

## HUNGARIAN ARCHAEOASTRONOMICAL RESEARCH II. Symbols of Atmospheric Phenomena in Bronze Age Depictions

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*Archaeoastronomical research rarely touches on the role of solar/astral symbols in archeological cultures even though numerous abstract depictions from the Bronze Age indicate a particular celestial phenomenon. The various round symbols are essentially without exception considered to be solar representations by archaeologists, without raising the question of the reason for their variety or why the Sun was not simply depicted in the simplest manner possible on the various objects, with a circle and rays. The comparison of the celestial phenomena and the abstract Bronze Age symbols offers answers to numerous questions.*

In connection with the various decorative motifs containing round symbols some researchers have long hypothesized that the beliefs of Bronze Age Europe were characterized by a general cult of the Sun.<sup>1</sup> However, they have not yet examined the background behind the abundant formal diversity of these presumed solar symbols. The symbols are classified by comprehensive typological analyses without searching for the reasons for their variety.<sup>2</sup> No study has yet appeared that focuses on the details of these representations, which would raise the issue of the basis upon which they are considered symbols of the Sun or why the idea has been dismissed that they could be a star or the Moon. Another interesting question is what the reason for their formal diversity is and why we can find the same symbols in nearly every human culture despite significant differences in time and location.

During the thorough comparison of atmospheric optical phenomena and Bronze Age symbols the resemblance between the appearance and form of the abstract symbols and the celestial phenomena was noticeable, particularly on finds that could be connected with individuals of status and power. On the basis of the results of the comparison, we were able to provide new answers to a surprisingly large number of questions. It seems that celestial phenomena played a significant role in Bronze Age visual culture, and the significance of objects containing these optic phenomena was more important than those that only depicted the Sun or Moon.<sup>3</sup>

### ATMOSPHERIC PHENOMENA GENERATED BY SUNLIGHT AND MOONLIGHT AND THEIR RELATED SYMBOLS

Due to the restrictions of the extent of the study, I can only briefly introduce a few of the celestial phenomena whose representations in my opinion can be found amongst the Bronze Age “solar symbols”.<sup>4</sup>

Nearly 80% of the Earth’s atmosphere is contained in its lowest layer, called the *troposphere*. This is the layer where weather processes occur and the overwhelming majority of atmospheric phenomena are

<sup>1</sup> E.g. Gelling, Peter – Davidson, Hilda Ellis: *The Chariot of the Sun* (London: J.M. Dent & Sons Ltd., 1972); Green, Miranda: *The Sun-Gods of Ancient Europe* (London: Batsford Ltd., 1991); Kristiansen, Kristian: The Nebra Find and Early Indo-European Religion. In: *Der Griff nach den Sternen*, hrsg. Harald Meller – François Bertemes. Tagungen des Landesmuseums für Vorgeschichte Halle, Band 5 (Halle, 2010), 431–437.

<sup>2</sup> E.g. Kossack, Georg: *Studien zum Symbolgut der Urnenfelder- und Hallstattzeit Mitteleuropas*. Römisch-Germanische Kommission des Deutschen Archäologischen Institut zu Frankfurt am Main. Römisch-germanische Forschungen (Berlin: W. de Gruyter, 1954); David, Wolfgang: *Studien zu Ornamentik und Datierung der bronzzeitlichen Depotfundgruppe Hajdúsámson-Apa-Ighiel-Zajta*. Bibliotheca Musei Apulensis 18 (Alba Iulia: Verlag ALTIP S. A., 2002).

<sup>3</sup> Pásztor, Emília: Prehistoric Light in the Air: Celestial Symbols of the Bronze Age. In: *The Oxford Handbook of Archaeology of Light*, ed. Konstantinos Papadopoulos (Oxford: Oxford University Press, handbook to be published at the end of the year 2015).

<sup>4</sup> Interested readers can find an extensive description of these with explanatory illustrations and numerous photographs at <http://legkoroptika.hu/>, Mila Zinkova, <http://www.andershanssen.com>, <http://markom.kuvat.fi> for example.

created. In the upper reaches of this layer the temperature is low and water droplets often turn into ice crystals. The light from the Sun, the Moon and the stars can interact with the air molecules, floating water droplets, ice crystals and dust in millions of ways. The incoming light is diffracted, refracted, reflected, diffused and absorbed, and as a result of this we are dazzled by innumerable atmospheric spectacles. Many quite stunning phenomena are created when the Sun and the Moon are low in the sky or when there are ice crystals of certain shapes and orientations. This is why atmospheric phenomena can be observed more often in the winter, in regions at higher altitudes or in areas at higher latitudes.

Colorful concentric rings closely encircling a celestial body are called *corona*, and are created around both the Sun and the Moon when the light passes through a thin, fog-like layer of cloud. This common phenomenon can be more easily observed around the Moon, and it often indicates rain.



Fig. 1: Corona around the Moon  
(photograph: Ákos Ujj, legkoroptika.hu)



Fig. 2: Sághegy disk  
(photograph: Emília Pásztor)

Rainbow colored rings of light can occur when there are ice crystals in the air, but this phenomenon, called a *halo*, appears further from the celestial body. These rings of light can be seen anywhere and at any time; for example the ancient Romans observed them around the Moon so often that they were not even listed in the annual prodigy list, being considered mere weather indicators.<sup>5</sup>



Fig. 3: Sun halo  
(photograph: Alexandra Farkas)



Fig. 4: Moon halo  
(photograph: Alexandra Farkas)

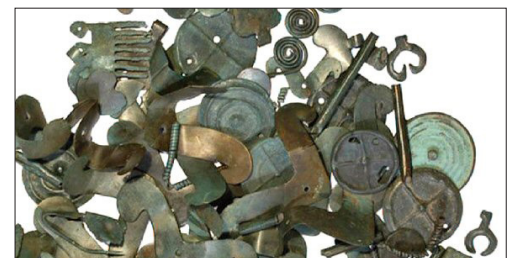


Fig. 5: Bronze Hoard from Zalasabbar, detail.  
The pendants depict several atmospheric phenomena. Szilvia Honti – Viktória Kiss: Bronze Hoard from Zalasabbar. In: *Moments in Time*, ed. Alexandra Anders – Gabriella Kulcsár (Budapest: L' Harmattan, 2013), from figure 1.2.

Various complex *halo phenomena* can occur depending on the form, orientation and configuration of the ice crystals in the atmosphere. *Sun dogs (parhelia)*, *light pillars* and *light crosses*, or numerous *light rings* and *arcs* with innumerable variations can appear in the sky. On the basis of the archaeological finds we can conclude that the atmospheric phenomenon that had the greatest influence was when a huge circular form with four spokes appeared in the sky.

<sup>5</sup> Stothers, Richard: Ancient Meteorological Optics. *The Classical Journal* 105/11 (2009), 27–42.





Fig. 6: Round atmospheric phenomenon with four spokes  
(photograph: Sarah McMahon)



Fig. 7: Round atmospheric phenomenon with four spokes  
(photograph: Ladislav Nyc)

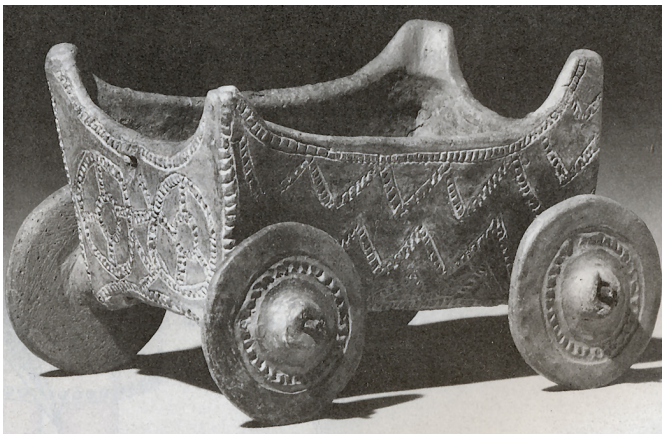


Fig. 8: Cart model from Pocsaj. Raczy, Pál (ed.): *Dombokká vált évszázadok (Centuries Changed into Mounds)* (Budapest: PYTHEAS Kft, 1991–92), from figure 4.

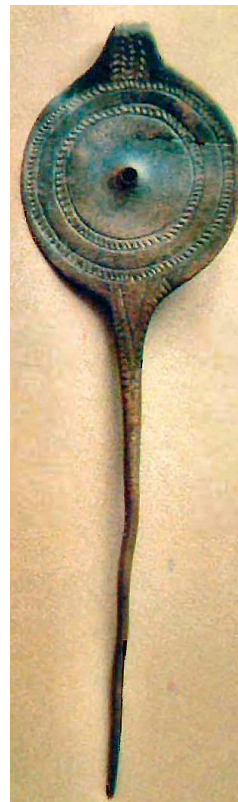


Fig. 9: Bronze pin with a disk-shaped head. B. Horváth, Jolán – Keszi, Tamás: *Az Intercisa Múzeum Kincsei II (Treasures of the Intercisa Museum)* (Dunaújváros: Extra Média Nyomda Kft, 2004), from figure 266.

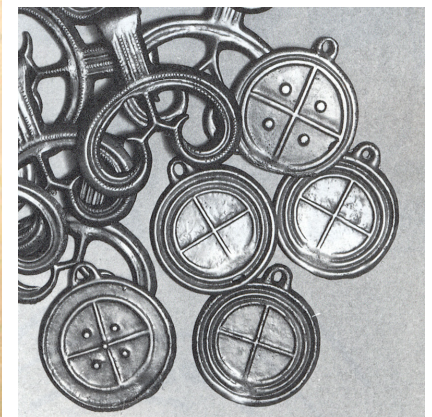


Fig. 10: Pendants from the Koszider I treasure. Raczy, Pál (ed.): *Dombokká vált évszázadok (Centuries Changed into Mounds)* (Budapest: PYTHEAS Kft, 1991–92), from figure 11.



Fig. 11: Filigree pendants from a Late Bronze Age hoard, Velem-Szentvid (photograph: Emília Pásztor)



Fig. 12: Bronze object from Haschendorf, Austria. It is topped with a disc decorated with a rayed solar symbol. An almost identical piece was discovered at Balkåkra, Sweden.



Not much less important were so-called *sun dogs*, which may also provide an explanation for the magical significance of the number three. This phenomenon can be observed around both the Sun and the Moon.



Fig. 13: Sun dogs on both sides of the Sun  
(photograph: Tim Post/MPR News)



Fig. 14: Sun dogs in Alaska  
(photograph: Sebastian Saarloos)



Fig. 15: Gold bracelet, Biia. Kovács, Tibor –  
Raczky, Pál (ed.): *A Magyar Nemzeti Múzeum  
őskori aranykincsei (Prehistoric Gold Treasures  
of the Hungarian National Museum)* (Budapest:  
Magyar Nemzeti Múzeum, 2000), from figure 26.

The atmospheric phenomena also provide an opportunity to interpret certain special archaeological finds. For example the prototype for disk-shaped pendants with concentric circles and a central spike may have been the *light pillar*.

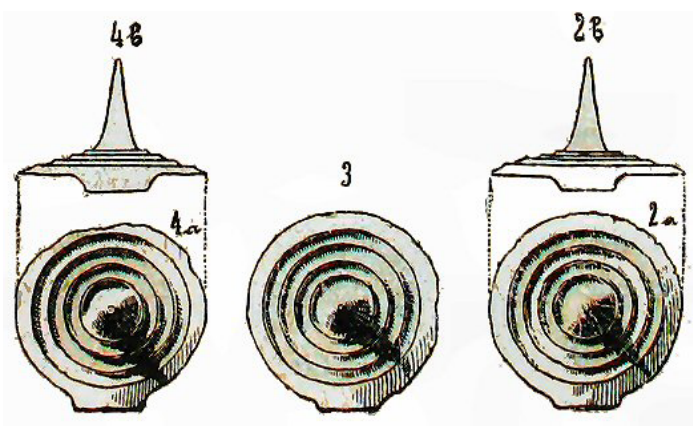


Fig. 16: Spiked disk pendant, Ráczegres. Hampel, József:  
*A bronzkor emlékei Magyarhonban (Bronze Age Relics in  
Hungary)* (Budapest: Országos Régészeti és Embertani Társulat  
*Kiadványa*, 1892), from table CLXI.



Fig. 17: Light pillar (photograph: Shir Goldberg)

The *sun dogs* and *halos* that form around the Sun may also have inspired the motif referred to as the *solar barge* in research, which was characteristic of the Urnfield culture and was probably related to their religious beliefs. I would like to illustrate my position by superimposing a solar barge symbol over a photograph of a complex atmospheric phenomenon. The two sun dogs on either side of the Sun relate to the figures of the two floating birds, while the halo and the Sun radiating shining light in the middle form the solar symbol between the birds.



*Fig. 18: Compound halo phenomenon, which may have been the inspiration for the solar barge symbol (photograph: Jay Johnson © Physical Sciences Lab, University of Wisconsin-Madison. Graphics: Áron Kelemen)*

The aforementioned atmospheric phenomena give the Sun and the Moon a special appearance, and as the above pictures show their forms can be identified in the Bronze Age representations. The idea that these are symbols of the Sun and the Moon in these cases as well provides an explanation for the variety of the symbols and for why the same representations are found throughout the world. The seeming lack of lunar symbols made the archaeologists overemphasize the role of the Sun and underestimate that of the Moon in spite of the fact that all of the historical and ethnographic sources vouch for the significance of the Moon in various areas of life. However, since numerous atmospheric phenomena can be observed around both the Sun and the Moon, some of these symbols may also refer to the Moon.

According to anthropological research these signs are important elements of traditional folk art and permeate every area of life. However, if we would like to examine the role of these signs in a given community, the research must be narrowed down to a single archeological culture or smaller geographic area. Several studies of this type are currently being performed.



## 1) CONNECTION BETWEEN THE BRONZE AGE SYMBOLS OF THE CARPATHIAN BASIN AND THE ATMOSPHERIC PHENOMENA

On the basis of the archaeological find materials several types of objects appeared in the 17<sup>th</sup>–15<sup>th</sup> centuries B.C., whose main purpose in addition to their practical function was to display the symbols that were well known from other objects. The best known of these are the bronze pendants that were decorated with signs of various forms considered to be solar symbols.<sup>6</sup> The increase in the number of these *solar symbols* in general can also be observed in other archaeological finds.<sup>7</sup> According to our theory the reason for this may have been in part that volcanic activity increased in the 17<sup>th</sup> century B.C. According to research, a large amount of volcanic material entered into the atmosphere from Mt. Vesuvius in 1660 B.C., from Mt. Aniakhchak in Alaska in 1645 B.C. and from Thera around 1620 B.C. Major volcanic activity can alter weather as well as atmospheric phenomena to a significant extent. The most conspicuous of these phenomena are the much more intense, reddish sunsets and sunrises (perhaps the gold arcs of the Nebra sky disk were inspired by these phenomena). Particles of ash and dust in the atmosphere and diffuse sulfurous gasses can change the sky and the color of the Sun and the Moon more than usual, as well as creating concentric circles around the Sun (so-called Bishop's Rings). The major volcanic activity made the weather unusually cold, and atmospheric phenomena can be observed more often in cold weather.<sup>8</sup> The goal of the project is the elaboration and testing of this theory.

## 2) THE ARCHAEOLOGICAL AND ETHNOLOGICAL INTERPRETATION OF A BRONZE AGE SYMBOL: THE CIRCLE-CROSS

Perhaps the most characteristic and most commonly occurring symbol from the Bronze Age is a circle with four spokes. According to our position, however, it is misleading to interpret this sign as a symbol of the four-spoked wheel of the sun god's chariot, or rather attributing its origin to this, since the symbol appears prior to the invention of the spoked wheel and it was also used in areas where the wheel was not yet known. Nor is it likely that the sign depicts the Sun and the four cardinal points, the latter indicated by the four arms of the cross. It is far more probable that they were depicting the Sun surrounded by a compound atmospheric phenomenon, a *light cross* and a *halo*. This symbol played a special role in the religious beliefs of Native North Americans, who did not know of spoked wheels. Through the analysis of the archaeological finds and the Native American ethnographic parallels we are trying to draw attention to the extraordinarily complex message of the seemingly simple symbols, which may have had several levels of meaning to a given community.<sup>9</sup>

## 3) SYMBOLS OF ATMOSPHERIC PHENOMENA IN HUNGARIAN FINDS

Although not recorded in research, finds have also come to light in Hungary that are similar from an archaeoastronomical perspective to the Nebra sky disk, or hold even more possibilities for scientific analysis. One example is the gold bracelet from Dunavecse, which in contrast to the Nebra sky disk provides more than just the opportunity to analyze the figures and identify them with atmospheric phenomena, since the function of the object is known: it is a bracelet. Its system of motifs and symbols is much more complex and richer than that of the sky disk. Two solar disks can be clearly identified at the meeting point of the tendril-

<sup>6</sup> E.g. Honti, Szilvia – Kiss, Viktória: Neuere Angaben zur Bewertung der Hortfunde vom Typ Tolnanémedi. *Acta Archaeologica Academiae Scientiarum Hungaricae* 51 (2000), 71–97.

<sup>7</sup> E.g. Kristiansen, Kristian – B. Larsson, Thomas: *The Rise of Bronze Age Societies, Travels, Transmission and Transformation* (Cambridge: University Press, 2005); Pásztor, Emília: The Social and Spiritual Impact of Sky Lore on Prehistoric Societies in Europe. *Compendium of Archaeoastronomical Studies Performed in the Carpathian Basin*. In: *Astronomy and Civilization in the New Enlightenment*, ed. Anna-Teresa Tymieniecka and Attila Grandpierre. *Analecta Husserliana* 107 (Dordrecht: Springer Netherlands, 2011), 137–145.

<sup>8</sup> We are researching this topic together with Alexandra Farkas, PhD candidate at the Eötvös Loránd University's Environmental Optics Laboratory.

<sup>9</sup> We have worked together on this project for several years with the anthropologist from the University of Turin, Enrico Comba, and would like to publish our results this year.

like curves, which either represent the arc of the crescent moon or the prow of a boat. Between the two solar disks there is a very important symbol consisting of five circles, for which there are numerous known analogies. This can be found on the famous, so-called Golden Cone of Ezelsdorf-Buch or the Berlin Gold Hat, both from the Late Bronze Age (14<sup>th</sup>–8<sup>th</sup> centuries B.C.),<sup>10</sup> as well as on the famous gold diadem from one of the Mycenaean shaft graves, which was perhaps contemporaneous.<sup>11</sup> This symbol also appears on the so-called Bratislava type bowls from the Late Copper Age, but its most important role was perhaps in the religious beliefs of the Vučedol culture characteristic of the transitional period from the Late Copper Age to the Early Bronze Age. Although according to the position of Aleksandar Durman this sign symbolizes the constellation Orion,<sup>12</sup> in my opinion it refers to an atmospheric phenomenon that occurs when four sun dogs can be seen organized symmetrically around the Sun. The significance of this symbol is clearly indicated by the fact that prestigious objects from numerous archaeological cultures were decorated with it. The group of three points used several times on the surface of this piece of jewelry for adorning the arm also refers to sun dogs in their most common form, one on each side of the Sun.

There are numerous other archaeological finds from the Carpathian Basin whose beauty and scientific value rival that of the Nebra sky disk. The international archaeological exhibit opening at the end of 2015 at the Türr István Museum in Baja will present these finds and the results of the related research, celebrating the *International Year of Light*. The title of the exhibit is “The Archaeology of Light”.<sup>13</sup>

Fig. 19: Gold bracelet.  
Dunavecse. Kovács,  
Tibor and Raczky,  
Pál (ed.): *A Magyar  
Nemzeti Múzeum őskori  
aranykincsei (Prehistoric  
Gold Treasures of the  
Hungarian National  
Museum)* (Budapest:  
Magyar Nemzeti Múzeum,  
2000), from figure 24.

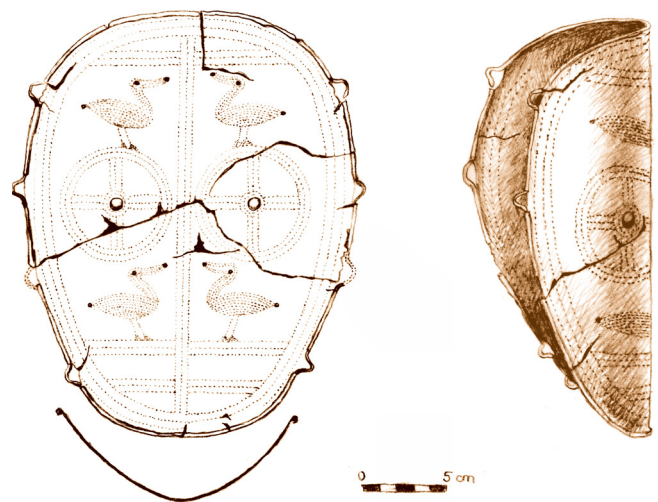


Fig. 20: Greaves, Rinyaszentkirály  
(drawing: Aladár Gáspár)

The deciphering of the “code” of the Bronze Age celestial symbols provides new opportunities for researchers in archaeoastronomy. The solar symbols depicting particular celestial phenomena appear on innumerable finds, e.g. grave ceramics, weapons and jewelry. Their study can provide valuable new information for Bronze Age archaeology. Hopefully, this brief summary does not only prove that it is worthwhile studying Bronze Age symbols, but also that celestial phenomena had significance in numerous areas of life for Bronze Age people and this can also be demonstrated in their material culture. Sooner or later, the field of archaeoastronomy will gain the recognition it deserves in Hungary as well.

<sup>10</sup> Springer, Tobias: The Golden Cone of Ezelsdorf-Buchs: A Masterpiece of the Goldsmith’s Art from the Bronze Age. In *Gods and Heroes of the European Bronze Age*, ed. Katie Demakopoulous, Jorgen Jensen, Jean-Pierre Mohen, Albrecht Jockennoel (London: Thames & Hudson, 1999), 176–181.

<sup>11</sup> Shaft Grave III (“Grave of the Women”), Grave Circle A, Mycenae: <http://www.flickr.com/photos/rosemania/5705121818>

<sup>12</sup> Durman, Aleksandar: *The Vučedol Orion and the Oldest European Calendar. Catalogue* (Zagreb: Tisak Trebotić d.o.o., 2000).

<sup>13</sup> Organizers: Emília Pásztor, Jaromír Kovárník (Katedra archeologie, Univerzita Hradec Králové), Andrzej Rozwadowski (Institute of Eastern Studies, Adam Mickiewicz University, Poznań), Peter Toth (Katedra archeologie, Univerzita Komenského, Bratislava), Judit P. Barna (Balaton Museum, Keszthely). To go along with the exhibit, which Mihály Hoppál will open, we are also planning a catalogue and a symposium in the year 2015 or 2016.

## RECOMMENDED LITERATURE

PÁSZTOR, EMÍLIA

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PÁSZTOR, EMÍLIA

Celestial Symbols on Archaeological Finds from the Bronze Age in the Carpathian Basin – A Case Study. In: *Cognitive Archaeology as Symbolic Archaeology*, ed. Fernando Coimbra – Georg Dimitriadis, 13–21. BAR IS. 1737. Oxford: Archaeopress, 2008.