Nagy, Mihály

Typological Considerations on Christian Funerary Buildings in Pannonia

In Pannonia, several Early Christian burial chambers, some of them decorated with frescoes, have partly survived. It means, that after the Roman period the superstructures were usually destroyed, and we can study now mainly the fundaments, or in some favourable cases the underground chambers.

The first comprehensive work was done by Lajos Nagy in 1938.[1] According to him, the *cellae trichorae* of Pannonia are local variants of earlier buildings with similar form and purpose known from Rome. He dates the cellae form Sopianae and Aquincum together with other similar buildings to the 4th century A.D., and supposes an influence from Aquileia. The oblong-shaped burial chapels with one apse at the end may have originated also from Aquileia, [2] while the simpler constructions without apse are closely related to the usual Late Roman burial chambers once popular in Eastern Pannonia.[3] Lajos Nagy reports about Late Roman *basilicae* as well, which seemingly did not contain burials, so they do not make a part of this article. This is also true for the cella trichora from Savaria.[4] A detailed study of Gyula Gosztonyi have also dealt with the buildings from Sopianae, describing the ones discovered after Nagy's work.[5] The first comprehensive works after Gosztonyi, were published by András Mócsy[6] and Ferenc Fülep. The latter author dates the buildings in the Late Roman cemetery near the present day Bishop's Chruch in Pécs to the second half of the 4th century, stating that chamber no. I cannot be earlier than the years around 380 A.D. The painted chamber no. II is also dated to the last third, while the cella trichora to the last decades of the 4th century.[7] The cella septichora[8] which did not contain any archaeological dating evidence, according to Fülep, judging from its orientation, was constructed at the turn of the 4th and 5th centuries A.D.[9]

The latest summary was written by Endre Tóth.[10] He regards only those buildings Christian, in which wall paintings with Christian symbols were discovered. He also states, that buildings with 3, 5 or 7 apses are characteristic forms that were applied later by Christians as well, although he admits, that a building standing in the centre of a Late Roman cemetery corresponds Christian burial customs, therefore we may say that those buildings were built by Christians.[11] According to Endre Tóth's classification there are two main types of *mausolea*, one has an underground chamber (originating from the Balkan region), the other, with a more complicated ground plan has no underground chamber, and originates from Italy or Dalmatia.[12] Two local variants of the latter type were found in Kővágószőlős near Pécs, and Alsóhetény (*Iovia*).

Now at this occasion I would like to deal only with one aspect of these monuments, i.e. the analysis of certain characteristic ground plans. Aside the typolgical groupings mentioned above, analysis of metric data of ground plans were not carried out, and no original blueprints were reconstructed so far. We can do it only in those cases, where enough precise metric data, or detailed drawings are available. In the framework of this lecture I will concentrate on two buildings from the most important cities of Late Roman Eastern Pannonia, the cella septichora from Pécs (*Sopianae*), and the building with five apses from Óbuda (*Aquincum*).

The results of the excavation with a series of exact dimensions of the cella septichora was published by Gyula Gosztonyi in 1940 and 1943.[13]

Measurement	Actual measurement			Ideal measurement of the reconstructed plan		Difference between actual and ideal measurements	
	mm	pM	digiti	mm	digiti	mm	%
Diameter of the apse at the eastern end	4900	16.55	264.86	4934.875	24.25x11=266.75	-34.875	-0.70670
Diameter of other apses	3900	13.17	210.81	3866.5	19x11=209	+33.5	+0.86641
Thickness of walls	1100-1250	3.71-4.22	59.45-67.56	1119.25	5.5x11= 60.5	-19.25 +11.68	**-1.71990**
Outer length of the building	22800	77.02	1232.43	22792.00	112x11=1232	8	+0.0351
Outer width	17350	58.61	937.83	17297.5	85x11=935	+52.5	+0.30351
Largest inner length	20350	68.75	1100.00		100x11=1100	0	0
Largest inner width	1510	51.18	818.91	15059	74x11=814	91	+0.60428
Distance between levelling brick layers in the stone wall	1000	3.37	54.05	1017.5	5x11=55	-17.5	**-1.71990**
Thickness of bricks	50		2.70	50.87	0.25x11= 2.75	-0.875	**-1.71990**
Width of bricks	300	1.01	16.21	305.25	1.5x11=16.5	-5.25	**-1.71990**
Length of bricks	440	1.48	23.78	457.87	2.25x11=24.75	17.875	-3.90390

In some cases, we find that the buildings in question were set out in Roman feet (*pes Monetalis*) measuring 296 mm, like e.g. at the cella trichora of Aquincum[14], or the building with five apses from the Kiscelli út, again in Aquincum,[15] at the building with two apses of Ságvár,[16] and also at a chamber from Pécs.[17] In other cases, like at the cella septichora of Pécs, it seems, that the eleven digit unit prevails. The correctness of the reconstruction depends on the correctness of observations made during excavation. The recurrent value of –1.7199017 % indicating the difference between actual and ideal measurements, probably means that those observations are usually quite precise, but due to the fact that archaeologists publish their measurements is metric system, and sometimes they round off fractions, such a difference may occur.[18]

We know similar data, containing the 11 as multiplier from elsewhere too, mainly from *burgi* of the Late Roman limes along the Rhine and Danube, built under the reign of Valentinian I:

Site	digiti				
	8x11=88	10x11=110	11^2=121	8^2x11=704	80x11=880
Köln, City Wall[19]			thickness of wall		
Engers[20]					wall and ditch distance
Zullestein[21]		thickness of wall			
Mannheim -Neckarau[22]		thickness of wall			
Zeiselmauer[23]		width of gate	distance of timber framework from threshold		
Dunabogdány-Kőszegtő[24]				length of wall	

Site	digiti				
	8x11=88	10x11=110	11^2=121	8^2 x11=704	80x11=880
Leányfalu[25]	thickness of wall width of pillar				inner length of wall
Budakalász-Luppa csárda[26]					inner length of wall
Szob-Hidegrét		length of foundation walls	thickness of wall		
Nógrádverőce		thickness of wall	thickness of wall		
Mihajlovac-Blato[27]	thickness of wall	thickness of wall width of gate			

Recently I have tried to analyse measurement data of Late Roman military installations, and I pointed out the use of an 11 digit unit.[28] The frequent use of this unit, sometimes multiplied with 8, or raised to the second power, instead of the use of the ordinary Roman feet consisting of 16 digiti, may be explained probably by its usefulness in architectural practice. The 'tool-kit' of architects was very simple: they used mainly straight-edges, compasses, and set-squares. It is well known, that the theorem of Pythagoras was used to construct a rectangle, with the help of 3, 4 and 5 unit long rods or ropes.[29] Since $3^2+4^2=5^2$ it is possible to lay out a rectangle on the site with this method too. The construction of a pentagon with compasses is quite simple at a drawing board, but on site it would be very difficult, and sometimes perhaps there was not enough space to operate with ropes. In such cases the architect may have used a rectangular or L-shaped template or set-square with sides 8 and 11 units long (Fig. 1.).[30]

On the example of the reconstruction of original ground plan of the cella septichora at Pécs, I would like to show, how indsipensable is the pentagon at the construction of certain building types (Fig. 2.).

The first step in the drawing is to establish orientation: let us draw the main axis signed EW of our building. Then determine point A on the axis, as centre of the building's eastern apse. From point A swing an arc 24.25x11=266.75 digiti long, cutting the axis at B. From B as centre, with compass unchanged draw a circle, cutting the East-West axis at points A and C (Diameter: 48.5x11=533.5 digiti). From point A as centre, draw a circle with a radius measuring half of the previous circle (=12.125x11=133.375 digiti). The eastern half of this circle marks out the inner surface of the apse's wall. From point C swing an arc 50 digiti long towards east cutting the axis at D. From point D swing an arc 24.25x11=266.75 digiti long, intersecting the axis at E. From point E as centre, with compass unchanged draw a circle cutting the axis at F. (Diameter of the circle: 48.5x11=533.5 digiti). Construct pentagons from points C and D inscribed in the circles, with points GHIJ and G'H'I'J'. Join points GG' and JJ' respectively. The pentagons intersect each other at points K and L Draw a perpendicular line through points K and L. From points K and L as centres, swing arcs 24.25x11=266.75 digiti long, bisecting the NS axis at points M and N. The distance of the latter from each other is 55x11=605 digiti. Draw lines from points GG' and JJ' through B and E. These lines will cut the circles containing the pentagons at OO' and PP'. From point A as centre draw a half circle with a radius 18x11=198 digiti long, to mark out the outer surface of the apse's wall. Parallel with the NS axis this outer wall projects to north and south, forming corners 20x11=220 digiti far from point A. From points OMO' and PNP' as centres draw half circles with radius 15x11=165 digiti long, to determine the outer surface of the walls of side apses. From the same points as centre draw half circles with a radius 9,5x11=104.5 digiti long, to mark out the inner surface of the apses. (At the junctions of the apses the wall is thicker). Parallel with axes EW; JO J'O'; GP G'P' and NS connect half circles indicating the inner wall surface of apses with the sides of the pentagon in front of them. 1.5x11= 16.5 digiti far to the west from point F draw a perpendicular line 32x11=352 digiti long, which marks out the width of the front wall (total thickness of the wall: 6x11=66 digiti).

Total length of the building outside: 112x11=1232 digiti; while inside between points Q and R: 100x11=1100 digiti. The total width outside is 85x11=935 digiti, inside: 74x11=814, that is the difference between the outer and inner width is exactly 11x11=121 digiti (in other words, the thickness of walls is 112/2).[31]

The overlap of the pentagons needs an explanation. Probably the architect had to reduce the inner length of the building in order to obtain similar length for those walls of the southern and northern apses which touch the sides of the pentagons (in other words there are two primary and two secondary, altogether four pentagons on the ground plan. The two secondary pentagons with centres K and L are not indicated on our drawing. The base of these pentagons are identical with sections GG' and JJ'). In the same time it is remarkable, that the total inner length after the reduction became exactly 100x11 digiti. In connection with this phenomenon, we may suppose a tripartite process of planning: the architect first determined the inner length of the building, and then calculated the diameter of the circles which contained the pentagons, and in the same time calculated the necessary overlap of the circles (which as a consequence also determined the width of the building). The diameter of the eastern apse is a derivative of the large circles: measuring exactly half of them.

The most spectacular geometric feature in the ground plan of the cella septichora of Pécs, the pentagon, is a well known Platonic symbol, which was regarded in Antiquity as a symbol of universe.[32] According to ancient tradition it was invented by the Pytha-goreans, and even their emblem was the pentagram.

The use of the so-called Platonic geometrical figures in architecture is quite evident: let us think of the triangle and the square. The pentagon is not so frequent, although there are several examples for its application from Antiquity to the Middle Ages. The octagon was also popular, mainly as a ground plan for imperial mausolea.[33] Their use in architecture is explained by Cyril A. Mango, and following him by Nigel Hiscock as follows:

"... a Platonic connection seems to be implied in a letter Constantine wrote in 334 in which he states that:

There is a need of as many architects as possible... who are about eighteen years old and have had a taste of the liberal arts.

(Codex Theodosianus XIII. 4, 1.)

It would be interesting to know what Constantine meant by a "taste of liberal arts" and whether this would have embraced the quadrivium with its teaching on number and geometry. If so, it might imply a possible route by which Platonic thinking could have been transmitted to early Christian architecture."[34]

In fact, some of the most important Christian thinkers of the second half of the fourth century, like Basil, Bishop of Caesarea, or his younger brother Gregory, Bishop of Nyssa, themselves were students of Neoplatonist philosophy.[35]

No wonder, that the use of Platonic figures appear among the steps of the reconstructed setting-out of the ground plan of Old St Peter's Basilica in Rome, built by Constantine the Great.[36]

It is a well known fact, that various symbols of Christianism appear in buildings of religious purpose. Sometimes they are closely connected to the architectural form, like e.g. cross-shaped basin sunken into the floor of a baptisterium, or the cross-shaped ground plan of church buildings. Sometimes they appear as decorations on floor mosaics, or wall paintings.[37]

The monogram of Christ and related patterns are used in a similar way: they may be placed in the centre of a ceiling, or as the so-called "Architektur-Monogramm" they are applied on column capitals, mosaics, or chancel arches. The size of some of these monograms is monumental.[38] According to Gardthausen, the reason behind the use of these symbols in Antiquitiy was the belief, that *"Who uses or displays these divine symbols, recommended himself to the deity's protection... and the sign of good deities were regarded as helpful resources in the fight against evil ghosts."*[39]

There are evidences, that even a whole building may have been regarded as a metaphor, and the dimensions were designed rationally to express holiness of the building.[40] Buildings with seven sides and an entrance in the eighth represent "entry from the sphere of Earth" (number seven symbolises Holy Spirit, eight signifies resurrection).[41] Gregory of Nyssa, in a letter dated to the 380s, describes such an eight sided *martyrion* with seven niches, emphasising, that the form of the ground plan is a cross.[42]

We may suppose, that the cella septichora itself was such a metaphor: on the reconstructed ground plan in case of the most important lines (i.e. the axes) and centre points we may discover a popular symbol: a *staurogram*, or a combination of a staurogram type Gardthausen 185 and a Christogram type Gardthasuen 186. (Fig. 3.)[43] Both were widely used over the whole Roman Empire during the second half of the fourth century A.D. We may also suppose that the appearance of the monogram is not a mere coincidence, since the length of letter *rho* between points Q and R is exactly 100x11=1100 digits, while the length of the line crossing it (line MN), is 55x11 digits. If we accept that the symbol contains *chi*, the beginning letter of Christ's name as well, then it is formed by the 75x11 digits long lines between points OP' and O'P. (It is noteworthy, that the stems of *chi* are 20x11 digits longer than the horizontal arm of the cross). The stems of the letter chi does not intersect each other under 90°, similarly to the monogram types Gardthausen 186 and 194. The proportions of the parts of letters are also similar.

The construction of the building with five apses from Budapest, Kiscelli Street is dated by Györgyi Parragi to the end of the 3rd century. It was repainted during the 4th, and was still in use at the beginning of the 5th century.[44] In the apses graves were excavated, and the building formed perhaps the centre of a Late Roman cemetery. It has the following main dimensions[45]:

Measurement	Actual measurement			Ideal measurement of the reconstructed plan			Difference between actual and ideal measurements	
	mm	pM	digiti	mm	digiti	pM	mm	%
Thickness of hexagonal EW wall	1200	4.05	64.86	1184	64	4	16	+1.35135
Thickness of semicircular apse walls	800	2.70	43.24	888	48	3	-88	-9.90
Diameter of apses	3800	12.83	205.40	3848	208	13	-48	-1.24740

From the measurements it turns out clearly, that the building was laid out in Roman feet. From the published data and drawings we may reconstruct the original plan as follows (Fig. 4.). First, we should determine the main East-West axis of the building with point A on it. Draw a perpendicular line (NS axis) through point A. From point A as a centre, draw a circle with 200 digiti = 12.5 pM cutting the axes at points BCD and E. With compass unchanged, from points B and D intersect the circle at points EF and GH. Join points BEFDGH. Repeat the process with a radius of 280 digiti = 17.75 pM, to create B'D'E'F'G'H'. The above points joined together determine the walls of the hexagonal central space (except the wall on the eastern side). From point A draw lines bisecting the sides of the hexagon. From point A as a centre draw a circle with radius 300 digiti = 18.75 pM cutting the axes at points IJKLMN. From points IJKLMN draw half circles with radius 104 digiti = 6.5 pM in order to determine the inner surface of the apse walls. (The inner diameter of the apses is identical with the length of the side of the inner hexagon BEFDGH). The half circle drawn from point I intersects the EW axis at point P. Repeat the process with a radius of 152 digiti = 9.5 pM, in order to determine the outer surface of apse walls. Parallel with axes EW, JM and KN join half circles that determined the inner surface of apse walls, with sides of the hexagon. The eastern wall of the hexagonal space, cutting the EW axis at point O, lies closer to the centre than the other walls. The distance between the central point A and the eastern wall of the hexagon is 160 digiti = 10 pM. The outer length of this wall was probably also 10 pM. In front of the building a small antechamber stood, of which only a fragment of the northern wall survived. The reconstruction here is purely conjectural, but I have supposed, that the total outer length of the building was 800 digiti = 50 pM (i.e. double of the diameter of the first circle).

The extraordinary position of the eastern wall of the hexagon may be explained similarly like in case of the cella septichora of Pécs; that is the objective of the architect was to decrease the inner total length of the building. In this case the distance between points O and P is 564 digiti = 35.25 pM. The importance of this dimension becomes clear, if we suppose, that like in Pécs, the original plan here too contained a *staurogram*.[46] If we accept this concept, then the perpendicular line of the cross is identical with the distance between point B and D, which is 400 digiti = 25 pM long (Fig. 5.). The ratio between the two largest inner dimensions of the building, that is length and width is 564:400=1.41. The result (1.41) equals $\sqrt{2}$. The ratio $\sqrt{2}$ is generated by the process of doubling the square, ($\sqrt{2}$ being the length of the diagonal of a square with 1 unit long sides) and describing it, Vitruvius refers to the method used by Plato.[47] Number six is perfect, according to Augustine, since it is the sum of its parts: 1x2x3=1+2+3=6, and since God created man on the sixth day. The hexagon, around which the apses are grouped, was intended to symbolise time.[48]

Summarising our results we may establish, that in certain cases, traces of Neoplatonist philosophy can be observed in the plans of Late Roman funerary buildings in Pannonia. We may also suppose, that certain ground plans may have contained Christian symbols; i.e. these symbols were inscribed in the plans and the walls of the building encircled them as they were inscribed into oil lamps, lamp-hangs and wall paintings.The presence of Neoplatonism and Christianity in leading Pannonian centres like Sopianae and Aquincum is not a surprise: it rather means, that Pannonian architects were also familiar with current ideas. It was the era, as Ferenc Fülep – together with other scholars – stated "that the martyrcult at Sopianae flourished only after the decline of Arianism, and after the beginning of the reaction of Ambrosian orthodoxy."[49] On the basis of geometrical analysis, in the future we shall be able to work out a new typology, according to which we can separate two main groups: one with Neoplatonist-Christian ideological background, and one without it.

Note:

[1] Nagy L. 1938, 115-119.

[2] Nagy L. 1938, 126 mentions this type from Diós, or Kis-diós-puszta. A survey in 1968 only partly proved earlier informations, and the building's Christian character is questionable. See: MRT 4, p. 244 and Fig. 48, Nr. 75:5 Ugod, Diós-puszta.

[3] Nagy L. 1938, 128.

[4] Mócsy 1962, 728:36-37.

[5] Gosztonyi 1943.

[6] Mócsy 1962, 728; and Mócsy 1990, 264.

[7] Fülep 1984, 160-161.

[8] Fülep 1984, 58: the excavated part of the building is probably an underground family burial chamber, or – considering its dimensions – it could have been the funerary basilica of the Early Christian cemetery as well.

[9] Fülep 1984, 161.

[10] Tóth 1994, 241-272.

[11] Tóth 1994, 250.

[12] Tóth 1994, 252.

[13] Gosztonyi 1940, 56-61; Gosztonyi 1943, 6 and 11-14.

[14] Nagy L. 1931, 12.

[15] Parragi 1976, 158-161.

[16] Radnóti 1939, 152.

[17] Török 1942, 208.

[18] Cf. e.g. Nagy M. 1998, 36-38; and Nagy M. 1999, 115-120.

[19] Schultze–Steuernagel 1895, 251-253.

[20] Röder 1952, 116.

[21] Jorns 1974, 430.

[22] Gropengießer 1937, 117.

[23] Ubl 1977, 255.

[24] Soproni 1978, 61.

[25] Soproni 1978, 63.

[26] MRT 7, 48 no. 3:13.

[27] Prodanović–Zotović 1964, 56-57.

[28] Nagy M. 1998; Nagy M. 1999.

[29] Evans 1994, 151.

[30] Hiscock 2000, 175 and 281.

[31] Similar wall thicknesses were observed along the Lower Pannonian limes at the watch towers of Budapest-Békásmegyer–Boathouse on the Danube; and Budapest-Békásmegyer former OKH week-end-house. See: Soproni 1976, 81, nos. 5 and 6. For 112 digiti thick walls see our chart above.

[32] Hiscock 2000, 111-112 and 115: *"...in terms of Platonic cosmology... equilateral triangles represent the three atmospheric elements, the square the earth, and the regular pentagon the plane figure of the dodecahedron of the universe."*

[33] Tóth 1988, 47-51.

[34] Hiscock 2000, 217.

[35] Hiscock 2000, 56-57.

[36] Hiscock 2000, 215-217 and Plates 35-42

[37] De Bruyne 1957, 343-383.

[38] Gardthausen 1924, 134-138.

[39] Gardthausen 1924, 26.

[40] Hiscock 2000, 121 citing Augustine, De ordine II.19.49 is a perfect illustration: *"Out of several pieces of material lying around in scattered fashion [chaos] and then assembled into one design, I can make a house [cosmos]. If, indeed, I am the maker and it is made, then I am the more excellent, and the more excellent precisely because I am the maker [Divine Creator]. There is no doubt that I am on that account more excellent than a house. But not on that account am I more excellent than a swallow or a small bee, for skilfully does the one build nests, and the other constructs honey-combs. I am, however, more excellent than they because I am a rational creature. Now, if reason is found in calculated measurements, does it follow that the work of birds is not accurately and aptly measured? Nay, it is most accurately and aptly proportioned. Therefore, it is not by making well-measured things, but by* ***grasping the nature of numbers****, that I am more excellent."*

[41] Hiscock 2000, 130.

[42] Hiscock 2000, 130-131. The niches are alternating: three of them are rectangular and four apsidal. For a mausoleum with alternating apses and rectangular niches dated to the 350s-360s see: Tóth 1988, 39-52.

[43] Gardthausen 1924, 7 and 79.

[44] Parragi 1976, 178.

[45] Parragi 1976,177 and 181.

[46] For similar form see: Gardthausen 1924 no 194: where the stem of letter *rho* is not longer than those of *chi.*

[47] Hiscock 2000, 8; 13-15 on Platonic geometry; Virtuvius IX. preface 4 and 5.

[48] Hiscock 2000, 63, 72.

[49] Fülep 1984, 160.

Bibliography:

DE BRUYNE 1957
De Bruyne, L.: La décoration des baptistčres paléochrétiens. Actes du Ve Colngrčs international d'archéologie chrétienne. Studi di Antichitŕ Cristiana 22, Cittŕ del Vaticano – Paris, 1957, 341-390.
EVANS 1994
Evans, E.: Military Architects and Building Design in Roman Britain. Britannia 25, 1994, 143-164.
FÜLEP 1984
Fülep F.: Sopianae. The history of Pécs during the Roman Era, and the problem of the continuity of the Late Roman population. Archaeologia Hungarica n.s. 50, Budapest, 1984.
GARDTHAUSEN 1924
Gardthausen, V.: Das alte Monogramm. Leipzig, 1924
GOSZTONYI 1940
Gosztonyi Gy.: A pécsi hétkarélyos ókeresztény temetői épület.– Ein altchristliches Gebäude mit 7 Apsiden in Pécs. Archaeologiai Értesítő 1940, 56-61.
GOSZTONYI 1943
Gosztonyi Gy.: A pécsi ókeresztény temető. Pécs Műemlékei. Pécs (1943).
GROPENGIEßER 1937
Gropengießer, H.: Spätrömischer Burgus bei Mannheim–Neckarau. Badische Fundberichte 13, 1937, 117-118.
HISCOCK 2000
Hiscock, N.: The Wise Master Builder. Aldershot – Brookfield USA – Singapore – Sydney, 2000
JORNS 1974
Jorns, W.: Der spätrömische burgus "Zullestein" mit Schiffslände, nördlich von Worms. Actes du IXe Congrčs International d'études sur les frontieres Romaines. Bucuresti – Köln – Wien, 1974, 427-432.
MÓCSY 1962
Mócsy A.: Pannonia. Pauly's Realencyclopädie der Classischen Altertumswissenschaft. Suppl. 9. Stuttgart, 1962, 515-776.
MÓCSY 1990
Mócsy A.: A kereszténység emlékei. Pannonia régészeti kézikönyve (Eds.: A. Mócsy and J. Fitz), Budapest, 1990
MRT 4
Magyarország Régészeti Topográfiája 4. Veszprém Megye Régészeti Topográfiája. A Pápai és Zirci Járás. Budapest, 1972
MRT 7
Magyarország Régészeti Toporgárfiája 7. Pest Megye Régészeti Topográfiája. A Budai és Szentendrei Járás. Budapest, 1986
NAGY L. 1931
Nagy Lajos: Az óbudai ókeresztény cella trichora a Raktár-utcában. (Az Aquincumi Múzeum 1930. évi ásatása).– Die altchristliche Cella Trichora der Raktár-Gasse in Óbuda (Altofen). (Ausgrabungen des Museums von Aquincum im Jahre 1930). Budapest, 1931
NAGY L. 1938
Nagy Lajos: Pannonia sacra. Szent István Emlékkönyv I. Budapest, 1938, 31-148.
NAGY M. 1998
Nagy Mihály: Nagy Lajos, a dunakanyari késő római védőrendszer kutatója. Budapest Régiségei 32, 1998, 35-43.
NAGY M. 1999
Nagy Mihály: A pannoniai IV. századi burgus-típusok méretei.– Dimension of 4th century A.D. burgus-types in Pannonia. Pannoniai kutatások. A Soproni Sándor emlékkonferencia előadásai. Szekszárd, 1999, 113-140.
PARRAGI 1976
Parragi Gy.: Karéjos épület a Kiscelli utcában.– The apsidal building excavated in the Kiscelli Street. Budapest, Régiségei 24:1, 1976, 177-181, 58, 158-161.
PRODANOVIĆ˘ – ZOTOVIĆ˘ 1964
Prodanović, Lj. – Zotović, M.: Mihajlovac. Arheološki Pregled 6, 1964, 55-57.
RADNÓTI 1939
Radnóti A.: Római kutatások Ságváron.– Römische Forschungen in Ságvár. Archaeologiai Értesítő 52, 1939, 148-164; 268-276.
RÖDER 1952
Röder, J.: Burgus Engers, Kr. Neuwied. Germania 30, 1952, 115-116.
SCHULTZE–STEUERNAGEL 1895
Schultze, R. – Steuernagel, C.: Colonia Agrippinensis. Bonner Jahrbücher 98, 1895, 1-144.
SOPRONI 1976
Der römische Limes in Ungarn (Ed.: J. Fitz). Az István Király Múzeum Közleményei – Bulletin du Musée Roi Saint-Étienne A:22. Székesfehérvár, 1976.
SOPRONI 1978
Soproni S.:, Der spätrömische Limes zwischen Esztergom und Szentendre. Budapest, 1978
TÓTH 1988
Tóth E.: Az alsóhetényi 4. századi erőd és temető kutatása, 1981-1986. Eredmények és vitás kérdések.– Vorbericht über die Ausgrabung der Festung und des Gräberfeldes von Alsóhetény 1981-1986 – Ergebnisse und umstrittene Fragen. Archaeologiai Értesítő 114-115, 1987-1988, 22-61.

TÓTH 1994
Tóth E.: Das Christentum in Pannonien bis zum 7. Jahrhundert nach den archäologischen Zeugnissen. Das Christentum im Bairischen Raum von den Anfängen bis ins 11. Jahrhundert (Eds.: E. Boshof and H. Wolff). Köln – Weimar – Wien, 1994, 241-272.
TÖRÖK 1942
Török Gy.: Rómaikori sírkamrák Pécs Felső-Sétaterén.– Grabkammer aus der Römerzeit and der Oberen Promenade von Pécs. Archaeologiai Értesítő 1942, 207-215.
UBL 1977
Ubl, H.: Der spätrömische Burgus von Zeiselmauer. Grabung und Restaurierung. Studien zu den Militärgrenezn Roms II. Köln – Bonn, 1977, 251-262.
VITRUVIUS
Vitruvius, Tíz könyv az építészetről. Budapest, 1988.

Tipológiai szempontok a pannoniai keresztény sírépületek tanulmányozásához

A keresztény sírépületek tipológiai besorolására Nagy Lajos, Mócsy András, Fülep Ferenc és Tóth Endre munkáiban találunk példákat.[1-12] A jelenlegi tanulmányban két, ebbe a kategóriába tartozó épület (Pécs, *cella septichora*, Aquincum, *cella quinquichora*) geometriai elemzését végzem el.

A cella septichora esetében pontos, elemzésre alkalmas méretadatokat ismerünk Gosztonyi Gyula közleményeiből.[13] A tanulmányozott sírépületek némelyikénél azt találjuk, hogy a falakat az építés során a 16 digitusból álló, 296 mm hosszúságú hagyományos római lábban (*pes Monetalis*) tűzték ki, míg más esetekben (pl. a cella septichora esetében is) egy 11 digitus hosszúságú mértékegység használatára következtethetünk.[14-17] Hasonló mértékegységre több példát ismerünk a Rajna-Duna menti későrómai limesről.[19-28] Ezzel a mértékegységgel gyakran úgy adják meg egy-egy épület bizonyos mérteit, hogy 8-cal szorozzák, vagy négyzetre emelik. Ennek oka valószínűleg a 8 és 11 digitus hosszúságú mértékek gyakori alkalmazásával magyarázható.

Míg derékszöget viszonylag egyszerűen ki lehet tűzni a Pitagorasz-tétel segítségével, addig az ötszög szerkesztése csak rajztáblán tűnik egyszerűnek, az építkezések helyszínén egyszerűbb volt ezt a műveletet olyan sablonok segítségével elvégezni, amelyek derékszöget bezáró oldalai 8 és 11 egység hosszúságúak (1. kép).[29-30] A pécsi cella septichora példáján meggyőződhetünk arról, hogy milyen fontos volt egyes épületek kitűzésénél az ötszög szerkesztése (2. kép) Az épület teljes külső hossza 112x11=1232 digitus, belső hossza a Q és R pontok között 100x11=1100 digitus. Külső teljes szélessége 85x11=935 digitus, belül 74x11=814 digitus. A külső és belső szélesség közötti különbség 11^2=121 digitus (azaz a falvastagság $11^2/2$)[31]

Az alaprajzon a két ötszög csúcsa részben fedi egymást. Ez valószínűleg azzal magyarázható, hogy a tervező úgy akarta csökkenteni az épület belső hosszát, hogy az apszisoknak az ötszög oldalaival érintkező falszakaszai azonos hosszúságúak legyenek. Az alaprajzon két elsődleges és két másodlagos ötszöget figyelhetünk meg (utóbbiak középpontja K és L, alapja a GG' és JJ' szakasz; a másodlagos ötszögeket az alaprajz áttekinthetősége miatt nem tüntettük fel a rajzon). Az épület belső hossza a csökkentés után 100x11 digitus. Ezzel a méretadattal kapcsolatban a tervrajz-készítés három szakaszát rekonstruálhatjuk: az építész először meghatározta az épület belső hosszát, azután kiszámította az ötszögek köré írható kör átmérőjét (48,5x11 digitus) és az ötszögek szükséges átfedését a C és D pontok között (50 digitus). Ezzel egyúttal meghatározta az épület belső szélességét is, hiszen a két másodlagos ötszög középpontja éppen K és L pontokkal azonos. Harmadik lépésként a keleti apszis belső átmérőjét számította ki: ez éppen fele az ötszögek köré írható kör átmérőjének.

A cella septichora alaprajzának legszembetűnőbb vonása az ötszögek alkalmazása. Az ötszög a jól ismert platóni síkidomok egyike, egyúttal az univerzum szimbóluma is.[32] A platóni síkidomok (egyenlő oldalú háromszög, négyzet, egyenlő oldalú ötszög) használatára az építészeti tervezésben és az épületek helyszíni kitűzésében az ókortól a középkorig számos példát ismerünk.[33-34] A platóni síkidomok építészeti használatát összefüggésbe hozzák Constantinus 334-ben kelt rendeletével, amelyben a szabad művészetekben jártas fiatal építészekről szól.[35] A platóni síkidomokat a császár által építtetett római Szent Péter bazilika kitűzésénél is használták.[36]

Keresztény szimbólumokkal nemcsak a hitélettel összefüggő berendezési tárgyak esetében találkozunk gyakran, ezek a szimbólumok az épületek egyes részein is feltűnnek (pl. padló, vagy mennyezet díszítése). Ezek között "építészeti monogramként", néha monumentális méretekben a Krisztus-monogram is előfordul. Néha az egész épületet metaforának tekintik, és méreteit racionálisan úgy tervezik meg, hogy azok kifejezzék annak szentségét.[37-40] Nyolcoldalú épületeknél a hetes szám a Szentlelket, a nyolcas a feltámadást jelképezi.[41]

Nüsszai Szent Gergely, a 380-as években írt egyik levelében leír egy nyolcoldalú, hét fülkés martyriumot, miközben hangsúlyozza, hogy az alaprajz kereszt alakú.[42] A cella septichora alaprajzán az épület méreteinek meghatározásához szükséges fő tengelyek és metszés-pontok egy sztaurogramot rajzolnak ki (3. kép).[43] A szimbólumot feltehetően tudatosan tervezték az alaprajzba, hiszen annak méretei kerek számok (a *rhó* hossza a Q és R pontok között 100x11=1100 digitus; a kereszt szárának hossza az M és N pontok között 55x11 digitus).

A Budapest, Kiscelli utcai ötkaréjos épületet[44] római lábban tűzték ki.[45] A közölt méretek és ásatási rajzok alapján nagyrészt rekonstruálható az eredeti tervrajz (4. kép). Az épület belsejébe rajzolható hatszög keleti oldalával párhuzamosan futó fal belső síkját a többi öt oldaltól eltérően itt úgy jelölték ki, hogy a hatszög középpontja és a belső falsík közötti távolság 10 láb legyen. Erre ugyanolyan magyarázatot találhatunk mint a pécsi cella septichora esetében: az építész csökkentette az épület belső hosszát (O és P pontok közötti távolság 564 digitus). Ennek a méretcsökkentésnek csak akkor válik világossá a jelentősége, ha feltételezzük, hogy az eredeti alaprajz itt is sztaurogramot tartalmazott.[46] Ebben az esetben a kereszt szárának hossza a B és D pontok között 400 digitus (5. kép). Az épület legnagyobb belső méreteinek, azaz a hosszúságnak és a szélességnek az aránya 564:400=1,41. Az eredmény (1,41) azonos 2-vel. A 2 gyakran előfordul épületek alaprajzán, mivel a négyzet megkétszerezése során keletkezik (2 az egységnyi oldalú négyzet átlójának hossza).[47]

A hatos Szent Ágoston szerint tökéletes szám, mivel alkotórészeinek összegével azonos: 1x2x3=1+2+3=6, és mivel az Úr a hatodik napon teremtette az embert.[48]

Az újplatónikus szimbólumok jelenléte nem meglepetés a későrómai Pannonia olyan jelentős városaiban, mint Aquincum, és Sopianae: inkább azt jelzi, hogy az itteni építészek is ismerték a kor aktuális szellemi irányzatait. A geometriai elemzés segítségével a jövőben finomíthatjuk az eddigi tipológiai besorolásokat, és adatokat nyerhetünk a tervezés és kitűzés folyamatára, illetve a tervezők műveltségére vonatkozóan.[49]

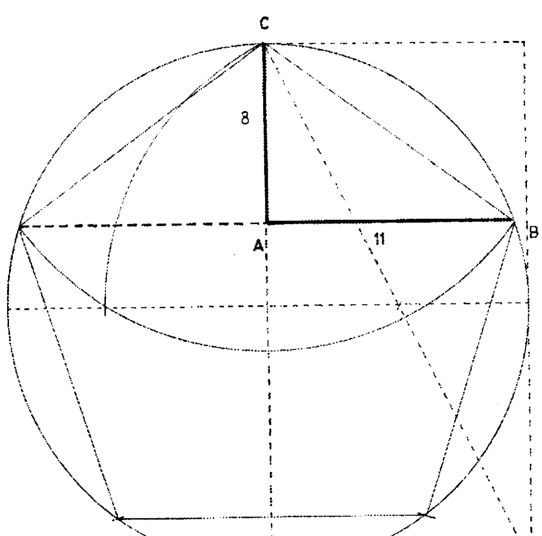

Fig. 1. Construction of the pentagon from a doubled square. AB is half of the pentagon's diagonal. The angle at point C is 54°, at point B 36°.

1. kép: Ötszög szerkesztése a négyzet megkettőzésével. Az AB szakasz hossza egyenlő az ötszög átlójának felével. A háromszög oldalai által bezárt szög C pontnál 54°, B foknál 36°.

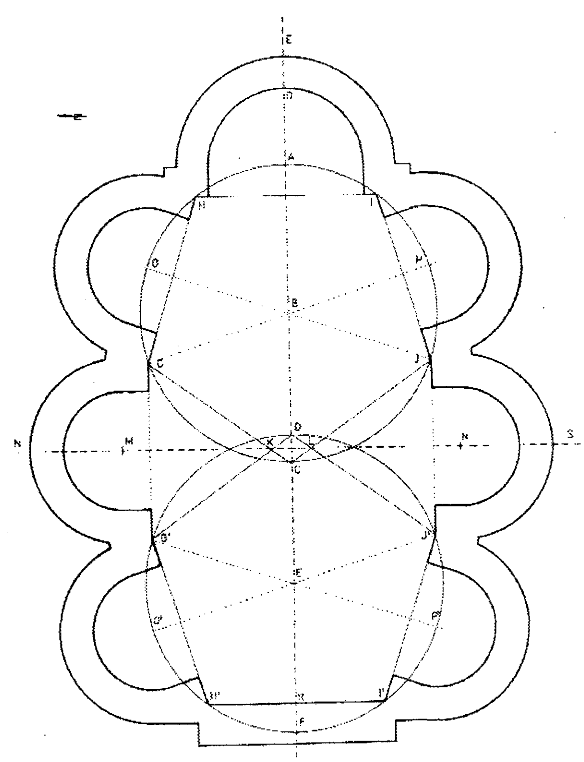

Fig. 2. Geometrical analysis of the ground plan of the cella septichora of Pécs

2. kép: A pécsi cella septichora alaprajzának geometriai elemzése.

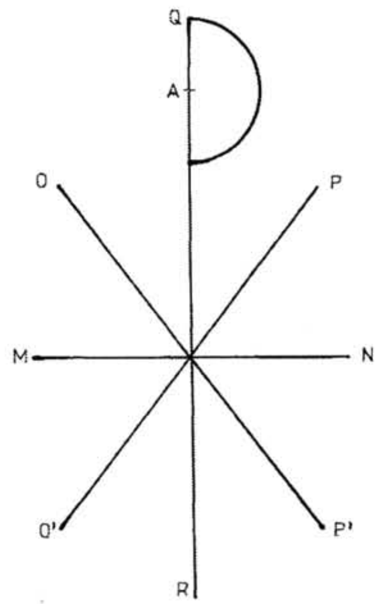

Fig. 3. Combination of a staurogram and a possible Christogram in the ground plan of the cella septichora of Pécs
3. kép: Sztaurogram és Krisztus-monogram kombinációja a pécsi cella septichora alaprajzán.

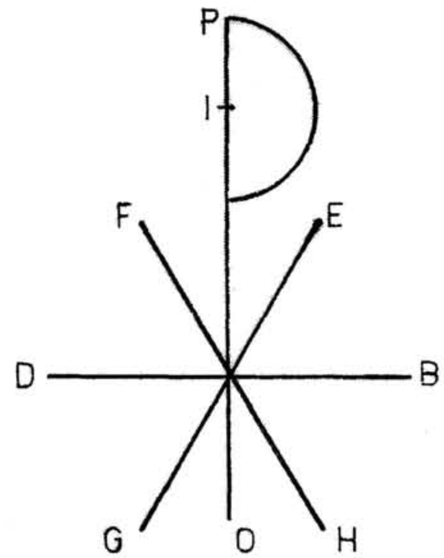

Fig. 5. Combination of a staurogram and a possible Christogram in the ground plan of the cella quinquichora of Aquincum
5. kép: Sztaurogram és Krisztus-monogram kombinációja az aquincumi cella quinquichora alaprajzán.

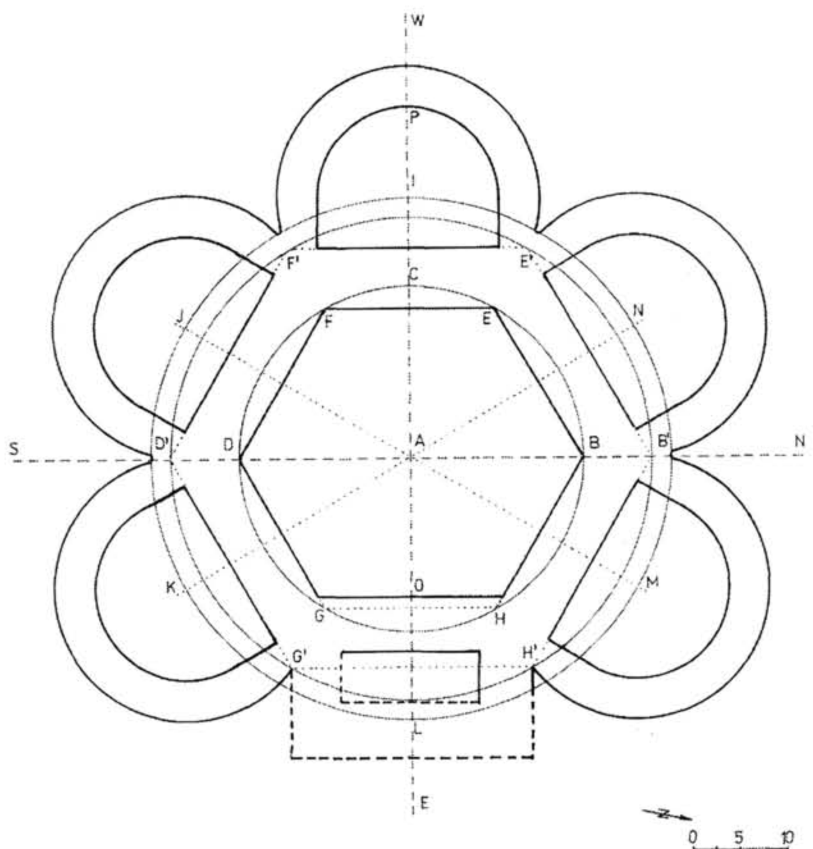

Fig. 4. Geometrical analysis of the ground plan of the cella quinquichora of Aquincum
4. kép: Az aquincumi cella quinquichora alaprajzának geometriai elemzése.