

The Space and Time in Rock Art of Armenia

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Keywords: *Shrakatsi, Aragats, Ayrarat, calendar, constellation, dragon-stelae, Geghama mountains, Olcott, petroglyph, rock-carving, Tumanyan*

1. Introduction

Rock carvings of Armenia are of great cognitive importance as a historical and cultural primary source of the pre-literate era, which reflects the deep past in a pictorial way. These monuments, representing almost all the main and important spheres of our ancestors' life, have convey a peculiar picture of their mental activity and worldview.

Rock-art in Armenia arose in the Neolithic period, reaching its peak during the Bronze Age. It existed as a means of human cognition and communication, carrying out the functions of expressing, recording, accumulating, storage, transmitting information and feelings, thus ensuring the connection of generations, the continuity of life experience, mentality and culture, preserving the wisdom and essence of the past. They are closely and harmoniously intertwined with the surrounding natural and historical environment, forming the cultural landscape.

The role of heavenly luminaries and phenomena, on which life and safety mainly depend, has been understood since ancient times. The connection between the heavenly and earthly phenomena was reflected in the mythological thinking, manifested iconographically in the products of almost all significant spheres of Armenian culture. Rock paintings stand out among them, as an ancient expression of human observation abilities and worldview.

The manifestations of ancient perceptions of space and time are abundant in rock-art of the Armenian mountains. They are expressed in compositions consisting of images of the Sun and the Moon, stars and stellar groups, atmospheric phenomena, the Earth and planets, comets and meteors, and geometric symbols. In this way were formed calendars, drawings and maps of the starry sky and surroundings, Earth's pole marks, time of day, eclipse, ideograms, etc. They were also objectified in observatory structures, stone alignments, later vividly expressed in the culture of the Urartian period (IX-VI ce. BC) and in medieval manuscripts. All that greatly predetermined the development of the Armenian scientific mind.

2. Distribution and themes of petroglyphs

Armenian rock art is distinguished by a huge number of images, stylistic diversity and rich content, and occupies a special place in the cultural heritage of the Ancient World. In the regions adjacent to the Armenian Highland, ancient petroglyphs are rare, while on the Highlands their high density of distribution, thematic and typological richness is observed (fig. 1). In the Highlands, petroglyphs are highly concentrated in and around Airarat Province: Kars, Horom, Gosh, Lchashen, Geghama mountains, Zovuni, Quchak, Aparan reservoir, Tghmut, Ashtarak, Oshakan, Voskehat, Agarak, Aragats, Mastara, Kaqavajor, Shamiram, Geghamavan, Metsamor, Armavir, Artin mountain, Dashtadem and Gomshut (in Kaghzvan) (figs. 2-3).

In rich content of Armenian rock art, four main areas are distinguished: nature, everyday life, results of human creation and the inner world. I have organized their rich diversity into 31 thematic groups: terrain elements, the Earth, heavenly luminaries, celestial, atmospheric and terrestrial phenomena, plants,

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Figure 1.



Figure 2.

animals, agriculture, hunting, animal fighting, battles, sports, competitions, dance, weapons, instruments, transportation means, constructions, applied images, learning tools, play aids, garment, cult, mythical creatures, anatomy of creatures, portrait, uncertain image, ornament, symbols, letter-like signs.

3. SPACE: Earth

Large and prominent elements of the terrain are reflected in petroglyphs. Since ancient times for orientation in space there have been used simple graphic and cognitive forms using symbols, which indicate the expression of space, the connection with the visible landscape. Rock painting, the result of pictorial reflection of the ancient thought system, was also a powerful means by which the inhabitants understood and expressed their place in environment, formed the sacred space. The great armenian philosopher Grigor Tatevatsi presented the connection between nature and the culture-creating activity of man. “They will beautify the land with various paintings and dexterity” (Grigor Tatevatsi, 156). There are many reflections of space and spatiality, which are manifestations of human cognitive thought, life experience and scientific knowledge (Tokhatyan 2021, 12-13, 19).

- Orientation land-marks, as a simple ”map”: natural and man-made static elements, mainly mountains, hills, ridges, sometimes rivers, lakes, ponds, rocks, caves, most often drawings indicating the location of a spring and a stream, trees, path, passage, road [figs. 4-5].
- Drawings of partial separation, demarcation, functional zoning and development of the territory:

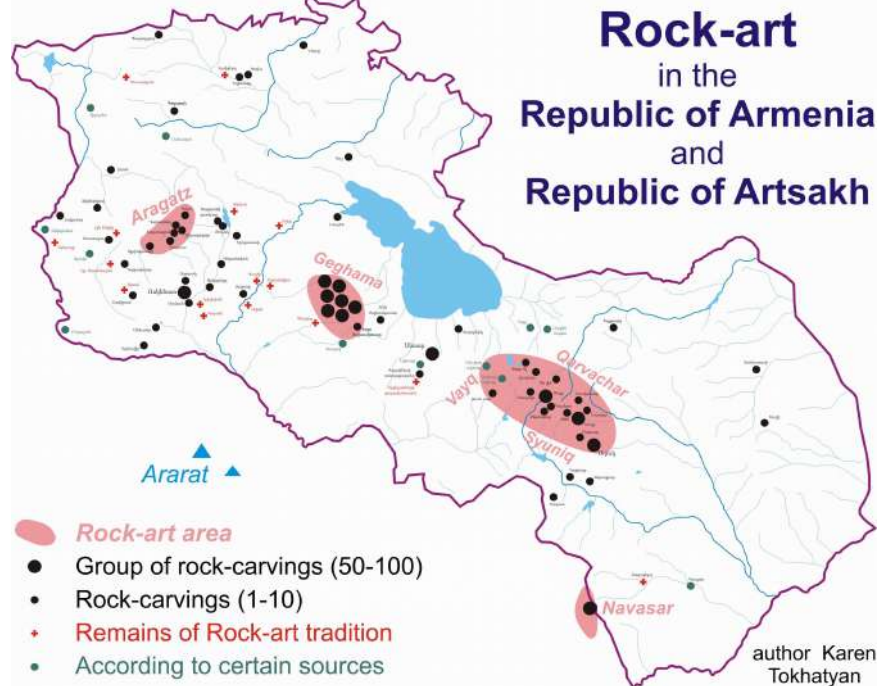


Figure 3.

ambush, kites, hunting place [figs. 6-8], cultivated land, irrigation network, etc. [figs. 9-10].

- The need for orientation in space stimulated the direct marking of Earth's poles with a cross sign [fig. 11 (1-4)], also the positions of the sunrise and sunset points [fig. 11 (5-8)], celestial luminaries, star groups and constellations [fig. 12].

In one of the high valleys of Geghama mountains, a unique petroglyph shows three of the Armenian worshiped mountains rising in a row: Hatis (2528 m), Araler (2577 m) and Aragats (4090 m). The contours of the two-peaked Hatis and the broad cone-shaped Araler are especially prominent [fig. 13 (1)].

A petroglyph on Aragats (on 3150 m) depicts the three visible peaks of Aragats with acute angles on the right, and a radial wheel of the setting Sun on the left. This can be considered the earliest image of the eternity sign, which may have symbolized the rotation of the Sun [fig. 13 (2-4)]. Another petroglyph on Aragats (on 2850 m) reminds of a four-peaked mountain and two rivers sourcing from it: Gegharot, Anberd or Arqashen.

In the Astghaber site of the Geghama Mountains, there is a petroglyph marking the place of the water source between the hills; another one is a map indicating the location of streams flowing into and out of the pond [fig. 51]. On the western slope of Kaputjugh, in the Navasari rock-art site, there is a sketch of three lakes near the summit and the tributaries connecting them [fig. 5 (2)].

Sacred space. Among the mythological creatures seen in the rock paintings, dominate dragons, both in solitary and in group scenes, in peaceful position, mostly long-bodied, bull-like, snake-like, tailed, one-headed, often multi-horned and multi-legged [fig. 14]. Related to them are the "Armenian brand" dragon stones found in sacred mountain areas, mainly near water sources [fig. 15]. These monuments are not only the result and bearers of fertility cult, but also indicators of sacred area having landmark function. In particular, it has been found out that at least two or three of the highest mountains can be seen from each of them. **Buildings.** These are mostly dwelling-like pictures (Tokhatyan 2021, 7-12, 17-18). The four-sided type predominates, with the entrance marked in the upper corner of the drawing [fig. 163-15]. This is comparable to the earthen house described by Xenophon (430-355 BC) in Karin (Upper Hayq Province). Some rectangular and round-shaped figures remind of a dwelling are similar to plans of Teghut, Shengavit settlements (V-IV mill. BC). They are also similar to the ones excavated in the last twenty years in Lernagog, Aratashen, Aknashen, Masis Blur (VII-VI mill. BC), the constructive compositions in Gegharot and Tsaghkahovit (IV mill. BC), the groups of III-II BC cup-marks in Agarak-1 site and the horizontal forms of a number of temples of Ancient Armenia [fig. 16 (23-27)].



Figure 4.

Dual projection. This type of petroglyph is a form of spatial juxtaposition, when the three-dimensional reality is shown in the same petroglyph from different viewing angles, as if seen simultaneously from two or three points. With such duality, with an unnatural, seemingly "wrong" approach, the painter was able to harmoniously combine what he saw from different sides on the flat surface. He did not depict what he saw directly, but what he considered most understandable and appropriate for that subject and situation, its "universal, acceptable" nature. This way of presentation makes the reality more complete and dynamic, which is seen from the most essential, characteristic and recognizable aspects [fig. 17].

Perspective. Some petroglyphs are flat reflections of three-dimensional reality, viewed and pictured from one point. The purpose of perspective is to emphasize spatial depth, horizon, and also movement direction. It is implemented by direct or angular projecting from the point of view along contours converging in the distance. At first glance, such a picture may seem imperfect, even "wrong": uneven, torn legs, disproportional torso and horns [fig. 18]. In this way, the painter tried to emphasize the depth, which may mean that space has been perceived on an empirical level since ancient times. "In the group paintings, there are characteristic ways indicating that there is already a more definite idea of space and depth" (Sardaryan 1967, 115). Large-scale discoveries of rock paintings in the world prove that the perception and expression of perspective was present even in the Paleolithic age¹.

Panorama. In some multi-element large compositions, "seen" from a high or far point, without horizon,

¹The oldest source on the rules of perspective is the treatise "Optika" by Euclid (325-270 BC), translated into Italian (La prospettiva di Euclide, Fiorenza, 1573). Perspective has been widely used since the 14th century, during the Renaissance.



Figure 5.

they used upper projection method [fig. 19]. The participants and the whole situation seem to be observed from above: people, animals and things are in different positions and directions, mixed or arranged in a circle, the horizon line, up and down are indistinct. In this way, they differ from ordinary, simple petroglyphs, in which the horizon of the plot, the carving, and therefore our view point is certain and the only one. The artist imagined himself as an observer or the main actor, in the center of the participants and events. Such a complex image had to be formed by the power of thought and fantasy. In order to fully and completely perceive, understand such a "multi-viewpoint" rock painting, we still go around today, perhaps involuntarily repeating it, reproducing an ancient hunting or another ritual, fulfilling a message from an ancestor. **Globe.** These are cross-in-circles, often isolated without an accompanying sign. In this way the Globe was usually pictured [fig. 20]. The idea of Earth sphericity described by Pythagoras (570-495 BC) and Aristotle (384-322 BC), was introduced to Armenia by Anania Shirakatsi, later developed by Grigor Tatevatsi, Hakob Ghrimetsi and others. At the southern foot of Paytasar volcano, in the Geghama Mountains, there is a unique petroglyph, which seems to be a direct image of the Earth and the people living on its four sides, a reflection of the ancient concept of sphericity [fig. 201]. It could also symbolize the "antipodes" living on opposite sides of the Earth. It was interpreted as a manifestation of the divine forces guarding the four gates of the world, the quadripartite division of the Earth. In a broader sense, it can be considered the Imago Mundi. With its four-sided and four-pointed design, it is also comparable to the swastika [fig. 21].

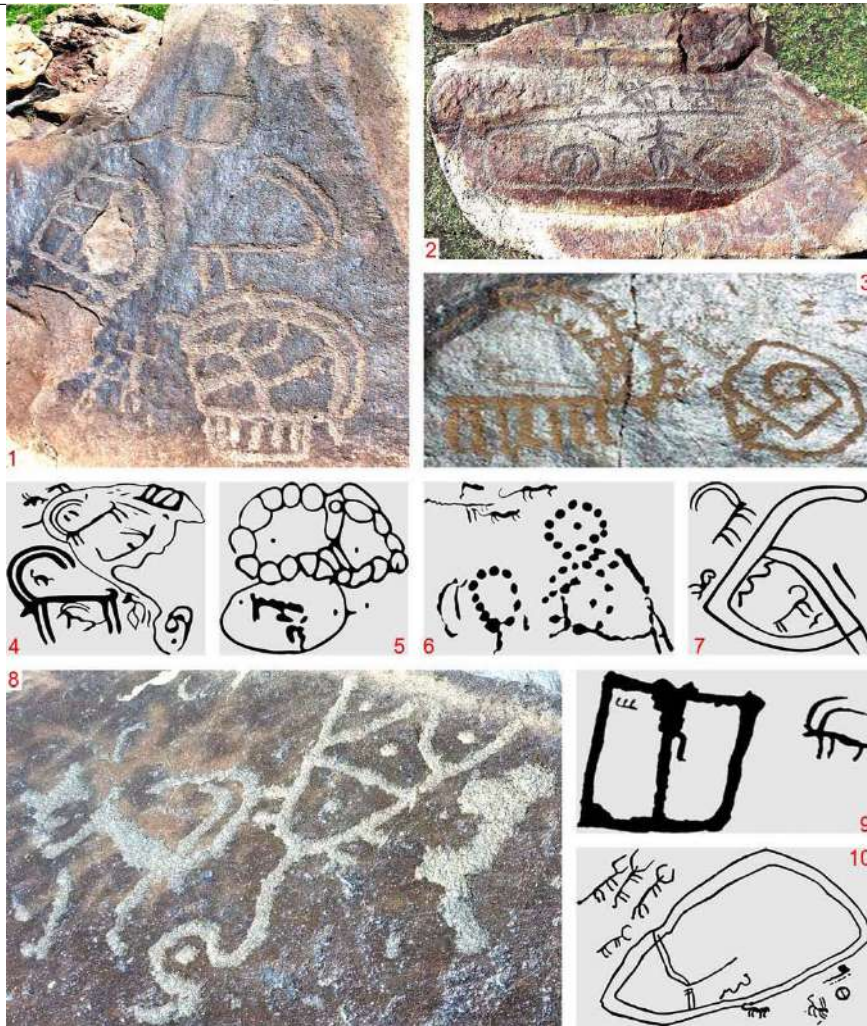


Figure 6.

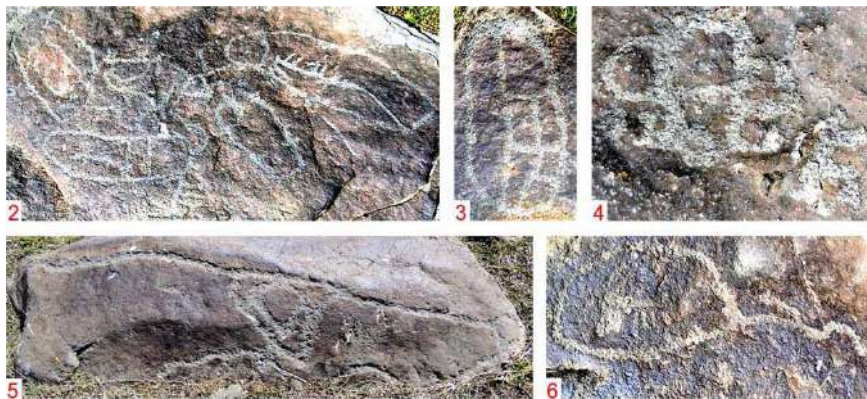


Figure 7.

4. SPACE: Heaven

There are many reflections of visible objects in the sky in the rock-art of Armenia.

- Luminaries, celestial bodies, periodic and sudden, random phenomena (comet, eclipse, meteor) [figs. 22, 36 (3), 27].
- Maps of the sky showing the Milky Way [fig. 23], star groups [fig. 12], Zodiac and other constellations with a sign or image of their beings [fig. 24], cup marks or engraved rings [fig. 25].

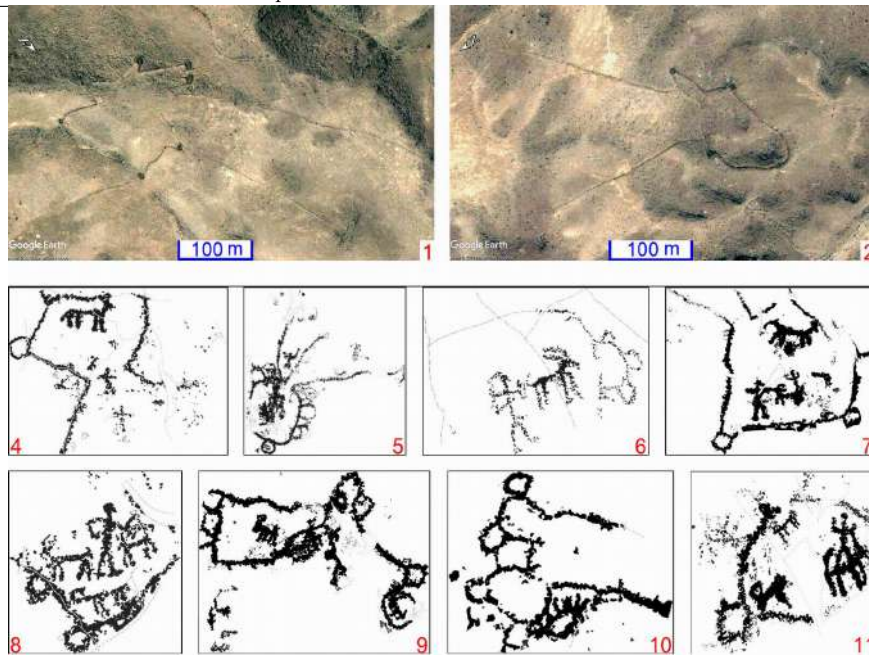


Figure 8.

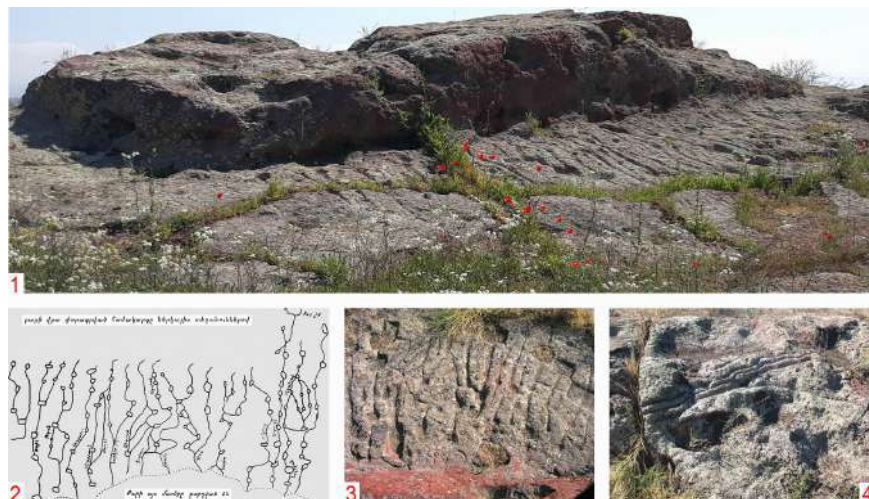


Figure 9.

- Records of the position and appearance of luminaries and other celestial bodies [fig. 26].

For easier orientation in the dark sky, about 5000 years ago man formed from the bright stars sustainable and memorable images – constellations. Their description comes from the alexandrian poet Arattes, written upon Eudoxes’ work (IV ce. BC). Arattes speaks about deep and unknown antiquity of the origins of constellations.

The tradition of dividing the sky into constellations began among native people of the Armenian Highlands–Armenians, who separated and named the Zodiac in the star field visible from the northern hemisphere.

In 1910, the historian of astronomy William Olcott, summing up the assumptions of the archaeologist Edward Maunder, astronomers Carl Swartz, Camille Flammarion and Arthur Berry, came to the conclusion that the Zodiac constellations were formed and got their names on the latitudes of 36⁰-42⁰, in XXX-XXVIII ce. BC. He wrote: “Astronomy unites with history and archaeology in pointing to the Euphrates Valley, and, as we might expect, the region of Mt. Ararat, as the home of those who originated the ancient constellation figures... We have left Asia Minor and Armenia, a region bounded by the Black, Mediterranean, Caspian, and Aegean seas, as the logical birthplace of the stellar figures” (Olcott 1911, 7-8).

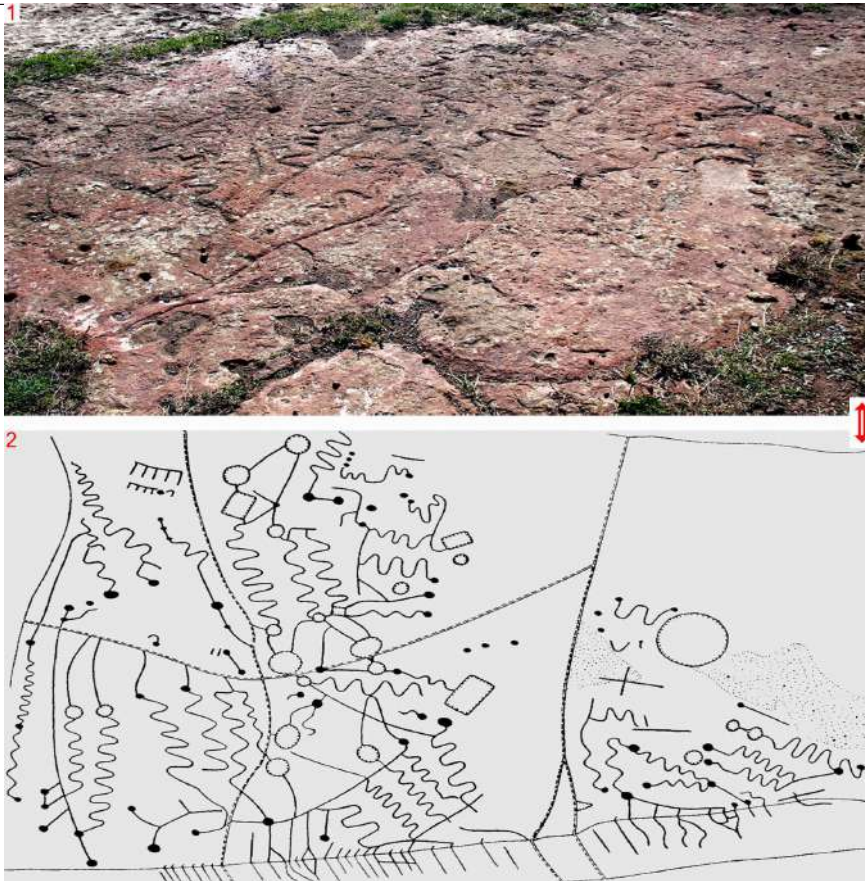


Figure 10.

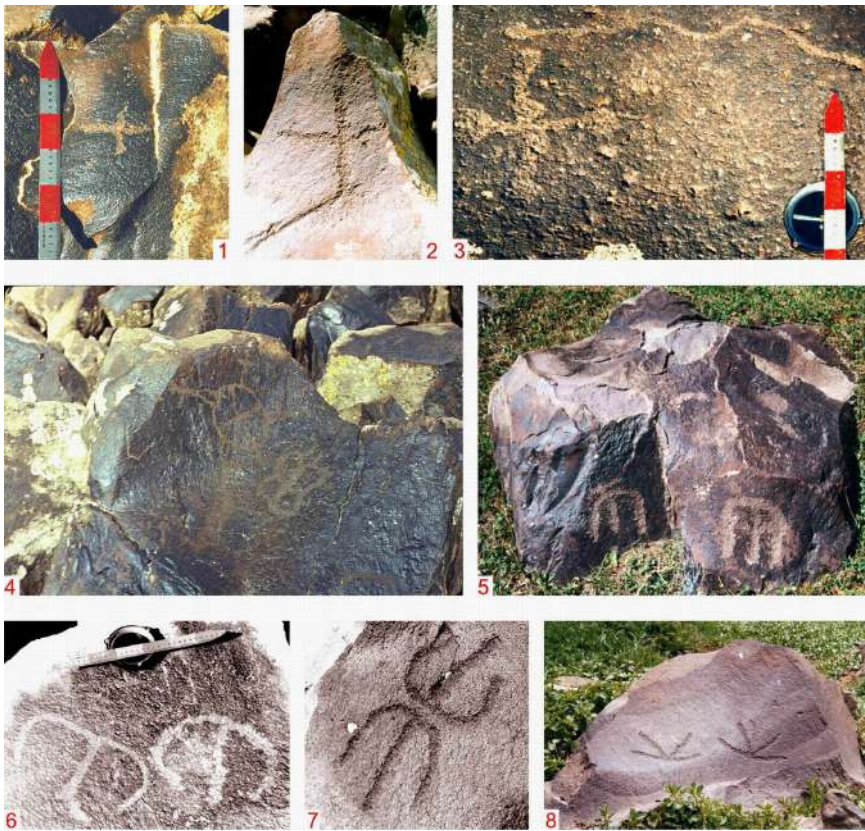


Figure 11.

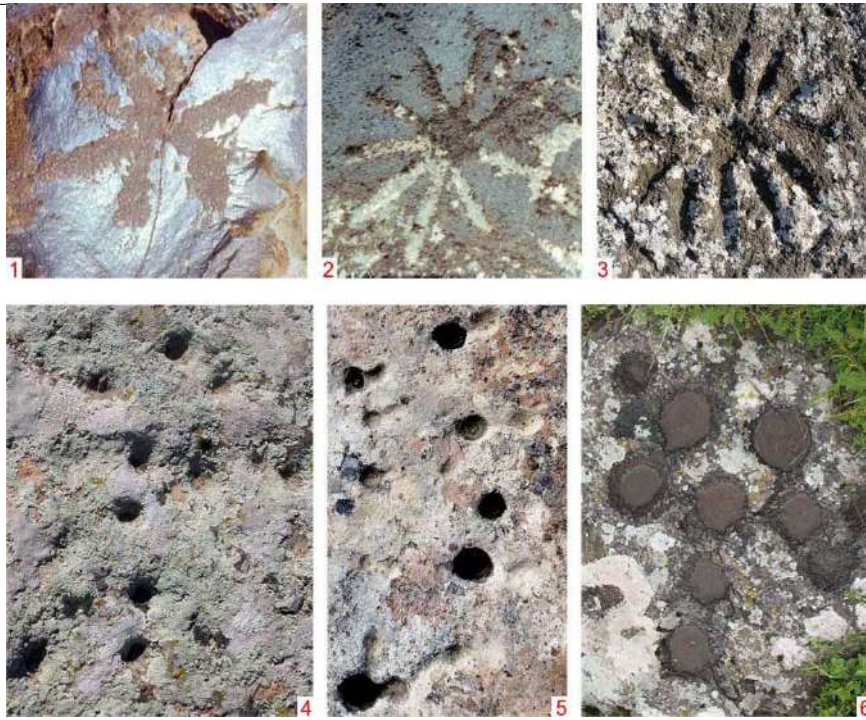


Figure 12.

The scholars have made these conclusions theoretically, by examining astro-geographical (from which latitude and which period of the past were seen those constellations), zoo-geographical (areas of animals represented in the Zodiac) and general archaeological data. They did not know about the cosmological perceptions and their material realization in form of artifacts in Armenia: astronomical constructions, observatories, belt-calendars, shield-calendars, and especially the astronomical rock-drawings.

I found out that all-Armenian poet Hovhannes Tumanyan knew about this very important for world culture and history theory of W. Olcott, and in 1921, in his report² related it to Armenian thinking and thesaurus³. W. Olcott's theory conclusion was objectified and brilliantly proven decades later.

In the past 60 years, the following have been discovered and interpreted in terms of astronomical meaning:

- astronomical observation structures: Sevsar⁴ (1967) [figs. 27-28], Metsamor (1967), Zoratsqar (1893/1984), Portablur (1995) [fig. 29],
- petroglyphs with astronomical meaning: stellar maps of the Vardenyats Pass⁵ (1967) [figs. 25(2-3),

²The handwritten "Dictionary of the Armenian Epic" (Tumanyan archive, №64, p. 1-98) was published only 38 years later, in 1959. Probably not being aware of its publication, W. Olcott's theory was circulated four years, further by the astronomer Hayk Badalyan (Badalyan 1963, 63-74):

³Examining the connection of patriarch Hayk with Orion constellation, Hovh. Tumanyan has referred to astronomy. "To what extent were the inhabitants of ancient Armenia connected with the heavenly luminaries, did the worship and science of the stars develop among them, and did they have a love and inclination to the stars and stargazing or not? Fortunately, great astronomers and scientists give a positive answer to this question. The inhabitants of ancient Armenia, hunters, shepherds and herdsmen, always talked to the starry sky in their high celestial world, always under the open sky. And scientists have already confirmed that the ancient region which determined the constellations and gave names to the stars, was Asia Minor, and Armenia is especially mentioned in Asia Minor (Olcott, Legends of star world, p. 7). They said that the ancient names of the stars have got the names of the tools that were used in those countries, the names of the animals that were known in those countries, and the language that the ancient inhabitants of those countries spoke" (Tumanyan 1959, 372-373), see Tokhatyan 2019, 221-223.

⁴This unique and famous astronomical site was discovered by architect Suren Petrosyan. As interpreted by Armenian historian of astronomy prof. Benik Tumanyan, these are engraved images of large meteorite fall, the constellations Aquila, Gemini, Serpens, and the part of Milky Way. Nearby, on an area of 200x100 m, about two dozen carved boulders are scattered, which allow to suppose that it was a great astronomical and cult center.

⁵This group was also found by S. Petrosyan, at the top of the pass (2410 m). It consists of 12 large stone slabs with engraved rings. Being on the ancient caravan route (later – a branch of the Silk Road), protected by number of cyclopean fortresses,



Figure 13.

30], calendars and constellation images in Sevsar [fig. 31(1, 7-8,] and Geghama Mountains⁶ (1989) [fig. 31(2-6, 9)], star groups in Ararak-1 (1990) [fig. 12(4-5)] and Lchashen (2004) [fig. 12(6)] sites, the image of sunrise near Arpi village (2018),

- tens and hundreds of meters long single-line, two-line and three-line regular rock alignments near the villages Navur, Artsvaberd, Choratan, Ashotsk, Zuygaghbyur, Hartashen⁷ [fig. 32] and Khnatsakh, single-line rock lines in Aragats, Syunik and Geghama mountains],
- rock circles: near the villages of Koghesh⁸ in Lori marz (1990) [fig. 33], Lezk⁹ (1874/2006) [fig. 34] and

these carvings very likely had ritual and orientation significance. In 1969, B. Tumanyan identified those images with Zodiac constellations Leo, Sagittarius and Scorpio. The stars are represented by dots and circles, accordingly to their brightness.

⁶There is a couple of images on the slope of the Astghaber (3139 m). In one, an archer shoots a bull, in another, instead of man is pictured man-like swastika [fig. 25(4-6)]. We must assume that the archer and swastika symbol were identical or equivalent. This is exactly how the constellations Orion and Taurus are located in the sky. The images looking towards the east where the constellations rise. This may be an iconographic evidence of the worship of patriarch Hayk and constellation Hayk. The eponym Hayk is deified and finds a place in the starry sky.

⁷Archaologie in Armenien, 2011, 73-113.

⁸Tonakanyan, Tokhatyan 1991, 31-34; Tokhatyan 2017, 62, 73, 77; Tokhatyan 2020, 132, 141, 146.

⁹To the 7 km north of Van, near the ancient village Lezq, at the foot of hill “Adamants Qarer”, on an area of 400 m², are spread 2475 standing stones with about 1 m height. The distance between the stones is almost the same, located evenly along parallel lines. This “stone forest” may have an astronomical and calendar meaning. From nearby tombs was found IX-VII BC



Figure 14.

Datvan¹⁰ (1864/2003) in Van Lake basin, "Sharvan stones"¹¹ (1974/2003) of Tandzut village in the Basen field, Maratuk's "Row of Stones" (1965/2023) in Sassoon and other¹².

- bronze belt-calendars from Sanahin (1946) and Metsamor (1970) sites [fig. 35(1-2)], bronze disc from Baralet village of Javakhk (1989) [fig. 35(9)],
- bronze decorative shields of Urartian kings (1955) [fig. 35(6)], many gold and bronze jewelry, bronze military items, seals, etc. [fig. 35(3-5, 7-8)].

The founder of Armenian natural science, Anania Shirakatsi, VII ce. philosopher, mathematician, astronomer, provides direct evidence of the connection between sky watching and rock engraving: "The receptors of our ancestors were more sensitive than ours, due to which they could **notice** not only the movement of the Sun but also of all the other luminaries and stars, and could **carve** and **recognize** them" (Anania

ce. ceramics.

¹⁰To the southeast of Nemrut volcano, near the Datvan village there is a 330 m long group of vertical stones.

¹¹To 5 km south from village, according to an eyewitness description (before the Genocide in 1915), there was a huge stone circle with diameter of about 60 m.

¹²About this and many other menhirs and stone alignments see Ghanalanyan 1969, 51-78.



Figure 15.

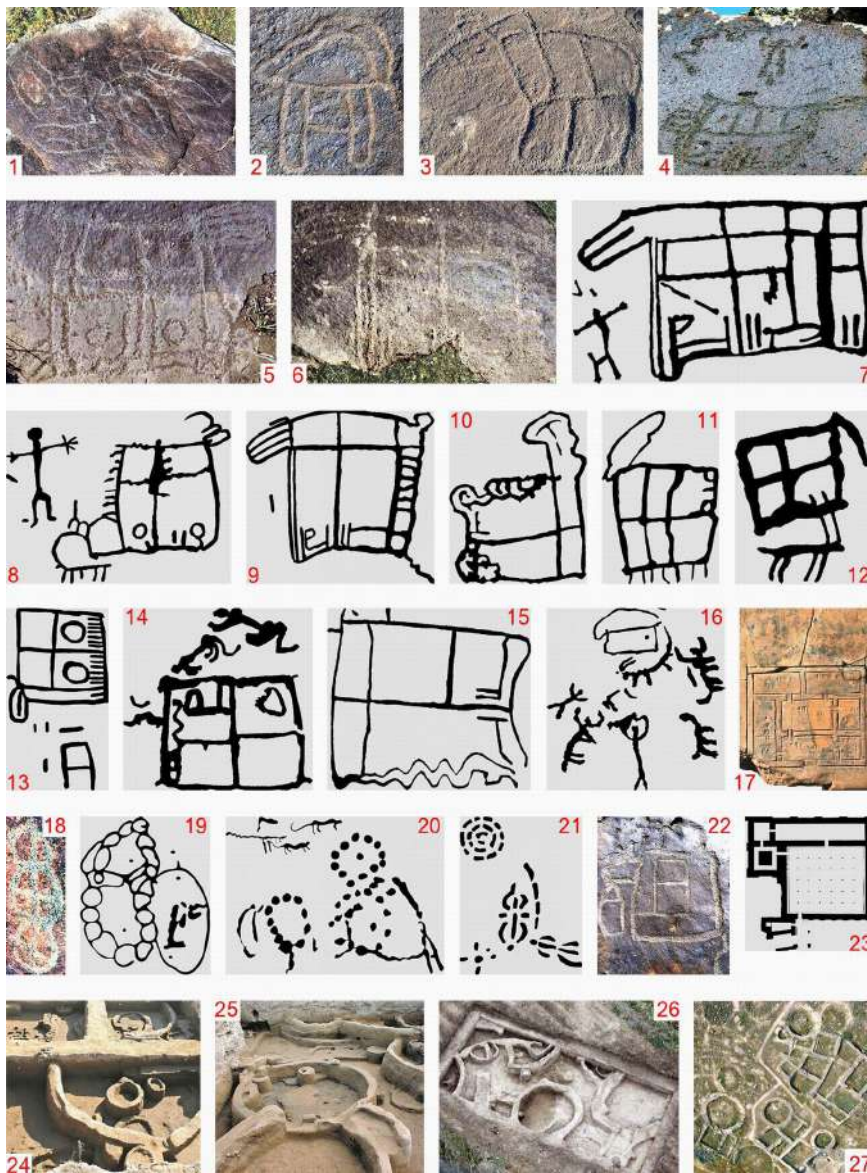


Figure 16.

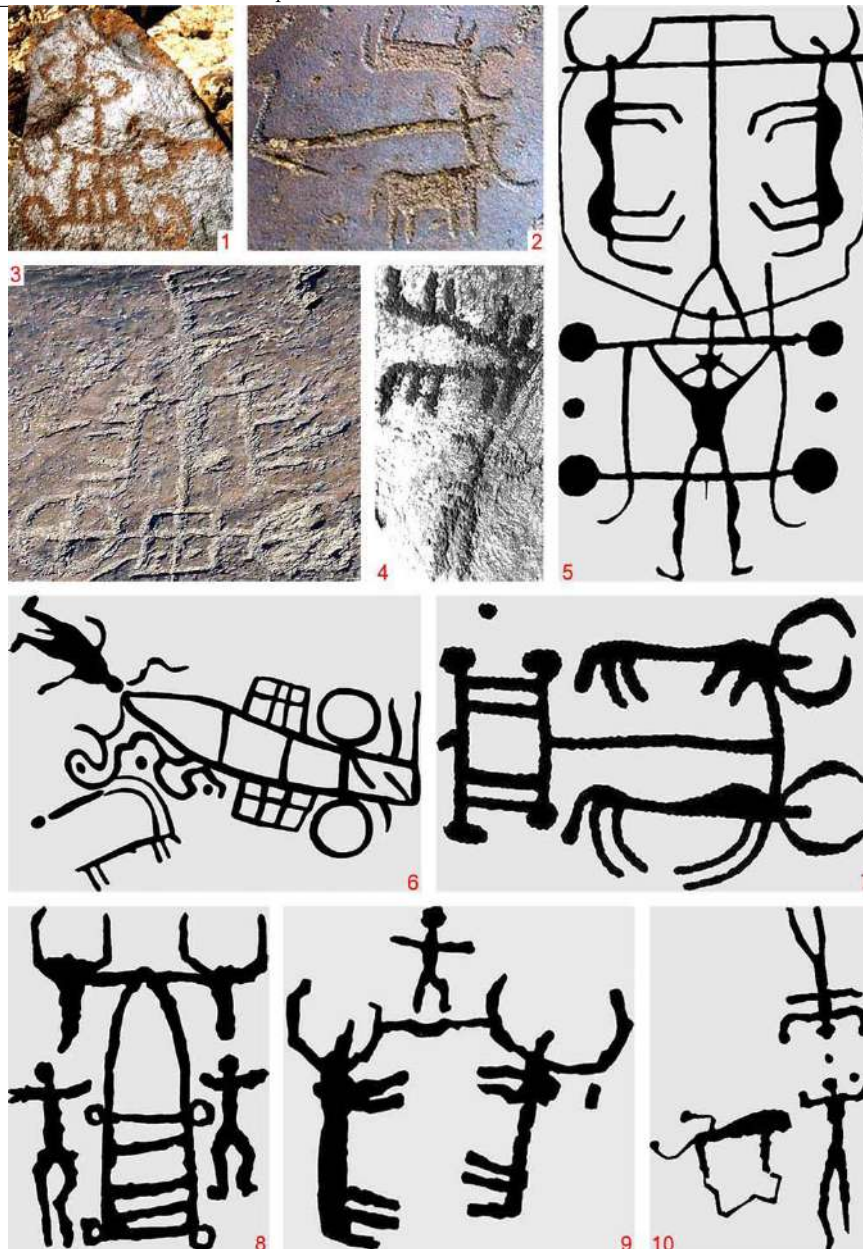


Figure 17.

Shirakatsi 1940, 83-84). This directly applies to records of the position and appearance of luminaries and other celestial bodies. It is best seen in this unusual carving which represents a table of astronomical records [fig. 26].

This fragment is the world's earliest written evidence about the existence and antiquity of rock-drawings. It is very important that Shirakatsi mentions this sequence of studying phases: carve and recognize, i.e. first the **noticed** positions of heavenly bodies had to be **recorded, fixed** (collecting and accumulating the knowledge), and only after that they had to be **researched and recognized** (understanding the rules of luminaries' movements). As mentioned above, astronomical processes are very slow, and man cannot notice and remember the considerable displacements of stars during his lifetime, therefore, periodical recordings were needed.

These are arguments in favor to the theory of the European astronomers-historians that the Zodiac was formed and named in the territory of Armenia, also testifying that it is one of the cradles of ancient astronomy.

A star map formed by the spatial arrangement of petroglyphs.

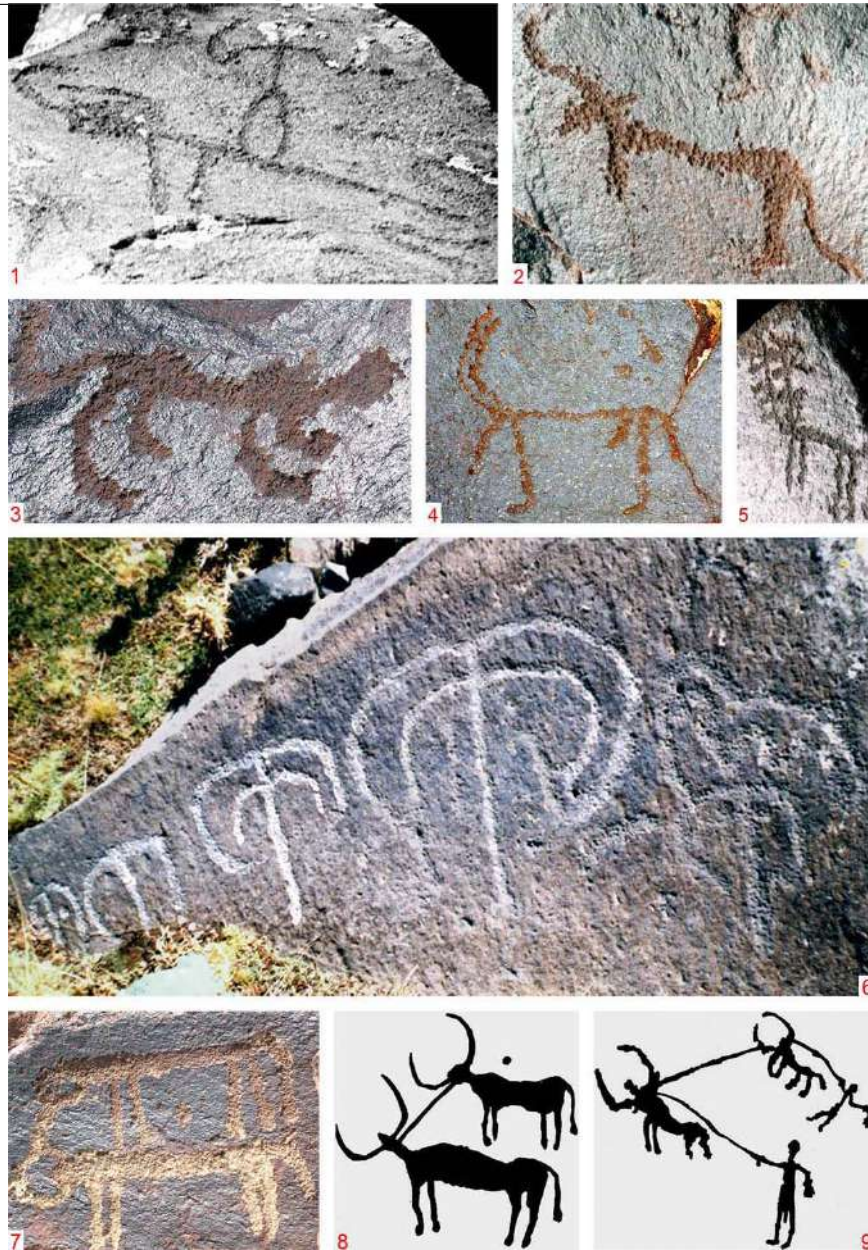


Figure 18.

Some petroglyphs in compact groups remind a being (sometimes an object) that is the picture-basis of any star-group and constellation. The spatual arrangement of these carved stones can be similar to the mutual positions of star-groups and constellations in the sky. In other words, adjacent petroglyphs may mark some large domain of the sky.

This is very probable, because it is difficult to fit a group of several constellations even on a large surface (with signs, cup-marks, rings signifying stars or with animal figures). By carving on stones close together, the ancient astronomer could easily have a map of a large area of the sky.

5. TIME: calendar

The need for time orientation arose in the immemorial past. The ancient hunter, shepherd, and farmer became the first primitive explorers of the starry sky, weather changes, and other natural phenomena. Archaeological, cultural and natural science researches proves that the simplest astronomical-calendaric knowledge originated 20-30 thousand years ago. Since ancient times, observations of the starry sky have been made throughout the world to regulate economic and ritual life.

Parallel with the development of human observational and analytical abilities, a number of ways of perceiv-

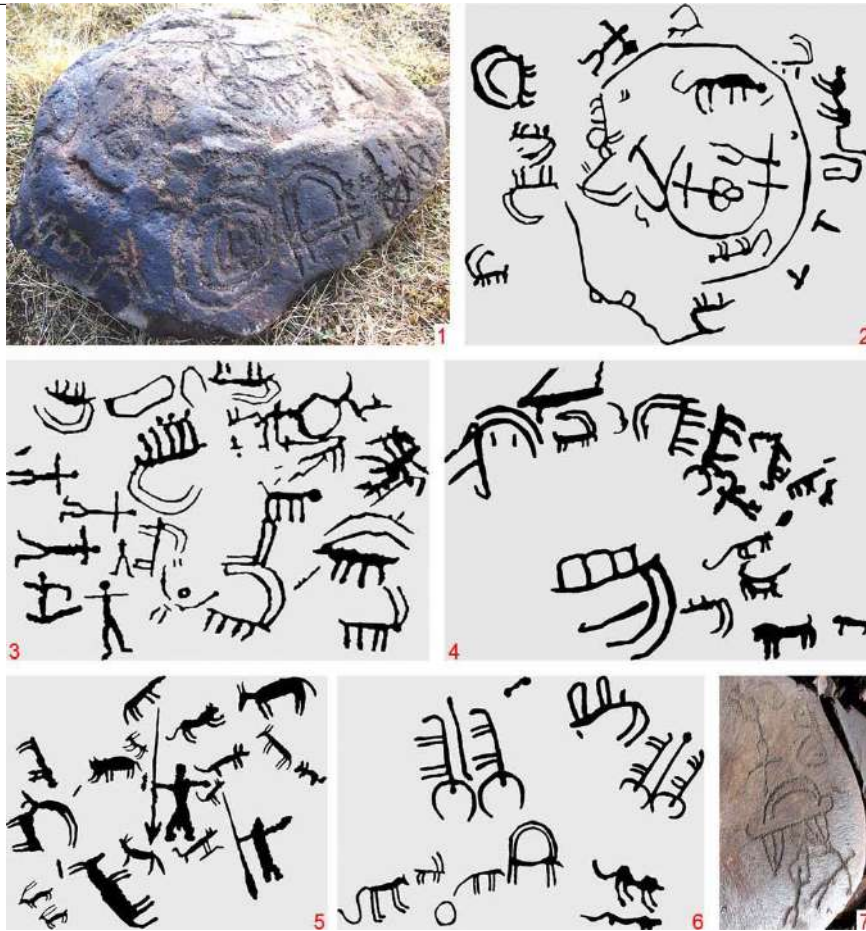


Figure 19.

ing and measuring time periods have emerged, based on the temporal characteristics of vital, terrestrial, and celestial phenomena. In the VII-IV mill. BC, the first astronomically based calendars appeared, when people had already realized that some of the phenomena of earthly life are the result of the movement of the luminaries, the Sun, the Moon, and the planets. Hundreds of calendars have been formed in different countries and times, which are united by the definition of the term "calendar" - a system of counting long periods of time that has a specific order and starting point for counting days and larger units.

There are many reflections of the time perception in the petroglyphs. Astronomically based calendars are manifestations of human cognitive mind, life experience and scientific knowledge. In Armenia IV-III mill. BC, lunar and lunisolar calendars were used up to X ce. BC. Material evidence of this is a number of rock paintings with 14, 27 and 29 dashes, regularity of ornament of ceremonial ceramics (III mill. BC), patterns of belt-calendars and shields of Urartian kings [figs. 31, 35].

A few petroglyphs depicting action and living beings sometimes have a sun-like symbol at the top, left or right. It probably indicated the time of day: afternoon, morning or evening (depending on the position of the petroglyph in relation to the Sun). Some archeological and ethnographic artifacts also reflect a similar meaning [fig. 36]. Mythological evidences are the 7 worship pillars, the 7 viewing platforms for observing the Sun, the Moon and the 5 planets in Metsamor observatory, and the 14 gods in Hayasa (half moon).

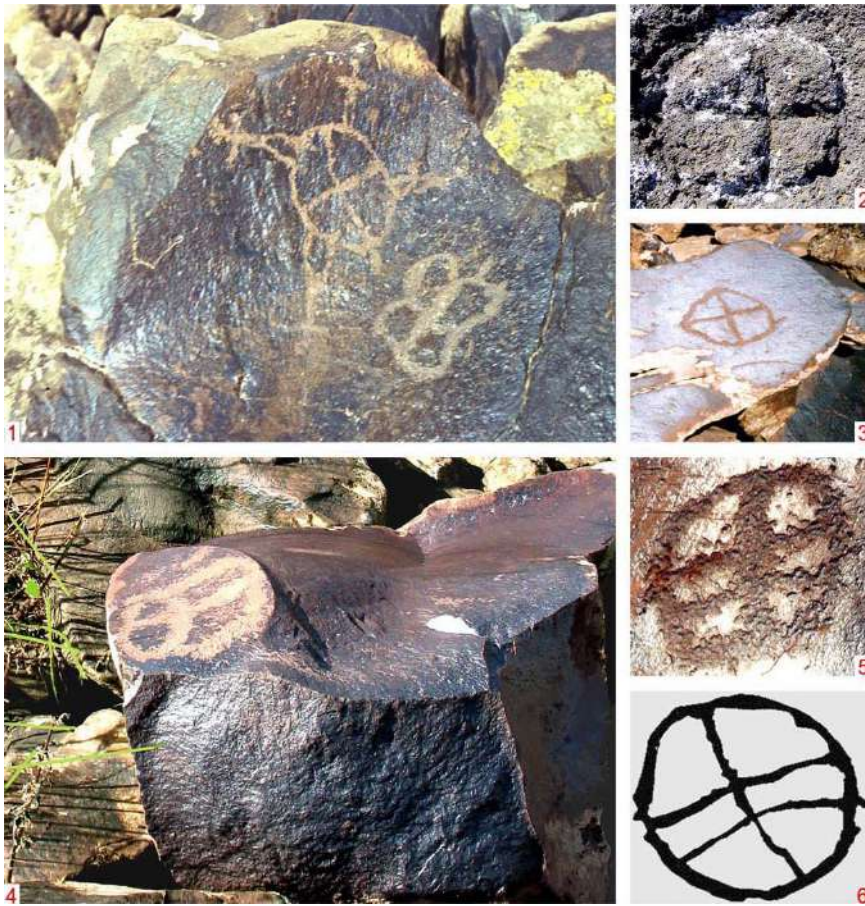


Figure 20.



Figure 21.

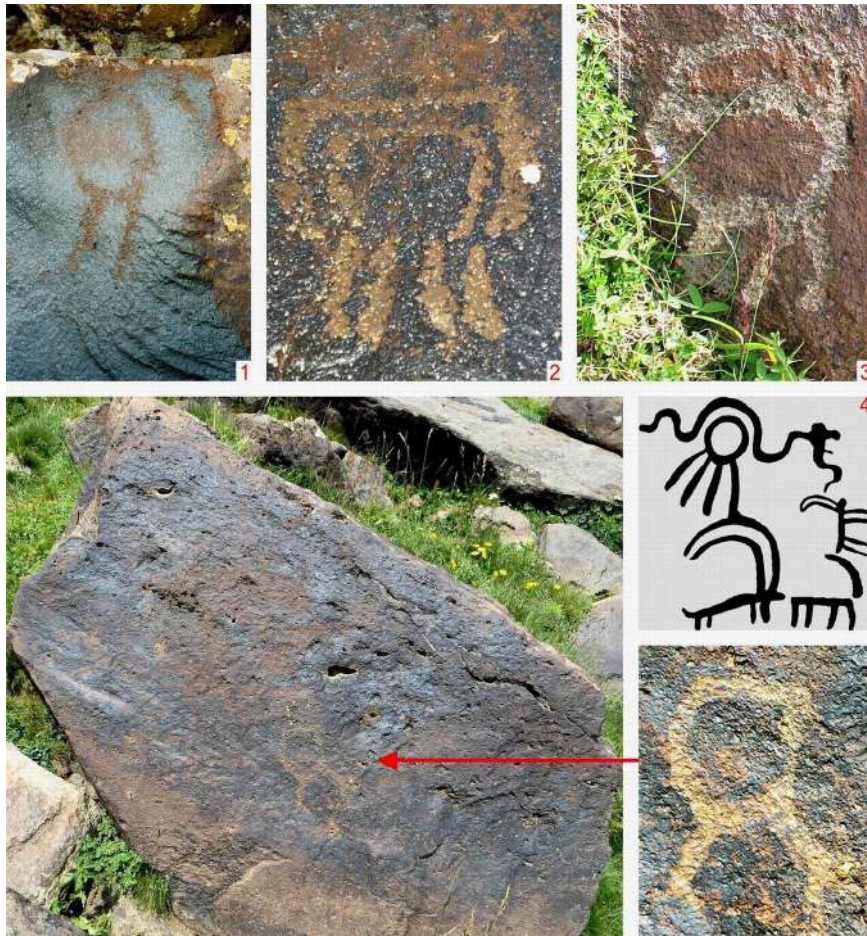


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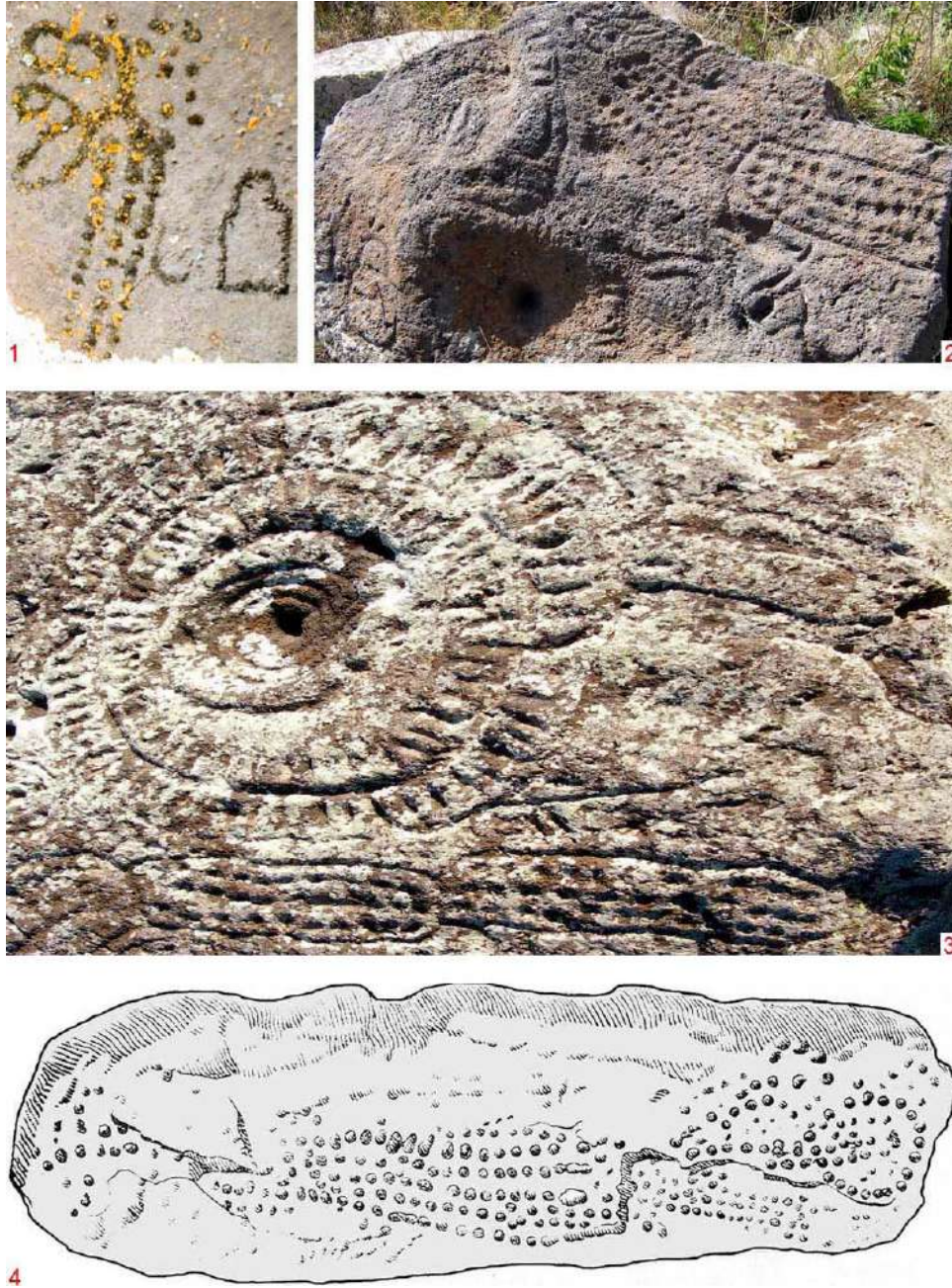


Figure 23.



Figure 24.

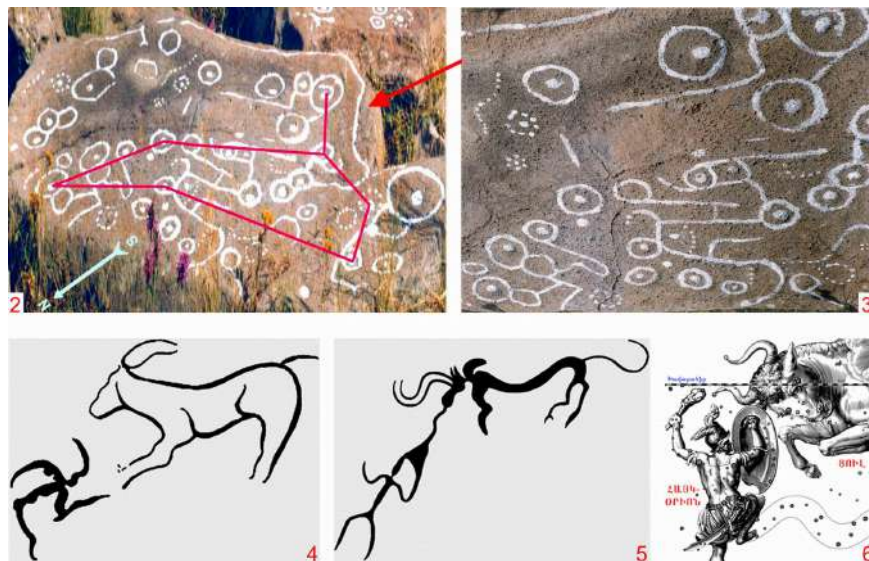


Figure 25.



Figure 26.



Figure 27.



Figure 28.



Figure 29.



Figure 30.

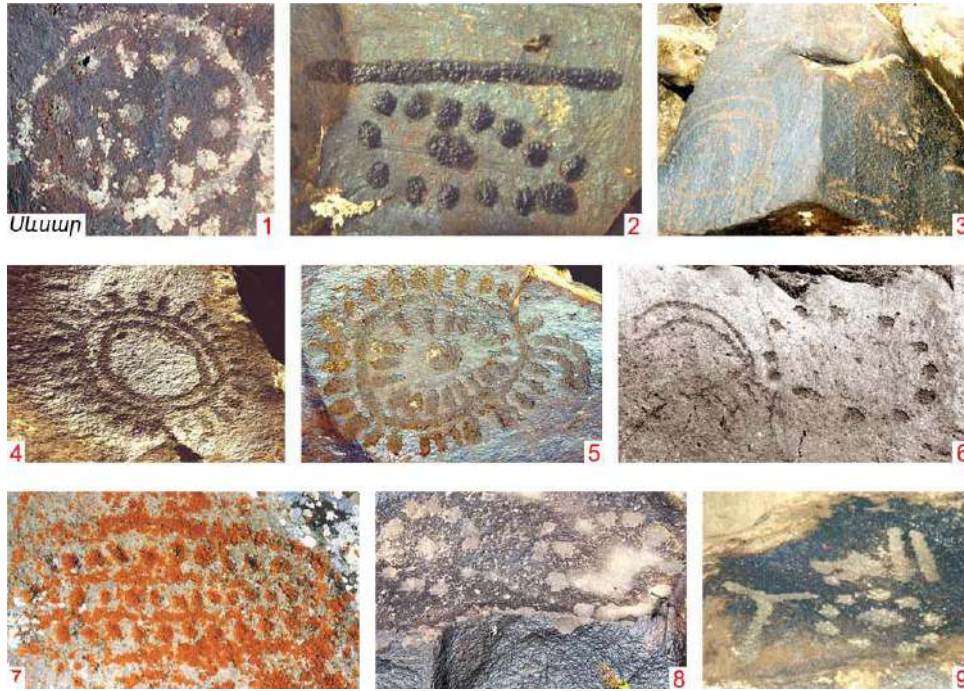


Figure 31.

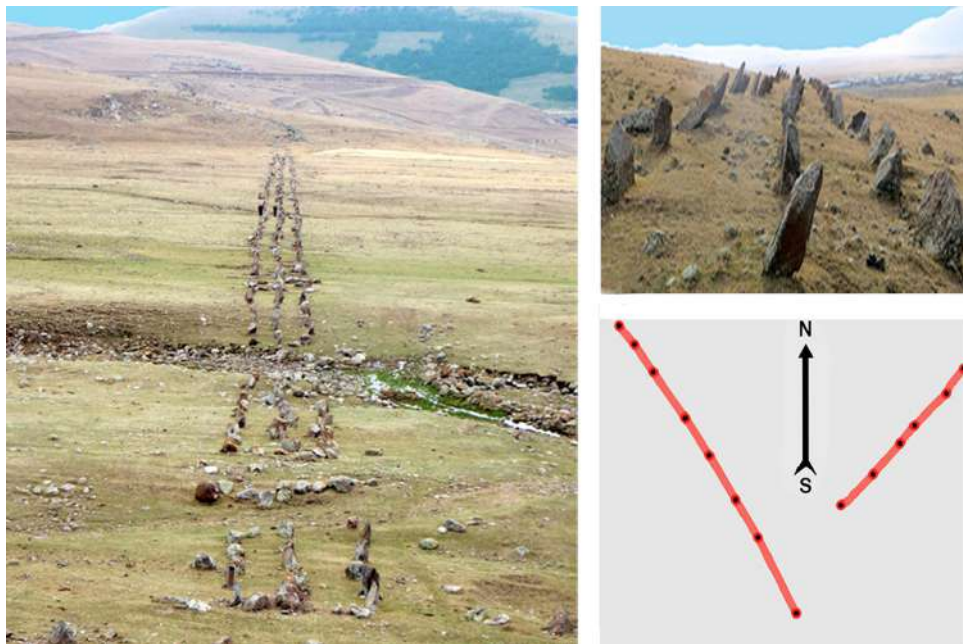


Figure 32.

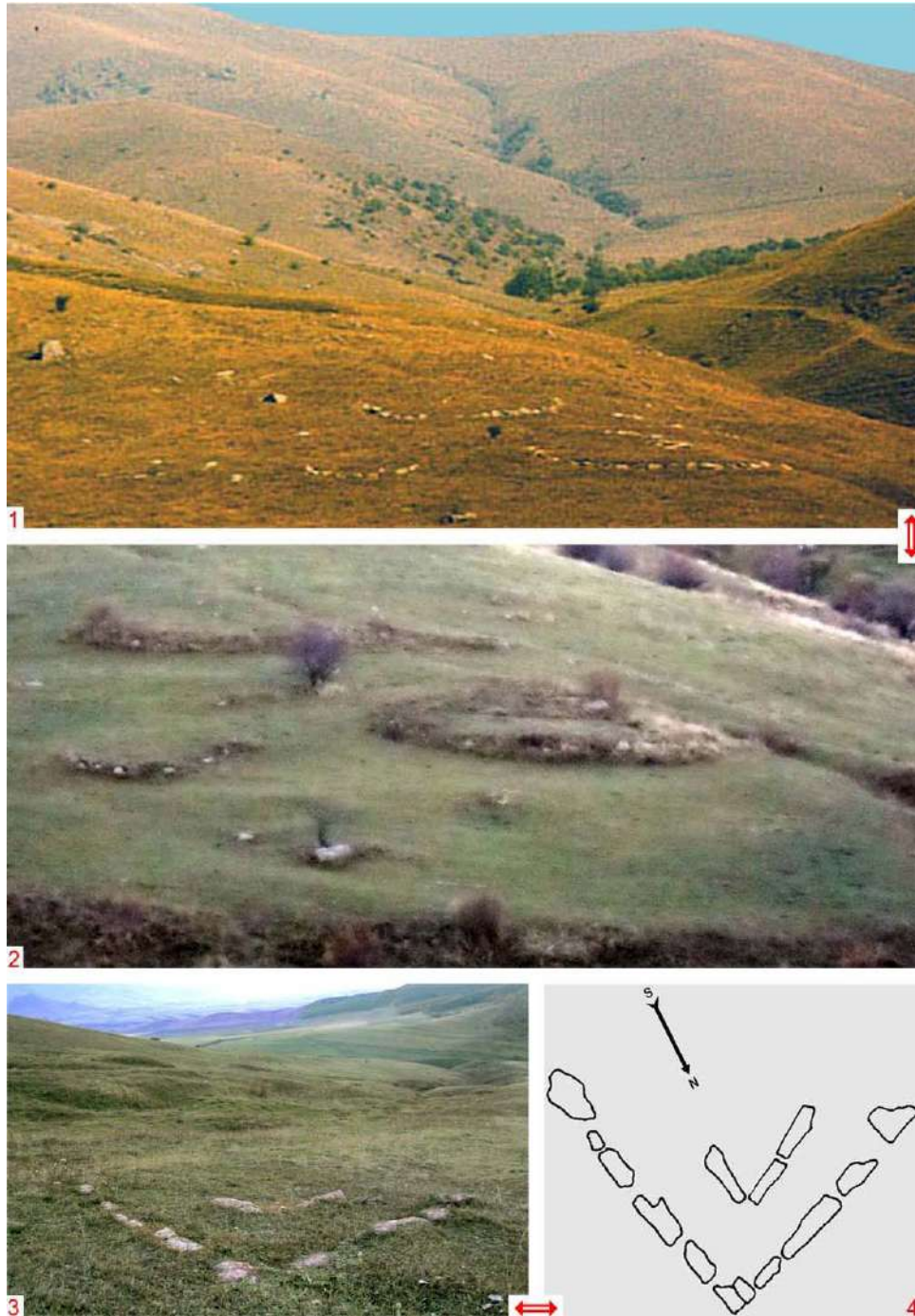


Figure 33.



Figure 34.



Figure 35.

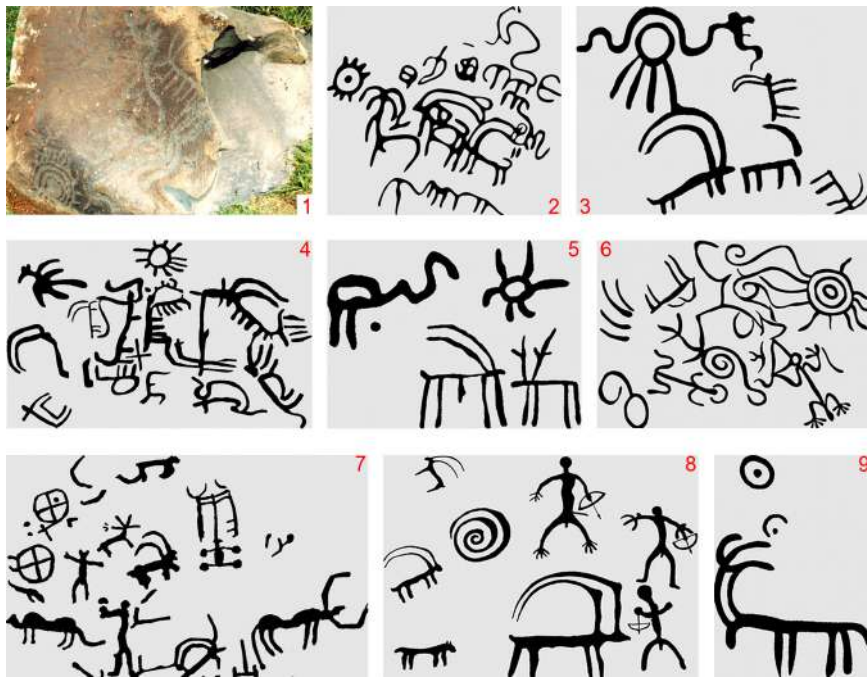


Figure 36.

6. Summary

Ancient perceptions of space and time are abundant in the main areas of Armenian culture: in thesaurus and folklore, in fine arts and architecture. Astronomical knowledge and perceptions have been expressed in various ways and in different spheres. Their ancient bearers are petroglyphs, stelae and observational structures, applied art and household items, weapons and jewelry.

All this was vividly expressed in the Urartian culture, in medieval manuscripts, and greatly predetermined the development of Armenian mythological and naturalistic mind. For thousands of years, the investigation of time and space, their correlation in the Cosmos and the Earth has created new scientific ideas in Armenian natural and historical sciences.

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