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the Pleiades Cluster with Effects on the Real Geographic Space**

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ABSTRACT

This paper presents the basics of the original method of topographic space analysis and its reconstruction, in a world context. The method is derived from the discovery of astrognosical primordial geometrical matrix of the Pleiades cluster with effects on the real geographic space, regarding urban and religious organization and impostation of the cities, sanctuaries and temples. For the first time so far, this method introduces the concept of *Trojan eponymy*. When the method is applied outside the Mediterranean, through Arab, African and Asian world, it gives compatible spatial and temporal coordinates, which points to the Pleiadean primordial pattern as a postulate of the overall spatial and geometric arrangement of the world. The method was applied in several separate projects: Milesian colonization of the Black Sea, epic poem *Argonautica* by Apollonius of Rhodes, Hannibal's march on Rome – First Punic War, the legend of Loreto, the position and architecture of Pre-Romanesque Rotonda in Ošlje etc. The matrix is autonomous in finding the lost prehistoric cities, which was verified in some obvious examples, such as archaeological site Kasta Tomb, Amphipolis. It opens and discusses the crucial question: who would nowadays be able to construct such a properly arranged matrix in which cardinal geographic objects and prehistoric cities throughout Mediterranean and Europe function perfectly, if they have not originated through the matrix itself? The matrix projection is based on elementary geometry and mathematically confirms astronomical and terrestrial coherence through all the layers of history starting from the oldest known civilizations. Its nature is fractal and in itself precisely reflects the metaphysical principle “On Earth as it is in Heaven”. Interdisciplinary, natural science, philosophical and theosophical approach is proposed, in order to provide a critical review of this work, which, in terms of scientific research, introduces the necessary novelty and freshness, while in

technological sense, enlivens the neglected dimension of the human as a depoliticized being.

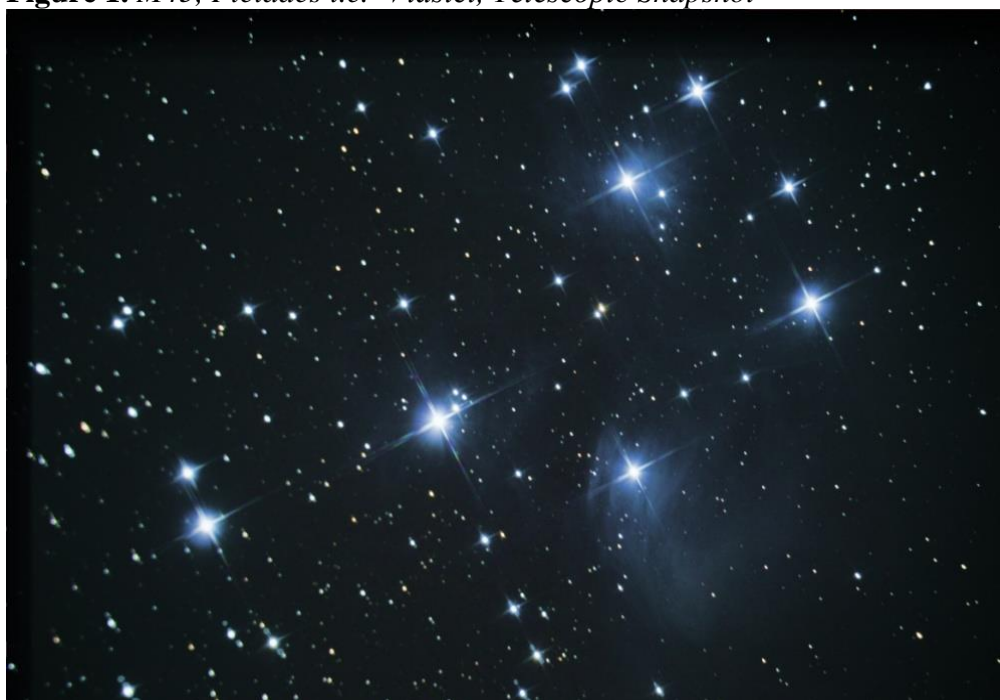
Keywords: Pleiades, matrix, space geometry, golden ratio, Troy.

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Introduction

This paper presents the structure of a specific geometrical matrix based on a golden ratio. This matrix represents star cluster Messier 45 (M45), i.e. the arrangement of stars in the constellation of Pleiades, in Croatian language also known as Vlašići.

Figure 1. *M45, Pleiades i.e.- Vlašići, Telescopic Snapshot*



Du Astro – Dubrovnik, December 2017.

The nature of each set is function, therefore this paper gives an overview of the implementation of the geometrical matrix of the Pleiades in the real geographic space, as it was set up and analyzed in the primordial form by Igor Šipić, first published in his book *Zašto bi mogla...Atlantida?* (2014) (translator's note, *Why could it ... Atlantis?*).¹ In this book Šipić brought

¹ Šipić, I., 2014., *Zašto bi mogla... Atlantida?*, Naklada Bošković, Split

original and verified, so far unknown interpretation of the geometrical matrix of the constellation Pleiades as well as its geometric development and reflection on the real geographic space. The scientific discourse is based on the astrognosical view of the cluster visible from the ground, through interrelations of the brightest nine stars, which historically correspond to the mythological patterns of the cluster within ancient cultures and civilizations, not only throughout the Mediterranean, but also across the entire planet.

The other important type of the implementation of the matrix presents its reflections in the architecture and ground plan of the pre-Romanesque octaconch Rotonda in village Ošlje in Dubrovnik Primorje region. In this respect, one can speak of a system that, with its general characteristics not only aspires to implement a geometrical matrix in a real Mediterranean space, but with its specific and individual characteristics, points out a geographic position as a key proof of the correctness of the definition of the celestial cluster image.

This paper is therefore the result of the synthesis of the method developed in its basic principles by Šipić in his doctoral dissertation *Srednjovjekovni mediteransko-jadranski plovidbeni putovi i topografija jadranskih svetišta* (2012) (t/n *Medieval Mediterranean and Adriatic Navigation Paths and Topography of the Adriatic Shrines*).² This paper is today interdisciplinary and multidisciplinary used and applied by the scientific team of the Institute PanonIQum (HU) in their research. By analyzing the topography of the Adriatic shrines and Mediterranean-Adriatic navigational routes and their impact on the geography of the Mediterranean, with a special emphasis on the Adriatic, following the insights and knowledge gained by studying the baroque map from the second half of the 16th century - *Descriptio translationis Sanctæ Domvs Beatissimæ Virginis e Nazareth in Dalmatiam et Inde Lavretvm*³, but also with numerous analysis of the geographic space, its history and events,⁴ Šipić establishes a system that is speaking about itself in a specific language through the action of the given geometry.

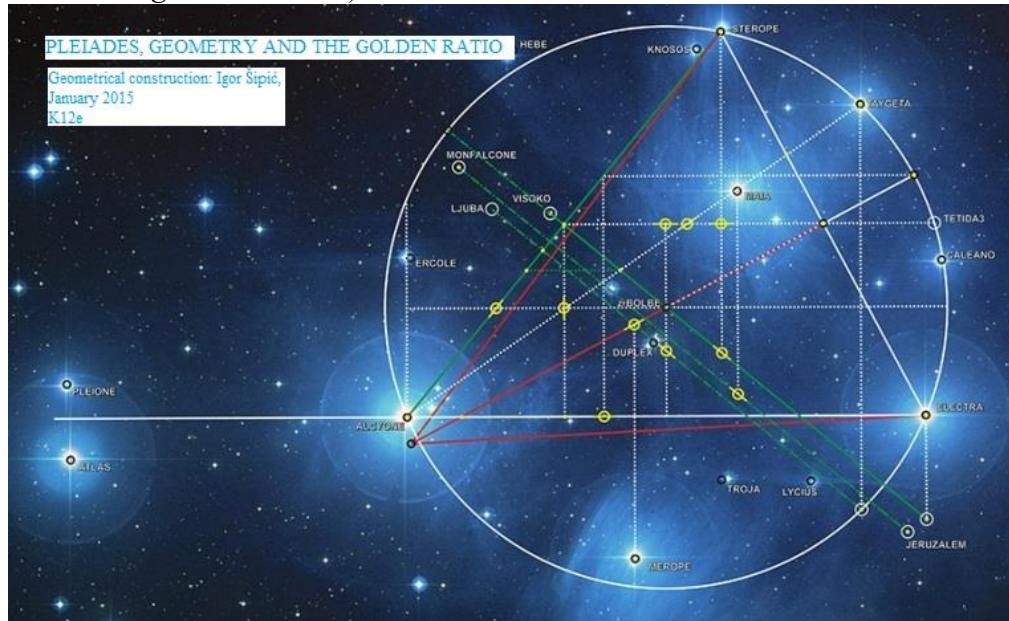
Namely, it is a geometric analysis in the geomorphologic sense of cardinal geographic objects of the Mediterranean and the continental earth masses gravitating to it, which shows the correct, mathematical arrangement of this geographic space, in parallel with the historical, civilization, urban, sacral and other significant infrastructure created by human activity in this part of the world, from the prehistoric times to the present day. The established astrognosical primordial matrix points to the fact that this arrangement is based on the position of the stars in the Pleiades cluster: Alcyone, Electra, Caleano, Taygeta, Sterope, Maya, Merope, Pleione and Atlas (Figure 2).

² Šipić, I., *Plan of Leopardus - the peak of the Loreto historiography*, self-published, Split; Šipić I. and Faričić, J. 2011. Presentation of the Transfer of the Holy House from Nazareth to Loreto, *Kartografija i geoinformacije*, Vol. 10, No. 15, Zagreb, 128-151.

³ Abbreviated as *Descrizione della Traslazione della Santa Casa*, today preserved by Archivio Storico Santa Casa, Loreto, Italy.

⁴ Šipić, I. 2013. The Cult of St. Lucy. Venetian context and influence along the Eastern Adriatic, *Studi Veneziani*, N. S. LXVII, Pisa – Rome, MMXIV, 201-231.

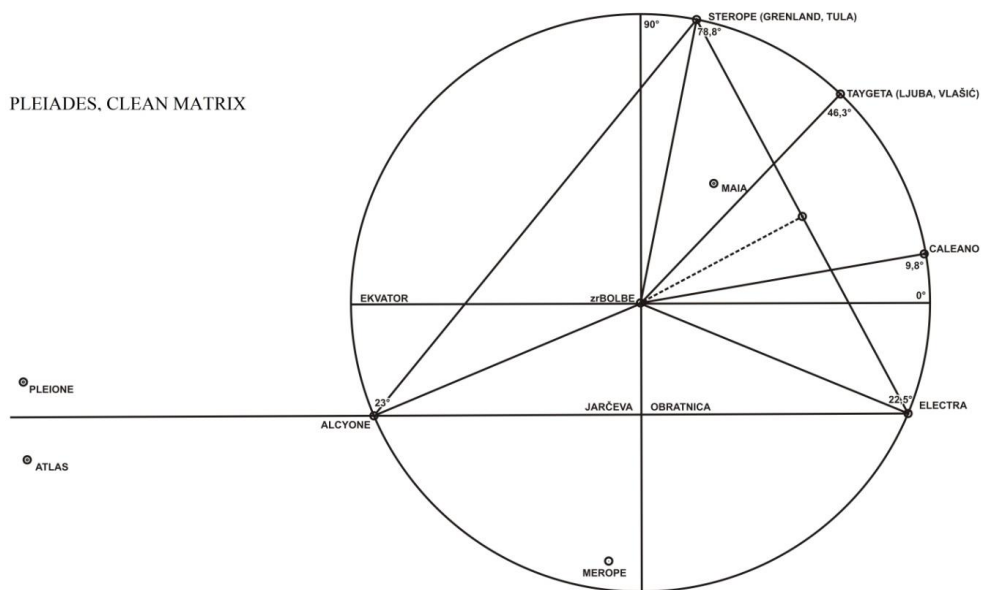
Figure 2. *The Geometrical Matrix of Pleiades and the Golden Ratio (Šipić, Zašto bi mogla...Atlantida?)*



Pleiades Star Cluster (M45), Hubble Space Telescope Image, Image ID: B6E207.

By analyzing the arrangement and positions of the stars in the M45 cluster, it is undoubtedly determined that five of the nine stars in the cluster, that is five of the "Seven Sisters", lie on a common circle. The pairs of Sterope - Taygeta and Caleano - Electra are equally distant, while the chord of Electra and Alcyone divides the radius, which is also the perpendicular bisector of the chord, fitting the golden ratio (Figure 3).

Figure 3. *Clean Matrix*



Source: Šipić, *Zašto bi mogla...Atlantida?* (2014).

The verification was carried out on several telescopic images taken from both Earth's hemispheres at different seasons, which show compliance with the mathematical model. For this analysis, footage from December 2017 is used, made by Astronomical Society DuAstro, Dubrovnik (Figure 1).

Methodology and Research Area

The original scientific paper deals with two aspects of discovery of the astrognosical primordial geometrical matrix of the Pleiades cluster: the first, mathematical expertise of comparing the contents of the celestial image of the Pleiades cluster and the postulates of elemental geometry, and the second one, their integrative effect on the real geographic space and the geographical position through determined implementation. Spatially, the research and application of the model includes the Mediterranean and its gravitating mainland, West and Central Europe, North Africa, the Asia Minor and the Arabian Peninsula, as well as the maritime cultures of two important seas - the Black Sea and the Sea of Azov⁵. The model is functionally tuned to the distances between coasts, on the principle of toolbox technologically closest to the "portolan" era (13th -15th century). All analyses were conducted on maps in Mercator's flat cylindrical projection. For this purpose, the authors used the International map of the Mediterranean Sea made at scales of 1: 7,500,000⁶ and 1: 2,250,000 (108 INT 302, Mediterranean Sea, western part; 109 INT 302, Mediterranean Sea, eastern part).⁷

Since this is the original and so far unknown effect of the compositional principle of the golden ratio for topographic purposes, the model carries specific characteristics of simultaneous interactivity and autonomy of producing geometric effects on the geographic position and real geographic space. In addition, the model has an enormous influence on the distribution of toponyms, cities, ports, temples, shrines, necropolises and independent tombs, legends, myths, historical events, and geomorphologic cardinal geographic objects, bays, capes, passages, straits, mountain peaks, estuaries, etc. Interactively self-propelled, the model distinguishes the historical layers, and with a high degree of certainty, its lower utilization threshold is chronologically set at the beginnings of Phoenician and Greek colonization of Mediterranean, but giving preference to Phoenician factories and the oldest ports and cities of Middle East Phoenicia.

During the process of the development of science, the era of observation,

⁵ Šipić is systematically engaged in maritime culture, which is evident in his master's thesis *Mediteran – suvremeni izraz europske povijesti* (t/n The Mediterranean - a Contemporary Expression of European History). This master's thesis was later upgraded in the book: *Mediteran. Povratak u utrobu., Naklada Bošković, Split, 2007.* (t/n The Mediterranean. Back to the womb.)

⁶ Hydrographic Institute of the Yugoslav Navy, Map of the Mediterranean, *Maritime Encyclopedia*, vol. 7, Zagreb, 1985.

⁷ Croatian hydrographic Institute, Split, December 1st 2001.

based on astronomy and incorporated in philosophical and natural science of the classical antiquity, transposed into medieval Arabic and European science and left deep traces in the current geographic distribution of key points of navigation and land corridors of the Mediterranean and the surrounding land masses. However, with the exception of some simulation projections, there was no indication of setting up a system based on a specific star constellation. Therefore, with innovative clarity and mathematical certainty, this model reproduces positions of the stars, comparing them with current cardinal positions of cities and geomorphologic markers. This could mean that the existing geographic situation corresponds to the first geographic knowledge about the sites that are the subject of this research, and that is why it is possible to reconstruct the paths of the main flows of goods and passengers in the Mediterranean. It is therefore entirely possible that during the period when it was relatively uninhabited, the first colonies, later the cities and sanctuaries, could be founded in places of reached points of navigation within certain astronomical orientation systems. This is a very important conclusion that will determine the methodological path of further investigation. The results of the application of the matrix of the Pleiades cluster are a starting point for establishing new views on a systematically founded urban-religious network of cities. They confirm that this is a previously unknown model of the organization of life within the coastal borders of the Mediterranean and the land surrounding it. In all likelihood, behind the model there is a "coded" geographic measurement, which can affect some established opinions in the field of the natural sciences and humanities, with emphasis on the historical geography.

Constructively, the model is subject to the fundamental principle of the projection with the base at the North African coastline. From there, a series of circles will be structurally developed, whose radiuses will be conditioned by the chosen mathematical points of European land, which is already the third level of matrix synchronization in relation to the real geographic space. Here are just some of the primary circles with centres on the North African coastline, whose radii are located on the meridians in cities such as Paris, Athens, Istanbul, or in historical sites, Troy, Ljuba, mountain Vlašić (lat. Mons Matrix), Alpine passage Col de Clapier ("Hanibal's Circle") etc. From the viewpoint of Greek colonization, "argonautic" and "volos" circles⁸ are very important, as well as "the circle of Ošlje", from the viewpoint of the system itself. "The circle of Ošlje" is determined by a radius in the site of Ošlje, where the octaconch Rotonda, also known as the "Greek church", appeared as a key of the research process which will be clearly demonstrated by the geometric harmony of the celestial matrix of the Pleiades, functionally copying itself to the Earth through direct influence on all subjects of the project.

Although this is not necessary, it should be said that the aforementioned

⁸ In the book co-written with T. M. Bilosnić, *Tajna Apolonova tronošca*, Naklada Bošković, Split, 2013. (t/n The secret of the Apollo tripod) Šipić discusses with ideas of academician Radoslav Katičić, offering a completely different view of the Apollonian epic of the Argonauts.

circle will lead to the extraction of Etalon “The six cataracts of Nile”, as a primary measurement standard and system check in all three developed projects: The legend of Loreto – transfer of the Holy House from Nazareth through Illyricum to Loreto; the implementation of the primordial matrix of the Pleiades into the real geographic space; the Trojan eponymy matrix as a distributor of the Pleiadian celestial matrix on the Earth.⁹ Preliminary results of the research support topographic and mathematical regularity as a state of transition from a seemingly chaotic state to a state of the highest order of arrangement.¹⁰ At the same time, they confirm the necessity of practicing the celestial pattern, in order to develop the infrastructure of the three main religions of the world, as successors of previous cultures and civilizations, especially in the domain of ancient cosmogonical primordials. In this respect, the crucial is the course of the development of the Marian cult which will take over the primacy from the ancient bearers of the feminine group of deities in the Mediterranean.¹¹ In this context, the author of this work suggested the position of Rotonda in Ošlje as "the Illyrian point of the legendary transfer of the House of Mary", which makes it one of the most elite monuments of world cultural heritage.¹²

Discussion - Geometrical Matrix of the Golden Ratio – Type “P”¹³

The Golden Ratio

The golden ratio or the golden section is defined, as the proportion of two quantities in which the bigger part divided by the smaller is equal to the sum divided by the bigger part.

$$a > b$$

⁹ The primary construct of the Trojan eponymy matrix was presented in book co-written with T. M. Bilosnić, *Ahilej u virovima vrtoloma, 3000 godina Za dar*, Zadar, 2012. (t/n Achilles in the whirlpools)

¹⁰ Šipić, I. 2018. STUDIJE I.-II. Vlašići i mali narodi, *PannoniQM Institute*, Sopron: Nogić, S. La divina commedia: Plejade u zlatnom rezu, 376-437.

¹¹ At the symbolic level, the matrix of the Pleiades cluster was originally interpreted by analyzing the drawings from the salt holder made of deer’s antler. It was found in the tomb of a knight from the 9th century, in Sopronkohida in Western Hungary: Šipić, I. 2018. STUDIJE I. Vlašići i mali narodi, Plejade u biku – geografija ljubavi, 245-278. (t/n Pleiades in Taurus – geography of love)

¹² Šipić, I. 2018. STUDIJE I. Vlašići i mali narodi: Rotonda Ošlje – spomenik nulte vrijednosti svjetske kulturne baštine i ilirička točka legendarnog prijenosa Marijine kuće, 373-374. (t/n Rotonda in Ošlje – a world heritage site and the Illyrian point of the legendary transfer of the House of Mary)

¹³ In this analysis, authors differentiate two types of geometrical matrixes based on the golden ratio. One of them is so-called *Trojan eponymy matrix*, denoted as Type – T, while the other, *matrix of the Pleiades*, is called Type – P. Only mathematical development of the Type – P matrix is represented in this paper. Even though mathematical development of the Type – T matrix is not a subject of this paper, it’s important to emphasize that these two matrixes are mutually mathematically coherent.

$$a / b = (a+b) / a$$

The coefficient of this division is a mathematical constant denoted by the Greek letter φ , and its value equals

$$\varphi = 1.6180339887\dots$$

The coefficient of the golden ratio is an irrational number and its reciprocal value $1/\varphi$ denoted by uppercase Greek letter Φ equals

$$\Phi = 0.6180339887\dots$$

Arithmetically expressed, φ equals

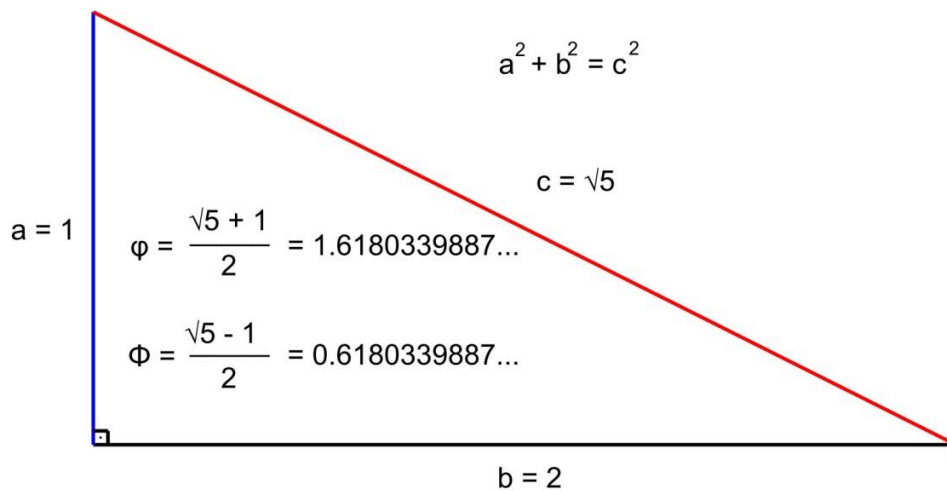
$$\varphi = (\sqrt{5} + 1)/2,$$

and its reciprocal value equals

$$\Phi = (\sqrt{5} - 1)/2.$$

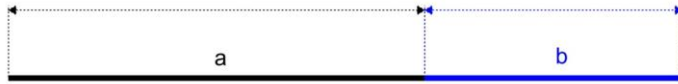
Numbers 1, 2 and $\sqrt{5}$ form a right triangle with the catheti's length of 1 and 2, while the hypotenuse, according to the Pythagorean theorem equals $\sqrt{5}$. This triangle allows us to create a geometrical construction of the golden ratio (Figure 4).

Figure 4. *Right Triangle, Condition $\sqrt{5}$*



The line segment divided in longer (a) and smaller (b) part according to the golden ratio is given below. In this example, the length of the line segment is $d=10$ m, the longer part equals around 6.18 m and smaller part equals 3.82 m (Figure 5).

Figure 5. Line Segment Divided according to the Golden Ratio



$$\frac{a}{b} = \frac{(a+b)}{a} = \varphi = 1.6180339887\dots$$

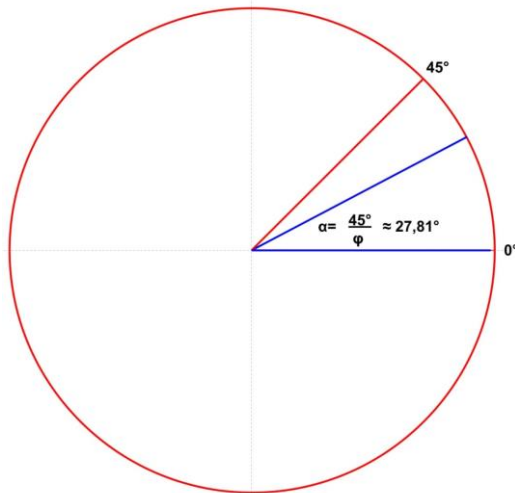
$$\begin{aligned} d &= a + b = 10 \text{ m} \\ a &\approx 6.18 \text{ m} \\ b &\approx 3.82 \text{ m} \end{aligned}$$

$$\frac{b}{a} = \frac{1}{\varphi} = 0.6180339887\dots$$

Angles can also be divided according to the golden ratio. Division of one eighth of the full circle is given below (Figure 6). The larger part of the divided angle equals

$$\alpha = (360^\circ/8)/\varphi = 45^\circ/\varphi \approx 27.8115^\circ.$$

Figure 6. 45° Angle Divided by the Golden Ratio



The angle α will be used as a fundamental angle in this analyses.

Points A, E, S, T and C

From the origin of the Cartesian coordinate plane with X-axis and Y-axis, we draw a circle K of arbitrary radius r (Figure 7). The circle K is called **principal (primordial) circle**. The centre of the circle at the origin is denoted by B.

On negative part of Y-axis, we denote the point Z that divides radius of the circle K according to the golden ratio. We denote these segments by x and y , such that the length x of \overline{BZ} is the smaller segment, i.e.:

$$r = x + y,$$

$$x/y = y/(x+y) = \Phi = 1/\varphi \approx 0.6180339887\dots$$

$$x = y/\varphi$$

$$y = x \cdot \varphi$$

$$\varphi = 1/\Phi \approx 1.6180339887\dots$$

Through the point Z we draw a line parallel to X-axis and we denote the intersections of this line and circle K in the third quadrant by A and in the fourth quadrant by E. Through the point B we draw a line p at angle α with respect to positive side of X-axis and we denote its intersection point on the circle K in the first quadrant by V.

$$\alpha = (360^\circ/8) \cdot (1/\varphi) = 45^\circ/\varphi \approx 27.8115^\circ$$

From the point E we draw a normal on the line p and we denote its intersection with the circle K in the first quadrant by S. We got a chord \overline{ES} of the circle whose perpendicular bisector is line p . We call line p **principal (primordial) perpendicular bisector**. Since \overline{ES} is perpendicular to line p , \overline{ES} and Y-axis form an angle α , hence \overline{ES} and X-axis form an angle $90^\circ + \alpha$.

Through the point S we draw a line that forms an angle $-\alpha$ with respect to a line through S that is parallel to the X-axis, and in the first quadrant we denote the intersection of this line with circle K by T. Reflecting point T with respect to line p we get the point C, which is also on the circle K. Hence the line p is the bisector of \overline{TC} which is parallel to \overline{ES} , while segments \overline{ST} and \overline{EC} have the same length.

We are pointing out **primordial triangle** $\triangle AES$, with the sides \overline{AE} , \overline{ES} , \overline{SA} . It is a triangle inscribed in the circle K, and its sides are chords of the circle K. The bisector of the chord \overline{AE} is the Y-axis, the bisector of the chord \overline{ES} is line p at angle α , while the bisector of the chord \overline{AS} is a line that forms a $180^\circ - \zeta$ angle with x-axis. We denote chord \overline{AS} bisector by v .

angle of point E equals

$$\beta + \zeta \approx 62.1884^\circ$$

and angle of point S equals

$$\alpha + \zeta \approx 67.5445^\circ.$$

Obtuse angles of inner isosceles triangles equal: triangle $\triangle ABS \approx 124.3769^\circ$, triangle $\triangle ABE \approx 135.0890^\circ$ and triangle $\triangle EBS \approx 100.534^\circ$, which are also the double values of the angles of the primordial triangle.

$$2 \cdot (\alpha + \beta) = 2 \cdot 50.267^\circ \approx 100.534^\circ$$

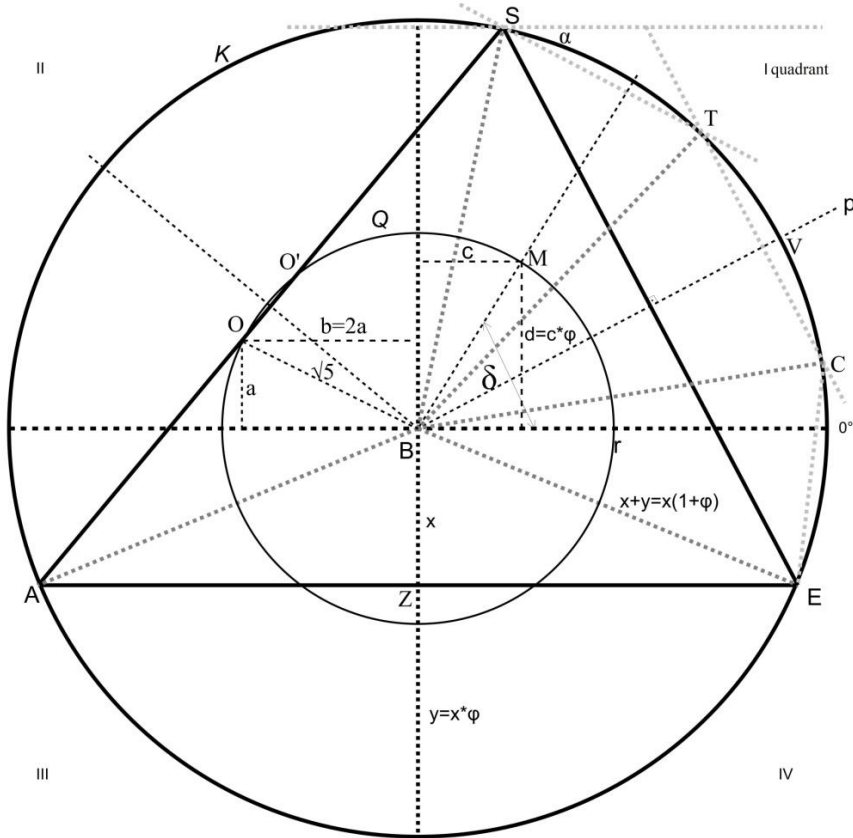
$$2 \cdot (\beta + \zeta) = 2 \cdot 62.1884^\circ \approx 124.3768^\circ$$

$$2 \cdot (\alpha + \zeta) = 2 \cdot 67.5445^\circ \approx 135.089^\circ$$

Point O – The Main Focus of the Matrix

Let us concentrate on a construction presented on the Figure 8.

Figure 8. Construction of the Point M (Maya)



In the second quadrant, on the chord \overline{AS} we denote a point O, whose coordinates on the X and Y axis ratio is $b/a = 2/1$. These sections form a right triangle in which the length of the hypotenuse to the lengths of the other side's ratio is $\sqrt{5}/2$ and $\sqrt{5}/1$.

From the point B we draw a circle with the radius \overline{BO} and denote it circle Q. Circle Q also intersects chord \overline{AS} in the second quadrant in a point that we denote O'.

On the circle Q in the first quadrant we mark a point whose X to Y coordinate ratio is $c/d = 1/\varphi$. We denote it by M. We draw a line from point B through point M. That line and positive side of X-axis form an angle δ that equals (Figure 9):

$$\delta = \text{arctg}(1/\varphi) \approx 58.2825^\circ$$

A line from point B through point S with the X-axis forms an angle σ :

$$\sigma = 2 \cdot \alpha + \beta = 2 \cdot (45^\circ/\varphi) + \arcsin(1/(1+\varphi)) \approx 78.0785^\circ$$

A line from point B through point T with the X-axis forms an angle ω

$$\omega = \delta - (90 - \sigma) \approx 46.2984^\circ$$

A line from point B through point T with the X-axis forms an angle ψ ;

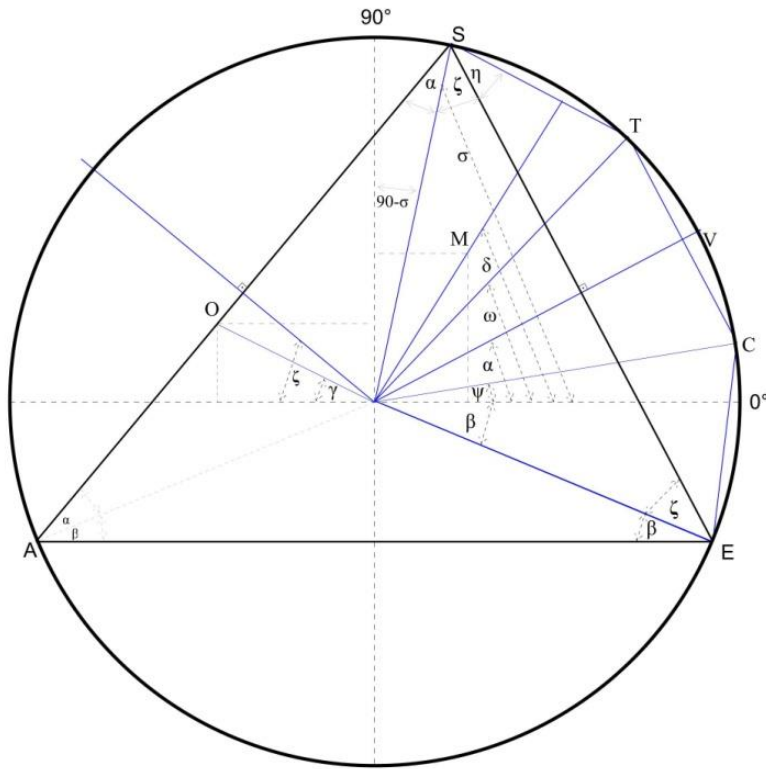
$$\psi = \sigma - \omega - \beta \approx 9.3247^\circ$$

A line from point B through point O with the X-axis forms an angle $180^\circ - \gamma$

$$\gamma = \arcsin(1/\sqrt{5}) \approx 26.565^\circ$$

$$180^\circ - \gamma \approx 153.4349^\circ$$

Figure 9. *Operating Angles*



Standard Deviation

By checking the values of the obtained angles, we notice that \overline{BS} forms almost the same angle with respect to positive side of Y-axis, as \overline{BM} forms with respect to \overline{BT} .

So we get:

$$\delta - \omega \approx 11.9841^\circ$$

$$90^\circ - \sigma \approx 11.9214^\circ$$

The ratio of these differences equals

$$(90^\circ - \sigma) / (\delta - \omega) = 11.9214^\circ / 11.9841^\circ \approx 0.994768,$$

that leads us to the value Δ_1 , considered the maximum deviation of the system.

$$\Delta_1 = (1 - 0.994768) \cdot 100\% = 0.5232\% \approx 5.2\%.$$

Values less than Δ_1 correspond to the deviation values in analysis. The occurrence of values like Δ_1 is noticed in the deviations of the star position in the cluster M45 respect to the construction of this matrix. Similar deviation values of real model respect to the mathematical one are found in the construction of Rotonda in Ošlje, as in the implementation of the matrix of the

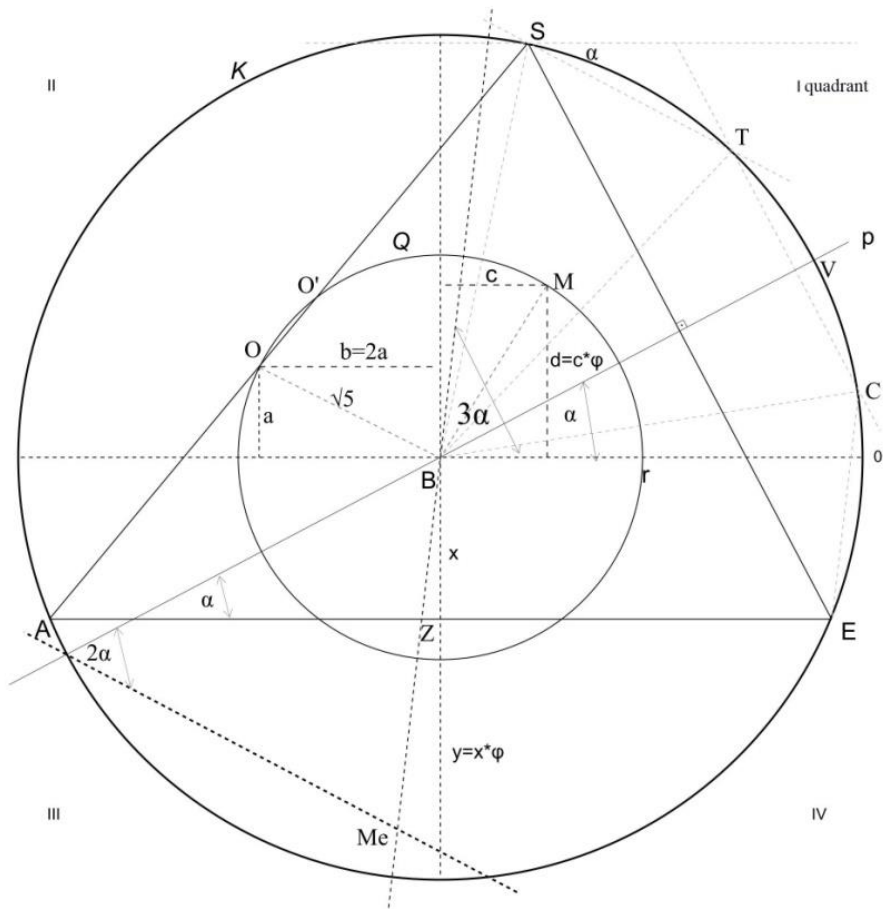
Pleiades in the Mediterranean Basin, which will be discussed in more detail in the section **Implementation**.

Point Me

We continue with the construction of the matrix.

Through the point B we draw a line at angle $3 \cdot \alpha \approx 83.4345^\circ$ (or $270^\circ / 2 \cdot \phi$). Through diametrically opposite point to the point V on the circle K (the second intersection of line p and circle K) we draw a line at angle $180^\circ - \alpha$ with respect to the positive side of X-axis. We denote the intersection of these two lines by Me (Figure 10)

Figure 10. Construction of the Point Me

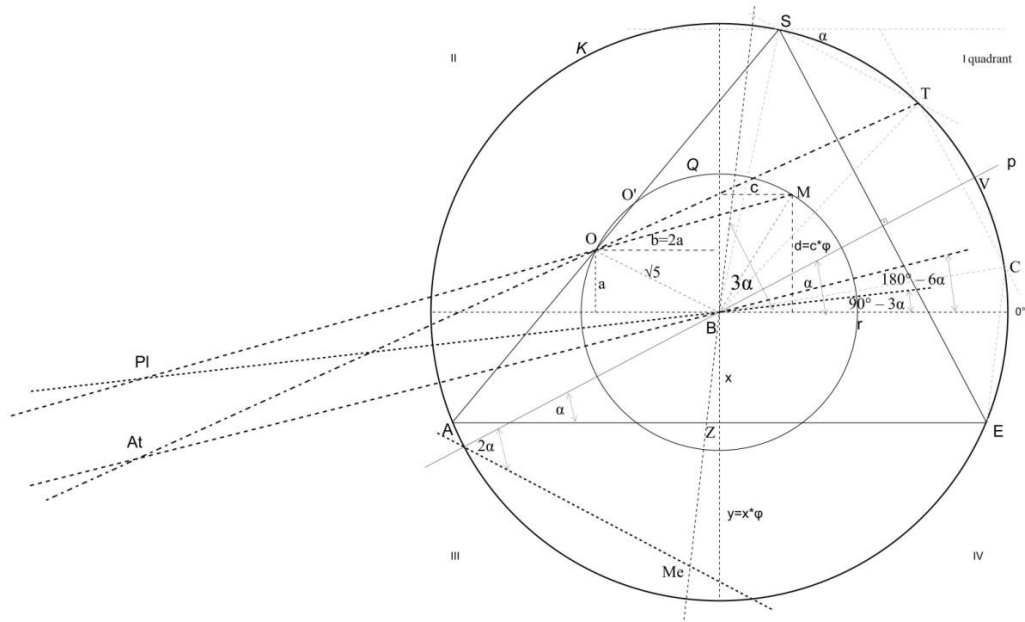


Points Pl and At

We draw one line through the vertex B at angle $90^\circ - 3 \cdot \alpha \approx 6.5655^\circ$, and another one through points M and O. We denote their intersection point by Pl.

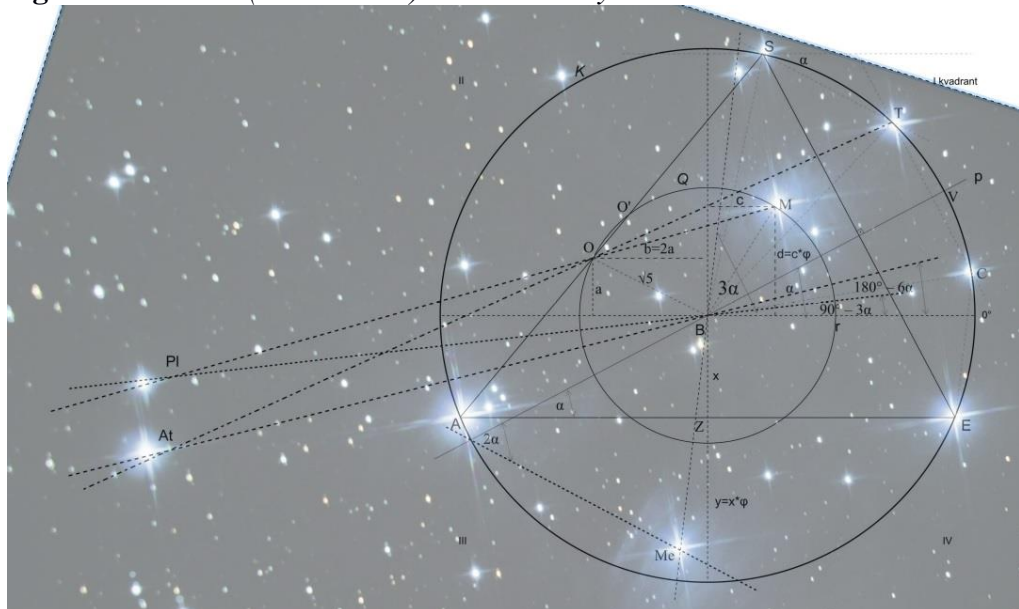
Then we draw line through the point B at angle $180^\circ - 6 \cdot \alpha \approx 13.131^\circ$, and another one from the point T through the point O. We denote their intersection by At (Figure 11).

Figure 11: Construction of points *Pl* and *At*



Finally, if we set points A and E of the matrix constructed above, to the centre of star Alcyone and Electra in M45 cluster, we can notice congruence of the position of stars in the cluster and the matrix, as it follows: Alcyone, Electra, Caleano, Taygeta, Sterope, Maya and Merope. Deviation is higher when it comes to stars Pleione and Atlas. However, these two stars gravitate towards constructed lines (Figure 12).

Figure 12. *Vlašići* (cr. *Pleiades*) and Geometry



Transition in the Main Focus of the Matrix

Lines that can be expressed by angle α are taken as the criterion for determining the positions of the stars Pleione and Atlas, along the lines that are in transition towards these stars through the point O (line T-O-At and line M-O-Pl). It is visible from Figure 12 that these intersections lay out of the centre of stars Pleione and Atlas, but it is also apparent that all of these lines pass through their shining zone.

Point O directly connects six stars in pairs: Alcyone-Sterope, Maya-Pleione i Taygeta-Atlas. Along with these six stars, Caleano is constrict, through point O, by the position symmetrical to the star Pleione, with respect to the X-axis (Figure 13). The seventh point, point M (star Maya) has the same distance from the centre of circle as the point O, i.e. they lay on the same circle. Electra, that forms primordial triangle ($\triangle AES$), influences positions of Alcyone and Sterope, so we can consider it an intermediate member of transition of the stars through point O. Furthermore, star Merope lays on a tangent of circle Q in the fourth quadrant, and it is parallel to the chord \overline{AS} (Figure 13). Since the point O connects eight of the nine stars, it can be considered as a geometric focus point of this matrix, i.e. the Pleiades star cluster.

Figure 13. *Transition in the Focus of the Matrix*

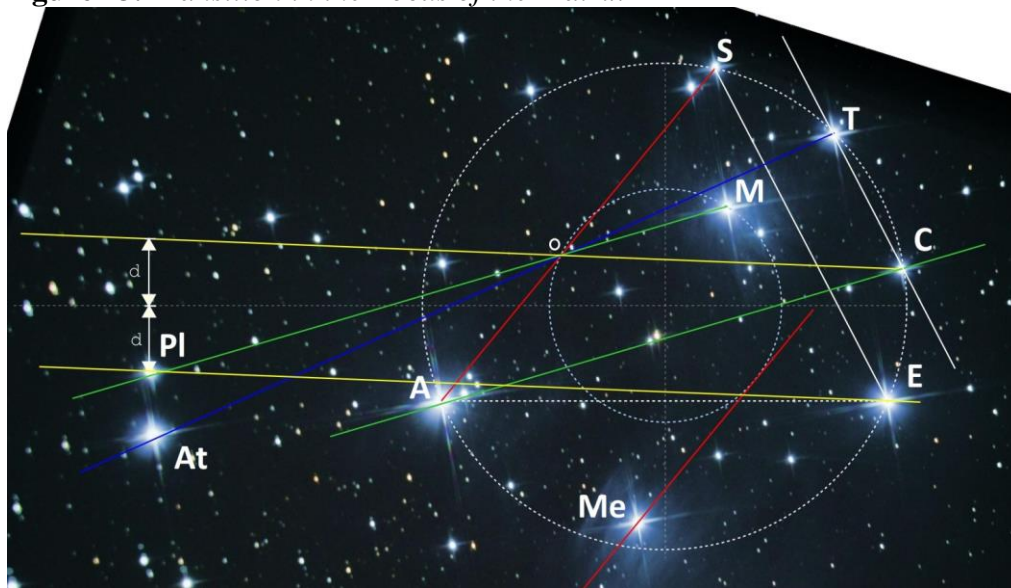


Figure 12 shows that Atlas position has the highest deviation in regards to situated matrix elements, i.e. intersection points. In regards to the position of other stars, the most apparent deviation is the one of Atlas from the line that from the point T (star Taygeta) passes through focus point of matrix and it remains open for additional interpretations. The same goes for deviation of star Pleione from the above-mentioned intersection point. Alternative solutions of the positions of these two stars are not discussed here.

Point P – The Starting Point of the Principal Perpendicular Bisector

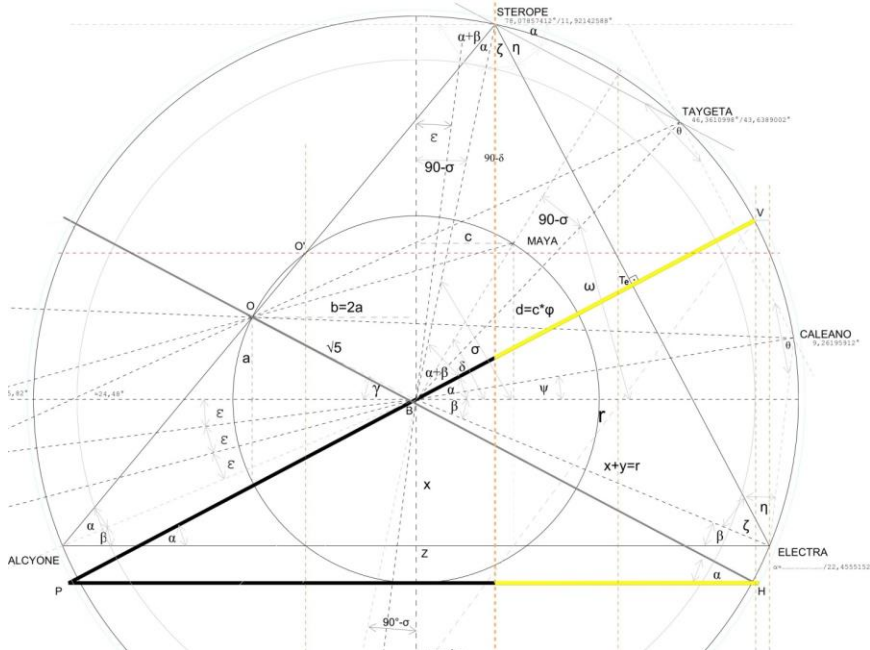
Let us denote intersection point of line p and chord \overline{ES} by **Te** (Figure 14). If we determine the length from point Te to point B as the smaller segment of the golden ratio, then the longer segment of the golden ratio is the segment \overline{BP} in the third quadrant. We consider point P, which is positioned out of the circle K in the third quadrant, **the starting point of the principal perpendicular bisector**, and point V on the circle K in the first quadrant, its **endpoint**. Line that passes through point P and is parallel to the X-axis, is tangent of circle Q. Besides, the golden ratio of the segment PV is determined by intersection of the line p and the normal from the point S to the X-axis.

Chord \overline{AS} intersects the circle Q in two points. We have already interpreted the one denoted by O. Second intersection of the circle Q and the chord \overline{AS} is denoted by O'. Figure shows us that the chord \overline{AE} intersects the normal from the point O' to the X-axis and the circle Q in the same point. This intersection confirms geometrically interpreted value of radius Q. It is not irrelevant that the projection of the point O' on the Y-axis is actually the point of the golden ratio of the radius of the circle K, from the origin B to the intersection of the Y-axis with the circle K.

At this stage of the matrix development, there is a whole series of phenomena arising in this system in very interesting ways.

For example, besides $\overline{BO} = \overline{BM}$, radius of the circle Q is manifested in the intersection of the negative part of Y-axis and the line that is parallel to the X-axis and passes through the point P. Moreover, the line that points to the star Atlas from the point T (Taygeta) through the point O, intersects the Y-axis in the projection of the point M (Maya) on the Y-axis, etc (Figure 12).

Figure 14. *Principal Perpendicular Bisector, Work Sketch*



At this stage of the matrix development, many of the indicative systematic phenomena are not yet mathematically defined in the way five points on the circle K (A, E, C, T, S), points on the circle Q (O, M) and points Me, Pl and At are defined.

The development of this model will stop at a stage where mathematics / geometry gives us solid answers to the practical questions discussed in section **Implementation**. The significance of matrix phenomena that demonstrate mathematical laws - including those mathematically defined and these obtained by measurements, become prominent in the implementation of this system in the real geographic space. Those occurrences that are not mathematically defined are measured within the already accepted deviation value Δ_1 , which is the value that offers high applicative precision.

Findings and Results - Implementation

Angles Comparison

In his book *STUDIJE - Vlačići i mali narodi*(2018), Šipić deals extensively with the question of the function and structure of Rotonda in Ošlje from the aspect of the implementation of the geometrical matrix of Pleiades in the geographic space, as well as in the object itself, and the subsequent implementation of the Rotonda matrix into the geographic space. In this chapter we will present basic concepts and characteristics of these implementations.

When we move from the exact mathematical domain to the aspect of application and implementation, ie architecture, construction, navigation etc, primarily due to human, but also due to many other factors, an error or deviation appears.

It is important to emphasize that the analysis of geographic space, as well as the octaconchal Rotonda in Ošlje, was conducted with Šipić's Clean Matrix (Figure 3), i.e. the matrix tool that Šipić constructed by basing it on the optically distinguishable arrangement of the Pleiades - telescopic photo of the M45 cluster. By comparing this Clean Matrix with a large number of telescopic representations of the Pleiades of various sources taken from different positions on both hemispheres, confirmed by photo taken near Dubrovnik in December 2017, unquestionable compliance of that celestial cluster with the Clean Matrix is evident, as well with the geometrical matrix of the golden ratio (Figure 11). Without going into a detailed analysis, we will only mention that the greatest deviations of the angle values of the Šipić's Clean Matrix, compared to the P-type geometrical matrix of the golden ratio are within the already obtained deviations Δ_1 . Table 1 shows these angle deviations.

Table 1. Values of Adjacent Angles Closest to X or Y Axis

Stars	Clean matrix, angles (Figure 3)	Geometrical matrix of the golden ratio, angles (Figure 11)	Deviation Δ
Caleano	9.8°	$\psi \approx 9.3246922^\circ$	$\approx 1.32\text{‰}$
Electra	22.5°	$\beta \approx 22.4555152^\circ$	$\approx 0.12\text{‰}$
Principle bisector	27.8°	$\alpha \approx 27.8115295^\circ$	$\approx 0.032\text{‰}$
Taygeta	46.3°	$\omega \approx 46.2983668^\circ$	$\approx 0.005\text{‰}$
Maya	58.8°	$\delta \approx 58.2825256^\circ$	$\approx 1.43\text{‰}$
Sterope	78.8°	$\sigma \approx 78.07857412^\circ$	$\approx 2 \text{‰}$
Merope	7.15°	$90^\circ - 3 \cdot \alpha \approx 6.5654115^\circ$	$\approx 1.62\text{‰}$
Alcyone	23°	$\beta \approx 22.4555152^\circ$	$\approx 1.51\text{‰}$
Atlas	14.34°	$180^\circ - 6 \cdot \alpha \approx 13.130823$	$\approx 3.36\text{‰}$
Pleione	7.27°	$90^\circ - 3 \cdot \alpha \approx 6.5654115^\circ$	$\approx 1.95\text{‰}$

The impact of these differences between Šipić's matrix and the geometrical matrix of the golden ratio on the entire system is such that at this stage of the development of the model did not show a destructive effect, that is, it does not undermine the stability of the implementation. Moreover, it is the analysis of the deviation in Šipić's method of implementation of the matrix into the geographic space and Rotonda, that confirmed systematicness, ie the possibility of a mathematical description of the material phenomenon, whether it was the stars, the geographical substrate or the church in Ošlje.

Rotonda in Ošlje, History and Current Knowledge

Figure 15. Rotonda in Ošlje



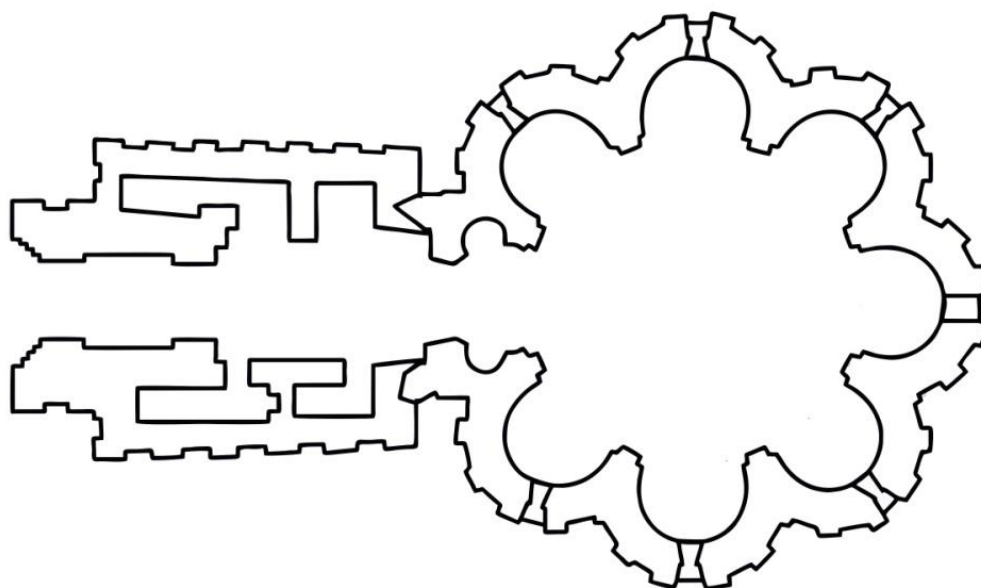
Source: Srđan Nogić.

The pre-Romanesque church of the widely accepted name Rotonda, more precisely - its remains, located in the hills above the village of Ošlje in the

Dubrovnik Primorje region, is one of the twelve polyconchal (polyapsidal) circular churches in Croatia and represents an exceptional example of such architecture of this part of the world and beyond (Figure 15). Such churches, in their varieties, spread from Zadar to Dubrovnik area, although geometrically similar and compatible sacral objects from various periods can be found elsewhere in the world. In Croatia, they have been subject of scientific interest of E. Dyggve, T. Marasović, I. Petricioli, Lj. Karaman, P. Vežić, M. Jurković and others¹⁴, who left a valuable set of data and observations in the field of archeology, history and art history.

A very little is known about Rotonda in Ošlje. Its builder is unknown, as well as to whom it is dedicated and when exactly it was built. The earliest known records of the church date back only to the 19th century. It is considered to be built at the beginning of 9th century. This object, which was devastated over time in circumstances that would also be interesting to know, was conserved based on its foundations and remains in the second half of the 20th century in the form that is visible today.

Figure 16. *Rotonda in Ošlje, Ground Plan*



Source: Vežić, P. (2002)¹⁵.

The remains of the church are without a roof – on the eastern apse they go up to almost four meters in height while the reconstructed westwerk stops at a height of about 1.5 meters. The outer diameter of the circular part of the building is approximately 12 m, while the length of rectangular western part – westwerk is approximately 8 meters, and width of approximately 6.5 meters. The range over the entire building is approximately 20 m.

¹⁴ Jurković, M, 1995, Predromanički šeserolisti Dalmacije, Problemi funkcije, *Prilozi povijesti umjetnosti u Dalmaciji, Vol. 35 No. 1*, Filozofski fakultet, Zagreb, 225-238

¹⁵ Vežić, P. 2012, Dalmatinski šeserolisti, sličnosti i razlike, *Ars Adriatica*, II,41-74.

Figure 17. *Westwerk*



Source: Srđan Nogić.

The eastern, circular part of the object follows the perfect circles and is embellished with seven perfect circular apses containing four pilasters from the outside which are evenly spaced along the circumference of the apses.

In each apse, at a height of about three meters, there are apertures, windows, among which the eastern one is distinguished by its form (Figure 16).

Figure 18. *The Apse*



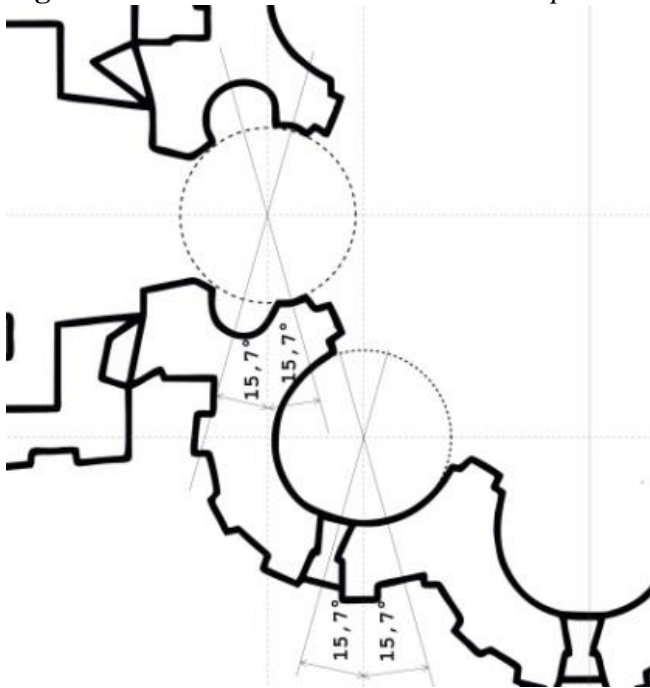
Source: Srđan Nogić.

All windows are located in the centre of the apses, except the one in the southwest apse, which is offset to the east (Figure 19). This window form an

angle of approximately 16° (the measured and approximate shift of the object from the equinox west towards the north is approximately 15.7°). Thus, this window disrupts the symmetry of the circular part of the building.

The west, eighth apse with two semicircular niches is missing approximately a quarter of a wall surface, thus opening communication between the western and eastern segments of the building, in other words, the passage (Figure 19). The perpendicular bisectors of these niches are intersecting in the centre of main truncated apse. The angles of the bisectors of these two niches are also approximately 16° .

Figure 19. *SW Window and the Western Apse*



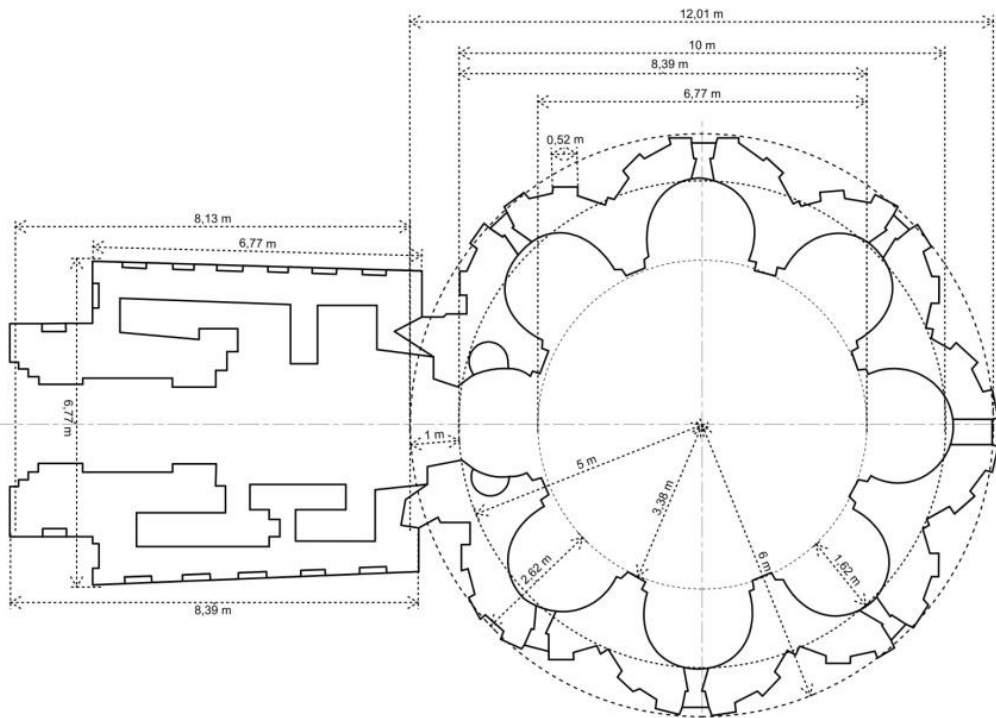
In the westwerk, symmetry is almost completely lost.

The north and south walls are not parallel, the number of pilaster strips on these walls is not the same, the thickness of the north and south wall of the portal is asymmetrically dimensioned, while in the interior there are four chambers of essentially different shapes and dimensions.

Dimensions, Measures and Ratios

Figure 20 shows the main measured values of the building. These are the ranges of the constructive circles of the circular part of the building as well as the basic ranges in the westwerk.

Figure 20. Measurement of Basic Dimensions



The found dimensions of the object can be observed through values based on the royal cubit, an old measure that implies a modern measure of the SI system - 1 meter. The royal cubit, used in ancient Egypt, is defined as the length of the arc of the circular section of the angle of 30° of the circle of radius 1 m. Therefore, the length of the arch, that is, the royal cubit is

$$r_c = (2 \cdot r \cdot \pi \cdot 30^\circ) / 360^\circ = \pi / 6 \approx 0.5236 \text{ m}$$

By applying this measure as the basic measure used in the construction of this octaconch, the diameter of the smallest circle d_1 will be calculated according to the expression:

$$d_1 = 8 \cdot r_c \cdot \varphi \approx 6.77746 \text{ m.}$$

The measured range of opposing pilasters, protrusions on the inner chords of the apses, is between 6.74 m and 6.78 m. The radius of this circle is therefore:

$$r_1 = d_1 / 2 = 4 \cdot r_c \cdot \varphi \approx 3.38873 \text{ m.}$$

The radius of the following constructive circle, one that follows the circumference of the apses, is once again reflecting the value φ :

$$r_2 = r_1 + \varphi = 5.0067 \text{ m} \approx 5 \text{ m}$$

$$r_2 - r_1 = \varphi = 1.6180339887 \text{ m} \approx 1.62 \text{ m.}$$

And finally, if we add a value of 1 m to the r_2 , the radius of the outer circle of Rotonda is:

$$r_3 = r_2 + 1 = 6.0067 \text{ m} \approx 6 \text{ m}$$

$$r_3 - r_1 = \varphi + 1 = 2.6180339887 \text{ m} \approx 2.62 \text{ m}$$

$$(r_2 - r_1) / (r_3 - r_2) = \varphi$$

With a slightly greater tolerance ($> 1\%$), but also with a possible indicative value, the ratio of the westwerk range (d_w) and the diameters of these three circles could be calculated (Figure 21):

$$d_3 / d_w = d_2 / d_1$$

$$d_w = (d_1 \cdot d_3) / d_2 = 8.13 \text{ m,}$$

Westwerk, measured from the western tangent of the largest circle, would have been 8.13 m, while this ground plan suggests that range of the westwerk is 8.24 m which is noticeable difference of 10 cm. The visible deviation from the possible and logical range of the westwerk may depend on a number of factors: deterioration due to age of the building, possible multiple deconstructions and reconstructions, lack of verified information from the site, imperfect nature of the ground plan etc. Based on archeological findings, A.Milošević and Ž.Peković suggested the existence of previous round westwerk¹⁶ which analytically corresponds with the model. Further analysis of church's mathematical model is not discussed in this paper. There are visible deviations in several positions in the object, but the compatibility of the mathematical model and object on the ground is obvious (Figure 22).

¹⁶ Marasović T., 2013, Sv. Petar(?) u Ošlju, *DALMATIA PRAEROMANICA: ranosrednjovjekovno graditeljstvo u Dalmaciji, sv. 4*, Književni krug Split, Split, 62.

Figure 21. Construction, Work Sketch

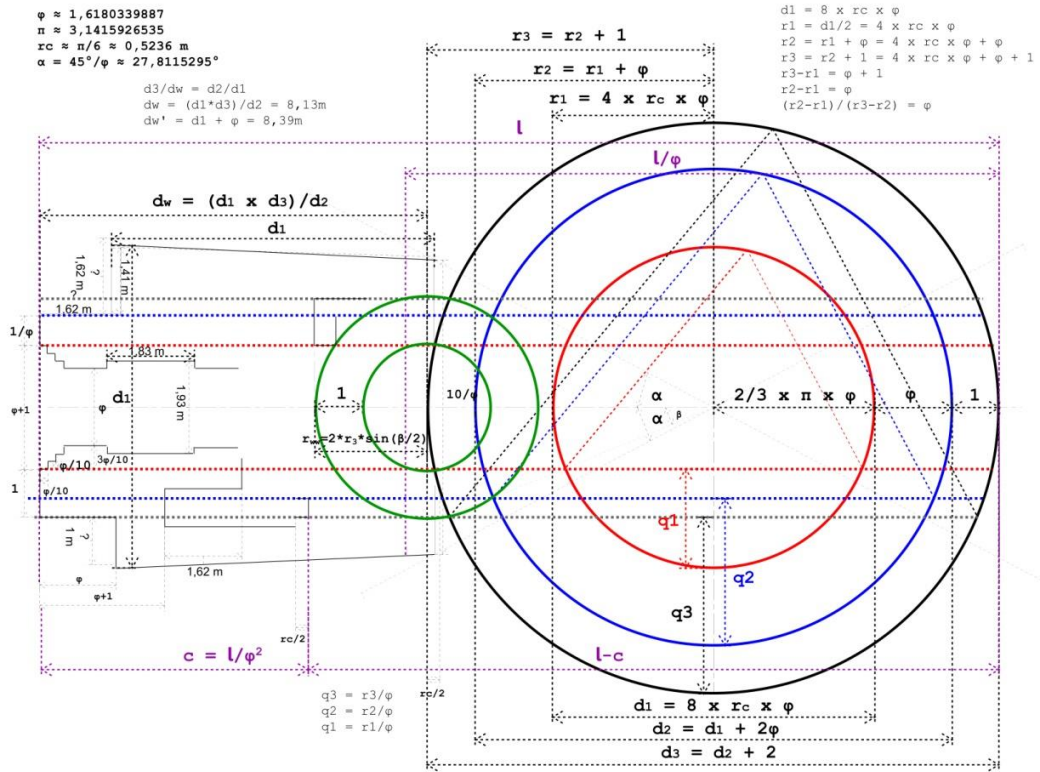
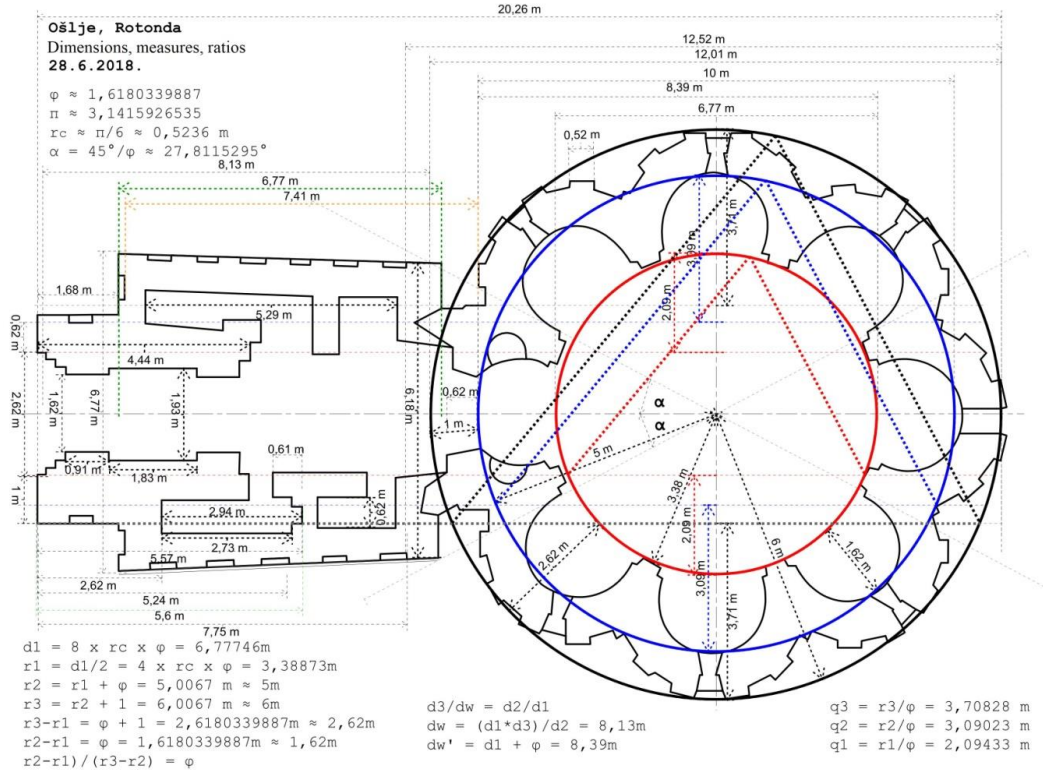


Figure 22. Dimensions, Measures, Ratios, Work Sketch



Geography

In the observation of the geomorphologic and infrastructural cardinality of the Mediterranean, there is an evident geometric connection between toponyms, natural geographic objects such as mountain tops, capes, gulfs, sea passages, estuaries, sacral buildings, cult sites, temples, churches, pyramids, harbors, cities, as well as historic events, places of birth, coronations or burials of historically significant persons.

In his book “Plan of Leopardus” Šipić interprets the historical and geographical background and development in understanding and formatting of the broader Mediterranean space in the context of navigation and travel, as well as the establishment of urban and sacral infrastructure from prehistory until today. On a broader geographical scale, such geometrical harmony led to the possibility of its astronomical origins.

Cadmean Axis

For example, 3 720 km east of the Strait of Gibraltar, there is Mount Aqra (36° N, 36° E), a holy mountain on the Middle Eastern coast, on the border of Turkey and Syria. The parallel of the very top of Aqra (35°57' N) bisects the Strait of Gibraltar. If we place the line on the position of Aqra, at an angle of α with respect to parallel, and point it in the direction of the northwest, on that line we will find Troy in Asia Minor, the peninsula Ljuba (cr. ljubav = love) near Nin (Croatia) and French cities of Troyes and Paris (Figure 23). Šipić named this line Cadmean axis.¹⁷

¹⁷ At the symbolic level, the line depicts the legendary journey of Cadmus. He traveled from Phoenicia to Greece, where he founded the city of Thebes, and then came to Illyricum with his wife Harmonia.

Figure 23. Cadmean Axis



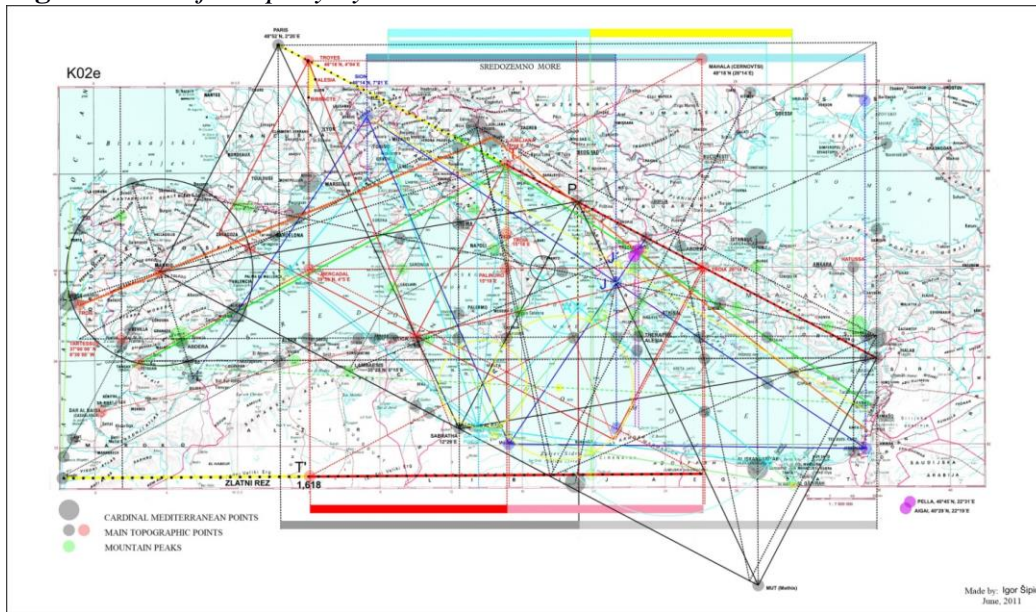
Map Source: Hydrographic Institute of the Yugoslav Navy, Map of the Mediterranean¹⁸.

The prehistoric site of Ljuba is situated on the meridian of $15^{\circ}18' E$, which is also the meridian of the Italian city of Troia. Ljuba is half the distance from Troy to Troyes, and at the same time, the golden ratio from the mountain Aqra to Paris. On the meridian of Ljuba, from its position to the Libyan coast, the golden ratio is on the parallel of the Troy in Asia Minor. Between the Meridian of Troy to Atlantic Moroccan Coast at Agadir, the golden ratio is the Meridian of Troyes.

On the Cadmean axis, there is also situated Sinj ($43^{\circ}42' N$, $16^{\circ}38' E$), in Croatia - The Shrine of Our Lady of Sinj. The system is produced in the rectangle, named Trojan eponymy matrix (Figure 24).

¹⁸ Hydrographic Institute of the Yugoslav Navy, Map of the Mediterranean, *Maritime Encyclopedia*, vol. 7, Zagreb, 1985.

Figure 24. Trojan Eponymy Matrix



Point P, the midpoint of the Cadmean Axis (Aqra-Paris) is located at the meridian of $19^{\circ}11'$ E, the meridian of the Mediterranean's southernmost point in the Gulf of Sidra at Al Uqaylah (El Agheila) in Libya - the cardinal geomorphologic point of the Mediterranean.

Ljuba is located at parallel $44^{\circ}17'$ N, which is also parallel of the very top of the mountain Vlašić in BiH, while the west side of peninsula is faced with the easternmost cove of the island of Pag, called Vlašići. The Rotonda in Ošlje is located at meridian $17^{\circ}44'$ E which is also the meridian that passes through mountain Vlašić in BiH. Near the Rotonda there is Ljubina glavica, karst peak that rises just above the church.

Alongside the harmonious relation between the ground plan of the church and geometrical matrix of Pleiades, there is also a toponymical and geographical connection between Ošlje and Vlašić.

Specchiola

The meridian of Ošlje, $17^{\circ}44'$ E, intersects the Italian coast in the position of the coastal town of Specchiolla (it. specchio = mirror), located at parallel $40^{\circ}44'$ N (Figure 25).

If we set the line at the angle $\alpha = 27.81^{\circ}$ with respect to its meridian (i.e. $90^{\circ} - \alpha = 62.19^{\circ}$ with respect to parallel) on the position of Specchiolla, that line pointed in the direction of northeast leads directly to point P, the midpoint of the Cadmean axis, while pointed in the direction of southwest leads to the southernmost point of the Apennine peninsula, west of the lighthouse and the Cape Spartivento, areas inhabited back in the Paleolithic. If we set the same angle α with respect to the meridian of Specchiola, but mirrored and pointed in the direction of northwest, it leads directly to Ljuba, while pointed in the direction of southeast, it leads to the very top of the heel of the Italian boot, at

the place of Santa Maria di Leuca where at the foundations of the Roman Temple dedicated to Minerva, basilica of De Finibus Terrae (end of the Earth) was erected, along with the impressive lighthouse of Santa Maria di Leuca, built in memory of the stay of St. Peter on his way to Italy. If we set a line at the same angle with respect to meridian on that cape, in the direction of northeast it will mark the easternmost point of the Adriatic Sea - the Gulf of Drin in Albania, a point that is on the same parallel as the easternmost point of the Apennine Peninsula – Gargano, but also the easternmost point of the Black Sea, the city of Kobuleti (41°47' N). From this point, the line at the angle α with respect to the parallel, pointed in the direction of northwest leads to the westernmost point of the Adriatic sea Porto Garibaldi (44°40' N, 12°14' E), 15' north of Ravenna. These are also cardinal geomorphologic points.

Between the parallel of Monfalcone, the northernmost point of the Adriatic, as well as the Mediterranean Sea, and the parallel of the southernmost points of the Mediterranean Sea in the Gulf of Sidra at Al Uqaylah in Libya, the golden ratio is the parallel of the easternmost point of the Mediterranean Sea, the city of Iskenderun in Turkey (Figure 29).

Figure 25. Specchiola

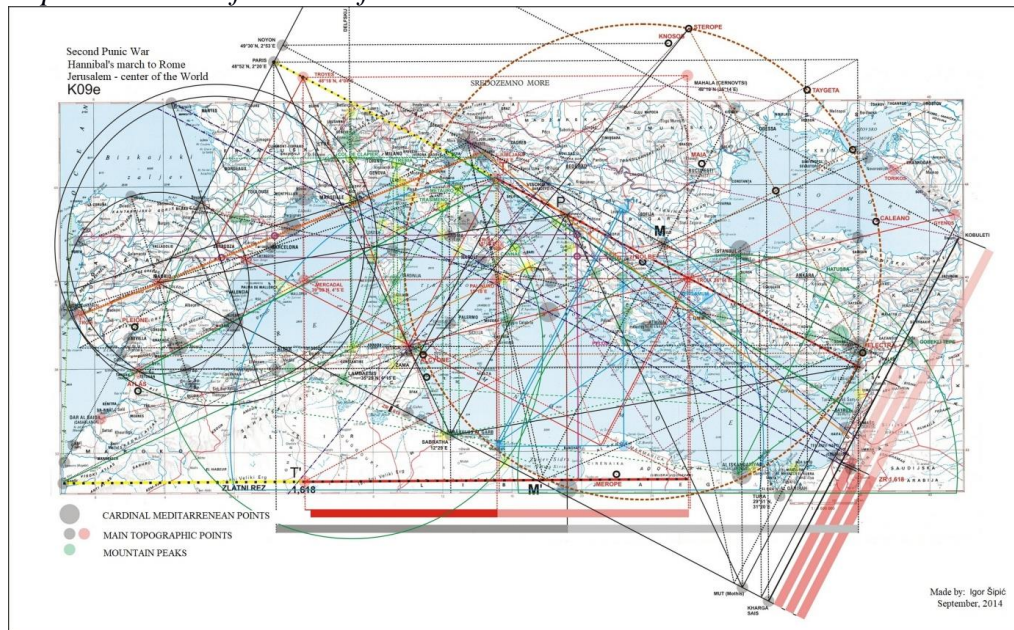


The midpoint of Cadmean axis (point P) is the point of the right angle of the right triangle, whose catheti ratio is $1/\varphi$, with Ljuba as the point on the shorter side, and the southernmost point of the Apennine peninsula as the point on the longer side.

The Matrix, Geographic Space and Primordial Implementation

Šipić points out that this is an ancient measurement of geographic space that originates from the Pleiadean system and he calls it the primordial implementation (Figure 26).

Figure 26. *Implementation of Trojan Eponymy Matrix and the Primordial Implementation of Matrix of Pleiades into the Mediterranean*



Here we will point out some cardinal features of the positions of the implemented stars:

- Electra (36°36'36" N, 36°12' E) in Gulf of Iskenderun, northeastern corner of the Mediterranean Sea, its easternmost point, the city of Iskenderun,
- Alcyone (36°36'36" N, 10°57' E) on the northern top of the African continent, along with the Cape and Bon peninsula, which closes the Gulf of Tunis with the ancient Phoenician Utica and Carthage, from where sailing through the Strait of Sicily is controlled,
- The projection of Electra on Alcyone (lifeline) which is parallel to the Earth's equator, ends at the Atlantic coast in the centre of Cadiz, the ancient Phoenician Gades or Gadir,
- Atlas (35°01' N, 5°31' W) on the northwest horn of the African continent is on the meridian of two mythological Pillars of Hercules at the very gate of Gibraltar, and the Middle Atlas Mountains, which at the angle of 90° to the Cadmean axis, that is, the angle α with respect to the meridian, marks the highest peak of the High Atlas – Toubkal, and in the opposite direction through Zaragoza, points to the centre of Troyes
- Pleione (37°58' N, 5°42' W) is on the meridian of the cape and the city of Tarifa, the southernmost point of the Iberian Peninsula in the Strait of

Gibraltar and on the parallel of the prominent Portuguese cape Sines, as well as on the parallel of the Mount Kyllini on the Peloponnese, where according to myth the Pleiades were born, while at the angle of 90° on the Cadmean axis, that is angle α with respect to the meridian, pointed in the direction of the northeast, it goes through Toledo and enters the centre of Paris,

- Sterope ($50^\circ 07' N$, $26^\circ 14' E$) on the meridian of the Troy in Asia Minor,
- Merope ($30^\circ 52' N$, $21^\circ 58' E$) on the meridian of the very top of Mount Rtanj in eastern Serbia,
- Caleano ($42^\circ 28' N$, $37^\circ 01' E$) on the parallel of the westernmost point of the Black Sea, city of Burgas in Bulgaria,
- Maya ($44^\circ 55' N$, $26^\circ 59' E$) on a common circle with Ošlje, the main focus of primordial implementation

The primordial circle encompasses:

- the starting point of Cadmean axis (Aqra Mountain)
- the northernmost point of the Nile Delta
- the southernmost point of the Mediterranean Sea at Al Uqaylah
- the Phoenician port of Misratah (the meridian of Ljuba and the Italian Troia $15^\circ 18' E$)
- with the western tangent it almost touches the easternmost point of Sardinia, Cape Comino, etc.

Endpoint of the main perpendicular bisector on the circle is on the parallel of Trsat $45^\circ 22' N$ (Croatia)¹⁹, as well as easternmost point of the Crimea (Pantikapaion). Its meridian is $35^\circ 39' E$ (Sahlet Bartaa, Vierge Lebanon),

The point called Thetis²⁰ (Point Te, the intersection of the main bisector and the chord Electra-Sterope) is on the parallel of Sinj (Croatia)²¹, $43^\circ 42' N$, and on the meridian of Giza plateau, $31^\circ 12' E$. The parallel of Thetis passes only 4' southern of the very top of mountain Rtanj.

The starting point of the main bisector is located 2' east of the Tunisian coastal city of Salakta²² ($35^\circ 34' N$, $11^\circ 05' E$).

On line p , from the starting point of the principal bisector to the Tethis (Te, meridian of Giza plateau), the golden ratio is Bolbe (B), the centre of the primordial circle of the implemented matrix, while from starting point to the endpoint V, the golden ratio is at the intersection of the principal bisector and the meridian of Sterope. It is worth mentioning that the parallel of the starting point of the principal bisector is also the parallel of the Syrian coastal city of Latakia (Phoenician Ramita). From there, in the direction of northwest, the line at the angle α passes through Ošlje, and goes to the very top of the mountain

¹⁹ The Shrine of Our Lady of Trsat, according to the adopted tradition is the Illyrian point of the legendary transfer of the Holy House

²⁰ Thetis, a sea nymph in the Greek mythology

²¹ The Shrine of Our Lady of Sinj

²² Latin word Selectum – “the chosen place”

Jungfrau (gr. virgin) in the Swiss Alps.

The other perpendicular bisector, the bisector of the chord Alcyone-Sterope (points A, S), at the angle of 39.63° ($\zeta = 90 - \alpha - \beta \approx 39.73^\circ$) pointed in the direction southeast-northwest, goes through Visoko (Bosnia and Herzegovina), which determines the multi-intersection of Visoko, and through the very top of the Vlašić mountain. After the intersection with the primordial circle, it marks the top of the highest mountain of the Eastern Alps in Tyrol, Grossglockner, while its southeastern intersection with a circle is a point of the golden ratio between Grossglockner and Ryad.

The Centre Bolbe

The matrix that has been implemented in this way, has the centre of the primordial circle in point Bolbe (B),²³ located at the point of the northern coast of Lake Volvi and the village of Mikri Volvi in Greece ($23^\circ 31' N$, $40^\circ 44' E$), on the geographic latitude of Specchiolla. Furthermore, the indication within the system is Nea Apollonia, which is located on the shores of Lake Volvi – if we go west, following the parallel of the centre of the circle, in Albania we will find the ancient Greek city of Apollonia. This parallel crosses Italian coast in Specchiolla, on whose meridian, just 2' westward on the opposite shore of Gulf of Taranto, we find toponym Specchiarica. Interestingly, parallel of Specchiolla is also the parallel of the Wall Street in New York.

This geometrically aligned system tells us that the rectangular triangle with its points Ošlje – Specchiolla – Volvi, has the catheti Ošlje – Specchiolla and Specchiolla – Volvi in ratio $1/2$, while the value of the hypotenuse Ošlje - Volvi is $\sqrt{5}$.

Axis, Axes – Ošlje

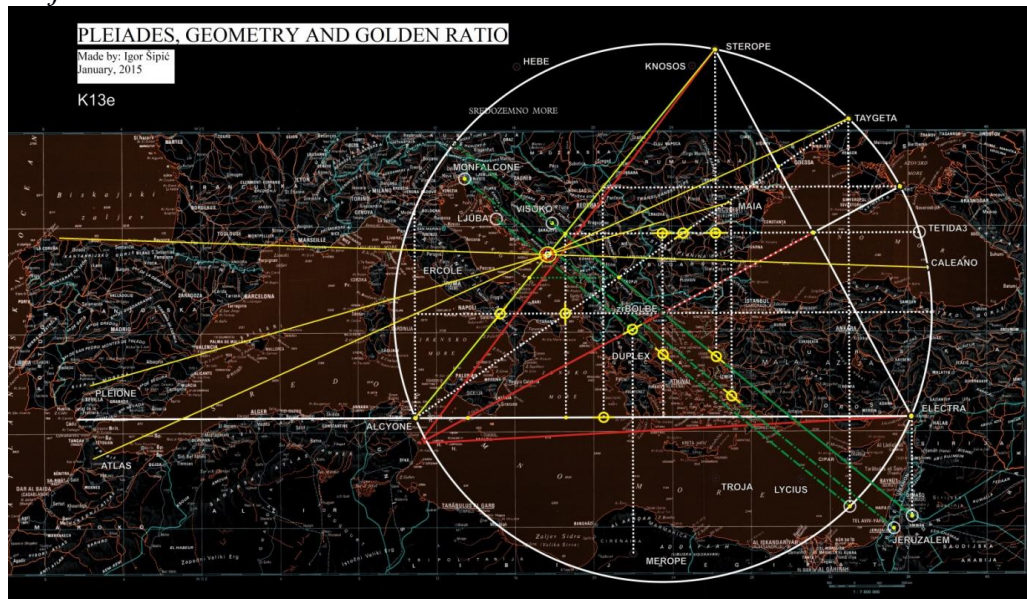
Figure 27 shows the procedure for determining the geometrical focus of the implemented matrix of the Pleiades in the Mediterranean, in the position of the village Ošlje in Dubrovačko Primorje region ($17^\circ 44' E$, $42^\circ 53' N$). In Figure 8, there is the point O, formed as a product in the construction of the golden ratio, within the geometrical matrix of the golden ratio. As a part of the implementation of matrix of the Pleiades into geographic space, the point Ošlje is the result of connecting the cardinal matrix points, stars (Figure 27). With two stars, the cluster set up in this way gives four astrognosical pairs:

- Taygeta – Atlas
- Maja – Pleione
- Alcyone – Sterope

²³ In Greek mythology, the most beautiful among the Naiads. In the surroundings of the lake, on the west side, there is Nimfopetres, known for the sculptural quality of its natural rocks. On the southern side, one of the ancient cities of Apollonia is located, which is an important indication of the system, since Illyrian Apollonia in Albania is located on the geographical latitude of the centre of the Bolbe circle.

- Caleano – the inverse Pleione.

Figure 27. *Implementation of the Matrix of Pleiades into the Mediterranean – Ošlje*

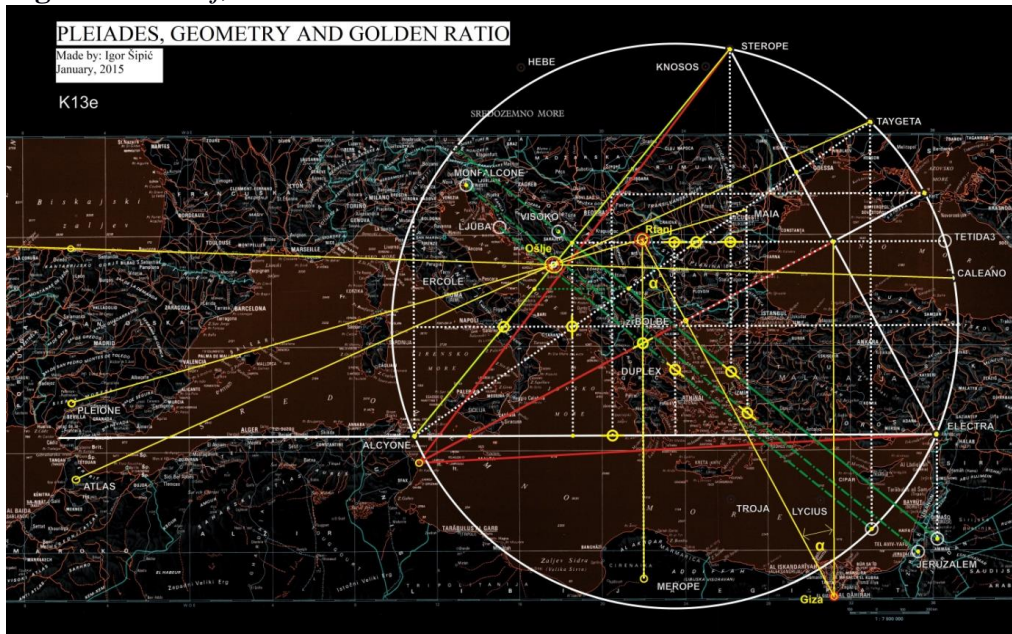


Rtanj

The implementation of the matrix of Pleiades in the Mediterranean is characterized by the phenomenon of the mountain Rtanj in eastern Serbia.

A regular triangular pyramid of Rtanj, with a peak called Šiljak is located on the cardinal direction of the matrix that connects the primordial stars of the implementation, the Pleione and Maya, through the focus of the matrix in Ošlje. The angle of this line with respect to the parallel is 15.7° , which is the estimated angle of the Rotonda's shift to the north from the Equinox West. The intersection between Cadmean axis and aforementioned line Pleione-Ošlje-Rtanj-Maya is on the meridian of Otranto, the easternmost point of the Apennine peninsula. Rtanj shows its spatial and matrix cardinality with a meridian that minutely passes through the implemented star Merope located at Cyrenaica Peninsula in Libya (North Africa). The position of Šiljak is 4' north of the Thetis parallel (the midpoint of the Sterope-Electra chord) whose meridian passes through the Giza Plateau. In relation to that meridian, the chord Rtanj-Giza in the direction of southeast-northwest closes the angle α (27.8°), while it intersects the primordial circle at the meridian of Ošlje (Figure 28).

Figure 28. Rtanj, the Situation



By constructing the Rtanj circle, a circle with a centre on the Libyan coastline and on its meridian, and with a radius at the very top of Rtanj, a plan for building a geomorphologic space as well as civilization points in that same area is visible (Figure 29). The radius of the aforementioned circle corresponds to the shortest distance from Rtanj to the meridian of Aqra (Cadmean axis starting point). The parallel of Aqra determines the golden ratio on the meridian from Rtanj to Merope. From the parallel of Aqra to the parallel of Merope, the golden ratio is on the parallel of Acra (Akko) on the Israeli coast, north of Haifa, which is also one of the oldest inhabited cities in the world, the most important port in the Crusade era. The golden ratio of the diameter of the circle of Rtanj across its meridian is intersected by the parallel of the Giza. The Rtanj circle passes through the position of Mostar which is located on the Cadmen axis (Aqra-Paris), and their intersection is in the zone of the meridian of the main focus of the matrix – Ošlje. Furthermore, it intersects the Italian coastline on the meridian of Trsat, at the point of the golden ratio between Pleione and Maya, the chord mentioned at the beginning, on which Ošlje is located, as well as the very top of the Rtanj.

Figure 29. *The Circle of Rtanj*



Deviations and their Importance

As previously mentioned, spatial analysis covers the range of 4000km x 2000km, i.e. more than 50 degrees of longitude and 17 degrees of latitude. Measurements on two maps in Mercator's flat cylindrical projection at scales of 1:7 500 000 and 1: 2 250 000, satellite, statistical and other comparative tests lead to the determination of the position of Ošlje, as well as many other localities that, according to this matrix, show maximum deviation of about 5 ‰. In some other analysis we made the deviation is even smaller than 2 ‰ (per mills). For example, the intersection of 4 lines that determine the position of Ošlje is 2' north of the position of the church.

Deviations of mathematical points from spatial markers (natural or artificial) have different origins. Such as: inability to work with more precise tools, imperfections of the surface of the map, inability to accurately calibrate the system, laws of environmental conditions of urbanization and other. Considering the impact of all these causes of deviation, their observed, calculated and measured values are actually cumulative values, and as such represent maximum of system deviations.

As Šipic explains, such deviations do not affect the system, nor from the aspect of the spatial navigation and orientation, nor from the aspect of constructing and positioning objects in the space based on the points assigned by this mathematical system. Moreover, observed system deviations in many cases act as a systematic value, a value often dictated by an environment that prevents construction or consent of a vessel to a specific mathematical point spatially determined. Hence, the closest position that the environment permits should be chosen for such needs - either for the construction of some important object, harbour or some other necessary infrastructure.

Of course, this status is conditioned by natural resources such as potable water, but also by the historical habits of sea piracy, which is why protection is

a prevalent factor. Spatially, this would mean that some object (church, temple...), harbours, or some important infrastructure installations (lighthouse...) could be distant up to several spatial minutes, i.e. several kilometres from a mathematical point. One of these examples is the Rotonda in Ošlje, whose position is in the inaccessible karst hills, but on a micro-locality that allows positioning of an object of those dimensions. In particular, the measured mathematical point, the focus of the matrix of the Pleiades, is in the area of Ljubina glavica, village Ošlje and position of the Rotonda. Ljubina Glavica is about a kilometre to the northwest from the village, and on the half of that distance, on the hill with a small valley and a well, made by dry stone crown, the church is located (Figure 30).

Figure 30. *Ošlje and Ljubina Glavica*



Source: Srđan Nogić.

Conclusions

In each chapter of this paper, only the basic structural elements of the constructions and projections are given. Many results of analysis which are subjects of current research have not been included in this paper due to the very nature of the matrix and its implementations, that is, a multitude of information which is subject to multiple tests. In this regard, many recent findings resulting from this research, such as development of the geometrical matrix of the golden ratio, more detailed architectural and acoustic analysis of the object, the mathematical geomorphologic matrix, and others, will be the subject of future work.

This model supports the idea of shifting the boundaries of the scientific understanding of astronomy and historical geography of ecumene, at least to the Phoenician period (1200-700 BC). Then the cultural period of the so called „dark age“ begins, between the Trojan War and emergence of Homer and

Milesian school with individuals like Thales, Anaximander and Anaximenes. For that matter, the territory of Illyria in the context of its coastline and the central Bosnia, should be considered as an inseparable part of a system. Without this notion there is no Mediterranean manifestation of interweaving of people and their cultures, no mutual trade and religious interrelations. Then there is no matrix which unites the space, and does not divide it.

This paper, and the construction of the geometrical matrix presented here, opens the possibility of an exact mathematical review and interpretation of Šipić's implementation of the matrix of Pleiades in the Mediterranean, as well as the possibility of mathematical interpretation of certain astronomical phenomena and geomorphologic processes, the construction of Rotonda in Ošlje, the implementation of the Rotonda matrix into Mediterranean and other phenomena created on Earth by human activities since the beginning of civilization to the present.

The significance of this paper is also manifested through relation of the matrix and language, the human communication system. Through toponymy, the language is reflected in meaningful geometric phenomena. These reflections are also manifested through written and narrative history, culture, religion and science.

Furthermore, an important contribution of this paper is the interpretation of the phenomenon of the Rotonda in Ošlje, that is, the origin of its form, position, function, titular, builder, as well as other unknown facts related to it.

Šipić's research resulted in a series of original insights and solutions. By identifying this geometrical matrix based on the golden ratio, the matrix of Pleiades with its implementations is presented according to the rules of the profession.

Finally, due to innovation and broader scientific potential of the matrix and its application, the work itself requires a serious review, preferably, from perspective of as many scientific disciplines as possible, since research is based on the geometric analysis of geographic and geomorphologic space, its macro-urban images, distribution of sacral infrastructure, toponyms and historical events from prehistoric times onwards.

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