On the Possible Astronomical Function of Portasar's (Göbekli Tepe) Pillar 27

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Abstract

The examination of Portasar's Pillar 27 in Enclosure C from an archaeoastronomical point of view reveals four distinct directions. Considering the directions obtained as observational shows that they could have served to observe the simultaneous culminations of *Pleiades*, α *Persei*, and *36 Draconis* pointing towards the North Ecliptic Pole during the activity period of the *September* ε*-Perseid* meteor shower. On the same day (perhaps a few days apart) before sunrise, it was most likely possible to observe the star disappearance of the constellations Hercules and Centaurus at their culmination points. At the same time, the T-shaped structure of Pillar 27 could serve as a shadow meter (gnomon) to show the specified day of the mentioned observations. Additionally, 36 days after the summer solstice (*Perseids* activity period), the simultaneous appearance of the stars β *Andromedae* and γ *Draconis* at their culmination points was observable.

On the other hand, there are principal parallels with the possible observations with the help of Portasar's Pillar 27 and the function of Platform 3 (as well as some angular stones (No. 7, 12, 158, etc.)) of the Zorats Qarer megalithic monument, which refer to the same millennium (9000 BC). There are also commonalities with ancient calendar patterns that relate to ancient mythological concepts. Their detailed analysis is still in progress.

Keywords: *Göbekli Tepe, Pillar 27, Pleiades, Perseid Meteor Shower, Observational Instruments, Archaeoastronomy, Ancient Calendar, Zorats Qarer, Megalithic Monuments.*

1. Introduction

The importance of the ancient site of Portasar (Göbekli Tepe) in studying the immemorial layers of the historical-cultural heritage of the civilization is indisputable (Bengisu, 2023). The monument has been reliably dated to 9500-8500 BC using the radiocarbon method (Dietrich, 2011, Dietrich & Schmidt, 2010). Dating has become a necessary support for various specialists, including archaeoastronomers (Henty (2022) pp. 60-64) to understand the functional significance of the monument. Particularly, an attempt was made to connect the monument with the setting of the star Deneb (α *Cygni*) in one case (Collins, 2014, 2018, Collins & Hale, 2013), and with the rise of Sirius (α *Canis Majoris*) in another case (Magli, 2015), as well as with the worship of Taurus, Orion (Schoch, 2012, Seyfzadeh & Schoch, 2019) and Gemini (Coombs, 2023) constellations. The connection of the monument with Deneb has been considered in more detail. As a result, some clarifications were made regarding correctly accounting the atmospheric conditions of observations on the horizon (De Lorenzis & Orofino, 2015). Although most archaeoastronomical studies relate to the orientations of the main structures, the low-reliefs of Pillar 43 (Enclosure D) are more discussed objects. An attempt was made to identify the images with some constellations. The most interesting thing is identifying the vulture image on Pillar 43 and the constellation Swan (Armenian Angegh-Vulture) (Collins, 2014, Collins & Hale, 2013, Vahradyan & Vahradyan, 2010). However, this bird was later associated with the Sagittarius constellation (Burley, 2017, Sweatman & Tsikritsis, 2017a), which immediately became a reason for heated discussions (Burley, 2017, Furter, 2018, Notroff *et al.*, 2017, Sweatman & Tsikritsis,

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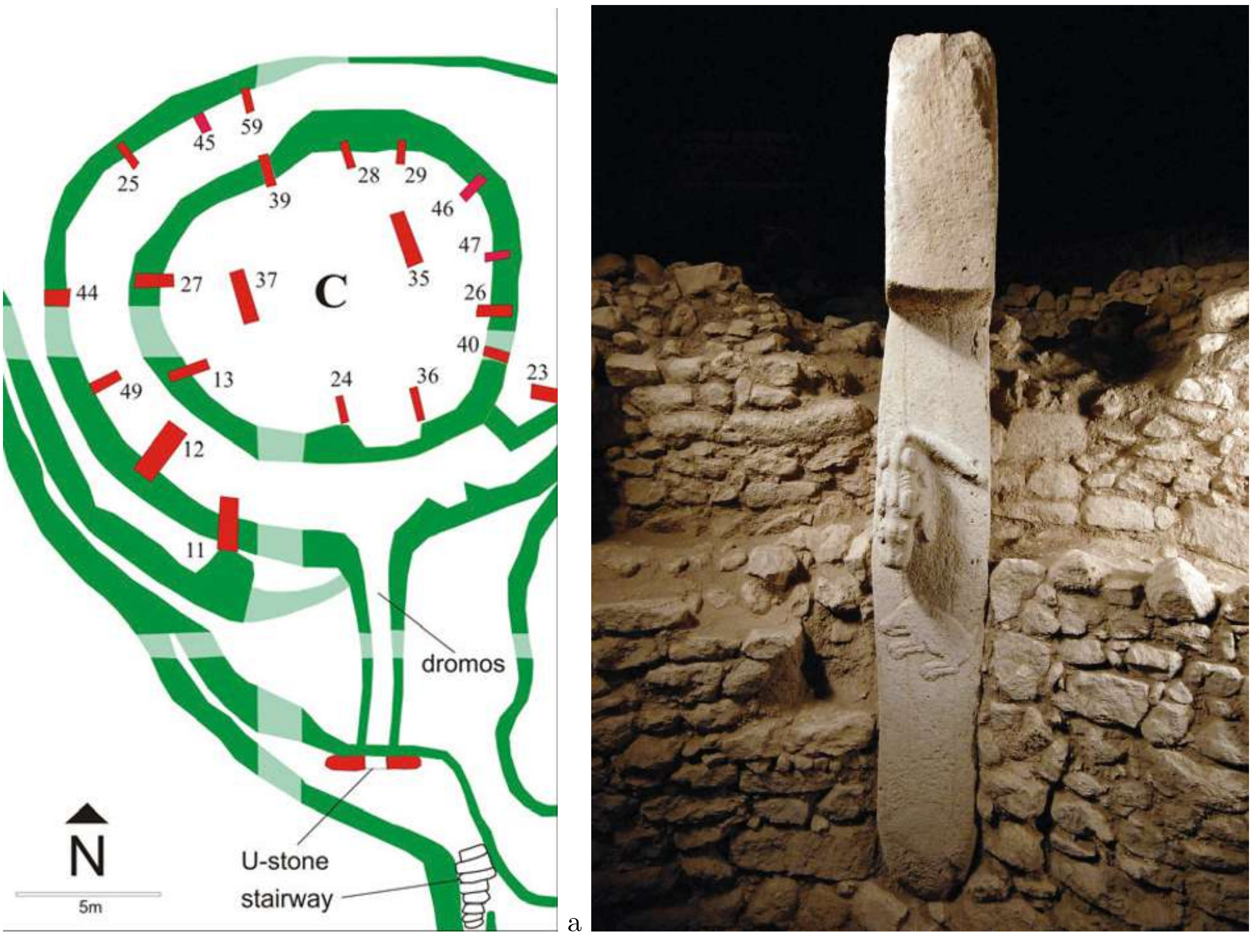
2017b). However, today, similar juxtapositions of low-reliefs continue (Coombs, 2023, Sweatman & Coombs, 2018). Without referring to the details of these researches, let us mention only one of the latest publications, where the author questions the connection of the monument with astronomy, generalizing the existing studies (Banning, 2023). Thus, clarifying the monument's functional significance and connection with the sky becomes very important.

The presented research aims to shed some light on the problem above. Below, it will be shown that Pillar 27 of Enclosure C of the historical-cultural complex of Portasar (Figure 1) most likely served as an astronomical "observational instrument".

2. Material and Methods

The T-shaped Pillar 27 is located in the thickness of the western wall of Enclosure C (Figure 1b) of the Portasar complex. Two animals are depicted on its eastern face: the lower bas-relief is a baby boar image with a high relief of predator[1] above it (Dietrich *et al.*, 2012). Its vertical position can be considered preserved from the beginning and it probably has a West-East orientation (Figure 1a) (Schmidt (2010), Dietrich *et al.* (2014) fig. 2, p. 12).

The high relief of the "predator" is distinguished by its spatiality from the depictions of the remaining monument Pillars. Noteworthy are the two through holes on it: the first (southern, No. 1) is made at the tail base, and the other (northern, No. 2) is at the tail tip (Figure 2).



a b

Figure 1. (a) West-East orientation of Pillar 27 in Portasar's Enclosure C (Dietrich *et al.* (2014) fig. 3, p. 12); (b) vertical position of Pillar 27 and the sculptures on its East face (Dietrich *et al.* (2012) p. 680) *(photograph: D. Johannes).*

[1]For some reasons, we think this animal should be called **"wolf-headed dragon"** ("vishap" in Arm.).

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a b

Figure 2. Two through holes of the "predator" tail of Pillar 27 of Enclosure C: (a) view from the north; (b) view from below. (https://humanoriginproject.com/gobekli-tepe-oldest-temple/)

2.1. The Holes and Their Direction

We could not find any publication on the significance of these holes. Obviously, their existence must have a logical reason, so this question needs a special examination. Taken separately, the holes cannot clearly orientate the observer. If we assume that they are made for celestial body observations, the bottom-up direction should be accepted for hole No. 2, and the observer's eye should be located at the tip of the "predator's" tail for No. 1. In this case, we will get a clear direction *(D_s)* extending from the tail tip to the southern hole, whose azimuth *(A)* is the South point *(A_s=0°)*, and the elevation *(h_s)* corresponds to the angle formed by the inclination of the "predator's" tail. In other words, by determining the angle of the tail inclination from the horizontal line, we will get the angular height *(h_s)* of the southern direction (Figure 3). It should be specially emphasized that the field of view will be limited by the thickness of the tail when viewed from higher points, and by the thickness of the left hind leg of the high relief when viewed from lower points. Figure 2a clearly shows the groove between the tail and the left hind leg, pointing towards hole No. 1. It should also be noted that if we look at hole No. 1 from the northeast, such as the camera position in Figure 2a, no clear direction will be formed. Thus, if hole No. 1 is designed for observations, the only clear direction that can be formed in this structure is the South direction from the tail tip to the hole. It is worth noting that the height from the ground to the tail tip corresponds approximately to the height of the eyes of a person of medium height in a standing position. This can be seen in many photos that are available on the Internet[2].

Now consider the direction of hole No. 2. The diameter of this hole is about half the thickness of the tail. Thus, even assuming the hole is cylindrical, the angular direction error would be about 30°, which is too large to solve an astronomical problem. We cannot unconditionally consider that the axis of hole No. 2 is perpendicular to the axis of the tail, although the pictures do not exclude this. In Figure 2b, it is clearly seen that the field of view is open to the North; that is, the direction of the line of sight *(D_n)* should touch the eastern surface of Pillar 27 (Figure 3). In this case, there

[2]See for example https://orientlight.co/wp-content/uploads/2022/11/IMG_3525-scaled.jpg (10 Feb, 2024).

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is a clearly expressed North direction *(A_n=180°, from the South point)*. It remains to determine the vertical component of this direction *(h_n)*. If D_n is directed to the North, it is clear that observing right through the hole is very problematic, because the "predator's" high relief does not leave such possibility. Hence, it must be observed from a certain distance as in the case of D_s. Therefore, the highest point from which one can see through the hole must pass down the "predator's" left front leg. If we draw such a line, it will touch a baby boar's nose (proboscis, tusk). Thus, the elevation of the direction D_n will be the angle *(h_n)* formed with the horizontal line (Figure 3). Of course, observing through hole No. 1 from lower positions is possible. However, a clear direction will not be formed in that case. Therefore, we will consider the direction D_n.

Thus, with the help of the high relief of Pillar 27 and the holes on it, two directions (Figure 3, Table 1) for observing the sky are clearly distinguished:

a) D_s, which tangent to the "predator's" tail and directed to its base hole No. 1,

b) D_n, which passes from the boar's nose through the hole on the tip of the "predator's" tail.

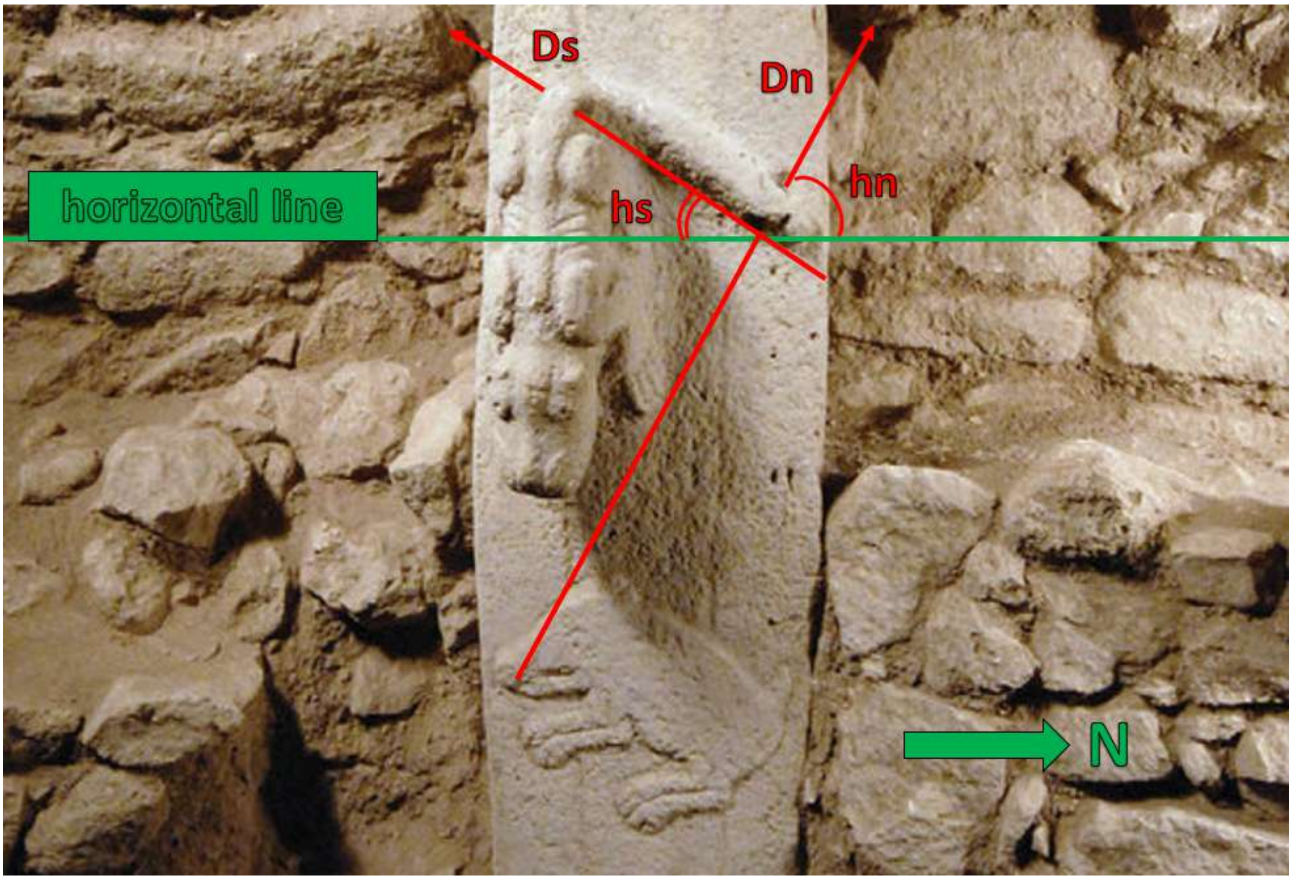

Figure 3. Described directions D_s and D_n and their elevation angles h_s and h_n.

2.2. A Possible Function of the T-shaped Form of Pillar 27

On the upper part of the eastern face of Pillar 27, there is a certain shadow (Figure 1b), which is a consequence of its T-shaped structure. Starting at noon, right after the highest position (culmination) of the Sun, the eastern flat surface of the Pillar will be completely shadowed. However, until noon, as the Sun climbs, the border of light and shadow will move from top to bottom. That is, the shadow line position will move down the surface of the Pillar during the day until the highest position of the Sun, after which the entire surface will be in shadow. Thus, the position of the boundary line between light and shadow in the noon depends on the elevation of the Sun's culmination. Therefore, the border position of light and shadow on the eastern surface of the Pillar can be repeated twice a year, except for the days of the solstices. The presence of a hole distinguishes the "predator's" tail

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tip. Thus, the case when the border of light and shadow reaches the "predator's" tail tip in the noon deserves special consideration (Figure 4). Indeed, with the help of the tail tip and the southern angle crest of the T-cut, a south direction D_{ts} with an elevation h_{ts} is clearly formed (Figures 4 and 5), which is applicable for observing the culminations of the celestial bodies. On the other hand, the D_{tn} with the elevation h_{tn} can also be considered a similar direction. It is formed by the upper point of the "predator's" tail base and the northern corner of the T-cut (Figure 5). By combining the Pillar T-cut form and the predator, we can see that two more directions are clearly distinguished: D_{ts} and D_{tn}.

Thus, the above-mentioned four directions (D_s, D_n, D_{ts} and D_{tn}), can be measured with the help of a protractor, accepting that:

1) Pillar 27 stands vertically in its initial position
2) It has a West-East orientation along its transverse axis
3) Its eastern surface is perpendicular to the transversal axis and has a North-South orientation
4) The horizontal mark in the photo (Figure 1b) corresponds to the actual horizontal line.

Of course, a slight inaccuracy may occur in the above-mentioned points, which cannot qualitatively change the main result of the study, because the possible error in the measured data will be of the order of 1° (Table 1).

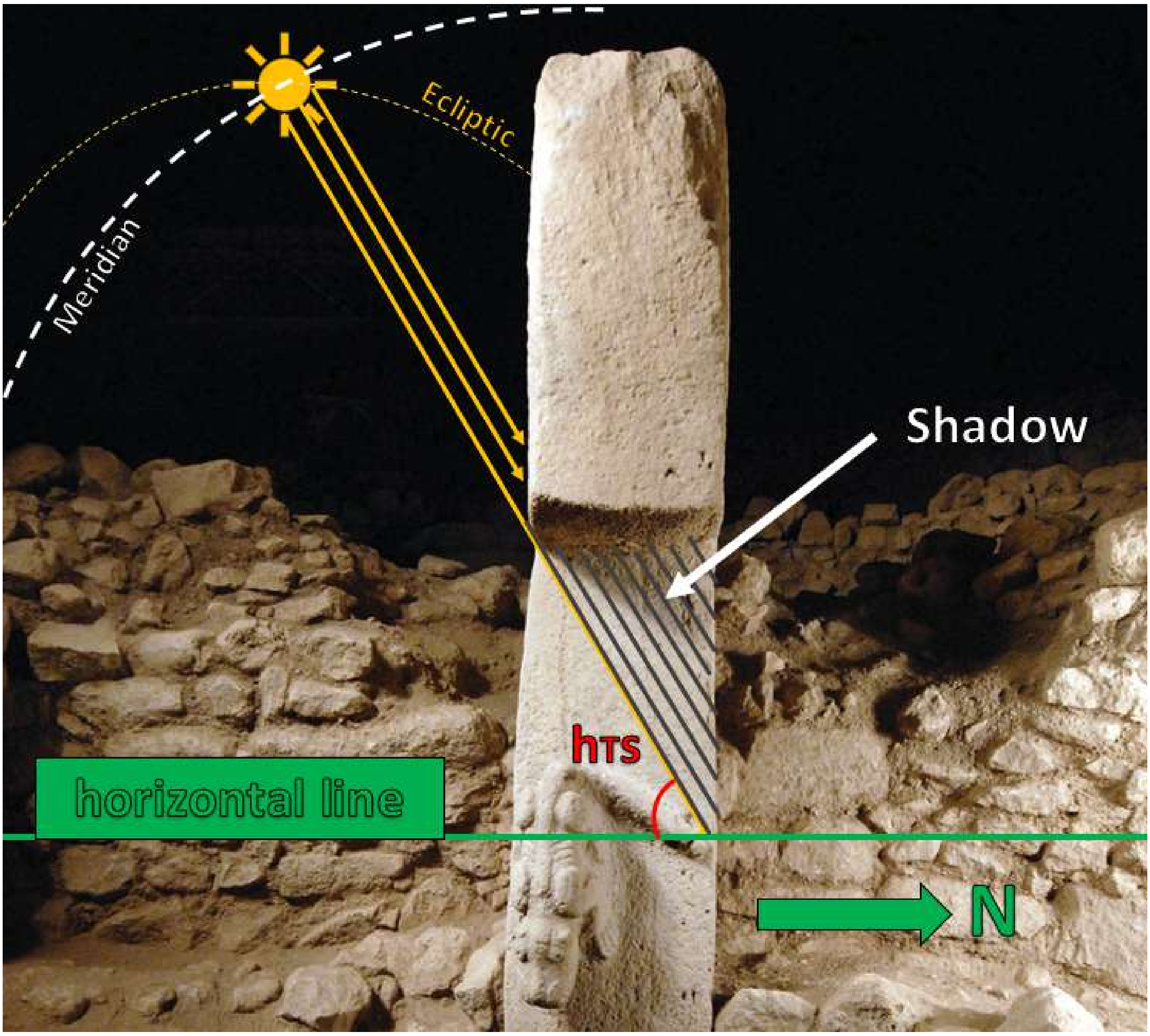

Figure 4. The elevation of the culmination of the Sun at noon, for the case when the border of light and shadow coincides with the tip of the "predator's" tail. h_{ts} - the elevation angle.

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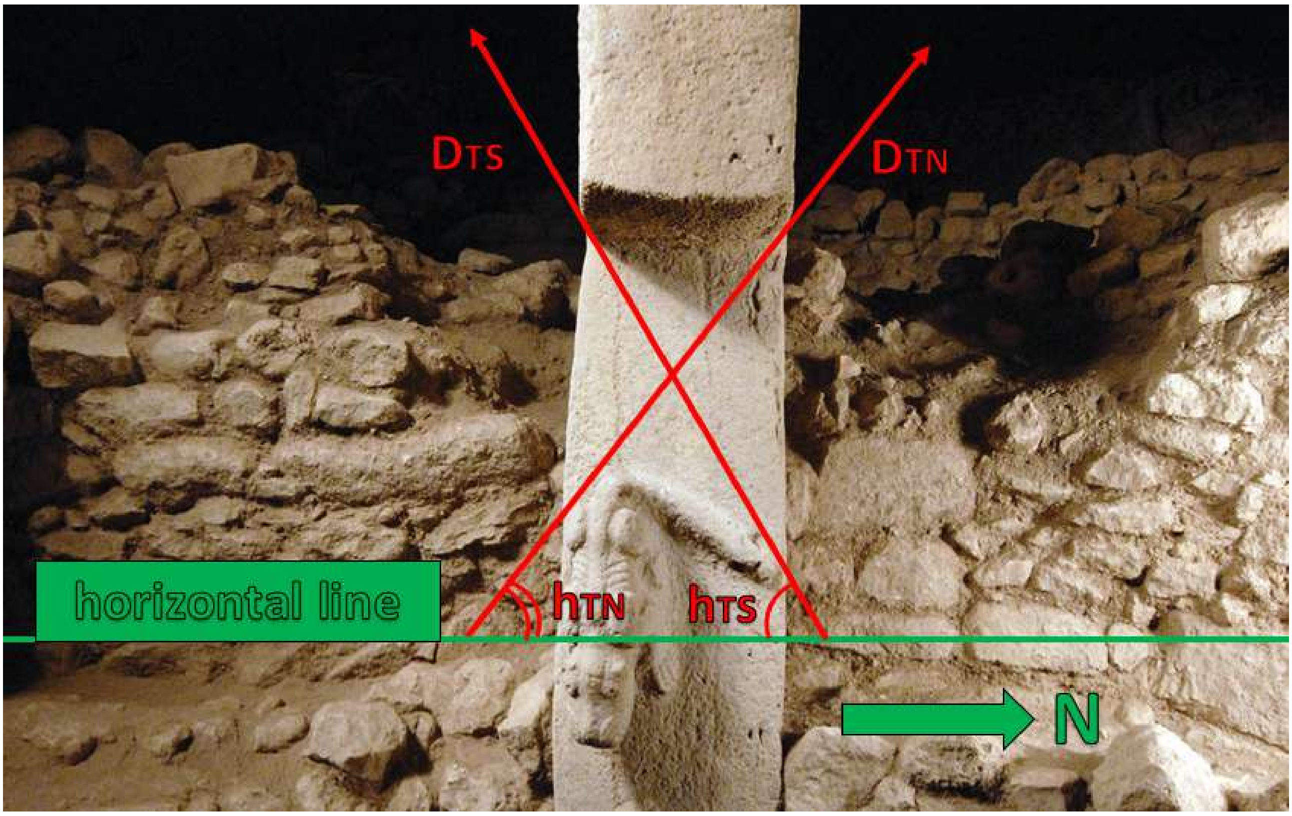

Figure 5. Directions formed by the corners of the T-cut of Pillar 27 and the contours of the high relief.

3. The Observable Celestial Bodies

It is necessary to examine the possible observational significance of the above-mentioned four directions. To find out which celestial bodies would be observed in the received directions (Table 1), it is necessary to have the geographic latitude of the site and activity epoch. The site is located at 37°13′ N latitude, and archaeological methods date Enclosure C of the monument to 9500-8500 BC (Dietrich, 2011). It should also be noted that the study data from Deneb's observations (9230-9080 BC) through the *Cartes du Ciel (CDC)*[3] project are in harmony with the above archaeological estimate (De Lorenzis & Orofino, 2015). Accepting 9000 BC as the date corresponding to the above two estimates, the examination can be performed using *Stellarium v0.20.4*[4].

Table 1 shows that in two of the four directions (D_n and D_{ts}), the transitions of the Sun, Moon, and visible planets are excluded, and with D_s and D_{ts}, observations of all visible celestial bodies are possible. The culminations of the Moon and the visible planets will not be discussed below, because they will not answer any question clearly regarding the calendar.

It is also clear that observations with the naked eye would refer to celestial objects with high apparent magnitude (m). Only objects with an apparent magnitude of up to $6^m.00$ are visible to the naked eye. However, only the brightest stars with a magnitude of up to $3^m.00$ are included in the present study, as the brightest stars have traditionally been given great importance in mythology and worship. In Tables 2 and 3, the celestial objects and their possible observation days are given.

For calendar purposes, the appearance of a star at its culmination point right after sunset and its disappearance right before sunrise are more important than its annual repeated culminations since they occur once a year. We effectively applied the same approach to find calendar information in the Zorats Qarer megalithic monument (Broutian & Malkhasyan, 2021, Malkhasyan, 2021a,b, 2022a,b, 2023a, 2024b).

[3] CDC accessed https://www.ap-i.net/skychart/it/start (3 June, 2024)
[4] Accessed https://stellarium.org (3 June, 2024)

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Direction	$\boldsymbol{D_s}$	$\boldsymbol{D_n}$	$\boldsymbol{D_{ts}}$	$\boldsymbol{D_{tn}}$
Azimuth Elevation	A_s=0° h_s=33°	A_n=180° h_n=60°	A_{ts}=0° h_{ts}=59°	A_{tn}=180° h_{tn}=51°

Table 1. The measurement data for the four directions are given. The possible error is about 1°. Azimuths from the South point are given.

Direction	λ	β	δ	α	Elevation (h)	Date
$\boldsymbol{D_{ts}}$	+167°11′ +17°14′	+1°20′ -0°50′	+6°27′ +6°13′	11^h15^m 1^h05^m	59°13′ 58°59′	AE - 12 VE + 18
$\boldsymbol{D_s}$	+234°44′ +309°50′	-0°06′ +1°28′	-19°39′ -19°46′	15^h29^m 20^h51^m	33°07′ 33°01′	WS - 36 WS + 42
$\boldsymbol{D_n}$	North Ecliptic Pole *(36 Draconis, m = $4^m.95$)*	+90° +89°09′	- +66°35′	- 17^h57^m	- 60°38′	AE - 18 VE + 12

Table 2. The days of the Sun culmination in the southern directions in 9000 BC (ε=24°12′20.02″). VE - vernal equinox, AE - autumn equinox, WS - winter solstice.

In Table 3, some observation day overlaps are noteworthy. We will highlight three of them below (subsections 3.1, 3.2 and 3.3). It is clear that if the mentioned astronomical observations were realities, their mythological concept may have been preserved in the folklore of the later period. In the present study, we will not discuss the mythological parallels of the visible coincidences (Tables 2 and 3) and their interpretation, because they need a comprehensive and detailed separate examination.

3.1. Pleiades and Perseus

Remarkably, the *Pleiades* and *α Persei* appear at their culmination positions at the same time on the same day of the year. If we look at the coordinates of their right ascension (α) (Table 3), we will see that they appear at their culmination positions (that is, they reach the same celestial meridian) with a difference of about 10 minutes. Moreover, on the same day, the Sun's culmination position corresponds to the direction D_{ts} (Table 2, Figure 4). In other words, the following picture is obtained. At noon, 14 ± 4 days before the autumn equinox, the shadow of the T-shaped protrusion of the Pillar reaches the tip of the "predator" tail, as shown in Figure 4, and shortly after that, the entire eastern surface of the Pillar stays in shadow. On the same day, right after sunset, *Pleiades* and *α Persei* almost simultaneously appear at their culmination points (Figure 6). At the same time, D_n is directed to the Ecliptic Pole, which is adjacent to *36 Draconis* in this millennium (Table 2).

Direction	Star	δ	α	m	Elev. (h)	App.	Disapp.
$\boldsymbol{D_s}$	η Tauri (Pleiades) β Centauri	-20°56′ -19°11′	17^h57^m 5^h43^m	$2^m.85$ $0^m.55$	31°51′ 33°35′	AE - 16 VE - 7	VE +11 AE
$\boldsymbol{D_n}$	β Herculis α Coronae Borealis	+67°58′ +66°25′	5^h57^m 3^h27^m	$2^m.75$ $2^m.20$	59°16′ 60°49′	VE - 6 VE - 38	AE + 5 AE + 25
$\boldsymbol{D_{ts}}$	γ Leonis α Persei β Andromedae δ Corvi γ Hydrae ι Scorpii	+6°13′ +5°04′ +4°54′ +5°11′ +6°43′ +6°24′	23^h38^m 18^h07^m 16^h13^m 2^h57^m 3^h48^m 7^h44^m	$2^m.20$ $1^m.75$ $2^m.05$ $2^m.90$ $2^m.95$ $2^m.95$	58°59′ 57°50′ 57°41′ 57°57′ 59°30′ 59°11′	WS + 7 AE - 10 SS + 36 WS + 45 VE - 34 VE + 15	SS + 19 VE + 11 VE - 36 AE - 30 AE - 19 AE + 27
$\boldsymbol{D_{tn}}$	ζ Herculis γ Draconis	+77°10′ +76°57′	6^h18^m 16^h16^m	$2^m.85$ $2^m.20$	50°03′ 50°17′	VE - 1 SS + 36	AE + 9 VE - 34

Table 3. Observable stars with apparent magnitude up to $3^m.00$ and their observation days in 9000 BC. App. - appearance, Disapp. - disappearance, SS - summer solstice.

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The same picture would be observed 14 ± 4 days after the vernal equinox when the above-mentioned stars disappear at their culmination points right before sunrise.

Therefore, the fitting of the shadow to the predator's tail tip at noon becomes a clear indicator for the observation of the appearances of *Pleiades* and α *Persei* at their culmination points on the same day, right after sunset (14 ± 4 days before the autumn equinox), and for the observation of the disappearances of the same stars at their culmination points right before sunrise (14 ± 4 days after the vernal equinox). Thus, we see that the **T-shaped Pillar is most likely an ancient astronomical instrument, at the same time adapted as a noon shadow meter, to show what two simultaneous astronomical phenomena can be observed at sunrise or sunset on the same day** (the certain two days during the year).

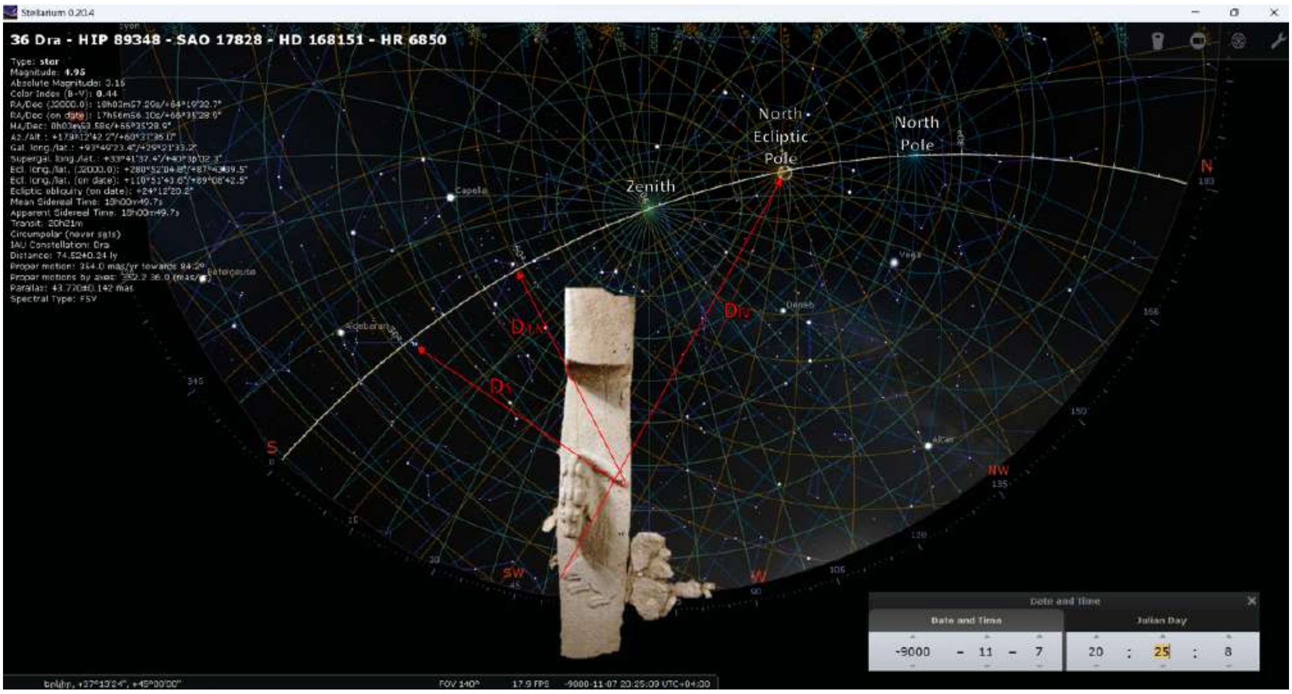

Figure 6. Synchronous culminations of the *Pleiades* and α *Persei* in 9000 BC. The direction D_n is drawn towards the North Ecliptic Pole (*36 Draconis*) simultaneously.

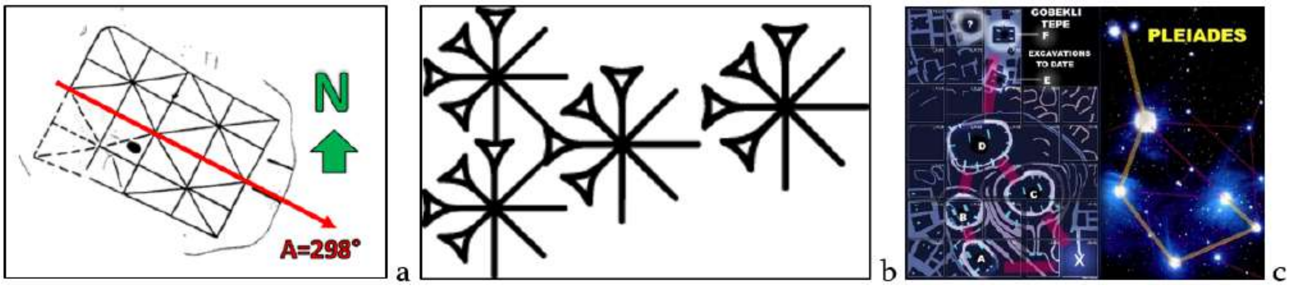

Figure 7. (a) Petroglyph on the small hill platform in Metsamor (Parsamyan, 1985), the directions are drawn by us; (b) Sumerian cuneiform symbol *mul-an* (ePSD, 2024); (c) a comparison of Portasar's Enclosures A, B, C, and D positions with the brightest stars of *Pleiades* (Hershel, 2003).

The simultaneous *Pleiades* and α *Persei* observations were likely related to ancient mythological and calendar concepts. As an additional piece of information, the orientation (A=*298°*) of the petroglyph on the small hill platform of the Metsamor archaeological site (Armenia) is noteworthy (Parsamyan, 1985, Parsamyan & Mkrtchyan, 1969), which could serve for observing the heliacal rising of the *Pleiades* near to the winter solstice (9000 BC) (Broutian, 2017). The petroglyph itself almost

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repeats the Sumerian cuneiform symbols **"mul-an"** (Figures 7a and b), meaning the "heavenly stars" (ePSD, 2024). It should be emphasized that the petroglyph on the platform in Metsamor Hill corresponds well with the shape of the four largest Enclosures (A, B, C, and D) of Portasar (Figure 7c), the similarity of which with the arrangement of *Pleiades* was also observed before (Hershel, 2003). The "interest" in the *Pleiades* in different monuments already tells about the importance of its observations in ancient times.

The fact that the appearance date of the α *Persei* corresponds to the period of activity of the *September ε-Perseids* meteor shower (Gregorian - Sept. 4-14) is also worthy of attention, especially since its radiant coordinates are adjacent to "Medusa's Head" (β *Persei*, Algol, Gorgonea Prima) (Figure 8) (*Stellarium v0.20.4*). **Apparently, the abundance of snake images in Portasar** (Peters & Schmidt, 2004) **should also be related to interpreting such heavenly phenomena**.

Figure 8. The *Perseus* constellation and the position of the radiant of *September ε-Perseids* at its maximum activity (Gregorian - Sept. 4-14).

3.2. Hercules and Centaurus

With the help of Pillar 27, the observations of the stars of the *Hercules* constellation were also possible (Table 3). Indeed, the culminations of the β, ζ *Herculis*, and β *Centauri* occur almost simultaneously (Figure 9). The simultaneous disappearances of these stars in the indicated directions would be observed 5 ± 4 days after the autumn equinox and their appearances 4 ± 3 days before the vernal equinox. In mythological terms, these observations can be linked to the famous Greek conflict between Hercules and the Centaurs (Kun (1989) pp. 206-208). At that exact moment, the lower culmination of *36 Draconis* (the North Ecliptic Pole) would occur (Figure 9). There is a 180° opposite position of the sky relative to the moment described in point 3.1 (Figure 6). That is, **all the mentioned stars (**η ***Tauri (Pleiades),*** α ***Persei,*** β ***Centauri,*** β, ζ ***Herculis, 36 Draconis*****) fall in the same meridian plane** (Tables 2, 3), which is extremely remarkable. If we attribute the approximately 10-day difference between the observations in points 3.1 and 3.2 to the roughness of the calculation, we can also assume that we are dealing with the sunrise and sunset of the same day.

3.3. Draco and Andromeda

β *Andromedae* and γ *Draconis* also reach their culmination points simultaneously, 36 days after the summer solstice, right after sunset, and 35 ± 1 days before the vernal equinox, right before sunrise (Table 3). Notably, these star culminations corresponded to when the Milky Way plane passed through the zenith point (Figure 10). In other words, the bright layer of the Milky Way had the shape of an

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arc passing through the zenith for the observer from the Earth at that moment, which may have been given a significant meaning in ancient times.

It is also important to note that **the appearance day of *Andromeda* and the *Draco* in the specified directions (Gregorian - July 28) coincides well with the time of activity of the *Perseid* meteor shower** (Gregorian - July 17-August 24, maximum activity: August 13).

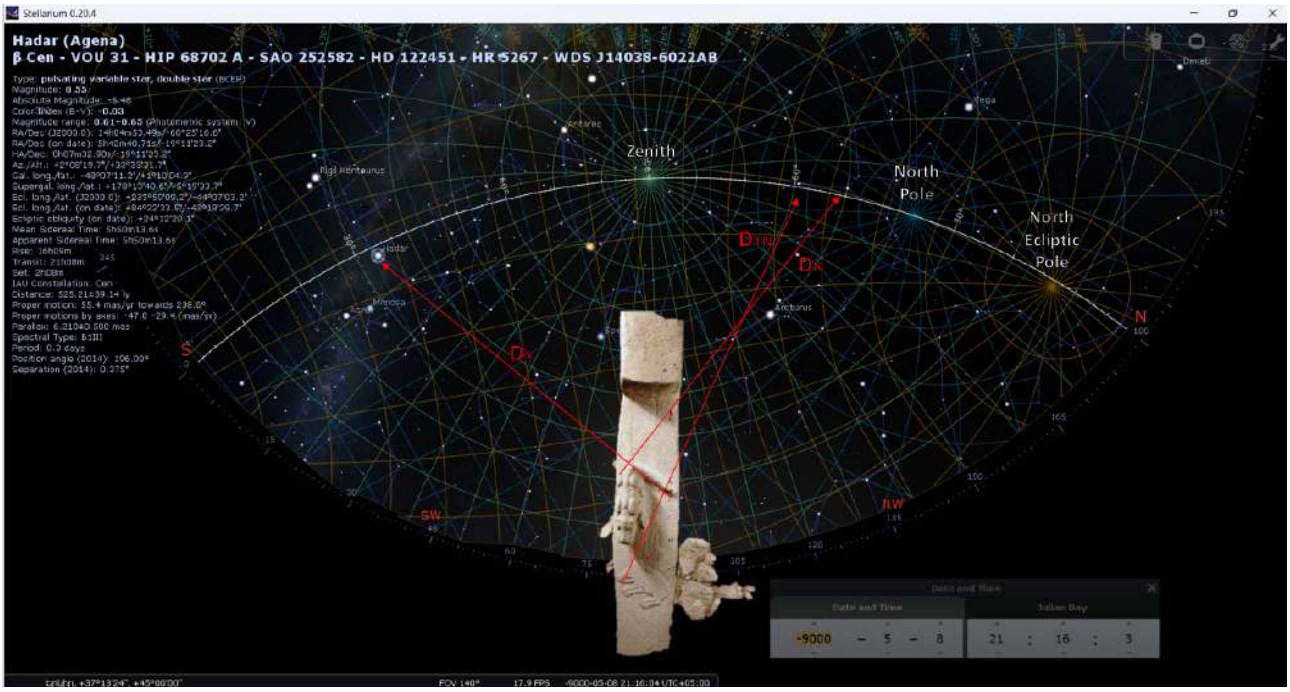

Figure 9. The simultaneous culminations of the stars of *Centaurus* and *Hercules* in 9000 BC. The North Ecliptic Pole (*36 Draconis*) at the lower culmination point.

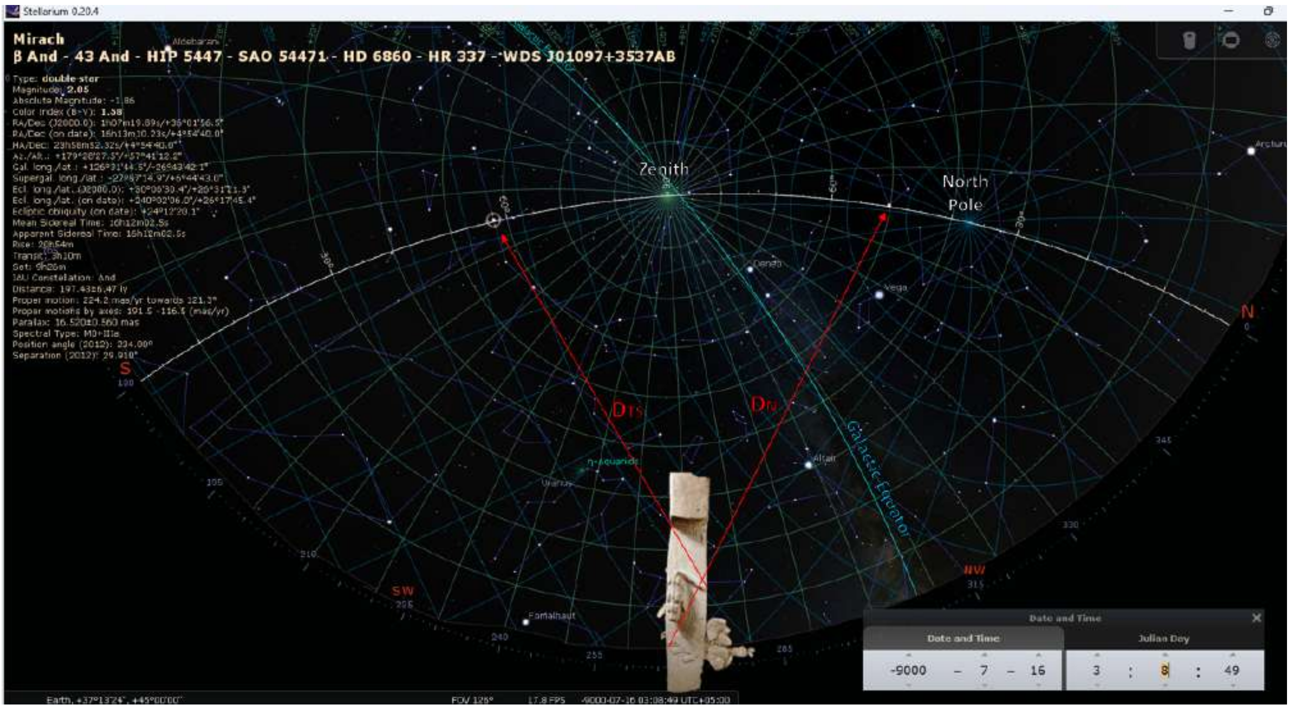

Figure 10. Simultaneous culminations of β *Andromedae* and γ *Draconis* in 9000 BC. The plane of the Milky Way (Galactic Equator) passes through the zenith point.

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β *Andromedae* was observable at the same time as the γ *Draconis*. It is known from Greek mythology that the monster (dragon) is described in two main characters: fish-like (when swimming in the waves of the rough sea) and boar-like (when climbing above the sea) Kun (1989) pp. 151-153). It is interesting that at the time when the mentioned stars were observable, on the western horizon (at about 4° altitude) the Southern Fish (Piscis Austrinus) constellation was visible (Figure 10), which we identify with the mythical Dragon-Fish (Malkhasyan, 2023b). At the same time when the α *Persei* appears at its culmination point, the Southern Fish stars are no longer visible (below the horizon, "dead", "defeated") (Figure 6). We should also note that parallel to the culminations of the above-mentioned stars, the ζ *Cephei* (Cepheus constellation, King Cepheus, Andromeda's father) also reaches its culmination, very close to the zenith point, approximately at the intersection point of the Milky Way plane and celestial meridian (Figure 10). On the other hand, at the time of the Perseus star's culmination, the other star of the Cepheus constellation, γ *Cephei*, reaches its highest position very close to the zenith point (Figure 6). From a mythological point of view, this is a very important circumstance because the events described above occur in the kingdom of Cepheus (Kun (1989) pp. 151-153). Examination of the remaining overlaps presented in Table 3 requires additional data. Therefore, it will be left to the future.

4. Some Parallels with the Megalithic Monument Zorats Qarer

Similar results were obtained in the study of Platform 3 of the Zorats Qarer monument (39°33′ N latitude, Armenia). In particular, from Platform 3 on the top of guiding stone No. 7 (A=*282° 32′*, h=*2° 49′*), the acronical rising of the β *Gemini* 37 days after the summer solstice and the heliacal rising 33 days before the vernal equinox were observable in 9000 BC (Malkhasyan, 2024b). We are dealing with the same day and position of the sky. That is, at the time of the culminations of the β *Andromedae* and γ *Draconis* (in the D_{ts} and D_{tn} directions of Portasar) β *Gemini* rises (on the top of the stone No. 7 from Platform 3 of Zorats Qarer). This can be considered an exceptional coincidence. In two different monuments, different stone "instruments" were used to the stars on the same day and at the exact moment. This is especially interesting in that the Portasar monument is also associated with the constellation Gemini worship (Coombs, 2023). Moreover, in 9000 BC, from Platform 3 of Zorats Qarer, in the direction to the top of guiding stone No. 27 (A=*345° 32′*, h=*2° 44′*), the heliacal rising of the λ *Velorum* was observable 40 days after the summer solstice and the acronical rising 27 days after the winter solstice (Malkhasyan, 2024b). This is interesting in the sense that at the moment of the λ *Velorum* rising, the plane of the Milky Way coincides with the plane of the horizon, and parallel to it, the β *Centauri* also rises, the culmination of which, as we saw in point 3.2, was observable in the D_s direction of Pillar 27. In other words, Platform 3 in Zorats Qarer served for two observations. In one of them, the Milky Way plane crosses the zenith point (which we see in Portasar (Figure 10)); in the other, it coincides with the horizon plane. Such coincidences allow us to discuss the close relationship between the two monuments. We have also touched on some connections primarily related to the low relief of the vulture on Pillar 43 (Enclosure D) and the constellation Swan (Cygnus) before (Malkhasyan, 2020, 2021b, 2023a, 2024b).

We should also note that similar "observational instruments" were discovered as a result of the studies of the Zorats Qarer monument, which refer to 9000 BC (Malkhasyan, 2022a,b), i.e., the exact date of Portasar (Dietrich, 2011). The observation device made of stones No. 60, 62, and 63 of the Zorats Qarer monument works on the same principle. The two directions formed by their holes stretch to the South and are directed to the culminations of the celestial bodies (Herouni (2006) pp. 64-67).

In almost the same way, the double-angled stone No. 12 was used for simultaneous observations of the main stars of Gemini constellation in 9000 BC (Malkhasyan, 2022b). Besides, the day of these observations corresponds to the midpoint of the period between the summer solstice and the autumn equinox, which corresponds to the result of examining the orientation of Portasar's Enclosure F (De Lorenzis & Orofino, 2015). The authors associated the day with a harvest festival, which was later criticized (Banning, 2023). However, we do not rule out this correspondence if we take our region's grape harvest festival, celebrated around astronomical midsummer (Malkhasyan, 2024b).

A similar "observational instrument" is stone No. 158 in Zorats Qarer, with its two angles simul-

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taneously directed to the bright stars of the constellations Cassiopeia and Ophiuchus four days after the summer solstice (Malkhasyan, 2021b, 2022a). This day already corresponds well to the harvest of autumn cereal crops. As we can see in both monuments, the astronomical calendar and worship content are common in the same millennium context.

It should be noted that in addition to the possible observations of the *Pleiades* in the ancient site Metsamor (Broutian, 2017), an observation device was also found in Zorats Qarer, which is pointed at the rising of the *Pleiades* in a later period. In particular, in 5800 BC, from the same Platform 3 to the top of the stone No. 201 ($A{=}290^\circ 44'$, $h{=}2^\circ 13'$), it was possible to observe the heliacal rising of *Pleiades* 38 days before the vernal equinox and the acronical rising 30 days after the summer solstice (Malkhasyan, 2024b). The zenith point crosses the constellation Swan and the Milky Way's plane at that moment. As we can see, the days of such observations are very close to some of the data in Table 3, which we referred to in point 3.3.

As for the function of Pillar 27, its principle parallel was also found in Zorats Qarer in the form of stone No. 137, which was apparently used in much earlier times to specify the observation day of the stars due to the Sun's position (shadow meter, gnomon). With the help of stone No.137, it is possible to determine the summer solstice related to sunrise and the Sun's culmination, which indicates the appearance of the γ *Cygni* (Sadr) in the hole direction ($A{=}173^\circ 58'$, $h{=}34^\circ 09'$) on the same day of right after sunset in 15500 BC (Malkhasyan, 2024a).

Summary

The archaeoastronomical analysis of Pillar 27 of Enclosure C in Portasar (Göbekli Tepe) reveals four distinct directions, two of which (D_s and D_n) are formed with the help of the tail of the "predator's" high relief, and the two holes on it. The other two directions (D_{ts} and D_{tn}) are formed due to the T-shaped structure of the Pillar. Examining the received directions as observational, we found out they could have served to observe the culminations of some celestial bodies. In particular:

1) The simultaneous appearance of the *Pleiades* and α *Persei*, as well as *36 Draconis* pointing towards the North Ecliptic Pole, at their culmination points during the activity period of the *September* ε*-Perseid* meteor shower. The T-shaped structure of Pillar 27 could have served as a shadow gauge to indicate the date of such observations.

2) On the same day (perhaps a few days apart), it was most likely possible to observe the disappearance of the stars of the constellations Hercules and Centaurus at their culmination points.

3) The appearance of the stars Andromeda and Draco at their culmination points was observable 36 days after the summer solstice during the activity period of the *Perseid* meteor shower (as well as the disappearance 35 ± 1 days before the vernal equinox).

4) Principled parallels with the possible observations with the help of pillar 27 and the functional significance of Zorats Qarer Monument (Platform 3, angular stones No. 7, 12 and 158, as well as the stone whit hole No. 137, etc.) dating back to the same millennium (also to an earlier period) are highlighted.

All four points above relate to ancient mythological concepts, which are very superficially examined here. There are also commonalities with ancient calendar patterns, which are still being investigated in detail.

Of course, the measurement method of the directions formed with the help of the structural features of Pillar 27 used in this work is rough because no accurate data is available. However, we think such deviations cannot qualitatively affect the obtained results. It is highly desirable to revise our results if accurate on-site (*in situ*) measurement data are available.

Based on the obtained results, it can be confidently asserted that the search for such "observational instruments" in the Portasar monument is a necessity.

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