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THE TRANSFORMATION OF THE NEOLITHIC POPULATION INTO TRIBES WITH THE MARIUPOL TYPE CEMETERIES AFTER THE COOLING EVENT 8.2 ky BP

The climate has always played an important role in human existence from ancient times to the present. Climate change has always had a significant impact on the development of traditions and technologies in prehistoric times. The global cooling event 8200 Cal BP was one of the greatest climatic events of the Holocene, which had a significant impact on the Neolithic population of Southern and Eastern Europe, Antalya, the Middle East, and North Africa.

During the 160–400-year cooling phase, several major environmental changes took place, such as an increase in the ocean and seawater; cooling the average temperature by ~ 3,3+/–1,1° C; drought in North Africa and the Middle East. The cooling affected the transgression of the Black Sea, whose rapid rise in water levels affected the population of the northern Black Sea coast.

The sharp drainage of the climate between 43° – 50° N latitudes has caused active migration processes among the Neolithic population in Anatolia, the Balkans, the Danube, and the Steppe Black Sea coast.

On the territory of Ukraine, the cold event occurred during the transition from the Mesolithic to the Early Neolithic. Late Mesolithic Hrebenykz, Kukrek and Donetsk cultures coexisted with the early Neolithic tribes of the Bug-Dniester, Sursk and Azov-Dnieper cultures. Under the influence of changes in natural areas in the northern Black Sea coast and the arrival of a new population of migrants from Anatolia to the Balkans and the Danube, there are active waves of local migration to the Bug-Dniester interfluve and settlement of the Middle to Lower Dnieper steppe.

Simultaneously with the cooling, these societies underwent profound changes that could be caused by the settlement of new groups in the region. One of the “characteristics” of these new cultural groups is the production of ceramic objects, such as pottery and the spread of a new funeral tradition — straightened on the back with outstretched arms and legs, which becomes the main for Mariupol-type cemeteries.

Keywords: cooling event 8.2 ky cal BP; migration; Neolithic population; East Europe; Cemeteries of the Mariupol type

During the 20th century, a large number of Mesolithic, Neolithic, and Eneolithic sites were discovered on the territory of Ukraine.

The transition to the Neolithic age began on the territory of Ukraine at 6500 Cal BC. During the 7th millennium BC, the Mesolithic and Early Neolithic cultural groups coexisted on the same territory (Telegin et al. 2015) and became witnesses of the cooling event. It raises the question whether the cooling event forces the Neolithization process itself in the Northern Black sea region and in the Dnieper rapids. It triggers the next question regarding how the cooling event of 8.2 ky BP influences on the local population and whether we can find these direct markers in the material culture.

Generally, all human communities have always reacted to the climate changes. It has usually been a passive reaction in order to enable the adaptation to the new conditions or cultural innovations. The active response is only expected in case of catastrophic weather conditions that are incompatible with the survival of the affected population without any active actions such as changing the living place (settlement) which caused the necessity to migrate. It could also be a reason for the reconstruction of the whole settlement or its parts (Gehlen, Schön 2005).

The question of whether climate changes in 8.2 ky BP which could trigger the economics of the early Neolithic tribes and cause the migration of the Neolithic farmer groups was already discussed (Berger, Guilaine 2009; Weninger et al. 2006; Budja 2007) but it is still pending in the end.

The following research has a purpose to trace the evidence of the climate changes in the Black sea region and find the Neolithic tribe's migration waves which in the next 400 years had

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created the population in the Middle and Lower Dnieper region.

The event 8.2 KY happened during the cooling phase dated 8600 and 8000 BP. The event was detected in multiple paleoclimatic records from the Greenland ice cores and a variety of sedimentary records (Morrill et al. 2013) (Fig. 1).

All available data about climate events for the Eastern Europe region is based on the pollen analyses. The analyses indicated the decrease of Alnus, Corylus, and Ulmus pollen, and registered the 8200 Cal BP abrupt climatic cooling.

During the 160–400-year cooling phase, several major environmental changes took place:

- the increase of water in the ocean and seas;
- the cooling of the average temperature by ~ 3.3+/–1.1° C;
- the aridification of the North Africa and the Middle East
- "an abrupt change to colder/dryer conditions in the otherwise warm and humid conditions of the early Holocene, in the entire Mediterranean (Ariztegui et al. 2000).

During the time period ca. 8250–8000 Cal BP, the regions such as Levante, Anatolia, Mesopotamia, Greece, Bulgaria experienced unusually cold/dry climatic conditions» (Weninger et al. 2006). According to M. Budja, the regions with the temperature around 43° – 50° N in respond to cooling event had wetter climate, while other latitudes suffered due to the drier weather conditions (Budja 2007).

The Event 8.2 ky BP triggered the transgression of the Black sea, which rose to the 45 m up (Zaliznyak 2008).

Each transgression of the sea level caused drier weather conditions on the West-North and North Black sea region and influenced the changes of the terrestrial ecosystems, the reason why forest ecosystem became forest–steppe, forest–steppe to steppe, and steppe became closer to the semi–desert ecosystem. Together with the regression of the Black sea, there was a reverse process too (Fig. 2). The changes in the ecosystems directly influenced traditions of the domestic economy and caused crises which caused the migration depending on the natural ecosystems (Kotova, Makhortych 2010). It also applies to the negative natural changes that took place in Anatolia and the Levant – a sharp precipitation rate decrease made impossible farming in the region. Together with aesthetic processes in the Black sea, we are able to track the migration processes alongside the Dniester, Bug, and Dnieper rivers, where the groups–in–migration with transgression moved in the northwest and northeast directions.

In his research about the climate forcing at the Neolithic population, B. Weninger concluded that the most considerable influence of the 8.2 ky event was detected in Central Anatolia according to the analyzed C^{14} data. After that research, the famous settlement at Catalhöyük East was deserted abruptly but then was re–occupied on the other side of the hill as Catalhöyük West. It is also remarkable to mention that a considerable number of archaeological sites in the Eastern Mediterranean were first occupied at about 8200 BC (in North-West Anatolia: Hoca Çeşme IV; in Greece: Nea Nikomedeia, Achilleion, Sesklo; in Bulgaria: Ovcarovo–Platoto (Weninger et al. 2006), Karanovo–Anzabegovo (Gehlen, Schön 2005)). The drying of the climate in the central Anatolia caused the migration of early farmers out from Anatolia to Greece (Thessaly and Greek Macedonia) and Bulgaria (Weninger et al. 2006). Regarding the influence of the 6200 Cal BC with newcomers from Anatolia, Gehlen (2005) speculated that on the settlement of Thessaly the extension of the Neolithic land cultivation had begun before the 8.2 ky event but it could be still related to the start of the new phase of the settlement. However, the Anatolian population already remained at the phase of the Pottery Neolithic and was close to the transition to the Chalcolite, while the Greek cultures remained at the pre–pottery Neolith phase. The Iron Gates, at the same time, moved to the Neolithic cultural Phase III and had the first founds of Starchevo pottery and new silex technics (Gehlen, Schön 2005).

L.L. Zaliznyak assumes that the transgression of the Black sea may be associated with the appearance of sites of Hrebenyky culture in Odesa and Mykolayiv in the second half of the VII millennium BC. The Proto–Neolithic Hrebenyky type flint processing technique was brought to the territory of Ukraine from the Balkan-Danube region, where it appeared from people from the Middle East. In addition, typical trapezium of the Hrebenyky type is recorded in the pre–ceramic Neolithic–first part VII millennium BC of preceramic Thessaly (Agros, Protoseskl0, Nea Nicomedia). The technology also extends to the territory of Romania (Ripicine, Izvor), Danube (Lepenski Vir), and Dniestr region (Soroky, pre–ceramic layers) (Zaliznyak 2008). Similarly, L.L. Zalizniak and O.V. Dyachenko underline the tendency that in order to reduce the «demographic pressure» on the territory, the population was pushed further into the Bug-Dnieper interfluve with each new drier–phase of climate in the region (Zaliznyak 2008; Dyachenko 2010). They assume that each group of the newcomers' tribes that came to the

region was caused by the wave of the climate changes that pushed a part of the "local–cohabitants" to the Northern Black Sea region like in a "domino–effect".

Then, the cultural groups of the Kukrek tradition on the Southern Bug river in the VII millennium BC. They adopted from the migrants of the Krish culture from the Dniester region the Neolithic pressure processing technique of the flint and adopted the first skills of ceramic production, as well as agriculture and cattle breeding. As a result, the Bug-Dniester culture became common. And again, during the VI millennium, they were displaced by a wave of immigrants LBK and Kukuteni–Trypillya) in the middle Dnieper and Kyiv Polissya who, in turn, influenced the formation of the Dnieper-Donetsk and Neman cultures (Zaliznyak 2008; Shydlovskyi, Morozova 2020).

Kotova assumed that during the aridization 6300 BC with the migration of the group with the Hrebeneky culture of the steppe Azov Sea in the Dnieper valley together with the locals with Kukrek culture appeared Surska culture. Together with aridization, it also contributed the domesticated animal breeding, and pottery from the Rakushechny Yar. These groups moved along the rivers to the North (Kotova, Makhortych 2010).

At the end of the VII and the beginning of the VI Millenium BC on the territory between the Bug river and the alongside the Dnieper rapids Bug-Dniester, Azov-Dnieper, and Surska cultures were already formed. Their inhabitants formed cultural groups which belonged to the different Mariupol type cemeteries.

Cemeteries were mostly attributed to the Azov-Dnieper culture. However, the close contacts in the region between the population obligate us to count with the cross–influences between these cultures as well as other neighboring cultures as the Dnieper-Donetsk, Donetsk, Neman, Volynska cultures.

In Ukraine, alongside the Dnieper rapids and in the Azov steppe were founded 24 big Neolithic cemeteries from 1930 to 1985 by M. Makarenko (Mariupol cemetery, 1930), O.V. Bodyanskyi (Nenasyteckyy threshold cemetery, 1951; Maryivka cemetery, 1956; Lysa Hora cemetery, 1959), A.V. Dobrovolskiy (cemetery near village Chapli, 1954), M.Ya. Rudunskiy (Vovnygy I cemetery, 1955; Vovnygy II cemetery, 1956), A.D. Stolyar (Second Vasylivka cemetery, 1953), D.Ya. Telegin (Vilnyanske Cemetery, 1955; Mykilske Cemetery, 1959 and 1967; Vasylivka V cemetery, 1968; Yasynovate cemetery; Deriivka cemetery, 1967), O.G. Shaposhnikova (cemetery near village Kapulovka, 1970), A.A. Shchepiskiy (cemetery near village Dolynka, 1965) and other (Telegin, 1991).

Already at the end of the XX century, D.Ya. Telegin speculated that the ritual of the Mariupol–type cemeteries was also formed under the influences of the migration waves from the Near and Middle East region. All cemeteries were united under the common name of the first opened cemetery in Mariupol.

The stratigraphy of the cemetery defined in two periods A and B (Figure 3). Period A was related to the common collective graves in the rounded pits, during the period B, the graves usually had trench forms with collective graves, or pairs, and in the Eneolithic time there were individual graves. The bodies lied in the extended supine position. The skeletons from the earliest time were later moved to the funeral rituals. We can track it particularly in the Lysa Hora where there was a special pit with 17 skulls inside, obviously from the removed graves. The remarkable is that the graves were accomplished with a large amount of red ochre and grave goods (Bodyanskyyi O.V., 1961).

It was quite typical for the cemeteries: fish and deer teeth, turtle, flint tools and bone bracelets (Vasylivka II), fragments of pottery with either stroked or comb ornamentation, decorated bone plate of Mariupol–type, deer and fish tooth pendants, flint knives, annular beads, spear points and flint scraper (Deriivka 1).

The pottery was founded in big quantities near 60 pots in Lysa Hora and Mykilske cemeteries, which formed a part of the funeral and crashed during the ritual. Besides, in smaller amounts as only several sherds were founded at Yasynovate, Deriivka and Vovnygy Left Bank cemeteries, which also belonged to the period B.

In 1990-ties the periodization of the cemeteries was conducted by correlating the burials rituals with the grave goods. The major goal of this paper is to review this with a contemporary method using the latest available ^{14}C data. We performed a comprehensive collection of published ^{14}C data from journal articles and monographic publications to establish a database for the Neolithic and Eneolithic cemeteries and settlement sites in the Middle and Lower Dnieper region. We collected 244 published ^{14}C dates from 40 sites, including 106 dates from 13 cemeteries. All data selected for further analysis with R were cleaned and structured into columns: 'site', 'lab code', 'data BP', and 'std (standard deviation)'.

A quantitative analysis was carried out using the statistical software R and R-Studio. In order to calibrate old and new data uniformly using the current calibration curve IntCal20 (Reimer et al. 2020) and to summarize the data in a structured way according to phases, we used the R package

'oxcAAR'. The data were restructured so that for each site a sequential calibration with standard boundaries was performed. Within these, a KDE plot (Bronk, Ramsey 2017), or in the case of only one date per site, a cumulative plot, was then created for a visualization of the potential runtime of each site. As a result, we obtained statistical plots with the calibrated time periods of the existing cemeteries and settlement sites. This provides us with information about which Neolithic sites were contemporaneous with each other and which sites were earlier or later (Figure 4). Unfortunately, so far, the available ^{14}C data from cemeteries is limited, but we can state with high probability that the majority of the cemeteries were in use in the same time during Period B.

As reported by Pothekhina 'The mtDNA analysis of the most present–day haplogroups founded in Europe likely evolved in the Middle East about 40.000 years ago. At that time, the branches of the N* node diffused in Europe through Anatolia and across the lower Danube Basin. Other branches of the same node, notably members of the J/T cluster, advanced in Europe via the same route with the advent of agriculture' (Richards et al. 2000; Roostalu et al. 2007; after Nikitin et al. 2009).

According to M.C. Lillie and I.D. Potekhina, on the Early Neolithic Cemetery were also founded non–local individuals who were related to the ancient hypermorphic north-European population, and individuals were determined as connected to the Middle East region, with date frames between 5616–5090 Cal BC (Lillie et al. n.d.). Besides, were fixed the individuals with C* node who belonged to the Caucasian population.

The extended supine position of the dead was typical for Western Europe during the late Palaeolithic (Cro-Magnon, Combe-Capelle, Barma-Grande, Arena Candide, etc. (Breul, Lantier 1959, 308–311). In the Eastern Europe, Late Paleolithic burials in different positions were discovered: Contracted – Markina Gora and Kostenky-18, extended – Sungir, and sitting Kostenky-2.

During the Mesolithic time, in North Central Europe and Scandinavia there was a common single burial in the extended position with ochre on the cemetery of Vedbaek in Denmark, Zveinieky, Latvia. However, in the middle Danube region, and near the Baltic Sea the extended supine position and sitting position were more typical. However, the cemeteries of Schela Cladovei, Vlasac near the Iron Gates in the Middle Danube, and the burials of the settlement of Lepenski Vir were found in the extended position (Telegin 1991).

According to the buried body–position tradition, all Neolithic—Eneolithic cultures were divided into the two zones: North European–Siberian zone, and Central European—Middle Asia zone.

The cemeteries of the Mariupol type belong to the North European—Syberian zone: the main markers are the use of the ochre during the ritual and supine position. Nevertheless, I believe we have also some influence from the "southern zone" such as grave goods in the graves, the founds of the mace in the Mariupol cemetery which related to the Bug-Dniester culture. Besides, it is still in question it the "transition zone" between the two major lines does exist. At the same time, on the Mesolithic cemetery of Vasylivka III there were found 7 graves in supine position both individual and in groups. The possibility of the special transition area proved also at the Chapli cemetery, where were excavated graves from Mesolithic (at contracted position) and Neolith (at supine extended position) periods. In this case, Chapli cemetery so fur is a unique site which kept layers with different periods (Telegin 1991). Unfortunately, the anthropological material from Chapli was badly preserved and not able to give us more evident.

Another interesting theoretical connection with the Middle East is the wooden constructions on the cemetery of the Mariupol, graphic reconstruction that you can see. The typical constructions might be on the main big cemeteries of the Mariupol type. The contraction is showed as a wooden longhouse or small huts. It pushed to hypostatize the possible connections with the Anatolian Neolithic tradition of the graves under the houses. Besides, the ritual of the broken pottery during the funeral procession might have had the roots from the tradition that was also traced at Mesopotamia, there were stone vessels broken during the procession (Telegin et al. 1987).

In conclusion, the relatively significant climate changes in the Holocene stable climate 8200 BP cooling event made a huge push for changes in the Middle East, Mediterranean, and Northern Black sea steppe, as well as in the whole Europe. Even if it seems problematical to fix the material culture changes during of 200 years, we can still trace the sequence of changes that took place at that times.

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ТРАНСФОРМАЦІЇ НЕОЛІТИЧНОГО НАСЕЛЕННЯ У ПЛЕМЕНА З МОГИЛЬНИКАМИ МАРІУПОЛЬСЬКОГО ТИПУ ПІСЛЯ ПОХОЛОДАННЯ 8200 р. тому

Для людини клімат завжди відігравав важливу роль у її існуванні від найдавніших часів і до сьогодення. Кліматичні зміни завжди мали помітний вплив на розвиток традицій та технологій у доісторичний час. Глобальне похолодання 8200 років тому було однією з найбільших кліматичних подій Голоцену, яке спричинило значний вплив на неолітичне населення Південної та Східної Європи, Анталії, Близького Сходу та Північної Африки.

Протягом 160–400-річної фази охолодження відбулося кілька основних екологічних змін, таких як, збільшення води в океані та морях; охолодження середньої температури на ~ 3,3+/–1,1° C; засуха на території Північної Африки та Близького Сходу. Похолодання вплинуло на трансгресію Чорного моря, стрімке підняття рівня води якого вплинуло на населення Північного Причорномор'я.

Різке осушення клімату між 43° – 50° N широтами спричинило активні міграційні процеси посеред неолітичного населення на Анатолії, Балканах, Дунаї та Степовому Причорномор'ї.

На території України холодна подія припала на період переходу від мезоліту до раннього неоліту. Пізньомезолітичні Гребениківська, Кукрекрецька та Донецька культури співіснували з раніми неолітичними племенами Буго-Дністровської, Сурської та Азово-Дніпровської культур. Під впливом змін природних зон в Північому Причорномор'ї та приходу нового населення мігрантів з Анатолії до Балкан та Подунав'я відбуваються активні хвилі локальних міграцій до Буго-Дністровського межиріччя та заселення степової зони Середнього на Нижнього Дніпра.

Одночасно із похолоданням ці суспільства зазнали глибоких змін, які могли бути спричинені поселенням нових груп у регіоні. Однією з «характеристик» цих нових культурних груп є виробництво керамічних предметів, таких як кераміка та поширення нової поховальної традиції — випростаної на спині з витягненими руками та ногами, яка стає основною для могильників Маріупільського типу.

Ключові слова: похолодання 8200 років тому, зміни клімату, міграції, населення неоліту, могильники маріупільського типу

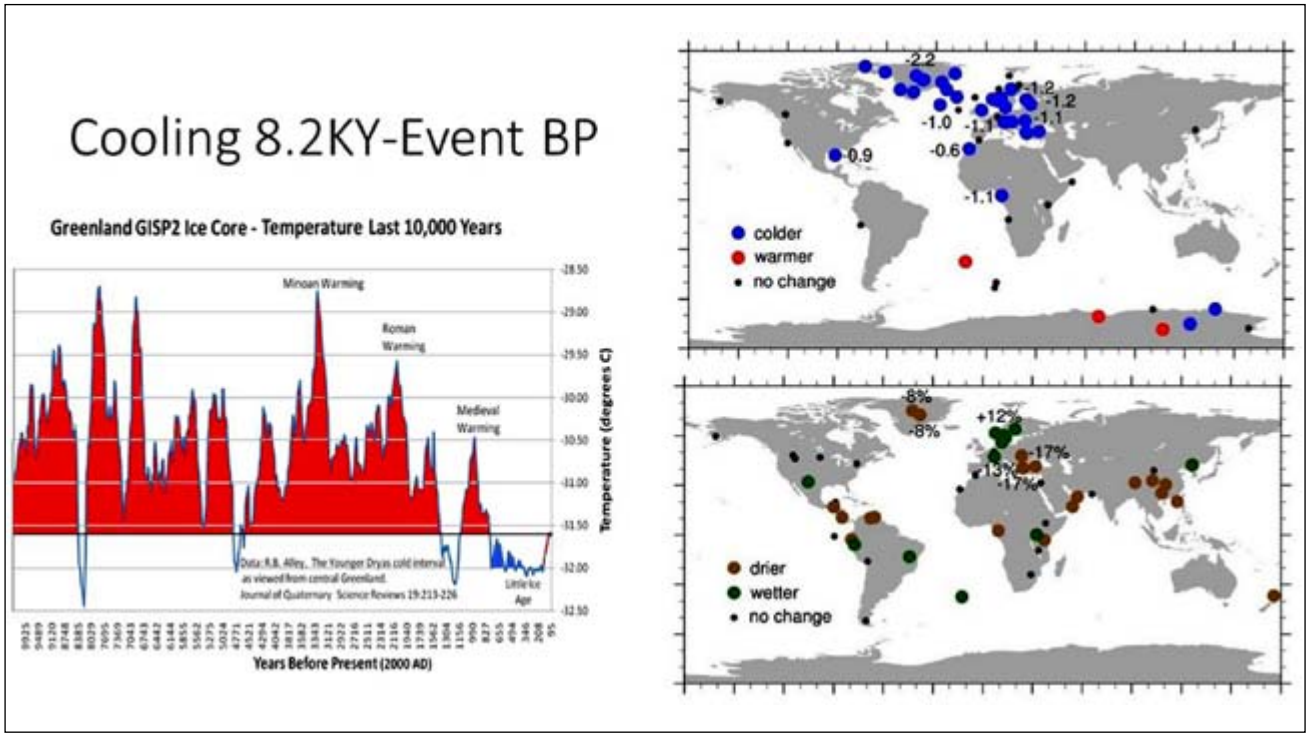

Fig. 1. The cooling event 8.2 ky BP (after Morrill et all, 2013)

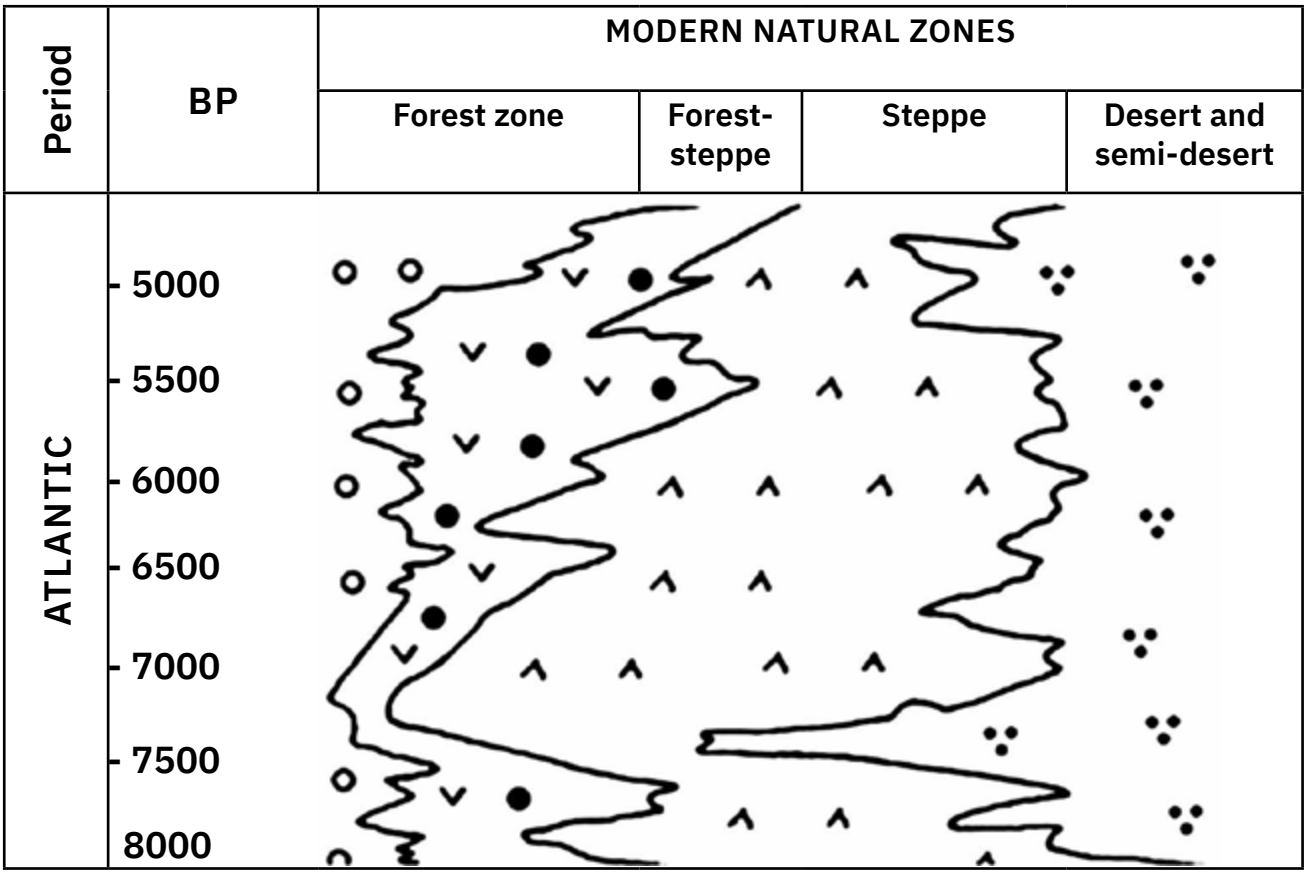

Fig. 2. The changing of the natural zones (after Kotova, 2010)

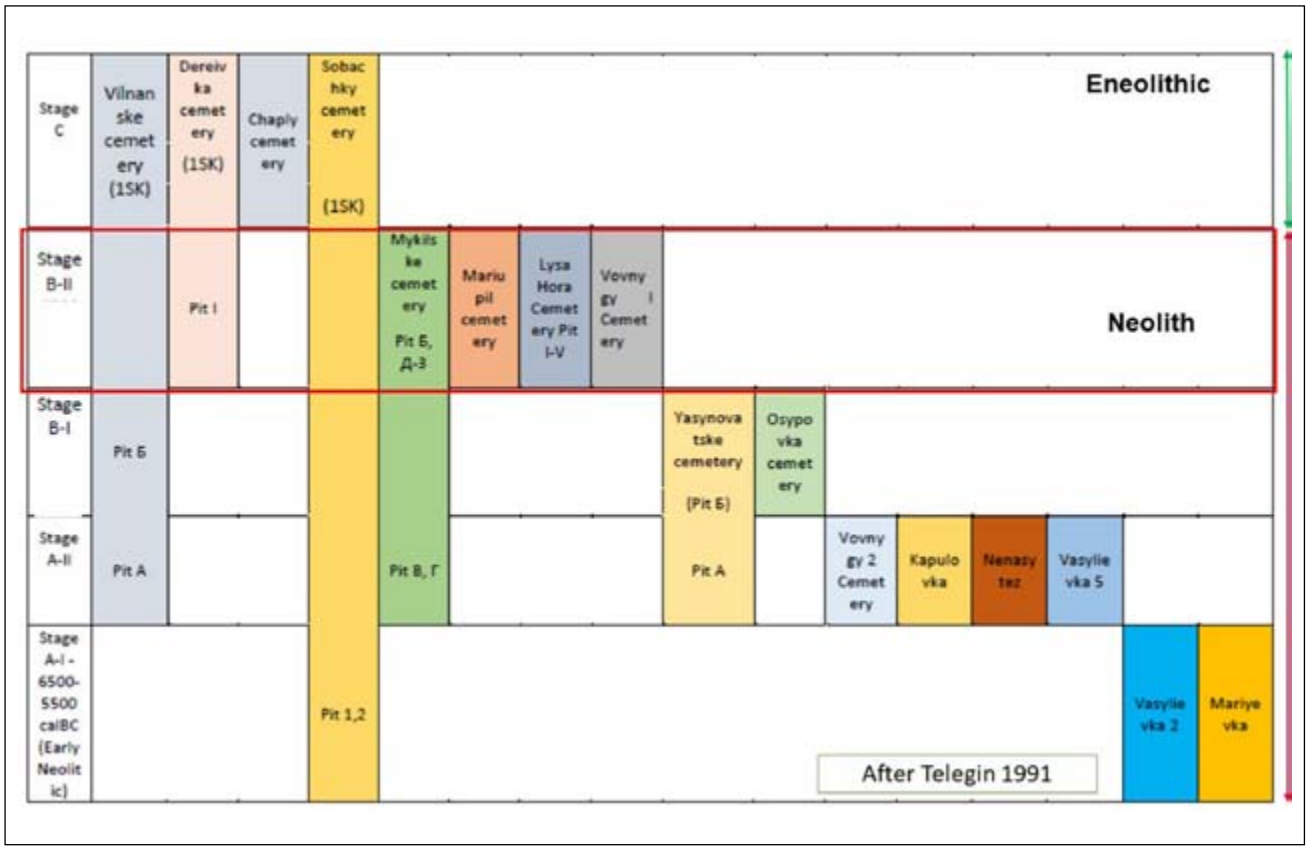

Fig. 3. The periodization of cemeteries of the Mariupol type (after Telegin, 1991)

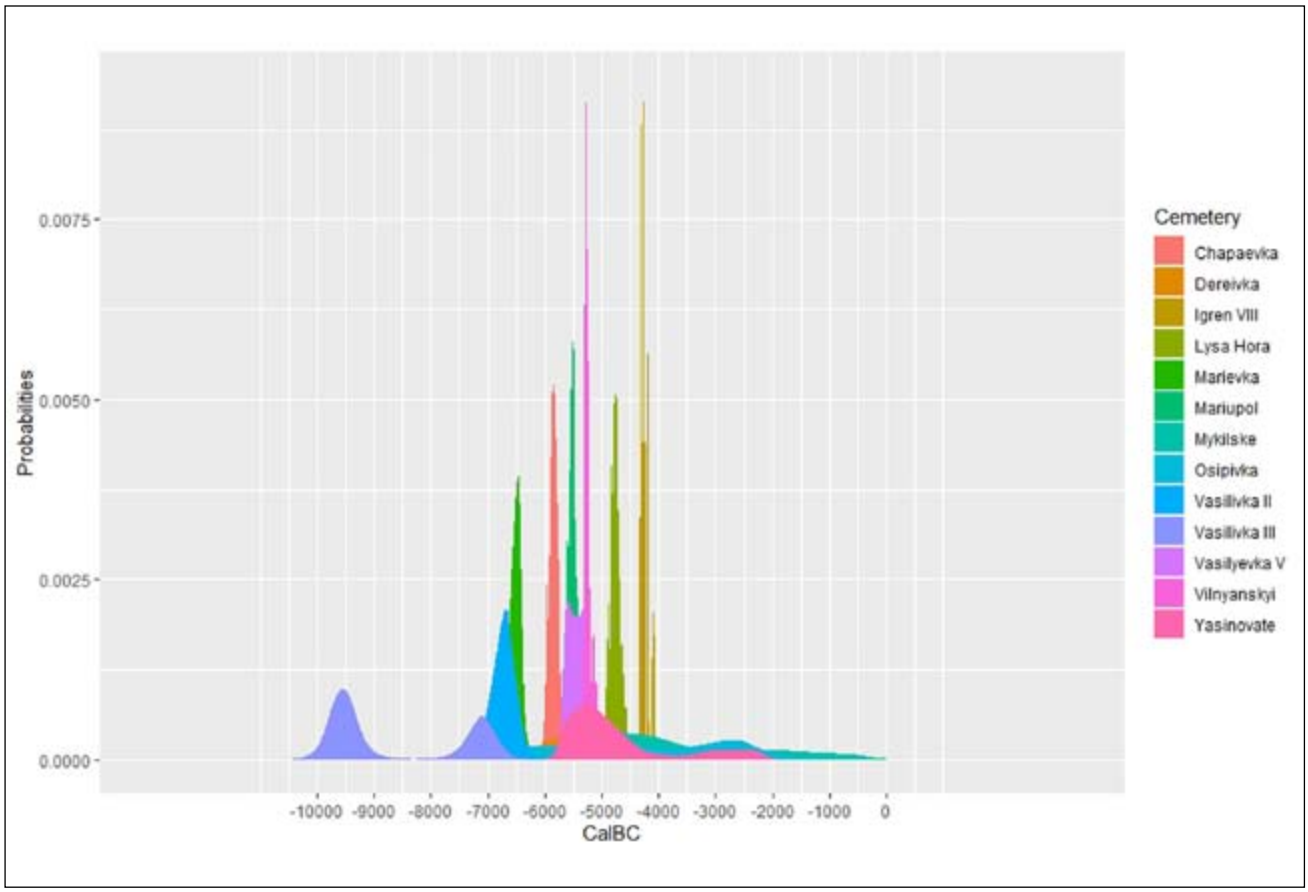

Fig. 4. The relative periodization of cemeteries of the Mariupol type of the calibrated C14 data