

PARIS M. HEROUNI



**ARMENIANS
AND OLD ARMENIA**

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AND OLD ARMENIA**

**ARCHAEOASTRONOMY
LINGUISTICS
OLDEST HISTORY**

YEREVAN, 2004

ՊԱՐԻՍ Մ. ՆԵՐՈՒՆԻ

**ՀԱՅԵՐԸ ԵՎ
ՀՆԱԳՈՒՅՆ ՀԱՅԱՍՏԱՆԸ
(ԴԻՍՔԵՐԸ ՀԱՅՈՑ)**

ԱՐՔԱԵՕԱՍՏՂԱԳԻՏՈՒԹՅՈՒՆ
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ՀՆԱԳՈՒՅՆ ՊԱՏՄՈՒԹՅՈՒՆ

ԵՐԵՎԱՆ, 2004

ПАРИС М. ГЕРУНИ

**АРМЯНЕ И
ДРЕВНЯЯ АРМЕНИЯ**

АРХАЕОАСТРОНОМИЯ
ЛИНГВИСТИКА
ДРЕВНЕЙШАЯ ИСТОРИЯ

ЕРЕВАН, 2004

TO THE BRIGHT MEMORY OF
MY FATHER **MISSAK HEROUNI (SACHIAN)**
AND
MY MOTHER **SEDDA HEROUNI (AZATTIAN)**
THIS BOOK IS DEDICATED

I am very grateful to Mrs. Zarouhi & Mr. Hrach Davidyan and Mrs. Elvina Makarian (USA) for their financial support in this book publication.

Paris Herouni

"If I were asked where one can see the most miracles on our planet, I would name Armenia.
... I loved your country, her gifted people.
And leaving from, I have left here my heart."

ROCKWELL KENT
1962 [107]

INTRODUCTION

This book is about the Armennian* nation, its real prehistoric and ancient history recovery, about its language, knowledge, national state, civilization and development from the very beginning until 301 AD when in Armennia the Christianity was adopted as a State religion.

The recovery of Armennian old history is very important also for all the World old history because the history of old civilizations on the Earth has now too many ununderstandable and unexplained facts and enigmas. The answers to many of them are in the Armennian old history.

It seems this book is the first scientific attempt to demonstrate that Armennian civilization, arisen in the Armennian homeland, is the first in the World and the cradle of all other civilizations.

I understand that this new concept seems very unusual (though it is not in contradiction with Bible) and it is too difficult to accept it, because the old history of the World is now very distorted and Armennian old history is made out by political reasons mainly. Ambitions "to forget" the words Old Armennia, Armennians, Armennian language also continue now. For example, now instead of "Armennoid race" is often in use "Anterior Asia race", instead of "Armennian Culture" - "Cour-Aracsian Culture", instead of "Armennian Mesopotamia" - "North Mesopotamia", instead of "Armennian Highland" - "Eastern Turkey", etc. Even there was an attempt to rename Mount Ararat.

But I believe that one day the truth will win. Someone must begin the fight for the truth and I am doing it, in spite of too much potential opposition from many sides.

I understand also that the problem I want to solve is scientifically very complex. It is related to different specific directions such as history, archaeology, anthropology, linguistics, ethnography, astronomy, mathematics, geo-

* Today the form "Armenia" is in use, phonetic pronunciation of which is [armi:nia]. But it is wrong. The accurate pronunciation should be [armenia]. So in this book everywhere I have written double "nn", i.e. "Armennia", to show everybody the right pronunciation.

logy, mineralogy etc. It was necessary to collect data from them to one unit. I have read many special books and made many notes and calculations during the last 15 years. I hope this book can demonstrate the truth. Of course, the problem is too big and this book is just the first step on the way to its solution. I think, the final will be achieved by scientists of new generation. This process has begun now in Armenia.

apenudice Writing this book I don't aspire to fame, to make revolution in the history. In my main scientific directions, which are radiophysics, radiotechnics, radioastronomy, I have enough serious achievements in the area of large antennas, telescopes, radioholography, radar, antenna metrology, solar power units, etc., which are known in the World and in use in developed countries. But being an Armenian scientist, member of the Armenian National Academy of Sciences, I can not be apathetic to the present big distortions of truth about my country, my nation.

There are very many facts in honour of my concept. The main and important of them are presented in this book, in three main parts: PART 1, "Carahunge – the Prehistoric Wonder in Armenia", about the big and developed Observatory, the oldest one in the World, which was in active operation more than 7500 years ago; PART 2, "Armenian Language Analysis", about large, important and interesting information which is kept in the language and comes from the oldest times; PART 3, "Armenian Old History", about the beginning of Armenian civilization in Armenia more than 40 thousand years ago and its development until the Christianity adoption in 301 AD.

Fortunately I am not alone in my opinion about big distortions in the World old history. U.K. scientist Graham Hancock in the beginning of his book "Fingerprints of the Gods" (Heinemann, London, 1995) expresses gratitude to five researchers (giving their names) "who saw that there was something very distorted in the World history, who have courage to stand against that their brain did not agree with, and initiated by this the evolution of basic knowledge which become already irreversible". *неодержимости*

This book is scientific one, but I aspired to make it at the same time as popular as possible. I hope the book will be interesting for many readers in many countries.

ACKNOWLEDGEMENT

I am very thankful to Dr. J.G.Gallagher (DERA, U.K.) for discussing and editing my preliminary original English text of PART 1, to Dr. Sci. S.M.Martirosyan, Ph.D. K. Martirosyan for computer processing of the final text, tables, figures, and also to my wife Angela Herouni for edition and grammatical correction of my English.

PART 1

CARAHUNGE – THE PREHISTORIC WONDER IN ARMENIA

*“Per Apera ad Astra”
 (“Through Difficulties to Stars”)*

In Armenia, near town Sisian (200 km from Yerevan, capital of Armenia) there is the prehistoric Monument, consisting of hundreds large standing Stones (Fig. 1). Many of these Stones contain holes running through their upper part (Fig. 2).

Archaeological excavation had been carried out only near (around) the Monument, where ancient sepulchres and a settlement dated III-II millennium BC were discovered [1 - 4]. But the Stone Monument itself was not investigated. There have only been just assumptions about these Stones containing likely religious [1], spiritual [2] or other significances. Local residents of Sisian call the Monument “Standing Stones” or “Protruding Stones” and tell that it was built presumably for religious or fortification purposes and also that old people were looking at stars through the holes.

The first supposition about eventual astronomical function of the Monument (along with other surmises) was published by archaeologist O.Khnikikian in 1984 [4].

раскопки
монумента

символ
эпическая
топонимия

были монумент
предположительно
горящие

1.1. FIRST RESEARCH

Believing to my supposition that the Monument was a very old and big Observatory, I decided to do my own investigation using astronomical methods. I have undertaken (at my own expense) scientific expeditions (8 persons and 4-day-long each time) on the equinox and solstice days in 1994, 1995, 1996, 1997, 1999 and 2001. The detailed topographic map of the Monument, as well as the latitude, longitude, magnetic deviation of place, angular heights of ridges on the horizon, azimuth and elevation angles of the holes in Stones and other features were measured. The catalogue of 223 stones with their sizes and condition was completed and all these Stones were numbered. Many observations of sky sources, photo and video films of the moments of Sun and Moon rising, setting and culmination were done. A comparison of measured and calculated values was completed. Many prehistoric Stone Astronomical Instruments were discovered and accuracy of them was determined. Furthermore, I have established the date of the Observatory, using the Earth axis precision and other laws.

The results of Carahunge research are printed in Armennia [5, 7, 8, 9, 11, 12, 14], Russia [10, 16], Italy [6, 17], Canada [13], France [15], Argentina [17a].

This book contains results of all 6 expeditions and of many computer calculations, especially for stars rising, setting and culmination moments in the past, to demonstrate the age of Carahunge.

I consider now that the Carahunge Monument had three main functions: a) Temple of AR (Sun in Armennian) – Main God of old Armennia, and of His “Secretary”, Tir God – patron of science, written language and art, b) Large and developed Observatory and c) University.

It will be demonstrated in this book that Carahunge Observatory was very developed and in active operation more than 7500 years ago (VI millennium BC) during more than 5500 years (I millennium AD), so it is the oldest Observatory in the World.

It is also obvious for me that the Carahunge should be researched much more thoroughly, and also by archaeologists and different specialists during many years.

1.2. THE SITE AND NAME OF MONUMENT

The Carahunge site is on latitude of $39^{\circ} 34'$ and longitude of $46^{\circ} 01'$ on the mountain plateau having altitude 1770 m and occupies a territory of about 7 hectare on the left side of the Dar river canyon, the tributary of the river

(гарни)

Vorotan (at 2 km). The underground river comes to the surface 5 km from the Monument and at 4 km, near village Shakki, it drops down a fall of 30 m.

In the distance of 29 km (linear) to the East from the Carahunge Monument is the village Carahunge, near new town Goris. In the distance of 80-90 km to N-E, in Lernayin (Nagorni) Karabakh or Artsakh there are two another villages having the same name Carahunge. Near one of them there are holes in rocks (not investigated yet).

In Armenia in total (including the Historical Armenia) there are many old megaliths, menhirs, stone observatories, old universities, etc. Especially in region of Carahunge Monument there are many old megaliths, tombs and universities, as some famous traditional early medieval universities and Christian old abbeys in Tatev, Gladzor, Shoushi.

Armenian historian Stepanos Orbelian in his book "History of Syunik" (I-XII centuries) mentioned that in Tsluk (Yevalakh) region of Armenia, near town Syunik or Sisakan (now Sisian) was a village Carunge [18]. This name in Armenian means "Stone Treasure" or "Foundational Stones".

The word "car" in Armenian is "stone", the word "hunge" or "hunch" – is "voice", "echo", "sound". So the name "Carahunge" means "Speaking Stones".

Having above-mentioned data I called the Monument "Carahunge", i.e. Speaking Stones. Indeed, these Stones told old astronomers much interesting information about Space, and now also tell us (and will tell) much new and unexpected information about old times.

1.3. THE STONES OF CARAHUNGE

The Carahunge Monument consists of the following parts: the Central Circle, the North Arm, the South Arm, N-E Alley, the Chord (crossing the Circle) and Separate Standing Stones (see map, Fig. 3). General view of Carahunge central part from helicopter is shown in Fig. 4.

The heights of the stones range from 0.5 to 3 m (above ground) and weight up to 10 tons. They are basalt (andesit) stones, eroded by time and covered with moss and lichen of many colours. The inside surface of holes preserved much better. There are also many broken and unnumbered stones.

Stones were picked up from neighbouring canyon and lifted (hauled) by animals (bull, horse). Then in the Observatory the holes in stones and astronomical instruments were made.

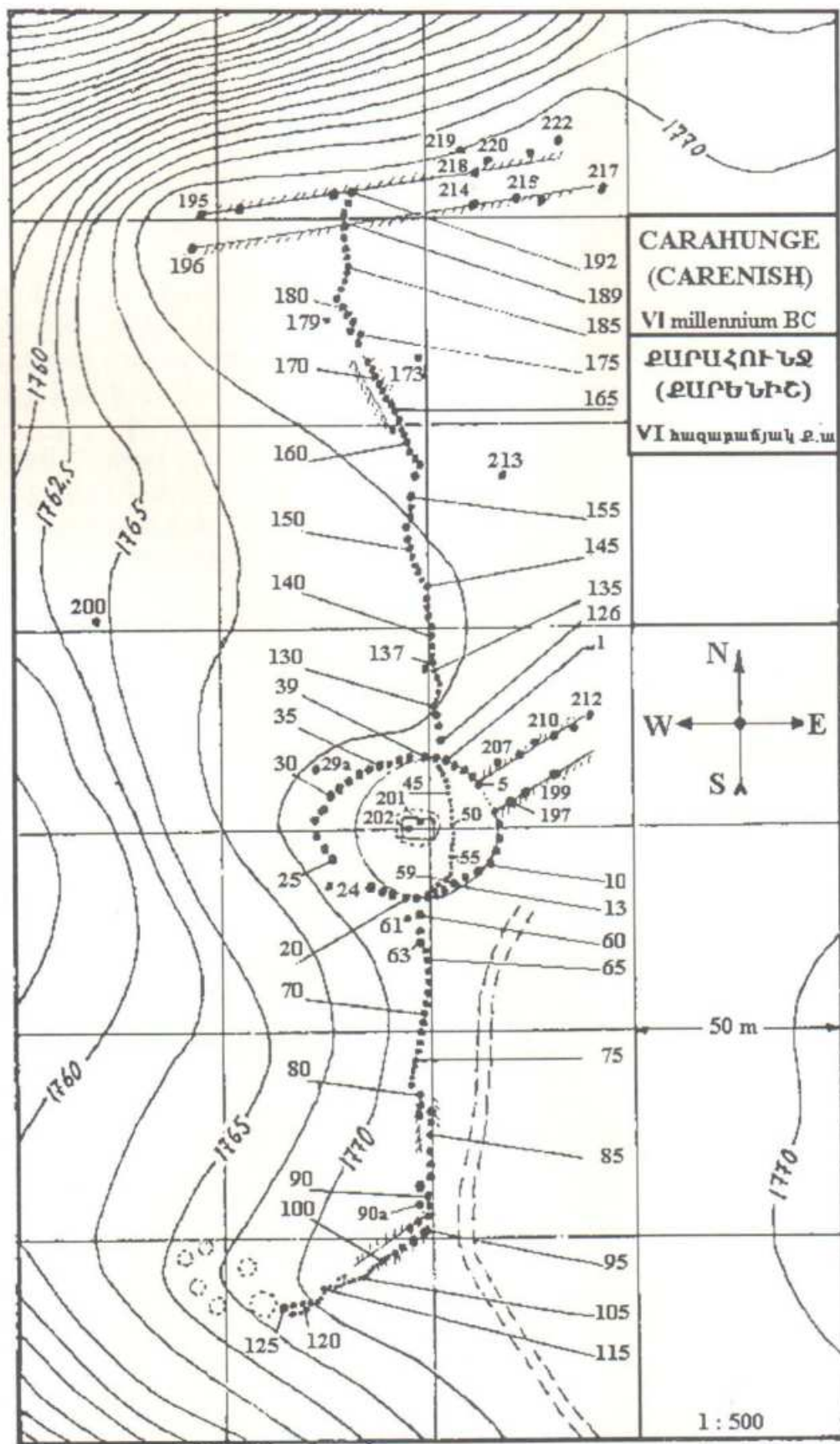


Fig. 3. The Map of Carahunge Monument

The Monument was designed, built and used by Armennians, native inhabitants, who created here civilization more than 40 thousand years ago (see below, PARTS 2,3).

The information about quantity and condition of numbered 223 stones is in Table 1.

Table 1

CARAHUNGE STONES									
	Numbers	Total quantity	Total with holes	Standing	Standing with holes	Lying	Lying with holes	Declining	Damaged
Central Circle	1-39 +29a	40	-	15	-	9	1	10	2
Chord	40-59	20	6	8	3	1	-	3	6
South Arm	60-125, +90a,+62a, 64a, 65a	70	27	25	16	32	10	2	17
North Arm	126-196 214-222	80	49	28	18	35	30	3	21
NE Alley	197-199 208-212	8	2	2	-	4	2	2	3
Separate Stones	200-202 207, 213	5	1	1	-	2	1	-	-
Total		223	85	79	37	83	44	20	49

1.4. THE CENTRAL CIRCLE

It consists of 40 stones and is egg-shaped to the West, with sizes of 45 x 35 m. Approximately in the middle of Circle there are ruins of perhaps some religious temple having proportions about 7 x 5. It is interesting that the same proportions has the famous ancient Garni Temple (20 km from Yerevan) of Sun God AR (see PART 3, Fig. 62).

Apparently the Central Circle and NE short Alley (directed to the sunrise point in Summer solstice day) served for solemn ceremony in honour of AR.

There were no sacrificial altars (Stones) and sacrifice in Armennia. The AR God was kind to nature, to people, to Armennians – His children. He gifted life generously and unselfishly.

1.5. THE NORTH ARM

It goes to North from the Central Circle and consists of 80 stones (numbered), 49 of which have holes. The length of the Arm is 136 m and it has at the northerly end of the Arm western and eastern alleys of about 50 m length each one.

1.6. THE SOUTH ARM

It goes to South from the Central Circle for 75 m, then turns approximately to WW-S and continues for 40 m more. It consists of 70 stones (numbered), 26 of which have holes. After the end of South Arm there are circular tombs 3 m to 8 m in diameter.

1.7. NORTH-EAST ALLEY

It has a length of 36 m and width of 8 m and is directed approximately to the Sunrise side at the Summer solstice day. The Alley includes 8 stones (numbered, including lying ones), 2 of which (lain) have holes. All NE Alley is on bank of about 0.5 m in height.

1.8. THE CHORD

Chord crosses the Central Circle and is as the continuation of North Arm pending to connect it with South Arm. The Chord includes 20 (numbered) relatively small stones, 6 of which have holes.

1.9. SEPARATE STANDING STONES

They stay at the East as well as at the West sides of the Arms at a distance of up to 90 m and more. There are minimum 5 of such stones. One of them (lying) has a hole. Possibly Separate Stones have been used as Heel stone in Stonehenge (as bead on gun).

1.10. ABOUT SOME STONES

Stones №№ 50, 71, 85 have two holes each. The lying stones №№ 90, 92, 125 have holes pierced partially (are not finished) and these stones are not too mossy. This suggests that both sky observing and new instrument making work in Observatory were carried on simultaneously over a long period of time and were suddenly interrupted.

*beams
oznachenie*

Many stones are declined or lying extracted from ground. Many stones are broken (especially their hole parts).

1.11. SOME PARTICULARITIES

The North and South Arms have the slit paths of about 1-1.5 m in width, paved (covered) by stone plates (Fig. 5). Along paths in opposite side of Stones there are small stones, which perhaps served as "seats" for observers. The seats probably had also a wooden superstructure to fix the head of observer.

*proyazniam
pogrep*

Many Stones look like men and animals (Fig. 6).

1.12. MEMBERS OF EXPEDITIONS

In Fig. 7 some regular members of our expeditions are shown: (from left) camera-man M.Nersesian, consultant V.Azoyan, historian P.Safian, P.Herouni, tourist manager O.Bakhshian, film director R.Hovanesian, driver S.Manoukian, mechanic V.Karapetian. A lot of work was done also by topographers S.Hakopian and M.Hovsepian, photographer G.Bagdasarian, astronomer R.Mnatsakanian, programmer L.Tatevosian and many others.

In Fig. 8 a working moment of our expedition in Carahunge in 1994 is shown.

It was Dr. of History P.G.Safian, who first paid attention to the stones №№ 207-222 at the North part of the Monument (Fig. 9).

1.13. OUR GUESTS' FINDINGS

Dr. H.P.Kleiner, the specialist (studied also archaeology) from Switzerland, who took part in our expedition in 1995 (Fig. 10), paid attention to the stone № 68 having a bowl with water, the reflected ray from the surface of which composes a definite angle with top of the neighbouring stone № 69. He noted separately standing stone № 200 that could be an analogue of the Heel stone of Stonehenge. He also found a little cutter made from obsidian (Fig. 11).

Professor N.G.Bochkarev (astronomer), President of Euro-Asian Astronomical Society (Moscow), who took part in our expedition in 2001 with his two students (Fig. 12), discovered another Periscope-Stone (№ 90a), which was lying between other lying stones near South Arm Stone № 90 (Fig. 13). "Carahunge is a very serious Observatory" – was the first main opinion of Professor Bochkarev, who further using other methods also came in 2003 to the same estimation of the Carahunge Observatory age equal to 7500 years and agreed that Carahunge is the World oldest Observatory [96].

With the 7500 years of Carahunge age agreed also Armennian historian Professor G.A.Galoyan [75, p. 12].

1.14. THE HOLES IN STONES

*обеспечивает
гарантированно*

The Holes all the way through Stones in Carahunge is a unique phenomenon in ancient monuments (observatories). The Holes made in these massive Stones ensure the highly stable and accurate pointing directions. Some Holes in Stones are shown in Fig. 14. The weight and hardness of the Stone make it a very reliable instrument for observing celestial objects over many centuries. The long time stability of these stone astronomical instruments is even much more than of modern telescopes. *небесный (обсерватория)*

Most of holes are directed to different points of the real horizon. Some holes point above horizon and look up to the sky.

In Table 2 the Azimuth and Elevation angles of unbroken (or almost unbroken) Holes measured by our expeditions in 47 normal standing Stones are presented.

The Holes are 4-5 cm in diameter and are located 15-20 cm below the top of the Stones. From the both sides Holes are broadened conical to diameter about 12 cm. The surface of the inside of the Holes is clean and smooth as if they had been polished (Fig. 14). Holes had been made by instruments having obsidian enters put in fired clay.

The Holes in Stones are the clearest indication that Carahunge had the astronomical function. They even allow to calculate the age of Carahunge Observatory (and of each Stone with Hole) with high accuracy, as it is shown below.

азимут и высота

Table 2. Azimuth and Elevation of unbroken Holes in normal standing Stones

Table 2

SOUTH ARM					NORTH ARM				
№ №	Stone Number	Azimuth (degree)		Elevation (degree)	№ №	Stone Number	Azimuth (degree)		Elevation (degree)
		compass	corrected				Compass	corrected	
1.	60	168	170	7.3	1.	126	40	43	6
2.	62	180	181	50	2.	128	0	5	9
3.	63	100	102	3	3.	129	110	111	7
4.	64	265	267	5.5	4.	137	0	0	90
5.	66	70	76	7.5	5.	138	290	291	23
6.	67	90	94	4	6.	139	245	248	10
7.	71	285	287	33	7.	143	25	28	8
8.	76	125	125	18.5	8.	146	215	216	17.5
9.	78	265	267	24	9.	147	135	146	10
10.	79	90	94	2.5	10.	151	215	216	5.5
11.	81	255	257	20	11.	152	0	5	5
12.	84	325	327	15	12.	160	255	257	7
13.	85	70	76	10	13.	161	60	65	4.5
14.	89	80	85	3.5	14.	162	220	222	10
15.	97	135	134	25	15.	163	230	232	5
16.	98	135	134	10	16.	164	215	216	7
17.	99	305	316	6	17.	165	250	252	10
18.	108	230	232	2	18.	177	229	227	13
19.	109	0	5	18	19.	181	335	338	7
20.	110	135	134	5.5	20.	183	115	116	21.5
21.	122	325	327	16	21.	187	60	64	7.5

CHORD				
№ №	Stone Number	Azimuth (degree)		Elevation (degree)
		Compass	corrected	
1	40	90	94	1.5
2	44	310	322	15
3	51	310	311	2.5
4	53	180	181	22.5
5	55	260	262	20

In the Table 2:

Az = 0° – is the North,

Az = 90° – is the East, etc.

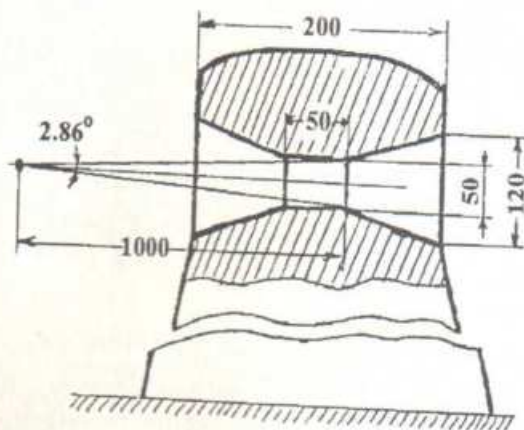
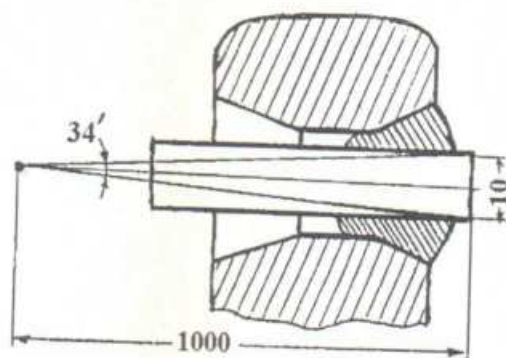


Fig. 15. Scheme of the Hole in Stone



(Dimensions in mm)

Fig. 16. Scheme of the Hole with pipe

If the eye of observer is at a distance of 1 m from the external edge of cylindrical part of the Hole, then the horizon is seen in angular limit $2.86^\circ = 172'$ (Fig. 15).

Considering that position of the Sun or Moon may be fixed by the eye in the centre of the Hole with accuracy equal to its angular size ($32'$), we achieve the accuracy of observation (or fixing) of their position equal to about $(172-32) : 2 : 20 = 3.5'$ (or 14 sec. of time).

I presumed that this accuracy could be increased if to observe through a pipe (made, for example, from bamboo or rush having inside diameter about 10 mm) interposed and fixed in a Hole by means of clay (Fig. 16).

For a particular moment, such as Sunrise, it is necessary to correct the position of pipe. This can be done at the moment while clay is still wet. The next day, when the clay hardens, it can be removed (with pipe) from the Hole for using again for the same event next days or year (years). Using the pipe, the horizon angular limit will be $34'$ and the accuracy of the Sun and Moon observations, from the same distance of 1 m, will be equal then to about $(34-32) : 2 : 2 = 0.5' = 30''$ (or 2 sec of time!). For the star and planet observation it was possible to use a thin yarn cross in pipe and then the accuracy will be equal to $34' : 2 : 20 = 0.85' = 51''$ (or 3.4 sec. of time).

To work with said high resolution it was necessary also to fix the head of observer (his chin and brow, i.e. eyes) using some simple wooden construction.

In the autumn equinox of 1997 and days close to it we made successful experiments with the pipes (having an inside diameter of 1 cm) for the Sun and Moon rising and setting moments observation using the stones №№ 66, 67, 79 and others. In Fig. 17 the stone № 66 with the pipe in the hole is shown. Fig. 18 presents three of our pipes in the clay, removed from the holes. Some of the results of our observations are given in Fig. 19 - Sunrise moment through the pipe in Stone № 67 on 22 September 1997, and in Fig. 20 - Moonrise through the pipe in Stone № 79 on 21 September 1997. This experiment shows the possibility of using pipes in Carahunge many thousand years ago.

In favour of the pipes using in Carahunge times testifies also the important fact that the edges of all Holes are conical broadened. Using a sketch as

капитул
Трактат

одна
рафа

справа

идея
(1997)

схема,
небольшая



Fig. 1. Carahunge (fragment). A line of standing stones.



Fig. 2. Carahunge (fragment). Stones with holes.



Fig. 4. Carahunge, central part. A view from helicopter.



Fig. 5. The path along stones of South arm



Fig. 6. Stones like king and animals (bear, dog, lion)



Fig. 7. Regular members of our expeditions in Carahunge



Fig. 8. Working moment at first expedition in 1994



Fig. 9. Member of expeditions PhD P.G.Safian near lying stone



Fig. 10. Our guest H.P.Kleiner from Switzerland in Carahunge, 1995

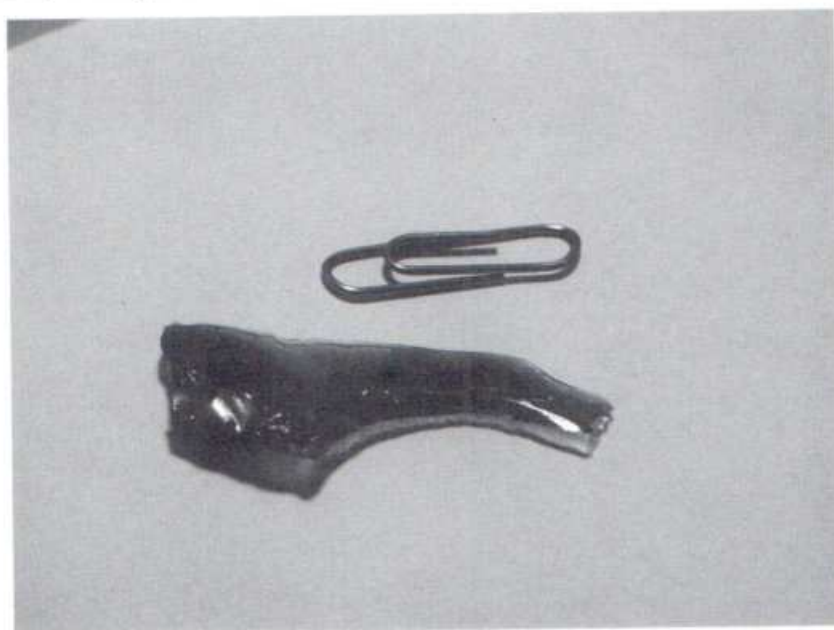


Fig. 11. Small cutter from obsidian



Fig. 12. Our guest Prof. N.G. Bochkarev from Moscow in Carahunge



Fig. 13. The new found Periscope-Stone No 90a



Fig. 14. Holes in stones



Fig. 17. Stone No 66 (Eagle) with pipe in Hole



Fig. 18. Pipes in clay, removed from Holes



Fig. 19. The Sunrise moment through pipe in Hole of Stone No 67 on 22.09.1997

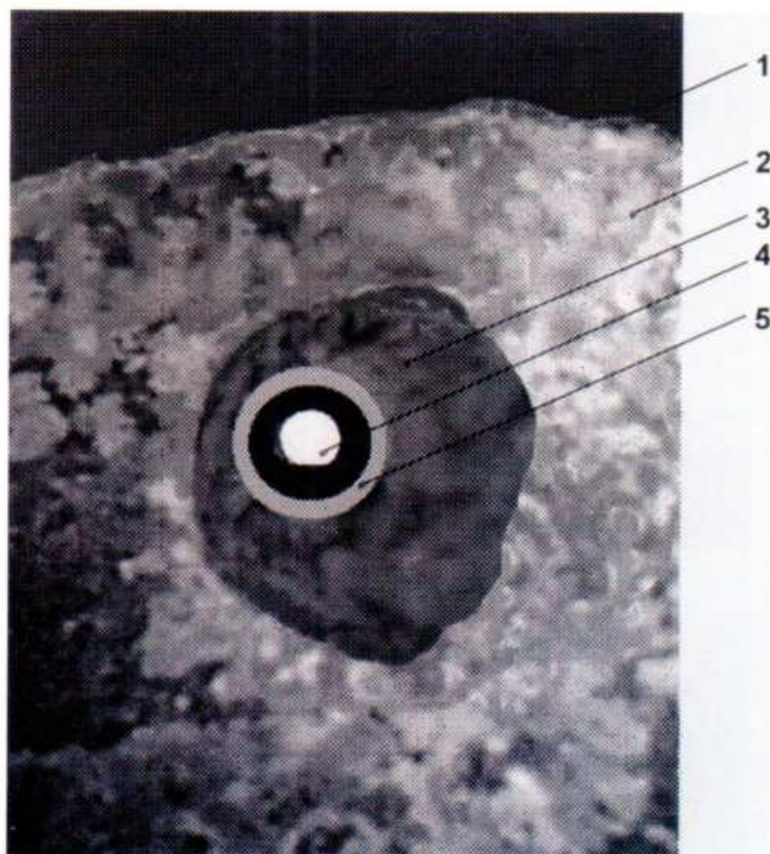


Fig. 20. The Moonrise moment through pipe in Hole of Stone No 79 on 21.09.1997
(1-sky, 2-Stone, 3-clay, 4-the Moon, 5-pipe)

in Fig. 16 we can calculate that the pipe with inside diameter of 10 mm and outside diameter of 24 mm (so wall thickness is 7 mm, which becomes bamboo) can be declined in Hole to the angle $\pm 25^\circ$ to any side from hole axis. Thus, such a pipe, having the high angular (and time) resolution for observations, gives the possibility to be fixed in Hole for a wide angular directions and to use each Hole for different celestial sources observation or the same source for different moments of time. This is the reason why Holes have been made with conic broadening in Stones.

The presence of Holes with narrow diameter (4-5 cm and 10 mm) directed to definite fixed points on the Sky gives the unique possibility to make exact calculations of the age of Carahunge Observatory using astronomical methods, even with more accuracy than it is possible to achieve by well-known Carbon method.

1.15. STONE ASTRONOMICAL INSTRUMENTS

All Stones with Holes, single ones or groups of 2 or 3 Stones (including also some stones without holes) are the unique Astronomical Instruments for different observations of celestial sources: the Sun, the Moon, stars, planets and others.

To project, build and use such stable and accurate instruments for different scientific purposes it was necessary to have the preliminary accumulated knowledge in astronomy, mathematics and technology, to have written language, to have high experience in methods of observations and calculations, for a long time of thousands years before building of Carahunge.

At that time there was no one to learn from, so it was necessary to accumulate knowledge from zero, which was very slow process and needed too much time. This was the main reason why the development of Armennian civilization required about $40 - 10 = 30$ thousand years. The development of other civilizations (Sumer, Egypt, Greece or other) required less than one thousand years only, because they had teachers, who were Armennians.

So there are grounds to presume that astronomy in Armennia started about 25000 years ago, and the first and simple work with simple instruments in Carahunge began more than 20000 years ago. Then 15000 years ago more complicated instruments were built.

In Carahunge at present there are more than 80 Astronomical Instruments, which have been built and were in use from about 8000 up to 2000 years ago (see below).

Every astronomer who makes observations using astronomical instruments knows very well the frequent misfortunes with clouds coming to shield the object of observation at the very important moment. Especially when the moment you need will take place only after just one year (or more). At Carahunge we met also these obstacles during our observations of the rising, setting and culmination moments of the Sun, Moon and stars.

And at each that time I remembered the Armennian old, nice and simple song, which, I am sure, was a song of old astronomers. Here is this song.

Melodically *Armennian Old Song of Astronomers*

The Sun, the Sun come, come to my sto - ne top come
Ար - և, Ար - և եկ, եկ, տի-րու՛ն քա - թիս վեր եկ:

Clo - uds, clo - uds go a - way to make for Sun cle - ar way.
Ամ - պեր, ամ - պեր հե - նա ցեք, Ար - և - ին ծամ - փա քա - ցեք

պահպանում են In Carahunge, indeed, there is three-stone astronomical instrument, where the Sun comes every equinox midday to the top of the main stone (see Item 1.28). *id est - ու շուր*

This song indeed is nice and simple (i.e. old) and at the same time is marvellous address to the Nature, to the God.

*օր
րոյ* I shall present below a few unique Stone Astronomical Instruments of Carahunge with the results of our observations and calculations for their age dating.

1.16. SINGLE STONES WITH HOLES

*սրբազան
շէտաւ* Many Single Stone Astronomical Instruments were investigated during our expeditions. They were appropriated for the Sun, Moon, planets and stars observations.

For the Sun observations there are 17 "Sun-Stones", including Sunrise Stones №№ 65, 161, 187 for Summer solstice; №№ 97, 98, 100 for Winter solstice; Sunset Stones №№ 52, 99 for Summer solstice; №№ 108, 169, 177 for Winter solstice; and №№ 40, 55, 63, 64, 67, 79 for Spring and Autumn equinoxes days Sunrise and Sunset moments. About the Instrument for Sun culmination moment in equinoxes see Item 1.28.

For the Moon observations there are 14 "Moon-Stones", including Moonrise Stones №№ 161, 187, for culmination declination $\delta = +18.7^\circ$; №76 for $\delta = - 18.7^\circ$; №147 for $\delta = +29^\circ$; Moonset Stones № 138 for $\delta = +18.7^\circ$;

№№ 108, 163 for $\delta = -18.7^\circ$; №№ 44, 51, 99 for $\delta = +29^\circ$; №№ 146, 151, 162, 164 for $\delta = -29^\circ$.

About planets observation see Item 1.29.

Stars observation results see in Items 1.23, 1.24, 1.25.

We made preliminary calculations and a line of observations using "Sun-Stone" Instruments, and received very interesting and unique results. Here some of them are shown. Fig. 21 presents the Sunrise moment when looking through Hole in Stone № 67 at equinox of 22.09.1997. In Fig. 22 the Sunrise through Hole in Stone № 63 at equinox of 22.09.1997 is shown. In Fig. 23 the Sunrise through Hole in Stone № 66 at Solstice of 23.06.2001 is shown.

Single Stone Instruments in Carahunge Observatory were widely used during many millennia.

1.17. THE OLDEST CALENDAR (AOC AND AFC)

In Armenia the Solar Calendar was in use for all times. And this is understandable because the Sun was the Main God. There is no data that the Moon calendar was ever used, although it was known and the Moon period of rotation around Earth was not difficult to measure.

Prehistoric astronomers looking through any Single "Sun-Stone" Hole (or using other older simple instruments) could fix the azimuth (position on horizon) of Sunrise (or Sunset) point at any day and define (even without pipe) that this point moves along the horizon from day to day for value up to 30 arc min, at days close to the equinox days, which is almost equal to the angular diameter of Sun ($32'$), and comes back to the same first position (from the same side) after 365 days, which made one year.

It is obvious that such a simple observation could be done much earlier than the time of developed Carahunge, when for agricultural and other work the calendar becomes necessary. That time was, perhaps, about 23 thousand years ago when the Armenian Oldest Calendar (AOC) was established having the beginning of year on the Spring equinox day Areg 1 (now March 21) *.

It was also defined that once per year, in Summer Solstice the star Sirius rises just before Sunrise, i.e. the year by Sirius also includes 365 days as

* Perhaps at that time, in 22946 BC, the Armenian favourite old God Vahagn (fighter of dragons and evil) "was born". The value 22946 years comes from the supposition that these events took place 14 "Armenian periods" before Armenian King Hayk's victory in 2492 BC ($14 \times 1461 + 2492 = 22946$). So later Armenian period was called also the "Haykian period".

Solar year has. This takes place because of accidental combination of precession and self movements of Sirius.

*հասկանալի
հարցեր* This Solar AOC was so-called "movable". The festal days slowly moved along all year round (with period of 1461 years) because real Solar year includes about a quarter day more than 365 days ($365.25 : 0.25 = 1461$).

The developed Carahunge Observatory (7500 years ago) gave much better possibilities to make observations during many years and with much higher accuracy (30" or 2 sec. of time with pipes). So at that time it was found out that Solar year consists of about 365.25 days. So to "stop" the "movable" calendar, i.e. to "fix" the festal days with the Sun real movement during the year, it was necessary to add in Calendar one more day once per four years. Thus the "fixed" (immovable) Calendar was invented and developed in Carahunge with the moment of year beginning at 6 o'clock in the morning (or in midday) of Spring equinox day, at Areg 1 (March 21). Thus Armennian Fixed Calendar (AFC) was established in Carahunge, and the period of 1461 years was called "the Armennian period".

Armennians used both "movable" and "fixed" calendars in parallel more than five thousand years (up to the end of XIX century AD), and taught people of other countries these calendars, especially Sumers and Egyptians whose civilizations began in III millennium BC.

Using both AOC and AFC during very long time Armennian astronomers found out that the additional quarter day in year (365.25) being accumulated in "movable" calendar gives one whole year after each 1461 years ($0.25 \times 1461 = 365.25$). This period of 1461 years (or 1460 for "fixed calendar") was called the "Armennian period" (or "Armenian cycle"). The same duration has "Sirius cycle", or so-called "Sotis" *.

It was corrected later that Armennian cycle and Sirius cycle have a little difference of 12 days, i.e. 12 min. per year (0.002%) because the Solar year has a little less duration (365.242 days), than Sirius year (365.25 days).

AFC as well as Armennian Cycle and Sotis were known and were in use also in Old Egypt [19].

The "fixed" calendar, of course, is more convenient in using. It entered Europe by July Caesar (with the help of Egyptian astronomers, as Sosigen from Alexandria) on January 1, 45 BC (so-called "Old Style") and later it was corrected by Pope Gregory III (with the help of Polish astronomer Copernicus) in 1582 AD ("New Style", which is in use now)**. Armennia admitted the Julian calendar in 122 AD (by King Artashes II).

* Let me note that "Sirius" or "Sotis" means in Armennian "The loved one in the house of Holy person", where Holy person is perhaps Armennian King Hayk. In Old Egypt there was a festal day "Siruhis" which in Armennian is "My beloved woman" (see also Fig. 44).

** To turn to Old Style it is necessary now to add to the date 12 days.

1.18. KING HAYK'S CALENDAR (HBT)

Much more information is known about Armenian next old fixed calendar, called "Hayots Boun Tomar" (HBT) – Armenian Basic Calendar (ABC) started in 2492 BC by order of Armenian King Hayk (about 2493-2444 BC, P.H.), who had the title "Kesar", i.e. "Half AR", "Half Sun", "Half God", because Armenian King was in the same time the Main Patriarch, or "Son of Sun" and representative of the Main God – Father AR on the Earth. The word "kes" in Armenian means "half", so Kesar was "Half God". The word "Kesar" later overpassed to Europe via Greece and was used as "Caesar" (in Rome and Byzantium), "Caesar" (in Germany), "Czar" or "Tsar" (in Russia), etc., but already in the meaning of "emperor".

As it was told by Movses Khorenatsi, Armenian famous historian of V century AD, the Nakharar (King) Hayk worsted the Babylon army which came to occupy Armenia, killed the Babylonian king Bel (Nemrod) in battle and ordered to celebrate this day every year and to rename the months of year after the names of His sons and daughters [20]. About Kesar Hayk see also Item 3.30.

The date 2492 BC was recovered by Armenian historian of XIX century AD Ghevond Alishan [21]. It was known, that New Year (Navasard 1) in 428 AD by "movable" ASC coincided with August 23 by Julian (Hulian) Calendar (or with August 11 of present calendar). Using this fact and "Armenian Cycle" of 1460 years he calculated that $1460 - 428 \text{ AD} = =1032\text{BC}+1460 = 2492 \text{ BC}$. As G.Alishan wrote, the same figure of 2492 BC is shown by old authors Aphriakanos and Yevsebios as the date of Bel's death [21].

Armenian Basic Calendar (HBT, ABC) consists of 12 months 30 days each, so 360 days plus 5 (or 6 once per every four years in fixed HBT) Additional days (the New Year celebrations). Each month and each day of month, as well as each of 24 hours of day have their own names – Armenian words. Armenian scientist of VII century AD Annannia Shirakatsi tells these names [22]. I have presented here the names of months of HBT and corresponding dates of present calendar:

<u>HBT (ABC)</u>	<u>New Style</u>
1. Navasard (Նավասարդ, daughter of Hayk), 1-30	-----August 11 – Sept. 9
2. Horri (Հորի, daughter), 1-30	-----September 10 – Oct. 9
3. Sahmi (Սահմի, daughter), 1-30	-----October 10 – Nov. 8
4. Tre (Տրե, son of Hayk), 1-30	-----November 9 – Dec. 8
5. Caghots (Զաղոց, son), 1-30	----- December 9 – Jan. 7

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6. Arats (Արած, son), 1-30 -----January 8 – Febr. 6
7. Mehekan (Մեհեկան, daughter), 1-30 ----- February 7 – March 8
8. Areg (Արեգ, daughter), 1-30 -----March 9 – Apr. 7
9. Ahekan (Ահեկան, old name) *, 1-30 -----April 8 – May 7
10. Mareri (Մարերի, daughter), 1-30 -----May 8 – June 6
11. Margats (Մարգատ, old name), 1-30 -----June 7 – July 6
12. Hrotits (Հրոտից, son), 1-30 -----July 7 – Aug. 5
13. Avelyats (Ավելյաց), 1-5 ----- August 6 – Aug. 10

Additional (Avelyats) 5 days were named by names of 5 known at that time planets [19].

In “fixed” HBT one more day (once per 4 years) of leap year was added to month Mehekan.

The names of days of month were the Armenian names connected with the names of sacramental mountains, heathen temples and Gods: *այսպես*

- | | |
|-------------------------|----------------------------|
| 1. Areg (Արեգ) | 16. Manni (Մանի) |
| 2. Hrand (Հրանդ) | 17. Assak (Ասակ) |
| 3. Aram (Արամ) | 18. Massis (Մասիս) |
| 4. Margar (Մարգար) | 19. Annahit (Անահիտ) |
| 5. Ahranc (Ահրանք) | 20. Aragats (Արագած) |
| 6. Mazdegh (Մազդեհ) | 21. Grgourr (Գրգուր) |
| 7. Astghik (Աստղիկ) | 22. Kordouic (Կորդուիք) |
| 8. Mihr (Միհր) | 23. Tsmak (Ծմակ) |
| 9. Dzopaber (Չոպաբեր) | 24. Lousnak (Լուսնակ) |
| 10. Mourts (Մուրց) | 25. Tsrón (Յրոն) |
| 11. Yerezkan (Երեզկան) | 26. Npat (Նպատ) |
| 12. Ani (Անի) | 27. Vahagn (Վահագն) |
| 13. Parkhar (Պարխար) | 28. Sis (Սիս) |
| 14. Vanatour (Վանատուր) | 29. Varag (Վարագ) |
| 15. Aramazd (Արամազդ) | 30. Gisheravar (Գիշերավար) |

The beginning of day was 6 o'clock of morning (Solar time, of course).
The names of hours of day were also Armenian words:

* It were renamed 10 names of months, so 2 names retained their old names. Probably King Hayk had only 10 children.

Day time

Night time

1. (Ա).Ayg (Այգ), 6-7 h.
2. (Բ).Tsayg (Յայգ), 7-8
3. (Գ).Zoratsial (Չորացնալ), 8 -9
4. (Դ).Tcharagaytheal (Ճառագայթանալ), 9-10
5. (Ե).Sharaveghial (Շարավեղնալ), 10-11
6. (Զ).Yerkrates (Երկրատես), 11-12
7. (Է).Shantharkogh (Շանթարկող), 12-13
8. (Ը).Hrakath (Հրակաթ), 13-14
9. (Թ).Hourthapeal (Հորթափնալ), 14-15
10. (Ժ).Thaghanteal (Թաղանթանալ), 15-16
11. (ԺԱ).Aragot (Արագոտ), 16-17
12. (ԺԲ).Arphogh (Արփող), 17-18

13. (ԺԳ). Khavarak (Խավարակ), 18-19
14. (ԺԴ).Aghjamoughj(Աղջամուղջ), 19-20
15. (ԺԵ). Mthatsial (Մթացնալ), 20-21
16. (ԺԶ). Shahavot (Շահավոտ), 21-22
17. (ԺԷ). Kamavot (Կամավոտ), 22-23
18. (ԺԸ). Bavakan (Բավական), 23-24
19. (ԺԹ). Khothapheal (Խոթափնալ), 0-1
20. (Ի). Gizak (Գիզակ), 1-2
21. (ԻԱ). Lousakn (Լուսակն), 2-3
22. (ԻԲ). Aravot (Արավոտ), 3-4
23. (ԻԳ). Lousaphayl (Լուսափայլ), 4-5
24. (ԻԴ). Phaylatsu (Փայլածու), 5-6

The seven-day week Belt-Calendar of II millennium BC was found near town Sanahin in Armennia. The days on this Belt-Calendar are called by names of Sun, Moon and Armennian old names of five planets [19, 23].

1. Արև	Sun	-	Sunday	(կիրակի)
2. Լուսին	Moon	-	Monday	(երկուշաբթի)
3. Հրատ	Mars	-	Tuesday	(երեքշաբթի)
4. Փայլածո	Mercury-		Wednesday	(չորեքշաբթի)
5. Լուսնթագ	Jupiter	-	Thursday	(հինգշաբթի)
6. Արուսյակ	Venus	-	Friday	(ուրբաթ)
7. Երևակ	Saturn	-	Saturday	(շաբաթ)

It is interesting that first two present English names of week-days are directly connected with Armennian names of the Sun and Moon, and Saturday is connected with Saturn.

HBT is sometimes used in Armennia until now. Many people also celebrate the old New Year (August 11). Nobody annulled the king Hayk’s order of 2492 BC.

Old Egyptian Calendar (taken from HBT in III millennium BC) was like HBT [19], but had not names for days of month [19, 24].

Besides HBT in Armennia other calendars were also in use after Christianity adopting, as Hayots Mets Thvakan (HMT, Armennian Great Date) began from July 11 of 552 AD, Ecclesiastical Calendar, “fixed” calendar of Armennian scientist Hovanes Imastaser, began from 1085 AD, with the New Year (Navasard 1) at August 11 of Julian calendar.

HBT is the oldest, regular and exact Calendar in the World. In August 11, 2008 it will be completed 4500 years of HBT. Let us hope this fact will be marked in many countries by the help of International Organisations.

1.19. SUNDIALS AND SUN-CALENDARS

It is obvious that in Carahunge Observatory the Sundials and Sun-calendars were in operation from old time. But they are not saved. May be they will be found in future. It is possible to suppose that the Carahunge Stone № 63 with Hole on its back was used as the Sundial (see also Item 1.28, page 48 and Fig. 38, page 69).

At the same time it is obvious that in Old Armennia Sundials and Sun-calendars were widely used. There are many Sundials on walls and near the Medieval Christian churches till now [23]. Many of them were also found during excavations. All scales of them are calibrated from 6 o'clock morning to 18 in the afternoon.

Sundial shows on its scale the time of day by the shadow of the rod (called "gnomon"). Armennian old Sundials were called "gitsoh" (գիտցոհ) which in Armennian means "knowing (one)". In Fig. 24 Sundial from the wall of Armennian church "Zvartnots" (VII cent. AD) near Etchmiadzin is shown.

Sun-calendar shows on its scale the month of a year by the length of shadow of its rod. Old Armennian Sun-calendars were called "stverachaph" (ստվերաչափ) which means "shadow-meter".

We designed and made two new type Sundial-Calendars (SDC, "Gitsoh-Stverachaph") built from red colour tuff (volcano-stone), one in Aragats Scientific Centre (on Mount Aragats) of our Radiophysics Research Institute (RRI) in 1987 (4480 HBT) and another one – in front of the main building of RRI in Yerevan, in 1989 (4482 HBT) [5]. Each of them has three main scales (horizontal, vertical and spherical ones) and one common rod (gnomon) declined to the angle 40° (equal to the latitude of place) and having three small crosses (for each scale), shadows of which show the months and (approximately) days of months. Horizontal scale is divided (by titanium curve lines) to months by present calendar, vertical scale – by Hayots Boun Tomar (HBT) and the spherical scale – by real solar months (Zodiac constellations).



Fig. 24. Sundial from the wall of church Zvartnots, VII cent. AD (15 km from Yerevan).

The project of SDC was done by me, calculations of hour lines and month curve lines on scales were made by Dr. V.Oskanian and ornaments on stone were chiselled by sculptor S.Panosian. All work was done in workshops of RRI.

In Fig. 25 the New Type of Sundial-Calendar (SDC) built in front of the main building of RRI, 49/4 Komitas Avenue, Yerevan, Armenia, is shown.

1.20. EARTH AXIS INCLINE

Did Carahunge astronomers know the angle of Earth Axis Incline (angle ϵ or Ecliptic Inclination)? Yes, because (see Fig. 26) they could measure the height (elevation angle h_1) of Sun in its summer culmination (in midday at Summer solstice, the longest day, June 22) and its height (angle h_2) in Winter culmination (in midday at Winter solstice, the shortest day, December 22)*. Then they could find the Sun declination (δ) in culmination days (angle δ_c) as

$$\pm \delta_c = \frac{h_1 - h_2}{2} . \quad (1)$$

Of course, they had seen that during the year the Sun elevation (h) changes in limits $h_1 > h > h_2$ and declination - in limits $-\delta_c < \delta < +\delta_c$.

Reiterating these measurements many years and becoming sure that δ_c is almost not changed (and even did not depend on latitude (φ) of place, see below) they had to understand that the Sun direction in Solstices is inclined to the Earth's Equator Plane (or Sky Equator, $\delta = 0$) for the angle $\epsilon = \delta_c$ i.e. Earth Axis is inclined to the normal to Ecliptic Plane for the angle $\epsilon = \delta_c$. And this is the reason why we have on Earth Summer and Winter (Solstices), Spring and Autumn (Equinoxes).

Using Fig. 27 it is easy to find relation between ϵ , φ and Azimuth of Sunrise (Sunset) point A_s on horizon. It is the following:

$$A_s = \arccos \frac{\sin \delta}{\cos \varphi} . \quad (2)$$

In case of solstice days, when $\epsilon = \delta_c$ we have for the Sunrise point:

$$A_s = \arccos \frac{\sin \epsilon}{\cos \varphi} ; \quad \epsilon = \arcsin(\cos A_s \cdot \cos \varphi) \quad (3, 4)$$

* Below (Fig. 35-37, Item 1.28) the Carahunge Three-Stone Instrument used for measurements of Sun elevation at equinox days ($\delta = 0$, $h = 90 - \varphi$) and also for measurements of latitude (angle φ) of place is shown.

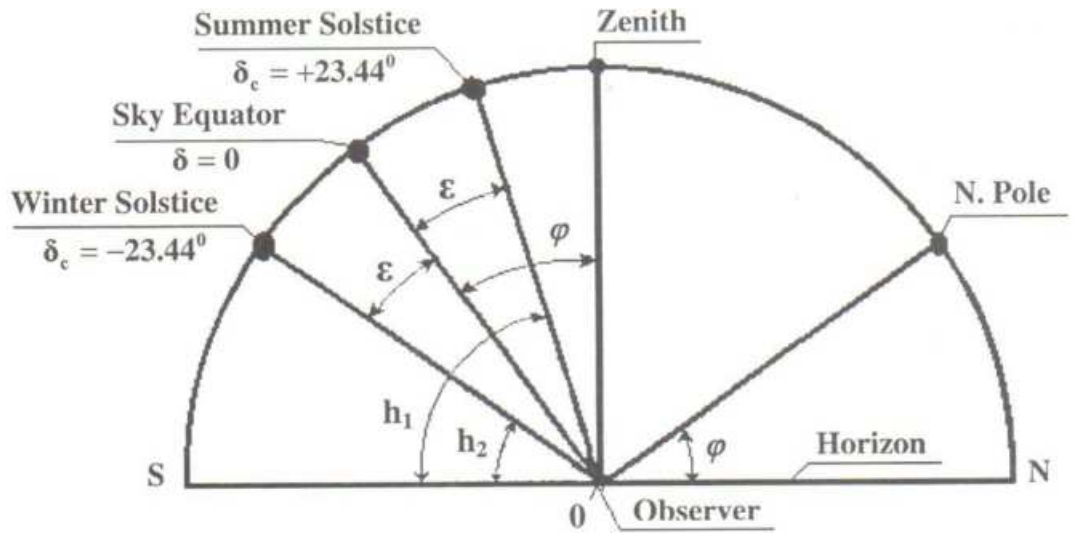


Fig. 26. The Sun culminations

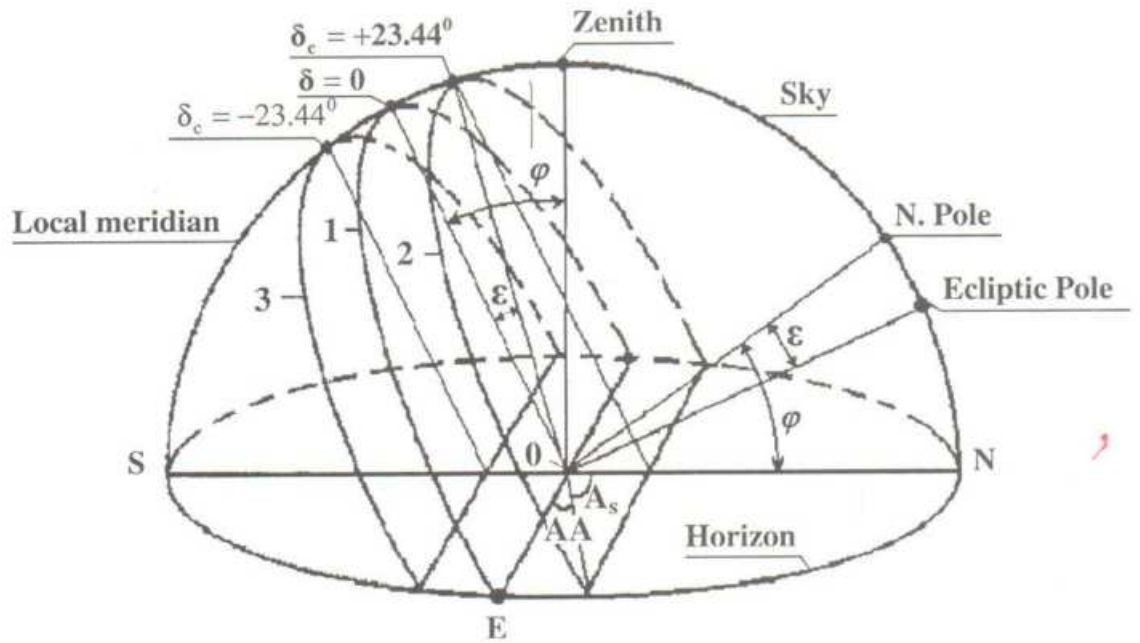


Fig. 27. Sun movement trajectories on Sky at:
 1 - Equinox days; 2,3 - Solstice days
 A_s - Azimuth of Sunrise point at Solstice

Did Carahunge astronomers know about Earth rotation around its own Axis? Yes, because they knew that Earth has the Axis of rotation and even knew the angle (ϵ) of its Incline and its Precession (see Item 1.22).

According to G. Hancock the Earth Axis Incline changes in limits from 22.1° to 24.5° with period of 41 thousand years [24]. According to Astronomical Yearbooks [25] the Ecliptic Inclination now is equal $\epsilon = 23.44^\circ$ and slowly decreases with speed 0.00013° ($0.47''$) per year*. We can use also the value for speed $\Delta\epsilon = 0.013^\circ$ ($0.78'$) per 100 year, because we are now in linear part of the sine-kind law of Inclination changing (Fig. 28). Thus the Azimuth of Sunrise point at Solstice (A_S) also decreases and angle ($90 - A_S$) as well as Azimuth Shift (ΔA_S) increases (see Fig. 26). Using equation (3) we can calculate, that when $\epsilon = 23.44^\circ$ and latitude $\phi = 39.5^\circ$ (Carahunge), $A_S = 58.97^\circ$ and if $\Delta\epsilon = 0.013^\circ$ then $\Delta A_S = 0.018^\circ$ or $1.1'$ during 100 year.

Having accuracy of observations (with pipes) $30'' = 0.5'$ old astronomers theoretically could mark the shift $\Delta A_S = 1.1'$ after 50 years, but practically it was impossible, because the pipes had not so high time-stability. But using Holes even without pipe (and having the accuracy of $3.5'$) they had to mark ΔA_S after about 300 years (the stone instruments have very high stability). After 1000 year the shift could be $\Delta A_S = 0.18^\circ$ or $11'$ which is 3 times more than the accuracy without pipes. Finding this, they would make other new stone instruments for Sunrise (Sunset) in Solstice days directed to the new point, i.e. with some azimuthal shift, to have Sunrise point again in centre of holes.

In fact in Carahunge there are indeed a number of stones approximately directed to the present Sunrise (Sunset) point at Solstices having some shifts between holes directions (which we measured). So we know the shifts between present Sunrise point and old points. These give a possibility to calculate the age of stones and of Observatory as a whole.

Let us return to Fig. 28 and explain it a little. The variation of Earth Axis Incline is in limits $\pm 1.2^\circ$ ($\epsilon = 23.3^\circ \pm 1.2^\circ$). It practically does not change a heat value coming from Sun to the tropic, subtropical and moderate zones of the Earth. But this small change of ϵ is very sensible for regions, which are close to arctic zones. So Axis Incline change law (sine-kind) acts an important role near arctic, because the Sun rays are coming with too sharp angles and this conduces to forming a large glacial covering in subarctic zones, with period of 41000 years.

The last glacial period started about 32000 years ago and finished 12000 years ago (see Fig. 28). In the last 2000 years of this period ice melted very intensively and 12000 years ago the Great Deluge took place. In the result the level of ocean rose up to 100 m. It was too dangerous for Mesopota-

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наблюдения

* It is interesting to notify here that Armennian author of XVII century gives for this angle the value 23.5° [19]. This was a very good result because the actual value has been about 23.445° .

mia and other low altitude places but not for Armennian Highland with average altitude 1700 m (Mount Ararat 5160 m). There were clouds, lightning, rains, rough rivers, etc, but nothing dangerous for life of people, animals, and flora. Armennian Highland was the real Noah's Ark and the civilization here continued to develop. Our Present time is on linear part of Axis decline changing law, so the beginning of the next Glacial period will be after 8500 years and next Great Deluge after 29000 years (Fig. 28).

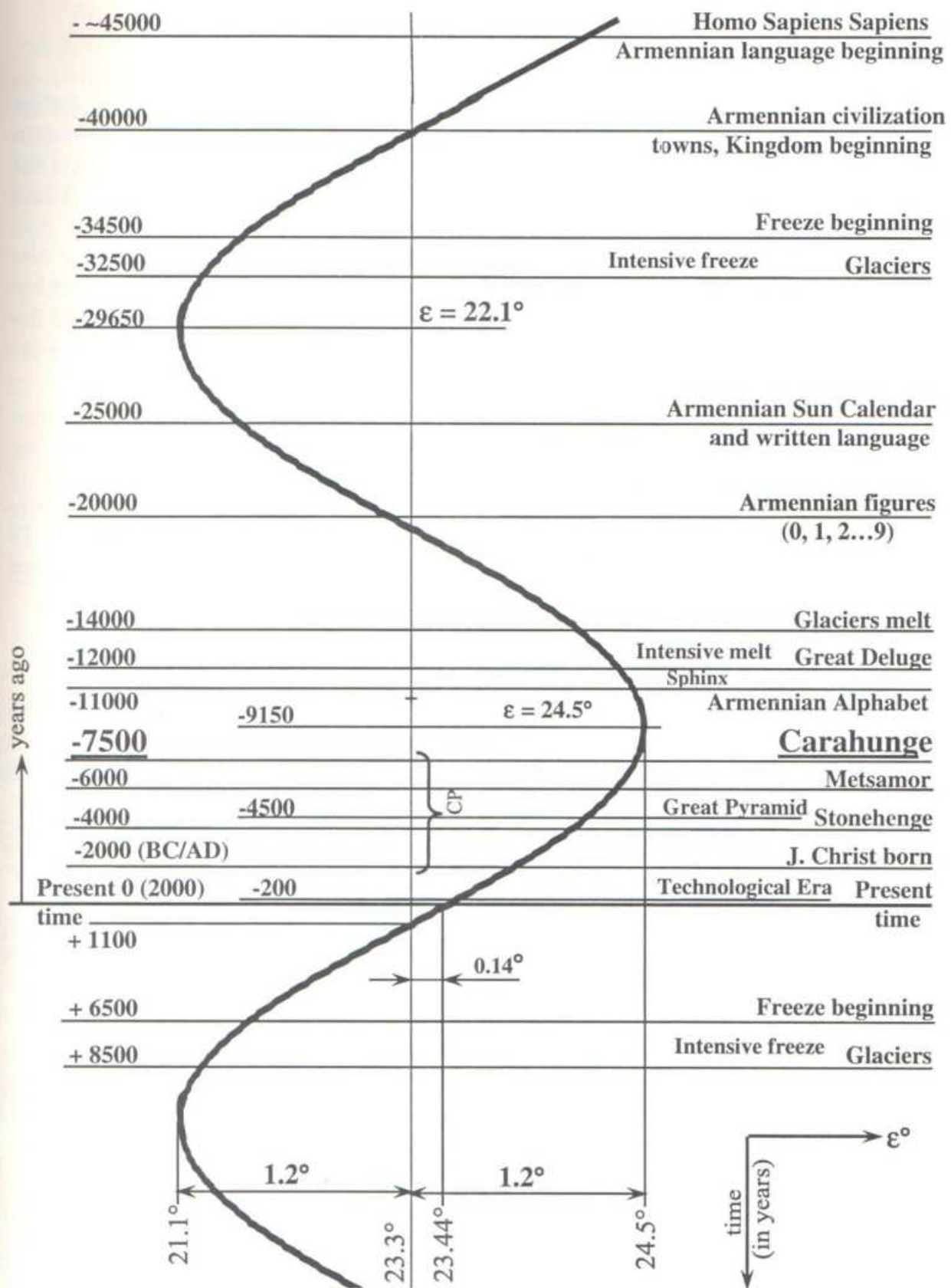


Fig. 28. The change of Earth Axis Incline and Eras evolution (CP – The Carahunge Period)

1.21. THE AGE OF CARAHUNGE. METHOD № 1

The method of Age determination of Old Monuments (Observatories) using the "Azimuth Shift" (explained in Item 1.20) was used first by famous British astronomer N.Lockyer to calculate the age of Stonehenge in 1901 [27]. His result was: between 1880 and 1480 BC, which is very good (it had to be approximately 1850 BC for Stonehenge III)[24, 28, 29].

In Table 3 the calculated present Azimuths (Az°) for Sun and Moon rise and set points are shown in line 2 taking into account corrections on real horizon heights, refraction and Lunar parallax. The correction required for magnetic deviation is put to hole Azimuth values (line 4b). After this the resulting possible error is equal to about ±0.1° or

$$0.1^\circ \times 1000 : 0.18^\circ = 550 \text{ year.}$$

In column 4c the Azimuth shifts (ΔAz°) are put between Azimuth (corrected, calculated for present time) and measured directions of holes for 17 "Sun Stones" and 12 "Moon Stones". For stones with holes Azimuth shifts are in limits from 0.5° to 3°.

Table 3

SUN																									
Sunrise										Sunset															
		Summer Solstice			Winter Solstice			Spr.,Aut. Equinox			Summer Solstice			Winter Solstice			Spr.,Aut. Equinox								
1	Now	Decl. δ°																							
		+23.44			-23.44			0			+23.44			-23.44			0								
2		59+4=63			122+9=131			90+3=93			302-1=301			239-5=234			270-2.5=267.5								
3	Ancient Az° was	<63			>131			=93			>301			<234			=267.5								
4	a) Stone N	a	b	c	a	b	c	a	b	c	a	b	c	a	b	C	a	b	c						
	b) Hole Az°	65	62.5	0.5	97	133	1	40	90	-3	99	303	2	108	232	2	64	264	3.5						
	c) ΔAz° (shift)	161	62	1	98	133	1	63	99	+6	52	302	1.5	169	233	1	55	260	7.5						
		187	61.5	1.5	100	130.5	0.5	67	90	-3				177	231	3									
								79	90	-3															
MOON																									
Moonrise										Moonset															
1		+18.7			-18,7			+29			-29			+18.7			-18,7			+29			-29		
2		63+0.5=63.5			116.5+6.5= =123			129+6=135			51+6=57			294.6-4.6=290			235.4-5.4=230			309-2=307			1223-8=215		
3		<63.5			>123			>135			<57			>290			<230			>307			<215		
4		a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
		161	62	1.5	76	124	1	147	137	2	-	-	-	138	289	1	108	229	1	44	309	2	146	214	1
		187	62	1.5													163	229	1	51	309	2	151	214	1
																							164	214	1

There are two main possible reasons for the presence of existing different Azimuth shifts. One is, that the Observatory (the Instruments) was built continuously over different times. The second reason is, that some shift could take place following the natural conditions (earthquake, landslide, etc.) during millennia. For the second reason, it is dangerous for our problem not the parallel shifts (along or across of hole axis), but just the hole rotation around any vertical axis (the probability of which is low). Nevertheless, to minimize this second reason we average the shift values.

There are no Az shifts for Sunrise (Sunset) points at equinox days, so we have $17-6=11$ "Sun Stones".

Taking all these into account we have (in Table 3) for 11 "Sun Stones" (except 6 equinoxes) the average $\Delta Az = 15^\circ : 11 = 1.36^\circ$. Then the Age is $1.36 \times 1000 : 0.18 = 7575 \pm 550$ years. Except 2 stones with $\Delta Az = 0.5^\circ$ each, and one stone with $\Delta Az = 3^\circ$ as extreme values we have for 8 "Sun Stones" the average $\Delta Az = 11^\circ : 8 = 1.37^\circ$ and the Age is $1.37^\circ \times 1000 : 0.18^\circ = 7640 \pm 550$ years. The Age of two "youngest" stones (№№ 65, 100) having $\Delta Az = 0.5^\circ$, is $0.5^\circ \times 1000 : 0.18^\circ = 2200 \pm 500$ years.

For 12 "Moon Stones" presented in Table 3 we have the average $\Delta Az = 17^\circ : 12 = 1.42^\circ$ and the Age is $1.42^\circ \times 1000 : 0.18^\circ = 7870 \pm 550$ years.

Thus, the Age of Carahunge Observatory active operation is more than 7500 years (the middle of VI millennium BC).

How long Carahunge was operating? The "youngest" stones were in operation about 2000 years ago. So work was continued before that time, but was suddenly interrupted. This is also told by three lying stones with holes pierced partially, (mentioned above, see Item 1.10).

So Carahunge Observatory was in operation during more than 5500 years, from more than 7500 years ago until less than 2000 years ago.

1.22. EARTH AXIS PRECESSION

The Earth Axis (inclined now 23.44°) makes a slow conic movement with period 25920 years. This phenomenon is called Precession (Fig. 29).

As a result of Precession the stars positions (co-ordinates) on the Sky are slowly changing. In Fig. 30 the way of North Pole point on Sky during about one Precession period is shown.

The Sun slowly moves on the Sky along Zodiacal constellations in the opposite direction to its annual motion along them. As the result the Spring equinox moment comes each year a little earlier (5.5 min per 100 year, so-called Equinox Anticipation) and the Sun moves among stars on the Sky with speed $360^\circ : 25920 \text{ year} = 83.3'$ per 100 year, being in each Zodiacal constellation $25920 : 12 = 2160$ years.

*one year
of the year*

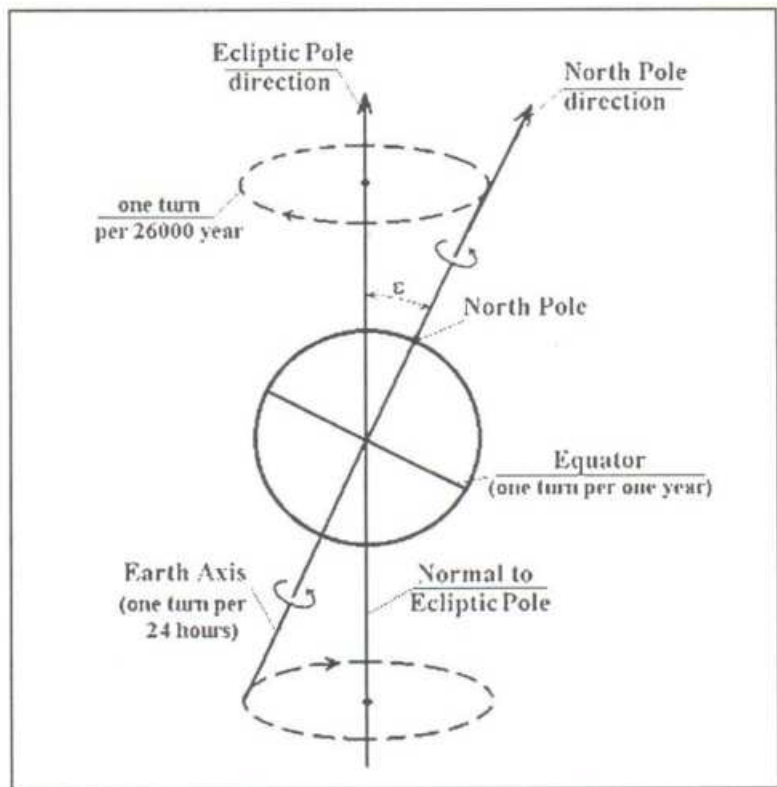


Fig. 29. Earth Axis Precession

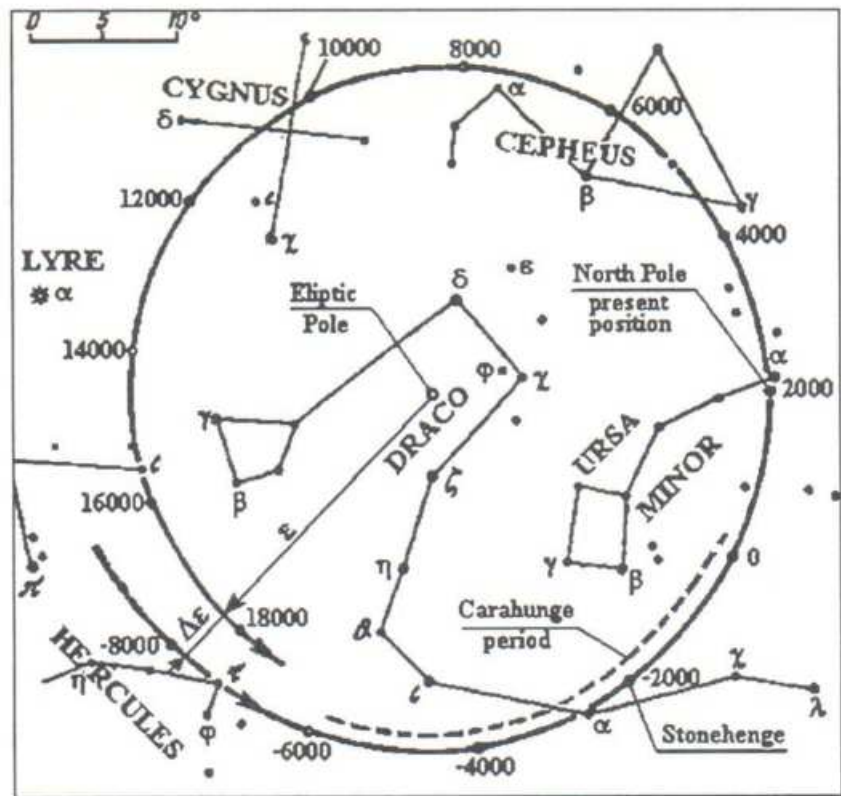


Fig. 30. The travel of North Pole point on the Sky

Could the Carahunge prehistoric astronomers espy Precession? Yes, because they could measure the shift of the Sun position regarding stars (for example in Sunrise, Sunset, and Midday moments at Equinox or in other fixed moment). This shift has the value 50" per year ($83.3' : 100 \times 60 = 50''$), which they could measure in Carahunge during about 7 months.

The generations of astronomers searching the Sky during hundreds and thousands of years could know Precession even many thousand years before Carahunge. I think it was done in Armennia even 11-13 thousand years ago. So the Precession, called also the "Space Great Clock", was known to civilized people on Earth of yore.

Knowing the Precession laws, also the present position (co-ordinates) of stars and their proper motion it is possible to calculate the position of each star for any past time (as well as for future), i.e. to say, where was each given star, where (at what point of horizon) it rose (sat), where culminated, etc. thousands years ago. These calculations we can do using the following equations [30]:

$$\left| \begin{array}{l} \delta_2 = \arcsin[\cos\delta_1 \cdot \sin\theta \cdot \cos(\alpha_1 + \psi) + \sin\delta_1 \cdot \cos\theta] \\ \alpha_2 = z + \arcsin \frac{\cos\delta_1 \cdot \sin(\alpha_1 + \psi)}{\cos\delta_2}, \end{array} \right. \quad (5)$$

$$\begin{aligned} \text{where: } \delta_1 &= \delta_0 + 100\mu_\delta \cdot T; & \alpha_1 &= \alpha_0 + 100\mu_\alpha \cdot T \\ \psi &= 2305.7'' \cdot T + 0.302'' \cdot T^2 + 0.018'' \cdot T^3 \\ z &= 2305.7'' \cdot T + 1.095'' \cdot T^2 + 0.018'' \cdot T^3 \\ \theta &= 2003.87'' \cdot T - 0.427'' \cdot T^2 - 0.042'' \cdot T^3 \end{aligned}$$

where: α_0, δ_0 – is the present position of given star (rectangular equatorial co-ordinates) [25];

- μ_α, μ_δ – is the proper motion of star [25],
- α_1, δ_1 – is the present position of star with proper motion addition,
- α_2, δ_2 – is the position of given star in past (future) time,
- $\pm T$ – is the time in Julian centuries.

Using equations (2) and (5) it is possible to calculate the azimuths of given star rising A_r and setting A_s moments in the past:

$$A_r^0 = \arccos \frac{\sin\delta_2}{\cos\varphi} \quad \text{and} \quad A_s^0 = 360^\circ - A_r^0. \quad (7)$$

The star swell angle (\hat{h}), or its height over horizon (elevation) in culmination is:

$$\begin{aligned} h_2^\circ &= 90 - \varphi + \delta_2 && \text{when } \delta < \varphi, \\ h_2^\circ &= 90 + \varphi - \delta_2 && \text{when } \delta > \varphi \text{ and} \\ h_2^\circ &= \varphi + \delta_2 - 90 && \text{when } \delta > 90 - \varphi \end{aligned} \quad (8)$$

When star-crossed zenith point, $h_2 = 90^\circ$ ($\delta_2 = \varphi$).

1.23. STAR OBSERVATION. PERISCOPE-STONE. METHOD № 2

In the North Arm of Carahunge there is another unique Instrument, the Stone № 137. Its hole does not go through the stone rightly but at half way turns up and comes out from the top of stone. If to put a piece of mirror (of black obsidian) in place of turn it will be a periscope, very comfortable to observe Zenith point while sitting, because the height of the Stone is 1.2 m (see Fig. 31). On the opposite side of stone (of observer side) there is a hand-made bowl about 20 cm in diameter. This bowl with water was a level to check and to control the vertical axis of Periscope during millennia (Fig. 32).

What were they observing in zenith when the Sun and Moon never crossed zenith point in this latitude (at least during last 10000 years)? Of course, it were stars. And bright stars, because the mirror was not very good. Using given above Earth Axis Precession laws we can find, whether this occasion took place in some day in past or not (the probability of which is very low).

I researched the potentiality of 21 brightest stars of our Sky to cross the Zenith point of Carahunge at some time in past. This was our Method № 2 to calculate the Age of the Observatory. It proved that four of them had crossed the Zenith point (see Table 4).

Table 4

STARS. Periscope – Stone No 137				
Star name	Constellation	Prehistoric period		
		Years ago	Declination	Altitude
Deneb	α Cyg	7630	39° 34'	90° 00'
Arcturus	α Boo	3480	39° 35'	90° 00'
Vega	α Lyr	3000	39° 35'	90° 01'
Capella	α Aur	2330	39° 35'	90° 00'

The first of them was Deneb (α Cygnus), which crossed Zenith point 7630 \pm 10 years ago. Then Arcturus (α Boo) 3480 years ago, Vega (α Lyre) - 3000 years ago and Cappella (α Aur) 2330 years ago. They were in region of Zenith point at a distance $\pm 0.5^\circ$ during a period of about ± 100 (up to ± 300) years, i.e. it was enough time to make instruments and observe them.

The Altitude shift of Deneb position from zenith point in function of time in Table 4a is shown.

Table 4a

DENE B. Periscope-Stone № 137				
J2000, $\delta_0 = 45^\circ 28'$, $\alpha_0 = 310^\circ 36'$, $\varphi = 39^\circ 34'$				
Years ago	Declination	Rising Azim.	Setting Azim.	Altitude
7400	39° 03'	35° 10'	324° 49'	89° 29'
7500	39 16	34 47	325 12	89 42
7600	39 30	34 23	325 36	89 56
7630	39 34	34 15	325 44	90 00
7700	39 44	33 58	326 01	90 10
7800	39 58	33 32	326 27	90 24
7900	40 13	33 05	326 34	90 39

We can see that Deneb position shift in the limits $\pm 0.5^\circ$ near Zenith point took place during about ± 200 years. It is calculated also, that the next

star, which will cross the Zenith point in Carahunge, will be Vega, after 640 years.

Carahunge astronomers could see the slow shift of star position from Zenith point and understand Precession. Having accuracy of observation 30" they could espy the star position shift after 1.7 year.

*убудто, то-
мелко вы-
гаражал*

The time of Zenith point crossing by Arcturus, Vega and Cappella is not so important for us in this context of Carahunge dating because there are many other stones with age more than 7500 years and it is also known that in Armennia 4492 years ago there was started the new accurate solar Calendar (HBT, see above, Item 1.18). So more important is the time of Deneb - 7630 years ago. It allows to date Carahunge more than 7600 years, when Observatory was in active operation.

1.24. STAR IN RISING AND SETTING POINTS. METHOD № 3

In Carahunge Observatory the star systematic observations at their rising and setting points on horizon using Single-Stone Instruments were undertaken. This gave another possibility of maintaining the Calendar and calculating Precession. At the same time it gives us another possibility (Method № 3) to determine the Age of Carahunge using Precession equations (5-8, Item 1.22).

The rising and setting Azimuths of nine bright stars in Carahunge sky (4500, 6000 and 7500 years ago) were calculated and Stones directed to these Azimuth points at those times were found. Their Numbers are shown in Table 5.

Here are 31 Stones, some of which were used 2-3 times (for different stars) and they were in use for more than 50 purposes. Nine Stones were in use 4500 years ago, 12 Stones - 6000 years ago and 15 Stones were in use 7500 years ago, because their Holes are directed to the given (calculated) corresponding Azimuths in angular limit $\pm 2^\circ$.

These calculations are not completed and here we can just say that Carahunge was in active use during the period 7500-4500 years ago. It will be shown below that the real period of activity is 7500 - 2000 years ago (see Item 1.25).

Table 5 shows also that Carahunge astronomers had special high interest in the Orion constellation stars (14 Stones for 5 stars), star Deneb (6 Stones), Canis Major stars (12 Stones for two stars) including star Sirius (5 Stones).

*Воронья Пёс
(у Гонимых Пёс)*

Table 5

STARS					
Star name, Constellation	Prehistoric period			Stone N	
	Years ago	Rising Az°	Setting Az°	Rising	Setting
1 Sirius α C Ma	4500	117.5	242.5	183	-
	6000	125.2	234.8	-	108
	7500	135.7	224.3	98, 110	162
2 Cappella α Aur	4500	51.5	308.5	-	51
	6000	63.2	296.8	161, 187	-
	7500	73.7	286.3	66, 85	71
3 Rigel β Ori	4500	120.7	239.3	-	-
	6000	132.3	227.7	98	-
	7500	146.2	213.8	147	151
4 Betelgeuse α Ori	4500	96.6	263.4	40	78
	6000	107.0	253.0	-	160
	7500	118.4	241.6	183	-
5 Deneb α Cyg	4500	39.9	320.1	126	-
	6000	38.9	321.1	126	44, 99
	7500	34.8	325.2	-	84, 122
6 Bellatrix γ Ori	4500	101.1	258.9	-	55, 160
	6000	112.0	248.0	-	139
	7500	123.6	236.4	76	163
7 Alnilam ε Ori	4500	109.3	250.7	129	-
	6000	120.1	239.9	-	-
	7500	132.3	227.7	98, 110	177
8 Alnitak ξ Ori	4500	109.7	250.3	-	-
	6000	120.4	239.6	-	-
	7500	132.6	227.4	98, 110	177
9 Mirzam β C Ma	4500	124.5	235.5	76	-
	6000	134.1	225.9	98, 110	177
	7500	147.0	213.0	147	151, 164

1.25. STARS CULMINATION. METHOD № 4

Using Precession laws we can answer the question, did Carahunge astronomers make Instruments and use them to observe stars in their upper and lower culmination moments? At the same time we can calculate the time (in past) of these observations, i.e. the Age of Carahunge (Method № 4). The research shows that these types of work in Carahunge were also undertaken.

The Table 6 shows another group of eleven stars that crossed the local meridian of Carahunge in prehistoric times at the definite elevations. We can see that using six Stones shown in Table 6 the observation was done

during the period from 7500 years ago down to 2000 years ago (four Stones of them are 7500 years old). The accuracy of Stone Hole axis directions to the calculated star Elevations in their culmination moments is $\pm 1^\circ$.

Table 6

STARS					
Star name	Prehistoric period				Stone N
	Years ago	Culmination	Az $^\circ$	Altitude $^\circ$	
Arcturus, α Boo	7500	Lower	0	8.6	128
Rigel, β Ori	7500	Upper	180	10.6	60
Alioth, ϵ U Ma	7500	Lower	0	18.2	109
Dubhe, α U Ma	7500	Lower	0	5.6	152
Alkaid, η U Ma	2000	Lower	0	9.6	128
Alnilam, ϵ Ori	7000	Upper			
Alnitak, ξ Ori	7000	Upper			
Sirius, α C Ma	6500	Upper	180	~22	53
Mirsam, β C Ma	5000	Upper			
Procyon, α C Mi	6000	Upper			
Betelgeuse, α Ori	3500	Upper	180	~50	62

In the result we can say that Carahunge was in active use during the period of 7500-2000 years ago.

The high attention was paid again to Orion (4 Stones) and also to Ursa Major (5 Stones) constellations.

Большая
Медведица

1.26. CARAHUNGE DATE CONCLUSION

We considered four independent astronomical Methods of Carahunge age determination: the Sun and Moon rising and setting Azimuth shifts (Table 3), Zenith point star crossing (Table 4), Star rising and setting Azimuths (Table 5) and Star culmination Elevations (Table 6).

It is very interesting that all four Methods of dating have given the same result: Carahunge Observatory was built and operated more than 7500 years ago (middle of VI millennium BC).

Obviously the building and operation of Carahunge started much earlier (having more simple instruments), more than 15000 years ago.

Carahunge was in continuous operation more than 5500 years, up to 2000 years ago till perhaps 301 AD when Christianity was accepted as the

State religion in all Great Armennian Kingdom, by King Trdat III the Great*.

Carahunge certified that in Armennia was high civilization much more than 7500 years ago. Let us recall that it is considered that any civilization did not exist yet neither in Mesopotamia, Egypt nor anywhere else before 5500 – 5000 years ago.

1.27. PROFESSOR G. S. HAWKINS

In February 1999 I sent all my Carahunge materials including the Age calculations to Professor G. S. Hawkins (Washington D.C.) who is the top specialist on old monuments dating by astronomical methods and asked his opinion. I am very thankful to him that he kindly agreed and has done a lot of work to check my results and gave a high estimation. In Fig. 33 is shown a photo of Professor G. S. Hawkins.

In his letter of May 18, 1999 he answered me the following [31]:

“The Carahunge site is very interesting, and I have some thought to share with you.” and then,

...”I am most impressed with the careful work you have done, and hope that the result will ultimately get recorded in the literature”.

In his letter of June 28, 1999 he wrote that I can publish his comments in my next publication, which I am doing now with pleasure:

“The menhir-lined Avenue leading from the stone circle (of Carahunge, P.H.) is similar to the Avenue at Stonehenge, and the Avenue at Callanish. The former points to the midsummer sunrise, and the latter to the extreme point of the setting of the moon.

Both date to the third millennium BC. At Carahunge the arrangement is similar. The Avenue from the stone circle points to the extreme northerly rising of the moon in the third millennium BC. As the Stonehenge and Callanish, the Avenue is the most distinctive architectural feature of the monument.” [31].

It is very interesting that Professor G. S. Hawkins sees the parallel between Stonehenge, Callanish and Carahunge.

Professor G. S. Hawkins is also painter. In Fig. 34 his painting “Stonehenge” is shown.

* At first, in 33 AD Christianity was accepted in Armennian Pharam Aram (in Armennian: “The country of Aram’s junior brother”, now - Mesopotamia) with capital Arpha (later – Edessa, Urfa) by King Abgar V (12-50 AD) who in 33 AD delegated his secretary and artist Hannan to Jesus Christ with letter (inviting Him to Arpha) and received His reply letter and His portrait (the famous so-called “Mandilion”) painted by Hannan (See PART 3).

1.28. THE LATITUDE AND EARTH SIZE. THREE STONES INSTRUMENT

Another unique Astronomical Instrument in Carahunge attracted my attention since first expedition. It is the ensemble of Stones №№ 60, 62, 63 standing along NS direction and located at the beginning of the South Arm. The Stones № 60 and 62 have Holes directed to different elevation angles and through which the top of the Stone № 63 is visible (Fig. 35, 36, 37).

It was in equinox day, 1994, during the 1-st expedition, when we made observations through Hole in Stone № 62, how the Sun came to the top of Stone № 63 exactly in midday. The Stone № 63 (which is apropos alike the Aries) at the said moment acquired the head! *вводятся, награв, гостина*

The direction of Hole in Stone № 62 to the top of Stone № 63 makes the angle about 39.5° apropos of vertical, i.e. equal to the latitude of place.

Thus, using this Instrument, the Carahunge astronomers measured the geographical latitude of place (with accuracy $30''$). They also measured the beginning (on March 21) of the year (with accuracy 2 sec.) either in the midday or at the moment of Sunrise using the Hole on the back of Stone № 63 directed to Sunrise point in equinox.

So they could find out that year consists of about 365.25 days and made corrections of calendar (for the day, month and year duration) and came to the "fixed" one. Besides these they could even during one year measure the Equinox Anticipation ($0.83'$ per year) and find out Precession of Earth Axis (see Item 1.22). *Они измеряли продолжительность года*

The Stone № 60 was used to help to fix and maintain the position of the top of Stone № 63, the prolonged stability of which was very important.

Stone № 63 perhaps was used also as Sundial and Sun-Calendar. During our IV expedition at equinox September 21, 1997, a piece of mirror was fixed (by clay) in the Hole on the back of Stone № 63 (Fig. 38) and reflected Sun spot which moved more than 4 cm per min. on a screen at a distance of 10m from the Stone.

So it was possible for old astronomers to measure the Sun movement with good accuracy by Right Ascension (angle α) and Declination (δ). Sure enough, in Carahunge there were special Sundials and Calendars with gnomons, which we have not found yet (or they were destroyed)

A fragment of Carahunge stones painted by Spartak G. Safian is shown in Fig. 25a.

Carahunge astronomers knew that Earth has a ball-form. To be sure for 100% they had to measure the latitude also in other latitudes, better on distance of \pm equal angles $\Delta\varphi$ from the Carahunge latitude $\varphi = 39.5^\circ$.

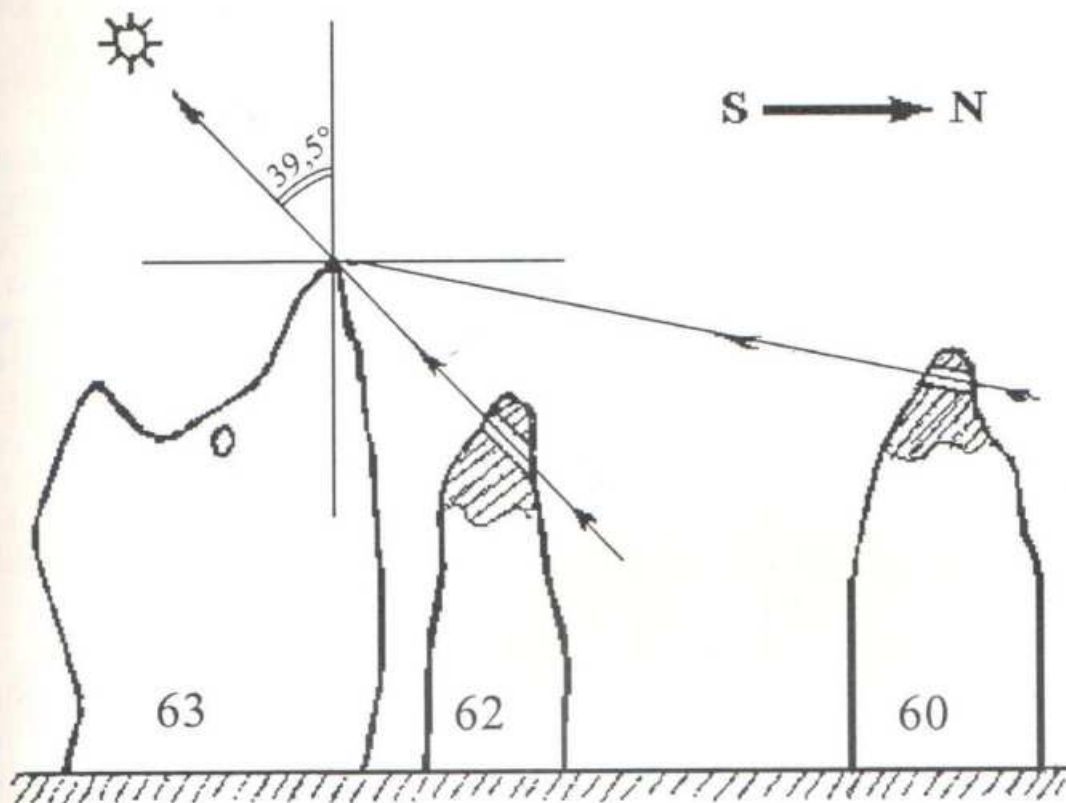


Fig. 35. Three-Stone Instrument. Scheme of operation

There are facts that they did it, for $\Delta\phi$ equal up to $\pm 10^\circ$, $\pm 16^\circ$ (see below, Item 1.33). So, Armennians knew the ball-form of the Earth more than 7500 years ago.

The famous Armennian astronomer, mathematician and philosopher of VII century AD Annannia Shirakatsi (Fig. 39) in his book "Cosmology and Chronology" writes that heathen Armennian philosophers affirmed that Earth is ball-formed, and people and animals live on all its sides [22].

A very interesting illustration of this old knowledge is one prehistoric engraving in Armenia, carved on mountain rocks near Lake Sevan, about V millennium BC, see Fig. 40 [32].

The information about Earth's ball-form came to Europe first in Medieval period from Pythagoras (VI century BC) who till his age of 50 years lived and learned knowledge in Armenia and only after that came back to Greece [33].

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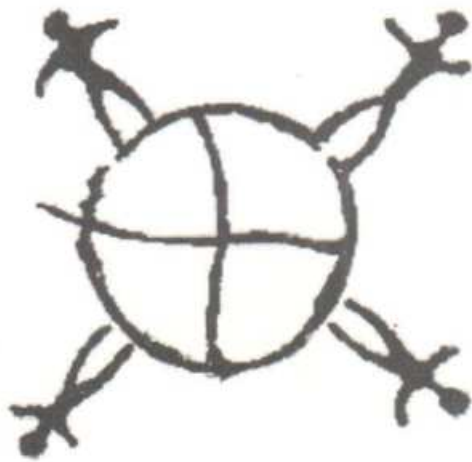


Fig. 40. The Earth is ball-formed and people live on all its sides.

Engraving on rocks near Lake Sevan (about V millennium BC).

Being able to measure latitude and knowing the ball-form of Earth, old Armenian scientists could measure also the size of the Earth. For this it was enough for them to measure the length of meridian part, say in limit $\Delta\varphi = 1^\circ$ (or about 110 km)*, with error $\pm 1'$ (or about 2 km) which is about 2%. The value of $\pi = 3.14$ they could find experimentally with error about 1%** . Then they could calculate the Earth radius as:

$$360 \times 110 : 2\pi \approx 6300 \text{ km} \pm 3\% \approx \underline{6300} \pm 190 \text{ km},$$

which is very good result (the real value is about 6370 km).

1.29. PLANETS. HELIOCENTRIC SYSTEM

In our research of Carahunge Observatory we did not study the problem of Planets observation or calculation. It is necessary to do that in future, because I am sure the Carahunge old astronomers were interested in the Planets. Five planets (Mercury, Venus, Mars, Jupiter, Saturn) were known and had Armenian old names which were presented in Item 1.19.

Հրեշտակային Տի, Արեւիկայ, Զրամբ, Լուսնի քայք, Արեւիկայ

* The old length measure in Armenia was "armung" (elbow) about 0.5 m.

** Armenian mathematician V. Mirzoian confirmed that value of π was measured in Old Armenia with accuracy 0.01% (and better) using clay disks with diameter about 1m, which were excavated in Karmir Blour near Yerevan [69].

Old astronomers, of course, saw the unusual (related to stars) movement of planets. The Armennian word for "planet" is "molorak" (մոլորակ) which means "errant" or "spinning one". And indeed, they move sometimes to the back direction. So to understand their real way it was not so easy.

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Old astronomers knew about planets the following (even without using any instruments):

1. Planets have different movement than stars, travel crossing constellations, and sometimes stay on one line ("parade" of planets).

2. They are visible from different sides of the Sun, sometimes in the morning before Sunrise and sometimes in the evening, after Sunset, so they perhaps rotate around the Sun.

3. Their velocities on sky are much more than stars velocities, so they sometimes outstrip stars, sometimes move to opposite direction, and they do not blink as stars, so they are much closer to us than stars.

4. Their brightness changes much so they are sometimes at more and sometimes at less distance from us, and their orbit planes are almost parallel to the Ecliptic plane of the Earth.

մոլորակ

5. At dark nights in mountains, perhaps, it was possible to see the phases of Venus, Jupiter and understand that planets have not their own light, but are illuminated by the Sun, as the Earth and Moon (the angular size of Venus and Jupiter sometimes comes up to 40"-50", the normal average resolving power of eye is $1' = 60''$, but many people can see twice better).

6. Mercury and Venus are nearer to the Sun than the Earth, because period of their rotation around Sun is less than Earth period, equal to one year or 365.25 days. Period of Mercury is about 2.9 months, of Venus - 7.5 months. Period of Mars is equal to about 1.9 years, of Jupiter is equal to about 11.8 years, of Saturn - 29.5 years, so they are further from the Sun, than the Earth.

7. Periods of planets rotation old astronomers could measure in Carahunge using Stones with Holes directed to their rising (or setting) points on horizon. They could also associate 11-year period of Jupiter rotation with 11-year period of the Sun activity. I think, they knew about the Sun influence on nature, flora, fauna and people on the Earth much more than we know now.

8. The Sun is the Main God, so it is natural that everything around is in His ascendancy and influence, and has to rotate around Him.

Carahunge astronomers knowing all these (and supporting it by observations with instruments) could suppose that all planets rotate around the Sun. Thus the Heliocentric Solar System becomes at first known (as hypothesis) in VI-V millennium BC. It was proved by N.Copernicus in XVI century AD, and then supported by observations of G.Galilei (XVII cent. AD), theories of I.Keppler (XVII century AD) and I.Newton (XVII-XVIII cent. AD).

1.30. UNIVERSITY

Such a large Observatory as Carahunge, of course, needed many high quality specialists, particularly hundreds observers, mathematicians and service personnel. So Carahunge had to be also a teaching centre, even if knowledge was passed just to limited circle of people (from father to son).

One confirmation that Carahunge had also been a University centre is the Stones № 160 (having height of 1.9 m) and № 161 (height 1 m) standing close together, for teacher and pupil. Both Holes look almost to the same point on the top of nearby hill where there would have been a stone used as an object of observation.

In Carahunge they had to teach observation methods for the Sun, Moon, stars, including pipe (with crossing lines), the recording of observation results and their fixation, the determination of their accuracy (metrology), astronomy, mathematics etc. The cosmology, chronology and Armennian language was also taught.

The presence of such an Observatory tells us about the existence of written language with Alphabet, figures, mathematics*, philosophy etc, and also about the existence of a stable state and order during many millennia. Because under condition when all around there was not any civilization to learn from them, it was only possible to accumulate (beginning from zero) such a high knowledge over many millennia, and by systematic work of many scientists.

Thus the Carahunge (and Armenian language, see PART 2) confirms that close to nature Armennian civilization came from very very old times, more than 30000 years ago, Armennian astronomy – more than 25000 years ago, because the development from zero level up to high one (7500 years ago) needs much more time than learning the knowledge given by ready teachers.

1.31. THE OTHER RESEARCH OF CARAHUNGE

Having my approval Professor H.G.Babayan from Stone and Silicates Institute in Yerevan with his colleagues went in 1999 to Carahunge, took samples of some Stones and about half year researched them in physical and chemistry laboratories. They could not, of course, define the absolute age of Stones, but making physical and chemical experiments with samples they found the relative ages (or difference between ages) of Stones. The results

* “Mat-a-mat-ika” means in Armennian: “Finger follows finger”, i.e. “counting”. In old Armennia the decimal counting system was in use with “zero”. This word means in old Armennian: “It makes the beginning, but is not material” (deep philosophy!).

were interesting: these relative ages are concurrent with age differences found by our astronomical methods [14].

հնագույն

Another group of researches using sensitive magnetometer, found out that the distribution of natural magnetic lines inside Central Circle has spiral form.

էմպանո, Ըմբոսիւն?

1.32. THE CARAHUNGE NAME

I am sure the Monument in old time was called Carahunge (also Carenish). This name is saved in the names of three villages Carahunge which are not far from the Monument. One of them 30 km to East, near present town Goris, and two others (60 and 90 km to East), in Artsakh (Nagorni Carabakh).

Armennian historian of XII century Stepanos Orbelian in his book "History of Syunic" (I-XII centuries AD) notes that there was a village Carunge near the town Sisian (together with names of other existing now villages) [18]. Evidently it is the same village (settlement) just near Carahunge Monument which was excavated (by O.Khnikian and dated II-III millennium BC [4]). And perhaps the population of Carunge migrated after 301 AD to the East and founded above-said three villages saving the name Carahunge.

"Car" in Armennian is "stone"; "Hunge" (hunch) means a "sound", "echo", "voice", because the analysis of the Armennian word "հմւնջ = h · n · ũ · ջ = h · u · n · g" gives: հաճեիլ է այն ու բարձր = It is nice and high (see Table 10 in PART 2).

Thus, Carahunge means "Resonant Stones" or "Speaking Stones". Indeed, they had much to tell to old astronomers and have much to tell us.

There is an interesting analogy between words Carahunge and Stonehenge. The "car" and "stone" are a stone, but what is "henge" is unknown, there is not the word "henge" in English language*. So the name Stonehenge is the same "Speaking Stones", and at old times, perhaps, it was called Carahunge. The name crossed all over Europe and was saved during millennia! But could this coincidence be by chance? No, because there are too many coincidences:

1. In Ireland a similar Monument dated 2500 BC is called New-Grange, i.e. the same "henge" (hunge). There are many "henges" in Europe [29].

2. In NW Scotland, on the Outher Hebrides there is Monument like Carahunge (but smaller and without holes in stones) called Callanish (about 2000 BC). "Cal or Car" is almost the same word and in Armennian is "stone". The word "nish" (which is also absent in English language) in Armennian is "sign", i.e. Callanish means "Stone Sign" (Stone Mark, Stone Marker). The is-

* I don't agree with some authors (as [29]) trying to explain "henge" as "hang". Stonehenge doesn't have any relation with "hang".

land (where Callanish is) is called "Lewis" ("light" in Armenian), and near it there is a peninsula called "Harris". In Armenian "Arris" is "Aries", which is not only the first Zodiac constellation, but this big, nice and proud rock goat was also one of three (with "Aryuts" – Leo and "Artsiv" - Eagle beginning from letters AR) symbols of the old Armenian main and very kind God "AR" (the Sun), whose children were Armenians.

3. In the NE of France, in Brittany is a large stone Monument dated about 2000 BC which (together with the nearest town) is called Carnac. This word in Britton language was written and spoken as "Cagrneagh - Carnikh", i.e. Carnak or Carnish – also "Stone Sign" in Armenian.

4. In Egypt also there is Carnac, where is a temple of Amon – Ra (the Sun God) which is also called Carenish.

There are many other examples. And these Monuments have not only linguistic analogy, but also many other connections (see below, Item 1.34).

1.33. OTHER OLD OBSERVATORIES IN ARMENIA

Now the Republic of Armenia is a small country in South Caucasian mountains at the North part of the large historical Armenian Highland. Nevertheless in this small Armenia there are very many petroglyphs on rocks (see for example [49]) and old observatories near lake Sevan, in Vardeniss mounts (Fig. 41) [32], in Metsamor (Ararat valley), in Syunic, in Agarak (at the foot of mount Aragats), etc.



Fig. 41. An Observatory with figures carved on rock in Vardeniss mounts near Lake Sevan [32,48].

It is very interesting that another old Observatory like Carahunge (but smaller) is in 30 km from town Goris near village Khndzoresk [106].

I am sure that many old observatories are in Armennian Highland (now in Turkey). In town Van (near Lake Van) there are Standing Stones of different height. Two of them, so called "Fiancee and Fiance", are shown in Fig. 42 [34]. The Carahunge type standing stones with holes are near village Kazan or Kaghzvan (now in Turkey), to the West from the Big Ararat. My friend from Holland G.Aalten sent me photos (made by B.Corbin in 1998) of these standing stones (Fig. 43a), some of them with holes (Fig. 43b) and with carved old crosses (before Christianity) and pyramids (Fig. 43c) [35].



Fig. 42. "Fiancee and Fiance".
Standing Stones near town Van [34].

1.34. THE ORIGINAL BRAIN CENTRE

Many scientists write that the Great Pyramid, Stonehenge, Sphinxes and other big old Monuments in Europe, Egypt, America and other places were not the culture of local population (at that time they had not such high level of knowledge) but were introduced from outside, perhaps from East, from the Mediterranean sea basin. But where from exactly and who really designed and built them is unknown yet.

There are also many other enigmas and questions in human old history having no answers. For example, why the big Monuments were built in their present places (for what it was necessary to carry many stones 50 tons each and more from distances of hundreds km), for what purposes they were built, who could build them with so high accuracy, who could make the map of Antarctica without glisters, more than 6000 years ago? In connection with this extraordinary map of 1513 AD G.Hancock (and other scientists) thinks that in very old times, more than 6000 years ago on the Earth was a high developed civilization, the place of which is unknown yet and which researched almost all Planet and gave the knowledge to other nations [24].

zaragice

3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

We can answer to these questions because Carahunge proves that in very old times the necessary knowledge (to design and build so big and accurate Monuments) had only Armennians. There are the facts that many of old Monuments have real relation to Carahunge, and were conceived and planned here. Let me tell about some of these facts.

Inside of Great Pyramid in Egypt (2450 BC, $\phi = 30^\circ$) nobody was interred. Nevertheless, inside of it from the funeral chamber of king a narrow (20 x 25 cm) shaft is made (in process of building) directed to the Orion belt bright star (to its culmination point at that time). And from the chamber of queen there is another shaft directed to the Sirius star culmination altitude 39.5° (at that time), see Fig. 44 [36].

But at that time the Orion constellation was called the Hayk constellation [19] and Great Pyramid was built at the time of Armennian King Hayk (2493 – 2444 BC). The Hayk constellation always was (and is) accompanied by Sirius (Alpha of Canis Major or “Big Dog” – “The loved one in house of Holy person”).

The next important fact: the altitude 39.5° of queen – Sirius shaft is exactly equal to Carahunge latitude 39.5° ! It is possible to be only on latitude 30° , where is the Great Pyramid.

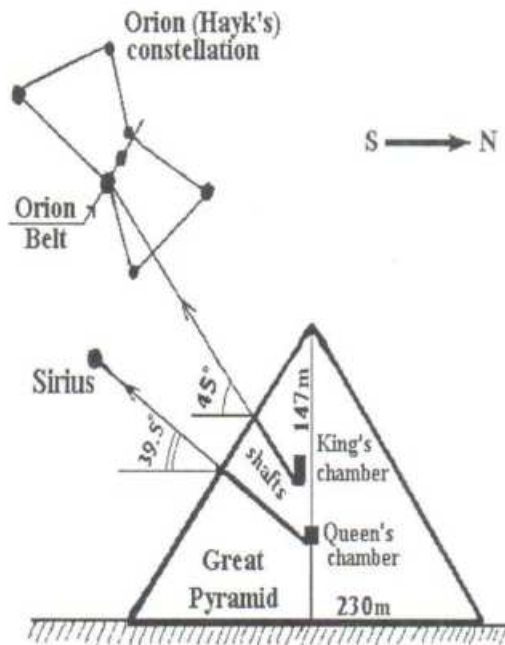


Fig. 44. The Great Pyramid [36]

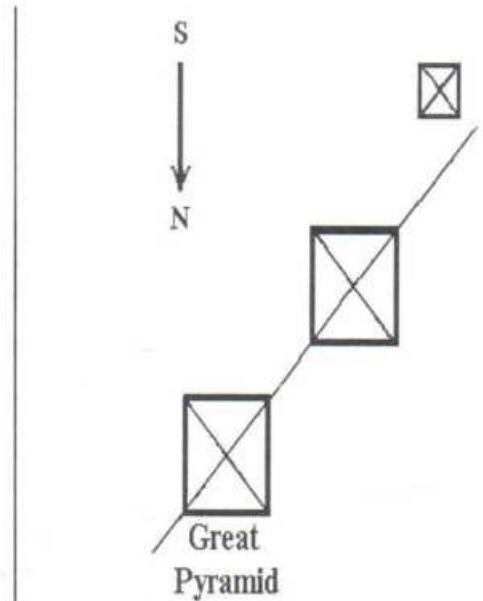


Fig. 45. Three Big Pyramids [36]

The Great Pyramid and Stonehenge are on latitudes, which are almost at equal distances from Carahunge latitude ($39.5 \pm 10^\circ$).

As it is shown by R.Bauvel, the disposition of three Big Pyramids in Giza iterates the positions of three stars in Orion Belt, see Fig. 45 [36].

Carahunge astronomers had much interest in Hayk (Orion) and Canis Major (with Sirius) constellations during 7500 – 4500 years ago, i.e. long before the Pyramids were built (see Tables 5 and 6 in Items 1.24 and 1.25), and Great Pyramid was connected with that interest.

The Stonehenge (2000 BC) is on the latitude $\varphi = 51^\circ$, where (and only here) the four points on the horizon of the Sun and Moon rising and setting in their extreme positions form a rectangle [28]. Besides, the altitude of the Sun in Stonehenge at noon of equinox days is almost equal to Carahunge latitude: $90^\circ - 51^\circ = 39^\circ$ (difference about 0.5°).

There are underground rivers near Stonehenge and Carahunge. There are deep (30 m) wells close to Stonehenge and to ruins of VII century Armenian round temple Zvartnots (near Etchmiadzin) which, perhaps, earlier was another Carahunge.

Callanish is on latitude which is Arctic Circle for Moon [28], and its latitude is about $\varphi = 55.5^\circ$ ($55.5^\circ - 16^\circ = 39.5^\circ =$ the latitude of Carahunge).

The oldest Egyptian Observatory near present Asuan* is on latitude about $\varphi = 23.5^\circ$ ($23.5^\circ + 16^\circ = 39.5^\circ =$ the latitude of Carahunge).

It is obvious, that these four old Monuments (Stonehenge and Great Pyramid, Callanish and Asuan) were built on specially chosen (by somebody) latitudes and are closely connected with Carahunge ($39.5^\circ \pm 10^\circ$ and $39.5^\circ \pm 16^\circ$).

Of course, there were taken into account for Monument place choice also other important conditions: climate, presence of many workers, of water, etc.

All these tell us that it was in old Armenia the Original Brain Centre (OBC), where the building of different Monuments was planned. They knew astronomy, mathematics, Earth ball-form, its sizes, technology of stone treatment, etc. and had necessary enough accurate instruments including compass*, sextant, protractor and others. Of course, they measured preliminary the latitudes of many places. They were the first who divided the Sky into 12 parts (Zodiacal Constellations) and 360 degrees ($12 \times 30 = 360^\circ$), divided day into 24 hours ($12 \times 2 = 24$), the hour to 60 minutes ($12 \times 5 = 60 \text{ min} = 1 \text{ h.}$), the minute to 60 seconds ($12 \times 5 = 60 \text{ sec} = 1 \text{ min}$), thereat 1 sec. is almost equal to 1 period of human heart rhythm. In the result the Sky (i.e. Earth) rotates with velocity 15 degree per hour, or 15 arc. minute per minute, or 15 arc. sec. per second, easy to remember.

It was decided in OBC to build at first the Great Pyramid at latitude $\varphi = 30^\circ$, in order the elevation of Sirius extreme to be equal 39.5° , as Carahunge latitude. The difference was $39.5^\circ - 30^\circ = 9.5^\circ$. To build Stonehenge on the same latitude shift, i.e. on latitude $39.5^\circ + 9.5^\circ = 49^\circ$ was impossible because unfortunately, there was English Channel (La Mansh). So they de-

* "Asu •an" in Armenian means "speaker", "speaking one".

* "com" (kohm) in Armenian is "side" (կողմ).

cided to go to $\varphi = 51^\circ$ where were good conditions and another connection with Carahunge: the equality (approximate) of Sun elevation at equinox noon to the Carahunge latitude.

It is interesting also that Carnak (latitude about 48°) in Britain (France) was built almost at the same time (2000 BC) with Stonehenge and the middle latitude between them is equal to $39.5 \pm 10 = 49.5^\circ$. Indeed, $48+51 = 99 : 2 = 49.5 - 10 = 39.5^\circ$, i.e. the latitude of Carahunge.

Then the place latitudes for Callanish and Asuan Observatory, as $39.5^\circ \pm 16^\circ$ were chosen. Of course, at these places at first simple observatories were built by them, as for example, the circles near Goseck, Germany (4900 BC, latitude about 50°) [104].

I think, the places were chosen by this way, although to build Monuments in these places it was necessary to do the titanic work to carry very big stones for Stonehenge and Great Pyramid from the distances of hundreds kilometres.

Why did they decide to build so big Monuments, for what main purpose?

I think, the main purpose of Great Pyramid and Stonehenge building was to tell, to lead, to bring, to inform the far future generations about the great scientific discovery they knew, the Ball-form of the Earth!

They were clever enough to understand that many scientific knowledge could be forgotten, because population on Earth at that time generally was not yet civilized, had no written language, i.e. had no long time memory. And they were right. R.Bauvel and A.Gilbert write that about 1000 years after Pyramids building it was unfortunately forgotten who built them and for what purpose [36]. Also, by G.Hawkins the real history of Stonehenge was forgotten [28].

1.35. THE GREAT SPHINX

At the first time Armennians were in Egypt much earlier, perhaps, about 12000 years ago, and built the Great Sphinx. *by benobermber 2016*

My opinion is the Sphinx was built to perpetuate the another great scientific discovery, the phenomenon of Earth Axis Precession, the Great Space Clock of Equinoxes.

The Great Sphinx is Lion, the symbol of Armennian main God AR (the Sun), and it looks exactly to the East, to the point on horizon, where the Sun rises each equinox day. Why was needed this orientation? G.Hancock thinks that Sphinx was built in Precession epoch of Lion constellation, i.e. between 10970 BC and 8810 BC (about 13000 – 10800 years ago). He says: "The Lion was looking to the Lion!" [24]. I can add: "And to the Sun, twice per year!"

- [dɛlʲjuːdʒ] - нодон, веступнон нодон.

- [iˈrɔʊʒn] - эррогис, пагзегарис

- [iːpʊk] - энока, бис, эне

According to modern data the Great Sphinx was built much earlier than Pyramids (more than 6000 years earlier) and may be even before the Great Deluge, because the stone material of Sphinx is much more eroded than stones of Pyramids or temples near them [24].

Let me add that next Lion epoch will be between 14950 AD and 17110 AD. So the Great Sphinx is looking indeed to the very far future!

To the question "Who built the Sphinx?" many modern scientists answer that it was done by some very old and great civilization on the Earth, the place of which is unknown yet.

G.Hancock tells that French mathematician R.A.Shwaller de Lubich in his books "Temple de l'Home", "Roi de la theocratic Pharaonique" (XX century AD) noted that the science and culture in Egypt were much more developed and complicated than the modern scientists think [24]. He tells also that well known geologist John A.West in his book "The Serpent in the Sky" said that Egyptian civilization possibly is not the result of development in limits of the Nile Valley but is the heritage of much earlier, more great but still unknown civilization which "outstripped dynastic Egypt and all other famed civilizations for thousands years" [24]. And he said also that the Great Civilization, perhaps, preceded Great Deluge, which allow to suppose that Sphinx already existed at that time [24]. And G.Hancock said also the opinion of the famous American geologist R. Schoch: "I am going by the way of the science, which leads me to the deduction that Sphinx was made much earlier than it was deemed" [24]. - нонанароц, омитаноц

I am glad that there are such opinions. I think that the said "unknown yet the Oldest and Great Civilization" might be only Armenian Old Civilization in Armenia, because there is the developed Carahunge of 7500 years old and there are no other variants.

outstrip - одромит, ерпенка; пребокагис (брен-н)
dynastic - [diˈnæstik] - гинацурис

1.36. COSMOLOGY, PHILOSOPHY, THEOLOGY

famed - убесонин, гнаменитин, поварбненит

In Old Armenia the Cosmology, Philosophy and Theology together were developed. This is possible to explain using Armenian Language (see PART 2), especially some words, for example:

- The word Universe (Տիզերց - Tiezzerc) means in Armenian "Edges of people home (place)" (see Table 10). There is also another old Armenian word for Universe, which is perhaps, older one. It is Աստ (Ast) which means "The home (place) for beautiful life". So the Universe was in close connection with life, was for people life, so people are the part of Nature and live in all the Universe. This very old opinion shocks, doesn't it?

- The word Star (Աստղ - Astgh) means "The clot in the Universe", "The clot (quintessence) of the Universe (matter substance)", be-

clot - н, комок, сгусток; черная масса воды, песок

Deity - [ˈdeɪəty] - Տառապատ, Տառապատաւոր, Ըղջարան,

cause "Ast" is Universe and "ղ - gh" is clot of different substances, as for example "Յուղ - Yough" is "butter" which is clot of milk. Deep philosophy!

• The word God (Աստված - Astvats) means "Omnipresent", because "Ast" is Universe and "vats" or "ats" in Armennian words show the position state of the object, as in words "դրված - put", "սփռված - wide-spread", "կանգնած - standing", etc. So the God is the Substance spread all over Universe or Omnipresent, which is (one of) His main quality.

Thus the Main Deity, Main God of Old Armennians was the All Universe, All Nature. The Sun (AR, AREV) was the Main God of Earth or, perhaps, for the all Solar System.

1.37. ABOUT ASTRONOMY IN OLD ARMENNIA


I am not sole in opinion about the presence of developed level of science, language and culture in Old Armennia.

At the beginning of XX century well known German historian E.Maunder and archaeologist Swarts [37], famous British astronomer and historian of astronomy W.Alcott [38] wrote that the first people who divided the sky to the constellations and named them, lived not in Egypt, not in Babylon, but in Armennian Highland (in Valley of river Euphrates) and around Mount Ararat, at latitudes from 36° to 41°, and that process was completed in III millennium BC. According to W.Alcott these conclusions are agreed also with historical and archaeological data.

E.Mounder also writes: "Egyptians, on whose ancient monuments twelve Zodiac signs were found out, told the truth that they had taken their knowledge about stars from the Chaldeans (= Urartians = Armennians, see below, P.H.), and they in their turn were teachers of Greeks at the times of Phales and Pythagoras" [37].

Zodiac signs, used till now, are ancient Armennian hieroglyphs for Zodiacs which are saved in Armennia till now, for example, in Metsamor Monument (big metallurgical plant and observatory in the Ararat Valley, V millennium BC), [39], in rock petroglyphs [32, 32a], on pages of Matenadaran* manuscripts.

The planet Earth (with human population) is denoted in present astronomy (from old times) by ring with cross on the top. This was an Armen-

nian old sign of Earth: the ring with man on the top , which was simpler and earlier than petroglyph shown in Fig. 40. The same structure have the

* Matenadaran is Repository, Scientific Institute and Museum of Ancient Manuscripts in Yerevan, the capital of Republic of Armennia (see Fig. 67a on page 142).

6
Inscriptions to Carahunge
carved ornaments on thousands Armenian famous Cross-Stones made before (Fig. 43c) and especially after the Christianity adopting (Fig. 94).

French famous astronomer and philosopher K.Flomarion [40], British scientist A.Berry [41] and others noted the high level of astronomical knowledge in prehistoric Armenian Highland.

American scientist, the well-known researcher of Stonehenge and Callanish, G.S.Hawkins in 1970-s wrote to V.H. Hambartsumian, President of the Armenian National Academy of Sciences, that Stonehenge is not alone and it should be expected the presence of such astronomical culture in Armenia [3, 31]. Carahunge and this PART 1 are bright confirmation of his rightness.

Carahunge is also confirmation of other above mentioned statements and opinions about developed astronomy and culture of Old Armenia.



1.38. ABOUT ASTRONOMY IN MODERN ARMENIA

In the present Republic of Armenia Astronomy is also developed.

In famous Byurakan Astrophysical Observatory (BAO) led by director V.H.Hambartsumian the high level scientific results were achieved by him as well as by Professors B.Marcarian, G.Gurzadian, M.Arakelyan, L.Mirzoyan, E.Khachikian, PhD H. Baddalian and others. The interesting results were achieved thanks to cooperation with Foreign Member of the Armenian National Academy of Sciences Ye.Terzian (Director of Astronomy Department of Cornell University, NY, USA).

In BAO the Star Associations were discovered where stars are born also in present time; the new type of galaxies with ultraviolet superfluity (Marcarian galaxies); the activity of galaxy nuclears; the first space telescope "Orion" was made, etc.

The first in Armenia radioastronomical observations were done in BAO in 1950-es led by PhD-es V.Sanamian and PhD E. Mirzabekyan.

In Yerevan State University Professors G.Sahakkian and D.Sedrakkian received important theoretical results about neutron stars, Prof. B.Toumanian made interesting works on old calendars, etc.

In Yerevan Physics Institute (Yerevan and Mount Aragats) led by director A.Alikhanian the new types of telescopes for space high energy particles were made and many interesting results were achieved.

In Radiophysics Research Institute (RRI), founded in 1968-71 and heading by the author of this book, with RRI Experimental Plant "Wave" (Yerevan) led by director M.Khorasanjian, and RRI Aragats Scientific Centre (ASC, 100 hectare, Mount Aragats) led by director Dr. V.Oskanian (present director T.Tonoyan) there has been worked out the theory and projected the large radiotelescope with the Large Antenna of the new type having fixed (in ground) spherical main mirror and movable correcting secondary small mirror [42-44]. In 1960-62 was projected and built the working model of Large Antenna 5 m in diameter (0.64 m secondary mirror) for mm radio waves [43]. It was, at that time, the biggest Antenna in the World for short mm wave range.

In 1960's and 70's the entire project of large Radio-Optical Telescope with the Large Antenna and all systems was completed in RRI. The building of the first in World Radio-Optical Telescope ROT-54/2.6 had begun in 1976 in ASC of RRI on altitude 1700 m.

The main building and construction work were done during 1976 -1986 by big staff of RRI (with more than 850 persons). The huge work was done by specialists of RRI: A.Antonian (building), R.Adamian, E.Kazarian, A.Pogosian (design), M.Khorasanjian, O.Dolbakian, Dr. H.Bagdasarian (technology, manufacturing), Dr. M.Arakelian, Z.Astvatsatrian, G.Aslianian (montage, adjusting), Dr. S.Sarkisian, A.Nersesian (28 control systems making and adjusting), Dr. N.Khachatrian, N.Yeolchian, (radiometric receivers for 2, 3, 8 mm, 3, 10, 20 cm ranges), Dr. V.Oskanian (optical telescope design), G.Utunjian (300 tons antenna aluminum surface melding), V.Hovannesian (turner and welding master) and many-many others.

The main building, preparation and montage works, as well as all infrastructure: electrical grid, telephones, water and heating supply, laboratories and control buildings, hotel etc, were finished in 1985. Also the first observation of radio sources was done in 1985 [46].

During 1986 - 1987 all systems adjustment work was finished in ASC and ROT - 54/2.6 with Large Antenna 54m in diameter and Optical Telescope with 2.6m in diameter were ready (Fig. 46a,b,c). In 1988 parameters of ROT - 54/2.6 were measured and observations started.

The measured parameters of the Large Antenna are presented in Table 7 and its comparison with parameters of other large antennas in the World is presented in Table 8.

ROT - 54/2.6 Large Antenna parameters are better than parameters of any large antenna in the World, especially in mm wave range (until now). This is the most accurate, short wave, narrow beam, high gain, low noise, high sensitive and high speed large antenna in the World.

Using this unique modern Astronomical Instrument we (with Dr. A. Sarkisian, Dr. V. Oskanian, Dr. Panchenko, Dr. N.Khachatrian, A.Oskanian and others) made first observations and discovered the bright flare on Etta Gemini red giant star. Such a powerful flare was observed for

the first time for red giant type stars. The new radiosources in mm radio wave range were discovered.

It was also demonstrated (thanks to very low level of the Antenna Self Noises, 2.8K) that the "relict" background emission (of 2.7K) in Universe is absent, so the present cosmological theory of the Birth of the Universe by Big Bang is wrong [45-47].

In RRI other radio telescopes were also built: RT-18 with parabolic antenna 18 m in diameter for 3 cm – 1 m wave range; RT-3.2 with spherical doublemirror antenna 3.2 m in diameter (accuracy 7 micron) for sub-millimetre (0.1 mm – 3 cm) wave range, which is put on Mount Aragats on altitude of 3200 m, and others.

ROT - 54/2.6

The Results of Measurements of ROT Main Parameters

Table 7

N	Wavelength, mm Parameter	200	30	8	3	2	1 (expected)
		1	Beamwidth	25'	3.7'	1'	22''
2	Effective Area, m ²	560	560	540	520	482	350
3	Gain	2x10 ⁵	8x10 ⁶	10 ⁸	7x10 ⁸	1.5x10 ⁹	4.4x10 ⁹
4	Area using factor	0.7	0.7	0.67	0.65	0.6	0.4
5	Self Noises, K	5	4	2.8	3	not measured	
6	Sensitivity (Eff. Area / selfnoises)	112	140	193	173	not measured	
7	Field of view, square degree	2.8	(±1 0 x 10 beam- widths)			not measured	

The ROT Comparison with the World Other Largest Antennas

Table 8

Parameter \ Antenna	ROT Arme- nia	Nobjarna Japan	PicoVioletta Spain	Effelberg German	Aresibo USA	Evpatoria Ukraine	Medvezhji ozera Russia	RATAN 600 Russia
1. The full diameter, m	54	45	30	100	305	70	64	7.4x580
2. Using diameter, m	32	45	30	100	260x213	70	64	74 x 320
3. Using Aperture, geo- metrical Area, m ²	804	15 90	707	7854	43514	3848	3217	2368
4. RMS of mirrors, mm	0.08	0.2	0.13	1.2	7.5	1	1	1
5. Shortest wavelength, mm Max. frequency, GHz	<u>2</u> 150	3.3 9.4	3 10	30 1	37 0.81	30 1	30 1	30 1
6. Effective Area factor (at shortest wave)	0.6	0.4	0.4	0.4	0.5	0.4	0.4	0.4
7. Effective Area, m2 (at shortest wave)	482	63 6	283	3142	21760	1539	1287	947
8. Electrical diam/103, λ (at shortest wave)	16	14	10	3.3	6.4	2.3	2.1	0.25x11
9. Self-Noise Temper., K	3	35	35	40	35	35	35	50
10. Sensitivity, m ² /K (Eft. Area / Self-noise)	161	18	8	79	622	44	37	19
11. Beamwidth, arcsec. (at shortest wave)	14	17	24	72	41x34	103	112	22x900
12. Beam cross (cut) sec- tion, arcsec ²	196	28 9	576	5184	1095	1060 9	12544	19800
13. Gain /106 (at shortest wave)	1514	78 0	395	44	200	21	18	13
14. Sky coverage, degree	120	12 0	120	120	22	0150	150	150
15. Latitude, degree	40	36	37	50	18	45	56	44
16. Declination of visible sources, degree	-35 +85	-24 +7 5	-24 +75	-10 +75	+24 +46	-30 +90	-19 +90	-30 +90
17. Sky coverage along source declin., degree	120	99	99	85	22	120	109	120
18. Duration of source ob- servation, hour	8	6.6	6.6	5.7	1.5	8	7.3	8
19. Tracking accuracy, arcsec.	2	2	2	10	10	?	?	?
20. Parallel Optical- Telescope diameter, m	2.6	-	-	-	-	-	-	-



Fig. 21. The Sunrise moment through Hole in Stone No 67 on 22.09.1997



Fig. 22. The Sunrise moment through Hole in Stone No 63 on 22.09.1997



Fig. 23. The Sunrise moment through Hole in Stone No 66 on 23.06.2001



Fig. 25. The New Type of Sundial-Calendar in front of RRI main building



Fig. 25a. Fragment of Carahunge stones. Painted by S.G.Safian



Fig. 31. Periscope-Stone No 137



Fig. 32. Bowl with water in down part of Stone No 137



Fig. 33. Professor G.S.Hawkins



Fig. 34. Stonehenge. Painted by G.S.Hawkins



Fig. 36. Three-Stone Instrument (TSI)



Fig. 37. Two main Stones of TSI



Fig. 38. Sun reflection from a mirror
Put in Hole of Stone No 63.
Photo by H. Bagdasarian

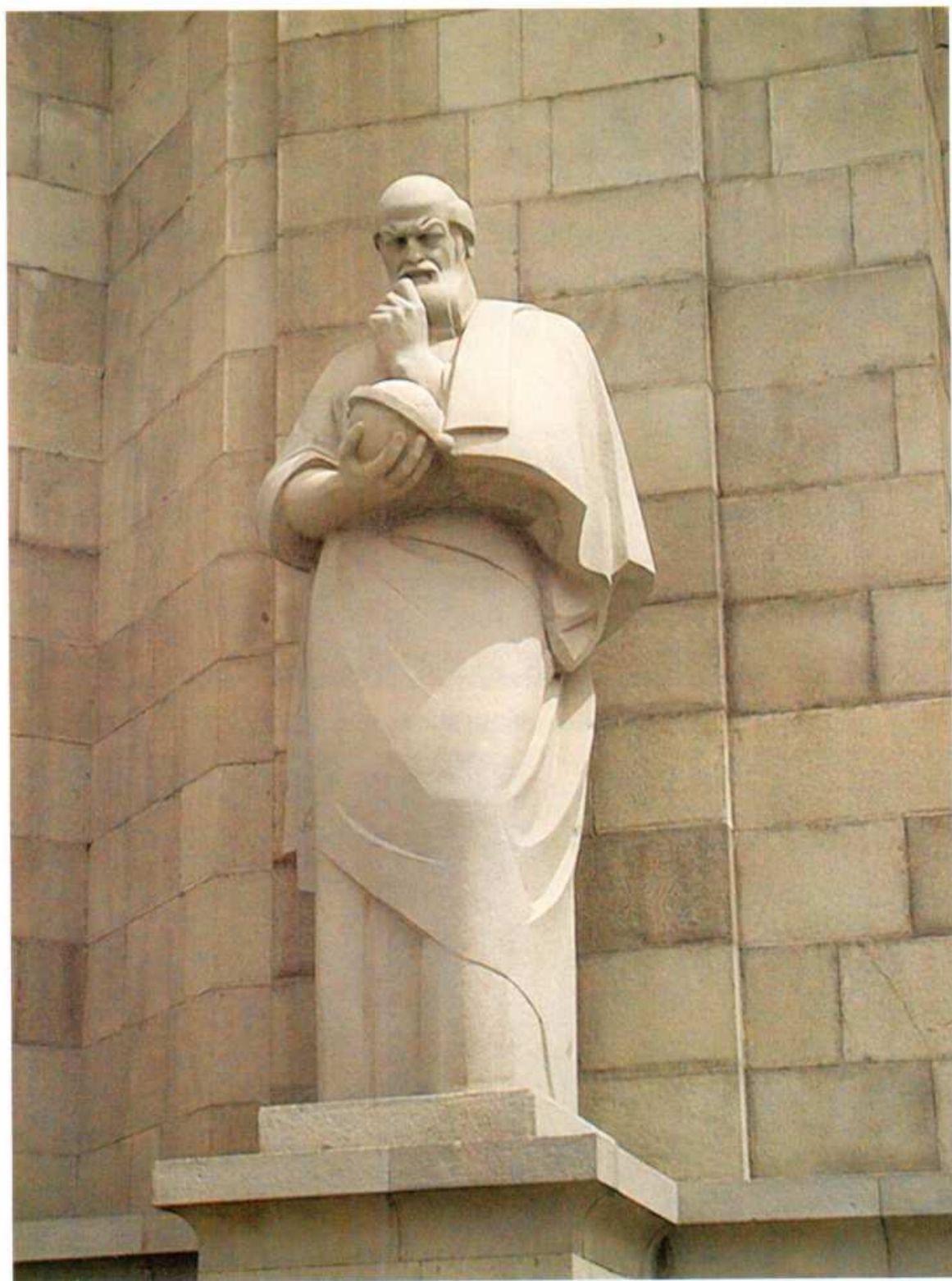


Fig. 39. Statue of Annannia Shirakatsi, Armennian old astronomer and mathematician of VII cent. AD, with the model of ball-formed Earth



a - General view



b - Stone with hole



c - Stones with engraved old crosses and pyramids

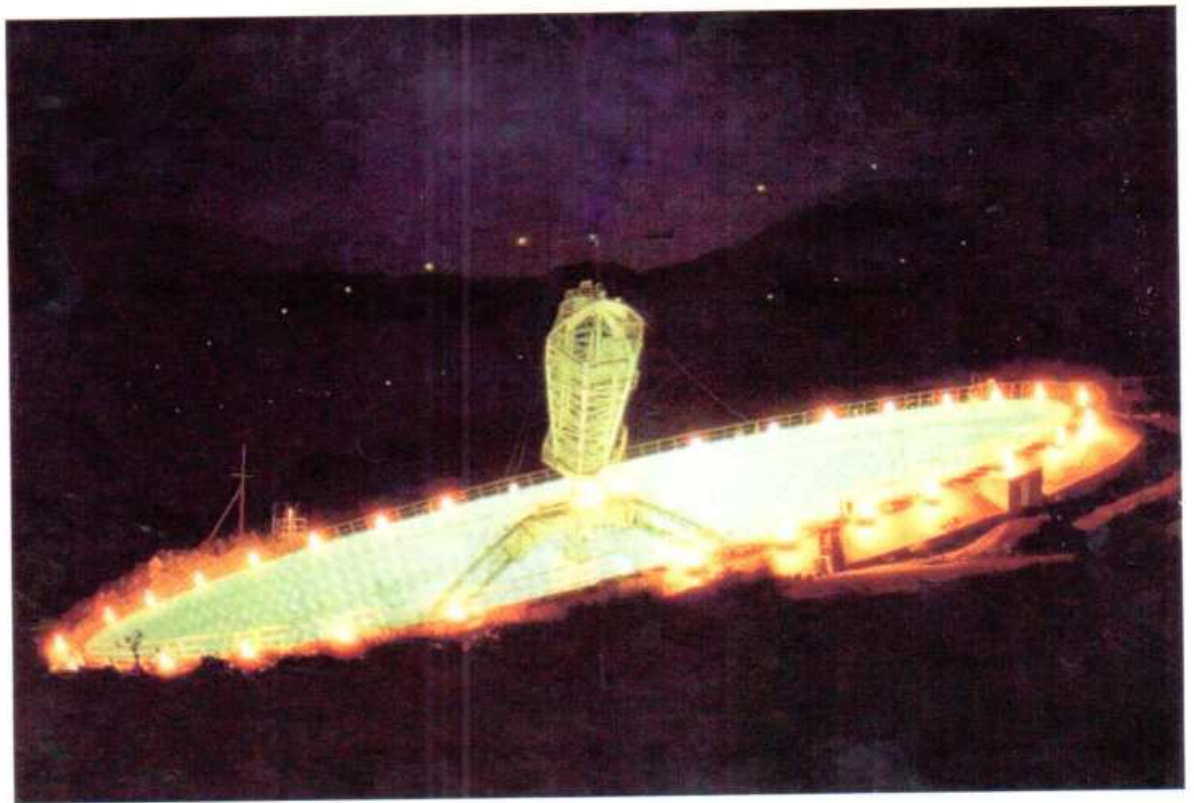
Fig. 43. Standing stones near Mount Ararat [35]



a - General view from helicopter



b - Secondary Mirror



c - View at night

Fig. 46. Radio-Optical Telescope ROT-54/2.6

1.39. CONCLUSION OF PART 1 CARAHUNGE – THE PREHISTORIC WONDER IN ARMENNIA

Carahunge is the prehistoric stone Monument in Armenia, near town Sisian. It consists of hundreds Standing Stones (also lying and damaged ones) from which 223 are numbered by us. 84 of them have accurately made holes, 4-5 cm in diameter, going through stones and looking to different directions, mainly to the real horizon.

In the middle part of the Monument Stones form the Central Circle with sizes 35 m x 45 m, from which to the North and South directions the Stones Arms are going as far as 110 – 150 m as well as the short NE Alley. The territory occupied by Monument is about 7 hectares.

Beginning from 1994 we are researching Carahunge using astronomical methods. Our conclusion is the following:

1. Carahunge was very old Temple (Central Circle) of the oldest Armenian Main God AR (the Sun), very large and developed Observatory (Arms) and big University;

2. Carahunge consists of about 80 Stone Astronomical Instruments the accuracy of which is up to 30" or 2 sec for the Sun and Moon, and 51" or 3.4 sec for stars and planets observations;

3. The name "Carahunge" means in Armenian "Speaking Stones";

4. Using the Earth Axis Incline changing and its Precession phenomena laws and our observations results of the Sun, Moon and stars rising, setting and culmination moments using old Astronomical Instruments, as well as our calculations results of the used four independent astronomical methods we believe that:

– Carahunge Observatory had developed scientific level and was in active operation more than 7500 years ago,

– It was in continuous operation during more than 5500 years, perhaps, until Christianity adopting in Armenia as the State religion in 301 AD;

5. Carahunge is the oldest and biggest Observatory among all known old ones in the World. It is older than Stonehenge for 3500 years, than Great Pyramid for 3000 years and than the beginning of the oldest civilizations in Sumer and Egypt for 2500 years. Armenian civilization is the oldest in the World;

6. In Carahunge time prehistoric Armenian scientists knew the following:

– the Earth is ball-formed and its radius is about 6300 km;

– the Earth rotates around its own Axis with period of one day, and around the Sun with period of about 365.25 days; the old "movable" calendar (coming from about 23000 years ago) was corrected to the first "fixed" one; the Armenian Circle of 1460 years was corrected to 1461 years;

– the Earth Axis is inclined for the angle about 24° from the vertical to the ecliptic plane and this angle very slowly changes in small limits;

– the Earth Axis makes also a slow conic movement (called now Precession) with period about 25920 years, in the result of which the Spring equinox moment comes each year earlier for about 50" (or 3.3 sec.), so-called Equinox Anticipation; the Sun slowly moves (in relation to stars on sky) with velocity 83' (or 5.5 min.) per 100 years, i.e. lies in each Zodiac constellation for 2160 years. The Precession was, perhaps, found out in Carahunge much earlier, about 12000 years ago (so-called "the Space Great Clock");

– Carahunge astronomers have had special interest and made long time observations of stars in Orion (with its Belt) and Canis Major (with Sirius) constellations, using many specially made Stone Instruments, holes of which were directed to the rising, setting and culmination points of said stars at period of 7500 – 4500 years ago; they found out also the Sirius Cycle (Sotis) which is very close to the Armenian Cycle (difference is 12 min. per year);

– five planets were known with their periods of rotation around the Sun: Mercury – about 3 months, Venus – about 7.5 months, Mars – about 2 years, Jupiter – about 11 years, Saturn – about 30 years. So the Heliocentric Solar System was known in Armenia more than 8000 years before N.Copernicus, G.Galilei, I.Keppler and I.Newton;

– Carahunge demonstrates that 7500 years ago in Armenia were developed mathematics, technologies, written language (alphabet) as well as the state (kingdom) with law and order during millenia;

7. We understand that such a high knowledge, which had Armenian Carahunge Scientists, was achieved by systematic work during many thousand years. In Carahunge we have found developed Astronomical Instruments built 7500 years ago and designed using already high special knowledge. This means that before these Astronomical Instruments, there had been simpler ones. When was the beginning?

To answer this question it is necessary to take into account that being the first civilization Armenians could not learn knowledge from anybody else because there was not any other civilization. It was just one source – Nature. They were children of the Sun, of the Nature and accumulated the knowledge little by little, starting from zero. Of course, this is a very slow process, requiring many thousand years.

Probably, Armenian language, settled life, agriculture, state, i.e. civilization began about 40 thousand years ago (which will be proved also in PARTS 2 and 3); the first sky observations and calendar began 23 thousand years ago; the first Observatories, Precession discovery and preliminary Alphabet – about 15-10 thousand years ago.

8. There are a lot of indisputable facts of analogy between Carahunge and other old monuments:

– Stonehenge and Callanish have Central Circles, NE Alleys and Arms (Callanish), as it is in Carahunge;

– Stonehenge and Great Pyramid are built in latitudes which are about ± 10° from Carahunge latitude (39.5°);

- Callanish and oldest Egyptian God RA (AR) temple and Observatory (near present Asuan) are built in latitudes about $\pm 16^\circ$ from Carahunge latitude;

- The narrow shaft inside the Great Pyramid (made during Pyramid building), going through Pyramid from king's chamber to its South side, is directed to bright star of Orion Belt in its culmination at that time, about 4500 years ago, when Orion was called Hayk constellation (by name of famous Armennian King Hayk, about 2493-2444 BC);

- Another the same type shaft going from queen's chamber is directed to Sirius (which is near Orion) culmination point (at that time) and its inclination angle is 39.5° which is exactly equal to Carahunge latitude. This can be so only at latitude 30° where the Great Pyramid was built;

- In Stonehenge the inclination angle of the Sun at equinox days noon is also equal to about 39.5° which is latitude of Carahunge. This can be so only at latitude 51° where Stonehenge was built;

- Callanish was built on latitude about 56° which is approximately North Polar Circle for Moon; Old Observatory in Egypt (near Asuan) was built on latitude about 23.5° which is close to North Tropic Circle for the Sun;

- The word "Stonehenge" is the same as "Carahunge" because "car" in Armennian is "stone" and "henge" (the word which is absent in English) is very close to "hunge". So Stonehenge means the same "Speaking (singing) Stones";

- The word "Callanish" is very close to Armennian word "Carenish", where "car" is "stone", "nish" is "sign". So Callanish means "Stone Sign", "Stone Symbol". The island where Callanish was built is called "Lewis", which in Armennian is "light";

- Carnac in Brittany (France), the name of which in old Briton language was written as "Carnikh" or "Carnish", is the same "Stone Sign". The same means Carnac in Egypt;

9. These above mentioned facts (there are also others) tell that analogies between Carahunge and other old monuments are not accidental, which means that almost all old monuments were planned in one "Original Brain Centre", in Armennia. For what purpose?

There were two main purposes:

- the first one was to perpetuate the Great Scientific Discoveries. The Great Sphinx was built (about 12000 years ago) in honour of Precession phenomenon discovery, and Great Pyramid and Stonehenge, as well as Callanish and Asuan, were built in honour of Earth ball-form discovery;

- the second purpose was the great and noble mission of Armennian civilization - to civilize other tribes and nations. Armennians were never aggressive. They were kind and gifted knowledge bountly and unselfishly as their Main God AR gives life.

10. There is a line of almost the same old legends of many nations (as Sumerians, Egyptians, Greeks, all nations of Central America) telling that in

very old time came white and bearded kind Gods and taught them to be kind, do not make human sacrifice; they knew everything and taught them knowledge. The name of leader of Gods who came to Sumer was Ovannes, which is Armennian male name. Armennia gave knowledge to Sumer, Egypt, Babylon, Crete, Mycena, Delphi, Greece, Iran, India etc. (see PART 3);

11. My present research of Carahunge is the first and, of course, it is necessary to continue it. I am sure Carahunge is very interesting and complicated object and many new results will be achieved by many other specialists: astronomers, geologists, historians and archaeologists.

12. Carahunge belongs to all mankind as a certification of its high knowledge coming from very old times.

P.S. According to the Government decision No 1095-n of Republic of Armenia, dated 29 July, 2004, the old stone Monument near town Sisian in Armenia is named "Carahunge Observatory".

This Decision is affirmed by the President of Republic of Armenia Robert Kocharian at 11 August, 2004.