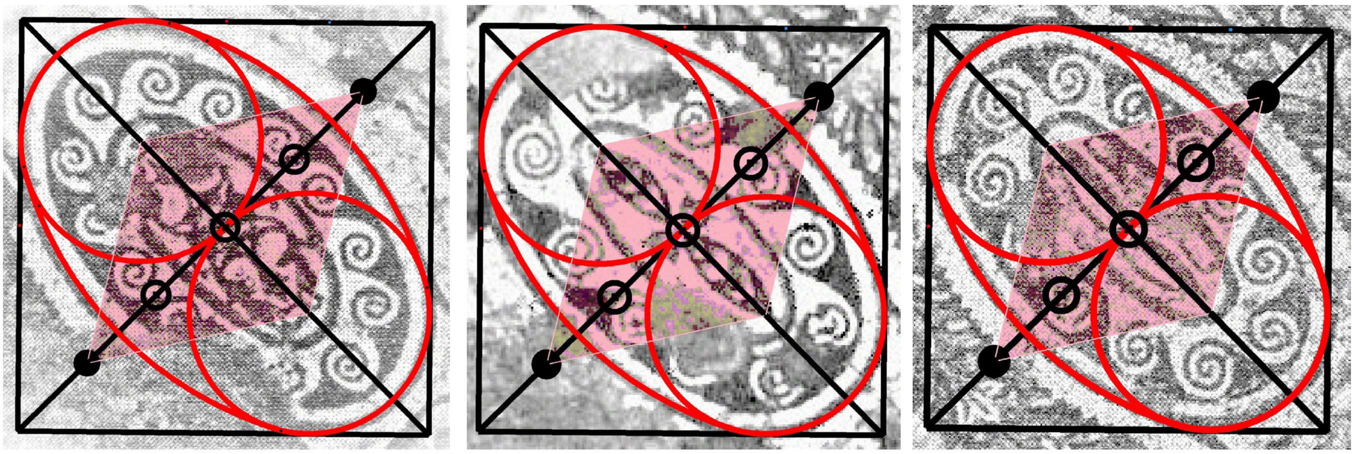


Figure 12
Thuburbo Majus. Superimposition of the model to three ovals (photo from Alexander − Ennaïfer 1980: n° 81).

At any rate, we can conclude from the study of this corpus that the ovals of a given mosaic, on the one hand are obviously not the result of freehand drawing, and on the other hand, except for one case−Thuburbo Majus− are the result of a same simple precise process, which may change from one mosaic to another but is nevertheless well defined for each of them. The source lozenge is a square homothetic to the circumscribed square, and for the *pictor* the only remaining question is to decide about the location of its vertices on the diagonals.

A particular case of this process has been particularly successful: the one observed at La Chebba, the construction of which is illustrated on Figure 6. In some cases the mosaicist modified this prototype by locating the vertices of the guiding square at other places than the thirds of the diagonals, but nevertheless the same for all (*e.g.* Volubilis). This resulted in changing the shape of the ovals; more precisely, nearer were the vertices from the extremities of the diagonals and thinner was the oval (Fig. 13).

On the contrary, the mosaicist could implement a more general process by using any lozenge as source instead of a square, but this seems to have been uncommon (Thuburbo Majus, Bulla Regia).

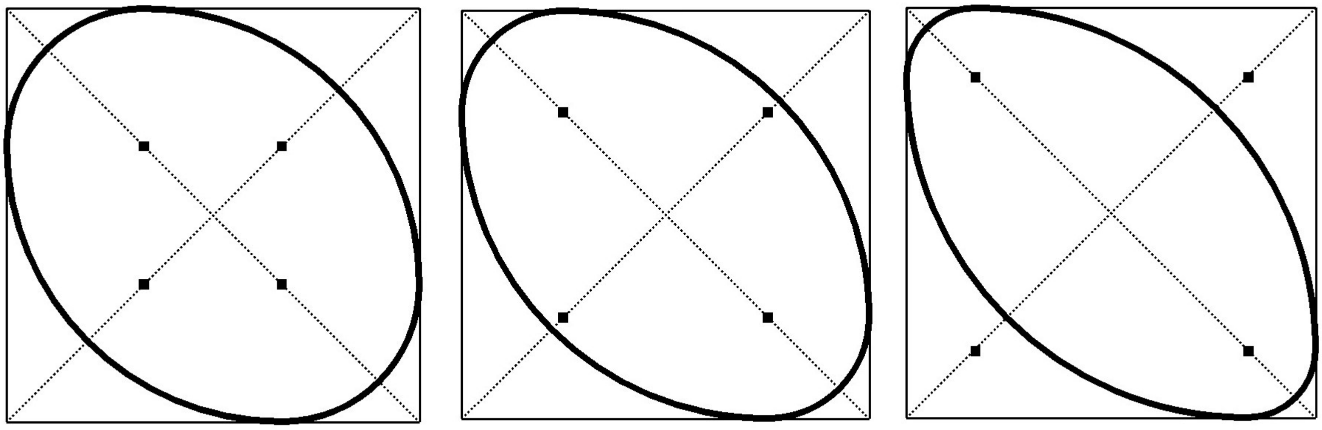


Figure 13
Shape of the oval, according to the location of the centers on the diagonals.

4.2. Grid of Bands

As said above, a grid of bands is determined by the ratio between the narrower and the broader bands. This ratio is variable for the mosaics of our corpus; for instance, in La Chebba (Fig. 4) the width of the narrower bands is half that of the broader ones, whereas in Timgad (Fig. 8 B) it is two-thirds, and for the House of the Fancy Dress Banquet (Thysdrus) it is only one-third.

In fact, two among these three ratios are by far the most frequent: in the corpus, we have 7 items with 1/2, 7 items with 2/3. Moreover, five other pavements can be added to them:

- 3 for which the ratio is 1/3 (Althiburos and Thysdrus, Tunisia; Loano, Italy).
- 2 for which the ratio is 1/1 (Nîmes, France and Trier, Germany). In this last case, the grid of bands is in fact a regular square net.

In the last five mosaics the ratio is null, or nearly, meaning that the narrower bands nearly, or even completely, disappear. This is namely the case in Rome, with the most frequent type of ovals (Fig. 14).

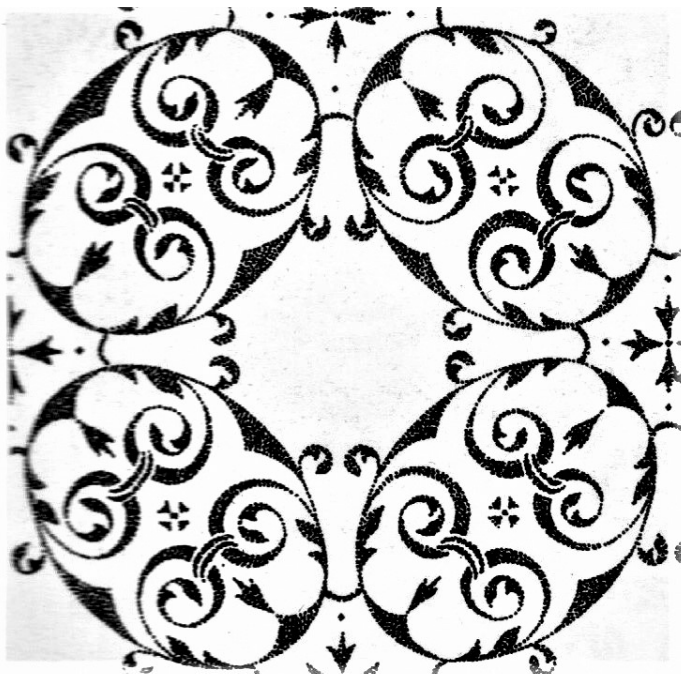


Figure 14A
Rome. Nearly adjacent ovals (Balmelle et al. 1985 : pl. 253d).

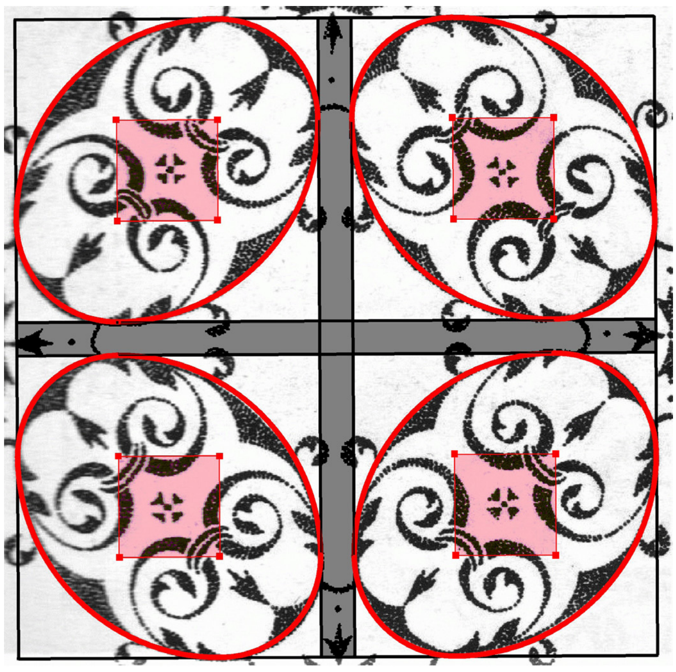


Figure 14B
Rome. Nearly adjacent ovals. Superimposition of the model.

To end with, let us notice that the choice of 1/3 or 2/3 as a ratio (10 items) made it possible to get all the guiding lines and points on a single square net, a possible reason for their relative success.

4.3. Cushions

Both the ratio between the bands of the grid and the type of ovals have of course an influence on the shape of the cushions. A third significant element is the arc of circle joining two neighboring ovals, since the cushion will be broader or narrower according to its position. Namely, this arc can either be in contact with the edges of the square circumscribing the motif (7 items) or be located inside (13 items). The center of the circle supporting this arc is most often situated, either in the middle of the segment joining the nearest points of two neighboring ovals, or at the center of a rectangle of the grid of bands.

N.B. When the ovals are adjacent, the cushions are reduced to 'concave squares'.

5. Related Patterns. In Search of Possible Origins

The decors of this family can be paralleled with similar compositions including circles instead of ovals, according to "*a scheme mostly frequent in Europe, where it appears as soon as the beginning of the second century*"[7] (Picard 1968: 121). Examples of this scheme can be found in Thysdrus itself, dated to AD 222-235 (Picard 1968: fig. 17) and in Saint-Émilion, France, dated to the fourth or fifth century AD (Balmelle et al. 1999: pl. CCXXXVII/2). The similarity is even more obvious between a mosaic from Bologna, Italy, and another one from Trier, Germany (ca AD 250), both built on a square 3×3 grid (Fig. 15).

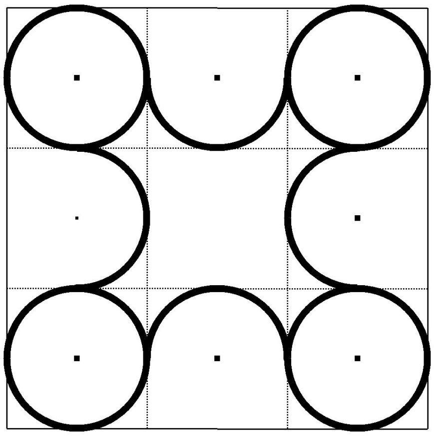
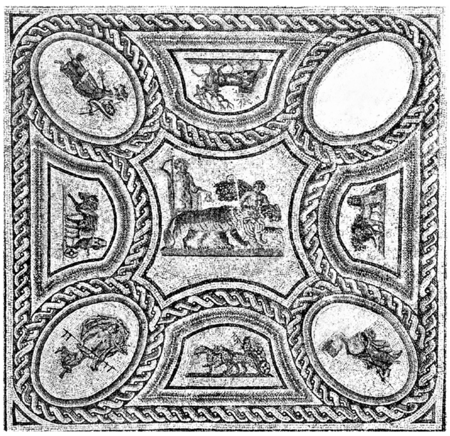


Figure 15A
From circle to oval.
Bologna (Blake 1936: fig. 19).

Figure 15B
From circle to oval.
Theoretical pattern (proposal).



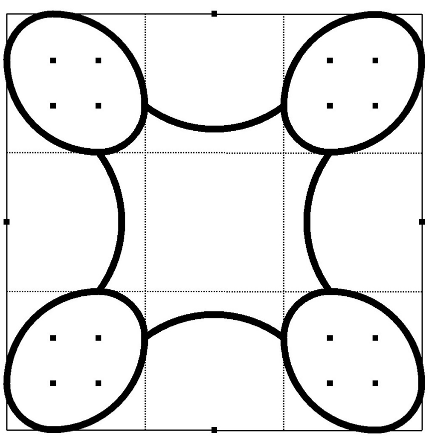


Figure 15C
From circle to oval.
Trier (Hoffmann et al. 1999: pl. 88).

Figure 15D
From circle to oval.
Theoretical pattern (proposal).

7 My translation.

Going even a little beyond, one can also discern a similarity between the pattern of Bologna and one from Thysdrus (Fig. 16 A). In the proposed model of this pattern (Fig. 16 B, C) the ratio between the bands of the grid is 2/3 and there are straight lines in place of the arcs of the cushions. Consequently, we find "*trapezoids with two concave sides*" (Décor II: pl. 358b) instead of bells.

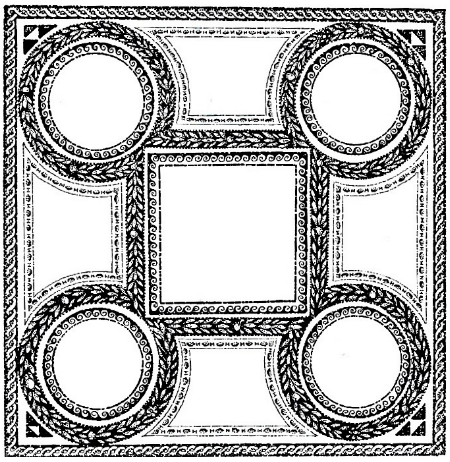


Figure 16A
Related pattern from Thysdrus.
(Décor II: pl. 358b).

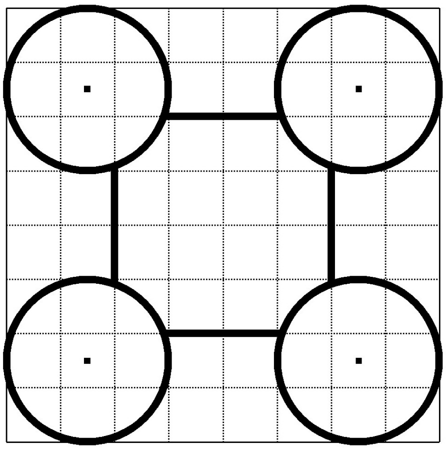


Figure 16B
Related pattern from Thysdrus.
Theoretical model (proposal).

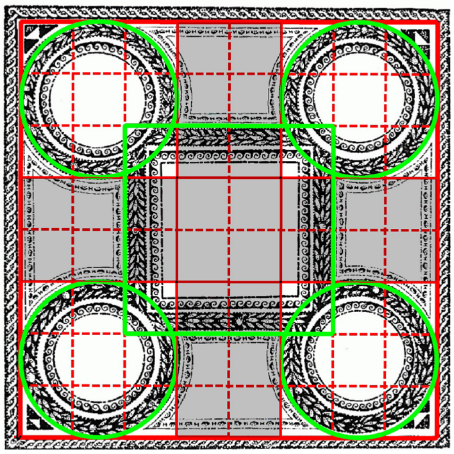


Figure 16C
Related pattern from Thysdrus.
Superimposition.

A pavement from Apollonia, Albania, shows a pattern quite similar to the one in Bologna, not as a single pattern but featuring on an orthogonal composition (Fig. 17 A). Should some circles be replaced with ovals, this decor would belong to our family: it would be similar to that of the mosaic of Nîmes[8], but with no figural scenes and slightly different intermediate arcs (Fig. 17 B).

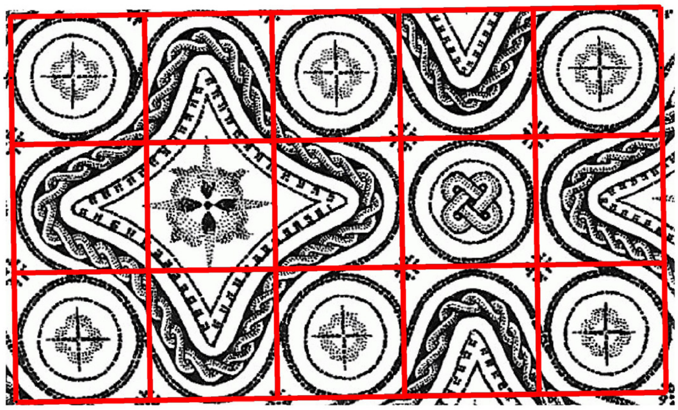


Figure 17A
Ovals vs. circles.
Apollonia (from Décor I: pl. 253 g).

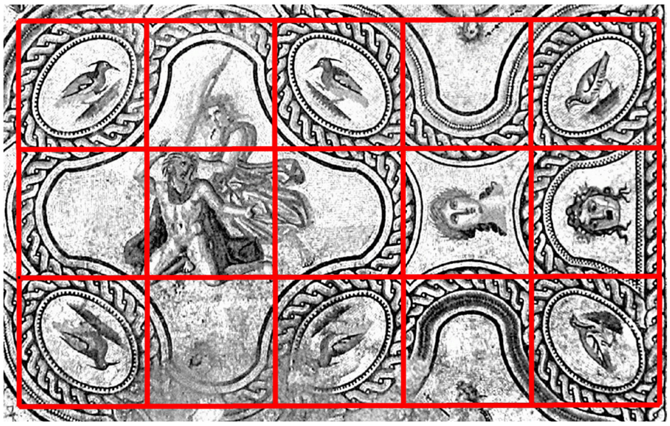


Figure 17B
Ovals vs. circles.
Nîmes (from Parzysz 2009: fig. 1).

Nevertheless, although being real, these formal similarities do not imply any filiation between the pavements.

Besides, could the idea of a shift from circles to ovals have emerged from a comparison with the shape of amphitheaters? In both cases there was indeed a need for obtaining equidistant parallel curves: rows of seats in the case of public monuments, borders (guilloche and others) in the case of mosaic. But for amphitheaters the starting point was an open tract of land, generally a rectangle, the axes of which were the same as those of the intended curve. This –as we have seen– is not the case with mosaic decors, for which the starting point was a square.

In mosaic the original idea (When? Where?) might have been a wish for introducing another shape, more attractive and multipurpose than the 'banal'

8 The study of this mosaic, and namely its 'ellipses', was the starting point of the present study.

circle. Hence the idea of introducing in a mosaic decor an elongated curved shape. Nevertheless, inscribing an oval in a square instead of a rectangle, and using a guiding square instead of a lozenge, seems to have been an original idea of mosaicists, in contrast to amphitheaters, in which the guiding lozenge was frequently made of four joined 'Egyptian' triangles (Golvin 2008; Parzysz 2008). For the moment this is still an open question.

6. Conclusions

1- A first conclusion which can be drawn from this study is that the so-called 'ellipses' included in the decors of this family – and most certainly in others– are actually four-centered ovals, *i.e.* sets of four arcs of circles connected with one another, the centers of the circles being the vertices of a 'source' lozenge. Besides, this is confirmed by the commonness of equidistant parallel curves included in borders (Figs. 4, 12) and by a much better integration in the general composition (Fig. 2 B). In the specific case of the family here studied, the ovals are inscribed in a square and the source lozenge is a smaller homothetic square (22 items on 24), the vertices of which are located on the diagonals of the larger square, most often at the thirds (21 items). Anyway, since the official term for these curves is 'ellipse', let us go on with this name, although remembering that they are in fact ovals.

2- A second conclusion is that the squares containing the ovals are the larger squares of a grid of bands for which the ratio between the widths of the narrower and broader bands is very simple, most frequently 1/2, 1/3, 2/3, 1 (19 items overall).

3- A third conclusion can also be proposed, related to the implementation of this type of pattern. We assume it likely to take place according to four successive stages, once the surface assigned to the mosaic is identified:

> 1° Setting up a grid of bands in which the widths of the narrower and broader bands are in a simple ratio.
>
> 2° Constructing the ovals in the larger squares of the grid, with a homothetic source square.
>
> 3° Setting up the cushions (and, consequently, the bells) as arcs of circles connecting neighboring ovals.
>
> 4° Carrying out ornamental motifs (geometrical, vegetal or figural).

4- Another conclusion is that 'cushion' and 'bell' squares are almost always associated in a 'natural way' to form a composition (Fig. 18), except for two cases in which they are found isolated: Bulla Regia (cushion square) and Trier (bell square, Fig. 15 C).

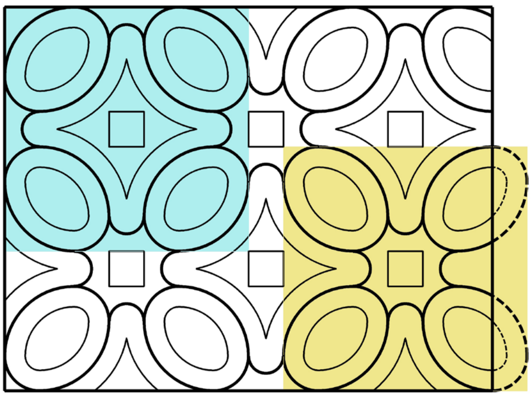
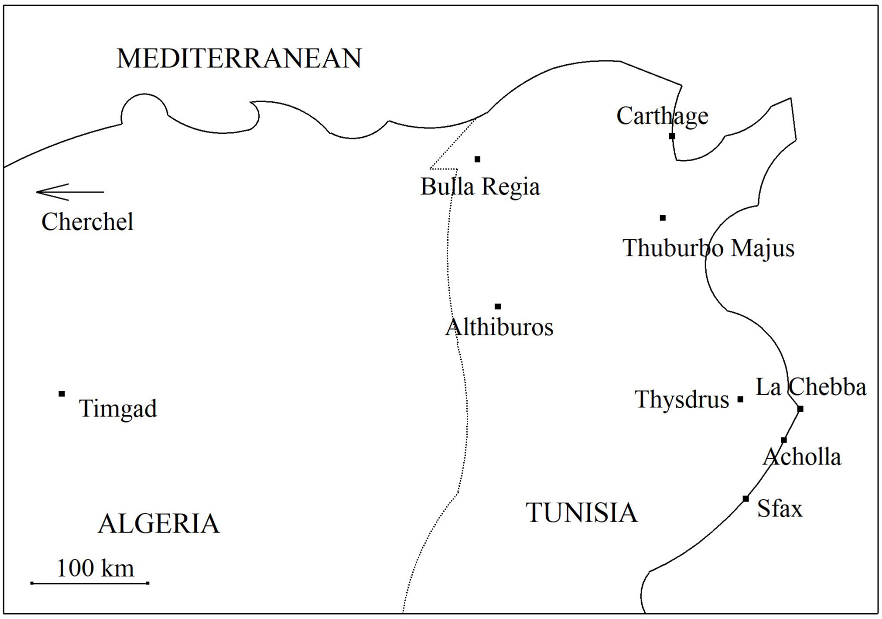


Figure 18
Althiburos. Theoretical scheme (blue = 'cushion' square, yellow = 'bell' square).

5- From a geographic point of view, the Annex shows that all the mosaics belonging to this family are restricted to the Western part of the Mediterranean basin, with an obvious concentration (14 items) in Tunisia (Fig. 19), the latter constituting Picard's "*Byzacenian series*" (Picard 1968: 117). All the pavements date from the second century to the end of the fourth century AD, this span of time being even attested on a single site like Thysdrus (most represented site in our corpus).

Figure 19
Locations of the Tunisian and Algerian sites.



A structural link (oval + cushion + bell) between the mosaics of the corpus having thus been established, it would now possibly be of some interest that specialists of ornamental design could establish stylistic links between some of them, with the aim of identifying the existence and locations of possible workshops in this area, thus extending the results of earlier research (Picard 1968; Dunbabin 1978; Corpus Tunisie II/1, Corpus Tunisie III,1; etc.).

Bibliography – Kaynaklar

Balmelle et al. 1999 — C. Balmelle - M. Blanchard-Lemée - J.-P. Darmon - H. Lavagne, « Nouveaux apports à la connaissance de la mosaïque gallo-romaine », CMGR VII, 627-637.

Blake 1936 — M. E. Blake, "Roman Mosaics of the Second Century in Italy", MemAmAc XIII, 67-214.

Blazquez – Mezquiriz 1985 — J. M. Blazquez - M. A. Mezquiriz, Mosaicos romanos de Navarra, Madrid.

Corpus Tunisie II/1 — M. A. Alexander – A. Ben Abed (coll. S. Besrour-Ben Mansour, D. Soren et alii), Corpus des Mosaïques de Tunisie, II/1, Thuburbo Majus, Tunis, 1980-1994 (4 vol.).

Corpus Tunisie III, 1 — C. Duliére - H. Slim (coll. M. A. Alexander - S. Otrow - J. G. Pedley, D. Soren), Corpus des mosaïques de Tunisie, III, El Jem, 1, Tunis, 1996.

Corpus Tunisie IV, 1 — A. Ben Abed - M. Alexander et alii, Corpus des mosaïques de Tunisie, IV, Carthage, 1, Tunis, 2000.

Décor I — C. Balmelle - M. Blanchard Lemée - J. Christophe - J.-P. Darmon - A.-M. Guimier Sorbets - H. Lavagne - R. Prudhomme - H. Stern, Le Décor géométrique de la mosaïque romaine I, Paris, 1985.

Décor II — C. Balmelle - M. Blanchard-Lemée - J.- P. Darmon - S. Gozlan - M. P. Raynaud, Le Décor géométrique de la mosaïque romaine II, Paris, 2002.

Dunbabin 1978 — K. M. D. Dunbabin, The Mosaics of Roman North Africa, Oxford.

Golvin 2008 — J.-C. Golvin, « L'architecture romaine et ses créateurs, in Rome », Le Point (HS), 92-101.

Grazian 2017 — A. Grazian. « Disegni inediti di pavimenti antichi da Villa Casali sul Celio », AISCOM 22, 413-424.

Hoffmann et al. 1999 — P. Hoffmann - J. Hupe - K. Goethert, Römische Mosaik aus Trier, Trier.

Parzysz 2008 — B. Parzysz, « Des ellipses… sans ellipses: les amphithéâtres romains », Bulletin de l'Association des Professeurs de Mathématiques de l'Enseignement Public 479, 772-780.

Parzysz 2009 — B. Parzysz, "B. Key diagrams to design and construct Roman geometric mosaics?", Nexus Network Journal 11-2, 273-288.

Parzysz 2012a — B. Parzysz, "Une grande famille de décors géométriques", M. Şahin (ed.), 11th International Colloquium on Ancient Mosaics, Bursa, 735-748.

Parzysz 2012b — B. Parzysz, « La géométrie de la mosaïque de Penthée (Nîmes) », Bulletin de l'Association des Professeurs de Mathématiques de l'Enseignement Public 500, 420-428.

Picard 1968 — G. C. Picard, « Les thermes du Thiase marin à Acholla », AntAfr 2, 95-151.

Salies 1974 — G. Salies, Untersuchungen zu den geometrischen Gliederungsschemata römischer Mosaiken, Kevelaer.

Stern 1979 — H. Stern, Recueil des mosaïques de la Gaule. Volume I, Gaule Belgique, Paris.

Thouvenot 1948 — R. Thouvenot, « La maison aux Travaux d'Hercule », Publications du Service des Antiquités du Maroc, fascicule 8, 69-108.

Yacoub 1995 — M. Yacoub, Splendeurs des mosaïques de Tunisie, Tunis.

Annex. Corpus of mosaic pavements

Coding: Grid of bands: *a/b* = width of the narrower bands / width of the broader bands

Oval: *n/p* = one diagonal of the source lozenge is divided into *n* parts, the other into *p*

Cushion: T = arcs tangent to the circumscribed square, I = arcs inside the square

N°	Site	Mosaic	Reference	Date AD	Bands	Oval	Cushion
1	Acholla (T)	Neptune	Picard 1968 : fig. 14	160-170	1/2	3/3	I
2	Acholla (T)	Marine Thiasos	Picard 1968 : fig. 12	*ca* 130	1/2	3/3	I
3	Althiburos (T)	Navigation	Picard 1968 : fig. 18	b. 4th c.	1/3	3/3	I
4	Bazoches (F)		Stern 1979 : n° 75	200-250	2/3	3/3	T
5	Carthage (T)	Triconch	Alexander-Ennaïfer 1999: n° 95 pl. 32		0	4/4	–
6	Cherchel (A)	Minerva	Décor I: pl. 253c	3rd c.	≈0	3/3	I
7	La Chebba (T)	Orpheus&Arion	Picard 1968 : fig. 22	3rd c.	1/2	3/3	I
8	Liedena (E)		Blazquez-Mezquiriz 1985 : n° 18	2nd c.	1/2	3/3	T
9	Loano (I)		Picard 1968 : fig. 22	b. 3rd c.	1/3	3/3	I
10	Nîmes (F)	Pentheus	Parzysz 2012 : fig. 1	b. 3rd c.	1/1	3/3	T
11	Rome (I)		Blake 1936 : pl. 14	2nd c.	≈0	3/3	–
12	Rome (I)	Villa Casali	Grazian 2017 : 422	*ca.* 200	2/3	3/3	I
13	Sfax (T)	Oceans	Picard 1968 : fig. 20	3rd-4th c.	2/3	3/3	T
14	Thuburbo (T)	Bound animals	Alexander–Ennaïfer 1980 : n° 81	b. 3rd c.	1/2	X/6 *	I
15	Thuburbo (T)	Commons	Alexander–Ennaïfer 1980 : n° 322B	200-250	0	3/3	–
16	Thysdrus (T)	Banquet	Picard 1968 : fig. 19	3rd-4th c.	1/3	3/3	I
17	Thysdrus (T)	Ferjani Kacem	Picard 1968 : fig. 16	3rd c.	1/2	3/3	I
18	Thysdrus (T)	Isaona	Dunbabin 1978 : fig. 70	b. 4th c.	2/3	3/3	T
19	Thysdrus (T)	Procession	Picard 1968 : fig. 13	140-150	2/3	3/3	T
20	Thysdrus (T)	Sollertiana	Alexander–Ennaïfer 1996 : pl. 1	2nd c.	≈0	3/3	–
21	Thysdrus (T)	Tertulla	Picard 1968 : fig. 15	193-200	2/3	3/3	I
22	Timgad (A)		photo A.A. Malek	3rd c.	2/3	3/3	T
23	Trier (D)		Hoffmann et al. 1999 : n° 144	*ca* 250	1/1	3/3	I
24	Volubilis (M)	Hercules	Thouvenot 1948 : pl. 11	?	1/2	4/4	I

* With the assumption made in the body of the article, for this mosaic X = 2+√2 (≈3,4). In other words, the centers of the smaller arcs would be located somewhere between the third and the fourth on their diagonal of the square, the centers of the larger arcs being located at the sixth on their own diagonal.