Estonian Literary Museum & Tartu Observatory

CULTURAL CONTEXT FROM THE ARCHAEOASTRONOMICAL DATA AND THE ECHOES OF COSMIC CATASTROPHIC EVENTS

Abstracts submitted for the SEAC 2002 Tenth Annual Conference, 27–30 August in Tartu, Estonia

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Tartu 2002

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18.00 Coffee break (presentation of art exhibition)

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SEAC 2002

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SEAC 2002

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22.30 Demonstration of stellar sky
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SEAC 2002

30 August, Friday

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Albert M. Chechelnitsky *Horizons of Physical Eschatology: Lost and New Knowledge about Antiquity and Fate of Man and World*

Demeter Ianos, Z. Maxim, T. Oproiu, I. Csillik *Some Thoughts on Christian Churches in Transylvania*

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SEAC 2002

EXCURSION TO SAAREMAA

31 August – 1 September
The colloquium of SEAC 2002 will be followed by a two-day excursion to the beautiful island of Saaremaa in western Estonia. There will be no extra charge to take part in this trip. However, the accommodation (appr. 20 EUR or in tents) and food will have to be covered by the participants themselves.

The most extraordinary geological marvel on Saaremaa is **Kaali meteorite craters**. The latest estimates date the falling of the meteorite back to the first half of the first millennium B.C. and it has left its clear traces not only in the landscape, but also in folklore (Edda, Kalevala) and written sources (Pytheas, Scandinavian sagas).

The meteorite with a mass of 20–80 t fell from the east at an angle of 45 degrees at a speed of 15–45 km/sec. By passing through the atmosphere the meteorite heated and broke into pieces at an altitude of 5–10 km, falling to the Earth as a meteorite shower. As a result, the main crater, 110 m in diameter and 22 m in depth (Kaali lake) and at least eight smaller craters were formed. Apparently, at one time the main crater was surrounded by stonewalls dating to 600 A.D., and it is believed that it was a place of worship and pilgrimage.

For more information about the sights visited, see http://www.saaremaa.ee.

31 August, Saturday

8.00	Departure from Tartu
12.00	Ferry trip to Saaremaa
13.00	Visit of Pöide St. Mary's Church, hillfort and medieval castle ruins
14.00	Lunch in Kuressaare, capital of Saaremaa
15.30	Excursion to Kuressaare castle
17.00	Visiting Võhma pre-Roman period stone grave, and Panga bluff
19.00	Trip to Koguva village in Muhu island
20.00	Dinner in Koguva village in Muhu island

1 September, Sunday

7.30	Breakfast
9.00	Visiting Asva fortified settlement, Tõnija stone grave and cult place, Valjala church and stronghold and the Kaali meteorite craters
13.00	Lunch in Kaali
14.30	Visiting Kaarma stronghold and church, and Viking age cemetery at Piila
17.00	Ferry trip to mainland
20.00	Arrival to Tallinn
23.00	Arrival to Tartu

CONCERT BY URMAS SISASK

Composer **Urmas Sisask**, born on 9 September 1960 in Rapla, graduated from the Tallinn Music Secondary School in 1980 and from the Tallinn State Conservatory in 1985, the class of composition of René Eespere. Sisask has uniquely combined his love for composing and interest in astronomy. In the tower of an old castle in Jäneda he keeps a musical observatory-planetarium (the planetarium was opened in 1996 and the observatory finished in 1998), where a large part of his output is created and where he holds many concerts.

Already in his early years, Urmas Sisask was keen on astronomy and in its connections with music. This deep interest is reflected in his first larger works *Starry Sky Cycle* ("Tähistaeva tsükkel", 1987) for piano, *The Pleiads* ("Plejaadid", 1989) for piano, *The Milky Way* ("Linnutee galaktika", 1990) for two pianos and *Andromeda* ("Andromeda galaktika", 1991, for eight hands) for piano.

According to Sisask, the Universe is a giant organ created by God. The Galaxies, the stars, the planets etc are the pipes of this organ and **this** is his **work** and **credo**. Getting to know the harmony of this musical instrument of the Universe and making it audible to people is his **mission**. Hereby he does not think of himself as a composer, but more as someone who merely writes this music down.

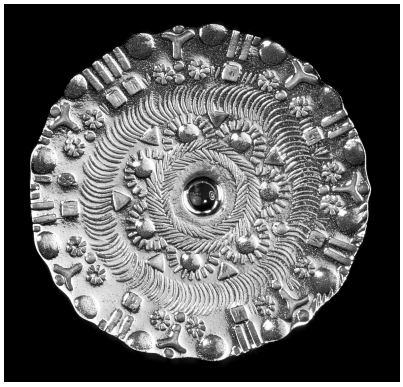
Another aspect of the composer is visible in his sacred music. The 24 sacred songs under the title *Gloria Patri* (1988) have become extremely popular. Urmas Sisask is probably better known for his choral pieces. In contrast with the bustling modern life, this simple, sincere and tender sound world appears as if it really has come from another Galaxy.

More information about the composer Urmas Sisask and his wonderful work in English:
http://www.emic.kul.ee/InglE/composers/Sisask,%20Urmas.htm
http://www.zzz.ee/edition49/composers/u_sisask/

Information in Estonian:
http://hot.ee/janedakodu/page4.html

EXHIBITIONS

I. HER DREAMS. Kärt Summatavet, born on 27 November 1963, graduated from the Metal Art Department at the State Art Institute of the Estonia in 1987. She is currently an assiciate professor of the Department of Metal Art of the Estonian Academy of Arts. Since 1985, her graphic works and finery have been exhibited in galleries of the USA, UK, Germany, Russia, Finland, Norway, Poland and Slovakkia. The artist has been portayed in the film *Touch* ("Puudutus", 1994). Kärt Summatavet's MA thesis concerned the female world view and its depiction in traditional applicational art and was in the form of an exhibition. In 1998, Kärt Summatavet became the first Estonian Doctor of Art student, at Taideteollinen korkeakoulu (UIAH), Helsinki, Finland.



In her works, the artist makes use of Estonian and Finno-Ugric mythology and folk art. The influences come, one the one hand, from lullabies that describe the child her future life and teach the wisodm of ancestors, and, on the other hand, from Estonian brooches and the idea expressed by an old Setu singer: "My brooch is so old, my mother's voice is in it."

The current exhibition displays her graphic works that are strongly influenced by Finno-Ugric mythology.

Read more about her career and work:
http://haldjas.folklore.ee/rl/pubte/ee/kart/
http://haldjas.folklore.ee/rl/pubte/ee/kart/cv.htm

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II. ROCK ART. Loit Jõekalda (born 16 September, 1951), freelance graphic designer, graduated from the Art Academy of Tallinn in 1980. His graduation work was a photo album of Finno-Ugric peopels. Experience in serigraphy, computer graphics, photography and design. Member of the Estonian Artists' Association and the Association of Estonian Printmakers since 1992, also member of the Estonian Prehistoric Art Society. Exhibitions since 1976, both individual and with Virge Jõekalda, in Estonia, Finland and France.

The Fenno-Ugria 2003 calendar includes his photos of rock art locations in Finno-Ugric and near-by territories (Lake Onega and the White Sea in Karelia, Umba and Ponoi Rivers on the Kola Peninsula, Atla in Norway, Hossa and Saraakallio in Finland, palaeolithic caves in the Sout Urals, the Tom River and Hakassia in Siberia).

His current exhibitions are *Human and Animal* (in Hermitage, St. Petersburg, till 26 August), *The Magic of Prehistoric Art* (in Finland, Hämeenlinna Cultural Center, till 1 September), and an overview exhibition of the material (photos, frotage and gypsum copies by Loit Jõekalda, Väino Poikalainen, Eve Selisaar, Ruth Treimut) collected by the Estonian Prehistoric Art Society (in Tallinn, Institute of History).

In recent years he has had various exhibitions on prehistoric art and graphics. In the frotage copies and serigraphic works he has used motifs from prehistoric art and united in them traces of different times and places, attempting to thus imagine possible structures and to maintain stability without exiting the central point of endess opportunities.

More about his works:
http://www.obs.ee/~emts/pildid/Loit_Joekalda.html
http://www.estograph.ee/autorid/loit/autor.html

loitj@online.ee

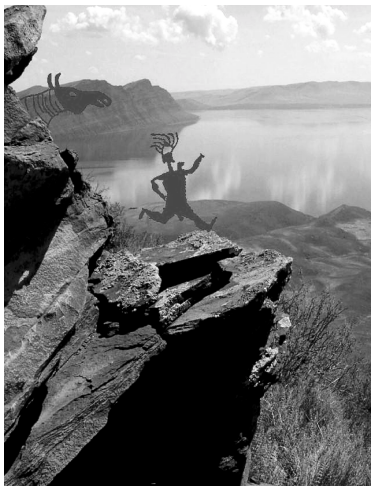
III. WHAT DID ROCK CARVINGS LOOK LIKE IN PREHISTORIC TIMES?

Erkki Luoma-aho

There are two different types of prehistoric rock art: carved or painted images. Rock paintings are usually situated in caves or on vertical cliffs that are protected from above by a shelter. Rock carvings, on the other hand, can usually be found on horizontal or only slightly inclined surfaces.

These two categories of art do not have any clear mutual connection. It is not known why only paintings and not a single carving has been found in Finland while the eastern areas, just beyond the present-day border, are rich in carvings, but there are no paintings found there. Both carvings as well as paintings can be found in areas to the west of Finland.

The depth of incisions of rock carvings may reach 0.5 cm, but usually they are only 1–2 mm deep. Therefore they can only be seen with a favourable oblique light. The sites of rock image were probably holy places for prehistoric societies. This theory is supported by the archaeological findings, although the poor visibility of carvings contradicts this statement to a certain extent. However, those that can be enhanced by the light of the setting sun usually form a unique sight even today.



At some sites (for example in Scandinavia) rock carvings have been overpainted with red ochre to make them clearly visible to visitors. Some traces of ancient paint provides evidence that rock carvings were also originally painted, but the pigments have faded away on horizontal or inclined surfaces over the course of time.

With the material exhibited here I have attempted to show how rock carvings may have looked just after their creation. The colours I have used – red, yellow and orange – are the most widespread colours used in prehistoric rock paintings. The painters of that time used fat, blood and egg protein to fix the pigments. I have composed my painting using a more modern technique: Photoshop software and a colour printer.

I took the pictures myself for this exhibition called “Elks and Men – Rock Art from the Alps and Siberia” during my visits to the Tom and Yenisei rivers in Siberia in 2000 (sites: Tomskaya Pisanitsa, Tutalskaya, Novoromanovskaya, Sulekskaya, Boyarskaya, Oglakhty, Kazanovka) and to Val Camonica (sites: Bedolina, Luine, Foppe di Nadro, Nquane, Paspardo, Sellero) in the Italian Alps in 2001.

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Dear participants of the Xth Annual International Conference of SEAC !

A small volume you hold in your hands is a collection of Abstracts submitted to the Scientific and Local Organizing Committee of the Meeting organized jointly by the Society for European Astronomy in Culture (SEAC), Estonian Literature Museum and Tartu Observatory. This publication including also a Scientific Programme and the List of Participants of SEAC-2002 Meeting can be regarded as a prelude to the four day long colloquium "Cultural Context from the Archaeoastronomical Data and the Echoes of Cosmic Catastrophic Events" to be held in the University town Tartu, August 27–30.

At the same time this is an outcome of the long lasting serious organisational efforts undertaken jointly by the authorities of SEAC and a small group of enthusiastic researchers from both our institutions.

A formal decision adopted in March of the last year by the Executive Committee of SEAC to convene the first in its brief history jubilee Annual Conference in Estonia was warmly welcomed by the small scientific community in this country, notably by astronomers, ethnographers, historians, archaeologists and artists. The early studies in the field of ethnoastronomy in Estonia date back to the 17th century. In the last century systematic research in paleoastronomy and ethnoastronomy were inextricably connected with the names of two great scholars and enthusiasts of popular astronomy in Estonia Paul Prüller and Heino Eelsalu. It is a good omen that at the very start of the third millennium an old University town Tartu has been chosen as a site of this prestiguous and truely interdisciplinary scientific forum gathering researchers from more than ten European nations and beyond. We hope that a new generation of young researchers in Estonia will be inspired by the SEAC-2002 Meeting and ensure the continuity in this exciting and promising field of scientific and cultural pursuit.

We wish you fruitful discussions and hope that a cosy, intimate spirit of our old town will stir your imagination and creativity for the benefit of international scientific cooperation in archeaoastronomy and ethnoastronomy.

Krista Aru, Director of Estonian Literature Museum
Laurits Leedjärv, Director of Tartu Observatory

Scenes of the Cosmic Hunt on Early Iron Age Wares From the Northern Sub-Urals

Lidia Ashikhmina

The archetype of the myth of the cosmic hunt, the elk's theft of the sun, and the celestial hunter-bear, known from the myths of Siberian peoples, was reconstructed based on the folklore materials of the Komi people by the ethnographer N. D. Konakov. He also analyzed and reconstructed the binary zoomorphic hunting calendar showing the division of the year into two seasons. In this connection recent findings of clay, stone and sometimes bone spindle whorls in multi-layer hill-forts in the basins of the Kama and Vyatka rivers might be of interest to us. These have usually been associated with the Ananyino population of the Early Iron Age. According to their world-view the spindle whorl was related to cosmic order and to female image. The spindle whorl proper was associated with the sun.

Sometimes they display ornamentation. Their surface may be covered with solar signs: concentric circles, radial lines, spirals. Images of animals, often stylized, also occur. Of these the elk (reindeer) is the most readily recognized. Contours of animals are placed in a circle and are shown either in motion, or oppositionally, in a static position. These images are evidently the symbolic elements of an ancient calendar and reflect various spatial directions (east-west), the opposition between night and day, sunrise and sunset, the seasons of the year (spring-summer, autumn-winter). Additionally, there are also articles with images of the elk expressing the same idea. Some articles also have numerical symbols. Earlier plots refer to the Early Iron Age (Ananyino findings from Vyatkan hill-forts) and may be considered as scenes of the cosmic hunt. The surfaces of some spindle whorls are divided into two halves by clear-cut line. Each part has various contours of animals either in movement or static. Evidently this illustrates the binary zoomorphic code and division of the year into two seasons: spring-summer and winter-autumn. A number of metallic articles with analogous symbols came from archaeological sites discovered in the Vychegda and Pechora basins. Some of these images depict solar as well as lunar symbols.

Perhaps in ancient times some type of rituals were dedicated to commemorating the cosmic events. Possibly something like this might have been the case in the Vomynyag sanctuary (in the basin of the upper Vychegda) where we find six holes on a hill (four holes – a dipper of irregular form, two holes – a handle) that presumably symbolize the Big Bear constellation. They are joined by a big hole opening up from the reservoir side. These are perhaps the remains of constructions related to an ancient calendar system and actions depicting the theft of the sun by the elk.

Thus, the analysis of spindle whorls and other articles on the basis of solar-lunar symbols demonstrates how they might reflect an early mytho-poetic conception of cyclic time as related to the binary zoomorphic code and the division of the year into two seasons. They contain ideas on the various parts of the day and parts of the world.

Micro History in “ Basatanya I”, a Copper Age Cemetery

Katalin Barlai

Even in today’s over civilized times love and death and thus wedding ceremonies and funeral practices retain some supernatural aspects characteristic of early communities. Because of their daily proximity and interaction with nature, almost every activity of prehistoric people was guided or influenced by supernatural forces.

The population that used the Basatanya I cemetery in the Copper Age observed the custom of orienting the graves of their deceased in a W-E direction. The direction of the setting sun occurs over a specific part of the horizon between midsummer and midwinter. The length of this interval depends on the geographic latitude of any given site. We can examine the distribution of grave orientation with respect to just this interval.

Basatanya is one of the many well-excavated and well-studied cemeteries where, apart from the recording of the inventory of grave goods, precise measurements of the orientation of the graves have been made. Wherever the state of the skeletons made it possible to do so, the age, sex, social status, history of individual sicknesses as well as anthropological types have also been determined.

In correlating anthropological type with the orientation of the grave it proved to be a conspicuous fact that members of one ethnic group, Protoeuropid men, buried with rich grave goods, almost exclusively were interred in a narrow band (± 2 deg) around the W-E direction of the equinoxes. Further afield they are represented in the close vicinity of the W-E direction, within an ± 8 deg azimuth interval, as well. My suggestion is that this group of the population enjoyed a privileged status within the community.

The statistical weakness of this procedure lies in the fact that, out of the 75 graves of the Basatanya I period, the precise orientation could be determined in only 61 cases and anthropological analyses were successful in no more than 28 cases. Taking into consideration other significant features and circumstances (eg. the number of children, whose anthropological type could not be determined) the reliability of the present hypothesis might well be subject to doubt. If the hypothesis, however, proves to be true, light might be shed on some layers of complexity in a small prehistoric community.

Astronomy in Kazakh Folk Culture

Nyssanbay Bekbassar

This work is devoted to the review and ethno-astronomical analysis of published data of the astronomical knowledge (beliefs) of the Kazakhs, one of the representatives of the Turkic language group. The study of the folk culture of the Kazakhs began in the middle of 19th century. The first data about astronyms, myths and legends of this people are contained in the works of A. G. Potanin and Ch. Walihanov, two researchers and travelers in Central Asia. Calendar notions are described by V. V. Radlov, B. A. Kouftine and A. Divaev. Kh. Abishev, a teacher of astronomy in the middle of the past century, conducted the most recent research in this field. The research, essentially ethno-astronomical in nature, demonstrates that even as late as the 1950's, astronomical practices were still widely used in the economic life of the Kazakhs.

Currently, the author of this article is making an attempt to resume the collection of information on the astronomic notions of the Kazakhs, and to evaluate its current state. Concomitant is a comparative ethno-cultural analysis of the astronomical notions of the Turkic and Mongolian peoples.

The analysis demonstrates that Kazakh astronyms are of the general Turkic type and are of the type not found among any other people. The influence of Arabic and Persian astronomy is evident only in calendar names of the zodiacal months and the days of week. An interesting fact is the transfer of the Persian name for the zodiac constellation Libra to the Orion Belt (Tarazy) and the Arabic name of the constellation Virgo to Sirius (Sumbile). Consequently, they, along with the Pleiades (Urker), have became the symbols and the astronomical signposts for appropriate periods of the year that play a considerable role in the cattle-breeding and agricultural life of the Kazakhs. At the same time, Kazakh (more broadly – Turkic) astronyms influenced the formation of a number of Russian astronyms.

A good knowledge of the sky is evident from the fact that heavenly bodies have played an important role in the life of the Eurasian nomads. At the same time, according to the existing ancient tradition of the Turkic and Mongolian peoples, worship of the sky, Tengri (Eternal Blue Sky), and starry heaven were seen as dictates for the entire visible world. No phenomenon under the skies could occur without the stars' knowledge. So, at the birth of a man a star lights up in the sky, and on his death it falls down. For this reason, the Kazakhs upon seeing a shooting star, pronounce aloud "my star is higher". A happy man is called "a man with a star". The best wishes for a man are as follows: "May your star flare up", "May your star never go out". The blessing: "May the stars appear on the left, and the Moon on the right", reflects the movement of heavenly bodies in the world inhabited by man, namely, when facing the south (the primary orientation in ancient Turkic tradition), the stars and the Sun rise on the left, and the young Moon is engendered on the right. The steadfastness of the world is represented by the immobility of the Polar star, and the eternal rotation of the two is linked to swift heavenly horses that go around it.

The starry sky also managed the daily life of the nomads. They oriented themselves by the stars when traveling long distances at seasonal migrations, they identified the time at night, and used it to determine when tasks associated with cattle-breeding and agriculture were to take place. In the Kazakh calendar there exist certain periods that have a special ritual and economic significance. According to the state of weather at these particular moments they could predict the weather for other periods of the year, or even for the whole year in general. Some of these period coincide with the heliacal and achronal rising/setting of the Pleiades, Orion and Sirius. The appropriateness of the

movements in the night sky and relationship between the positions of various stars and the state of the environment are enumerated in the form of “sky rules”. For example, “Three groups of stars rise during three months and set within one month”, “Urker has gone down on the Earth, the cattle are filled up with grass, people are filled up with milk”, “Urker has risen – soup becomes nutritious”, “Tarazy has risen – the morning becomes cool”, “Sumbile has risen – water gets cold”.

A peculiarity of the calendar system of the Kazakhs and some of the Turkic and Mongolian peoples is manifested in a star calendar based on the sidereal period of the Moon. The landmarks are the well-known star cluster of the Pleiades and the constellation of the Lions.

Star themes are widely attested in Kazakh folklore. Myths and legends are devoted mainly to Ursa Major, Ursa Minor, the Pleiades, Orion, Jupiter and the origins of the 12-year animal calendar.

On the Megalithic Monuments of the Eastern Mediterranean: New Perspectives

Juan Antonio Belmonte

The megalithic phenomenon spread through extensive areas of Europe and nearby regions from the fifth millennium BC onwards. Since the beginning of field research in this area, the monuments associated with the phenomenon (essentially dolmens and cromlechs) were studied from the archaeoastronomical point of view in an attempt to establish relationships between the stone orientations and the heavens. In this respect, extensive surveys have been made in the western Mediterranean region and north-western Europe during the last ten years. However, the megalithic phenomenon also produced important groups of monuments in the Levant, ancient Thrace (the south-east of Bulgaria, a European Turkey) and the Caucasus region, places where dolmen-like structures are very common.

Some fieldwork has already been conducted on several dolmen groups dating from the late fourth or early third millennium BC in the area of the Jordan Valley. These exhibit customary orientations that can be associated with astronomy as well as sacred topography. One such custom could well be related to one used in contemporaneous megalithic monuments of Ancient Egypt during the Old Kingdom, the pyramids. In addition, a preliminary analysis of published data on the dolmens of the northern Caucasus region, erected *circa* 2000 BC, seems to demonstrate, if not for all of them then at least for many, an astronomical intent in the orientation of a vast group of monuments there.

Another important area for megalithic phenomena is ancient Yemen where, apart from some impressive cromlechs and stone rows, we have the megalithic temples of the Sabean civilisation. This culture dominated the region known as Arabia Felix for 2000 years, before the Revelation and the general conversion of the Arabian peninsula to Islam in the seventh century AD. Good quality plans of several of these monuments have been published in recent times based on the work of a few teams of European archaeologists during the 1990's. An analysis of these plans shows that several of these temples could be orientated with the Moon (or Venus), the Sun and the stars, specially with Canopus. Curiously, these are the same orientations that we have found in Petra and which have also been reported for the sacred Ka'aba in Mecca.

All these initial results clearly suggest that extensive archaeoastronomical fieldwork in these areas is warranted as an important task for the future.

Problems in Minoan Archaeoastronomy

Mary Blomberg, Göran Henriksson

In our study of Minoan orientations we have found that the majority of monuments were placed in relationship to major celestial events. For example, in the Middle Bronze Age, when the following monuments were built, the major axis of the peak sanctuaries on Petsophas and Pyrgos (Maleviziou) were both oriented to sunrise at the summer solstice while the east-west orientation of the ceremonial rooms of the palace at Zakros was to the southern major standstill of moonrise.

However, there are a few major buildings that seem to have been oriented to other celestial events, which, although not major, can still be understood to have had important calendric significance. For example, the palace at Mallia and the large villa southwest of Knossos have the same orientation and this is to the sunrise one lunar month before or after the equinoxes.

Our results from these buildings, from the two peak sanctuaries on Vrysinas and Gonies and from the remaining monuments in our project will be presented and discussed. This will conclude our archaeological study of Minoan Crete.

The results of our study provide the basis for a number of conclusions as to the nature of Minoan astronomical observations, the Minoan calendar, Minoan use of astronomical knowledge for navigation, Minoan influence on the Mycenaean and the later Greek calendars, the differences between Minoan, Babylonian and Egyptian astronomical knowledge, etc. We will summarize these briefly.

Does Boötes Drive an Ox-Drawn Wagon on the Minoan Star Map?

Peter E. Blomberg

When understanding today's map of stellar constellations there is a problem with the names of some northern constellations. One of the problems is that Boötes, the Ox-driver has a Bear nearby on our modern map. However, when we study the first European description of the night sky, in Aratos c. 275 BC, Boötes has a wagon but no oxen nearby. In many popular cultures we find various names for the constellation we call Ursa Major. No European folk culture named it the Bear; it is normally understood as a wagon driven by oxen or oxen only. In some northern European cultures Ursa Major was seen as an Elk. This paper will discuss the possibilities that earlier Greek cultures saw the Big Dipper as a wagon driven by oxen or as oxen only. The discussion is mainly based on literary sources from Greek and Roman times. It will also discuss why the two constellations close to the North Pole and to Boötes became known as Ursa Major and Ursa Minor.

When Aratos describes Boötes in relation to the surrounding constellations he says that he comes, "like a man driving" (Ar. 91). Later, when he describes the motion of the stars and constellation he says "No more will Boötes bulk large above and below horizon, the lesser part being above, and greater already in darkness. It takes four signs of the Zodiac together for the Ocean to receive Boötes' setting. When he is sated with daylight, he occupies more than half the passing night in the loosening of his oxen, in the season when he begins setting as the sun goes down. These nights are named after his late setting." (Ar. 581–585). The Greek word used for loosening his oxen is βουλυτός a noun formed by βους 'ox' and λυω 'to set loose', 'unyoke' etc., it is normally understood as indicating the point in the day when it is time to unyoke your oxen, i.e. the late afternoon or evening. However the original meaning must be to loosen the oxen from their wagon or plough.

Our problem here is that Boötes begins to set in the evening for some weeks only and thus this would indicate a time of the year. It would have happened in late October and could indicate the beginning of the winter season, but Aratos does not use Boötes' setting for that purpose.

He uses βουλυσίος for indicting the time of sunset once (Ar. 825) in the same way as Homer did twice. That they mean sunset is clear because Helios is mentioned as unyoking his oxen (The Odyssey IX 58, The Illiad XVI 779). The expression is not used by any other Greek author writing on astronomy. In Aratos we have the strange combination of Boötes with the expression unyoking his oxen. It may be an old folklore tradition Aratos refers to in this passage, indicating that in popular belief Boötes had one or several oxen that pulled the Wagon. This tradition would fit those in many surrounding cultures and seems most logical.

It must also be noted that the same expression is used for Helios, the sun, even if the pictures we have of Helios carried over the sky show him pulled by horses. This could indicate the age of the tradition, i.e. it would be from before horses were introduced into the Greek hemisphere.

This discussion of Boötes and the constellations surrounding him today and during Minoan times will the be compared with the meaning of Arktos in Homer and other early Greek authors. The aim is to explain how our modern star map was formed in the very beginning.

Abbreviation:

Ar. = "Aratos Phaenomena", see e.g.: Kidd, D. 1997. "Aratus Phaenomena". Cambridge Classical Texts and Commentaries, 34. Cambridge.

Ancient Armenian Astroarchaeological Monuments: Personal Impressions of Metsamor and Carahunge

Nikolai Bochkarev

In June 2001 the author had the pleasure of visiting two monuments erected by the ancient inhabitants of the present territory of the Republic of Armenia. These are (1) Carahundge (Carenish), first interpreted as a possible archaeoastronomical monument in the middle of the 1980s and now subject to enthusiastic investigation by Prof. Paris M.Herouni, Director of the Institute for Radio Measurements (Yerevan) and full member of the National Academy of Science (NAS) of Armenia, and (2) Metsamor, the astronomical meaning of which was revealed in the 1960s by Mrs. Elma S. Parsamian, an astronomer from Byurakan Astrophysical Observatory and now a corresponding member of the NAS.

The author is in all probability the first professional astronomer outside Armenia who has ever visited Carahunge. The site is located 3 km from the city of SiSian (in the Eastern part of the Republic of Armenia and 200 km from the capital, Yerevan) at the Eastern slope of Zangezur Ridge, 1770 m above sea level at 39.5 deg. North latitude and 46.0 deg. East longitude. It is part of a larger neolithic site dating from the third/second millennia BC with many dolmens and similar features. The monument consists of more than 200 vertical 1–2.8 m high megaliths of considerably varying form (P. Herouni with co-workers counted and described 222 main stones). Some of the stones (no more than a quarter of the total) have fallen to the ground.

The central area of the monument resembles Stonehenge. It is oval in shape, 35.46 m in diameter and formed by 39 or 40 stones. A corridor of stones goes from the oval in a north-easterly direction. In the center of the oval there are ruins of a dolmen-like structure (5.7 m in height). Long straight lines of rocks run in a precise north-south alignment from the oval. The distance between the ends of the lines is about 400 m. The northern line is limited by a path marked by a few stones running in an east-west direction. The farthest part of the southward line curves to the south-west and terminates near several burial sites. The main peculiarity of Carahunge consists of the holes found in the upper part of the rocks opening in the thinnest part of the little flattened stones.

Intact stones with holes are found only in the south and northward rows. Out of about 150 rocks forming the lines, 75 are holed. The absolute majority of the holed stones have only one hole that goes all the way through the stone with an occasional incomplete one. A considerable number of the holed stones are damaged being broken off across the hole. We found no standing stone to contain a hole in its lower part (at least below the middle of the height) nor any complete or incomplete hole located in the middle area of stones even when that part was not really thick.

The holes are completely cylindrical in shape with a rather smooth inner surface. They are 5–6 cm in diameter, and range from between 7–8 to 15–20 cm in length. Each hole “begins” in the center of a broad roughly cut recess of quasi-spherical shape, about 20 cm in diameter and 3–5 cm in depth and “comes out” in the center of a similar depression on the opposite side of the stone.

The completed holes in the standing rocks are oriented to different azimuths and as a rule stand at a rather low elevation above the local horizon. Of the 47 holes with a measured orientation only 13 have an elevation of more than 16 deg. Ten of them have an elevation ranging from 17.5–24 deg. three towards the East, five towards the West, one towards the South and one towards the North; the other three elevations are of 33, 50 and 90 deg. respectively.

The last case is one of three examples of stones where the hole begins horizontally but is turned

at a right angle in the middle of the stone itself towards the zenith. Volcanic glass mirrors are believed to have initially been located in the corners (there are many pieces of this mineral of the proper size in the local soil).

The author, accompanied by P.Herouni, his collaborators and two students from Moscow, spent the whole of 24 June, 2001, that is, two days after the summer solstice, on the spot from about 5 AM until midnight, and was able to observe and record with his personal video camera the rising of the Sun and the Moon. He witnessed that three or four of the holes are directed towards the point of sunrise while an equal number of other holes are oriented towards the point of sunset on the day of the summer solstice. The same is true of the points of the moon rising and setting on the day when the observations took place.

Carahunge can be seen from the nearest motor way, at a distance of a kilometer from the monument and is rather easily reached for the most part by cars and therefore is often visited by the local inhabitants and even by tourists from outside Armenia. We met five or six individuals and groups (a total of about three dozen persons) during our visit. Cultivated fields are located very close (about 100 meters or even less) to the monument.

Consequently, one of the main urgent tasks now is to find and put into practice measures to protect the monument from possible damage. These should be swiftly and easily implemented and be effective under current conditions.

The hills of the Metsamor neolithic site are located near the waterlogged bed of the small Metsamor river in a semi-arid part of the Ararat valley a few kilometers from an atomic power station, at a distance of about 35 km south-west from Yerevan, the capital of Armenia. Making use of the car supplied by P. Herouni, the author, accompanied by E. Parsamian, paid a short visit to the local archaeological museum located just on the hills. The museum consists of a nice exposition of artifacts from the fifth to first millennia BC uncovered during local excavations as swell as a small hill ("number 3") where "astronomical" rocks are located. These were discovered, investigated and described in scholarly publications by Prof. Elma Parsamian. Acting as a guide, Prof. Parsamian personally showed to the author the rocks and petroglyphs, related the history of her discoveries and gave explanations of the astronomical roots and meaning of the petroglyphs. The author made amateur-quality video-recordings of her on-site lecture.

About 25 minutes worth of shots from the above-mentioned on-site original video-recordings of the two monuments together with the main researchers at the site of the monuments and their personal explanations (in Russian) will be shown and commented on by the author. They will form the main part of the presentation, which will be supplemented by a number of overheads with schemes and tables as well as by oral explanations.

The Heritage of Anceint Global Civilization: Discrete Structures and Great Belts of Megalithic Sites (Observatories)

Albert Chechelnitsky

We present astrophysical proofs and conceptual arguments for the existence of a very advanced (in the intellectual sense) Ancient Megalithic Civilization (AMC).

The essential aspect of AMC is its Global character – its traces stretch out over the World, at least throughout all the Northern Hemisphere. A no-less important aspect of the Global Civilization is the physically distinguishable discrete character of unique quanta (measure) in the linear dimensions of megalithic astronomical sites.

We discuss the challenging problem of why the creators of AMC constructed such grand but "useless" ("non-profit") structures?

With the concept of the Wave Universe the author examines such problems from a variety of unique general positions – it was an attempt to come to terms with life in a radically evolving, sometimes, catastrophically changing world.

Many extremely important aspects of the Problem "Cosmos-Earth-Man", and Physics of the Universe and Cosmology, by being put into scrutiny the relationship between objects of the micro- and mega-world have found an answer within the framework of the Wave Universe Concept. The WU Concept suggests that arbitrary systems not only of the micro-world, but also giant astronomical systems of the mega-world as well possess a general fundamental aspect (property) – all these dynamic systems, in principle, are WAVE dynamic systems (WAS). If Quantum Wave Mechanics describe the wave structure of objects of microscopic scale, then Megaquantum Wave Astrodynamics (see Chechelnitsky,1980–2002) analyse and emphasize the MEGAWAVE structure of giant astronomical systems such as the presence of waves and rhythms of large length and periods in planetary and galactic systems. The effectiveness of this essentially fundamental new approach is argued for in many Hot Points of Physics and Cosmology (see physics/0102036) – from the analysis and discovery of the mass spectrum of the neutrino (physics/0103066) to the red shift spectrum of extremely distant quasars (physics/0102089).The true physical structure of the universe in both large and small scales can be understood only within the context of the theory of Wave Hierarchy, discreteness, commensurability, quantization.

A careful examination of the inheritance of the past, in particular megalithic astronomy**,** indicates some properties, which in terms of the level of understanding they were able to achieve may be qualified as a manifestation of discreteness, commensurability, quantization of symptomatic properties of the wave dynamic system (WAS).

In this connection, some questions arise:

1. What does the manifestation of such properties in archaeoastronomical monuments signify about the evident complexity of megalithic geometry?

2. To what extent is the demonstration of complexity in ancient monuments purposeful? Is the choice of their characteristic discrete modula, sizes, quanta that their creators used accidental or by design?

3. How significant or valid are the modula of discreteness discovered by some investigators (Thom, Broadbent, Kendall, etc)?

4. Why do some existing modula evidently have a unity and universality, that has been applied to various far-flung monuments?

5. How well did the creators of megalithic monuments understand the fundamental dynamic properties of the Solar system?

6. What was the theoretical base and fundamentals of such understanding?

7. What indeed did the giant monuments of the ancient World (henges, temples, pyramids, etc) signify. Why were they constructed, what were the aims of their creators? What were they meant to demonstrate and for whom?

8. What initially stimulated these enormous efforts? What did the ancient builders fear and what did they hope to achieve?

The Wave Universe Concept can provide answers that are true values, as well as suggest the nature and sources of the units of discreteness, commensurability and quantization, which the creators of megalithic sites over the world used.

Analyses from the point of view of the Wave Universe Concept of many of the astronomically important ancient monuments (in particular the complex and skilfully constructed egg-shaped Woodhenge, Stonehenge or Arkaim, the Pyramids at Giza or Teotihuacan) allows us to arrive at a clearer understanding of what the aims of their creators might have been and what might have guided these constructors, astronomers and priests thousands of years ago.

We also investigate the problem of localization of megalithic memorials on the Earth's surface. This reveals the existence of a concentration of astronomically significant objects or a Great Belt of megalithic observatories near the geographical latitude $\varphi = 51°$ N.

We will further go on to discuss the latent fundamental (and astronomical) sense of this phenomenon as well as the tendency toward functional and architectural simplicity and symmetry of the megalithic observatories (in the form of the Symmetric Mandala).

Finally, the possibility of the existence in the past of other extended concentrations or clusters of megalithic observatories in connection with other fixed positions with reference to the poles and the Earth's rotation is suggested.

The logic of investigation in cosmology, the search for truth in the understanding of the Universe is probably invariant in terms of the actual experience of time. That logic and the results achieved to date can suggest the directions to follow in investigations in archaeoastronomy.

All this can lead to a more adequate, deeper understanding of the heritage our predecessors have bequeathed us. Perhaps, through a consistent examination of ancient temples and myths and applying objective analyses based on advanced modern researches, we will finally succeed in toppling a very persistent mythologem of modern scholarship and science, that of the primitiveness of the people and the thinkers of the ancient pre-historic world.

Once Upon a Time There Was No Zero… The Evolution of the South-Eastern Mesoamerican Calendric Notational System

Albert Davletshin

One of the most remarkable innovations of the Ancient Maya was the invention of the positional, or place-value numeration, the so-called Long Count, and a special sign for denoting "zero". Being acquainted with the positional system from childhood, we are not aware to what extent this uncomplicated 'computing machine' makes our complex calculations easier. Nevertheless, some data cast doubt on the opinion that the Long Count as it occurs in the Classical Mayan inscriptions is a true positional system of notation at all.

The Long Count indicates an interval of time elapsed from a calendric day zero *4 Ajaw 8 Kumk'u* located in the distant past (c. 3114 BC). In all probability, the day *4 Ajaw 8 Kumk'u* was considered as the mythical starting point of the present era. The Long Count always follows the Initial Series Introductory Glyph (*tsiikha'b'* '[this is] the count of time') and consists of five glyphs, each with a numerical coefficient. The five glyphs denote units of time arranged in descending order: (1) *pih* = 20^3x18 days, (2) *win(ak)ha'b'* = 20^2x18 days, (3) *ha'b'* = 20x18 days, (4) *winal* = 20 days, and (5) *k'in* = 1 day. Even higher units representing multiples of *ha'b'* (20x18) and *winal* (20) are known. As reflected in these data, the Long Count is based on the vigesimal system with one exception 1 *ha'b'* = 18 *winal*-s. This deviation is not coincidental, because 360 closely approximates the solar year. Thus the Long Count is a device specially adapted to calendric calculations. In this connection it is pertinent to note that the number in the last position of the Long Count is responsible for the name of the day of the Sacred Round.

Pih, *win(ak)ha'b'*, *ha'b'*, *winal*, and *k'in* are translated as 'bundle [of years]', 'twenty years', 'year', '20 days', and 'day', respectively. After the Spanish conquest, the word *ha'b'* was applied to both the 360-day and 365-day years, and *winal* to both 20-day and 30-day units. Therefore, the Long Count is not a positional system in the strictest sense, because the value of a number is determined not only by its position, but by the following glyph as well. It is particularly remarkable that on Stela 5 from Pixoy the date 9.14.0.0.0 is written as 9.13.20.20.20, that is to say, the principle of place notation itself is violated. At the same time in the post-classical Codices calculations are given without units of time, that is, they represent a true positional system. In the Classical Mayan inscriptions Distance Numbers are written in reverse order with glyphs of time partially suppressed. In addition, there is one example of Long Count where glyphs of time are absent [Pestac Stela]. This constitutes evidence that monumental inscriptions were copied from manuscripts where the positional system was used. It is likely that there were two systems: (1) a place notation system, where calculations were carried out, and (2) a Long Count specially adapted for the recording of dates. In this respect it should be noted that the Sumerians, the first inventors of positional numeration, used it only for calculations, but the initial point and solution of problems were always given in the non-positional system. It is of interest that some solutions in the Dresden Codex are given with glyphs of time, for example: *pahtaj 15 win(ak)ha'b', 9 ha'b', 4 winik, 4 k'in, 9 O'l, 12 K'ana'w* 'it was obtained (lit. was made), 15 twenties of years, 9 years, 4 months, 4 days – [the day] 9 K'an, the 12th [day of the month] K'ayab'' [D49].

The Long Count was known outside the region of the Mayan Lowlands: Abaj Takalik, Kaminaljuyú, Chalhuapa, El Baúl, Chiapa de Corzo, Tres Zapotes, La Mojarra (Late Pre-Classical

Period), and Cerro de Las Mesas (Early Classical Period). The earliest example, which is damaged and incomplete, can be seen on Stela 50 from Abaj Takalik. The earliest solvable example [7](16).3.2.13 – 6 B'en [36 BC] is shown on Stela 2 from Chiapa de Corzo. Examples outside of the Mayan Lowlands never mention glyphs of time or, alternatively, they count only days, and represent a true place notation system of numeration. Furthermore, there are no round dates among them. This suggests that the tradition of erecting stelae, which commemorate Period Ending dates, came into being in the Mayan Lowlands in the Early Classical Period.

Another peculiarity of early dates is an absence of the sign "zero" and Distance Numbers counting backwards (Distance Numbers counting forwards are attested on the La Mojarra Stela and Kaminaljuyú Stela 10). The first example of the "zero" sign is dated 357 AD [Uaxactún Stela 18]. The inscription on Abaj Takalik Stela 5 suggests further interesting conclusions. There are two Long Count dates: 8–3–2–10–5–[damaged day sign] and 8–4–5–17–11–[damaged day sign]. It has been stated repeatedly that in this case the numbers of days are suppressed. However, a day sign without number has no sense, because position in the Sacred Round is determined by a combination of number and sign. By assuming that the last numbers correspond to days of the Sacred Round, one obtains 8.3.2.[0].10 – 5 [Ok] (102 AD) and 8.4.5.[0].17 – 11 [Kab'an] (125 AD). Therefore, "zero" is not specified in the inscription, and probably there was no special sign for "zero". All the above is in agreement with the well-known fact that in the Sumerian place value system a special sign for "zero" appears more than a thousand years after the invention of the system itself. It is apparent that the absence of "zero" in the Long Count did not prevent the Mayans from understanding inscriptions that had additional calendric information, neither did it pose any difficulty for calculations with figures that are aligned in a sequence.

On the Typology and Statistics of Anthropomorphs of Lake Onega

Enn Ernits

All in all some 131–133 astromorphs are known in the Onega region. The sites of Karitski, Peri VI and Peri III have the greatest number, including respectively 41…43, 34 and 28 petroglyphs. They make up 78.9% of the total amount. The silhouette carvings are the in majority throughout the entire region (113 carvings, or 85%). The fullest paradigms belong to this type in all groups. The reason for this may be the relatively late origin of the contour petroglyphs.

The disc- and crescent-shaped petroglyphs of Lake Onega have two parts: the body and rays. On the basis of the body shape, crescent-shaped (A), half-moon (B) and full-moon (C) carvings can be distinguished. The body points of the A-carvings may be connected by a line. The number 'I' indicates the absence of a connecting line. A straight or a zigzag line can link up the extensions of the points of the B-carvings' bodies. This phenomenon is marked as 'II'. The number 'III' denotes carvings with a specific design of the body. The letters 's' and 'c' stand for silhouette and contour petroglyphs accordingly. Figures with a peculiar jagged inner contour are also listed among contour petroglyphs. Astromorphs can have one to three rays but there are also carvings without rays. The Arabic numerals '1–3' represent the number of rays. The rays can be either detached (a) or connected with one another by a crossing line (a). One-rayed petroglyphs with a crossing line are also classified as belonging to the a-type.

If we disregard the difference between the contour and silhouette types (c + s), full-moon carvings are most numerous (max. 88, or 66.2%) and half-moon carvings relative rare (10, or 7.5%).The type with two detached rays I-2-a includes approximately a half (59, or 44.4%) of the total number of carvings. The type I-0 rates as second and includes 32...34 carvings without rays (25.6% out of the total number of the petroglyphs). Thus, two frequent types make up more than 2/3 of the astromorphs of the Onega region. The rest (7 types) are extremely rare.

Crescent-shaped figures (A) can be found throughout the area, although not on all the capes but mostly on the northern ones (Peri III, Peri VI, Karitski), where also the greatest number of half- and full-moon carvings is found. The A-I-2-a and A-I-0 types are the most frequent and the most evenly distributed ones. They make up respectively 45.7 and 29% of the A-type carvings.

The full-moon type is the most numerous one, in terms of both places of finding and subtypes. The most frequent types are (as was the case with crescent-shaped carvings) the silhouette one with two rays (C-I-2-a) and the type without rays (C-s-0), respectively 38 (43.2%) and 23 (26.1% of this petroglyph type). The greatest number of types of full-moon carvings (eight out of eleven) can be found on cape Karitski.

The astromorphs with connected body points and those with peculiar body are very rare, respectively 3 (2.3%) and 6 (4.6%). All kinds of carving types with connected points occur most frequently on Peri VI capelet. As most of the types of contour petroglyphs are represented but they come in small numbers on a few rocks (only on the northern-most ones). The carvings with two rays are the most frequent (84, or 63.2% of total). The astromorphs without ray rate as second (34, or 25.6%). The astromorphs with one or three rays are rare; they make up respectively 9.8 and 1.5 %.

Astromorphs in the area of Lake Onega belong to 26 types. The mean number of petroglyphs belonging to one particular type is usually 2–3 at any location. As the carvings are often isolated

from one another they cannot form a lunar calendar, though it is not impossible that the knowledge and application of an ancient lunar calendar has found expression here. The petroglyphs could have been cut into the rock during a particular phase of the Moon or it may have been done in the hope of the fulfilment of a wish at a particular time.

The Astronomical and Calendrical Sense of Some Numbers in Ancient Literature

Mark Frenkel

Karl Gustav Jung has written: “Since the remotest times men have used numbers to express meaningful coincidences, that is, those that can be interpreted... Number helps more than anything else to bring order into the chaos of appearances... It may well be the most primitive element of order in the human mind.”

What information about the surrounding world do these numbers bear? What can they tell about the level of knowledge of the people of past eras? To try to find an answer to these questions is a complicated task. This is because there always exists the possibility of interpreting numbers ambiguously and in this connection there is also an absence of any universal technique for “decoding” numbers, which could be recognized by the scientific community.

The present work is an attempt to interpret certain numbers proceeding from the context in which they are mentioned in the ancient sources. The example I would like to dwell on at some length here is found in the book of “Amduat” as found in the tombs of Thutmose I (New Kingdom, 18th dynasty 1504–1492 B.C.) and Amenofis II (New Kingdom, 18th dynasty, 1427–1397 B.C.). This book consists of a collection of 12 symbolical compositions (the number of night hours) which describes the various stages of the old Sun dying and the birth of the new Sun in Duat. The Barge of the Sun God Ra traverses 12 underground valleys during the 12 night hours. In the description of Ra travelling in the first, second, third and seventh valleys in Duat we encounter some remarkable numbers. To wit, at the very beginning of his journey, the baboons greet the Sun and let his Boat pass into the first underground valley (i.e. the first night hour) the length of which is 120 iteru. The length of the second valley (the second night hour) in Duat is 309 iteru, and the width is 120 iteru. At about three a.m. the Sun’s Barge crosses the third valley, which is also 309 iteru in length and 120 iteru in width. From here on the description of the size of the valleys come to an end. Only in the description of the seventh hour, where the battle between Ra and Apop takes place, do we find the information that the length of the sandbank where the serpent Apop contracted its rings while waiting for the Sun is 450 cubits.

We shall now try to clarify what the length of the three valleys of Duat represent. For this it is first necessary to know what length the ancient Egyptian unit “iteru” represents in modern units of measurement. In the materials of a WIPO seminar (Souley) as well as other sources we are told that one iteru is equal to 20,000 royal cubits, that is 10.5 km. This in fact might be the specified value of “iteru”. But if we take into account the fact that according to available scholarly data the royal cubit is equal to 523–525 mm (the Encyclopedia Britannica gives the value of 524 for the royal cubit) and assuming this value for our calculations then we can obtain a more precise value for iteru – 10.48 km. Similarly then for 120 and 309 iteru we get 1257.6 km and 3238.32 km respectively. If the length of the first valley is 120 iteru, and that of the second and the third is 309 iteru each then the total length of all three valleys is 738 iteru (120 + 309 + 309) or 7734.24 km. This impressive figure is commensurate with the length and breadth of Africa and represents approximately 7/36 of the length of the terrestrial equator. The deviation of the above-mentioned figure does not exceed 60 km or 0.77%. In the case of a comparison with the length of a terrestrial meridian, the divergence is only 0.42%.

If we take into account the fact that in the starry calendar of Egypt, starting in the Middle Empire, there were 36 deans, 7 of which belonged to Duat, then the above figures obtained for the length of the three valleys of Duat, do not seem random. And it follows from the logic of sacred texts that the dimensions of the underground empire of darkness should be mentioned in the book of "Amduat". All these striking facts have been discussed in the work of various German scholars.

Now, since a day consists of 36 starry hours (the number of the deans) with a duration of 40 minutes for each starry hour, and a night consists of 12 hours, then 7 "night hours" (the number of deans in Duat) were the hours of Duat. It is not difficult to calculate, that during the seven "night hours" of the Earth's daily revolution, any fixed point on the equator will move by 7792.4 km, which is only 58 km more than the length of the three valleys in Duat as calculated earlier.

It might also be worth mentioning that the numbers 120 and 309 are also associated with the calendar of Ancient Egypt. For example, 120 days make up the duration of one season of a solar year, and 309 lunar synodical months (9124.9517 days) make up the extremely important calendar period, i.e. the period of 25 Egyptian years (9125 days), the number of years required for the solar calendar to coincide with the lunar calendar. Moreover, 738, the number already mentioned (120 + 309 + 309), is also connected to a cycle in the lunar calendar. This number coincides closely with the periods of 25 synodical months (738.2647 days) and 27 sidereal months (737.6848 days).

I have not exhausted all possible combinatorial calendar-astronomical, geodesic and other properties yet, which exhibit the exotic, multi-ciphered character of the numbers under scrutiny. These were probably the reasons for their canonization and inclusion in the sacred texts of the tombs. Another example of the same kind is found in "The Legend of the Winged Disk" carved on the walls of the Temple of Horus in Edfu. It reports the number of warriors of darkness taken prisoner (651) and killed (381) by Horus during the battles between armies of Horus Behdet and Seta which took place in the 363rd year of the terrestrial reign of Ra the Sun God. These three numbers, if we apply a similar treatment to them, also demonstrate "sacred" properties. They appear to be connected to a Saroc and other calendar periods, which were important for the prediction of eclipses.

The polysemantic, ambiguous and frequently poetic character of the figurative range of religious texts of antiquity has been recognized by many investigators (Rack, Graves, Hoffmann). The above analysis serves to demonstrate that sacred numbers, bearing the seal of secret knowledge on the part of priests, provided certain metaphors for aspects connected to many phenomena of the surrounding world, which were so significant for religious consciousness and thereby underscored the divine character of the texts.

The Symbolism of Cosmic Catastrophes in Siberian Cultural Traditions

Boris Frolov

The symbolism of Cosmic catastrophes is considered in a context of traditional notions about the relationship between Cosmos and Chaos These notions exhibit similar features among Paleo-Asiatic, Tungusic, Ugric and other natives of Siberia. External forms of the symbolism are fixed in different kinds of images (from tiny elements found in costumes and ornamentation up to monumental petroglyph compositions), and in myths and rituals related to these as well; the main aim of the last is "transmission of knowledge". Traditional symbolism contains original interpretations referring to the leading figures who have a special role in protecting the Cosmos against the catastrophes caused by Chaos. According to Amur native myths, the ancestors can influence the behaviour of the Sun and thus induce/prevent catastrophic changes in the Earth's climate. The composition of the relevant petroglyphs include ancestral masks, typical aboriginal attributes of the "rites de passage", recorded by ethnographers. Independent fieldwork by ethnographers on the Yenisei, Altay, and Amur have found composite symbolism in aboriginal traditions depicting relations between people and heavenly bodies. Such acts were perhaps intended "to neutralize" catastrophic Cosmic mishaps (such as those related to the fall of a meteorite in 1908 in the Tungusic regions for example). The native peoples imagine their traditions as eternal while the experts or leading "persons of knowledge" in their communities are only temporary links (each spanning one human generation) in the endless chain of cosmogenesis. Moreover, archeological researches focusing on the symbolism of ancient Eurasian cultures from the Paleolithic era on, have uncovered more and more elements of archaic cosmology that are similar to Siberian ethnographic materials (many of these references are to be found in the author's publications between 1965–2001).

A hypothesis concerning the correlation between some of the tendencies in traditional symbolism will be discussed here. In effect, the ability of the people to protect themselves against Cosmic catastrophe depends on the completeness in the mastery they have of the experiences of their ancestors and, in turn, the populations surviving in extreme conditions promote the development in cultural tradition of that part of their ancestors' experiences that is recognized as being adequate and that corresponds to Cosmic processes.

Astronomical Dating of the Old Babylonian Kingdom

Göran Henriksson

The absolute chronology of the civilizations of the Ancient Near East is based on the well-documented solar eclipse of 15 June, 763 BC in Nineveh. The Khorsabad list of Assyrian kings is complete back to Enlil-nasir II, 1430–1425 BC The length of the reigns of the two preceding kings is unfortunately unknown because of damaged text and therefore no absolute dates can be calculated for the earlier kings. The existing chronologies for the earlier epochs are based on the astronomical dating provided by the Venus Tablets of Ammisaduqa, the tenth king of the First Dynasty of Babylon. However, there exists no unique solution and all of the suggested solutions are in conflict with other known facts. In this paper the First Dynasty of Babylon is dated by two previously unidentified total solar eclipses mentioned in the texts. The textual information about the circumstances during the two eclipses agree well with the calculations and even with the time-interval of 300 years between the eclipses. The calculations were performed by a new computer program developed by the author of this paper. It has been successfully tested against all known well-documented ancient and modern solar eclipses. The new chronology does not conflict with any facts known to the author.

According to the Low chronology, Samsuditana became king in 1561 BC and ruled until 1531 BC The total solar eclipse in 1558 falls within the years of Samsuditana's rule according to this chronology and seems to confirm this possibility. Dated cuneiform texts from the time of Samsuditana's rule, which were found between two floor layers in a house in the Merkes area in Babylon, allow us to conclude that nothing violent happened during the first 26–27 years of his rule. However, in the layer above the one with the tablets clear evidence of a fire and the subsequent destruction of the house was found. This catastrophic fire, which the archeologist working on the site associated with the plundering of Babylon by the Hittite king Murshilis I, also destroyed other houses in the Merkes area. The attack by Murshilis must therefore have happened during Samsuditana's last four years. If the total solar eclipse on 27 August 1558 BC is accepted as an omen for the attack by Murshilis, this attack must have happened a few years later.

From V. G. Gurzadyan's statistical investigation of the Venus tablets of Ammisaduqa we are justified in shifting the chronologies by multiples of 8 years. If we shift the Low Chronology backwards by 24 years, the last year of the rule of Samsuditana was 1555 BC and the attack by Murshilis took place between 1558 and 1555 BC Samsuditana himself was not killed and was safe at the royal palace while Murshilis plundered the temples and robbed the statue of Marduk, the god of the city, taking it to the land of Hani.

Two tablets recording economic transactions for the months Nisannu and Abu found at Tell Muhammad in south-eastern Baghdad mention an eclipse of the moon during Year 38 after the resettlement of Babylon. Lunar eclipses occur more or less every year But there must have been something extraordinary with this eclipse or rather eclipses as my calculations seem to indicate that the year 1495 BC was very unusual in that there were two total lunar eclipses. If this identification is correct we can date the fall of Babylon to 1557 BC and its resettlement to 1533 BC, since the return of the statue of Marduk after 24 years in Hani has been considered as the resurrection of the city of Babylon.

According to the Low Chronology, the Amorite Dynasty ascended the throne of Babylon in 1831/1830 BC. If we now, based on the proposed chronology, shift this year backwards by 24 years

we get 1855/1854 BC as the first year for Sumuabum the first Amorite king.

In the beginning of text B, part I in Tablet 27(28) of the *Enuma Anu Enlil*, there is a prediction that fits the situation at the time the first Amorite king ascended the throne of the Old Babylonian Kingdom. According to van Soldt, p. 85–86, line B 10' states that: "If the sun rises and its light is strong: one not of royal descent will be appointed king." and in line B 11': "If at sunset the light is very dark […]." The omen can be interpreted as a normal sunrise with an eclipse at sunset.

The total solar eclipse on 27 April 1858 BC, fulfils the criteria in the first version of this omen very well and it must in any case have been observed, because it is written, according to van Soldt, p. 87, on tablet 27(28), II 4 A: "[If the sun] becomes visible in the afternoon and is white, variant: its light is very dark: in the course of one double hour […, *before*] it sets at night, the moon is surrounded by a halo, and it breaks towards the east: during the day, at noon, an eclipse [of the sun will take place]." The important message here is the observation of a total solar eclipse a double hour before it sets, with the "white" light corresponding to the solar corona and the very "dark" light describing the effect of the eclipse. The comment that the moon was surrounded by a halo is of course true if they understood that it was the moon which covered the solar disc. The total phase occurred at 17.10, local mean solar time in Babylon, and the whole eclipse lasted 2 hours and 0 minutes and ended at an altitude of 3.8° above the horizon.

The proposed new chronology dates the rule of the most famous Old Babylonian king, Hammurabi, to 1752–1710 BC. Samsi-Adad I, contemporary with Hammurabi, was the Assyrian king 1777–1745 BC, which agrees very well with the dendrochronological dating of 1752 BC, which was ascertained from timber from a temple he built.

In the chronology proposed in this paper the first year of Ammisaduqa was 1606 BC, which coincides very well with the minimum errors around 1600 BC for the statistical parameters in the investigation of the Venus Tablets of Ammisaduqa by Gurzadayan.

The author has also proposed a new pair of lunar eclipses, separated by 42–43 years, that can date the Ur III dynasty. The eclipse that predicted the death of king Sulgi took place in 2019 BC and the eclipse that predicted the fall of Ur III took place in 1976 BC. The eclipse in 2019 BC has also been mentioned by Huber, as an alternative in conjunction with an eclipse in 1977 BC. The author prefers the eclipse in 1976 BC because it was much more impressive than the eclipse in 1977 BC. The death of the Akkadian king, Naram-Sin, can safely be dated by the total lunar eclipse in 2164 BC as the unique appearance of this eclipse fits very well with the portentous text that tells us that the moon was still eclipsed during its setting. The first year of the first king of Ur I, Messannipadda, can now be dated to 2518 BC.

Some Thoughts on Christian Churches in Transylvania

Demeter Ianos, Z. Maxim, T. Oproiu, I. Csillik

Since from the beginning of Christianity many eminent Church authorities took a position regarding the question of the orientation of churches. The majority considered that the axis should be orientated from West to East. This was probably an attempt on the part of the church to assimilate some practices associated with the Sun cult to Christian ritual.

Variations occur in terms of the location of the altar. Usually it was located in the east end, but in many churches from the fifth century the altar was positioned in the western end. However, in the eighth century the propriety of the east apsis was finally accepted. Many churches had already been orientated so that the edifice would be aligned in the direction of the sunrise or sunset on a specific day, which usually coincided with the name day of the particular saint the church was dedicated to.

Between the twelfth and fourteenth centuries the southeastern part (around Brasov and Sibiu) and the northern part (around Bistrita) of Transylvania had been populated by German settlers coming from Luxemburg and the Rhineland. They, the so called "Saxons", had built many churches. These later belonged to the Lutheran Church. Their orientation is for us of great interest.

In our studies we will discuss some of the Transylvanian churches whose orientation and alignment we have already determined.

Our investigations prove that in the construction of these churches the alignment with the sunrise at the equinoxes was retained. Because of the large number of early churches in Transylvania there still exists ample opportunity to continue the present research in measuring the alignments of churches in this territory.

Anticipating Catastrophes and Predicting the Future: Calendrical-Divinatory and Calendrical-Astronomical Cycles in Mesoamerica

Stanislaw Iwaniszewski

Archaeoastronomical research in Mesoamerica has proven that numerous both civic and public architectural structures were aligned to the sun's positions on the horizon on particular dates. These dates have been interpreted in terms of their relevance for the agricultural year, calendrically important intervals (from the point of view of Mesoamerican calendars), or even computations performed to predict some astronomically important moments (solstices, equinoxes or solar zenith passages). The idea that some prominent landmarks of distant horizons could have served as markers of different positions of sunrise/sunset through the year, and that those dates were arranged according to the structure of the Mesoamerican calendar has received a substantial support from scholars such as Aveni, Broda, Galindo Trejo and Esteban López, and Šprajc, who provided numerous examples of hypothetic horizon calendars in Central Mexico.

Obviously, not only specialized calendar-keepers but also laymen may easily recognize in the mountainous landscape of Central Mexico that there are differences in the position of sunrise/sunset throughout the year. The sun swings between solstice extremes eventually arriving at important landmarks on particular dates. It is emphasized however, that those dates reveal patterns corresponding (1) to the scheduling of important agricultural activities and (2) to the structure of Mesoamerican *tzolkin/tonalpohualli* calendar (intervals of 20, 13 or 9 days).

My previous analysis of the meaning and function of the cross-circle figures discovered during Matos Moctezuma's excavations at the Sun Pyramid area between 1993 and 1994 revealed the possibility of interpreting them in terms of calendrical-divinatory or astronomical-divinatory intervals of time rather than regarding their possible use as orientation devices, temporal indicators of astronomically important moments or board games. This allows me to propose another hypothesis concerning the meaning and function of those horizon calendars. Regarding on the one hand the points (1) and (2) already outlined and the fact that those horizon calendars do not refer to the whole tropical year, I argue that both the dates and the intervals between them provide combinations of days and numbers with a great divinatory potential. In this new view, the potential importance of certain dates for agriculture is recognized leading to the conclusion that divinatory readings were made to assure agricultural exit. Divinatory readings made by specialists during rain-bringing ceremonies performed on dates which are close to the Pre-Hispanic ones, seem to provide a further evidence in support of this hypothesis.

On the Time-Space Context of Moon-Related Beliefs

Jaak Jaaniste

Because often an attempt is made in historico-ethnographic studies to base various phenomena on astronomic facts we would like to draw the attention of non-astronomers to some aspects of the Moon's movement that might be of help in dating and pinpointing folk heritage related to the Moon.

First of all, there are no long-term changes in the orbital movement of the Moon. Both the precession (the drift of nodal points) as well as the recurrence of eclipses (saros) fall within a period of 20 years. Secular changes (such as the precession of the Earth) do not change the apparent movement of the Moon (precession influences the connection between seasons and Zodiacal signs and the orientation of the starry sky and the Milky Way).

Secondly, the position of the Moon and its movement relative to the horizon are determined by geographical latitude. If the dark spots on the disk of the full moon are described in terms of different images in the morning and evening, or if the crescent is compared to a boat, the corresponding legends cannot come from latitudes higher than 40 degrees. If a legend is presumed to be from the southern hemisphere and describes the old moon as C-shaped, we are dealing with an obvious misinterpretation or even a fraud.

In higher latitudes (55–70 degrees) the axis of the Moon – no matter which direction the Moon lies – is (usually) nearly perpendicular to the horizon. Thus the full moon is seen always in the same position and the images on its surface should be stable.

At Estonia's latitude, one needs to bear in mind the position of the ecliptics at different times of the year when studying beliefs connected with the phases of the moon. Since the southern part of the Zodiac is only 9 degrees above the horizon (and the Moon can be even lower!), the autumn new moon, summer full moon and springtime old moon are very difficult to observe. Thus, the belief that the new moon grows and old moon harvests could, instead of referring to monthly changes, rather be connected with the seasonal nature of fieldwork: in the spring, we see more of the new moon and in the autumn, the old moon. The fact that this is a singular truism among the otherwise contradictory moon-related beliefs and considering its astronomical background we can draw the conclusion that the ancestors of Estonians have engaged in agricultural activity in the north for a very long time.

Understanding Causality and Planetary Influence in Ancient Mesopotamia

Enn Kasak

Planets occupied an important role in the astral religion of ancient Mesopotamia. They are described mainly in astrological texts. My presentation will focus on the planetary gods and on the relationships between planets and gods in Mesopotamia. It appears quite impossible to give a good or a simple survey table about the names of the planets in Mesopotamia without violating the material. Numerous ruthless attempts to generalize can be found throughout the history of Mesopotamian research. Generalizations are by no means impossible, but before any such venture can be taken, the enormous material should be systemized with reference to localities as well as to periods. All the material should be re-evaluated and all the designations classified according to time and space. The presentation will give a tentative overview of how the planets were understood in Mesopotamian culture, how and why they received their names and which gods they were related to.

The problems of planetary influence in Mesopotamia relate to the issues of ancient astrology in general. The main principles and ideology, as well as the basic methodology of astrology originate in Mesopotamia, although its contribution to the doctrine that developed by the end of antiquity has often been underestimated. In its final form, ancient astrology is clearly the product of the Hellenic era; it was affected by different cultures, since the conquests of the Macedonians induced an active cultural exchange between the regions of Mesopotamia, Egypt, Greece, and Iran.

Another intriguing issue is the faith in causal relationships in antique philosophy and science. During the first period in the history of astrology – the period of astral fatalism – omens were treated as phenomena observed by the wise. The omens could not cause the predicted event. However, in the next phase, during the period of zodiacal astrology, heavenly events became interpreted as directly causing earthly developments. Ever since the period of zodiacal astrology, it has been quite common to believe that terrestrial events are evoked by celestial ones. It is very likely, that the confiding belief in causality developed as a result of astrological influence. Thus, it is possible that causality, one of the corner stones of modern sciences, actually emerged and evolved from Mesopotamian astrology.

Observable Evolution of the Constellation Draco

Eduard Kaurov

The evidence (direct or circumstantial) for observations of the World Pole in ancient China commence roughly in the sixth millennium BC. Presumable symbols of certain stellar asterisms and the sun also come from this period. From the fourth millennium BC come four partial symmetric symbols, reflecting the quadripartite orientation of the world model and finally, a sacrificial burial in Sushuipo, where East and West markers are in evidence. While the overall architectonic design is based upon a definite symmetrization of its elements, with respect to the N-S axis a diversified mode in the implementation of the observational results of celestial phenomena in ancient China is displayed.

The reference systems in old China appear to be associated with observations of Polaris. On the basis of these recordings a system was created “Polar star – equatorial constellations sju”, which was intended for orientation in space and time and in particular for calendrical purposes. Generalised outcomes of these efforts lasting thousands of years are given in the transactions (astronomical-astrological parts) of Sim Tsian an eminent Chinese astrologer and historiographer of the Han dynasty, while the principal outlines of this system were already explicitly defined as of the fourth millennium BC. It is important to this end to note the trajectory of the motion of the World Pole close to the tail of Draco with the actual observational facts of the World Pole in ancient China.

K. Flammarion cites the data on the movement of the World Pole between the sixth and first millennium BC from θ to κ Dra. At the same time we find from investigations in archaeology and ancient Chinese history direct and circumstantial evidences for observations of the World Pole in roughly in the same period The most important result of the analysis is the confirmation that the appearance of the constellation of Draco in old China changed depending on the specific era the observations derive from.

Incantations and Cosmology

Mare Kõiva

In the present paper I would like to examine what kind of information concerning cosmology we can find in the texts of various incantations and charms.

By way of comparison I will also use various motifs found in the recorded myths of Finno-Ugric epics (in the older or alliterative/runic/Kalevala style) as well as the accounts and narratives concerning folk beliefs. I will investigate the mythic space connected with the sky, sun, moon, stars as well as motifs about mythic beings associated with the sky (the heathenish cook and hen, the nocturnal hen, etc.).

In terms of background we must remember that incantations are one of the most complicated sub-genres of oral/written traditions: they preserve relicts of various myths emerging in different eras of time, They also reflect archaic beliefs and concepts in a concentrated form. They belong to an esoteric layer of tradition/heritage. Changes in the contents, structure and rituals were not common: only in the extraordinary cases was the user allowed to alter a text. The transmission of the heritage was also limited. The incantations had quite a fixed structure and they were connected with certain rituals. The main parts of the charms were pragmatic in function.

Astronomical Knowledge in the Bulgarian Folk Calendar

Vesselina Koleva

Data from the end of the 19th and the beginning of the 20th century allow us to consider the Bulgarian folk calendar as a unified system, which combines the Orthodox festival cycle with traditional pagan ritualism. Beyond the ideas of Christian theology we can find empirical knowledge of natural signs used to predict forthcoming economic activities. Ethnologists, folklorists and linguists in their research pay special attention to the astronomical origin of the folk calendar. This calendar is directly correlated with the need to determine the economic and cult activities of any given community. Astronomical knowledge is found in the practical methods of measuring time, in the folk etymologies of Christian festivals, and in the figurative language of rituals, games and dances. These are the common, non-verbal methods for memorizing and passing on knowledge of the language of signs and symbols to further generations.

The transition from spring to summer during the summer solstice, for example, is represented as "the Sun's turning round", and on the heels of the winter solstice people say that "the day is growing by a millet". During the autumnal equinox day and night "cross" or "cut each other", i.e. they become equal. On St. Atanas' day (18 January), called "mid-winter", the Sun "sets off for the summer", while on St. Iliya's day (20 July), called "mid-summer", the Sun "sets off for the winter".

St. George's day (23 April) and St. Dimiter's day (26 October) divide the calendar year into winter and summer, i.e. into warm and cold seasons. This ancient and wide-spread division organized the economic activities of the Bulgarian livestock-breeders until the end of the 19th century. It is believed that on the eve of these two festivals, at full moon, women who have twice given birth to twins can turn the Moon into a cow, bring it down to the earth and milk it. An interesting, although incorrect, saying is that "once a year, on the day of the summer solstice, the Sun meets the Moon".

In the folk calendar special attention is paid to the visibility of the Pleiades, called Hen (Brood-hen) or "Vlasci". It is well known that the Pleiades are not visible in the sky from St. Georgi's day (23 April) (heliacal setting) until the summer St. Todor's day (8 June) (heliacal rising). On the day when the Pleiades first appear on the sky, the cattle should stay in their pens in order to be protected against illnesses. On St. Constantin and St. Elena's day (21 May), when people believe that the Pleiades are in conjunction with the Sun, sheep, too, "should not see the sunrise". According to the visibility of the Pleiades people predict the future on St. Dimiter's day (26 October), Archangel Michael's day (8 November) and St. Nikola's day (6 December). At that time the Pleiades culminate around midnight.

The basis of the Bulgarian folk calendar lies in the Julian (solar) calendar, which was introduced officially in the Bulgarian state after the adoption of Christianity in the 9th century. The four seasons winter, spring, summer and autumn are well-known. The transitions between the seasons, however, are often connected with different dates. It is believed, for example, that the day starts to "grow" from St. Andrey's day (30 November) or from St. Varvara's day (4 December) or from St. Ignat's day (20 December), while the "turning" to winter takes place on St. Vartolomey's day (11 June) or on Enyovden's day (St. John's Day – 24 June). The day and night become equal on St. Georgi's day (23 April), or at Seknovenie (the day when John the Baptist was beheaded – 29 August), or on Krastovden (Holy Cross day – 14 September). Such discrepancies "blur" the borders of the so-called periods of transition in the ethnographic classifications of folk festivals and customs.

There are data that the three basic ethnic groups that formed the Bulgarian people – the Thracians, Slavs and Proto-Bulgarians, used a lunar-solar calendar before the adoption of Christianity. Thus, the influence from the older calendar tradition can explain some of the discrepancies between the significant calendar dates and the astronomical moments. Other discrepancies are probably due to the inaccuracy of the Julian calendar over the period of time in question.

Such an astronomical analysis of the Bulgarian folk calendar is necessary since it complements and expands the data of already existing semantic and mythological studies.

Arheoastronomy in Estonia

Andres Kuperjanov

The founder of the paleoastronomical movement in Estonia was Heino Eelsalu (1930–1998), Dr.Sci, member of IAU. In the present paper I will introduce and discuss some of his ideas about archaeoastronomy.

In the middle of the 1970's a new national awakening took place in Estonia, that brought about a resurgence in the study of Estonian national history and identity. This was closely connected to both the rise of interest in archaeoastronomy and new interpretations of rock carvings. The major figures of these movements influenced to a great extent intellectual activity in the Estonian community.

In archaeoastronomy the central figure was Heino Eelsalu, astronomer and science historian. At the beginning of the 1970's he investigated sacred places, the orientation of cup marked stones, as well as problems with the ancient calendar. Eelsalu organized a series of conferences on paleoastronomy; the first of which took place in 1979. Hundreds of people participated there. He also interpreted many myths in the light of paleoastronomy. He wrote on these topics in many articles during the period between 1978–1996. In the first articles he examined artefacts from the Stone Age and calculated their connection with the starry sky. The ensuing calendar-debates lasted for years. Interest in the relationship between celestial events and the beliefs of ancient peoples can be seen in all of his works.

Murine Symbolism in Magic Ceremonies: Reconstruction of Archaic Ideas Concerning the Milky Way

Andrey Kuzmin

In all ages, the mouse has been known as an animal living very close to people, both on earth and beneath the earth, and even in human dwellings. These features of the mouse's habitat were the most probable reasons for the mouse being deified and becoming the object of homage.

The mouse was worshiped as a guide between the worlds, endowed with an ability to disappear from one world and spring up in another one in the wink of an eye. This notion might derive from the remarkable nimbleness of this little animal and its inborn ability to hide itself in all kinds of natural shelters, which it easily finds in any locality. This ability makes it possible for the tiny rodent to survive in dangerous environments.

It might look, to the primitive person, like an actual disappearance or a mystical leap into 'another world'. Hence the respect given to the mouse as 'Mistress of the Two Worlds'.

In funeral rites, murine (mouse) symbolism is therefore associated with the mystical journey to the other world, the posthumous transmutation and migration of the human soul. The mouse was perceived as a sacred animal consecrated to the female deity (bearing different names in each separate culture) charged with a funeral rite, or, in other words, serving as a guide for the souls of the departed to the Underworld.

Secondly, in East Slavonic cultures, the Milky Way was known as 'the Mouse Path'. At the same time, it was regarded as a celestial road, by which souls passed to the other world. Furthermore, a common belief existed, that it was in the form of mice that the souls made the journey to the place of their ultimate destination. In some medieval icons, the soul of a dead person was depicted as a mouse. In most Indo-European cultures, the Milky Way symbolized either a transition in space, or a transmutation of quality. We can assume now, that here we have found a rather important point where the two symbolic objects, one of which is a common animal accompanying persons in their everyday life, and another, a cosmic object, the galaxy, come together. This is the point in which death most closely approaches life and the terrestrial world coincides with the Upper and Nether Worlds.

The Terror of Eclipses

Arnold Lebeuf

All over the five continents, similar beliefs concerning eclipses can be found. Eclipses are generally associated with illnesses, wars, deformations in new born children, quarrels among the gods, earthquakes, apocalyptic events. The reason of this universality probably lies in the fact that it is understood as a major sign of cosmic and general disorder. Some examples will be given from various cultures.

Round the Year With Elk and Deer

Alla Lushnikova

For the ancient peoples in different parts of the world horned and hoofed animals (cows, deer, elk, goats, etc.) were associated with the sky. They possessed stellar, lunar and solar symbolism and personified the supreme female deity. Common graphic and functional features conditioned syncretism in the designations of horned hoofed animals in many languages (including Indo-European, Ural-Altaic, Tungusic). Elk and deer defined stability of existence for the ancient populations of Eurasia. That is why the most characteristic phenomena from the life cycles of those animals – horn peeling, mating, calving, seasonal hunt, sacrifice – manifest themselves in the names of the months, (especially of those associated with the cardinal points of the year) as well as in the names of stars and constellations observed during the year. To illustrate this we will consider examples from the languages and traditional cultures of the Uralic Siberian peoples as well as those of the Slavs and Indo-Iranians, who had close contacts among themselves in the forest-steppes and northern regions of Eurasia millennia ago.

Early autumn is the mating season for elks and deer, as well as the time they are hunted and sacrificed. In folk calendars the months referring to this period of time are either named after elk/deer or reflect peculiarities of their biological rhythms.

The winter period was associated with the winter solstice according to the data of ancient cultures and marked the time for the most important sacrificial rites aimed at replicating the original act of the creation of the Universe, which had to be performed for the sake of ensuring the resurrection of life. For example, the constellation Orion, observed during the aforementioned period in the winter sky at night, was involved in the cosmic drama of the great sacrifice. For this reason it is often represented in the shape of a horned/hoofed animal divided into parts: Old Indian *mrga-śiras* ‘antelope’s head, Orion constellation’, Ket. (Yenisei Ostyak) *sel’d* ‘deer’s head, Orion’, Evenk. *ogletkan* ‘elk’s leg, Orion’, etc. It is reported that for the Saami people the period associated with December is called *Basse*, which earlier had the meaning ‘place of sacrifice, sanctuary’ and now means ‘to cook meat’ since at this time the Saami slaughter their deer and eat the meat to their hearts’ content.

Despite the fact that in Eurasia the bear was the calendar sign defining the coming of spring and the Siberian bear festivals were often timed to coincide with the vernal equinox, we can still find traces of symbolism related to horned/hoofed animal and its female personification. For example, in the bear festivals we find survivals of matriarchal traditions (only persons belonged to the kin, where the hunter’s wife comes from, are allowed to eat the bear’s meat etc.). Among the Udmurt the period associated with March is called *oš* ‘bull’. Among Siberian peoples a hunt on skis for elk and deer on the last frozen snow of spring is traditional, which is reflected in the names of this period: Evenk *ovīlasāni* ‘spring, last frozen snow’, etc.

In May elks and deer give birth to their calves which can be seen in the names of this period, for example, Evenki *huonkan* ‘the period when deer calve, May’. In the ancient Komi calendar the period from the end of April till the beginning of June is defined by the image of a reindeer. In May the Slavs had a festival devoted to Yarila, a deity of spring fertility associated with a he-goat comparable to the Old Ind. *Pushan*, a goat-like deity. *Yarila* was represented as a young girl dressed in white (similar motifs can be seen in Slavic new years rituals, where a goat played an important role and archaic elements linked to the female deity are revealed; cp. also Old Ind. *pushya* associated

with the period between December and January).

Some evidence connecting a horned/hoofed animal to the period that includes the summer solstice can also be found. For example, during the Slavic midsummer festival a cow's head as the symbol of Kupala was burnt. In the ancient Komi calendar this period is marked by the image of an ermine that along with horned/hoofed animals also symbolises the supreme female deity.

Saaremaa in the First Millennium BC: Cult Places, Graves and Fortified Settlements

Marika Mägi

In the first millennium BC, Saaremaa Island – known as *Ösel* in Swedish and German – consisted of many islands and islets, which have now become part of "the big island" as the result of the rising of the land mass. Archaeologically, the islands of Saaremaa form one of the richest regions in Estonia.

The best known archaeological sites on Saaremaa are the Bronze Age fortified settlements at Asva and Ridala on the southern coast, both of which have been thoroughly investigated by archaeologists. These were dwelling sites for rather large communities, and were closely linked to the international bronze trade. In the 1970s, a somewhat similar monument was found and excavated on the edges of the Kaali meteorite crater, one of the most mysterious sites on the islands. The impact of the meteorite has been dated differently but the most recent studies suggest that the event took place around 800–400 BC, thus during a period when the islands were already densely populated. Archaeological remains on the edges of the crater were initially identified as another fortified settlement. Later research has supported the interpretation of the Kaali site as a cult place.

Until very recently, ancient Estonians were believed not to have had special cult places. Excavations during the last decade have demonstrated that there were cult placed built in stone, usually located beside stone graves. Moreover, stone graves on Saaremaa were also used as cult places. Only partial skeletons in the graves indicate the custom of so-called secondary burials, and some parts of the graves were not used for burials at all. We can conclude that the stone graves functioned firstly as cult places and only secondly as burial grounds.

Astronomical Aspects Of Monuments in Seisart (Mountain Altai)

Leonid Marsadolov

Several expeditions from the State Hermitage Museum have conducted research on the archaeological monuments in the central part of the Altay Mountains near the settlement of Elo, in Semisart (Kara-Bom). In 1980, 1985, 1986, 1991 and 1995 five barrows were excavated at that "settlement" site where various lines of stones, astronomical observation posts and rock images were discovered (Marsadolov 1981, 1987, 1988, 1991, 1992, 1996, 2000, 2001).

There were at least five barrows in Semisart. Most of barrows were in the south-west, near the mountain range. These barrows were small; their diameters were 4–8 m. There were one to three stone boxes in the centre of the barrows. At the bottom of one of the stone boxes a man was buried, his head was oriented NW, his face was turned to the west, and he was laid out on the left side with very bent legs accompanied either with no objects or with a small number of objects. In the next box the remains of a horse hide with the end remains of legs and the skull were found. In all likelihood, the cheek pieces from Semisart I can be dated to the second part of the eighth or the first part of the seventh century BC. From the centre of every barrow a round panorama was drawn, and then the main directions of the sunrise and moon rise on astronomically important dates were calculated (they were counted for the period of the barrow construction). It is probable that the central part of the barrows were also used as observation posts. Examination of the finds at Semisart show that the arrangement of the burial mounds exhibit some regularity. They were situated along a NE–SW axis in such a way, so that the sunbeams at sunrise or sunset always fell on one burial mound, but the other one remained in the shade. The important astronomical and topographical directions were marked by stones of white quartzite as well as large stones and plates in the embankments of the burial mounds and on the mountainside.

An observation post is situated on the south side of the mountain. The astronomical meridian of this post passes exactly through the top of the hill sloping to the south. This post consists of three-four rocky niches with smoothed edges and lateral walls. Each of these niches has a strictly specialized function determined by its position on the rock. For instance: from one niche it is possible to observe the directions of sun and moon rise; from another, the directions of their setting in the west; from the third, only the Southern part of the horizon and so on. The small hollows and pictures of animals marked on the stones and rocks also point to various important astronomical and topographical features. On the whole, the "observation" rock in Semisart is similar in plan to the step-shaped zikkurat of antiquity, which were also often used for astronomical purposes. As is the case in the well-known Chinese, Korean and Japanese "gardens of rocks" the complex of objects in Semisart forms an isolated, loop system, connected through separate "transitions/inputs" to the whole world.

"The Garden of rocks" makes use of not only separate, usually natural stones of various colours, placed at different heights with frames of rocks and tables, but also a specific number (or series) arranged around a spring or pool in a temple construction. The comprehension and admiration of a natural frame of rock, with some "improvements" if necessary, has also been well-observed in Semisart. In Semisart the complex embodies the idea of a sacred "road" fixed in rock-paintings consisting of an identical set of components – person – horse – fence (or box filled with stones) – other animals (whose numerous remains have been found under the barrow banks and on a ritual

places). It required a rather high level of sophistication on the part of the ancient nomads of Sayan-Altay to arrange the small and large objects in simple and complex compositions, using separate planar and space images and such figures as circumference, equilateral and isosceles triangles, squares and orthogons, lozenges, trapezoids, right angles etc. The different combinations of coloured stones and plates of various shapes, rock pictures, barrows, and observation posts in Semisart resulted in a complex organized system reflecting the relations of the ancient person with the natural environment and space.

It is possible, that sanctuary and observation post in Semisart have existing for a long time. It should also be mentioned that the Semisart site is situated on the same latitude (52 ± 1–2° north latitude) as such famous sites as Malta in the Baikal region, the Great Salbyk barrow in Khakasia, the barrow-temple of Arzhan in Tuva, the sanctuary on Ocharovatelnaya mountain in the Altay range, the Arkaim complex of constructions in the Trans-Ural region and Stonehenge in England, where, undoubtedly, astronomical observations took place.

Some Comments on a Possible Explanation of the Orientation of Minorca *Taulas*

Emilia Pasztor

Archaeological finds and the monuments themselves bear witness that the *taulas* on Minorca were likely built by people belonging to the Talayotic culture. It is a strange feature of this culture that this type of monument can be found on only one of the Balearic Islands.

The most recent suggestion for an alternative interpretation of the orientations of *taulas* was suggested by M. Hoskin (2001: 42): "Around 1000 BC, α Centauri and the preceding stars of this Cross-Centaurus group would have been seen framed by the precinct entrance of a south-facing *taula*; but only if the site commanded a wholly uninterrupted view to the south."

The reason for this orientation was the function or role of the *taulas* as precinct. According to his hypotheses the *taulas,* as places of healing, were dedicated to the teacher of the god of medicine and hence they were orientated to the celestial representation of Chiron i.e. the Centaur. Could this devotion to Chiron have become so strong that the islanders turned their "T-altars" toward the tail end of the constellation seen as Chiron in Greek mythology even though this was not the custom in Chiron's homeland?

According to Hoskin's hypothesis the Minorcan islanders might have taken up the custom when they accompanied the Sea People to Egypt or became mercenaries in the Egyptian armies. The Egyptian gods and goddesses were routinely identified with constellations, although ancient Egyptian temples were not generally orientated to constellations. The role played by the Minorcan islanders in the activities of the Sea People is currently under scrutiny.

Hoskin based his hypothesis on the results of measuring the orientations of the *taulas* on the southern part of the island, Minorca (Hoskin 1989). Among these southern *taulas,* there is one, at Torralba, which exhibits an easterly orientation rather than a southerly one. This anomaly notwithstanding, the author believes it strengthens his idea by being orientated towards Sirius/Orion. He listed two pieces of evidence:

1. the animals, whose bones were found at the site, might have been sacrificed at the heliacal rising of Sirius;

2. in his travel guide, Heraclides Criticus wrote a description of a ritual that had taken place on Mount Pelion (the present Plesszidi in Thessaly, Greece), where Chiron lived, and which was performed at the heliacal rising of Sirius. This ritual may have been a sacrifice to Chiron (Hoskin 2001: 45).

Taulas precincts are considered sanctuaries because of the great number of animal bones and cult objects deposited in them (Hoskin 2001: 40). The sanctuaries in Sardinia at the end of the Bronze Age suggest a pattern which we are familiar with from Italy and the Aegean. Such sanctuaries developed primarily around sacred wells (Holloway 1997). That is not the case on Minorca. If we however, accept the assumption that they were cult places, then the intentional orientation of the *taulas* seems feasible.

The direction of the rising and setting of α Centaur in 1000 BC signify the limits of the segment inside which are the points on the horizon the *taulas* face. Were these stars remarkable enough to induce the Talayotic people to set their huge T-stones to face them even in the darkness of the night?

Hoskin ascribes the orientations toward α and β Centauri and the Southern Cross to a strong, new Greek influence which must have reached the Talayotic people before the building of the first

taula, that is to say at least 1000 BC or earlier but no earlier than their departure from Sardinia (at about 1500 BC?). This is based on the fact that Minorca is the only location of such monuments.

The author gives an evaluation of this assumption.

Using Hoskin's measurements (Hoskin *et al* 1990, table 1) to make a diagram of the orientation of the *taulas* (Fig. 1) it can be seen that they closely face due south with a mean azimuth of 180 degrees and a dispersion of ±15 degrees, which is low indeed. This means that the sun or the full moon might also have been likely sources for the orientation of the *taulas*.

The author presents possible evidence to support this.

Regardless of the attractiveness of the above-mentioned ideas we must also admit that the full moon or the sun might have had nothing to do with events taking place at the Minorcan *taulas*. The author gives a detailed rationale for this suggestion.

Cosmology and Astrology in the "Computus" of Philippe de Thaon

Rafal Perkowski

The methodology in the study of the History of Ideas tries to find explanations for mental attitudes in their historical contexts. In this paper I would like to demonstrate similar "intellectual manners" towards the notion of time peculiar to the Middle Ages.

As a source book for this study I have chosen the texts of the *computus*. The *computus* was used to determine Easter Sunday and dates of other festivals crucial to the Christian liturgy.

The text of the *Computus* of Philippe de Thaon (from the twelfth century), was the first translation of the Latin *computus* into a vernacular language (old French). This translation provides evidence that preachers made use of the *computus*. I have selected this version for my approach.

The texts of the *computus* illustrate the connections between the observations of the sky and the measurement of time. They also show the connection of astronomy to literature and theology, in other words it reveals a complexity of medieval thought. I would like to analyse some notions from Philippe's *computus* such as the planets, signs of the zodiac, hours, days, months, seasons.

I would also like to explore the structure of the Philippe's text, which can give us an idea about how the cosmos was understood in the Middle Ages.

I hope that my modest contribution here will shed light on a few aspects of the intellectual quest for time and its cosmological sense.

On the Role of Palaeoastronomic Studies in the Emergence of the Estonian Society For Prehistoric Art

Väino Poikalainen

Pursuant to its statutes, the Estonian Society for Prehistoric Art is a voluntary non-governmental organization uniting people interested in prehistoric cultures. The aims of the association are: to conduct research on Finno-Ugric prehistoric art and related areas, to protection and to disseminate information about the said art.

Although there had been great interest in Finno-Ugric prehistory in Estonia, the palaeoastronomical research of the late 1970's and early 1980's was the most influential factor in the establishment of the Estonian Society of Prehistoric Art. This research was initiated and mainly conducted by Heino Eelsalu, who worked at the Institute of Astrophysics and Atmospheric Physics (the current Tartu Astrophysical Observatory). He organized several conferences on the topic of astronomical interpretations of folklore, dating the orbital plane and the calendar problems of ancient time using the precession of the Earth. But there was a lack of precise data to support these hypotheses. Therefore the article about the Stone Age lunar calendar among the Lake Onega carvings published by Felix Ravdonikas in the late 1970's received a lot of attention. It dealt with a certain type of lunar and solar symbols resembling full, half or crescent moons (usually with ray-like appendages), which constitute about 13% of the total number of carvings. These petroglyphs may be typologically divided into a variety of categories according to the shape of the main body and the number and layout of appendages attached to them (Fig. 1).

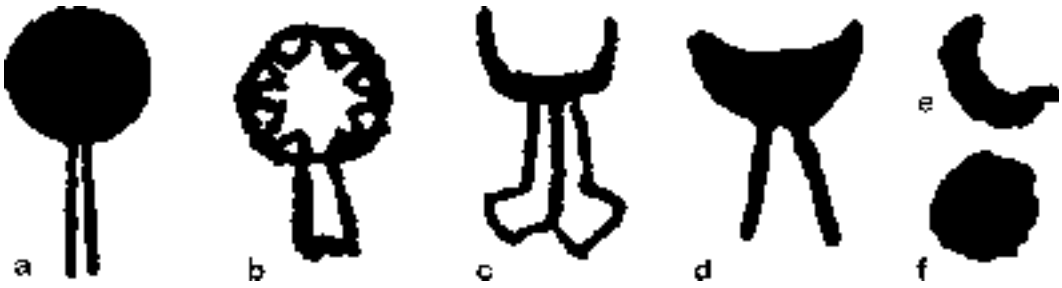

*Figure 1. Lunar and solar symbols from Peri-6 (**a**), Peri-3 (**b, d**), Karetski (**c, f**) and the Northern Besov Nos sites (**e**) of the Lake Onega rock art territory.*

The lunar and solar symbols have been under intensive study since the discovery of carvings by Constantin Grewingk in 1848. Grewingk explained the disc- and crescent-shaped carvings as being marks portraying lakes with river inlets and as the personal marks of ancient hunters. Alexandr Linevski developed the theory of traps of various shape and type. On this basis, he described most of the carving groups as hunting scenes and drew conclusions about the game animals hunted by prehistoric people. Vladislav Ravdonikas, the most prominent researcher of Lake Onega rock art before World War II, was the first to interpret these depictions as lunar and solar symbols. According to him the world view of the prehistoric man of Lake Onega had changed in the course of time from totemic (as a relic of the Palaeolithic Period) to cosmic. Felix Ravdonikas advanced this cosmological theory later. He proved statistically that the sector between the "rays" of these sym-

bols points to the direction of moon rise (or moon set) at certain phases of the moon over a period of 18.6 years (the Metonic cycle).

The idea of a lunar calendar depicted among the Stone Age petroglyphs of Finno-Ugrian origin was very inventive. In 1982 the decision was made to organize an expedition to Lake Onega under the auspices of the Estonian Branch of the USSR Society of Astronomy and Geodesy (EBSAG). This expedition was carried out at the end of the summer, with the main goal of verifying the data on the distribution and directions of lunar and solar symbols. In addition to the astronomers and surveyors from EBSAG, artists and photographers also took part in the expedition (Kestlane & Raudsaar 1983). The expedition was repeated in the following year (Kestlane 1986). Peeter Tenjes published the results of these expeditions in two articles, which neither confirmed nor rejected the theory proposed by Felix Ravdonikas (Tenjes 1983, 1986). Interest in a more thorough study of Lake Onega carvings has, however, now arisen among Estonian researchers. In 1984 a rock art work-group was formed within EBSAG with the aim of creating a computer database of the Lake Onega petroglyphs. This also led to a search for co-operation with scholars abroad: first with the Finnish specialist Eero Autio and late with other scholars and institutions in Russia, Finland and Scandinavia.

The Society of Prehistoric Art was established on October l6th, 1988, in Kabli, Pärnu county, and became an international organization based in Tartu. At that time the main task of the society was a general documentation of the petroglyphs. This work also revealed many previously unknown carvings in known sites. The Cape Swan carving locality north of the River Vodla was brought to light in 1986. The following years saw the discovery of about 200 petroglyphs there, including the greatest rock art image in Karelia: the 4.1 m Giant Swan. The creation of a catalogue consisting of all preserved rock carvings, plans, maps etc. is now under way. The first volume of this publication, which contains the petroglyphs of the Vodla region, has already appeared (Poikalainen & Ernits 1998).

At present the Estonian society unites about 150 people. Members of the society come mainly from Estonia, Finland and Russia, but some come from other countries also. They represent a wide variety of professions: artists, archaeologists, astronomers, biologists, surveyors, computer scientists, historians, engineers, linguists, mathematicians, etc. The activities of the society focus on the following: (1) collecting and helping preserve prehistoric art; (2) scholarly research into prehistoric art, culture and religion; (3) establishing contacts and co-operation with people, institutions and organizations worldwide; 4) popularising prehistoric culture. To meet these goals, the society organizes seminars, exhibitions, excursions and expeditions and publishes materials about prehistoric art, etc.

Sources of Perceptions of the Cosmos in the World View of the Ob-Ugrians

Tamila Potemkina

Materials acquired by the author as a result of archeological excavations of eneolithic round sanctuaries with certain astronomical alignments (Savin and others) on the river Tobol of the forest-steppes in the Trans-Urals (55°45' north latitude) that are similar to European rotundas and henges, enable us to assume that at the turn of the fourth and third millennia BC the population of this territory was already familiar with a three-fold model of the world. By comparing archaeological, ethnographical, mythological and folklore data we can learn how the layout and architectural elements of those constructions were connected with ancient knowledge of the different spheres of the Universe (lower, middle and upper), of the main deities associated with natural phenomena and elements (Sky, Sun, Moon, Fire), of the wide-spread cults of the world tree and the different kinds of sacrifices performed by these ancient populations.

The ancient visions of the cosmos that are thus revealed share many of their main features with the traditions of the peoples speaking Indo-European languages including Indo-Iranian.

At the same time the structure of the eneolithic sanctuaries and the character of the rites revealed there also find parallels in the beliefs and cults of the Ob-Ugrians, primarily the southern Khanty and Mansi, who belong to the Finno-Ugric branch of the Uralian language family. The similarities in particular manifest themselves in the cults and rites connected with their cosmic world view and are known to us thanks to ethnographical and folklore research. The data include such things as:

1. the existence of a three-fold model of the Universe divided into three basic spheres (lower, middle, upper) and having two main planes – vertical and horizontal;

2. the round lay-out of the shaman's rawhide tent with passage-like entrances from exactly the east and west sides; the east passage was to allow the spectators of the shaman's performance to enter and exit and for the shaman to communicate with the spirits of the earth; the west passage was barred both to the shaman and the people because it was through this passage that the shaman was in communication with the world of the dead;

3. the rituals connected with the cult of the world tree, the sun and moons. For example, the Mansi people from the river Lozva performed sacrifices to the Sky spirit by aligning with the sunrise a birch tree, peeled of its branches and whose trunk was incised with images of the spirits;

4. deities in the shape of wooden anthropomorphic sculptures of maximal schematic character in a predetermined form. Conservatism in cult practices is an indication of conservatism in actual beliefs.

The similarities that have emerged can be explained by permanent and long-term contacts between both ethno-linguistic communities lasting from between five to six thousand years. Due to the peculiarities of living conditions the perceptions of the cosmos, which was shaped in far ancient times as a result of integration processes, have survived in their original state practically up to the present. Sanctuaries were the very mechanism that contributed not only to the formation of the given visions of the cosmos but also to their safe-keeping, materialization and transfer to the following generations.

Can Modern Astrophysics Widen the Horizons of Archaeoastronomy ?

Izold Pustylnik

Archaeoastronomy regards the celestial vault with all its luminaries as a cultural resource. According to C. Ruggles and N. Saunders (1993) the "celestial sphere can be regarded as an untouched, untouchable and hence immutable part of the environment." This assertion seems indisputable as long as one is concerned with the positional aspects of asterisms and constellations over the time span embracing the whole cultural history of mankind. The concept of "immutable celestial sphere" becomes less obvious when one turns to another equally important aspect of the human perception of the luminaries – their visible brightness and colour. The observable appearance of the stars and nebulae is subjected to temporal variations due to (1) complicated solar-terrestrial interrelations caused mainly by the fluctuating magnetic activity of our daily star, variable solar winds sweeping the whole solar system, (2) by intrinsic light variations of the stars. Roughly ten per cent of the stars visible to the naked eye are supergiants. Early type (hot) supergiants exhibit irregular large variations of amplitude brightness up to two stellar magnitudes on a time scale of decades and three and more magnitudes on a time scale of centuries and millennia. From the point of view of modern astrophysics hitherto unpredictable short term large amplitude light and colour variations have proven to be a hard nut to crack on the part of both observers and theoreticians, who try to model internal structures and study evolutionary trends of supergiants. In fact, the peculiar properties of such supergiants stand nowadays highly on the agenda of numerous symposia and workshops.

Changes by three magnitudes in common speech was nothing less than a virtual disappearance of the specific star or on the contrary, its domination in asterism for an ancient observer armed only with the naked eye. We will discuss in detail two cases, for κ Cas and ς Per, where old Chinese chronicles and observations by the tenth century Arab astronomer Al Sufi provide strong evidence that variations in the conspicuous brightness at one time significantly altered the overall appearance of both constellations (other plausible cases are summarized by K. Hertzog in "Observatory", 1992).

In some constellations, notably Orion, Canis Majoris, Vela, and Carina the proportion of supergiants is considerably higher than our conservative estimates (see above) suggest.

In conclusion, it is worthwhile to revisit the half-forgotten pages of ancient records in search of traces of past dramatic events that have raged in a seemingly serene celestial sphere. Both modern astronomy and archeaoastronomical research can mutually benefit to a great extent from each and every reliable positive identification.

“Rushing Through the Clashing Rocks” – Does This Old Motif Have an Astronomical Meaning?

Barbara Rappenglück

Greek mythology tells us the story of the Argonauts who during their quest for the Golden Fleece were confronted with the dangerous Symplegades. The Symplegades were rocks, which continuously opened and closed very rapidly and threatened to crush anyone who tried to pass through them. The Argonauts speeded up their ship to the highest possible velocity and succeeded in passing, the ship’s stern, however, was crushed by the closing rocks.

This episode from the Argonauts’ story has parallels in myths and fairy tales all over the world. Studying the rich material we can see that the stories of the passage through clashing rocks are composed of various primary elements, which are similar all over the world. These elements are:

1. successful opening and closing rocks or doors
2. the passage demands on immense speed
3. the back part of the one who is passing through is crushed or cut by the closing rocks or doors,
4. the passage across the clashing rocks is part of a special sort of journey, e.g. an element of the way to the other world.

In religious scholarship there exists a very far-reaching agreement in the interpretation of the passage through clashing rocks: The clashing rocks are a door to the other world and the passage through them is one of the so called “rites des passage”.

Apart from these interpretations different scholars have ascribed astronomical meanings to the motif of the clashing rocks (or clapping doors), e.g. the rocks were somehow connected with the equinoxes, the sun itself, the moon, the Pleiades etc. Most such interpretations have been proclaimed as the only valid ones by the authors proposing them. However, they should be regarded with great scepticism because in general the authors fail to support their ideas with valid argumentation and examples.

Nevertheless, a number of examples of the motif of the clashing rocks are mentioned that seem to have some connection with celestial phenomena. These examples will be described and analysed here. We will examine motifs connected with the sun, the Milky Way, the horizon, the four corners of the world etc. It seems as if different cultures located the clashing rocks in different celestial phenomena. But this circumstance does not yet explain the motivation for the motif or the perception behind it.

A significant number of examples tells us that at the rim of the world the sky moves up and down and as it does so a passage opens and closes between the sky and the ground. A few examples give an even more detailed description: the sky is imagined as being made of solid rock (the idea of the sky being a vault of solid rock is quite widespread) and the rocks of the sky clash against the rocks of the earth. The openings that result from the movement of the sky offer a (highly dangerous) opportunity to pass from the inner side of the world-vault to the outside, where the gods are believed to live.

We will examine, whether the idea of moving gates situated in different celestial phenomena mentioned in our examples might be combined with the idea of the rocky vault of the sky.

The Pivot of the Cosmos: The Concepts of the World Axis Across Cultures

Michael A. Rappenglück

Across cultures and through the ages people's imaginations and rituals have been peaked by concepts of the center of the world, the celestial pole(s) and the Zenith, the circumpolar rotation of the stars, the axis of the world, and the realms skewered around it.

Around the globe, it was important for ancient people to create a habitable personal and social environment by organizing the worlds landscape. Since Paleolithic times man recognized a deep connection between himself and his culture to nature. Thus, a very important part of the archaic world view consisted of a concept of the interacting architecture of the world and the structure of personal and social human life. Because man basically needs order, rhythm and direction to establish his culture and to give meaning to his existence, he first built up a framework of the world and expressed it in materials, symbols, myths and rites. This process really makes a "cosmos", a structured and habitable realm, in the original sense of the Greek word. Organizing the world's landscape is to recognize a center, a top and a bottom, an edge, particular directions and strata, and periods of change, to relate these to one's own culture and to give them a concrete shape, for example in images and buildings.

One very impressive and important part of the world's landscape in the cosmic vision of the ancients was the world-axis, which also served as a sundial (a gnomon) and a star-clock. It expressed the power of the location, the center of the cosmos and the origin of creation. The world-axis set up the framework of space and time, which allowed man to orientate himself and to regulate his personal and social life. It illustrated the spatio-temporal structure of the cosmos with his different strata and the dynamic forces, especially shown by the movements of the celestial bodies, which held the universe in rotation. Thus, the vertical and the polar alignment of the world-axis are deeply related to ancient concepts of cosmogony and cosmology, and to the ordering of the world's spatio-temporal landscape, which interacts with human culture. In addition, the world-axis figured as a (polar aligned) and shadow-stick seemed to be one of the first human tools to materialize for measuring the world's landscape. It was used to relate the structure of nature to the construction of culture. In the handy shape of the power-sticks and scepters of the shaman or later rulers the world-axis became a symbol of sovereignty.

The setting-out of creation from the center implies a primary direction, which is given by the human sense of gravity and fixed as a vertical line between Zenith and Nadir. This is the first world-axis. It accents the aspect of connecting the above, the below and the standing place, which in every case has the function of the center. That means, it denotes upright asymmetric axiality. Symbols for this conception according to ancient thought are for example the human being itself, the phallus, navel (omphalos, navel-stone), the monopod, the vine, the rope, the snake (or dragon), the spider‘s thread, the conic mountain, the pyramid, the post, the plug, the upright standing stone, the column, the nail (in particular the nail of a foundation), the spear, the sword, a row of arrows, the scepter and others. Thus, a stable link between heaven and earth is established.

Because man‘s living space is essentially bound to the ground, this world-axis carried a special meaning: It indicated the two other basic realms of the cosmos, which for the uninitiated human being are usually not accessible, the sky and the underworld. These zones signify a fundamental polarity in the world extended in space. The ancient people tried to express their perception of a spectrum of increasing or decreasing cosmic power, which flows up and down along the world-

axis. In another version this axis marks the movement between a spiritual and a material realm. To illustrate this complex idea the symbols of the simple axial had to be extended. Around the world-axis several qualitative different cosmic strata – physical and psychic ones – were arranged hierarchically. In a simple case the ancient people believed in three layers – the sky, the earth, and the underworld. Sometimes representations of animals living in these realms signify specific layers. But they also perceived seven, nine or other numbers of strata. To illustrate this idea they, for example, used the course of the wandering stars (including sun and moon), and sometimes other astronomical elements such as the intersections between the moon's orbit and the ecliptic (the knots), which they treated as independent celestial bodies. These orbits showed the hierarchy of the heavens. According to the perceptions of ancient people they also indicate other worlds and levels of consciousness. This multi-layered cosmos may be seen in the world-tree's branches and wickerwork of roots, a human being with head, navel and feet, a layered world-mountain, in a step-pyramid, in a multi-leveled stupa, in a multi-layered granary, in a stepladder, in a post with notches, in a vertebral column with the ribs and other natural or artificial things. Simpler representation are for example the mushroom and the parasol or the cross.

But the vertical world-axis lacks the rotational aspect. Though the sky passed over the axis it does not really turn around it. Better suited as a world-axis including the dynamic aspect of revolving is the polar axis, which is a second world-axis. When the above cosmological system is aligned to one of the celestial poles, the skewered strata really turn around the world-axis. The polar world-axis is symbolized by a fire-drill, a mill, a spindle, a whirling mountain, a whirlpool, a churning stick, an animal or human being revolving around one leg, a rotating pillar crowned by a dwelling, or the nave of a wheel. Because it is not easy to depict or to build a model of such an inclined world-axis ancient people preferred to show the vertical version instead of the polar one. But they knew the polar aligned world axis very well and tried to express the conception in myths, rites and sometimes tangible architecture. Often a post, a spear, or a stone was set in the ground and aligned to the celestial pole, that means that the object had to be inclined.

The cosmogonic myths of the ancients often illustrate how, starting from the point of the origin, cosmic realms, directions, and strata have unfolded and arranged themselves around it. They also believed, that the power of the center was transformed into the entities and events of space and time, by radiating the one into the many. Through the center the world emerged and expanded. If the middle of the universe is destroyed the cosmos will collapse. Because in the opinion of the ancients human personal and social life is deeply related to and dependent on the center of the cosmos. This means that particularly in continuing renewal, man will loose access and contact with the origin of creation, which at the same time is the transmundane realm. As a result the cosmos will get out of order. Ancient cultures were afraid of such catastrophic events. Several worldwide myths deal with the destruction of the world-axis, which was situated in the center. Understandably, people resisted accepting cosmologies, which abolished the center or set an infinity of optional centers instead, which would disintegrate the structures of both the cosmos and human culture. The transition from the topocentric or geocentric cosmologies of ancient cultures to the non-centricity concepts of the universe established by modern ones, illustrates very well, how a culture feels when confronted with questions of self-confidence, when it loses its center and centricity.

The polar world-axis is often associated with a pole star, if one exists. In some eras there were stars at the pole or near it. In that instance the symbols of the world-axis sometimes included a star at the top or myths that stated that the pole star was directly situated, above an object, for example above a post, a stone, or a building. This change was caused by the precession of the earths axis. In some eras no star was located at the celestial pole or close by. This situation may be handed down in myths, which tell of a time when the world-axis was broken and the cosmic center was lost. Such a dramatic and very impressive change – seen through the eyes of the ancestors – occurred after approximately 12,000 BP (at that time α Lyr, Vega at 0.00 mag was the last really impressive pole star in the northern celestial hemisphere). After that era, which at the same time coincided with the

end of the last Ice Age, the celestial pole left the Milky Way, in which it was situated for around 6,000 years. For some thousands of years there was no impressive pole star brighter than 3.5 mag (7,600 BC: τ Her at 3.90 mag; 2,800 BC α Dra at 3.65 mag). There is some evidence, that this change is the astronomical background of many myths around the globe, which deals with the displaced or broken world-axis.

The paper categorizes these main perceptions and discusses their meaning in the world views and the religious life across ancient cultures.

Reflections of Aurora Borealis Phenomena As Seen in the Iranian Awesta (Yasna 9.11)

Elena Sinitsyna

In her recently published work Russian scholar L. M. Alexeeva presented a complex of symbols in Slavic (and other) mythologies for the Aurora Borealis phenomena. Among these are a serpent and a battle between a serpent and a hero. Her research is based on the theory that there was a migration of presumably pre-Indo-European tribes to the north about 12 thousand years ago when permafrost conditions in the European areal began to subside. I will use this theory to explain the possible origin of Aurora Borealis lore in Iranian myth. It is worth noting that if the northern lights were seen as the border of the World of Death, given the powerful impression they must have made on people seeing them, this might be the reason for the tenacious presence of these symbols in myth.

Yasna 9.11 of the Zoroastrian Awesta describes not a battle but contact between the hero, Keresaspa, with the serpent, Azhi Srvara (Horned Serpent). Keresaspa cooks food on its back. The relevant passage consists of only two sentences that seem rather worn alongside the other subjects of Yasna 9. It is quite possible that the passage descends from very ancient times. We can see below a comparison of the dynamic colour characteristics of the Aurora Borealis and the text of Awesta. There seem to be some interesting coincidences in our comparison. However, in order to make any far-reaching conclusions it is necessary to take into consideration the complexity of the serpent symbol in the Indo-Iranian context and the origins of the Awesta and Hom-Yash (Yasna 9.11) etc.

Northern Lights phenomena	Avestan text
1. A bright light-yellow arch	(he killed) of yellow horned serpent
2. For a long time the arch remains quiet, almost without	upon whom (horned serpent) Keresaspa
3. When substorm starts the Southern edge of the arch kindles and the luminescence spreads all through the arch	the scoundrel (the horned serpent) grew and began to perspire
4. The luminescence goes to the Northern part of the Sky (forward from an East-West direction of the spreading of the arch and the start of luminescence at the South) where it remains for some time	He (the horned serpent) knocked the iron cauldron forward (jumped off forward from the cauldron)
5.Then the luminescence changes into one luminous revolving mass like a whirlpool of red, yellow, green fire	he (the horned serpent) threw aside the boiling water
6. The arch disappears and the rays move to the East and to the West. If the magnetic storm is strong a sharp bend moves from the center of arch to the East	Terrified, ran to the side Keresaspa

The following is an English translation of Yasna 9.11 by J. Josephson: “who [Keresaspa] slew the poisonous yellow, horse-devouring, man-devouring, horned dragon and upon whom a poisonous plant grew to the height of a lance, the yellow (one) upon whom Keresaspa cooked food in an iron cauldron at noon_time the scoundrel grew and began to perspire. He knocked the iron cauldron forward; he intended to throw aside the boiling water. Terrified, ran to the side Keresaspa” (“The Pahlavi translation technique as illustrated by Hom Yasht”, Uppsala, 1997, p. 52).

Hermes and the Thracian Notion of Cosmic Time

Nikolai Sivkov

A clay protome of a ram (23 cm high) found in the village of Bosnek (western Bulgaria) represents an ancient Thracian lunar-solar calendar. The calendar information is coded through engraved signs and holes (parapegma). The signs can be divided into three groups:

1. the central group of signs is located on the ram's back and includes engraved "fish bone" notches (28 + 31), holes (parapegma) (16 + 12), and lunar signs (moon phases?) (15 + 7);

2. a group of signs on both sides of the ram including engraved notches on the ram's horns (20 + 18), engraved "fish bone" notches (17 + 3 + 3 + 6 + 16), holes (2 + 3);

3. a group of engraved notches (11 + 18) and holes (2 + 2) on the front of the ram.

The quantitative analysis of the signs shows that the calendar consists of information on the synodic and sidereal lunar months, lunar and solar year, the saros period, the lunar and solar eclipses, etc. The first group of signs can be used in every-day life for time reckoning.

Another type of information on the ram protome is of mythological nature: images of a caduceus, bird-snake, birds, elements from the phallic cult.

The ram's image is related both to the lunar cult and the zodiac. In antiquity the day of the vernal equinox was in the constellation Ram. At that time the new solar year began. In ancient mythology the ram is a mediator both in space and time.

As a divine animal the ram is connected with Hermes, the god holding a caduceus. Hermes is also a mediator. In Thracian mythology the ram is his beast of burden. Hermes was considered the god of kings, who derived their divine origin from him. The "Golden Fleece", which Hermes gave them, was a symbol of power and wealth. Through Hermes kings played the role of mediators between gods and people.

In south-western Thrace and Macedonia Hermes was associated with the cult of Kabirs, the sons of Hephaistos. Hermes was the fourth Kabir. The sacrifice of a ram occupied a central position in the mystic rituals of a phallic nature connected with the Kabirs. The area of this cult borders on the region where the ram protome was found. It is noteworthy that Bosnek was a well-known metallurgical and cult centre in antiquity.

Hermes' connection with the Great Mother Goddess gives him the authority to participate in calendrical agrarian rites together with the king-priests. Being the "fourth Kabir", Hermes takes part in the sacral initiation. In this connection, Hermes is responsible for the cosmic calendar, which measures cyclic cosmic time.

The ram protome represents a similar sacral calendar. Its sanctity is encoded in the image of the ram as Hermes' beast of burden, as well as on other semantic levels. The protome is a zoomorphic model of the Arbor Mundi, typical of the Thracian-Dacian culture. The three-part structure of the traditional Arbor Mundi is transformed into a two-part structure: the upper and lower zones of the Arbor Mundi are united into the image of a bird-snake, while the ram symbolises its middle zone. The image structure can be interpreted as the scene of a fight between a horned/hoofed beast and a griffin, which combines the features of mystic creatures from the upper and the lower worlds. Similar scenes are related to the changes in nature, which are considered to be the cosmogonic act of the nature's revival through destruction.

In ancient cultures natural and social order are interrelated through the rites. The coordination of the consecrate rites with the rites from the calendar cycle was performed by the king-priest, and therefore by Hermes.

The Northern Lights As Messenger From the Other World and Harbinger of War and Disasters

Jan-Erik Solheim

As we investigate how the aurora has been interpreted throughout the ages, we can also get an idea of the general development of culture, and a better idea of the connection between nature and culture. In this presentation, I will first give a short description of the scientific explanation for the Aurora, and show some examples of their colours, structure and movements. I will then present some of the explanations people have given for these phenomena – at least as far as they are found in written sources.

The appearance of the Northern lights – or Aurora Borealis is related to the activity of the sun, the position of the geomagnetic poles, latitude and the weather. Today we can see the aurora on almost every clear night at certain northern latitudes. The aurora normally occupies a region best described as an oval centred on the geomagnetic pole. The thickness of the oval depends on solar activity, while the distance it radiates from the geomagnetic pole depends on the time of day. Solar winds occur in bursts, and what we might call space weather, varies from a gentle breeze to storms of violent magnitude. This mixture of predictability and randomness makes it natural that auroras have been associated with events of the same nature on Earth, such as disasters, wars, and deaths. In addition, the movements of the auroral arcs, and their changing forms have inspired ideas of dance and messages from the gods above us.

In the cultures of the Nordic people many different explanations for the Aurora Borealis have been given throughout the ages. The oldest we know of identified the auroral arc as a bridge between the living and the dead. When a warrior died he left this world and had to cross over to the next on a bridge that appeared in the sky at night. In some cultures it was also interpreted as a river one had to cross in order to reach the other world.

Further South in Europe, the auroras appear more seldom. They are related to the eleven-year sunspot cycle and overall solar activity. The southern aurora was more often red in colour, and in mediaeval times the red aurora became a harbinger of coming wars and disasters. In Greek literature the vertical structures were related to the horns of goats, and their movements were interpreted as jumping goats, or fire in the heavens. It was also common to lump comets, meteorites and auroras together, giving everything not identified as a fixed star or a planet the name kometas or comet.

Some Remarks on Possible Astral Imagery in *Hymiskvida* and *Gylfaginning 48*

Arkadiusz Sołtysiak

Among the mythological stories of medieval Norsemen we can found a short tale about the meeting of Thor, the god of storm, and Midgardsorm, the serpent which encircles our world. One version of this story was included in the Elder or Poetic Edda (Hymiskvida), the second in the Prose Edda by Snorri Sturluson (Gylfaginning 48). Both narratives differ in some details, Snorri's version will be reported here:

Once upon a time Thor decided to visit a giant called Hymir. At dawn they both went out to sea to do some fishing. Thor took the biggest ox from Hymir's herd, tore off its head and took it as bait down to the sea. The ox was called Himinhriod. On the sea, Thor was rowing forward, too far in Hymir's opinion. Eventually they stopped, Thor fastened the ox–head to the hook and threw it overboard. Then "Midgardsorm stretched its mouth round the ox–head and the hook stuck into the roof of the serpent's mouth". The struggle began, which was stopped by Hymir who cut the line and let the serpent sink into the sea. The Poetic Edda provides us with more details: Thor visited Hymir together with Tyr and their task was to trick the giant out of a boiling pot . During their journey, both Æsir crossed the cosmic river Elivag, which separates the realms of gods and giants.

Bjorn Jonson has proposed a planetary interpretation for this story: Thor and Hymir are seen to be Jupiter and Saturn looping in the constellation Cetus, representing Midgardsorm. Such events would have been seen in 233 AD or 1085/7 AD. However, the basis for Jonson's hypothesis is very weak: there is no single direct or even indirect piece of evidence that the Norsemen observed the sky and interpreted planetary phenomena of this kind in a mythological way. In both Eddas there are only two cases of simple etiological stories concerning distinctive fixed stars, called Aurvandil's Toe (Skaldskaparmal 17) and Thiassi's Eyes (Skaldskaparmal 56).

Bjorn's hypothesis thus, appears then to be baseless. However, there are a few elements in the story about Thor and Midgardsorm, which could be interpreted as deriving from astral imagery. The first one is the river Elivag: according to Hymiskvida, Hymir lives at the edge of the sky to the east of it. In Snorri's opinion the river flows out into the cosmic chiasm Ginnungagap. It is likely that the name Elivag denotes the Milky Way, although no direct evidence can be found to support this statement. The second element is the name of Himinhriod, which can be translated as "the destroyer of heaven". Finally, there is a drawing of Midgardsorm in the codex AM 738 4°, which shows the serpent with forelegs only, a long tail, bearded face, horn, and an open mouth directed towards the bull's head. Such a pattern is typical of the representations of the constellation Hydra in Near Eastern and Graeco–Roman traditions.

These three elements are not sufficient to allow us to state that the story of Hymir and Thor should be interpreted as a kind of etiological story concerning the constellations Hydra and Taurus, however the possibility of such an interpretation must not be underestimated, taking into account the predisposition the Norsemen had for riddles. Moreover, the influence of Graeco–Roman or Arabian astrology also cannot be excluded.

Shamanic Clay Figurines From the Jettbole Stone Age in Åland

Bo Sommarström

The "Clay Gods" were the sensational find of Åland's pioneer archaeologist Björn Cederhvarf, who discovered them in 1905–1911. He had dug a large number of exploratory pits around a sand region. Objects of a new type dating from about 2500 BC, when the pit-ceramic culture arrived from the west, were found everywhere. In 1908 a young M.A. archaeologist, Hugo Sommarström, one of my uncles, who was born in Åland actually participated at these digs.

Buried in the thick, black soil lay a great many small fragments of burnt clay figurines. They were stylized figures of humans with plotting geometric patterns on the bodies and markings on the heads, which Cederhvarf interpreted as beard and hair. These human figures were probably relics of the Eastern comb-ceramic inhabitants, who occupied the Åland archipelago from about 4000 BC.

The figurines were made from more or less unmixed clay as opposed to ceramics containing pottery which always exhibits some degree of meagerness. Altogether they collected about one hundred fragments from approximately sixty human figurines.

The clay figurines were a sensation at the time because until then, at the beginning of the twentieth century, archaeologists had never found clay figurines of humans at stone-age sites in Scandinavia. At that time only animal figures in burnt clay were known. Cederhvarf thought that the figurines had been used as idols in connection with cult practices, and reflected cultural influences which had worked their way into Europe from the east.

Björn Cederhvarf's first published his findings of the Jettböle collection in an article in Swedish "Neolithic Clay Figurines from Åland", in 1912 in Finska Fornminnesföreningens Tidskrift, XXVI. The introduction from the above-mentioned work was largely used by Jan Andersson in his Swedish article "The Gentleman & The Clay Gods", with summaries of the Jettböle finds in English, Finnish, and German (published in 1997).

Archaeologic studies of different traditions can result in interesting interpretations of the abandonment of various [cultural] practices. In a book entitled "Shamanic Shadows" in Southern Scandinavia (7000–4000 BC)" by Jimmy Strassburg (doctoral dissertation, 2000, Department of Archaeology, Stockholm University) we can find partially transformed variations of such anthropological practices as animism, shamanism and totemism.

A number of objects from pre-ceramic traditions in Southern Scandinavia, for instance the Maglemose, Blak, and Aceramic cultures, exhibit the general presence of spirit beliefs, and ideas of spiritual communion between human beings and animals, as well as representations of various shamanistic practices and performances for example asking permission to enter a state of trance.

A dramatic time of Cosmic Reformation began, at least indirectly, due to the melting of the American ice shield. The extensive loss of land as the climate became warmer and moister was most likely seen as the work of raging water spirits. Eventually, a new type of shamanism emerged, which apparently relied more on passing through earth and stone than through the misty waters to reach the important netherworld.

In my lecture I will present some more ideas from the "Origins and Interpretations of the Figurines in Åland" by the specialits Boýena Wyszomirska and Milton G. Nunez. Also "The Old Europe" (6500–3500 BC) by Marija Gimbutas, and idols from Siberia and the Silk Road, finally finding the North Star and other Star Constellations.

The Astronomical Orientation of Central Apses in Dacian Sanctuaries in Romania

Florin Stanescu

The Dacians (Daces) as they were called by Latin writers or Getics (Getes), as the ancient Greek writers called them, formed the north branch of the Thracians. The ancient capital of the Dacians, Sarmizegetusa Regia, lies in the Orastie Mountains of Romania.

In the sacred precinct of Sarmizegetusa-Regia, in the vicinity of the fortress walls, eleven round, rectangular sanctuaries were discovered. Here we find erected on the tenth and eleventh terraces, the Great Limestone Sanctuaries (with four rows of 15 plinths), the Small Limestone Sanctuary (with three rows of six plinths), the Great Round Sanctuary, with a diameter of almost thirty metres, the Small Round Sanctuary with a diameter of almost thirteen metres, two other rectangular andesite sanctuaries, the Great Rectangular Andesite Sanctuary (with six rows of ten elements each), and last but not least, the altar, a sundial known as "The Andesite Sun". Similar sanctuaries are also found at Costesti, Racos, Brad, Barbosi Galati, Fetele Albe, Pustiosu, Batca Doamnei. These are, of course, smaller in size and lack the stateliness of those at Sarmizegetusa Regia.

An analysis of the orientation of the longitudinal axes of the central apses of Dacian sanctuaries and civil building at Sarmizegetusa-Regia, Racos, Meleia, Pustiosu, Fetele Albe, have, as well as some other aspects of the apsidal constructions leads to the following series of conclusions:

1. All longitudinal axes are aligned in the north-west, south-east direction, therefore on an axis pointing to the winter solstitial east and the summer solstitial west.

2. With a single exception, the azimuth of the longitudinal axis is placed within the interval of 56°–33°

3. They are thusly aligned in the big sanctuaries. Sarmizegetusa-Regia and Racos are aligned exactly along the above-mentioned axis and they have an azimuth of about 55°. Thus, they seem to take the mathematical horizon of the location as a guide.

4. The apsidal constructions as well as the smaller and older sanctuaries have an azimuth of about 33 °. This fact could have the following explanations:

a) the orientation has been guided by the physical horizon of the location respective of the point where the sun becomes visible from behind a higher physical horizon;

b) the orientation is intentionally placed for reasons that for the time being remain obscure. It is possibly aimed at another star or planet;

c) the orientation has only been made approximately at the same time aiming for the above-mentioned axis.

Study of these points is still on-going and, consequently, the conclusions concerning the apsidal constructions as well as that of some of the older sanctuaries are still only provisional.

As far as the big circular sanctuaries from Sarmizegetusa-Regia and Racos are concerned, they are aligned exactly along the afore-mentioned solstitial axis and, in our opinion, the only question which still waits for a convincing answer is the one concerning the way the Dacians determined and drew (marked) with such accuracy these astronomical directions relating to the mathematical horizon, considering, for example, that the construction of the Sacred Terrace from Sarmizegetusa-Regia, is on a location with a closed mathematical horizon.

Solstitial sunrises and sunsets also pervade the myths and legends of the Romanian peasant still today. On the other hand, the development of these apsidal types, some of them of even greater dimensions, with their solstitial orientations, can clearly be associated with the sun cult and find parallels in many different parts of Europe.

Catastrophic Cosmic Events in the Roman Sky Through History

Magda Stavinschi, Vasile Mioc

Irrespective of the era, people have always lived in fear of possible catastrophes. And even if those caused by man could be avoided to a certain extent, natural catastrophes seem always to be inevitable.

They can be terrestrial or cosmic. In the first category, the most menacing seem to be earthquakes, volcanic eruptions and hurricanes. All of these are nevertheless connected to our planet and, in spite of all the dangers and negative consequences they pose for man, they have been more easily understood and have inspired less fear than those that come from the sky.

Some cosmic events used to create terror only because there was a lack of knowledge about them. This is what happened for thousands of years with solar and even lunar eclipses. The unique show created by a total solar eclipse, especially as a consequence of the disappearance of light, manages even today, in spite of all the scientific explanations concerning the nature of the phenomenon and the protective measures that have to be taken, to create panic or at least fear sometimes.

However, eclipses can be predicted a long time in advance with a remarkable degree of accuracy. The same could not be said, however, for the appearance of comets (only a part of which have relatively short periods which allowed for them to be predicted) or for the debris of comets, or of asteroids, i.e. meteorites. Let's not even mention the alarms given by the mass-media concerning a possible collision with an asteroid or comet. Even the so-called alignment of planets or the transition from one century to another are today front-page topics for the newspapers. We should not forget that today we live in the information age, space missions and communications occur today at speeds and over distances almost impossible to have attained only few decades ago.

But what about people's reactions, let's say, only a century ago? The abysses of the Universe have always been the source of possible catastrophes that could lead to the disappearance of human beings.

Obviously, no place on Earth was exempt and an analysis of documents kept throughout the centuries from one end of the globe to the other does nothing if not prove the state of mind of the population when faced with such events. These are also scholarly documents, despite of the approximate nature of some of the information provided, which scholars cannot do without.

As we have already mentioned, each one of the unpredictable celestial events or those of an extremely rare appearance was a reason for fear, but we shall restrict our presentation only to the most spectacular and "frightening" of all – the comet.

The Romanian territories, especially the eastern regions, deprived of the protection provided by the Carpathian mountains, were too often shaken by wars, invasions, foreign occupations, as well as by natural catastrophes, such as great earthquakes or epidemics of great magnitude, for libraries, archives or universities to preserve many of the documents about them. The safest places to preserve them but also to create them were the monasteries. It was here that the population retreated during the wars and here were the nations treasures, including the cultural ones, kept. It is here that we find the records, very often made by the monks themselves, of the cosmic events that took place in the Romanian sky, as well as the reactions of those observing them.

The first rich archives are those dating from the 14th century. Thus we shall refer to the events we have found beginning with this century, and finish with the nineteenth century when our culture

embarked on its modern course.

Each appearance of a comet can be a topic to be studied in and of itself. We might review the dates of the appearances, the brightness and the colours of the comet, its trajectory in the sky, the place from where it was seen, make comparisons with other records of the same era from other places on the earth, calculate precisely its passage on the basis of the data known today, make an identification with well-known comets, etc.

However, in this presentation we are interested more in the echo each one of them had among the population of the time. This fact actually reflects both the level of the knowledge of the era, as well as the state of mind of the people at that time. Why? Because if a cosmic appearance took place in conjunction with some other calamity, be it natural or artificial, it was easy for the people to associate the two, just as the amplitude of the cosmic event could modify the perceptive degree of the cosmic menace.

Many comets, some more impressive than others, have been recorded in Romanian documents. Here we will deal only with those that were associated with terrestrial events.

The fourteenth century seems to have known but a single important comet, namely the very bright one of 1382. Considering the time that has elapsed since then, documentation about other cometary appearances at the time might have simply been lost. The archives of the fifteenth century records the comets of 1402, 1456, 1457, and 1473. The following century witnesses the passage of the famous Halley's comet in 1531, but also other comets, in 1517, 1545, 1556, 1577, and 1593. In the seventeenth century six very bright comets were associated with earthly events, namely those appearing in 1618, 1652, 1664, 1668, 1680, and 1683. By now we are getting closer to the modern era, when the archives became ever richer and we learn that in the eighteenth century only one impressive comet in 1744 was associated with terrestrial events. Finally, we finish with the nineteenth century, when four comets passed over the heads of the Romanians, who were involved in a truly revolutionary turmoil, namely the comet of 1821, the year of the Greek revolution, one comet was observed ten years prior to the revolution, and two others were seen in 1853 and 1858.

The nineteenth century was not just one of strong national struggles, but it was also one of true cultural revival. Due to the developments in education, as well as the beginning of the first scientific researches in the modern spirit of the times, the notes on the cosmic events began to have a pronounced scientific character. At the same time other cosmic events were increasingly becoming the goal of scientific expeditions (we mention here only the one made to Senegal, in 1893, to observe a total solar eclipse).

However, both at the beginning and end of the Middle Age, just as unfortunately, even today, the reactions of the witnesses to those cosmic events were often terrific in their scope. Among natural calamities, the comets were considered to presage earthquakes, black plague, weak harvests, drought, floods, famine, livestock epidemics. In terms of social events, they heralded wars, political and religious struggles, the deaths of prominent political personalities (kings, princes) etc.

Naturally, fear is not always unfounded. Let us not forget that it was well into the twentieth century that the nucleus of a comet collided with the Earth in the Tunguska region, and that at any time another one may come crashing down. All we can do is study to the best of our abilities the trajectories and physical data of such events and make strides in space technology, so that in time comets will become for the general public a fascinating show, worthy of being admired and observed.

The Fall of a Meteorite at Aegos Potami in 467 BC

Stratos Theodossiou, Panos G. Niarchos, V. N. Manimanis

Aegos Potami (a name meaning in Greek 'Rivers of the Goat') was a small creek (torrent) and an ancient small town built next to its estuary, on the eastern shore of the Galipoli Peninsula of Eastern Thrace, opposite Lampsakos (see map). Today the site is occupied by the Turkish village of Karakova. On the shores of the ancient town, in the autumn of 405 BCE, the Athenian and the Spartan fleets faced each other. The Spartan admiral Lysander managed to conquer the Athenian fleet. The catastrophe was complete for the Athenians. The Spartans seized 170 ships and captured and then killed 3,000 men. This catastrophic encounter signified essentially the end of the great Peloponnesian War with the defeat of Athens. As a result (Xenophon "Hellenica" II, 1, 18–24), Athens, having lost almost all of its allies, was besieged from both land and sea by the Spartans under Agis and Lysander and finally capitulated under humiliating terms. The power of Lysander (455–395 BC) was so great after his victory at Aegos Potami, that the Samians honored him as a hero and semi-god, while for a number of years the famous local festival of Heraia were held under the name Lysandreia.

Ancient writers and doxographers were of the opinion that this catastrophe had been foretold by the fall of a very large stone meteorite (aerolith) in 467/466 BC at Aegos Potami. According to Diogenes Laertius, Pliny, Plutarch and other authors, the philosopher Anaxagoras predicted the fall of this meteorite in 467 BC, for which he said that it would fall on Earth coming from the Sun ["Marmor Parium" ep. 57 (FG "Hist." 239 A 57, II 1000)]: "Since the stone fell at Aegos Potami and the Simonides the poet deceased years ... ... Theagenides being the eponymous archon in Athens." Anaxagoras held the view that the meteorites were celestial bodies whirling in the higher places of the cosmic whirl and from time to time happened to fall on the Earth from the sky.

Of course, the fall of a certain meteor – in this case an aerolith – was impossible to predict, however, that impressive event can be related with the equally pioneering views of Anaxagoras about meteors and stars being huge stones.

Pliny the Elder (Gaius Plinius Secundus, AD 23–79) reports the same event in his "Naturalis Historia" (Plin. N.H. II 149) and in addition he mentions some other meteorite which fell on Avydos, again after a prediction by Anaxagoras:

"The Greeks say that Anaxagoras of Clazomenes succeeded during the second year of the 78th Olympiad [467/466 BC] with his knowledge in astronomical (celestial) literature to predict that some days later a stone from the Sun would fall, and this happened during the daytime at the area of Aegos Rivers of Thrace – and this stone can be viewed even today, having the size of a coach and brown color – when a comet was shining during the nights. If one believes in this prediction, he must at the same time accept that the supernatural abilities of Anaxagoras himself consisted an even greater miracle, that our understanding of Nature is zero and everything is in confusion if it is credible that either the Sun itself is a stone or it ever used to have a stone inside it. Yet it is not doubted that stones do fall frequently. For this reason, in the sports center of Avydos they still worship today a stone, medium-sized to be fair, for which it is said that Anaxagoras had again predicted its falling at the middle of the earth."

We note that Avydos (Abydos) was an ancient city of Mysia, to the NE of today's Hanakkale, on the Asian shore of the Hellespontus and at the most narrow part of the channel (see map). Perhaps it is a coincidence, but in 411 BCE one of the most violent naval battles of the Peloponnesian War took place near Avydos (before the battle at Aegos Potami), and in that first battle the Athenians had won a victory against the Sparta.

The “Dragon Houses” of Euboea: Ancient Megalithic Observatories?

Stratos Theodossiou, Panos G. Niarchos, V. N. Manimanis

In the Oche Mountain and in other places of southern Euboea, 22 mysterious megalithic buildings are preserved in good condition. They are known as *Drakospita* ‘Dragon Houses’ but their builders, the way they were built and their purpose are unknown. We postulate that they, and especially the best-preserved one (that of Oche) were holy buildings dedicated to the worship of Teleia Hera (the “Perfect Hera”), the protector of marriage (a goddess corresponding to the Roman Juno). Local tradition holds that these structures were built by dragons, and that here resided the king of the Cyclops. The reason is simple: only giants, dragons or Cyclops were capable of transporting the huge rocks that were used for its construction. We think that the true constructors were the Dryops, an ancient prehellenic tribe worshipping the goddess Hera.

If the Drakospita were dedicated to Hera, this leads us to certain conclusions. We must not forget that, according to Greek mythology, Hera was the symbolic personification of celestial/atmospheric disturbances. This view connects Hera with celestial phenomena contradicting the alternate view, which considers the goddess the protector of marriage and Earth. According to the first view, we present arguments that at least the Drakospito of Oche was not only a place of worship of Hera, but also an ancient megalithic prehellenic observatory of celestial phenomena.

Celestial Phenomenon in the Symbolism of Lithuanian Folk Sashes

Vytautas Tumenės

One of the most archaic, exceptionally sophisticated and meaningful artefacts of Lithuanian folk art are its woven sashes. Their symbolic function, the meaning of the decorative patterns and their mythological images have many connections to cosmology.

The sashes are a very popular symbol in national ceremonies and also a necessary part of national costumes where it serves as a belt. The tradition of the sashes in Lithuania begins in about the sixth century. Their ornamentation became very elaborate as early as in the eleventh century.

In the traditional rural culture of Lithuania the sash is a symbol of the spiritual relationship between the people and the world (universe). The sash played a role in spiritually safeguarding the wearer and bringing them luck. The very act of weaving (spinning etc.) also had a aphothropeic, magical function. It was associated with the creation of harmony and the cosmos: people believe that weaving influences the life of domestic animals and ensured an auspicious wedding to those young girls skilled in weaving. Because of its destructive influence it was strictly forbidden to weave during the Advent period and between the New Year and Epiphany. Friday, Saturday, Sunday, Monday and Tuesday also had taboos to a certain extent in this regard, you could not begin or the finish a sash.

The sashes are exclusively associated with *Laumės,* the nature spirits of water and light (comparable to pixies, witches, lamias), and the goddess *Laima* (the hypothetical wife of the thunder god *Perkūnas*) but not to any other mythical being. *Laima* and *Laumė* are linked not only with the women who made the sashes, but also with celestial phenomena. For example, the rainbow is called *Laumės* or *Laimos juosta* 'The Sash of Laumė' or simply *Laumė*. Another name for the rainbow *vaivorykštė* is associated with sparkling and lighting. The existence of sky waters is explained by the appearance of the rainbow *Laumė,* which is also called *Smakas* 'The Dragon', who drinks water from the rivers and lakes. Folk names of comets shows that they were also associated with *Laumė*. The spider, the greatest weaver of nets in Lithuanian folklore is believed by the people to be linked with *Laima.* The spider similarly, is associated with happiness, fortune, (in Lithuanian *laimė* 'happiness', *palaima* 'bliss'). It is said that spiders carry good or bad fortune, depending on the time of day, either before or after noon.

There are other deities close to *Laumė* and *Laima,* who are also associated with all weaving technology. They are *Aušrinė*, the daughter of the Sun, (Venus) and deity of the bees – *Austėja*. Her name originated from *austi* 'to weave'. The flying of bees, their building of honeycombs are also associated with weaving. On another hand, the protector of bees and honey, and the producer of mead is *Laima*. Thus, in Lithuanian folklore all weaving technology belongs to the feminine aspect of the Indo-European myth about the Divine Twins, who, with the Sun Maiden, look after the Sunrise and Sunset. This is the opposite of Indo-Aryan mythology, where weaving and honey are associated with the male Divine Twins *Ashwins,* who look after Ushas (analogue of Lithuanian *Aušrinė*).

In the sash decoration we also find motifs that are directly linked with Laima or Laume. The herring bone pattern is traditionally called in Latvian and Lithuanian *šluotelė, eglutė* or *Laumas slotina, skujina, Laimos •ymė* ('broom', 'spruce', 'pine/spruce needle', 'Laima's sign') and is related to *Laumarykštė* ('Laumė's brooms') often found in spruce and birch-trees.

The very form of the sash and how it is exhibited in Lithuanian culture makes it similar to the snake. It is compared with a snake in folklore as well. Lithuanian and Latvian names of the serpent sign in the sashes •*altinėlis, zalktis* 'the grass snake' shows the relationship of this pattern with the mythical symbolism of a snake. Earlier we made a hypothesis that it has meaning as a spiritual mediator. The sign of the serpent in Baltic archaeological finds also allows us to associate it with the sun or the moon symbols.

The importance of the weaving process and the sash in folk customs, beliefs, and folklore, strongly associated with traditional cosmology, shows that the sash and the weaving process are among the most ancient and archaic phenomena in Lithuanian culture.

Reflections of the Ancient Cosmos in the Decoration of Distaffs From Lithuania

Jonas Vaiškūnas

This paper analyses the meaning of the ornamentation found on Lithuanian distaffs. A distaff is a wooden implement used for holding the fibre when spinning flax with a hand-spindle. It is one of the oldest wooden tools with ornamental decoration. The study is based on the exhibits of the Lithuanian museums from the end of 18th and 19th centuries (Kargaudiene 1989; Juodzeviciene 2000).

The four, six and eight-pointed stars in the circles are the most prevalent in the decoration of the distaffs (Fig. 1 A, B). We usually associate the six-pointed (segment) star with the traditional division of space into 6 parts, in which we can distinguish the north and south directions and the four marginal winter and summer sunrise/set azimuths. Similar examples can be found in ancient India (Golan 1994: 150) and Central America (Sosa 1989: 132–135). Thus, the segment star stands for the cardinal phases of the Sun's rotation around the Earth and it can be interpreted as a symbol of the space-time structure of the Cosmos (Meier-Boeke 1941: 179–186). The ideogram of the Sun's rotation can at the same time also be interpreted as the symbol of the Sun itself, light and time.

Besides the usual segment star in the distaff designs we can also distinguish symbols for trees (plants), birds, stars, water, ploughed earth, snakes, animals, and people. In the lower part of the plane surface of the distaffs we usually find depicted (grass-)snake-like, S-shaped symbols (Fig. 4) and in the upper part, birds (Fig. 3).

Two segment stars depicted on the vertical axes of a distaff are linked with the Earth and Sky (Fig. 1 A, B). Often these two spheres are connected with vertical meanders of water, the patterns of plants or squares of the Earth, or with the image of the Pole. Between these spheres there may be

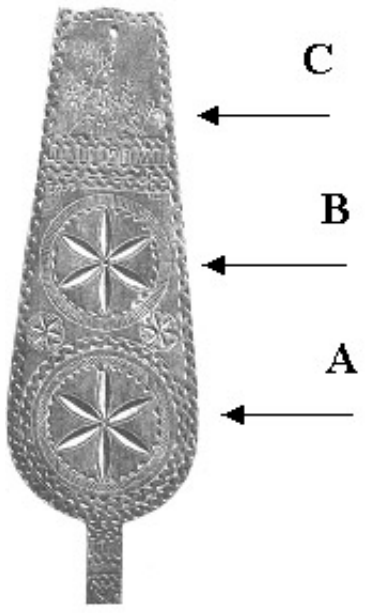

Fig. 1


Fig. 2


Fig. 3


Fig. 4

depicted scenes from human life too (Fig. 2). Sometimes one can find the mythological Tree or some other plant that grows through all the spheres of the world.

In the upper part of the distaff below the usual segment stars an autonomous or even closed sacred space is sometimes depicted. Here we can find images of stars, trees, birds, flower gardens, gates or temples (Fig. 1 C; Fig. 3). We have tried to associate these with the Lithuanian image of paradise (*Dausos*) as a celestial garden, which is located under the vault of heaven. Similar motifs are also found in Slavic countries (Serbia, Verchniaja Volga) (Rybakov 1987: 511).

The ensemble of distaff symbols represents the imaginary structure of the world. The structure of the world is represented as a combination of its horizontal and vertical projections in one design. On the vertical axis there are horizontal sections representing the two or three layers of the World laid out. Often all this structure is framed by meanders, which symbolise the World surrounded on all the sides by the Cosmic Waters. The very form of the distaff is associated with the silhouette of a tree. The silhouette of a tree, which embraces all the details of the World, serves as a symbol of the integrity of the micro-structures of the Cosmos. In this way even an undecorated distaff can be understood as a material symbol of the Cosmos.

Cosmological interpretations of the distaff decorations are based on the sacred and mythological importance of the spinning process in Lithuanian peasant culture. In Lithuanian mythology there is also a well-known image of the three spinning deities of fortune that are linked with the starry sky.

Cup-Marked Stones (“Star Maps”) in Belarus.

Sergey Vitiaz, Varelyj Vinakurau

Erratic boulders (of more than 1 m) are a characteristic natural as well as ethnocultural component of the landscape of Belarus (Liakou 1992, 1997). Research starting from 1977 has revealed more than 1000 boulders that are definitely connected to local national traditions (more than 300 of them have been thoroughly documented). Many of the boulders have different kinds of markings on their surface (figures, signs, inscriptions, furrows, orifices, curly fragments, recesses). Among these is a particular group of 29 boulders that bear in their surface the same type of recesses of an obviously artificial origin in the form of round cup-like indentation with a diameter of 3–5 cm and a of depth 1–5 cm:

No.	Names of boulders	Localization (village, district, region)	Quantity of recesses
1	None	Sipavichy, Braslav, Vitebsk	1
2	Vialiki (Great)	Kublichy, Ushachy, Vitebsk	1
3	Dziuravy (Torn)	Kaptaruny, Pastavy, Vitebsk	1
4	Vialiki (Great)	Vasilishki, Shchuchyn, Grodna	2
5	Chortau (Devil’s)	Kamiano, Vileika, Minsk	2
6	Vialiki (Great)	Litouka, Navagrudak, Grodna	2
7	None	Baroucy, Vileika, Minsk	3
8	Vialiki (Great)	Iushkavichy, Miadzel, Minsk	3
9	None	Galynka, Zelva, Grodna	3
10	Piarun (Thunder)	Taukine, Voranava, Grodna	4
11	None	Zabalaccia, Iue, Grodna	4
12	None	Vialikaia Krakotka, Slonim, Grodna	5
13	Budrevichau (Budrevich’s)	Remzy, Voranava, Grodna	5
14	Vialiki (Great)	Remzy, Voranava, Grodna	6
15	None	Staroe Dvaryshcha, Braslav, Vitebsk	7
16	Sedlavy (Saddle)	Zanarach, Miadzel, Minsk	8
17	None	Utki, Vileika, Minsk	10
18	Vialiki (Great)	Daragliany, Masty, Grodna	12
19	None	Vostrava, Zelva, Grodna	12
20	None	Pashevichy, Braslav, Vitebsk	14
21	Vialiki (Great)	Balichy, Shchuchyn, Grodna	31
22	Chortau (Devil’s)	Vialec, Glybokae, Vitebsk	33
23	Vialiki (Great)	Zarechcha, Shchuchyn, Grodna	33
24	Vialiki (Great)	Zeniaucy, Shchuchyn, Grodna	35
25	Vialiki (Great)	Mishuty, Vileika, Minsk	84
26	None	Dainova, Lida, Grodna	more than 50
27	None	Dounary, Iue, Grodna	more than 50
28	None	Urcishki, Iue, Grodna	more than 50
29	Vialiki (Great)	Dvaryshcha, Vileika, Minsk	Up to 100

What distinguishes these stones from the other Belarusian boulders is the scarcity or, as is more often the case, the full absence of any accompanying ethnographic information about them. Even names for the boulders were recorded for only half of them and most of these merely reflect their superficial characteristic, they were merely referred to as "Great" stones. Because there is no clear indication from the local sources themselves as to the essential function of these boulders, it is quite probable that we can determine this by comparing them to analogous monuments from adjacent regions, where they are simply referred to as "cup-marked stones" (such boulders have been found in the territories of Lithuania, Latvia, Estonia, Germany, Scandinavia, etc., see Tvauri 1999). While no uniform judgement in this matter has yet been passed, there, nevertheless exists a generally accepted suggestion that the various congestions of recesses (cups) on the surfaces of the boulders are actually ancient images of the star-studded sky (Müller 1939; Sciatskij 1962; Vaitkevicius 1996; Vaiškūnas 1996). As far as the Belarusian boulders under scrutiny are concerned such an interpretation has only been applied to one of the objects (No. 20). It was suggested by the Lithuanian scholar J. Vaiškūnas (1996) that the markings on this boulder specifically represent the constellation Cassiopeia, which in Belarusian tradition is known as *Kasary* 'Choppers'. It is hoped that the remaining images can like-wise be interpreted in a forthcoming publication which will include a brief characteristics of the monuments by type:

1. relatively large boulders with a diameter of 5–12 m, surface area of 2–10 sq. m, such dimensions result in the rather stable nature of the monument;

2. the presence of typically flat platforms (frequently horizontal, or table-like) along the perimeter of the boulder), on which the cups are placed, that testifies to their functionality;

3. typological proximity of the cups in form and sizes, irrespective of the structure of the stone, that suggests an artificial origin of the cups and a uniform approach to their creation.

Boulders of the given type are located in the outlined area in the north-west of Belarus. This in no way corresponds with the geological distribution of large erratics in general, but correlates well with the archaeological areal of the Ponemanje String Ceramics culture (a local variant of Baltic culture). It indicates, that such monuments, i.e. cup-marked stones, or "star maps" were originally created by the representatives of this particular culture, and provides a time-frame of between 2000–1500 BC for their creation.

The Coming of Pele. Beginning Again to Discover the Ancient Ways

Francis X. Warther

About two hundred years ago, the Hawaiian indigenous culture had decided to close their "Schools of Knowledge" located in Wailua in the islands of Ili Hia.

They had come under extreme pressure of a conquest from a Warrior Patriarch society from Tahiti located in the south tropic. The Hawaiian people who lived in the north tropic were an ancient matralenia society with a creator goddess and hula religious tradition centered on the Planet Hokukalani, supported by untold Mele's of chant, dance, rhythm; composed by their navigator poet ancestors.

The grandparent (Kupuna) and senior members (Hanau mua) fell silent and the sky wisdom, star time calendar, and the ritual places and alignments of the suns were taught no more. It was to preserve "their life of the mind" that they chose not to teach.

When I came to Kauai in the late seventies there had been newly published old translated material, which I collected, but astronomically this Polynesia was a land of two tropics, a world of two different times and two astronomies which I had to investigate. Investigating the myths of the goddesses and legends and in hula chants, I'm finally becoming aware that a single myth was about a single aspect of tropic time, which I had never known or read about. This paper gives the reader insight into a hidden culture that is so very much based in astronomy which is of interest to the conference. The mythic story is about the change from one time month to another new age of the span of 2160 years. It's name gives the clue; it is called "Ili hia, or the over turning of the tides of time." I call this "The coming of Pele, the fire goddess".

Great seas of molten lava raise up and inundate the heavens, and the ancestral homeland is threatened.

The sea mother, Haumea, calls to the daughter Pele, to take her family and flee. Build your ship 'O Pele, a double ship without time.

Call to your twin mothers to be the double hulls of your ship, Pele, and unite them with the morning star and evening star, the sacred twins of hula

And Pele fashioned a great steering oar, only she had the strength to steer from time and its destruction into a new unknown. Taking the delta from her own genetic heritage, she placed to receive the north wind.

Come elder brother, Navigator, take the staff from the sea world tree. Younger brother Kane Apua, baby sun, sit by me. Malau Milu spector of Death, go forward.

Mother Haumea, passed a new birth, golden egg, "here Pele, Place this egg under your arm. This is younger sister Hi'iaka, who will be the first fruit of the new cosmos the sky to your earth."

Then Pele stood tall on the deck of Poha. Poha with her steering oar. "Come" she said to her navigator, "point your staff Paoa and dream us the way through the barrier of Gemini and Wailua path."

Pele's own island vanished beneath the lava, and a great swell of a volcanic sea arose, and the navigator chanted the wind dream destiny, penetrated the tropic world of time and they sailed through.

In that instant the golden egg opened, and the young Hi'iaka stepped forth and went and stood by

her sister Pele, and all nature was again united; Hi'iaka heaven to Pele earth, never to be parted.

The great double ship of fire entered the tropic twin heavens of the eight suns and double moons. Pele stepped out and planted her left big toe on Motu mana mana and stretching her body high, reaching out, rested her right eye on Hawai'I, the underworld.

Pele's body transformed into the twelve sacred islands of Ili hia "place of completion" and the path of salvation from the upper world to the underworld was completed.

Pele created the islands on an ecliptic alignment, that is from June solstice set to December solstice rise. Which is also pacific plate movement. In Hawaiian this is called *hele aka ka la* 'the circuit of the sun path'.

The two percussive sticks are used in the hula, called Ka la au, or sun time sticks, very similar to the Maya kin, also known as sun time sticks. The Hawaiians used the geography of their island as a metaphor of the path of reincarnation, that is the upper world to the under world or Gemini to Sagitarius – "The path of salavation".

Astronomy of the "Gothic" Stone Rings: Myths and Facts

Mariusz Ziolkowski

One of the recurring motifs in the archaeoastronomical debate is the problem of the astronomical interpretation of stone rings. I would like to dedicate this review study to a special category of those structures: namely, to stone rings associated with the so-called "gothic" cemeteries, located in Scandinavia and among others in Northern Poland, dated from the first to third centuries AD.

In present-day literature those structure are related to the migration of Goths from Scandinavia to the South-East, during the first centuries of the Christian Era, which has been confirmed historically. In the nineteenth and the beginning of the twentieth centuries they were dated to the eighth century BC, contemporary with megalithic structures such as Stonehenge.

One of the most famous sites of this type is Odry, a necropolis with stone rings located in Northern Poland. The astronomical interpretation of this site was elaborated by German scholars in the first half of the twentieth century (Stephan 1915; Mueller 1934). Following from this theory, the stone rings from Odry testify to a rather sophisticated astronomical knowledge on the part of its builders as solar, lunar and stellar orientations must have been taken deliberately into consideration during the planning and construction phases of this site. This elaborate theory has often been quoted in publications related to the history of archaeoastronomical investigations.

Recent studies (Piasecki, Sadowski, Ziolkowski 1982; Sadowski 1992) have demonstrated however, that the main evidence behind this theory, that is, the original plans of the site of Odry used by the German specialists, was in fact not very precise: the standard error in the orientation to the true North is more than 2 degrees. In effect the proposed precise lunar and stellar orientations must, to a great extent, be rejected. Of the very complicated system, proposed by the above-mentioned German scholars, only the solstitial orientation between some of the rings remains. It is worth mentioning, that this same orientation has now also been attested in two other "stone-ring" sites from Northern Poland, namely Grzybnica and Wesiory.

In this paper, the author presents new evidence concerning the planning and orientation of the "gothic" cemeteries with stone rings. The evidence is based on the results of recent archaeological studies at the sites of Tradkownica and Babi Dol and on some information dealing with the historical data related to the organisation of the traditional annual meetings known as "ting".

The Orientation of Graves From the Period of the Conquest

Endre Zsoldos, Miklós Pócs, Bela Szeidl

The influence of the sky on the everyday life (and death) of our ancestors can be seen in a variety of burial rituals. While the rituals themselves have not survived their result have remained in the form of cemeteries, standing stones, various types of buildings. We can get a glimmer of the rituals from the orientation of these structures. It seems quite certain that Neolithic or Copper Age people were already using the sunrise/sunset for the time of burial.

The ancient Hungarians, coming into the Carpathian basin, were no exception to this rule. The most promising line of investigation is to determine the orientations of graves in cemeteries. Several such cemeteries from this period were measured using published maps. The distribution of the orientation angles strongly suggests that the pits were aligned in the direction of the daily sunset/sunrise.

The distribution of the angles will be compared to those measurements taken in the more or less contemporaneous cemeteries of the Turks, who shared a very similar culture.

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