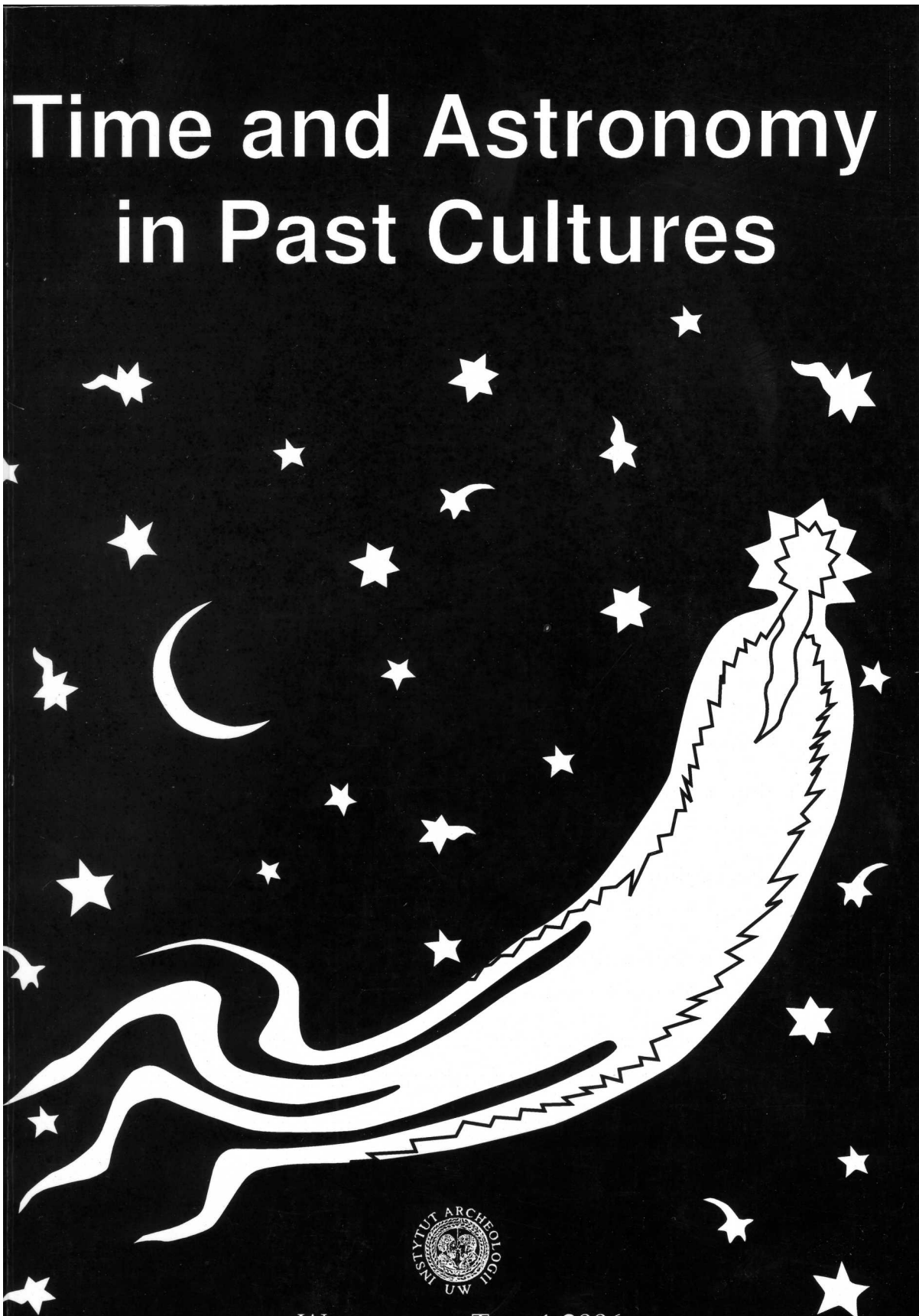
Time and Astronomy in Past Cultures



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The Observation of Celestial Bodies and Time Counting in the Lithuanian Folk Culture

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Abstract: *This paper deals with Lithuanian ethnographic data of the 19th and 20th centuries and with historical sources disclosing some of the Lithuanian folkways of counting time. This popular chronology is based on the observation of the Sun, the Moon and the stars. The Folk knowledge about the cycles of celestial bodies used to define the time of the day, the days in the year and the seasons is discussed and summarized. The ethnographic material shows that the azimuths of the sunrise and sunset were observed. The length of the shadow of a gnomon which can be a chosen tree or a person, etc., have been used as well as the simple observation of the eight of the Sun above the horizon.*

We certainly know that the changes of Moon phases and its positions among the stars and constellations were observed for the Moon calendar. But although the connections between various agricultural works and the phases of the Moon are very strong and significant, we unfortunately still miss extent direct knowledge about Moon observations.

Certain stars and planets were observed as well in the folk calendar, more especially the Pleiades, Orion, Ursa Major and Venus.

I. The Sun

Determination of the time of the day

The cycle of the movements of the Sun over horizon was the most natural phenomenon used to divide the day. Of course, the solar motion was perceived as a rotation around the earth. According to the cardinal positions, one full day was divided into 4 smaller parts: ***rytas*** *'morning'*, ***vidurdienis*** *'noon, midday'*, but also the term *pietūs* was commonly used, meaning altogether midday, dinner time, and South; ***vakaras*** *'evening'* and ***vidurnaktis*** *'midnight'*. These divisions corresponded to sunrise, upper solar culmination, sunset and mid night. Accordingly the same solar positions were applied to the space structure (cardinal points) which were named: ***rytai*** *'east'*, ***pietūs*** *'south'*, ***vakarai*** *'west'*, and ***šiaurė*** *'north'* or sometimes ***vidurnakčiai*** *'midnight, north'*.

Thus, the daily movement of the Sun through the sky was used to organize space and time and all human activities: work, meals and rest. We can observe here that the distinct categories of time and space were perceived as a unique

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whole, a time-space dimension, forming a frame for all activities. More precise subdivisions also relating to meal times were added to these four main cardinal solar positions:

1. ***priešpusrytis (priešpusryčiai), priešrytis*** literally meaning *'before half east'* or *'before breakfast'* or *'before East'* or *' before morning'*, some times ***apíeaušris*** *'twilight'*. The time of night when the Sun is about north – east (in summer time) just before dawn, and the time of the first breakfast in summer time.
2. ***pusrytis,*** *'half east'* or *'half morning'* or *'breakfast'*, more or less the time of sunrise at the East, time of first breakfast.
3. ***priešpietis*** or ***pùspietis,*** *'before south'* or *'half south'* – forenoon, time of the second breakfast, the Sun is then approximately in the south – east, it defines the middle of the morning working time.
4. ***pietūs*** or ***pietai*** *'south, noon, dinner'*.
5. ***pavakarỹs*** or ***apývakaris*** and ***apývakarė, (pusvakariai, priešvakaris*** also ***popietis, popietuvė*** and ***pusdienis)*** *'about west', 'half west', 'before evening'* also *'after south/noon/dinner'* and *'half the day'*. The Sun is half way between culmination and sunset. When the days are long, the time of an afternoon meal.
6. ***vakarienė*** *'westering, evening, supper'*.
7. ***pùsnaktis*** *'half night'*; midnight.

Priešpusryčiai (LKŽ X 711) and ***pavakariai*** used to be added to the usual main time sequences when the days were longer than the night in summer. These minor time partitions are related to intermediate Sun positions, which also describe intermediate cardinal points.

The ethnographic data concerning the division of the day are documented by a German written source of the 17th century. M. Pretorijus reports a division of the day in 15 parts. In fact he presents a general division in 4 parts, each of them subdivided respectively in 4, 3, 4, and 4 minor units (BRMŠ III 175, 282):

1. ***Rytas*** *'morning'*:
1.1 ***bregstims*** *'break'*, 1.2 ***priblindums*** *'twilight'*, 1.3 ***auszra*** *'dawn'*, 1.4 ***pusritis*** *'breakfast'*;
2. ***Pietus*** *'noon'*:
2.1 ***uspietus*** *'half noon, forenoon'*, 2.2 ***tikkras pietus*** *'proper noon'*, 2.3 ***po pietu*** *'after noon'*;
3. ***Wakars*** *'evening'*:
3.1 ***paludenis*** *'half the day'*, 3.2 ***apilope*** *'time of foddering'*, 3.3 ***prietemis*** *'half-light'*, 3.4 ***wakaris*** *'evening'*;
4. ***Naktis*** *'night'*:
4.1 ***iszwakaras*** *'threshold of night'*, 4.2 ***immigis*** *'deep sleep'*, 4.3 ***guddumas*** *'in the dead of night'*, 4.4 ***gaidgyste*** *'cockcrow'*.

In the 19th century, S. Daukantas gives the detail of the original names for each of the 24 hours of the day (Daukantas 1976, 587):

> 1. ***sambrėškis*** or ***brėkšta*** *'the break of dusk'*, 2. ***santėmis arba sutemo*** *'dusk'*, 3. ***vakaras*** *'evening'*, 4. ***nuovakarės*** *'offdusk'*, 5. ***išvakarės*** *'outdusk'*, 6. ***naktovidas*** *'midnight'*, 7. ***įmygis*** 'deep sleep', 8. ***pirmieji gaidžiai*** *'first cocks'*, 9. ***antrieji gaidžiai*** *'second cocks'*, 10. ***prieš aušrą*** *'before dawn'*, 11. ***aušta*** or ***švinta*** *'dawn'* or *'getting light'*, 12. ***mažoji pusrytėlė*** *'the minor half east/morning/breakfast'*, 13. ***išaušo*** *'dawn is over'*, 14. ***saulėtekis*** *'sunrise'*, 15. ***didysis pusrytis*** *'the major half east/morning/breakfast'*, 16. ***priešpietis*** *'forenoon'*, 17. ***pietai arba pusdienis*** *'south or noon'*, 18. ***pakaitis*** *'heat'* (the nap), 19. ***po pakaičio*** *'after heat'*, 20. ***po pusdienio*** *'afternoon'*, 21. ***pavakarė*** *'before evening'*, 22. ***mažoji pavakarėlė*** *'the minor evening'*, 23. ***vakarop*** *'near evening'*, 24. ***saulėlydis*** *'sunset'*.

Both documents partly cover and confirm each other, which is always a sign of authenticity. But we notice that the older list fills only partly the latter one. The discrepancies can well be caused by regional differences, but the important fact is that many of these tiny subdivisions are almost identical. We suspect that the nineteenth century compilation could be a distortion trying to fit into the modern 24 hours division frame of the day.

In order to determine the time of the day, the height of the sun over the horizon as well as its visible direction were taken into account. The most primitive way to determine Sun's height was to compare it to the height of a person or length of common tools. Low position of the Sun used to be described as being ***per kačiargą*** *'by poker'*, ***per šienkartę*** *'by hay-barling'*, ***per grėblį*** *'by rake'*, ***per grėbliakotį*** *'by handle of rake'* over the ground. Sun's height over the horizon also used to be approximately measured in feet, spans, or even fingers. More precise measurement used to be expressed in units of Sun's disks: "The Sun was already three circles (disks) up and you had just left to mow" (EAA, Gaška 1985).

Another popular way to define time was to observe the length of a shadow and its changes of direction. It was very common to measure the length of one's own shadow in steps or feet. It is said that in midsummer at noon one's shadow equals one step. Thus shepherds used to bring their herds home at noon when they could step or jump over their own shadow. Quite often shadow length used to be measured in feet. There are references to different shadow lengths at noon – from 4 to 9 feet. In the afternoon, time used to be determined by the length of the shadow as well: "When the shadow is shortest, only one step long, they know it is 12 o'clock, that is exactly noon. And then in each hour it adds one step till 5 o'clock; after 6 in the evening the shadow lengthens by two steps. And similarly from morning till noon" (Butėnas 1935, 82). Elongation of the shadow due to the shortening of the day was also considered: "Now (1st of July) at noon the shadow is one step long. From St. Ann's day, the shadow will be two steps long because the night will be longer for an hour and a half.

It will be better for shepherds" (EAA, Laurinaitienė 1992). "In June the shadow is 4 feet. In each month the shadow lengthens by a foot. When you turn out the livestock in May the shadow is 5 feet long, in June–July – 4 feet, in August – 5 feet..." (EAA, Zablockis 1993).

The shepherds knew how to make a sundial. For that purpose they used to hammer a pole in the ground and drew a circle around it. Then they asked someone what time it was and marked the place of the shadow on the circle. The circle was then divided into 12 parts and the progression of the shadow indicated the change of time.

At home the determination of noon and other hours used to be observed on the south windowsill marked with stripes specially carved on it, or by noting the position of the shadow of the window edge on some notable place inside the room (Dundulienė 1982, 202): "When the shadow used to come through the window across the house to the threshold they said it is noon" (EAA, Legotienė – Vosyliūtė 1992).

Such a method was employed not only for common purposes, but for magical ones as well. It is told that an evil person would try to estimate the so called "bad minute" – that is the precise time when all curses would certainly come true. The curser on a sunny day would watch out what happened at his neighbour's place, and whenever he would notice something going wrong, he would then mark the "bad minute" by the position of the shadow of some certain object or the place where the Sunrays would fall, by hammering a nail or by carving a notch in that place. Later, he would wait for that specific time, when the shadow would reach the same place again, to cast his curses (Dundulienė 1992, 52). Worth mentioning that the so-called "bad minute" is very individual, belongs to a certain person.

It is essential to point out that a special meaning used to be attributed not only to some special moments in time but also to different regular time periods of the day. It was believed that the choice of the time for various events or activities influenced the future result. Therefore working and ritual activities used to be bound to well-determinated moments of the day. For example, it was thought that the choice of different moments of the daytime for planting would play a good or a bad effect on plants and give them different qualities in the same way as, according to astrologists, birth time influenced people's character or destiny (Vaiškūnas 2001, 163). Thus great care was taken to time correctly all activities of everyday life.

Determination of the calendar time

Even nowadays, when collecting ethnographic data in Lithuanian villages, one stumbles upon observation of the Sun for the determination of the calendar time. Up to day, some people use specific places of the landscape to mark the locations of the Sun at its extremes, for example: "On the ***Seliutai*** (a toponym, the land owner's family name) oak rises the Sun and its sets on the ***Pamociškes*** (another toponym) slope in February, and when the days are getting longer then March comes. When the day gets longer we say that the Sun rises on the

Kalnas hill. Every hill or elevation of ours has a name" (EAA, Česnulienė 1994; Vaiškūnas 2003, 34). Here the familiar features of the local surrounding, such as a tree on the neighbour's property is used as a milestone in the calendar. The fact that country people were well aware of the directions of the rising and setting Sun not in the east and west but rather far in the north-east and north-west on the summer solstice days and that they observed it carefully is shown by the expressions used for these times of the year. The location of the midsummer sunrise and sunset are referred to as the ***vasaros aukštieji rytai*** *'High East of the summer'*; and the ***vasaros aukštieji vakarai*** *'High West of the summer'*, and the directions of winter sunrise and sunset – the ***žiemos žemieji rytai*** *'Low East of the winter'* and the ***žiemos žemieji vakarai*** *'Low West of the winter'*. It is thought that during the early phase of the calendar formation, the observation of changes in sunrise and sunset directions determined the duration of calendar celebrations that were connected to summer and winter solstices (Vaiškūnas 1997, 20; 2003, 34). It has been noted that the changes in the sun azimuths slow down considerably at its extreme directions north or south. For some time the sun "stops" and its rising and setting points remain fixed. The determination of the duration of immobility depends of the precision of the observation. If we accept a precision of about a degree for the measures of the azimuth, people must have considered that the Midsummer Sun had reached its extreme position and standstill between more or less June 13th and June 30th, that is a period of up to 18 days. Sun standstill is documented to last the period between ***Joninės*** *'Feast of St. John'* (06.24) and ***Petrinės*** *'Feast of St. Peter'* (06.29): "The Sun ***stovi vietoje*** *'stands in one place'* from St. John to St. Peter and then the days get shorter",[1] and they say about it that "the length of the day 'jumps back'" or, more often, that "the Sun jumps back" (Vaiškūnas 1997, 20; 2003, 34). The expression "jumps back" means the moment when the Sun returns from its northernmost azimuths. A close observation of changes in sunrise and sunset directions is reflected in one of the vivid expressions concerning the lengthening of the day after Christmas: "Between Christmas and Epiphany day becomes longer of a cocks step". The observation of the length of the Sun's path compared to the horizon was a natural mean of determining the length of the days and consequently the periods of the year, but another way of establishing the calendar was to employ a pillar or a stick as a gnomon and a sundial to observe its shadow length and direction. Here follows a more detailed description of such observations: "When the Sun moves furthest north the days are longest. Then it is St. John. The longest days were determined in the following way. Take some tree in the middle of the fields or something isolated and free from shadows. One day the shadow of the tree will be marked at sunset: the shadow is marked by a pole. The next evening the procedure will be repeated [...] When the shadow of the tree reaches the furthest point (to the south), and starts to go backwards, it was considered to be the longest day" (LTR 4508/17; Vaiškūnas 2003, 37).

[1] This can be the remnant of an older calendrical tradition, as we know the standstill is now on June 21st. Or could have a purely ritual value attached to these two saints.

A mast or a tree was also used to observe the shadows length and determinate the dates of agricultural activities: "Shadow length at noon was used by people to determine the beginning of haymaking" (VUB F81–1050, Gaška 1985). Other objects could also serve the same purpose, and in homesteads, poles were specially raised: "Father used to say that the pole in the yard has been planted near the gate and a piece of iron was on it, and it was used to measure time" (EAA, Kalvaitienė 1994). Another example of such a pole is the Fat Tuesday's pole which has a wheel on top. The inhabitants of Skuodas used to hang and burn ***Morė*** – the jackstraw of Fat Tuesday on it: "The wheel would be left unburnt, and on sunny days its shadow would show the time" (Kudirka 1992, 30). It is also known that the gnomon was used for complex time calculations and meteorological prognosis of the forthcoming year. P. Zablockis from the village of Kražiai witnessed his father and illiterate grandfather using different poles to mark calendar months depending on the length of the shadow. A vertical pole of about human height was used for that purpose. On the 20th–22nd day of every month the length of the shadow would be marked with a stick for each specific month. Six spikes were used. The weather of the current month was marked on the sticks. From June to Christmas, while the shadow got longer, notches were made to the western side of the sticks, for rainy days and to the eastern side for sunny ones. From Christmas onwards, the sticks were marked to the north for rainy or snowy days, and to the south for sunny ones. The sticks were kept as a primitive agenda, and consulted for future prediction of the weather. The same weather conditions were believed to return after every five years (EAA, Zablockis, 1994). The mention of a five years span is of course an important information as it recalls us of Celtic and Indian traditions.[2]

II. The Moon

The common term used for the Moon is ***Mėnulis***, but another word, ***mėnuo*** means at the same time the celestial body – Moon and the time period of a month. This name directly derivates from the Indo-European base **menes-*, **men(n)s-*, 'moon' and 'month', and have a more general meaning of **me-* 'measure' (DSS 54). So, the Moon was used as the natural cosmic instrument of measuring time.

[2] For the Celtic "Coligny Calendar", see: J.M. Lecontel, P. Verdier, *La mesure du temps chez les Celtes, une relecture du calendrier de Coligny*, "Publications de l'Obs. Astr. de Strasbourg, Serie Astronomie et Science Humaines", 1988 No. 2, pp. 117–134, and other papers on the same subject in the following numbers of the same publication: Nos. 3, 4, 8, 9; for the Indian five years calendar, see: A. Karp, *W poszukiwaniu doskonałości*, "Czas i Kalendarz", Papieska Akademia Teologiczna, Kraków, 2001, pp. 273–292, p. 279, citing A. Narahabi, *A note on the Five Year Yuga of the Vedanga Jyotisa*, "Electronic Journal of Vedic Studies" (EJVS) 1997, No. 3–4, pp. 21–28.

Daytime measurement

The Moon was used for night timing by noting the positions of Moon's different phases in respect to different parts of the world. It is especially easy to do this during the fullmoon when the Moon is opposite to the Sun then under the horizon and in the night sky it repeats the day sky movement of the Sun: it rises in the evening, culminates at midnight and sets at dawn.

Calendar time determination

Though Lithuanian chronology has unfortunately not yet been extensively explored and too little data about old calendar systems has been collected, it is still thought that the Moon cycle was of common use. One of the proofs may be

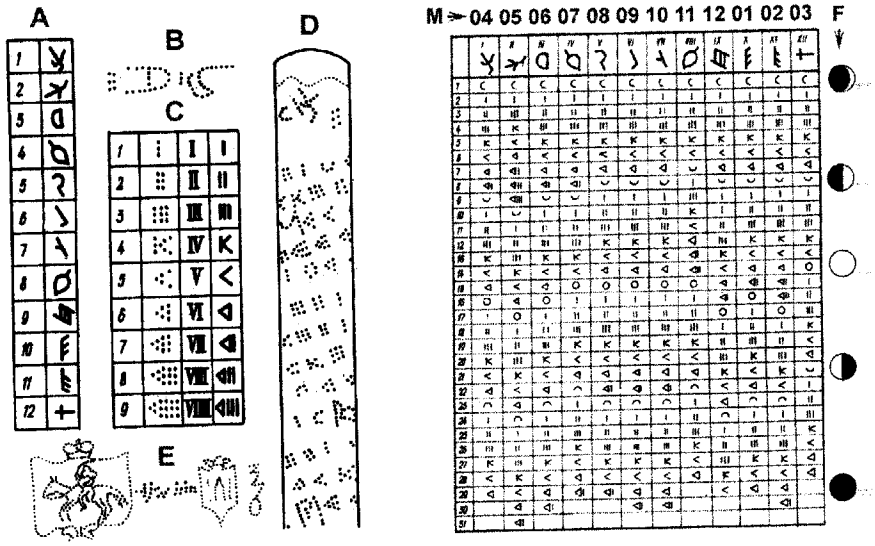

Fig. 1. Calendar stick (D) and explicative tables of the calendar signs written on it: A – the signs of the lunar months, B – an undecipherable inscription, C – the days of the lunar week, E – the armorial marks and an undecipherable inscription, F – Phases of the Moon, M – interpretation of the signs of the lunar month according to M.M. Gusev.

the description of a calendar stick explored by the 19th century Vilnius astronomer M.M. Gusev (Гусев 1865, 335–354). This stick dating to the 14th century was found under the ground on the slope of the Strėva river in the Trakai region. It is a stick with a copper-bound end and a spiral inscription (marks). Marks consist of many small nails (**Fig. 1** D). M.M. Gusev determined that the spiral markings represent twelve lunar months (**Fig. 1** A) and days of the week. Every month is marked with a different original sign and begins with the new moon crescent (**Fig. 1** F). M.M. Gusev found out that month marks depict phenologic aspects of the months and the main agricultural works. According to his opinion, the year in this calendar starts from April (**Fig. 1** M). So the first month is

represented by a descending pigeon (Lith. April – ***balandis*** *'pigeon'*). Weekdays are marked with original local tradition of writing numbers, somehow similar to the Roman (**Fig. 1** C).

In the Great Lithuanian Dukedom, already before Christianity, the Julian calendar was used together with both the Byzantine chronology (counting years since the creation of Earth – Annus Mundi AM – 5508 years before Christ), and the Roman Era count (counting from birth of the Christ – Anno Domini AD). But conservative folk still used phenologic and Sun-Moon calendar for their agricultural needs much later. Lithuanian traditions of the 19th–20th centuries are rich with examples of coordination of Sun and Moon cycles. Even recently recorded stories still tell about the differentiating between "heavenly months" and "earth months". It is said that the "heavenly month" starts earlier than the earthly one, therefore it can be used to judge the upcoming calendar month: "On the sky the months are counted. My mother knew that. Now the haymaking is coming but on the sky a different month comes. On the sky July, it goes by one month ahead. On the Earth nobody cuts hay but the sky shows haymaker. The sky month determines which one is coming. If our month comes first there is no knowing. When the sky showed the month with snow and rain, then we see what month is coming" (EAA, Mažrimas 1992). This statement refers to the fact that the beginning of the lunar month and its name may precede the beginning of the corresponding solar month. The solar cycle was the main phenologic indicator, but the Moon variations were also very important in the life of farmers. The changes in Moon phase changes was divided into two main lunar periods – ***jaunas*** *'young'* (waxing Moon) and ***senas*** *'old'* (waning Moon), which were further separated from one another by – ***tuščias*** *'empty'* (New Moon) and ***pilnas*** *'full'* (Full Moon) phases. Each of two main Moon phases already mentioned was again divided into ***priešpilnis*** *'before full'* (Waxing Gibbous), and ***senagalis*** *'old end'* or ***delčiagalis*** *'wane end'* (Waning Crescent).

Moon variations in folk tradition even nowadays are quite important – they are usually related to favourable and unfavourable time periods. A lot of country folk still strongly believe that various agricultural activities should be coordinated with different Moon phases. Whatever is started while the Moon is waxing is supposed to grow and proliferate too, while what is started during the decay of the Moon, decays and shrinks as well. Therefore the period of growing Moon is sometimes called ***dosnus*** *'generous'*, while decrescent Moon is called ***šykštus*** *'skimpy'*.

It is worth explaining here in more detail the opinion of the people about favourable and unfavourable Moon periods, because such attitude obviously demonstrates an archaic attitude to the natural environment and time. The analyse of an abundant but contradictory ethnographic data about the coordination of various agricultural activities with the Moon phases shows some general regularities in the popular categories of positive and negative aspects of Moon phases:

I. The waxing Moon is supposed to be favourable to the growth in general and for any starting processes. Still to day, we observe important variations in the acceptation of the start and end of this period:
   1. While the Moon grows from the first crescent to the first quarter (Waxing Crescent) all starting processes will undergo a strong growth. They say that during that time plants grow into stems, leaves, blossom abundantly, and that even foundation stones under construction, come up to the surface. This period is bound to strong growth, luxuriance, humidity, liquidity, and at the same time tenderness, softness, and weakness. Though active vegetation takes place, it is not fruitful. It is a favourable time for various pests.
   2. The growth of the Moon from the first quarter to the full Moon (Waxing Gibbous) is also favourable to all growing processes but this time it will be also fruitful, leading to full-fledged formation of the fruit, to maturity.

II. Although the whole second period is associated with decay and wane, its first and second part are somewhat different as well:
   3. It is a common belief that the period of shrinking of the Moon from the full Moon to the last quarter (Waning Gibbous) is the least favourable to start anything. Everything started during that period is condemned to decay.
   4. The period that starts after the last quarter (Waning Crescent) presents certain positive aspect of the waning process. Therefore the last crescent is again considered as favourable for all activities bound to conservation or even sterility. It is a time to prepare all the food conservation, to cut timbers, to salt or smoke meat, etc. It seems as if an additional force pointing downwards came to action, and therefore offers also favourable conditions for planting beets and root vegetables, gathering their energy underground.

At the end of the month, when the Moon vanishes from the sky for 2 or 3 days, there is a period, which is believed to be a "time in vain" and any work would be done in vain (Vaiškūnas, Lovčikas 1999).

As we see, the observation of Moon changes used not only to mark calendar time, but was also indicating some sort of time quality. Though it is now often heard that the phases of the Moon "have an effect", namely that they influence various phenomena, folk tradition does not speak of any direct physical influence of the Moon.

It seems that the popular old tradition pictures the Moon not only as a time marker or even a time factor but also as a quality mark for certain time periods. But all this is difficult to establish with certainty, because it has been also often observed that the favourable and unfavourable Moon periods are absolutely parallel to menstrual cycles. Does the general symbolism of growing in the nature accords with the visible aspect of the Moon? Or is it rather that a certain time has a growing quality influencing the whole of nature including the Moon? In fact, such logical questions have no object in folk culture, based only

on direct observation and logical-symbolical classification. This is confirmed by the general confusions found in all Indo-European languages between the categories of chronological time and weather conditions.

III. Stars

During the late autumn or winter, when people got up still in the dark, they used to estimate the time according to the position of prominent stars or constellations in the sky. According to ethnographical data we know that in the 19th–20th centuries they were:

1. Pleiades (Lith. ***Sietynas, Sietas*** *'the Sieve'*, ***Žvaigždžių sietas*** *'Sieve of stars'*).
2. Orion (Lith. ***Šienpjoviai, Šienpjūviai*** *'the Mowers'*, ***Kūlėjai*** *'the Threshers'*, ***Trys karaliai*** *'Three Kings'*).
3. Ursa Major (Lith. ***Gryžulo ratai*** *'Grįžulas wain'*, ***Grigo ratai*** *'Grigo wain'*).
4. Venus (Lith. Morning Star – ***Aušrinė*** *'Dawn (star)'* and Evening Star – ***Vakarinė*** *'Vesper'*).

Night time was determined by memorizing the positions of some constellation relatively to the horizon at various moments of the night. For the date determination people waited for some constellation to appear in the cardinal positions (rising, culmination, or setting) just before sunrise or just after sunset. For this purpose the following annual observable positions of near ecliptic stars are especially convenient:

1. *Morning (heliacal) rising* – the first appearance at the eastern horizon in the morning dawn before sunrise.
2. *Morning culmination* – culmination just before sunrise at the end of night.
3. *Morning setting* – setting just before daybreak.
4. *Evening (achronal) rising* – rising just after sunset.
5. *Evening culmination* – culmination just after sunset.
6. *Evening (heliacal) setting* – the last visibility in the evening after sunset.

1. Pleiades

1.1. Hour estimation

During long autumn and winter nights people could guess the time quite precisely according to the movement of the Pleiades. That is why they are sometimes compared with a clock: "***Sėtynas*** shows time as a clock" (LTA 1300[4]),

"***Sėtynas*** served as a clock for us in Butniūnai..." (LTR 4286[121]). People noticed that the Pleiades cluster, situated near the ecliptic, moves during long November nights in similar fashion as the summer Sun: "that *Sietynas* goes just like Sun in summer, in the same path". People used this corespondance to guess the hour of the night in a similar way as they did during daylight with the Sun. In November the Pleiades culminate at about midnight and it was known that: "when ***Sietynas*** rises up – that means it is before midnight, when it goes down – it is after midnight" (LTA 2256[103] also: LTA 2246[51], LTA 2249[81], LTA 2312[414]); "***Sietynėlis*** is going down, the day will come soon" (EAA, Čibirienė 1989). People could guess the time even more precisely. If the Pleiades are in the East and as they say "takes one quarter of the sky", that means it is 8 p.m. If they are in the "middle of the sky" that means it is midnight. And if they are turned to the west and "take half of the sky" – it is 3 a.m. (LTA 2260[88] also: LTA 2312[418],[423]; LTA 2240[62] etc.). People guessed the time from the position of the Pleiades according to separate objects of the surroundings: "***Sėtynas*** on the granary, so let's go to bed" (LTA 2257[184]); "***Sėtynas*** /.../ on the granary it's time to get up" (Vaiškūnas 1993a, 20; 1999a, 227).

In September people got up to trash when the Pleiades were in the south-east (LKŽ XII 534). In October – when they were culminating. At that time the time was guessed in the following way:

> The Pleiades rise – it is evening.
> The Pleiades in the south-east – it is 8–9 p.m.
> The Pleiades are in the south – it is 2–3 a.m.
> The Pleiades are going down it is 7–8 a.m. (LTA 2312[420] and also: LTR 4286[123], LTR 4287[26]).

In December about Christmas the culmination of the Pleiades (2-3 hours before midnight) was the sign for children to go to bed (EAA, Armonaitytė 1992; Vaiškūnas 1993a, 20; 1999a, 227).

1.2. Timing of agricultural activities and meteorological observations

Ethnographical data show that some particular days of the year were associated with the following positions of Pleiades:

1. Evening (heliacal) setting (April 23).
2. Morning (heliacal) rising (July 10).
3. Morning culmination (September 15).
4. Morning (cosmic) setting (November 30).

According to these ethnographical data, the heliacal setting has been considered especially important.

1.2.1. Evening (heliacal) setting

The heliacal setting of Pleiades was associated with St. George's day (April 23). This position of Pleiades indicated the beginning of spring and outset of agricultural activities. It was known that the lower the Pleiades appear after the sunset, the nearer the spring is. People said: "If ***Žvaigždžių sietas*** 'the Sieve of stars' is high, so spring is far" (LTA 2319[13]); "If the ***Žvaigždžių sietas*** 'the Sieve of stars' went down with the evening glow, it would be warm (spring) soon" (LTA 2259[89]); "***Sietas*** disappears and a cuckoo starts to call" (LKŽ XII 532). When the Pleiades entered the evening glow people started to plough fields, got ready for spring sowing. It was said: "***Sietynas*** in the glow, the bull in a furrow" (EAA, Jezerskis 1992 and Vaiškūnas 1993b, 332); "***Sietynas*** in the glow, the grey (horse) in the meadow (just before St. George)" (EAA, Andriukaitienė 1992); "If ***Žvaigždžių sietas*** 'the Sieve of stars' is not in the glow it's not yet the time to let your horse into the meadow" (LTA 1480[22]; Vaiškūnas 1993a, 21; 1999a, 228).

1.2.2. Morning (heliacal) rising

In early July, when the Sun takes distance from the Pleiades, they become visible again over the north-eastern horizon. As many other nations worldwide, the Lithuanians apparently also associated the beginning of summer's rainy days with the heliacal rising of the Pleiades (Allen 1963, 398; Gładyszowa 1960, 161, 170–176; Lebeuf, 1996). The first visible (heliacal) rising of the Pleiades coincides roughly with the folk calendar's day of the seven *sleeping brothers* (July 10). Accordingly to the weather on this day people guessed the quantity of precipitation for the second half of summer. They fell sure that if it is raining on that day, it will be raining for 7 days, or even 7 weeks. The relation of the 7 stars of the Pleiades with the day of the 7 *sleeping brothers* is proved by a legend according to which the stars of the Pleiades are 7 brothers who fell asleep in the basement of the church built by themselves (Vaiškūnas 1994, 17–18; 1999a, 223–224).

During hay harvesting, the forecasting of the rainy days during the end of summer time was very important. Summer mostly ends with rainy days in our country. As the widespread saying goes, "In vain even the entire folk begs for the rain before St. John, whereas later on just a single voice serves" (LT V 383). The Russians also waited for the appearance of the Pleiades at that time. They even called the 11th of July (old style) ***Яфимии стожарницы*** (Russ. *Стожары* – the Pleiades; КГ 280).

1.2.3. Morning culmination

The other significant position of the Pleiades was their culmination before the sunrise, which indicated the middle of the autumn sowing period. In the 17th century M. Pretorius wrote that a certain position of the Pleiades was a good