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THE EAST-WEST ALIGNMENT IN NEOLITHIC ON THE SOUTH-EASTERN  
ROMANIA

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**Keywords:** east-west alignment, neolithic necropolises, archaeoastronomy.

**Abstract:** *Alignment is a static orientation of some objects, or set of objects, in relation to others. In archaeoastronomy we can separate stone alignments (stone rows) and alignments connected with orientation (e.g. graves, or skeletons orientation). The object of our research is to emphasize the importance of orientation in the Neolithic time, which we can determine by using a magnetic compass. Our collected data led us to conclude that solar observation was the determinant of orientation. More particularly, the rising of the sun above the horizon and possibly, though less frequently, the setting sun, provided the alignment. It was possible to show a close correlation with sunrise, or sunset at feast days, that is, the day on which the venerated God was celebrated, at Easter and on true east, determined by equinoctial sunrise. We consider the orientation of burials in the Neolithic, on the south-eastern Romanian territory. These necropolises (Cernica, Grădiștea Ulmilor, etc.) show clearly that the East-West orientation was mostly taken. The Neolithic burials are aligned on that arc of the horizon where the Sun rises between the winter and summer solstices (solar arc) in a year. In the middle of the solar arc, of course, is also the zone within which Easter (spring and autumn equinoxes) falls.*

**Rezumat:** *Autorii prezintă în acest studiu importanța orientării în neolitic, determinată prin utilizarea unui compas magnetic. Datele obținute conduc la concluzia că observația solară era factorul determinant al orientării.*

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## 1. Solar alignment

It is very easy to observe and to predict the Sun periodicity at the sunrise and sunset, because it occurred in the same way in every year. It is not difficult to align buildings, settlements, graves and stones in connection with the Sun apparent motion (during the year the Earth moves around the Sun; as a result, the Sun appears to move around the sky once, in connection with the stars, as seen from the Earth).

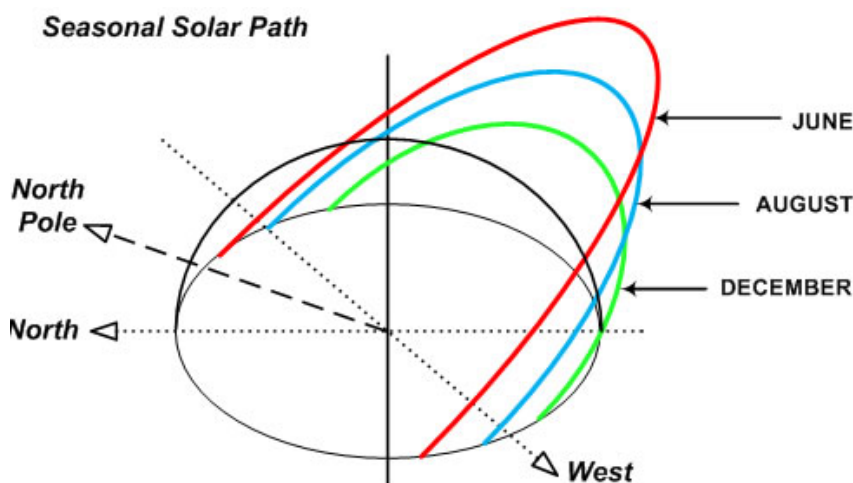


Fig. 1 – Seasonal Solar Path

On the Romanian territory there can be found many Neolithic necropolises, which, at a first glance, are disordered. But, when making a burial, or skeleton orientation (the skull direction shows the burial or, sometimes, only the skeleton direction) in connection with the Sun motion – then we realize that the burials are in a very ordered position, in a so called *solar arc distribution*. The solar arc is the Sun motion on the horizon in a year. This is very easy to observe.

The other phenomenon, that is very simple to observe, is the analemma, which is the Sun's path, viewed from the same spot, at the same time of the day, for one year's time.

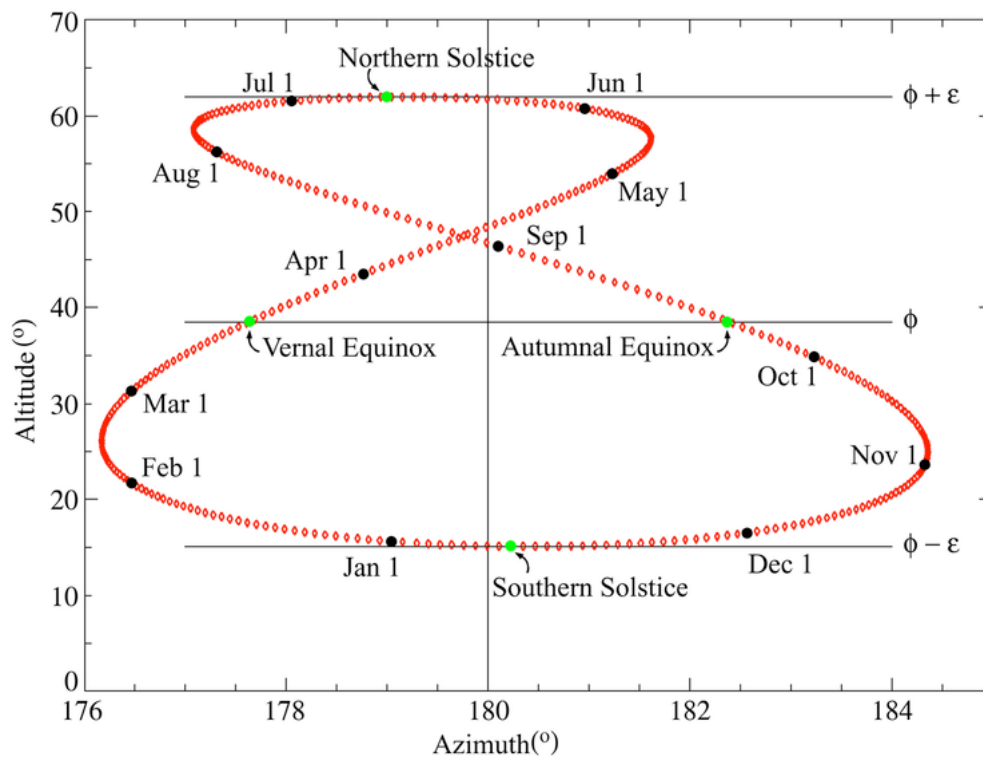


Fig. 2 – Analemma

An analemma is the figure-8 loop you get when you mark the position of the Sun at the same time each day throughout the year. The top and bottom of the figure-8 correspond to the Solstices - the Northern and Southern limits of the Sun's sky motion. The two Equinoxes find the Sun

at points along the analemma curve exactly half way between the Solstices.

The analemma could mean more for the Neolithic people than simple navigation; it could be their symbol of eternal life.

## **2. East-west alignment**

The solar arc determination and the analemma observation can help to underline the importance of the orientation in the Neolithic time. Today we determine the orientation by using a magnetic compass.

Our collected data led us to conclude that solar observation was the determinant of orientation. More particularly, the rising of the Sun above the horizon and the setting Sun, provided the alignment.

We consider the orientation of burials in the Neolithic, on the south-eastern Romanian territory. These necropolises (Cernica, Grădiștea Ulmilor, etc.) show clearly that the East-West orientation was mostly taken.

## **3. Cernica necropolis**

On the Muntenia territory, the Cernica necropolis (4200 BC) is the greatest necropolis in the Neolithic age. It belongs to the Dudești and Boian cultures.

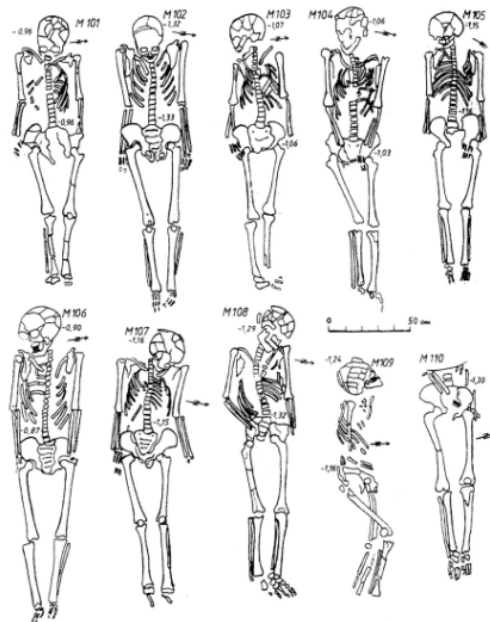
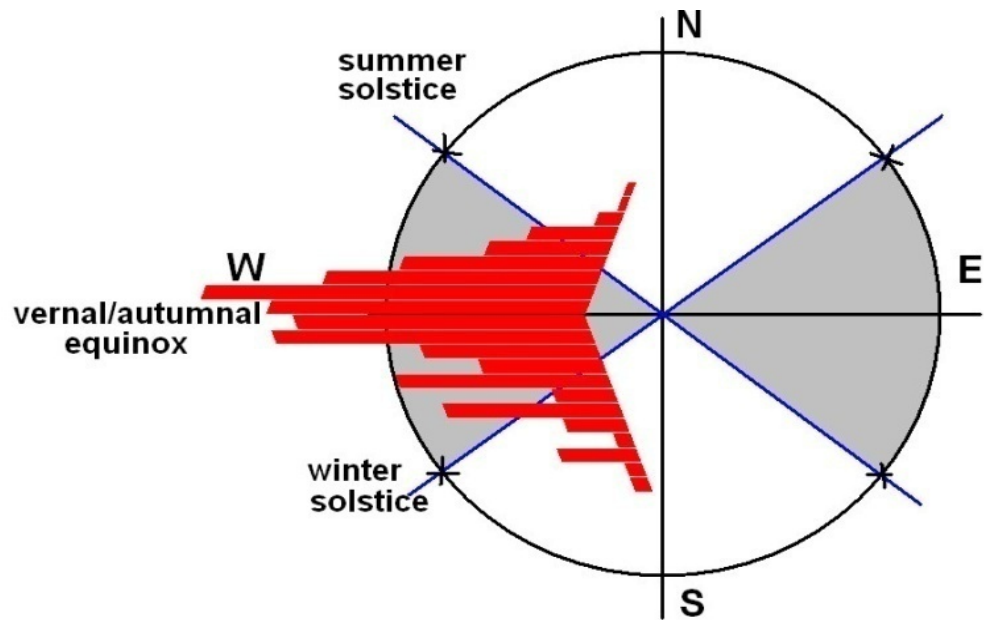


Fig. 3 – Skeletons in Cernica necropolis

The positions of the corpses were extended, or flexed.

The funerary inventories are: dishes, flint blades, axes made of stone, beads, or pendants, bracelets made of *Spondylus*, meat offerings, ochre (dust, or clumps) on, or under the corpses. In the burials from Cernica cemetery was also discovered a pearl made of copper ore.

The Gaussian distribution of the skeletons from this necropolis shows an east-west orientation with an apex at spring-autumn. This fact shows that the mortality rate grows in spring and autumn. This death-rate can be connected with epidemics (influenza, hepatitis, encephalitis), or food missing (the end of winter).



*Fig. 4 – East-West orientation, Cernica*

The calculated solar arc for Cernica (see SZÜCS-CSILLIK et al., 2010):

$55^{\circ}04' - 124^{\circ}55'$  (E)

$235^{\circ}04' - 304^{\circ}55'$  (W)

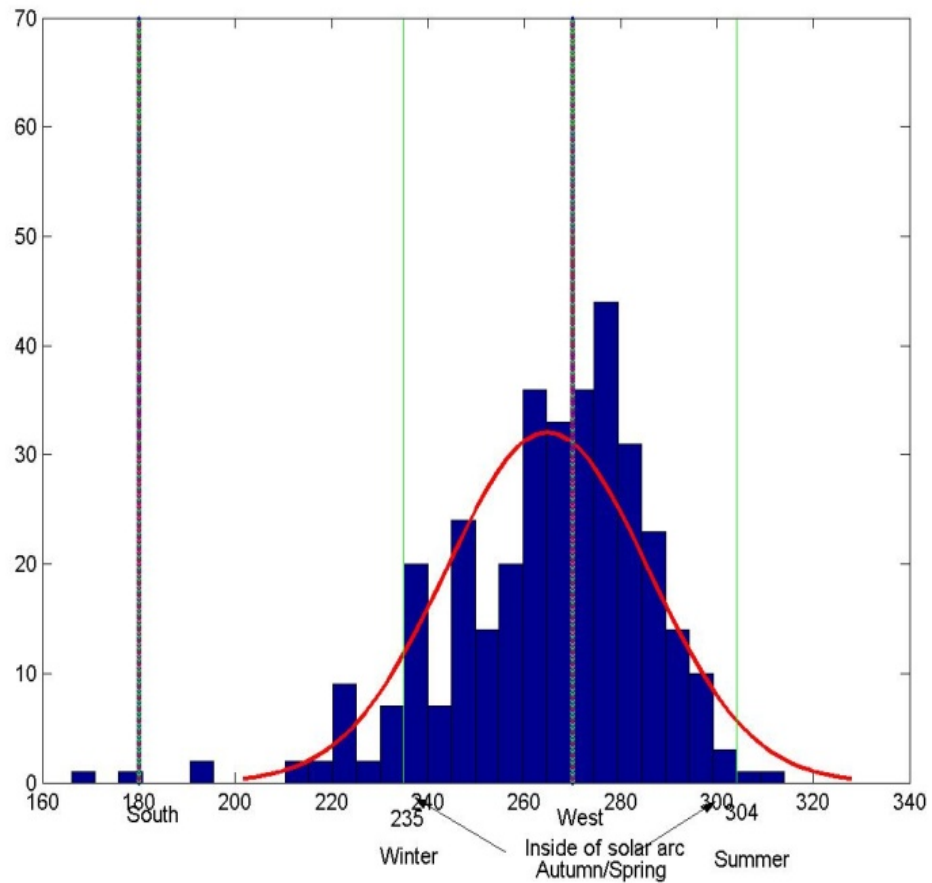
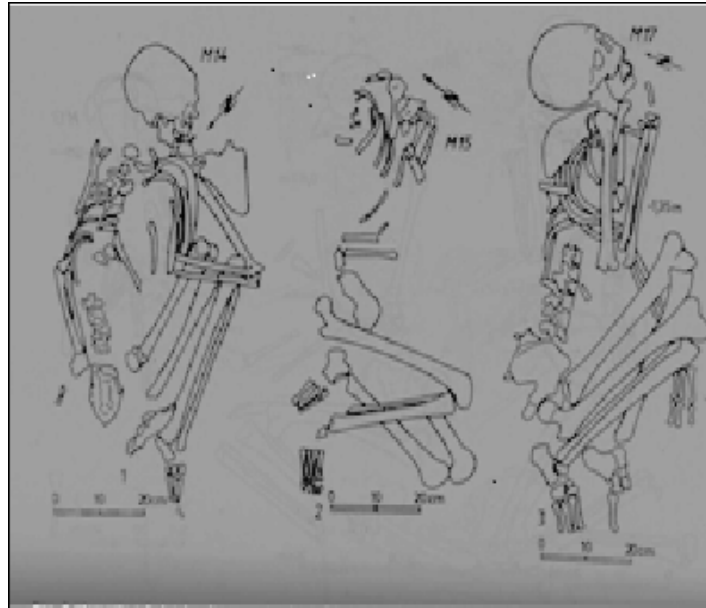


Fig. 5 – Skeletons distribution, Cernica

#### 4. Grădiștea Ulmilor necropolis

At Grădiștea Ulmilor was discovered the biggest necropolis belonging to the Gumelnița culture (4600 – 3900 BC). The funerary inventory consisting of: flint tools, copper pins with rhombic, two-lobe or rhombic plate shaped head, biconical, or flat clay artifacts, bone tips, shell pearls (*Dentalium*), amber beads, a few golden artifacts.

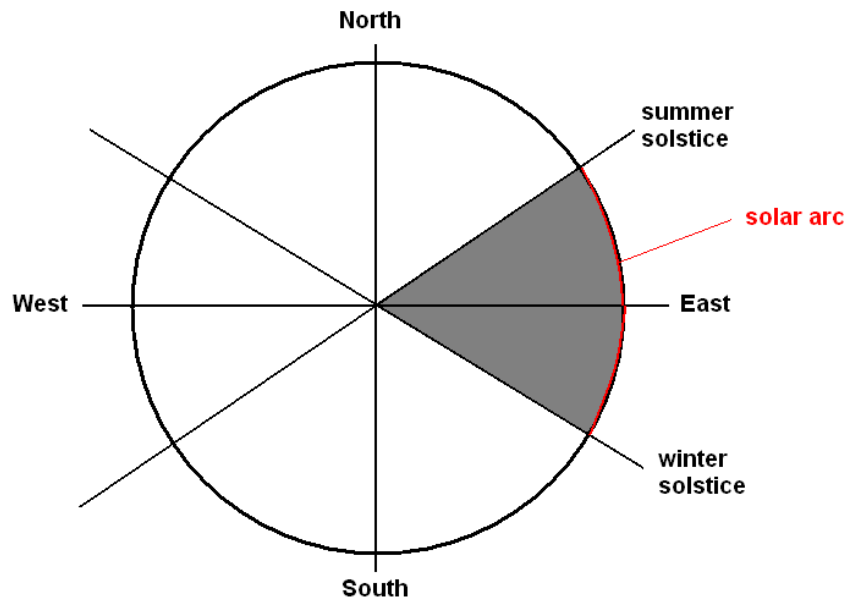
Most skeletons were crouched on the left side. In most cases the hands were bent at the elbows and laid with the palms opposite the faces.



*Fig. 6 – Skeletons, Grădiştea Ulmilor*

On the normal distribution we can see that many skeletons are compromised between the sunrise solstice points.



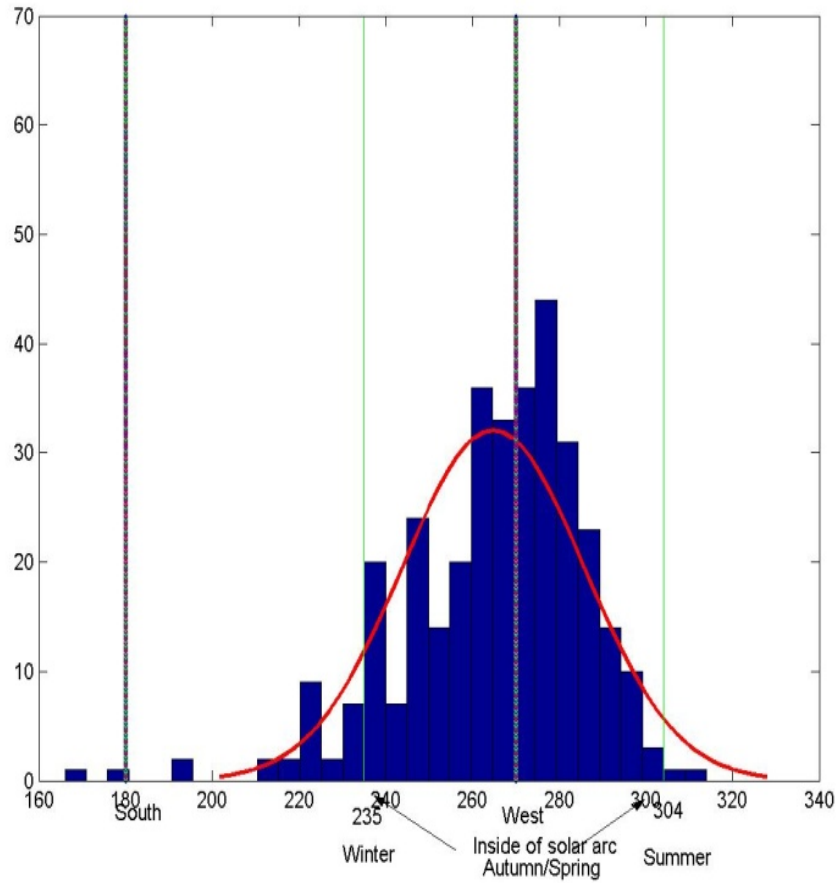


*Fig. 7 – East-West orientation, Grădiștea Ulmilor*

Some skeletons are orientated in the sunset direction, and some skeletons are not orientated in the Sun direction. Can be a social differentiation in the orientation of the skeletons, or a change in religious beliefs?

The calculated solar arc for Grădiștea Ulmilor (see SZÜCS-CSILLIK et al., 2010):

55°04' -124°55' (E)  
235°04' -304°55' (W)



*Fig. 7 – Skeletons distribution, Grădiştea Ulmilor*

## 5. Conclusions

Alignment studies represented an important part of the many Neolithic necropolises in Europe. The burials orientation acknowledges the wisdom of the ancient Neolithic people who buried their dead aligned with celestial events.

East-west orientation. The Neolithic burials are aligned on that arc of the horizon where the Sun rises between the winter and summer solstices (solar arc) in a year. In the middle of the solar arc, of course, is also the zone within which Easter (spring and autumn equinoxes) falls.

The East-West astronomical orientation in the Cernica and Grădiştea Ulmilor Neolithic necropolises is evident, because it was practiced a form of solar cult: sunrise and sunset was observed within the limits of a burial ritual. From aligned skeletons rates of 92.11 % (Cernica) and 92.40 % (Grădiştea Ulmilor) are also comprised in annual oscillation of the Sun in azimuth.

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