

TRACES OF GEOMETRIC CONSTRUCTION ON THE SECOND CENTURY A.D. ROMAN CEILING COMPOSITION OF SZŐNY¹

At the time of the ancient Romans a major town called Brigetio lay at the site of the village Szőny, which has since blended into Komárom. Here, in the province of Pannonia on the bank of the river Danube, which at the same time was the border of the Empire, was the first fort established in the first century A.D. This was later replaced, during the reign of Traian (98–117) or Hadrian (117–138), by one of the four legions stationed in Pannonia.

About two kilometres west from the legionary fortress was the civic town. Modern archaeological excavation started in this area in 1992 under the leadership of Dr. László Borhy, senior lecturer at the Eötvös Loránd University of Sciences, Faculty of Ancient Archaeology and Emese Számadó director of Klapka György Museum in Komárom (*Fig. 1*). During the excavation in the market place of Szőny (Site: Komárom/Szőny–Vásártér), buildings of several rooms with stone foundation, timber structure, sun dried bricks and with floor and wall heating came to light. A small, approx. 3 × 4.3 square metres room in one of them was once richly decorated with wall paintings. But the building, which was carefully emptied then abandoned completely by its tenants around the middle of the third century, gradually collapsed. Owing to this the wall paintings from the end of the second or the beginning of the third century had fallen and were discovered smashed to pieces mixed with traces of sun dried bricks and roofing debris on the terrazzo floor.

The lifting out of all the fragments of the decoration of the room was finished in 1996, but the restoration, which started in 1994, is still going on.² The compiled, restored surface is currently the biggest, connected Roman wall painting in Hungary.

THE CONSTRUCTION AND MAIN MOTIVES OF THE CEILING COMPOSITION

Although the surface is still fragmental the connection between the structural elements of the ceiling composition can be reconstructed (*Fig. 2*). The vaulted ceiling of the approx. 12 square-meter room is decorated with a composition based on a centrally symmetric geometric system of blue and red strips. Figural depictions appear in the different fields (*Fig. 3*).

An animated scene of a rearing, harnessed horse held back by its bridle by a female figure (Andromeda and Pégasos?)³ is seen in front of a white background in the central circular composition, which is about 145 cm in diameter (*Fig. 4*). The red trimmed, green drapery thrown on the shoulder of the female figure is floating behind her naked upper body. It forms a contour as it encircles her chest and stomach, covering her groin with a knot tied below the stomach. While one wing of the drapery, starting

¹ E. HARSÁNYI-ZS. KUROVSZKY: Ókori geometrikus szerkesztés nyomai a szőnyi mennyezetfestményen [Traces of an antique geometric construction on the ceiling painting of Szőny]. In: L. BORHY: Pannoniai falfestmény [Wall painting of Pannonia]. Budapest 2001, 69–74.

² E. HARSÁNYI-ZS. KUROVSZKY: A feltárt töredékek összeállítás, restaurálása és bemutatása. A mennyezetfestmény készí-

téstechnikája [The assembling, restoration and presentation of the lifted out fragments. The technique of preparation of the ceiling painting] In: L. BORHY: Pannoniai falfestmény [Wall painting of Pannonia]. Budapest 2001, 93–100.

³ L. BORHY: Pannoniai falfestmény [Wall painting of Pannonia]. Budapest 2001, 80–82.

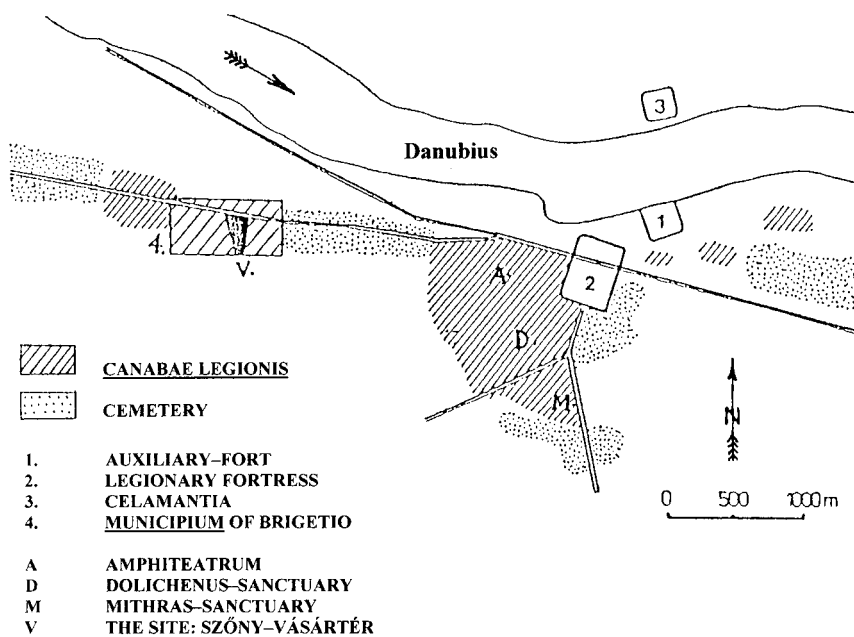


Fig. 1. Map of Brigetio

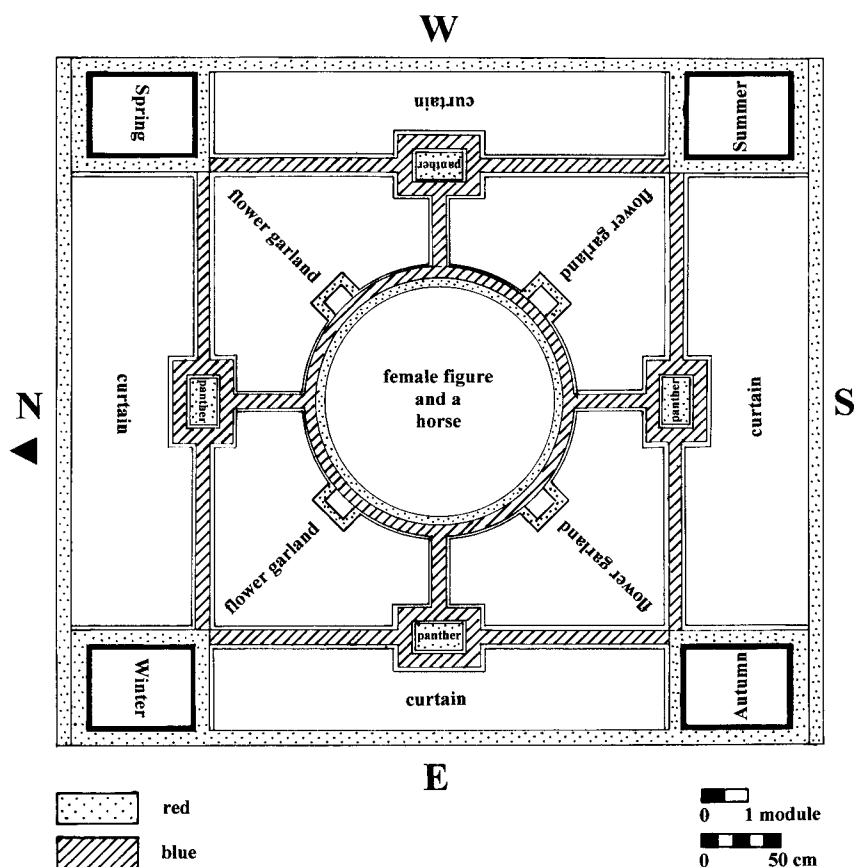


Fig. 2. The reconstruction of the ceiling painting. If we picture the composition on the ceiling the cardinal points fall into place

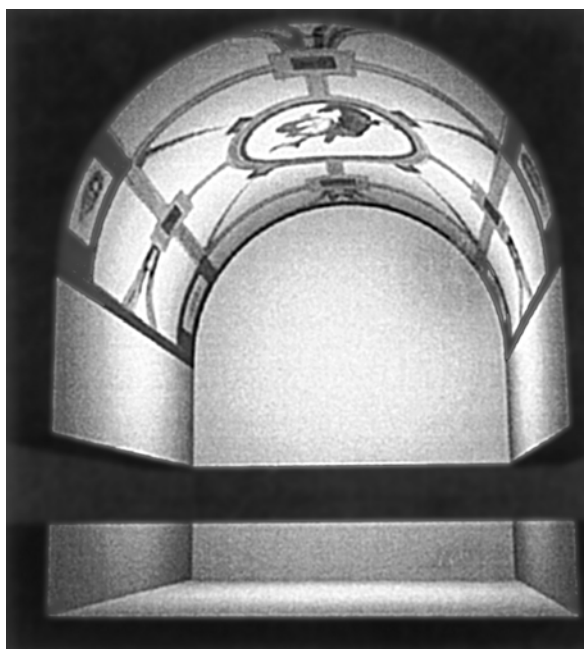


Fig. 3. Three dimensional representation of the ancient room
(Reconstruction by E. Harsányi-Zs. Kurovszky, computer-generated image by Z. Fuchs)

from the knot, runs down between the legs to the feet of the female figure, enhancing the contour of the right leg, the other wing of the drapery winds upward covering the groin of the horse. The artist depicted the head and the upper body of the female figure in profile, the hip and thigh slightly twisted and the right foot from the front. Her left leg is invisible under the drapery only her foot shows in profile. She turns her face towards the horse, her hair is in a bun. She has an earring in her ear, the shape of which is unidentifiable, perhaps made of pearls and has a curved bracelet, painted with light and dark ochre colours, on her right upper arm. The red-brown coloured horse galloping to the right, depicted in an unusual bottom-view, turns back its head towards the female figure, its left hoof and mane touches the wreath, which is black with scattered blue spots, that frames the circular composition. The wreath is encircled on the outside by a 4.5–5 cm wide red and a 7–7.5 cm wide blue strip, which is followed by a narrower 1–1.5 cm wide yellow-ochre strip and about 1–2 cm from this there is a 0.3–0.5 cm thick black line. The whole medallion is about 175 cm in diameter.

Four blue strips start from the blue arch that frames the scene and generate the perpendicular main axes of the composition directed to the middle points of the sides of the ceiling where they encircle the red, rectangular fields depicting the stepping panthers (*felina*) (Fig. 5). The yellow-ochre trim of the blue strips and the black line about 1–2 cm from it can be found only on the outside of the figural fields but on both sides of the others. The yellow-ochre trimmed blue strip and the black line continues from the two shorter sides of the fields depicting the panther forming a square frame parallel with the walls around the circle composition.

Flower garlands emerge from the stylised flower-cups in the corners of the blue square and follow the diagonals of the composition and gradually thinning join the ochre-red rectangles on the arch of the medallion. The master emphasised the spatiality of the flower garlands by using lighter and darker tones of the black base colour and differing colour intensity of the dotted rosette flower motives (around a central dot 5–6 similar sized and coloured dots). While the garlands of varied colours, bound by white ribbons and worked out in detail, have a plastic effect the geometric structure is depicted in plane.

Green curtains with red tassels start from the lower edge of the blue frames of the fields depicting a panther curving the ceiling into the side walls and opening up, stretch onto the red strips which indicate

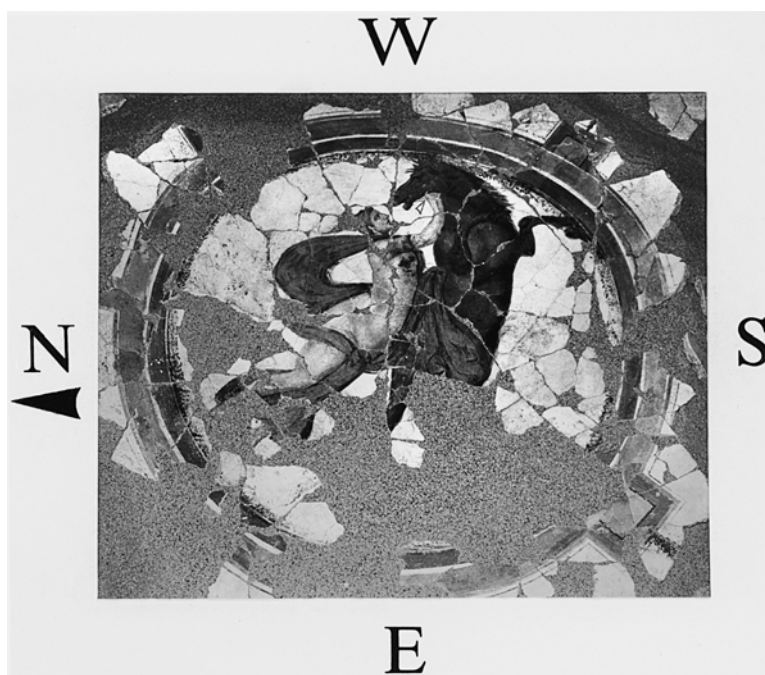


Fig. 4. Central medallion (Andromeda and Pégasos?). A wreath frames the circular composition encircled on the outside by a red and than a blue strip, followed by a narrower yellow-ochre strip and a black line. If we picture the composition on the ceiling the cardinal points fall into place



Fig. 5. Red rectangular field depicting a stepping panther encircled by yellow-ochre trimmed blue strip, on the eastern side of the ceiling



Fig. 6. Season personification in then northwestern corner of the ceiling: Spring



Fig. 7. Season personification in the southwestern corner of the ceiling: Summer



Fig. 8. Season personification in the southeastern corner of the ceiling: Autumn



Fig. 9. Season personification in the northeastern corner of the ceiling: Winter

the beginning of the side walls emphasising the building construction. In the longitudinal direction of the vaulted ceiling the strips are about 10 cm wide but along the curvature are only 3–4 cm.

Half-length portraits of the Four Seasons, with attributes of the different seasons on their heads, are shown in the corners of the ceiling on the red strip in rectangular fields, also trimmed with red and joining the square blue frame (Figs 6, 7, 8, 9).

ASSESSMENT AND ORIENTATION OF THE VAULTED CEILING⁴

From the arched surfaces of the fragments of the ceiling composition and from the ground plan of the room it was obvious that the painting decorated a ceiling and not a wall. After measuring the height of the arch it could be concluded that the room had a vaulted ceiling the axis of which was in the same direction as the main axis of the horse composition. The vault is a regular semi-cylinder the radius of which is 142–145 cm (Fig. 3).

The system used at lifting out the wall painting fragments helped to determine the orientation of the vaulted ceiling, which was in an east-west direction. In the original ceiling composition the head of the female figure and the head of the horse was on the west side, the female figure facing south and the horse north (Fig. 4).

TRACES OF CONSTRUCTION OF THE COMPOSITION ON THE FRAGMENTS OF THE CEILING PICTURE

In the course of restoration, when cleaning the surfaces, certain straight and curved lines, sometimes crossing each other, kept appearing incised or pressed into the plaster. While their origin was unclear it was certain that they were not caused by damage to the painting and were not there by accident. Undoubtedly they were the traces of a work process prior to painting as they were under the layer of paint (Fig. 10).

Some marks were immediately identified as the traces of tools used for the preparatory drawing of different elements of the composition. Other than the small dent in the middle of the circle, such were the arcs incised in the plaster in the red and blue strips and at the edges of the strips that frame the figural composition (Fig. 11), and straight lines along the square blue frame and red strips, which indicate the direction and width of the parts to be painted. The characteristic pattern of the straight lines, suggesting a cord of two intertwining strands, was preserved imprinted into the still wet plaster (Fig. 12). It was somewhat of a problem that such imprints were detectable not only along the longitudinal direction of the vault but along the curvature as well. This clearly excludes the probability of using a cord to snap the straight lines, but the tool and its usage for marking them is yet unknown. Further on, however, after its appearance we will call this mark “cord imprint”.

Having compiled a large segment of the ceiling in the past few years it was possible for us, with the aid of raking light, to try to find all the possible marks and attempt to put any interconnection into a system. With the help of directed light, despite the roughness of the plaster and the thickness of the painted layer, the marks lightly pressed in the plaster became distinct one after the other having remained hidden so long in keeping with the original concept. At the northern edge of the ceiling, along the longitudinal direction of the vault on the assembled fragments of the red strip, we found seven, repeatedly appearing short incisions at equal distances intersecting the „cord imprint” in the red strip. The measured distance between the intersections was mostly 29 cm (Fig. 13). (The shortest distance measured is 28.8 cm and the longest is 29.1 cm.)

⁴ E. HARSÁNYI-ZS. KUROVSZKY: Beszámoló a Komárom/Szőny-Vásártéren feltárt mennyezetfestmény restaurálásáról [Report about the restoration of a wall painting excavated at Komárom/Szőny market place (Site: Komárom/Szőny-Vásártér)] (Bericht über die Restaurierung des in Brigetio (FO: Komárom/Szőny-Vásártér) freigelegten Deckengemäldes). Acta Ar-

chaeologica Brigetionensia 1 (2000) 107–115; L. BORHY-E. HARSÁNYI-ZS. KUROVSZKY: A Komárom/Szőny Vásártéren feltárt falfestménytöredékek 1994–1999 (Fragments of wall paintings of a room excavated at Komárom/Szőny Market place, 1994–1999). In: S. Palágyi (ed.): A kiemelésről a bemutatásig (De la fouille à la présentation). Veszprém 1999–2000, 129–142.



Fig. 10. Two intersecting arcs on the bottom blue border of the south field with the panther

Taking this length as the basis for charting the system of the marks, we found the complete system of co-ordinates necessary for the measurement of the composition. The incisions appeared one by one, 29 cm apart on the “cord imprints” of the co-ordinate axes, on the “cord imprint” marking the north edge of the ceiling in the red strip in a longitudinal direction, and in a vertical direction in the middle. Upon examining the direction and swing of the incisions it could be concluded that they were measured with the aid of a 29 cm measuring rod. This 29 cm unit of measurement is further referred to as a “module”.

The explanation for the length of the scale used on the ceiling of Brigetio is most likely that one fifteenth of the length of the north and south plastered walls was taken as a basis, because the length of the east and west walls are not the same. The difference is about 1 module, therefore the ground plan of the room is slightly trapezoid shaped. Choice of the scale based on the length of the north and south walls seems more expedient.

POSSIBLE STEPS OF CONSTRUCTING THE COMPOSITION ONTO THE CEILING

Based on the revealed marks we tried to establish the possible process of constructing the composition onto the ceiling. Besides the obvious main steps we mention only the construction of a few details where it was most obvious, most probable.

The first step, most likely, was the halving of the four, but at least two, sides of the ceiling, the east and the west, with the aid of a rope that was as long as the width of the wall and which was folded in half. The middle points under the lunettes were projected onto the east and west edges of the ceiling. (This middle point is visible on the white background between the two sides of the east green drapery.) (Fig. 14 a–b).



Fig. 11. Arcs incised in the plaster in the red and blue strips that frame the figural composition. Two of the imprints of the four constructed arches in the frame of the medallion mark the edges of the strips precisely, the inner edge of the red strip and the outer edge of the blue strip. The other two incisions are found within the strips marking no place of any painted compositional unit. It is possible that the three strips were originally designed wider or narrower, perhaps of different colours but for some reason they departed from the original plan

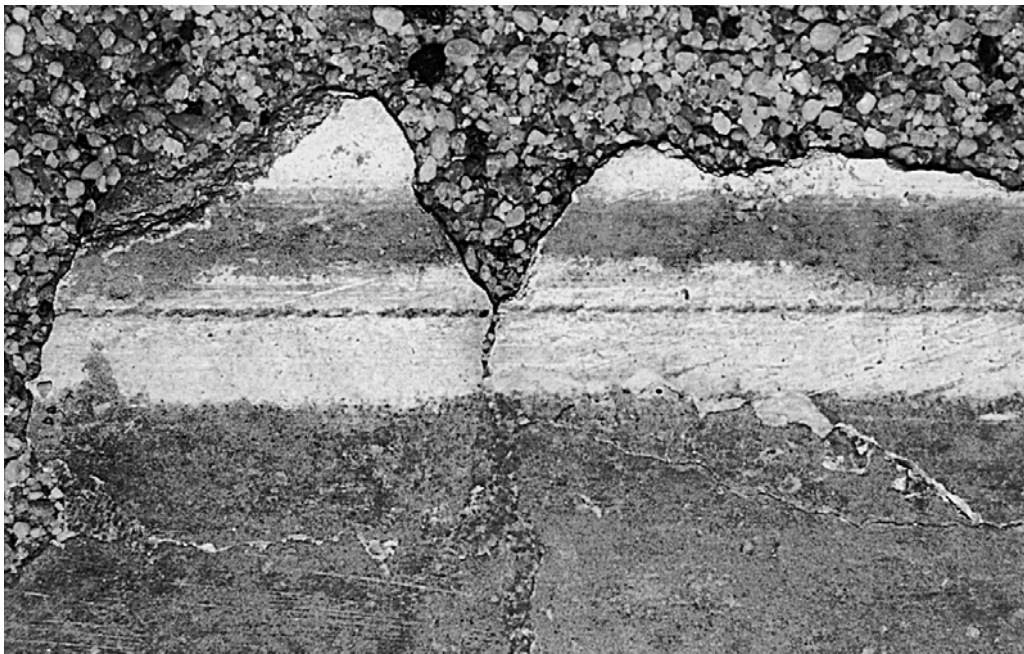


Fig. 12. "Cord imprint". The characteristic pattern of the tool used for marking the straight lines

Following this 8 modules were measured from the middle points in both directions, thus defining the bottom of the composition, on the north and south sides. (Only a few smaller surfaces have been assembled of the edges of the ceiling next to the lunettes till now, the correct places of which are yet unknown, so they are not fitted into the composition. However, the incisions marking the modules are visible on those surfaces.)

With the connection of the endpoints at the eighth module the two east-west horizontal lines could be marked. (The „cord imprint” is visible in the red strips. The red strips were later painted a few centimetres higher either because of a measurement slip caused by the roughness of the plaster or caused by the curvature in the transversal direction or by human error or because of correction for better visual effect. Along the bottom end of the northern strip traces of earlier paint, which had been wiped off, is noticeable). (Fig. 15 a–b).

Next, with the same span of compasses two intersecting arcs were traced from the middle points marked at the lunettes, which are visible on the bottom border of the south field with the panther (Fig. 10). The point of intersection that was emphasised with an extra incision was probably used to halve the ceiling in a north-south direction or as control of earlier middle points. This was most probably done on the north side as well, but the fragments of the north side of this area are missing.

Connecting the points of intersections the central, transversal axis could be precisely traced along the curvature. (The “cord imprint” is clearly visible outside the surface of the medallion.)

On the transversal axis with the aid of the other two middle points the central point of the ceiling could be marked. It is a few centimetres from the navel of the female figure (Fig. 16 a–b).

Following the marking of the ceiling’s centre point the modules were measured in two directions on the central axis helping to mark precisely the frame of the medallion and the longitudinal parallels of the square blue frame and positioning the fields decorated with the panther on the north and south side. (In the medallion, which is the most accentuated field, the incisions were carefully erased so the first and second incisions, measured from the centre in two directions, are invisible. The third incision, which is outside the medallion, is visible on both sides. The fourth and fifth incisions are only visible on the south side as the fragments of this surface on the north side are missing. The sixth incision is visible on both sides. The fragments at the seventh module are missing on both sides, therefore it is only probable that they were also marked. There was no need for them for the further steps of the construction. At the eighth module on the north side instead of an incision there is a “cord imprint”. Although the fragments along the central axis on the south side are missing, on the fragments in the eastern and northern direction the “cord imprint” is clearly discernible.)

Once the centre point of the medallion was known the arcs might have been drawn at this point, but still, they were more likely drawn after the square blue frame and the diagonals have been traced and then the correctness of the centre point was checked. The exact positioning in relation to the square blue frame of the medallion was important.

Some of the straight lines, along the longitudinal direction of the vault, were possibly traced in this phase, such as the inner straight line of the square blue frame, which is at the same time the upper straight line of the frames of the fields decorated with the season personifications pictures, visible at the fifth module on both sides. And probably at this stage was the line traced, in the same direction at the sixth module on the south side. (The “cord imprint” is visible in all three places. In the longitudinal direction of the vault the straight lines might have been traced by connecting the marks next to the lunettes but by this time they had the marks on the central axis which helped the exact marking.) (Fig. 17 a–b).

It is possible that the other longitudinal straight lines were also traced at this time but for these lines measuring and marking shorter distances was necessary. For example a “cord imprint” is visible on the outer side of the square blue frame running in an east-west direction, which at the same time marks the width of the upper strip of the field of the season personification. Under and above the “cord imprints” traced at the eighth module, the outer and inner edges of the north and south red strips framing the painting are also marked by “cord imprints”. Instead of the longitudinal central axis of the composition two parallel lines were traced on either side of it about half a module apart, which established the width of the fields within the blue border depicting the panthers, next to the lunettes.

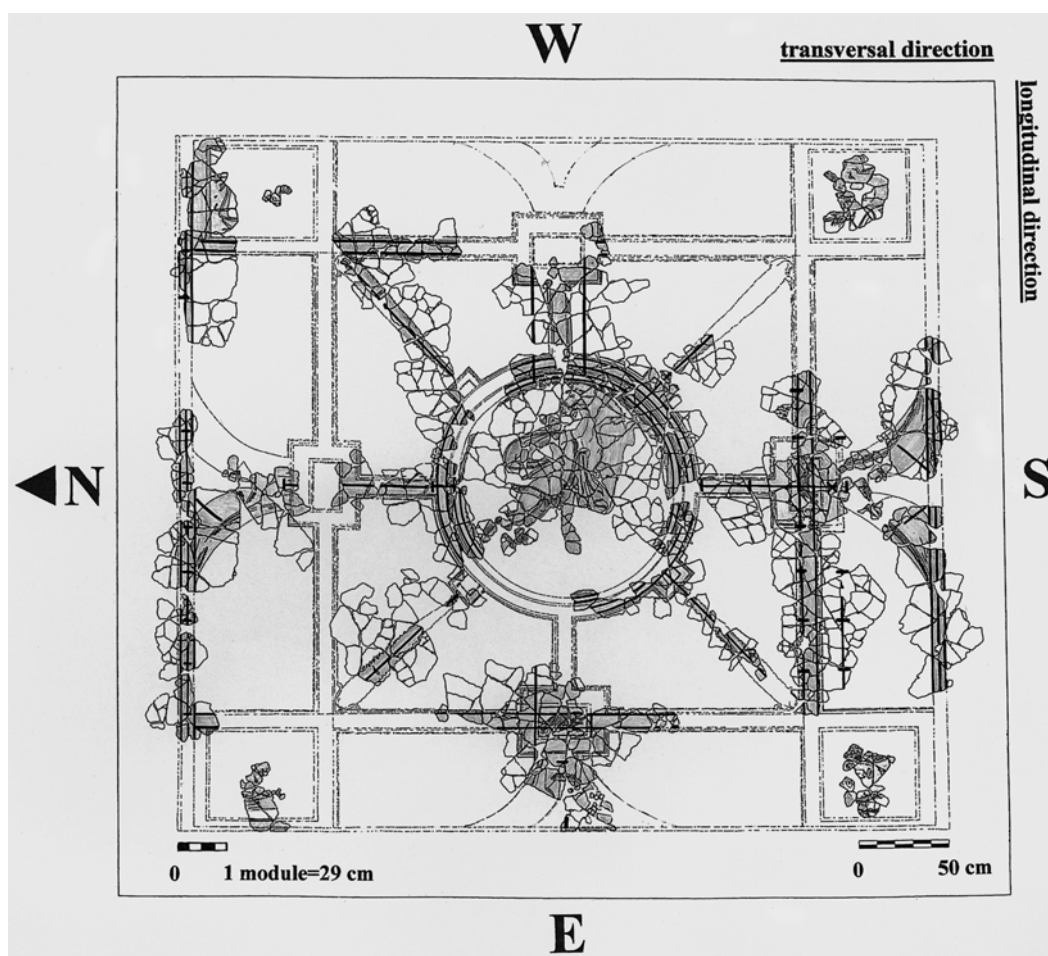


Fig. 13. Fragments with the main traces of construction of the ceiling composition fitted into place by 2000. A few marks can be seen on the assembled surface, which had not been mentioned among the steps of construction (e.g.: compass marks on the green curtains) as their role is not yet known. The smaller measurements such as the marks for the width of the strips and the construction of the fields decorated with a panther do not appear on the drawing. The measurements shown can only be approximately correct as measuring was done on the arch of the barrel vault and not on a flat surface. The marks are more pronounced on the drawing than in reality so they would be more discernible

After the markings of the longitudinal parallels, for the markings of the transversal lines the measurement of at least two longitudinal axes was essential. That is why the fifteen-module length of the “cord imprint” in the northern red strip was subdivided outwards from the centre. (On the right from the middle point five incisions come one after the other, the fragments of the sixth and seventh incisions have not been put in place yet. On the left from the middle point, after the first incision the fragments are also missing but the fourth and fifth incisions are visible.) The incisions arch sweepingly on the right of the centre indicating a quick and experienced hand. The incisions on the left of the centre marking the modules are somewhat clumsy, either because they were difficult to get at or because the master used his more inexperienced left hand to trace them.

The same subdivision was applied on the “cord imprint” found at the fifth and sixth modules on the south side. These double markings, so close to each other, are the only marks on the ceiling of which, for want of a better explanation, we thought were unnecessarily in the plaster and got there by mistake.

Following measuring, by connecting the markings the tracing of the transversal parallels became possible (Fig. 18 a–b).

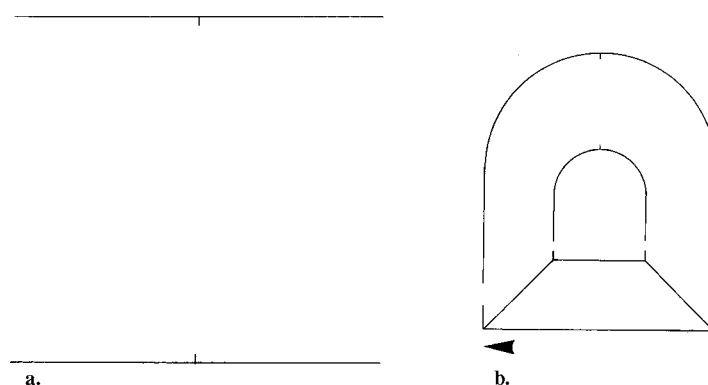


Fig. 14. a-b: The possible steps of constructing the composition onto the ceiling. The first step, most likely, was the halving of the four, but at least two, sides of the ceiling, the east and the west. The middle points under the lunettes were projected onto the east and west edges of the ceiling

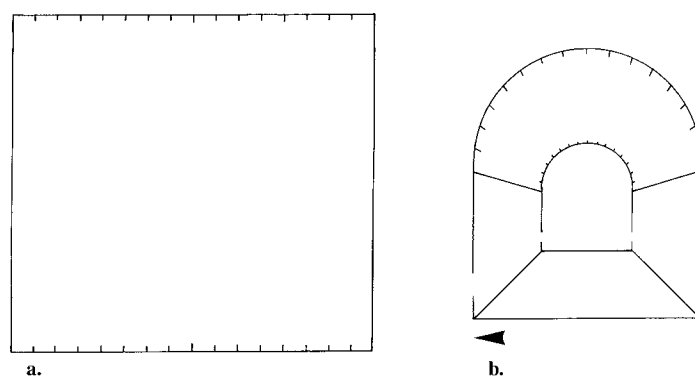


Fig. 15. a-b: Following the measuring of the middle points 8 modules were measured from them in both directions, thus defining the bottom of the composition, on the north and south sides. With the connection of these endpoints the two horizontal lines could be marked

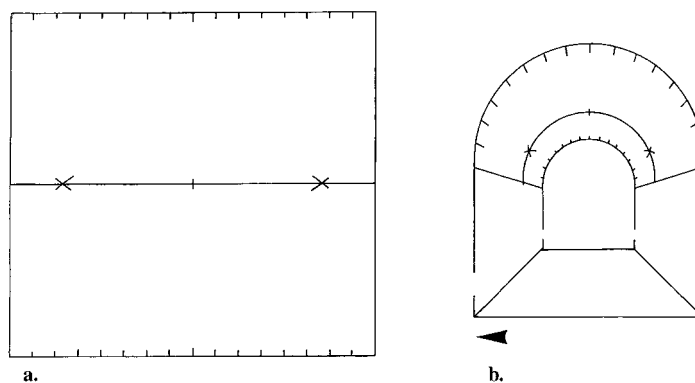


Fig. 16. a-b: Next, with the same span of compasses two intersecting arcs were traced from the middle points marked at the lunettes, which are visible on the bottom border of the south field with the panther. The point of intersection was probably used to halve the ceiling in a north-south direction or as control of earlier middle points. This was most probably done on the north side as well, but the fragments of the north side of this area are missing. Connecting the points of intersections the central, transversal axis could be precisely traced along the curvature. On the transversal axis with the aid of the other two middle points the central point of the ceiling could be marked

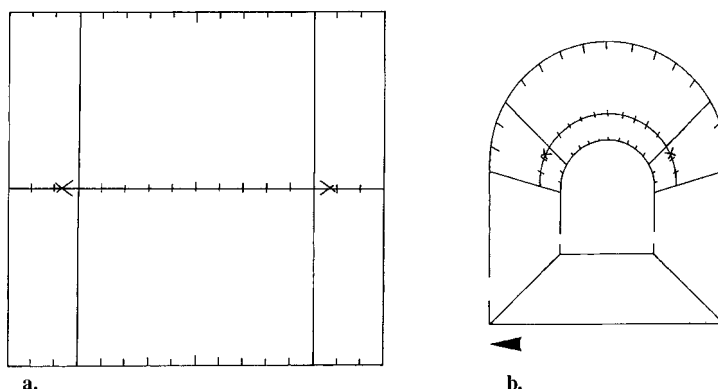


Fig. 17. a-b: Following the marking of the centre point of the ceiling the modules were measured in two directions on the central axis. Some of the straight lines along the longitudinal direction of the vault were possibly traced in this phase: the inner straight line of the square blue frame being at the same time, the upper straight line of the frames of the fields decorated with the season personification pictures, visible at the fifth module on both sides

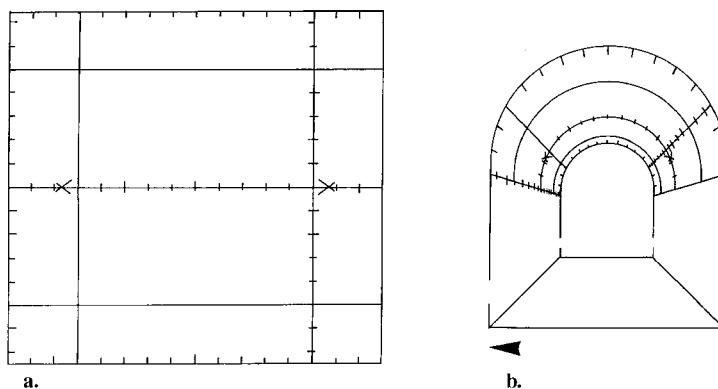


Fig. 18. a-b: After the markings of the longitudinal parallels, for the markings of the transversal lines the measurement of at least two longitudinal axes was essential. That is why the fifteen-module length of the northern „cord imprint” was subdivided outwards from the centre. The same subdivision was applied on the „cord imprint” found at the fifth module on the south side. Following measuring, by connecting the markings the tracing of the transversal parallels became possible

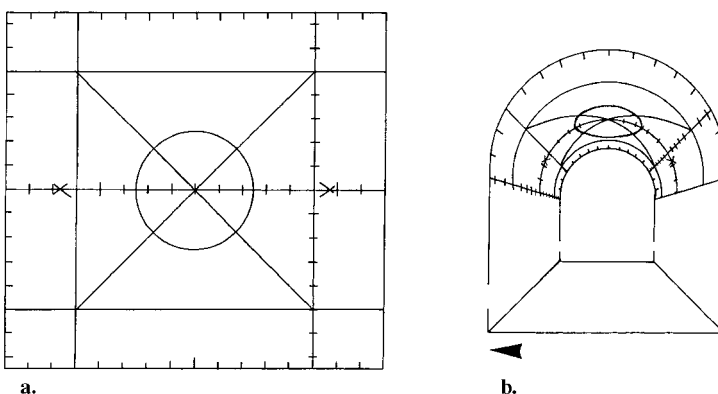


Fig. 19. a-b: The diagonal lines were traced after fixing the perpendiculars of the square blue frame with which the direction of the garlands was given. At the same time the centre point of the ceiling, that was fixed at the beginning of the construction, was checked and then the arcs of the medallion were traced

The diagonal lines were traced after fixing the perpendiculars of the square blue frame with which the direction of the garlands was given. (The “cord imprints” are visible.) At the same time the centre point of the ceiling, that was fixed at the beginning of the construction was checked and then the arcs of the medallion were traced (*Fig. 19 a–b*).

Although the assembled surface is still fragmental, the knowledge of the system of the incisions helped to find the exact place of the restored fragments still not fitting. It also made possible to determine the approximate size of the whole ceiling: the length of the composition constructed onto the vault is 15 modules i.e. 435 cm, and the width to the red strips, measured with 29 cm chords, is 16 modules i.e. 464 cm. Exact measurements cannot be given owing to the possible original measuring errors mentioned before.

CONSTRUCTION OF THE FIELDS DECORATED WITH A PANTHER

The last phase of the construction was probably the measurement of the smaller compositional units, such as the place of the blue strips connecting the medallion and the square blue frame, the size of the frame around the fields decorated with the panther, the seasons personification and the width of the strips. The yellow-ochre borders are painted freely.

The steps of construction of the fields decorated with the panther can be reconstructed perhaps the best, as of the south and east side there is a big enough segment compiled to allow the studying of the traces of the construction marks (*Fig. 5*).

With the connection of the module graduation on the red strip of the ceiling's north side and on the south side of the square blue frame, first the inner edge of the east and west strip of the square blue frame, which is closer to the medallion, could be traced. After measuring the width of the strip, the outer edge, which is closer to the edge of the ceiling could be traced. Along the longitudinal direction of the vault, about half a module distance from the central axis, in two directions, as mentioned before, two straight lines were traced helping the allocation of the fields decorated with the panther on the east and west side, thus marking the inner border of the south and north strip of the blue frame of the fields.

We are demonstrating the presumed sequence of steps on the east field decorated with the panther (*Fig. 5*). The intersections of the two longitudinal “cord imprints” and the transversal “cord imprint” at the inner edge of the square blue frame might have been the starting points of the construction (*Fig. 20*). North of the north point and south of the south point the width of the side strips of the blue frame of the field was measured, which was marked with a small incision on the “cord imprint” (the incisions are visible on both sides), then from these intersecting points towards west and east half a module distance was measured, which were also marked with a small incision. The incisions on the eastern side mark the inner edge of the eastern strip of the blue frame. (The incisions are visible.) The incisions on the western side mark the upper corners of the blue frame, close to the medallion. (The incision in the north-west corner of the frame is clearly visible, but parts of the south-west corner are missing.) From these last mentioned marks, towards the eastern side of the ceiling the width of the upper strip of the blue frame was measured. (The incision is visible in the north side, but parts of the south side are missing.) From the two points thus established and marked 1 module distance was measured to an eastern direction giving the bottom, north-east and south-east corners of the blue frame. (The short incisions are visible on both sides.)

The height of the blue frame, which was probably based on the construction detailed above, is $1\frac{1}{4}$ modules (36 cm), width is $1\frac{3}{4}$ modules (50 cm). The rectangle bordered with the thin black line framing the field is $1\frac{1}{2} \times 2$ modules (43.5×58 cm). The red background of the panther within the blue frame, leaving out a thin (1.5–2 cm wide) white strip, was not constructed but painted freely. The width of the red field is approximately 1 module (29 cm). The widths of the blue strips that cannot be measured in modules vary between 7.5 and 8.5 cm. The irregularities might be due to the painters using a rule of thumb to measure distances or perhaps using their palms. The arching of the ceiling and the unevenness of the plaster might also have some influence on the exact measurement.

The size of the east and south fields decorated with the panther is the same but for a few millimetres difference.

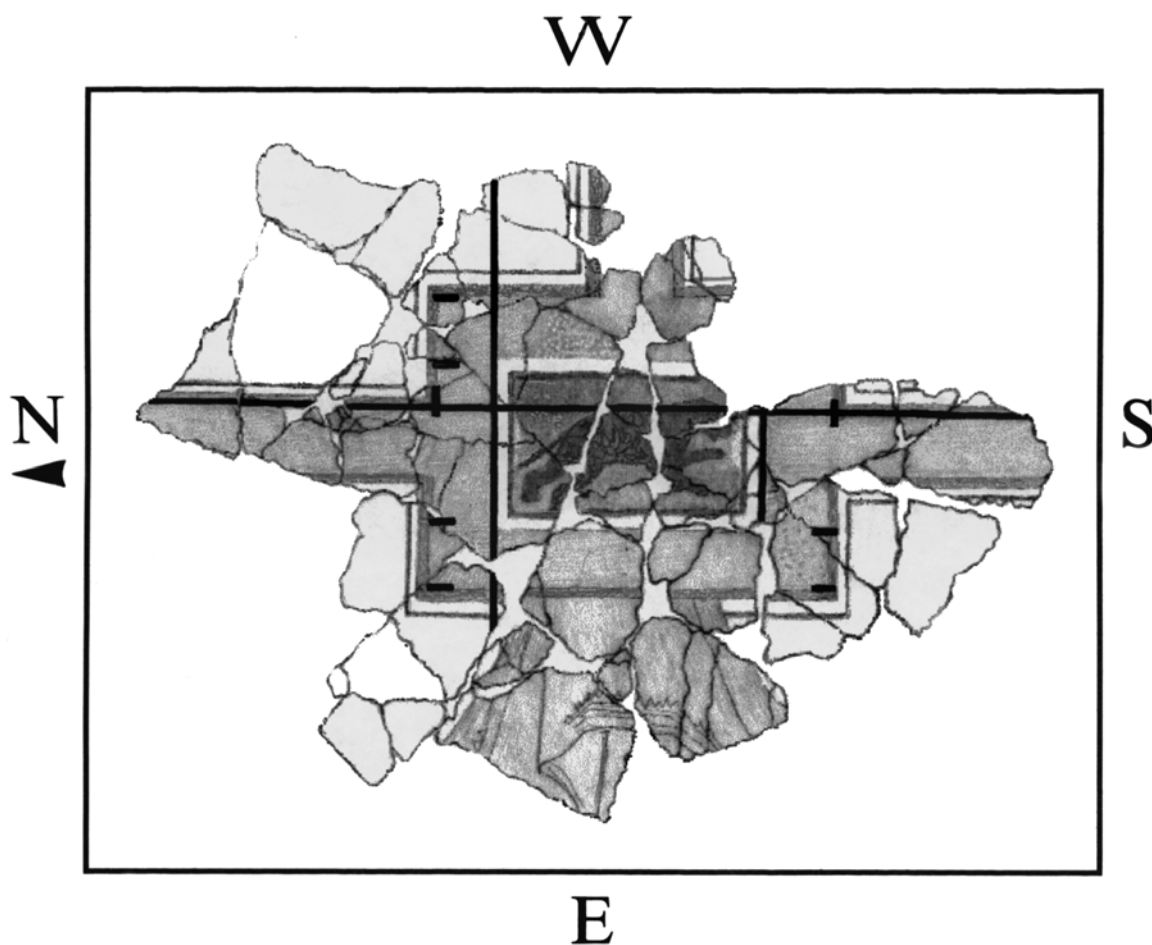


Fig. 20. Construction of the fields decorated with the panther. The drawing is about the field find in the eastern side of the ceiling. If we picture the drawing on the ceiling the cardinal points fall into place

GEOMETRIC PROPORTIONS OF THE CEILING COMPOSITION

The ceiling composition of Brigetio is built on a widely used, simple geometric proportion which is based on the connection between the square drawn around the circle and a circle drawn around the square. The basic scheme, for the employment of which there are several examples in the whole of the Roman Empire,⁵ is the following: a central circle is given around which a square (1) is drawn, then around this another circle and another square (2) so that the vertices of the first square mark the middle point on the sides of the second square. This is framed by another circle, followed by another square (3) as described before, and so on (*Fig. 21*).

In this case the central circle corresponds to the depression in the plaster made by a pair of compasses in the red strip of the medallion (*Fig. 11*). The third square is marked by a “cord imprint” in the plaster on the inner edge of the strip of the square blue frame. The blue frame of the Brigetio composition is quadratic but outside this it is distorted to a rectangle and therefore the north-south extent is larger than the east-west extent (*Fig. 22*).

⁵ Ceiling painting depicting Dionysus from the Echzell auxiliary fort, end of the 2nd century A.D.: M. SCHLEIERMACHER:

Die römischen Wand- und Deckenmalereien aus dem Limeskastell Echzell. SJ 46 (1991) 96–100.

It is possible that if the master painters had a scale model for the construction of the composition onto the barrel vault then it was based on the symmetric, geometric proportions mentioned before and thus it probably showed the ideal quadratic form. The scale model might have contained the following: a square with side of 30 units together with a lattice of lines and in which the lines of the lattice are a unit distance apart. In this instance a unit is half a module. Within the square marking the edge of the composition there is another square, positioned the same way, of 20 unit side, marking the place of the next main composition in the middle of which is a circle of 5-unit radius (*Fig. 23*).

Most of the distances measured on the surface of the assembled fragments correspond to the measurements on the presumed scale model: the radius of the circle imprint in the red strip of the medalion is 5 units (2.5 modules, i.e. 72.5 cm), the inner side of the square blue frame is 20 units (10 modules, i.e. 290 cm). The width of the frame of the fields depicting the season personifications is 5 units and consequently the east-west extent of the composition is 30 units (15 modules, i.e. 435 cm). However, the distance between the red strips marking the north and south edges changed to 32 units (16 modules, i.e. 464 cm) instead of the ideal 30 units. The 5-unit height of the red strip of the side of the fields depicting the season personifications changed to 6 units.

If the originally quadratic composition changed to a rectangle only on the barrel vault then the explanation might be that in order to present a more harmonic view the length of the side, as it seemed to be shorter because of the curvature, was slightly increased in the direction of the arc. The optical correction might be accountable for the increase in the height of the frame of the fields depicting the season personifications and of that the north and south curtains by half a module on either side.

When comparing the measurements of the presumed scale model a decimal scale is evident because the size of the main, geometric compositional units expressed in modules is ten or a multiple or a fraction of ten. Besides the decimal scale the important role of the number 6 is also noticeable. Its basis is given by the 2.5 modules radius length of the central circle. The composition might be divided into 6×6 (that is 36) squares of 2.5 modules side length. The thus constructed lattice of lines gives the basis for the picture designed for the three main fields: the central circle, the blue quadratic frame and the field bordered with the red frame (*Fig. 23*).

To conclude it might be said that the ceiling painting is based on a generally accepted and widely used geometric structure that contains both a decimal system thought ideal by Platon and the system of base six preferred by mathematicians:

*“perfectum autem antiqui instituerunt numerum qui decem dicitur; namque ex manibus digitorum numero [ab palmo pes] est inventus. si autem in utrisque palmis ex articulis ab natura decem sunt perfecti, etiam Platoni placuit esse eum numerum ea re perfectum, quod ex ∞ singularibus rebus, quae μοναδες apud Graecos dicuntur, perficitur decusis.”*⁶

*mathematici vero (...) ea re perfectum dixerunt esse numerum qui sex dicitur, quod is numerus habet partitiones eorum rationibus sex numero convenientes sic: sextantem unum, trientes duo, semissem tria, besem (...) quattuor, quintarum...quinque, perfectum sex. non minus etiam, quod pes hominis altitudinis sextam habet partem”*⁷

“The ancients considered the number called ten perfect because, from hands number of fingers are derived, and from the palm is derived the foot. By nature on the two palms ten is perfect, and also Plato held this from ten units called in Greek monades, complete number perfect.⁸ ($1 + 2 + 3 + 4 = 10$)

Mathematicians (...) contended for the perfection of the number called six because, according to their reasoning, this number has six divisors equal the number six itself in this way: for a sixth part is one, a

⁶ Vitruvii: De architectura libri decem III.1.5. Ed. F. Krohn. Leibzig 1912.

⁷ Vitruvii: De architectura libri decem III.1.6–7. Ed. F. Krohn. Leibzig 1912.

⁸ Vitruvius: De architectura III.1.5.

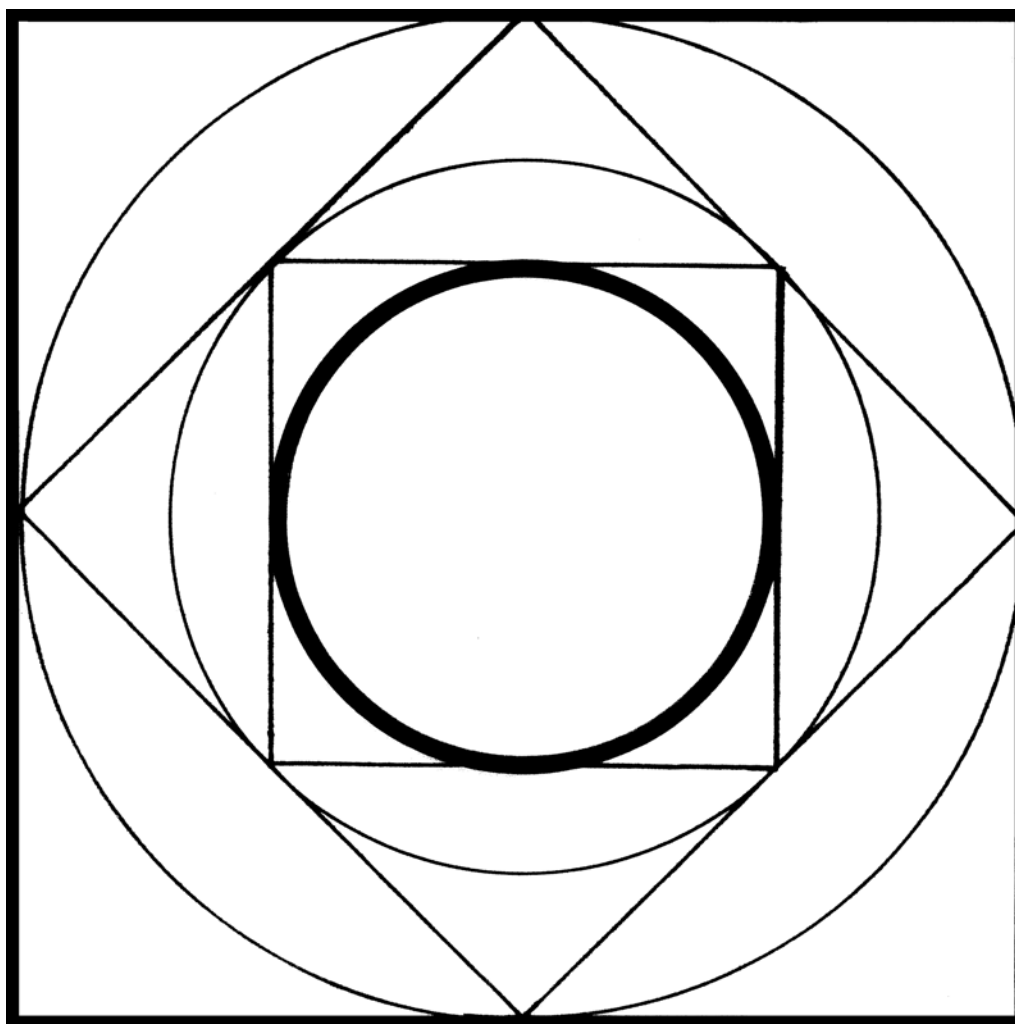


Fig. 21. The ceiling composition of Brigetio is built on a widely used, simple geometric proportion which is based on the connection between the square drawn around the circle and a circle drawn around the square

third two, a half three, two-thirds four (...) a fifth (...) five, and then the perfect number six. (...) Moreover, as the foot is the sixth part of a man's height (...) ⁹.

Although the Brigetio painting decorated one of the rooms of a private home nevertheless because of its geometric proportions the citation from Vitruvius on churches is appropriate here:

*“proportio est ratae partis membrorum in omni opere totiusque commodulatio, ex qua ratio efficitur symmetriarum. namque non potest aedis ulla sine symmetria atque proportione rationem habere compositionis, nisi uti hominis bene figurati membrorum habuerit exactam rationem.”*¹⁰

*relinquitur, ut suspiciamus eos, qui (...) ita membra operum ordinaverunt, ut proportionibus et symmetriis separatae atque universae convenientes efficerentur eorum distributiones.”*¹¹

⁹ Vitruvius: De architectura III.1.6–7.

¹¹ Vitruvii: De architectura libri decem III.1.9. Ed. F. Krohn.

¹⁰ Vitruvii: De architectura libri decem III.1.1. Ed. F. Krohn. Leibzig 1912.

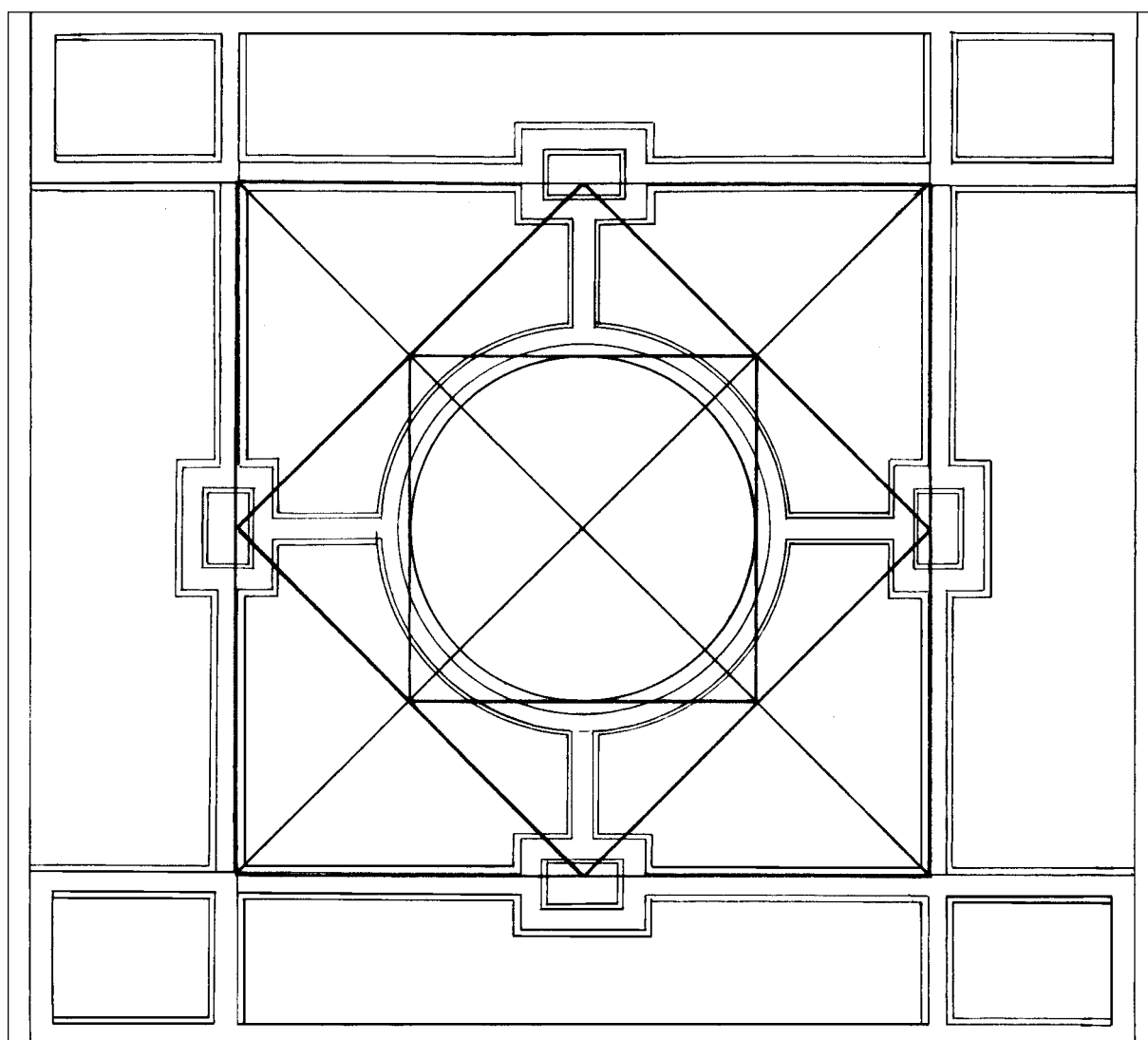


Fig. 22. Geometrical proportions of the ceiling composition

“Proportion is an adjustment of the size of the parts of members to the whole in every building, from this, symmetry is created. Hence it is not feasible the rational planning of a building without symmetry and proportion. In truth they are as necessary as the ordintaion of members of a well formed man,¹² (...) there is nothing left but to admire those, who (...) the members of buildings ordinated, to harmonize in proportions and symmetry separated and together ...”¹³

¹² Vitruvius: De architectura III.1.1.

¹³ Vitruvius: De architectura III.1.9.

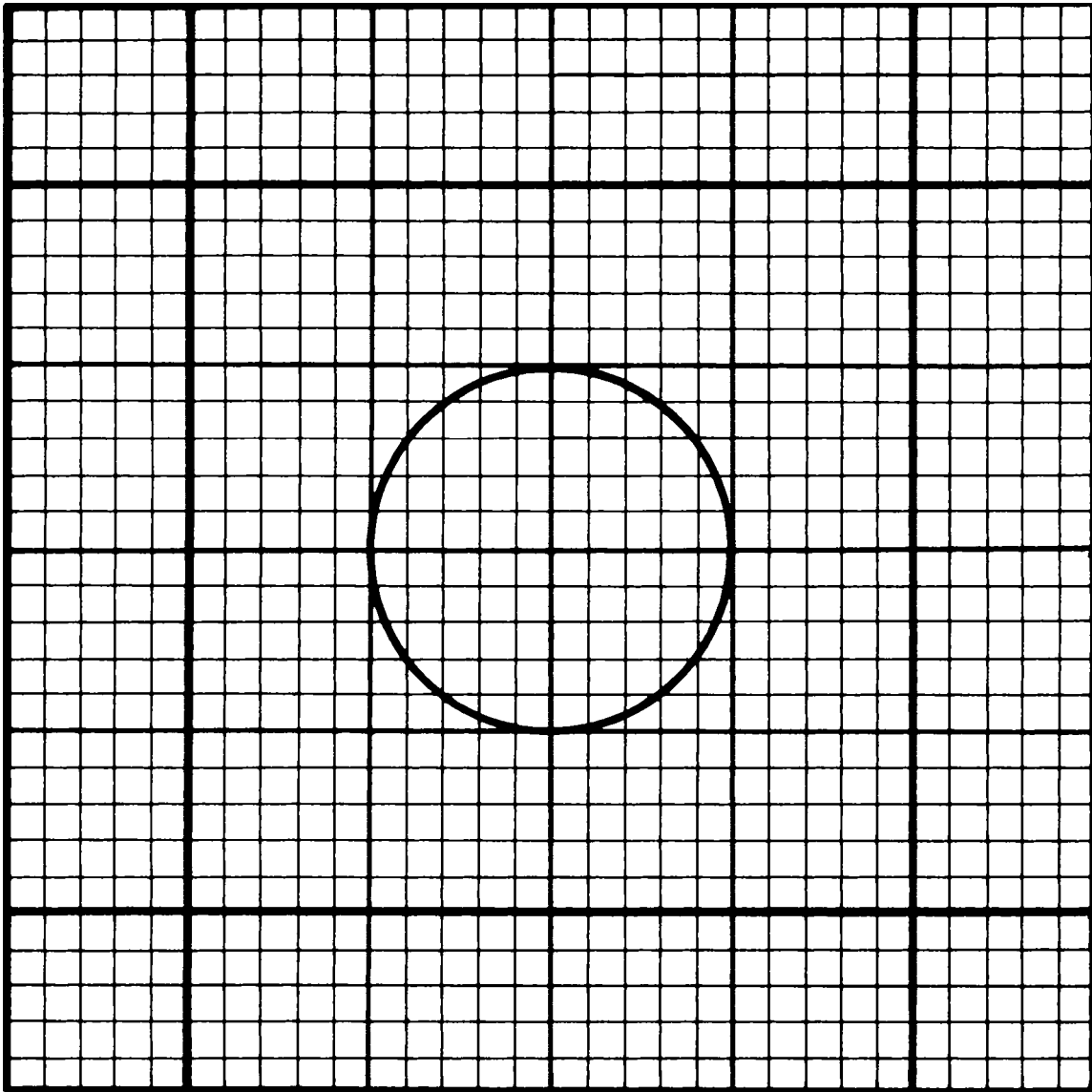


Fig. 23. Geometric proportions of the ceiling composition on the presumed, ideal scale model

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