THE CONTINUITY OF THE ANTIQUE COMPOSITIONAL PRINCIPLES IN THE ARCHITECTURE OF THE EUFRASIAN BASILICA

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Aleksander Vidmar

RESUMEN

El artículo aborda la supervivencia de los modos de construcción más allá de la caída del Imperio Romano, en particular se discuten las medidas de la basílica eufrasiana desde el punto de vista de la metodología, el ritmo modular, proporción y simbolismo numérico.

Palabras clave: modos de construcción, medidas, basílica eufrasiana, ritmo modular, proporción, simbolismo numérico.

ABSTRACT

This article studies the remains of the ways of building after the Fall of the Roman Empire and discusses, in particular, the size of the eufrasian basilique from the methodological point of view, the modular rythm, the proportion and numerical symbolism.

Key words: ways of building, size, eufrasian basilique, modular rithm, proportion, numerical symbolism.

The principles of the antique architectural composition survived the fall of the Roman empire. A good example for the survival is the architecture of buildings in the complex of the Eufrasian basilica in Parentium, or Poreč in Croatian or Parenzo in Italia.

The dimensional analysis of buildings in the complex of the Eufrasian Basilica reveals that the standard Roman *pes*, the Byzantine *pous* and the Venetian *piede* were used as modules. Between the 5th and 20th century, when the Basilica of Eufrasius and its surrounding buildings were erected, a number of successive governments imposed their standard systems of measures. The Roman dimensions gave way to the Byzantine units of length to be followed by the Venetian measures. The French metre and the Wiennese *Fuss* during the Napoleonic and the successive Austrian occupation left no trace. But inspite of the different systems of measurement, the antique compositional principles remained in use.

In this paper, we will discuss dimensions of the *Basilica Eufrasiana* buildings from the point of view of the

— metrology,
— modular rhythm,
— proportion, and the
— symbolism of numbers (gematria).

An order is a precondition of a composition[1]. Without order, there is chaos. In architecture, the order is created with the modular rhythm[2]. A module is usually a unit in a standard system of linear measures[3]. Modular sizes of the Roman building components are small[4] multiples of various dimensional units. Compositions of components are consequently sums and multiples of various standard units. A length of a building, e.g., was determined by a Roman architect as a multiple of a Roman standard dimensional unit. It was easy to transform such a length into sums and multiples of smaller standard sizes and hence the building's articulation. Vitruvius emphasized this principle by telling architects to respect diligently the ratio of symmetries, i.e., the ratio of modules: *Aedium compositio constat ex symmetria, cuius rationem architecti diligentissime tenere debent*[5]. The word *symmetria* in the Vitruvian context is not understood any more. Cesare Cesariano is aware in his edition of Vitruvius that the word will not be generally comprehensible: *La qual Symmetria mai alcuni saperano bene intendere: ne operare si diligentemente et promptamente non saperano le regule Arithmetice*[6] Follows the Cesariano's commentary on *symmetria: Consta de symmetrie: cioe di proportionale commensuratione*

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1   If from any craft you subtract the elements of numbering, measuring and weighing, the remainder will be almost negligible (Plato, *Philebus*, 55 d-e). We can deduce from this conclusion that orderly arrangement of components results in a composition, which has different qualitative properties than a disorderly agglomeration of the same components.

2   The primitive order in architecture is the modular rhythm. Building parts combine into an architectural composition when the relations between their dimensions are expressible with ratios of small whole numbers (KURENT, T.: *La legge fondamentale della composizione modulare*, Quaderni di studio, Facolta di architectura, Politechnico di Torino, 1968).
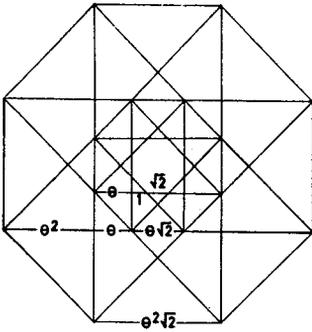
3   A module is a common denominator of architectural dimensions. The units of length in the old systems of lineal measures are used as modules in historical architectures (KURENT, T.: Il principio modulare. —*Belfagor* (Firenze), XXX, 2, 1975).

4   KURENT, T.: The Basic Law of Modular Composition. —*The Modular Quarterly*, Winter 1964-65.

5   VITRUVIUS: *De architectura*, III, Y, 1.

6   Cesare Cesariano (Como 1521), *Vitruvius De Architectura*, Wilhelm Fink Verlag, Muenchen, 1969.
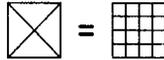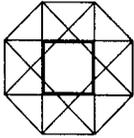
$1 - \sqrt{2} - \theta - \sqrt{2}\theta - \theta^2 - \sqrt{2}\theta^2 - \theta^3 - \ldots$ $1 - \sqrt{2} - 2 - 2\sqrt{2} - 4 - 4\sqrt{2} - 8 - \ldots$ $1 - \theta - \theta^2 - \theta^3 - \theta^4 - \theta^5 - \theta^6 - \ldots$

$0 - 1 - 2 - 5 - 12 - 29 - 70 - 169 - \ldots$
$1 - 1 - 3 - 7 - 17 - 41 - 99 - 239 - \ldots$
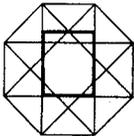$2 - 1 - 4 - 9 - 22 - 53 - 128 - 309 - \ldots$

$\theta = 1 + \sqrt{2} = 2{,}414\ldots$ $\theta^2 = 1 + 2\theta = 3 + 2\sqrt{2}$
$\sqrt{2}\theta = 1 + \sqrt{2} + 1$ $\theta^3 = 2 + 5\theta = 7 + 5\sqrt{2}$
$2\theta = \theta + 1 + \sqrt{2}$ $\theta^4 = 5 + 12\theta = 17 + 12\sqrt{2}$
$\theta^2 = \theta + 1 + \sqrt{2} + 1$ $\theta^5 = 12 + 29\theta = 41 + 29\sqrt{2}$
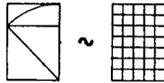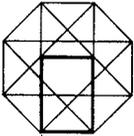$\sqrt{2}\theta^2 = \theta + 1 + \sqrt{2} + 1 + \theta$ $\theta^6 = 29 + 70\theta = 99 + 70\sqrt{2}$

1:1   **Q**   ⊠ = 🔲   PRIMA

QUADRIAGON

1:1,207   **XD**

$1 - 2 - 5 - 12 - 29 - 70 - \ldots$
$2 - 4 - 10 - 24 - 58 - 140 - \ldots$ $\longrightarrow \dfrac{\theta}{2} = \dfrac{1 + \sqrt{2}}{2} = 1{,}207\ldots$
$1 - 3 - 7 - 17 - 41 - 99 - \ldots$ $\longrightarrow$
$2 - 6 - 14 - 34 - 82 - 198 - \ldots$ $-\!\!-\!\!\shortparallel\!\!-\!\!-$
$1 - 4 - 9 - 22 - 53 - 128 - \ldots$ $\longrightarrow$
$2 - 8 - 18 - 44 - 106 - 256 - \ldots$ $-\!\!-\!\!\shortparallel\!\!-\!\!-$

1:1,414   **D**   DIAGON

$\dfrac{1 - 3 - 7 - 17 - 41 - 99 - \ldots}{1 - 2 - 5 - 12 - 29 - 70 - \ldots} \longrightarrow \sqrt{2} = 1{,}414\ldots$
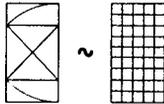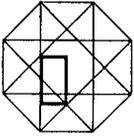
1:1,828   **DD**   DUAL DIAGON

$\dfrac{1 - 4 - 9 - 22 - 53 - 128 - \ldots}{1 - 2 - 5 - 12 - 29 - 70 - \ldots} \longrightarrow 2\sqrt{2} - 1 = 1{,}828\ldots$

1:2   **OQ**   OCTAVA
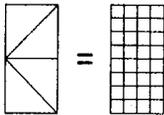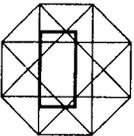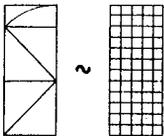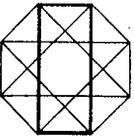
1:2,414   **θ**   DOUBLE QUADRIAGON

$\dfrac{2 - 5 - 12 - 29 - 70 - 169 - \ldots}{1 - 2 - 5 - 12 - 29 - 70 - \ldots} \longrightarrow \theta = 1 + \sqrt{2} = 2{,}414\ldots$

ILLUSTRATION 1. *The octagram and its proportions.*

527

α 1	ι· 10	ρ 100
β 2	κ 20	ς 200
γ 3	λ 30	τ 300
δ 4	μ 40	υ 400
ε 5	ν 50	φ 500
ζ 6	ξ 60	χ 600
Ζ 7	ο 70	ψ 700
η 8	π 80	ω 800
ϑ 9	𝈼 90	

ILLUSTRATION 2. *The Greek alfabet and its gematrical value.*

distincta numerabilmente in diuerse quantita et particulae: quale tutte assumpte insieme reassumeno et reformano la sua totale quantita in integru: si como habiamo de Euclide: aut per figure numerabile: uel lineale aut de cose superficiale uel corporeae. The definition of *symmetria* by Cetus Faventinus is similar: *Graeci modulorum mensuras symmetrian appelaverunt*[7].

The understanding of historical architecture is not possible without metrology[8]. In the Eufrasian buildings, the Roman *pes*, the Byzantine *pous* and the *piede Veneziano* determine the modular rhythm.

The present bishop's residence is a palace, built in the 6th century on the Roman foundations. Its dimensions can be measured with the Roman foot, or *pes*, 295,7 mm. long.

Basilica itself, the baptistry, the memorial chapel and the atrium in front of the entrance to the sanctuary were designed in the 308,00 mm. long Byzantine foot, or *pous*.

After the retreat of Byzantines, new buildings were conceived in the Venetian foot, or 347,30 mm. long *piede veneziano*. Among them, the oldest is the 15th century sacristy, which is a link between the Basilica proper and the memorial chapel. The church-tower was built in the 16th century. The two chapels were added to the southern side of basilica in the 19th century.

The foot, used as module in the Eufrasian buildings, was not constant in size, but the modular principle remained unchanged.

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7   HUGH PLOMMER: *Vitruvius and Later Roman Manuals*, Cambridge, University Press, 1973.
KURENT, T.: The Vitruvian Symmetria Means "Modular Sizes". —*Linguistica*, XIX. Ljubljana, 1979.
KURENT, T.: Modular Sizes According to Vitruvius. —*The Module*, The Modular Society, Spring 1972.
8   The Roman building components, buildings and towns are designed in standard Roman measures (DETONI, M., KURENT, T.: *The modular Reconstruction of Emona*, Dissertationes Musei Labacensis, Ljubljana, 1963). Vitruvius relates that *mensurarum rationes, quae in omnibus operibus videntur necessariae esse, ex corporis membris collegerunt, uti digitum, palmun, pedem, cubitum* (Vitruvius, *De architectura*, III, I, 5). Pour relever et comprendre les monuments grecs, c'est avec le pied grec qu'il les faut mesurer (VIOLLET-LE-DUC: *Dictionnaire Raisonne*, VIII, Symmetrie). Une analyse correcte du procede de composition d'un monument architectural du passe, soit dans son ensamble, soit en son detail, n'est pas possible, si l'on ne connait pas le systeme de mesures, sur lequel il est base (ZLOKOVIĆ, M.: Antropomorfni sistemi mera u arhitekturi. —*Zbornik zaštite spomenika kulture* IV-V, Beograd, 1953-1954). Metrology mirrors the history of civilisation (KURENT, T.: Merski sistemi v arhitekturi na Slovenskem. The Systems of measures in the architecture in Slovenia. —*Zbornik za zgodovino naravoslovja in tehnike*, 9, Slovenska matica, Ljubljana, 1987). Ídem, La coordinación modular de la dimensiones arquitectónicas. —*Boletín del Museo Arqueológico Nacional*, III, 4, Madrid, 1985).
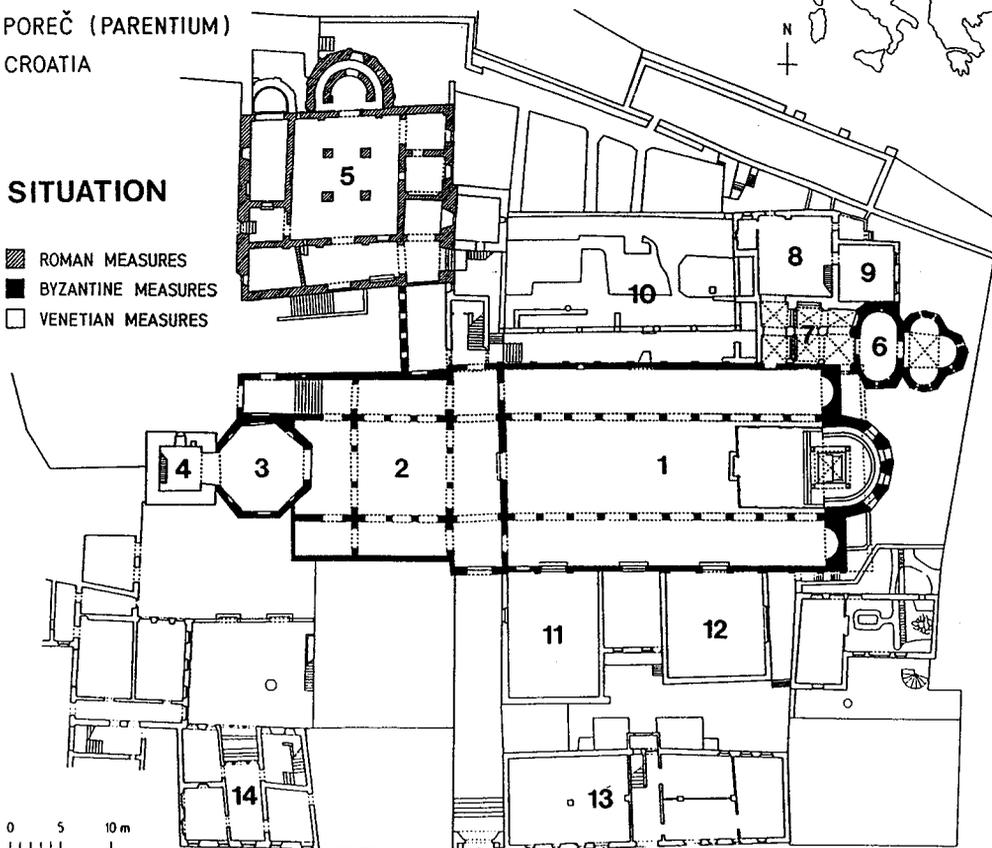
BASILICA EVFRASIANA

543 – 554 A.D.
POREČ (PARENTIUM)
CROATIA

POREČ (PARENTIUM)

N

SITUATION

▨ ROMAN MEASURES
■ BYZANTINE MEASURES
☐ VENETIAN MEASURES

0 5 10 m

1 **Basilica Eufrasiana** (6th cent.)   8 **New Sacristy** (19th cent.)
2 **Atrium** (6th cent.)   9 **New Sacristy** (20th cent.)
3 **Baptistery** (5th cent.)   10 **Older Sacral Buildings**
4 **Church Tower** (16th cent.)   11 **Chapel** (17th cent.)
5 **Bishop's Palace** (6th cent.)   12 **Chapel** (19th cent.)
6 **Memorial Chapel** (6th cent.)   13 **Canonici** (13th cent.)
7 **Sacristy** (15th cent.)   14 **Venetian Palace** (17th cent.)

ILLUSTRATION 3. *Buildings composing the Eufrasius' basilica complex in Poreč-Parentium were erected between the 5th and the 20th Century. In that period, the Roman, the Byzantine, the Venetian and finally the metric measurement were taking place.*

529

The proportioning scheme, regulating the Eufrasian buildings[9] in the Roman, and Byzantine period, is the eight-pointed star, called octagram[10].

The 5th century baptistry is a regular octogon in plan.

The bishopric and the Basilica Sanctae Agnese, built not far away in the 6th century on Roman foundations in the rhythm of *pes*, are designed as distorted octagrams[11].

The ratio 1:2 is the predominant proportion in the Byzantine era. The clear width and length of the Basilica, e.g., are 60 and 120 *podes*. The width of 60 *podes* is twice larger than the axial width of the central nave. In the same proportion 1:2 are the 29 ft height of the roof around atrium and the 58 ft distance between Basilica and baptistry. Also, the 45 ft height of the octagonal baptistry and the 90 ft distance between *campanile* and Basilica are in the ratio 1:2.

The Venetian proportions is also simple. The ground plan of the belltower is a square, 20 *piedi* wide.

The square and the double square are both in the family of octagram's proportions. In both cases the preferred dimension is either repeated or doubled.

The simplicity of proportioning with squares is due to the preference of symbolic numbers. The preferred modular dimensions were chosen by the architect because of their gematrical messages.

All numbers in the Basilica's dimensions have their symbolic meaning. The length of Basilica, e.g., is 496 modules of 4 dactyls. The length without apsida is 888 modules of 2 dactyls. The width and height of basilica are 127 modules of 8 dactyls and 432 modules of 2 dactyls, respectively. In the Venetian period, number 496 reappears in the height of the church-tower, the cross on the top included.

Numbers 888, 496, 432, 127, 120, 90, 60, 30... have their symbolic, or better, their gematric meaning. Gematria[12] is a Hebrew term for the translation of words into numbers and vice versa. The Hebrew and Greek letters are simultaneously symbols for numbers. Later, the Latin, Cyrillic, Glagolitic and the Arab gematrical cryptography developed. In this paper, we are interested only in the Greek and Latin gematric codes. One of the rules of gematric grammar

9   KURENT, T., MUHIČ, L., VIDMAR, A.: Razvoj kompleksa Evfrazijeve bazilike s stališča merske analize. —Zbornik Ljubljanske šole za arhitekturo, Ljubljana, 1989.
    KURENT, T., VIDMAR, A.: Merska kompozicija Evfrazijevih zgradb. —*Zbornik LŠA*, Ljubljana, 1992.
10   Scholfield, P.H., *The Theory of Proportion in Architecture*, Cambridge University Press, 1958.
11   The ancient architect knew well how to construct the right angle. With the distortion of rectangular plan, more preferred numbers were built into dimensions. See the distorted plans of the Diocletion Palace and of the Basilicae Eliane in Friuli in the papers:
    KURENT, T.: The Modular composition of Diocletian Palace in Split. —*Antiquite vivante*, XX, 1970;
    KURENT, T., POZZETTO, M.: Ancora un'ipotesi sulla configurazione spaziale delle basiliche di Grado. —*Archeografo Triestino*, Societa di Minerva, IV, L, Trieste, 1990.
12   FARBRIDGE, M.H.: *Studies in Biblical and Semitic Symbolism*, The Library of Biblical Studies, KTAV Publishing House, Inc., New York, 1970.
    CROWLEY, A.: *Liber 777 and Other Qabalistic Writing*, Samuel Weiser, Inc., York Beach, Maine, 1988.
    KURENT, T.: Gematrija v merah arhitekture na Slovenskem Gematria in dimensions of some architectures in Slovenia. —*Zbornik za zgodovino naravoslovja in tehnike*, 10, Slovenska matica, Ljubljana, 1989.
    KURENT, T.: La signature gematrique de Rabelais par les nombre 66 et 99. *Acta neophilologica XIX*, Ljubljana, 1986.
    KURENT, T.: Kaj je gematrija. *Življenje in tehnika*, april 1992.
    KURENT, T.: O merah v arhitekturi. *Življenje in tehnika*, oktober 1992.
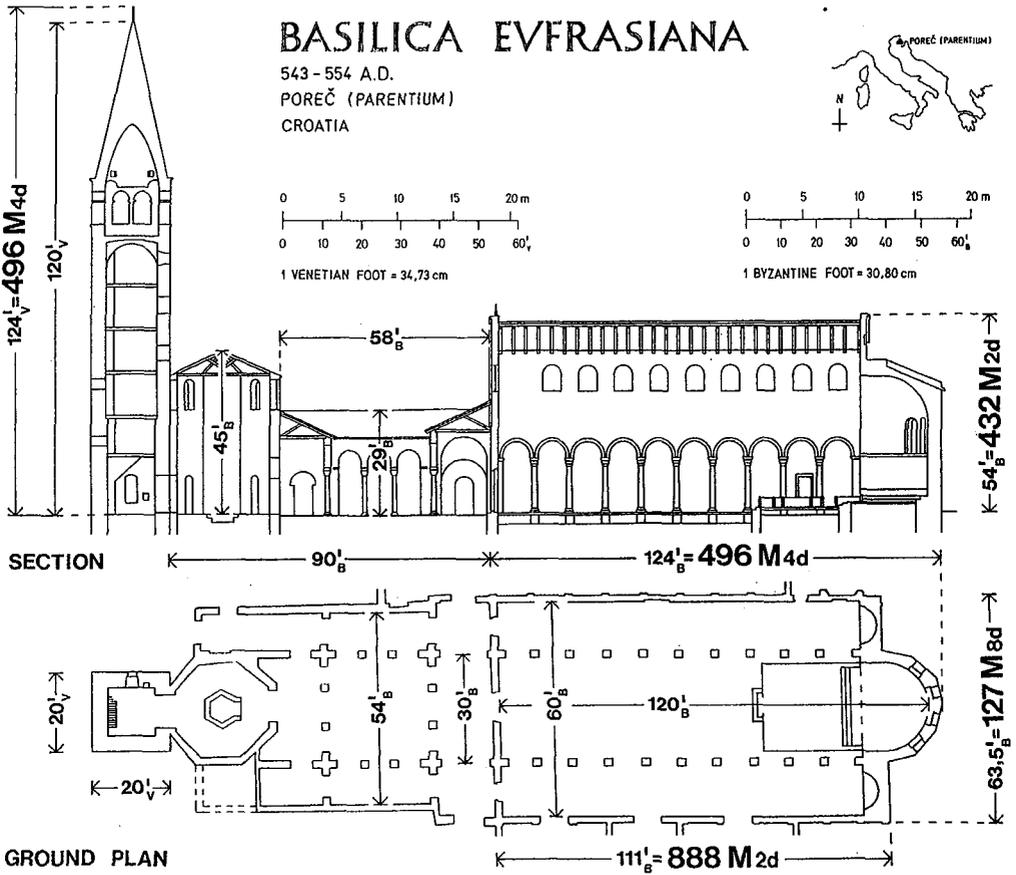
BASILICA EVFRASIANA

543 - 554 A.D.
POREČ (PARENTIUM)
CROATIA

SECTION

GROUND PLAN

ILLUSTRATION 4. *Preferred numbers, used as modular multiples in the dimensional composition of the Basilica Eufrasiana.*

says that a cypher can have the same gematrical meaning as a 2-, 3-, 5-, 7- times larger or smaller number. This is understandable, since 1 foot equals 2 *semes*, or 3 *trientes* or 4 *palmi* or 12 *unciae* or 16 *digiti*. Besides, 1 *palmipes* is equal to 5 *palmi* and 1 *cubitus longus* to 7 *palmi*. The multiple meaning of a number is still echoed in the Christian dogma, that the Holy Trinity, the Father, the Son and the Holy Ghost, are but one God. This numerical ambiguity of the old world ended when Arabs introduced their (Indian) numerals in Europe. Moslems believe that Allah is only one and unique: *Allah Wahed Ahad*[13].

In other words, numbers 3, 30, 3000, 120, 6, 240, are gematrically synonymous.

According to the Greek gematria, the most holy name of Jesus has the value of 888:

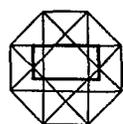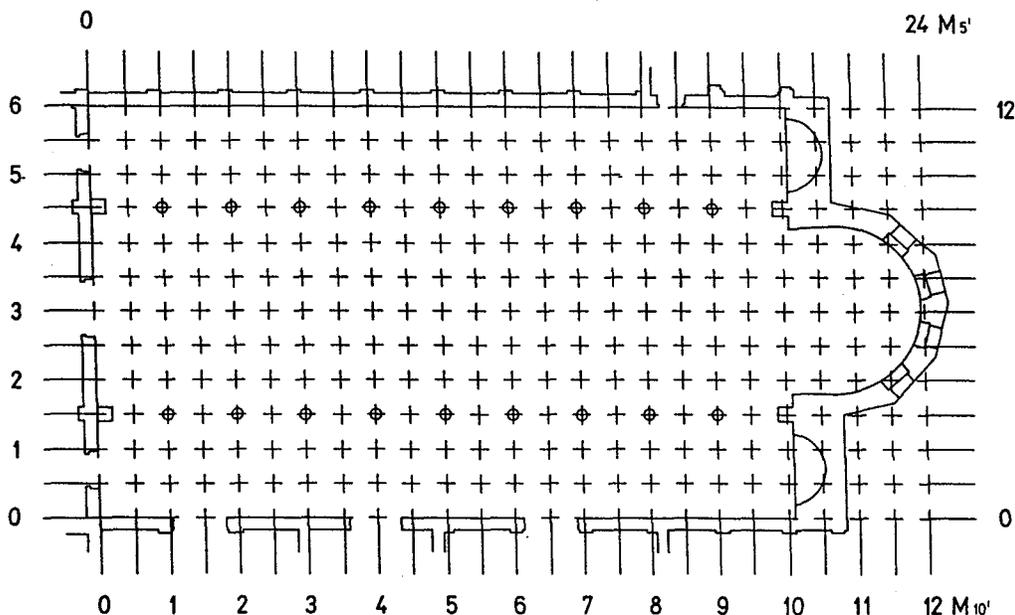13   112th Sura, *El Ihlas*.

BASILICA EVFRASIANA

543 - 554 n.št.
POREČ (PARENTIUM)
ISTRA

TLORIS BAZILIKE

ILLUSTRATION 5. *The distorted plan of the Basilica on the planning grid. The module is 10* podes *long.*

ΙΗΣΟΥΣ = 10+8+200+70+400+200=888 [14].
Also, the divine names **ΠΑΤΗΡ, ΥΙΟΣ, ΠΝΕΥΜΑ**, equal to 1776 or 2 x 888.

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14   The Second Enigma in the Sybiline Oracles is explaining the equivalence of the Jesus' name and the number 888. The number 888 and its synonyms are common in dimensions of churches. The Saint Stephan cathedral in Wienna, e.g., is 222 *Wiener Fuesse* wide. The cistercian basilica at Stična, Slovenia, is 222 *pedes*, or 888 *palmi*, long.

LAHM, K.: Siebenunddreisig. Die Neuentdeckte Schluesselzahl des Stephansdom. *Das Reich*, Juni 1943.

KURENT, T.: Cosmogramma della basilica Romanica de Stična. —*Critica d'arte* (Firenze), dicembre 1980.
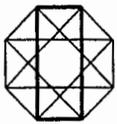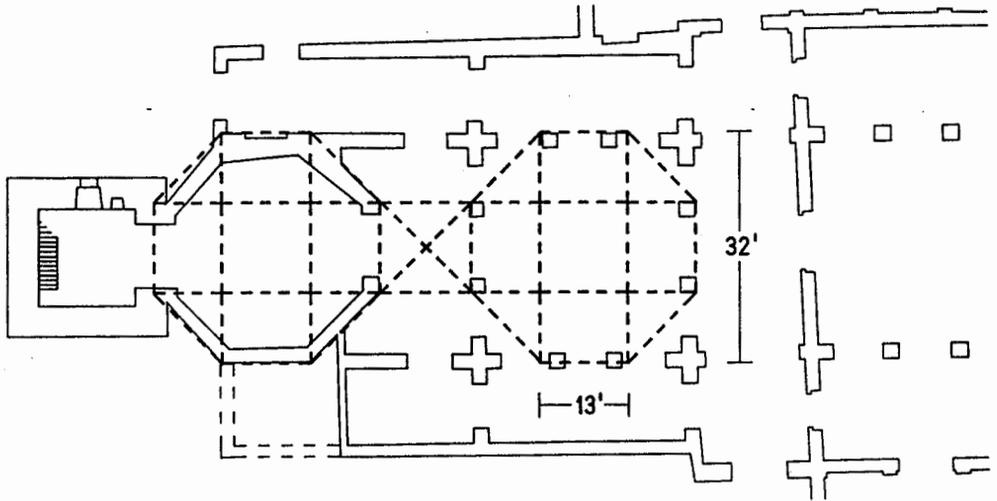
BASILICA EVFRASIANA

543 - 554 n.št.
POREČ (PARENTIUM)
ISTRA

TLORIS ATRIJA IN KRSTILNICE

MODUL = 1'

PELL 1 6 ⑬ ㉜ 77

32 : 13 = θ

S

0   5   10 m

0   5   10   20   30'

1 BIZANTINSKI ČEVELJ = 30,8 cm

ILLUSTRATION 6. *The plan of the atrium and baptistry is regulated by the scheme of octagram.*

Number 496 is an Euclidian perfect number[15]. It hides the following gematrical meaning: ΙΗΣΟΥΣ ΧΡΙΣΤΟΣ ΘΕΟΤΗΣ, ΕΞΟΥΣΙΑ ΤΟΥ ΘΕΟΥ. Jesus Christ, Godhead, Authority of God — in Greek is equal to 4960.

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15   KURENT, T., VIDMAR, A.: Evklidovo število 496 v kompoziciji Evfrazijeve bazilike skozi stoletja. —*Zbornik L A*, 1989.

BASILICA EVFRASIANA

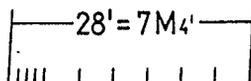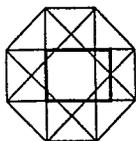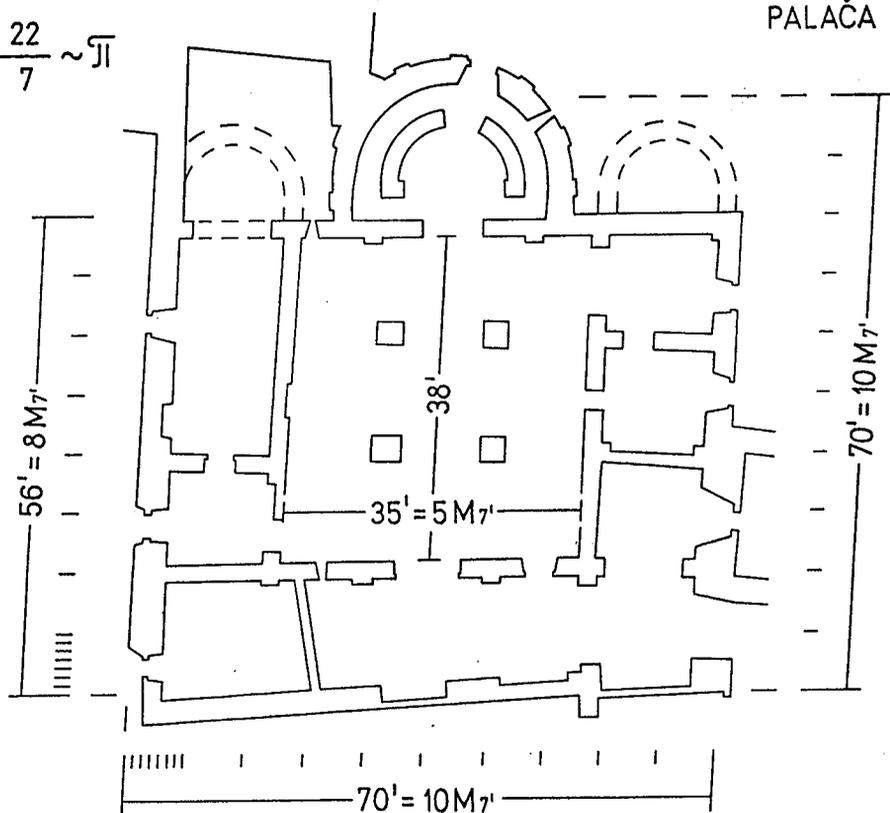543 – 554 n.št.

POREČ (PARENTIUM)

ISTRA

APSIDA

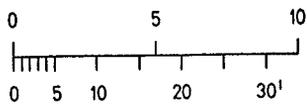$D = 28' = 7\,M_4'$

$C = 88' = 22\,M_4'$

$\dfrac{22}{7} \sim \pi$

ŠKOFOVSKA PALAČA

POREČ

$28' = 7\,M_4'$

$56' = 8\,M_7'$

$38'$

$35' = 5\,M_7'$

$70' = 10\,M_7'$

$70' = 10\,M_7'$

MODUL = 7'			
10 : 10	PRIMA		Q
10 : 8 = 5 : 4	QUADRIAGON		XD
PELL 1 2 ⑤ 12 . . .			$\dfrac{\theta}{2}$
2 ④ 10 24 . . .			2

0   5   10
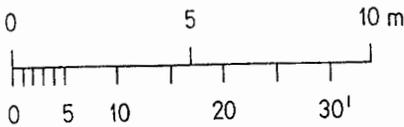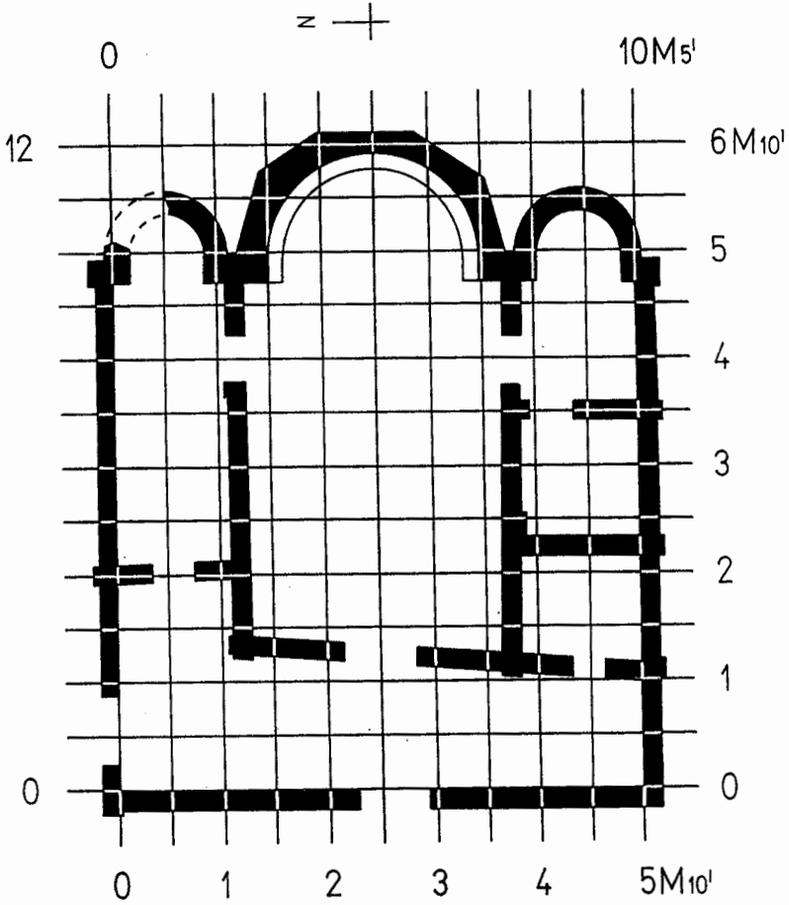
0   5   10   20   30'

1 RIMSKI ČEVELJ = 29,57 cm

ILLUSTRATION 7. *The present bishopric is built on the Roman foundations.*

BASILICA SANCTAE AGNESAE

VI. stol. n. št.
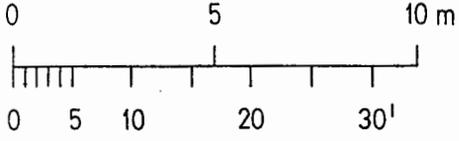MUNTAJANA (POREČ / PARENTIUM)
ISTRA

ILLUSTRATION 8. *The plan of the Basilica Sanctae Agnesae, built in the 6th Century A.D. in Muntajana near Poreč, on the Planning grid in the rhythm of the 10 pedes long module.*

BASILICA SANCTAE AGNESAE

VI. stol. n. št.
MUNTAJANA (POREČ/PARENTIUM)
ISTRA

POREČ

0   5   10 m

0   5   10   20   30'

1 RIMSKI ČEVELJ = 29,57 cm

— 2M 25'
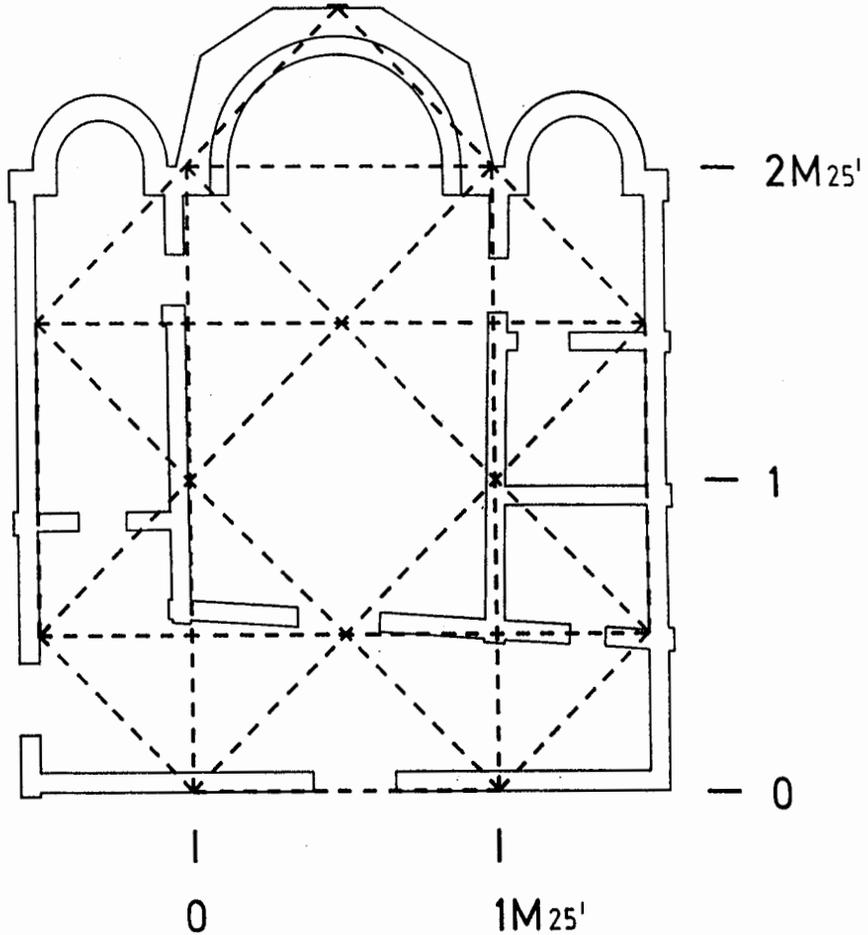
— 1

— 0

0   1M 25'

ILLUSTRATION 9. *The plan of the Basilica Sanctae Agnesae on the scheme of octagram.*

But in the Venetian-Latin gematria[16], number 496, equal to 16 x 31, hides the acronym of Dominus Nostes Jesus Christus. DNJC = 4+14+10+3= 31.

Number 432 is one of the oldest preferred cyphers[17]. One half of it, the number 216, means **ΜΑΡΙΑ ΑΛΗΘΕΙΑ**, Maria the Truth.

According to Critias, the diameter of Atlantis equals 127 stades[18]. Our basilica is 127 modules wide.

Number 3000, gematrically equal to numbers 90, 60, 30, 120... hides the Authority of the Lord God: **ΕΞΟΥΣΙΑ ΤΟΥ ΘΕΟΥ ΚΥΡΙΟΥ**.

The dimension of 120 *piedi*, or better, its synonymous number 3000 is reciting the Lord's Prayer in Latin:

PATER NOSTER, QUI ES IN CAELIS,
SANCTIFICETUR NOMEN TUUM,
ADVENIAT REGNUM TUUM,
FIAT VOLUNTAS TUA,
SICUT IN CAELO ET IN TERRA.
PANEM NOSTRUM QUOTIDIANUM
DA NOBIS HODIE,
ET DIMITTE NOBIS DEBITA NOSTRA
SICUT ET NOS DIMITTIMUS
DEBITORIBUS NOSTRIS.
ET NE NOS INDUCAS IN TENTATIONEM,
SED LIBERA NOS A MALO. AMEN.

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16   The Latin letters used as the gematric code:

A 1   K 11   U 21
B 2   L 12   V 22
C 3   M 13   W 23
D 4   N 14   X 24
E 5   0 15   Y 25
F 6   P 16   Z 26
G 7   Q 17
H 8   R 18
I 9   S 19

17   Number 432 is one of the most preferred numbers of the old world. Number 432.000 in the Icelanding *Edda*, e.g., is a product of numbers 540 (doors) and 800 (soldiers passing through). See chapter *Grimnismal* in the book: WAGNER, F.: *Les poemes mythologiques de l'Edda*, Facute de Philosophie et Lettres, Liege, Librairie E. Droz, Paris, 1930.

According to Berosus, the reigning of Mesopotamian kings before the Deluge lasted 432.000 years long. See: VON GUTSCHMID, A.: *Zu den Fragmenten des Berosus und Ktesias*, Reinische Museum, VIII, 1853.

According to Arybhata, the Hindu *Macha-Yuga* is 4,320.000 stellar years. See: *Aryabhata*, Sanscrit Edition, Leiden, Holland, 1874.

Our number is also known in the Greek world. The Platonic nuptial year equals $6^3 = 5^3+4^3+3^3= 216$ ordinary years. See: SHORLEY, P.: *Plato: Republic*, The Loeb Classical Library, VIII, 546 b-d.

Vitruvius writes about number 216 in his Book V, 3-4.

18   PLATO: *Critias*, The Loeb Classical Library, William Heinemann, Ltd, London.

KURENT, T.: Atlantis after Critias and Number of the Platonic Lambda. —*Antiquite vivante*, 29, 1, 1979.

KURENT, T.: The Vitruvian Man in the Circle, the Five Platonic Elements and the Preferred Numbers in Ancient Architecture. —*Antiquite vivante*, 31, 1, 1981.

Besides, in the number 300 is written the message: SERENISSIMA REPUBLICA VE-NEZIA.

Gematrically built-in messages are considered a sort of mysticism. But if Sheldrake's theory of morphogenetic fields[19] is valid, we might assume that gematric ideas influence even those who have never heard about gematria and even do not understand the language.

Conclusion. Metrology, the modular principle, proportion, the preferred numbers and gematria are not to be disregarded in the research of historical architectures.

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19   SHELDRAKE, R.: *A New Science of Life*, Paladin, London, 1988.
KURENT, T.: Mačkov Rotovž: Polje idej in gematrično čaranje. *Zbornik L A, 1991.*