SPRAWOZDANIA ARCHEOLOGICZNE 68, 2016
PL ISSN 0081-3834

Aleksandr Diachenko*, Thomas K. Harper**

THE ABSOLUTE CHRONOLOGY OF LATE TRIPOLYE SITES: A REGIONAL APPROACH

ABSTRACT

Diachenko A., Harper T. K. 2016. The absolute chronology of Late Tripolye sites: a regional approach. *Sprawozdania Archeologiczne* 68, 81-105.

While numerous studies have attempted to reconcile the relative sequence of Late Tripolye sites with ^{14}C data, results have generally conformed to the general, monolithic periodization of the Cucuteni-Tripolye cultural complex. When viewed as a multi-linear process occurring on the level of numerous interrelated regions, the development of local groups assigned to the periods CI, CI-II and CII can be shown to have a high degree of spatio-temporal variability and overlap. In this article we explore the synchronicity of interactions between groups assigned to different typo-chronological periods and propose a revised hybrid chronology for Late Tripolye development that considers both relative and absolute chronological indicators.

Keywords: Chronology, cultural synchronisms, radiocarbon, Late Tripolye
Received: 16.02.2016 Revised: 28.03.2016 Accepted: 18.04.2016

*Institute of Archaeology of the National Academy of Sciences of Ukraine, Gieroiv Stalingradu 12, Kyiv-210, Ukraine; oleksandr.diachenko@gmail.com
**Human Paleoecology and Isotope Geochemistry Laboratory, Pennsylvania State University, 403 Carpenter Building, University Park, PA 16802, USA; thos.harper@gmail.com

INTRODUCTION

Significant changes in environment, economy and society in the second half of the fourth millennium BC are among the key topics of European prehistoric archaeology. However, analysis of the relationship between the different factors that caused these transformations in Eastern Europe often remains mired in issues of radiocarbon dating. Such is the case with the sites of the Cucuteni-Tripolye cultural complex (hereafter CTCC), which are a subject of international interest due to their mutual imports and influences with material complexes in archaeological cultures spreading from Polish Kujawy to the Sub-Caucasian Steppe. Such spatio-temporal diversity leads to overlapping and incongruent chronological schemes. This paper deals with the chronology of the Late Tripolye, addressing the general issues of absolute dating and the possibility of employing regionally differentiated approaches for the development of related schemes. Beyond this we touch on the issue of synchronizing the Tripolye culture with the Funnel Beaker culture (hereafter FBC). We should, however, begin with a brief review of the chronological division and spatial location of the Late Tripolye sites.

THE LATE TRIPOLYE

Tripolye, even when separated from Cucuteni, is not recognized as a unified cultural group. Tsvek distinguished, initially as 'the sites of the Eastern area of the Tripolye' and later as the settlements of the 'Eastern Tripolye culture' (ETC), the settlements with ceramics mostly characterized by incised ornamentation. The ETC settlements are also denoted by specific sets of clay figurines and dwellings of certain types (Tsvek 1980; 2006). Ryzhov (2007) proposed the term 'Western Tripolye culture' (WTC) for the settlements where ceramic assemblages are characterized by painted ornamentation. An alternative concept, focusing mainly on disparities in the formation of the Precucuteni and Cucuteni-Tripolye complexes, was recently proposed by Burdo (2007). She proposes the terms 'Tripolye-Precucuteni culture' and 'Tripolye-Cucuteni culture' to highlight differences in the Tripolye development. This approach was heavily criticized by Tsvek, who noted that Burdo advocated 'nothing beyond renaming the ETC to the Precucuteni-Tripolye culture' (Tsvek 2012). It should be noted that Videiko and Tkachuk do not use the terms 'ETC' or 'WTC', preferring the definition of 'Tripolye culture' in its traditional sense, which describes the Eastern part of the Cucuteni-Tripolye complex.

Thanks to the work of Zakharuk, Tsvek, Ryzhov, Tkachuk and – especially – Dergachev, the taxonomy of the Tripolye sites was precisely developed. Considering the relatively small number of multilayered sites, Dergachev proposed the procedure of chronological, territorial and 'genetic' analysis of settlements and their groups. By 'genetic' he means the

evolutionary trajectory of material culture that characterizes the development of a certain population group over time (Dergachev 1980). The sites, usually clustered spatially, that have similar materials are grouped into types. These types of sites compose the local groups that in turn form the genetic lines of development of the culture, with both the WTC and the ETC consisting of several genetic lines of development. As we ascend the hierarchy in this scheme the timespan and occupied area increases with each taxonomic tier, while the differences in material culture grow. It should be noted that Romanian scholars mainly do not use the taxonomic levels of 'local group' and 'genetic line'.

The periodization of the Tripolye sites was proposed by T.S. Passek (1935; 1949), who divided them into three chronological groups – early, middle and late (correspondingly, A, B and C/γ). In the case of Tripolye C/γ this scheme was extended by both chronological sub-division and spatial separation (Tripolye B was sub-divided only chronologically). Sites located in the north – in Volyn and the Middle Dnieper region – were labeled 'Tripolye C', while sites located in the south – in the Prut, Dniester and Lower Southern Bug regions – were labeled 'Tripolye γ'. This results in the sub-division of Tripolye CI, γI, CII and γII (Passek 1949). Contemporaneous sites in Romania are referred to Horodiştea-Folteşti or, lately, Horodiştea-Erbiceni groups (or Horodiştea-Erbiceni/Gordineşti), and were considered at first as a separate chronological horizon and later as an individual culture or cultures (Dumitrescu 1963; Lazarovici 2010; Nestor 1950; Petrescu-Dîmboviţa 1950).

Movsha (1972) proposed replacing the term 'Tripolye CI' with 'Tripolye BIII', and relates only Tripolye CII sites (after Passek) to the latest period of the culture. Zbenovich (1974) and Dergachev (1980) also noted that the Tripolye CI (after Passek) settlements, dwellings, and ceramics are more similar to Tripolye BII materials than to the Tripolye CII data. Hence, Dergachev claimed that Late Tripolye corresponds exclusively to Tripolye CII/γII in Passek's scheme. His concept of the development of the Tripolye suggests two dialectically related processes. The first is the permanent formation of new cultural and ethno-social units that was to a great extent caused by long-distance migrations and interactions among the populations of the CTCC and their neighbours. The second process is the trend towards the unification of material culture that reached its peak in Tripolye CII with the formation of the 'common Late Tripolye horizon', represented by significant similarity of material culture (Dergachev 1980). Late Tripolye sites were also divided into two sub-periods simply labeled '1' and '2' according to chronological ordering (Dergachev 1980).

Tkachuk and Ryzhov, considering different issues with the transition from Tripolye CI to Tripolye CII (after Passek), used more neutral terms like 'late Tripolye CI – early Tripolye CII sites' or 'Tripolye CI-II' (Ryzhov 2007; 2012; Tkachuk 2005; 2011). To some extent, these neologisms were caused by different rates of development in the material culture in different regions of the CTCC, which we attempt to address in the analysis presented here.

More recently Ryzhov (2007; 2012) proposed applying a modified version of Movsha's changes to the periodization. According to him, most of the Tripolye CI sites should equate to the Tripolye BIII period, while a new period designated CI should be limited to sites previously attributed to the final phases of Tripolye CI and the early phases of Tripolye CII; i.e. the sites of the Badrazhskaya, Koshilovetskaya, Lukashevskaya and Kosenovskaya local groups and those contemporaneous with them (Ryzhov 2012). Tkachuk, meanwhile, continues to use the term 'late Tripolye CI – early Tripolye CII' (e.g. Tkachuk 2011; 2014). The idea of separating the latest Tripolye local groups into individual cultures has also found support recently (Burdo 2007; Petrenko 2009). Despite influencing highly generalized accounts such as those in student textbooks, this idea was not accepted by all experts.

Now let us consider the structure of the Late Tripolye. Complexes of material culture in the sites of the Middle Dnieper region and Volyn developed primarily from the ETC, but also exhibit significant influences from the WTC populations (Dergachev 1980; Kruts 1977; Ryzhov 2011; Tkachuk 2011). The chronological sequence of the local groups in the Middle Dnieper region is represented by the Chapaevskaya, Lukashevskaya and Sofievskaya groups, respectively dated to Tripolye CI, CI-II and CII (Ryzhov 2007; cf. Kruts 1977; Videiko 2002; 2011), while the Trojanov group, originating from the late Tripolye CI – early Tripolye CII Kolodiazhnoe type, was replaced by the Gorodsk group in Eastern Volyn (Dergachev 1980; cf. Shmaglij 1971). The sequence for Western Volyn is represented by the Khorjev (Khoriv)-type and Listvin-type sites, with the addition of the Lozy-type, which has a somewhat unclear chronological position (Peleshchyshyn 1997a; 1997b). It should be noted that the eponymous settlement of Khorjev I includes materials typical for the Brynzenskaya group of the WTC (Ryzhov 2007; cf. Dergachev 1980). Hence, Peleshchyshyn's term 'Khorjev type' refers exclusively to other sites that he previously categorized as being of this type. Other settlements with materials originating from the Brynzenskaya group complexes were recently discovered in Western Volyn (Król *et al.* 2013; Pasterkiewicz *et al.* 2013; Rybicka 2015). It should be noted that most of these units are usually labeled with the term 'type', but we use 'group' after Dergachev to follow on of the general rules of taxonomy – such as the application of first-order terms to first-order processes and phenomena. The geographic positioning and extent of the local groups addressed in this article are presented in in Figure 1.

Dergachev identified two 'genetic' lines of development of the Late WTC, represented at their initial stages by the sites of the Vykhvatinskaya and Brynzenskaya local groups in the Prut-Dniester interfluve (Dergachev 1980). The Brynzenskaya local group influenced the formation of the Koshilovtsy group in the Upper Dniester region (Ryzhov 1998; 2007; cf. Tkachuk 1998; 2005) and became the basis for the formation of the Gordineshtskaya, Kasperovskaya and Horodiştea groups as well as several types of sites in the Upper Prut region, Upper and Middle Dniester, the northern part of the Southern Bug region and the Southern Bug-Dnieper interfluve (Dergachev 1980; 2004; Ryzhov 2007; cf. Tkachuk 2011; 2014). These groups influenced the material culture of the Gorodskaya and Sofievskaya

groups and the Listvin-type sites (Dergachev 2004). Bicbaev (1994) identified the sites of the Kirilen-type in Northern Moldova with ceramic complexes that include both the Brynzeni and Gordineşti traditions, interpreting the Kirilen group as intermediate in this chronological chain. The Vykhvatinskaya local group became the base for the formation of the Usatovskaya group in the North Pontic region and the Folteşti group in Romanian Moldavia. However, early sites of the Usatovskaya group are generally synchronous with early sites of the Vykhvatintsy group, with only a short delay in development (Dergachev 1980; 2004).

Considering their lesser territorial extent and chronological span compared to local groups, several units are recognized as types. These include the Sandraki- and Pechora-types in the northern part of the Southern Bug region, which formed under the influence of the Brynzenskaya and Gordineshtskaya groups, and the Kocherzhintsy-Shulgovka-type in the Southern Bug-Dnieper interfluve, which arose from the Kosenovskaya local group (Dergachev 2004; Ryzhov 2002; cf. Tkachuk 2008). The ceramic collection from Sandraki mainly contains Tripolye table pottery with geometric ornaments typical of the Gordineshtskaya group. However, two fragments of ceramics with bichromatic ornamentation may be attributed as Brynzenskaya group ceramics. This allows a preliminary synchronization of Sandraki with the Kirilen-type from the perspective of linear evolution, or its synchronization with the Gordineshtskaya group, as proposed by Tkachuk (2011), from the perspective of multi-linear evolution. In the former case the presence of fragments of Brynzenskaya pottery should be viewed as a result of a delay in the peripheral development. Sites of the Lomachintsy-Vyshneva type were spread between the Prut and Dniester during late Tripolye CI – early Tripolye CII. Their populations were probably later included in the formation of the Brynzenskaya group (Ryzhov 2007).

The chronological correspondence of these local groups, the interactions between them and the principles of their identification are actively debated (for instance, compare Ryzhov 2007; Tkachuk 2014 and Videiko 2011). Western readers may be misinformed by papers that identify some groups based upon principally different criteria. For instance, the Northern group and Middle Dniester groups of the Late Tripolye identified by Movsha (1971a; 1971b) are not recognized by other experts anymore. The so-called 'Upper-Dniester group' was identified by Konoplia based on the location of sites within a given area (Vasylenko, Konoplia 1985), and labeled a 'regional group' instead of a 'local group' by Kruts and Ryzhov. In fact this is a set of sites that belong to different local groups during different times (Kruts, Ryzhov 1997).

THE OVERALL RANGE

How does it all look in terms of absolute dating? A significant increase in the number of radiocarbon dates within the CTCC during the past few years has led to many changes in related schemes (a detailed overview of the absolute chronologies proposed prior to

2004 may be found in Videiko 2004). Chronologies combining the relative sequence of sites with absolute dates have been advanced by a variety of authors. C.-M. Lazarovici proposed limiting the 'Horodiştea-Erbiceni/Gordineşti culture' to the range of 3500–3150 BC, including two Moldovan sites into the sample (Lazarovici 2010: 74, fig. 7). It should be noted, however, that she dates the end of Cucuteni B to 3600–3500 BC (Lazarovici 2010: 74). Videiko currently places Tripolye CII into the interval of 3400/3200–2900/2800 BC, somewhat truncating the younger limits he proposed earlier (Videiko 2013: 6; cf. Videiko 2004).

Kadrow (2013) dated Tripolye CII to 3600–2700/2600 BC. The beginning of this range is proposed in consideration of dates obtained for the stratified site Bilche Zlote-Verteba, as well as the overall Cucuteni-Tripolye absolute chronology and the numerous western influences found in ceramic complexes. Meanwhile, the younger limit of 2700/2600 BC is based on Tripolye imports at the FBC settlement of Zimne II and the series of dates received for this settlement (Bronicki *et al.* 2003). A similar range of dates was also suggested in Dergachev's latest overview of the Late Tripolye. He placed the first sub-period from 3500/3400–3100/3000 BC, while the second is limited by the range of 3100/3000–2800/2700 BC (Dergachev 2004: 110). Manzura (2005) notes that Tripolye CII generally corresponds to Early Bronze Age I (3500–3100 BC). Tkachuk, meanwhile, dated the beginning of Late Tripolye to 3500–3300 BC and Tripolye CI-II to 3800–3700 BC, noting its overlap with the Tripolye CI (Tkachuk 2011; 2014). We expressed similar views on Tripolye chronology (c. 3600 BC for the transition from Tripolye CI to Tripolye CI-II and Tripolye CII), considering it in the context of climate change and population dynamics (Diachenko 2010; Harper 2013; Weninger and Harper 2015).

Rassamakin (2004) dated the Late Tripolye to the interval of 3500/3400–3000/2900 BC, with a possible extension to 2750 BC. However, he later gathered most of the available dates for all the Tripolye periods and presented the issues in their interpretation, avoiding designating intervals for each of these periods (Rassamakin 2012). Rassamakin noted that, to some extent, the significant disparity between dates obtained for Romania and Moldova with those of Ukraine may be caused by the relatively high number of questionable dates produced by the Kiev Laboratory of Radiocarbon Analysis after 1998.

REGIONAL CHRONOLOGIES

The issue of Late Tripolye absolute chronology has mainly been questioned in the context of the overall culture area or in its Horodiştea-Folteşti and Tripolye CII sub-areas. The exception is Rassamakin's recent paper, which analyzes radiocarbon dates while considering the regional distribution of sites (Rassamakin 2012). Different rates in the development of Tripolye local groups, even those located within a similar regional context, have been noted in the literature (Dumitrescu 1963; Tsvek 1980; Mantu 1998; Ryzhov 2012; Tkachuk 2005; 2014). Employing a multi-linear approach to these spatio-temporal schemes is actively advocated by Tkachuk (2005; 2011; 2014), and has produced favorable

results; some of his conclusions are well-correlated with the results of recent mathematical simulations based upon the application of network analysis from epidemiology. According to these simulations, the temporal difference between the boundary of a certain period, identified via typo-chronologies, in the Dniester region and its peripheral areas may reach or even exceed 100–150 years. The duration of this is dependent upon the structure of settlement systems, the intensity of interactions and the 'openness' to innovations in certain Tripolye groups (Diachenko, Menotti 2015).

However, can this idea be reconciled with the current understanding of the absolute chronology? Here we present a regionally differentiated analysis of radiocarbon data, comparing the probability distributions of individual dates and summed sets of dates with the relative sequence of material synchronizations, mainly developed by Dergachev, Ryzhov and Tkachuk (Figures 2a and 2b; Data Table 1). Based on how well the probable span of a relative period coincides with the area of its corresponding probability distribution, we make a qualitative assessment of agreement that may direct attention to improbable and deficient areas of the absolute chronology. Dates were calibrated according to the IntCal 13 Northern Hemisphere curve (Reimer *et al.* 2013) in OxCal (Bronk Ramsey 2009) version 4.2. We decided against the use of Bayesian sequencing owing to its generally poor applicability to single-layer sites (Bronk Ramsey 2015). In the few cases where some vertical stratigraphy is perhaps present, such as the Verteba Cave series, the small number of dates actually attributable to specific local groups (eight out of 37 dates) and the overlapping nature of the chronology – which is ill-suited for use of the boundary function in OxCal – confounded the results.

The end of Tripolye CI in the Middle Dniester region is represented by dates obtained for Lacul Soroca, Vărvăreuca 8 and Ţipleşti (Markevich 1981; Ryzhov 2003; Tkachuk 2005). Tkachuk regards Vărvăreuca 15, the eponymous settlement for the Vărvăreuca 15-type sites, and the Cucuteni B2 settlement at Valea Lupului as synchronous with the sites of the first phase of the Badrazhskaya group (Tkachuk 2014). Thus, these settlements mark the beginning of Tripolye CI-II in the Prut-Dniester interfluve. Supplemented by four dates from the settlement Hancăuţi I, belonging to the second phase of the Badrazhskaya group (after Tkachuk), the beginning of Tripolye CI-II in this region may be dated in the range of 3800–3650 BC. This interval may be limited to 3700–3650 BC by considering several relative synchronisms at the CI/CI-II inferface (Ryzhov 1999; 2000; cf. Tkachuk 2008; 2014). The Chechelnitskaya group settlement Stena 4 is characterized by the presence of pottery of the Petrenskaya, Shypenetskaya and Tomashovskaya groups alike, while some influences from Vărvăreuca 15 are also notable. Imports and influences from Stena 4 and Vărvăreuca 15 were also found at Majdanetskoe (Tomashovskaya group, Phase 3, Stage 2), while the slightly earlier Talianki settlement, which mostly precedes the habitation at Majdanetskoe, shows only weak influence from the Chechelnitskaya group (Ryzhov 1999; Tkachuk 2005). The series for Majdanetskoe is represented by approximately 30 dates, but their interpretation varies depending upon methodological approaches,

considerations of relative chronology, and the shape of the calibration curve during this time. In our opinion, Majdanetskoe should be dated in the range of c. 3750/3700–3650 BC (cf. Muller *et al.* 2016, table 1). Hence, 3650 BC may be considered as the probable end of the Chechelnitskaya and Petrenskaya groups, while the duration of the Tomashovskaya group should be tentatively extended to 3600 BC in order to accommodate Tomashovka and other late settlements that replaced Majdanetskoe chronologically and 'genetically' (Diachenko, Menotti 2012; Ryzhov 1999).

Considering the two phases of development of the Badrazhskaya group assumed by Tkachuk (2014), with sub-division of the second phase into earlier and later settlements and the presumed phase duration of 50 years (Kruts 1989; Markevich 1981), we may suggest the dating of the Badrazhskaya group in the range of 3700–3550 BC. Hence, we presume that the Brynzenskaya group – which marks the start of the Tripolye CII period in the Prut-Dniester interfluve, begins c. 3550 BC. Unfortunately, the only sequence for the Brynzenskaya group in its 'mother area' is represented by five dates from Zhvanets, returning a range of 3480–2700 BC. New data from Novomalin-Podobanka in Volyn allow us to date the ceramic complex of the Brynzenskaya local group to the range (2σ) of 3627–3363 BC (Rybicka, Diachenko, in press). The older limit of this range may be revised in respect to our assumption regarding the Badrazhskaya-Brynzenskaya transition. The dates from Tsviklovtsy and Sandraki represent the absolute chronology of the Gordineshtskaya group sites between the Prut and the Dniester; however, both of them look 'too young'. Meanwhile, ceramic imports from the Gordineshtskaya group in Sărăteni may be dated to the range of 3300–2900 BC, which corresponds to the dates from Horodiştea I and II (Levitski *et al.* 1996; Rassamakin 2012). Thus, the transition from the Brynzenskaya to the Gordineshtskaya group in the Prut-Dniester interfluve occurred no earlier than 3350 BC. This, however, does not mean that the related sites across all of the territory of the CTCC exhibited a synchronous transformation of material culture.

The Brynzenskaya group influenced the formation of the Koshilovetskaya group, which was an offshoot of the Shypinetskaya group formed in the Upper Dniester region during Tripolye CI-II. However, the co-existence of late Shypenetskaya and Koshilovetskaya ceramics is also notable (Ryzhov 1998; cf. Tkachuk 1998; 2005; 2011). The absolute chronology of this group is represented by one date from Bilshivtsi (Ki-8273, 3695–3370 BC; Tkachuk 2003) and a series of dates from Verteba Cave (Kadrow *et al.* 2003; Nikitin 2010). The nature of the latter site is completely different from most habitational sites of the Cucuteni-Tripolye complex, and we may suggest that it was seasonally occupied over a long duration. Two dates obtained for ceramics of the Koshilovetskaya group suggest an interval of c. 3700–3350 BC, which may be somewhat limited according to our assumption regarding the transition from the Badrazhskaya to the Brynzenskaya group. This is in agreement with Kadrow's suggestion, based on the dates from Verteba Cave, that the transition from Tripolye CI to Tripolye CII occurred c. 3600–3500 BC (Kadrow 2013).

Fig. 1. The general distribution of Late Tripolye local groups and relevant sites with ^{14}C dating

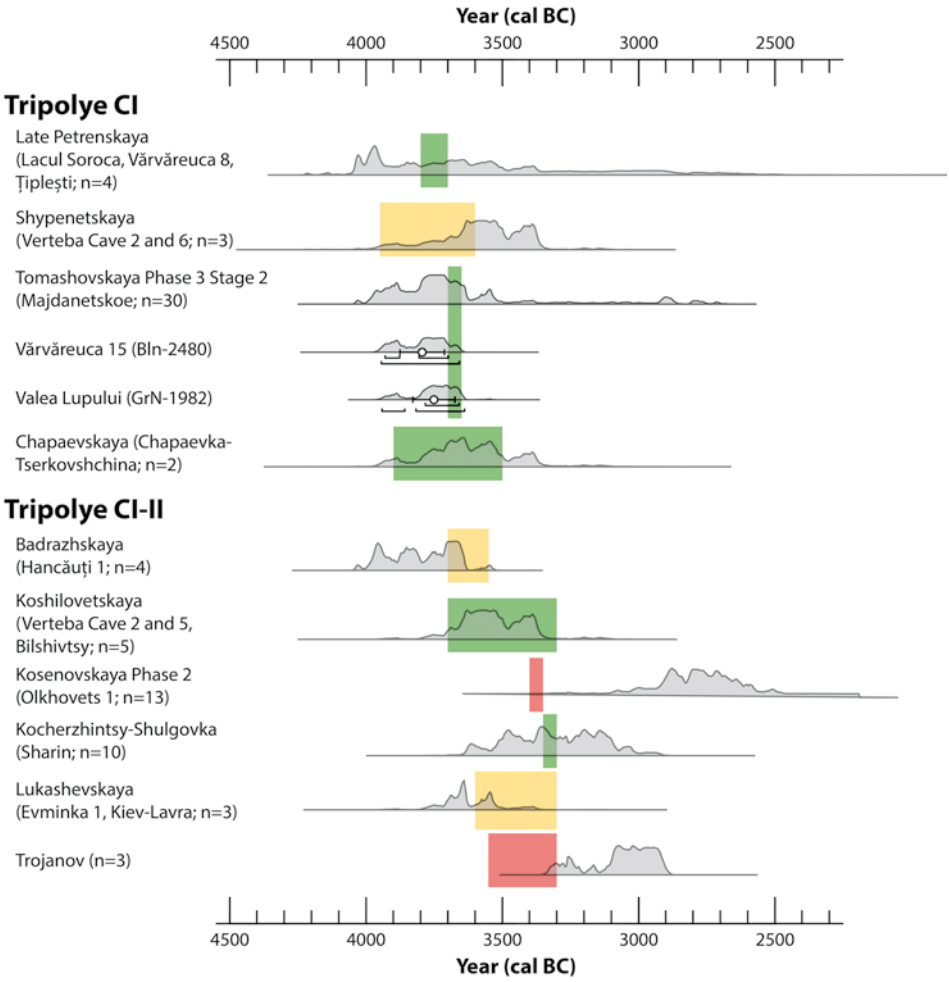

Fig. 2a. Comparison of ^{14}C data with relative chronology (Tripolye CI and CI-II). Colored rectangles indicate agreement: green – good agreement; yellow – partial agreement; red – little or no agreement

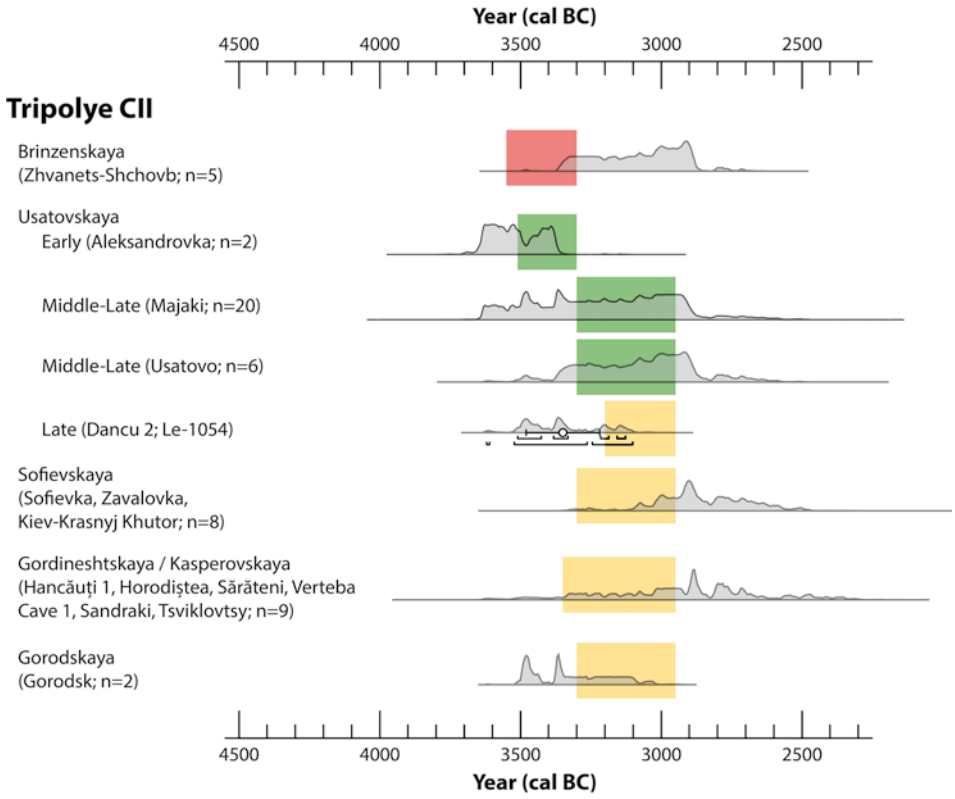

Fig. 2b. Comparison of ^{14}C data with relative chronology (Tripolye CII).
Colored rectangles indicate agreement: green – good agreement; yellow – partial agreement;
red – little or no agreement

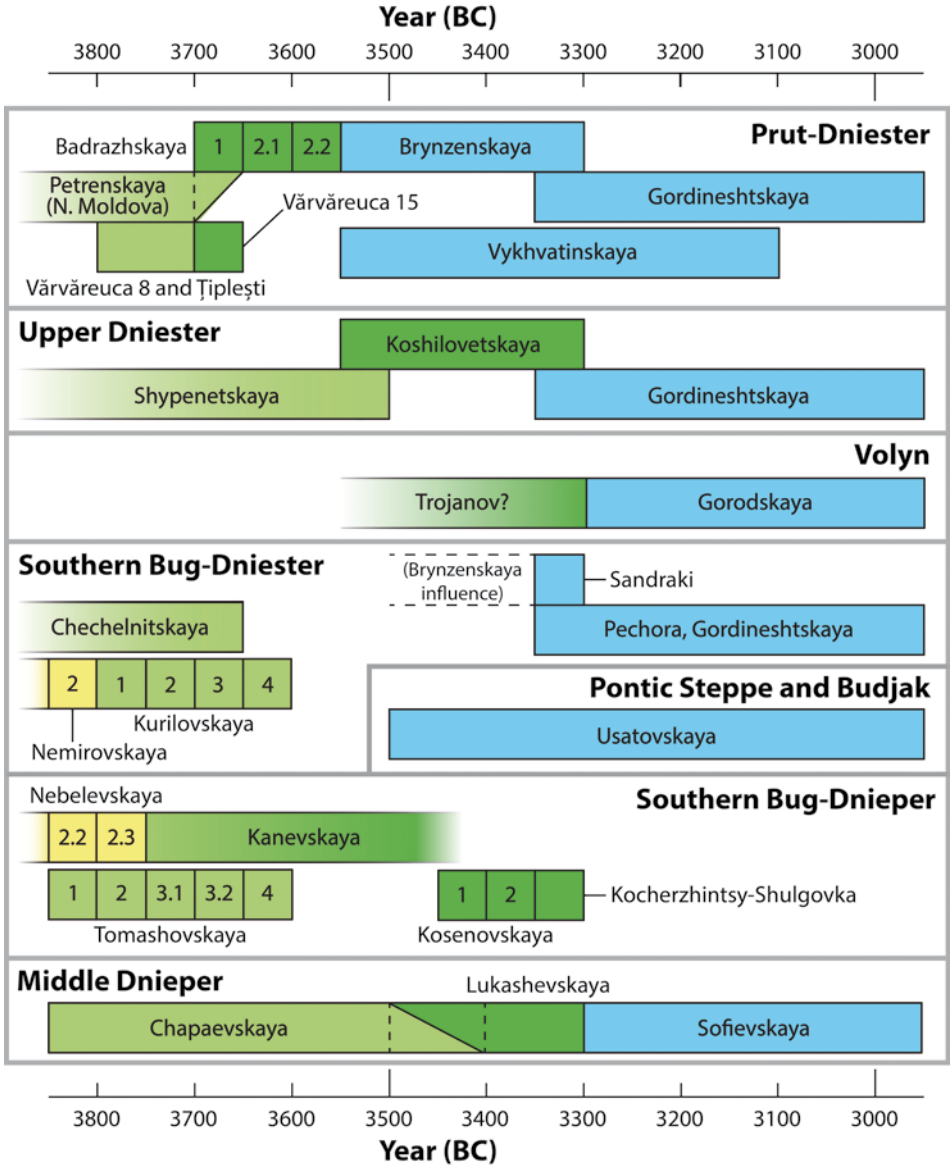

Figure 3. Proposed synchronizations and durations of local groups of the Late Tripolye culture. Colors indicate typo-chronological assignment: yellow – Tripolye BII; light green – Tripolye CI; dark green – Tripolye CI-II; blue – Tripolye CII

In the Southern Bug-Dnieper interfluve, Tripolye CII sites of the Kocherzhintsy-Shulgovka type (previously identified by Movsha as Phase 3 of the CI-II Kosenovskaya local group) are represented by a series of ten dates from Sharin, with calibrated means spanning from 3470–3215 and a 2σ range of 3695–2930 BC (Kushtan 2015; Rassamakin 2012). This provides a *terminus ante quem* for the first two phases of the development of the Kosenovskaya group, which we infer occurred during the range of 3500–3400 BC. Since Kocherzhintsy-Shulgovka ceramic complexes are not characterized with the latest Tripolye shapes and ornamentation schemes (Ryzhov 2002), their short duration may be preliminarily dated to 3390–3350/3300 BC.

The absolute chronology for the latter part of Tripolye CII in Volyn is limited to five dates from Trojanov and Gorodsk. In the relative sense, we would expect Trojanov, which is generally synchronous with the Lukashevskaya local group, to mostly precede the Gorodsk materials. However, three dates obtained for Trojanov and one from Gorodsk are dated very similarly, with a 2σ range of 3330–2880 BC, while the other date from Gorodsk is represented by the interval of 3520–3140 BC. Taken at face value, this would seem to invert the relative chronology of these groups, or at least allow for their synchronization. This leads to our acceptance of the date from Gorodsk with older results (GrN-5099; Mallory 1977) as being more broadly representative of CII in the region, while questioning the absolute chronology of Trojanov. The second date from Gorodsk (Ki-6752; Videjko 1999) is consistent with the later part of CII (3360–3020 BC).

The duration of CII has much better definition in the southern region (Budzhak and the western Pontic Steppe), which is mostly represented by the sites of the Usatovskaya local group. Here, the beginning of Usatovskaya materials is established by two dates from the Aleksandrovka cemetery (Petrenko, Kovaliukh 2003) that provide a 2σ range of 3660–3370 BC. In the relative sequence this is followed by the nearby settlements at Usatovo and Majaki; 26 older dates from these sites produce a wide range of uncertainty with poor constraint on the younger side, returning results as late as c. 2500 BC. However, five newer dates from Majaki processed by the Poznań laboratory (Ludwig *et al.* 2009) return a 2σ range of 3640–3030 BC, which tends to support the impression from Aleksandrovka that the Usatovskaya local group had an earlier beginning than many peripheral manifestations of CII, occurring c. 3550/3500 BC. The late Usatovskaya group site at Dancu 2 in Moldova has one date (Le-1054; Dolukhanov *et al.* 1976) returning a calibrated range of 3620–3100 BC. Since this is but one date it is difficult to know whether it is more or less representative of the end of the local group sequence (and, in turn, the end of CII and the beginning of the Early Bronze Age) than the dates from Usatovo and Majaki. Regardless, estimates for the end of Usatovo and of Tripolye CII in general should take into account that there is little overlap between the Late Tripolye, Yamnaya and Globular Amphora cultures. Objects of Usatovskaya origin are very rarely found within Yamnaya contexts, which suggests a transition occurring no later than c. 3000/2900 BC (Patakova 1979; Szmyt 2010; Zbenovich 1974).

In this analysis, the region we may say the least about is the Middle Dnieper. Though it has a series of 11 dates spanning three consecutive local groups belonging to CI, CI-II and CII, respectively (Chapaevskaya, Lukashevskaya and Sofievskaya), chronological boundaries between them are not at all clear. Two dates belonging to the Chapaevskaya group from the type-site Chapaevka-Tserkovshchina (Quitta and Kohl 1969; Telegin 1985) display a very long 2σ range, 3940–3130 BC. A further date from the site at Kiev-Lavra (Uspenskij Sobor) coincides with the expected end to CI (Ki 7022: 3700–3530 BC; Kruts 2008). The Lukashevskaya local group is defined by two dates from Evminka 1 (Mallory 1977) and one from Kiev-Lavra (Uspenskij Sobor; Kruts 2008), which return results largely contemporaneous with those of the Chapaevskaya group (3890–3360 BC). The older dates from Evminka 1 are much too early and fail to account for the fact that this site is typologically late, assigned to the transitional period between the Lukashevskaya and Sofievskaya local groups. The date from Kiev-Lavra (Uspenskij Sobor) Ki-7022 provides a much more attractive *terminus post quem,* thus placing the span of Lukashevskaya group ('peripheral' CI-II) at c. 3550/3500–3300 BC. The results from the Sofievskaya local group (eight dates) are consistent with where we would expect to see the CI-II to CII transition in this region (c. 3300 BC) but are generally too late in the younger bound (2σ: 3330–2460 BC) and must be constrained by the general assumed ending of Tripolye CII around 3000/2900 BC (Kovalyukh *et al.* 1995).

On the western and northwestern edges of the Cucuteni-Tripolye culture area, mutual imports between different groups of the FBC and Tripolye have become a subject for related synchronizations of absolute chronology. Meanwhile, Baden-Boleráz influences on the FBC are associated with the time periods of Bronocice II-III up to the formation of the FBC-Baden horizon (Bronocice IV-V). In southeastern Poland and the FBC, this includes phases IVB, VA and VB (Kadrow 2013; Kośko, Szmyt 2014; Kruk, Milisauskas 1999; Szmyt 2015; Videiko 2008; Zastawny 2015a; 2015b). Younger ranges suggested for the Late Tripolye, which are to some extent influenced by dates obtained by the Kiev Laboratory of Radiocarbon Analysis (e.g. Videiko 2008; 2013), notably correlate with the previous younger chronologies of the FBC assemblages in Poland (e.g. Kruk and Milisauskas 1990). Our results correspond well to the revised absolute scheme that dates Bronocice II-III in the range of 3650–3350/3300 BC (Nowak 2009; Włodarczak 2013) and dates the FBC phases IIIB-IIIC in Kujawy to the interval of 3650–3100 BC, including the 3500–3100 range proposed for Mątwy group (Kośko 2003; Kośko, Szmyt 2014; Szmyt 2015). In the latter case, the spread of Tripolye traditions among populations of the FBC in Kujawy correlates with the beginning of Tripolye CII in Prut-Dniester interfluve. The new chronology for the 'Badenization' of the FBC, including the Baden sites in southeastern Poland, agrees with the appearance of significant Baden influences during the second sub-period of Late Tripolye (after Dergachev), within the range of 3350/3300–2900 BC (Kośko, Szmyt 2014; Furholt 2009; Włodarczak 2013; Zastawny 2015a; 2015b).

CONCLUSION AND DISCUSSION

Transformations of material culture during the transition from Middle to Late Tripolye may be considered as multi-linear processes that had different rates in different parts of the Cucuteni-Tripolye complex. The chronological overlap of material culture representative of the periods Tripolye CI, CI-II and CII is perceptible at the regional level and may in many cases be reconciled with available radiocarbon data (Figure 3). The delay in the development of peripheral cultural units and the relatively short duration of transitional period CI-II resulted in a chronological sequence where CII in the Prut-Dniester interfluve (Brynzenskaya local group) may be synchronized with the development of CI-II in the Southern Bug-Dnieper interfluve (Kosenovskaya local group) and the Middle Dnieper region (Lukashevskaya local group). Considering these trends, we find the model of chronology in centres, sub-peripheries and peripheries proposed by Kadrow (2001) to be the most appropriate for describing the Cucuteni-Tripolye sequences. This issue should be considered in studies focused on intracultural mutual influences; influences belonging to a particular Tripolye period from a particular place could represent, calendrically, different times.

The concept of archaeological culture and its structural components are useful tools for the systematization of data, but their explanatory capabilities regarding socio-economic development behind the changes in pottery styles remain an issue (Furholt 2009; 2009 [2011]). Hence, the concept of 'social fields' or networks are considered an appropriate alternative to archaeological cultures when dealing with actual populations of the remote past (Wolf 1982; 1984; Müller 2001; Nakoinz 2005; Kohl 2008; Furholt 2009; 2009 [2011]).

Acknowledgements

This paper was made possible by a grant from the National Science Centre of Poland awarded to Małgorzata Rybicka (OPUS 8 2014/15/B/HS3/02486). Aleksandr Diachenko is one of the Co-PIs in this project. Ceramics from Sandraki, kept at the Academic Funds of the Institute of Archaeology of the National Academy of Science of Ukraine, were analyzed by Aleksandr Diachenko and Dariusz Król and are being prepared for publication.

Table 1. The majority of the radiocarbon data utilized in this paper were originally derived from the European ^{14}C database distributed with the CalPal calibration software (Wenginger, Jöris 2008) and were previously error-checked and published (Weninger, Harper 2015). However, several omissions and errors were still present among the Late Tripolye dates. We have made every effort to ensure the completeness and accuracy of the data presented here

LAB NR	C14	STD	CAL	1σ	68%		95%		Material	Site	Period	Local Group	N	E	Reference
Hd-18678	5127	47	-3905	68	-3980	-3810	-4039	-3797	charcoal	Hancăuți 1	CI-II	Badrazhskaya	48,049	27,190	Lazarovici 2010
Hd-19426	5106	49	-3886	62	-3967	-3805	-4033	-3783	charcoal	Hancăuți 1	CI-II	Badrazhskaya	48,049	27,190	Lazarovici 2010
Hd-17930	4938	42	-3721	51	-3762	-3659	-3797	-3643	charcoal	Hancăuți 1	CI-II	Badrazhskaya	48,049	27,190	Lazarovici 2010
Hd-18936	4884	54	-3676	61	-3712	-3636	-3789	-3532	charcoal	Hancăuți 1	CI-II	Badrazhskaya	48,049	27,190	Lazarovici 2010
Ki-6745	4530	50	-3225	93	-3357	-3111	-3483	-3033	bone, human	Zhvanets-Shchovb	CII	Brynzenskaya	48,551	26,488	Videjko 1999
Ki-6743	4480	40	-3198	93	-3331	-3095	-3349	-3026	bone, animal	Zhvanets-Shchovb	CII	Brynzenskaya	48,551	26,488	Videjko 1999
Ki-6754	4380	60	-3044	113	-3089	-2913	-3328	-2892	charcoal	Zhvanets-Shchovb	CII	Brynzenskaya	48,551	26,488	Videjko 1999
Ki-6744	4355	60	-3012	100	-3082	-2904	-3322	-2881	bone, animal	Zhvanets-Shchovb	CII	Brynzenskaya	48,551	26,488	Videjko 1999
Ki-6753	4290	55	-2918	83	-3011	-2877	-3090	-2699	charcoal	Zhvanets-Shchovb	CII	Brynzenskaya	48,551	26,488	Videjko 1999
Bln-631	4870	100	-3660	127	-3777	-3526	-3942	-3377	charcoal	Chapaevka-Tserkovshchina	CI	Chapaevskaya	50,310	30,549	Quitta and Kohl 1969
Ki-880	4810	140	-3582	173	-3712	-3375	-3958	-3127	charcoal	Chapaevka-Tserkovshchina	CI	Chapaevskaya	50,310	30,549	Telegin 1985
Hd-17959	4621	95	-3365	157	-3626	-3122	-3636	-3092	charcoal	Hancăuți 1	CII	Gordineshtskaya	48,049	27,190	Lazarovici 2010
Lu-2455	4410	50	-3076	117	-3261	-2925	-3331	-2909	---	Sărăteni	CII	Gordineshtskaya	46,610	28,466	Petrenko and Kovaliukh 2003
GrN-5099	4615	35	-3425	74	-3497	-3355	-3517	-3144	---	Gorodsk	CII	Gorodskaya	50,377	29,193	Telegin *et al.* 2003
Ki-6752	4495	45	-3205	91	-3336	-3101	-3356	-3029	shell	Gorodsk	CII	Gorodskaya	50,377	29,193	Videjko 1999
Hd-14785	4495	18	-3221	73	-3332	-3106	-3339	-3098	bone, animal	Horodiștea 1	CII	Kasperovskaya	48,238	26,734	Mantu 1995
Hd-15024	4377	21	-2981	42	-3014	-2930	-3084	-2916	bone, animal	Horodiștea 2	CII	Kasperovskaya	48,238	26,734	Mantu 1995

Hd-14898	4235	30	-2842	60	-2902	-2779	-2910	-2702	bone, animal	Horodiştea 2	CII	Kasperovskaya	48,238	26,734	Mantu 1995
Ki-6747	4210	45	-2787	73	-2895	-2701	-2906	-2637	bone, animal	Sandraki-Pagurok	CII	Kasperovskaya	49,506	28,048	Videjko 1999
Ki-6746	4175	50	-2757	79	-2879	-2679	-2893	-2620	bone	Sandraki-Pagurok	CII	Kasperovskaya	49,506	28,048	Videjko 1999
Ki-6751	3960	50	-2464	82	-2569	-2350	-2581	-2295	bone, human	Tsviklovtsy-Grjada	CII	Kasperovskaya	48,578	26,625	Videjko 1999
Ki-8270	4280	90	-2899	154	-3082	-2699	-3320	-2581	---	Bilche Zolotoe-Verteba 1	CII	Kasperovskaya?	48,789	25,871	Tkachuk 2003
Ki-11872	4700	100	-3468	131	-3631	-3371	-3695	-3111	pottery	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11869	4670	80	-3452	116	-3626	-3364	-3644	-3119	clay	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11870	4610	100	-3344	162	-3621	-3116	-3635	-3030	pottery	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11867	4590	80	-3318	147	-3509	-3113	-3628	-3030	clay	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11873	4580	100	-3297	162	-3501	-3103	-3632	-3017	pottery	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-12050	4575	60	-3290	127	-3496	-3114	-3516	-3094	bone, animal	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11871	4560	100	-3268	160	-3496	-3097	-3627	-2935	pottery	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11866	4530	80	-3226	132	-3363	-3101	-3506	-2931	clay	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11862	4520	70	-3215	117	-3353	-3105	-3496	-2942	bone, animal	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11868	4520	80	-3215	130	-3358	-3099	-3498	-2930	clay	Sharin	CI-II	Kocherzhintsy-Shulgovka	48,624	30,237	Kushtan 2015
Ki-11450	4300	90	-2941	155	-3090	-2712	-3328	-2631	pottery	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-11454	4280	90	-2899	154	-3082	-2699	-3320	-2581	---	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-11452	4250	90	-2839	143	-3009	-2671	-3261	-2574	---	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-10859	4240	90	-2822	138	-2927	-2638	-3091	-2575	---	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-6925	4225	55	-2796	83	-2906	-2698	-2921	-2628	bone, animal	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Videjko 1999

Table 1 cont.

LAB NR	C14	STD	CAL	1σ	68%		95%		Material	Site	Period	Local Group	N	E	Reference
Ki-6924	4205	50	-2779	77	-2895	-2696	-2907	-2631	bone, animal	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Videjko 1999
Ki-10858	4190	90	-2757	119	-2894	-2636	-3011	-2492	---	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-9754	4190	80	-2757	106	-2891	-2668	-2928	-2497	---	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-11451	4170	90	-2739	116	-2884	-2632	-2921	-2488	---	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-6922	4170	55	-2751	84	-2878	-2677	-2892	-2586	bone, animal	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Videjko 1999
Ki-6923	4165	60	-2745	88	-2877	-2671	-2891	-2581	bone, animal	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Videjko 1999
Ki-11453	4130	90	-2705	119	-2871	-2584	-2896	-2486	bone	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-9625	4110	80	-2692	115	-2864	-2576	-2883	-2488	bone	Olkhovets 1	CI-II	Kosenovskaya 2	49,041	30,862	Kovaliukh *et al.* 2007
Ki-13068	4810	100	-3580	121	-3697	-3384	-3794	-3365	pottery	Bilche Zolotoe-Verteba 2	CI-II	Koshilovetskaya	48,789	25,871	Nikitin *et al.* 2010
Ki-8273	4770	80	-3537	93	-3642	-3383	-3695	-3370	---	Bilshivtsy	CI-II	Koshilovetskaya	49,183	24,732	Tkachuk 2003
Ki-13069	4730	90	-3503	106	-3634	-3378	-3703	-3341	pottery	Bilche Zolotoe-Verteba 2	CI-II	Koshilovetskaya	48,789	25,871	Nikitin *et al.* 2010
Ki-13066	4720	110	-3483	139	-3635	-3374	-3711	-3106	pottery	Bilche Zolotoe-Verteba 5	CI-II	Koshilovetskaya	48,789	25,871	Nikitin *et al.* 2010
Ki-8271	4800	100	-3568	119	-3693	-3381	-3785	-3364	bone, animal	Bilche Zolotoe-Verteba 2	CI-II	Koshilovetskaya?	48,789	25,871	Tkachuk 2003
UCLA-1671B	4890	60	-3685	71	-3761	-3636	-3893	-3526	---	Evminka 1	CI-II	Lukashevskaya	50,862	30,855	Mallory 1977
Ki-7022	4838	38	-3613	53	-3661	-3536	-3702	-3526	---	Kiev-Lavra, Uspenskij Sobor	CI-II	Lukashevskaya	50,435	30,557	Kruts 2008
UCLA-1466B	4790	100	-3557	118	-3658	-3380	-3780	-3362	---	Evminka 1	CI-II	Lukashevskaya	50,862	30,855	Mallory 1977
Bln-2431	5165	50	-3966	78	-4042	-3945	-4219	-3800	charcoal	Ţiplești 1	CI	Petrenskaya	47,817	28,124	Wechler 1994
BM-495	4940	105	-3749	121	-3931	-3639	-3968	-3521	---	Lacul Soroca (Soroki 12-Ozero)	CI	Petrenskaya	48,130	28,289	Mallory 1977

BM-494	4792	105	-3560	125	-3662	-3379	-3798	-3353	---	Lacul Soroca (Soroki 12-Ozero)	CI	Petrenskaya	48,130	28,289	Mallory 1977
Ki-601	4370	180	-3047	252	-3354	-2780	-3619	-2500	---	Vărvăreuca 8	CI	Petrenskaya	47,883	28,317	Telegin 1985
Ki-14683a	4910	140	-3709	165	-3938	-3529	-3984	-3371	pottery	Bilche Zolotoe-Verteba 6	CI	Shypenetskaya	48,789	25,871	Nikitin *et al.* 2010
Ki-8272	4770	80	-3537	93	-3642	-3383	-3695	-3370	---	Bilche Zolotoe-Verteba 2	CI-II	Shypenetskaya	49,183	24,732	Kadrow *et al.* 2003
Ki-14683	4720	90	-3494	109	-3632	-3377	-3697	-3141	pottery	Bilche Zolotoe-Verteba 6	CI	Shypenetskaya	48,789	25,871	Nikitin *et al.* 2010
Ki-5012	4320	70	-2974	114	-3081	-2883	-3326	-2699	bone, human	Sofievka 1	CII	Sofievskaya	50,238	30,801	Kovaliukh *et al.* 1995
Ki-5029	4300	45	-2933	57	-3009	-2881	-3085	-2779	bone	Sofievka 1	CII	Sofievskaya	50,238	30,801	Kovaliukh *et al.* 1995
Ki-5015	4290	90	-2920	155	-3086	-2703	-3326	-2621	bone, human	Zavalovka	CII	Sofievskaya	50,867	30,557	Kovaliukh *et al.* 1995
Ki-5038	4280	110	-2906	182	-3087	-2679	-3331	-2577	bone, animal	Kiev-Krasnyj Khutor	CII	Sofievskaya	50,411	30,672	Kovaliukh *et al.* 1995
Ki-5013	4270	90	-2878	151	-3022	-2696	-3310	-2578	bone, human	Sofievka 1	CII	Sofievskaya	50,238	30,801	Kovaliukh *et al.* 1995
Ki-5014	4230	80	-2802	117	-2915	-2676	-3019	-2580	bone, human	Zavalovka	CII	Sofievskaya	50,867	30,557	Kovaliukh *et al.* 1995
Ki-5039	4160	90	-2730	116	-2879	-2631	-2915	-2488	bone, animal	Kiev-Krasnyj Khutor	CII	Sofievskaya	50,411	30,672	Kovaliukh *et al.* 1995
Ki-5016	4140	110	-2710	142	-2876	-2586	-3012	-2459	organic material	Kiev-Krasnyj Khutor	CII	Sofievskaya	50,411	30,672	Kovaliukh *et al.* 1995
Poz-60190	5165	35	-3974	50	-4036	-3954	-4045	-3817	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60189	5125	35	-3902	62	-3975	-3813	-3991	-3800	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60347	5125	35	-3902	62	-3975	-3813	-3991	-3800	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60350	5065	35	-3869	52	-3944	-3801	-3959	-3785	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60192	5060	35	-3867	53	-3942	-3800	-3958	-3780	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60186	5050	35	-3862	56	-3942	-3794	-3957	-3766	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60158	5020	35	-3830	70	-3936	-3715	-3943	-3710	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016

Table 1 cont.

LAB NR	C14	STD	CAL	1σ	68%		95%		Material	Site	Period	Local Group	N	E	Reference
Poz-60159	5020	30	-3832	69	-3933	-3766	-3943	-3710	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60348	5020	35	-3830	70	-3936	-3715	-3943	-3710	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60162	5015	35	-3822	71	-3929	-3715	-3943	-3707	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60188	5005	30	-3802	69	-3905	-3712	-3940	-3704	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60349	4980	35	-3764	61	-3790	-3707	-3930	-3661	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60187	4980	35	-3764	61	-3790	-3707	-3930	-3661	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60194	4970	35	-3751	56	-3783	-3705	-3909	-3657	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60191	4970	30	-3747	47	-3777	-3707	-3893	-3661	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60161	4965	35	-3745	53	-3782	-3702	-3905	-3655	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60296	4955	35	-3733	48	-3775	-3695	-3798	-3652	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60195	4940	30	-3714	38	-3761	-3661	-3777	-3654	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60295	4920	40	-3703	42	-3713	-3651	-3779	-3642	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60199	4895	35	-3680	31	-3697	-3649	-3762	-3637	---	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Bln-2087	4890	60	-3685	71	-3761	-3636	-3893	-3526	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Telegin 1985
Poz-60200	4875	35	-3665	34	-3695	-3640	-3748	-3538	---	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60352	4820	30	-3588	45	-3650	-3536	-3656	-3526	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60157	4810	35	-3580	45	-3645	-3534	-3656	-3521	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016

Poz-60198	4775	35	-3563	56	-3636	-3526	-3644	-3384	soil	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60351	4710	35	-3490	82	-3627	-3378	-3632	-3373	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Ki-1212	4600	80	-3337	147	-3517	-3119	-3631	-3037	charcoal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Telegin 1985
Poz-60201	4450	30	-3160	107	-3320	-3025	-3336	-2945	---	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60298	4290	40	-2917	49	-2928	-2879	-3022	-2779	bone, animal	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Poz-60197	4210	30	-2801	63	-2890	-2713	-2900	-2679	soil	Majdanetskoe	CI	Tomashovskaya 3.2	48,803	30,685	Müller *et al.* 2016
Ki-6750	4430	45	-3112	119	-3312	-2934	-3332	-2921	bone, animal	Trojanov	CII	Trojanov-type	50,130	28,534	Videjko 1999
Ki-6749	4410	50	-3076	117	-3261	-2925	-3331	-2909	bone, animal	Trojanov	CII	Trojanov-type	50,130	28,534	Videjko 1999
Ki-6748	4360	55	-3009	93	-3081	-2907	-3317	-2885	bone, animal	Trojanov	CII	Trojanov-type	50,130	28,534	Videjko 1999
Poz-24927	4770	40	-3555	65	-3636	-3524	-3644	-3381	bone, animal	Majaki	CII	Usatovskaya	46,394	30,273	Ludwig *et al.* 2009
Ki-9525	4760	70	-3530	86	-3638	-3384	-3656	-3371	wood	Aleksandrovka	CII	Usatovskaya	46,332	30,604	Petrenko and Kovaliukh 2003
Poz-24962	4745	35	-3537	77	-3633	-3386	-3637	-3380	bone, animal	Majaki	CII	Usatovskaya	46,394	30,273	Ludwig *et al.* 2009
Ki-9524	4720	70	-3502	88	-3631	-3378	-3638	-3370	wood	Aleksandrovka	CII	Usatovskaya	46,332	30,604	Petrenko and Kovaliukh 2003
Ki-870	4670	110	-3423	156	-3633	-3352	-3659	-3094	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Videjko 1999
Poz-24850	4640	35	-3447	53	-3498	-3366	-3518	-3357	bone, animal	Majaki	CII	Usatovskaya	46,394	30,273	Ludwig *et al.* 2009
Poz-24849	4605	35	-3403	91	-3496	-3349	-3515	-3128	bone, animal	Majaki	CII	Usatovskaya	46,394	30,273	Ludwig *et al.* 2009
Le-1054	4600	60	-3349	131	-3510	-3127	-3620	-3101	charcoal	Dancu 2	CII	Usatovskaya	46,757	28,209	Dolukhanov *et al.* 1976
Ki-9751	4600	90	-3332	155	-3518	-3116	-3632	-3031	---	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
Ki (KING)-282	4580	120	-3295	178	-3513	-3099	-3634	-2938	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Patakova *et al.* 1989
Poz-24862	4550	35	-3240	90	-3365	-3121	-3370	-3103	bone, animal	Majaki	CII	Usatovskaya	46,394	30,273	Ludwig *et al.* 2009

Table 1 cont.

LAB NR	C14	STD	CAL	1σ	68%		95%		Material	Site	Period	Local Group	N	E	Reference
Ki-11462	4540	90	-3240	146	-3370	-3096	-3517	-2934	---	Usatovo	CII	Usatovskaya	46,527	30,675	Kovaliukh *et al.* 2007
Ki-11464	4530	90	-3227	143	-3366	-3096	-3512	-2928	---	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
Ki-11459	4520	90	-3216	141	-3364	-3093	-3503	-2923	---	Usatovo	CII	Usatovskaya	46,527	30,675	Kovaliukh *et al.* 2007
Ki-9752	4490	90	-3184	137	-3349	-3034	-3494	-2915	bone	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
Ki (KING)-281	4475	130	-3177	177	-3357	-2945	-3619	-2883	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Patakova *et al.* 1989
Ki-11465	4460	90	-3155	136	-3336	-3022	-3365	-2911	---	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
Ki-11460	4410	90	-3106	139	-3320	-2915	-3347	-2899	---	Usatovo	CII	Usatovskaya	46,527	30,675	Kovaliukh *et al.* 2007
Bln-629	4400	100	-3098	149	-3321	-2908	-3366	-2876	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Quitta and Kohl 1969
Ki-9527	4380	70	-3058	123	-3096	-2906	-3333	-2889	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Petrenko and Kovaliukh 2003
UCLA-1642B	4375	60	-3037	110	-3089	-2910	-3327	-2890	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Mallory 1977
UCLA-1642G	4375	60	-3037	110	-3089	-2910	-3327	-2890	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Mallory 1977
Ki-11463	4370	100	-3062	155	-3313	-2891	-3359	-2712	---	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
Ki-11466	4360	90	-3047	145	-3265	-2887	-3350	-2764	---	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
Ki-11461	4350	100	-3033	160	-3311	-2880	-3354	-2697	---	Usatovo	CII	Usatovskaya	46,527	30,675	Kovaliukh *et al.* 2007
Le-645	4340	65	-3000	104	-3081	-2894	-3328	-2872	charcoal	Majaki	CII	Usatovskaya	46,394	30,273	Sementsov *et al.* 1969
UCLA-1642A	4330	60	-2981	90	-3017	-2895	-3313	-2778	bone	Usatovo	CII	Usatovskaya	46,527	30,675	Mallory 1977
Ki-11458	4270	100	-2883	166	-3077	-2679	-3324	-2576	---	Usatovo	CII	Usatovskaya	46,527	30,675	Kovaliukh *et al.* 2007
Ki-9753	4180	90	-2748	117	-2889	-2635	-3003	-2488	---	Majaki	CII	Usatovskaya	46,394	30,273	Kovaliukh *et al.* 2007
GrN-1982	4950	60	-3751	77	-3782	-3658	-3941	-3638	grain, wheat	Valea Lupului-Fabrica Chimică	CI	Vărvăreuca 15 (sync.)	47,175	27,488	Vogel and Waterbolk 1963
Bln-2480	4990	60	-3794	82	-3930	-3698	-3944	-3657	charcoal	Vărvăreuca 15	CI	Vărvăreuca 15-type	47,875	28,288	Wechler 1994

References

Bicbaev V. M. 1994. Predgordineshtskie pamyatniki tipa Kirilen v Severnoj Moldove. In E. V. Yarovoj (ed.), *Drevneyshie obshchnosti zemledeltsev i skotovodov Severnogo Prichernomorya (V tys. do n.e. – V v. n.e.)*. Tiraspol: NIL «Archeologija» PGU im. T. Shevchenko, 64–69.

Bronicki A., Kadrow S. and Zakościelna A. (2003). Radiocarbon dating of the Neolithic settlement in Zimne, Volhynia, in light of the chronology of the Lublin-Volhynia culture and the South-eastern group of the Funnel Beaker culture. In A. Kośko and V. I. Klochko (eds.), *The Foundations of Radiocarbon Chronology of Cultures between the Vistula and Dnieper: 4000-1000 BC* (= *Baltic-Pontic Studies* 12). Poznań: Adam Mickiewicz University. Institute of Prehistory, 22–66.

Bronk Ramsey C. 2009. Bayesian analysis of radiocarbon dates. *Radiocarbon* 51(1), 337–360.

Bronk Ramsey C. 2015. Bayesian approach to the building of archaeological chronologies. In J. A. Barcelo and I. Bogdanovich (eds.), *Mathematics in Archaeology*. New York: CRC Press, 272–292.

Burdo N. B. 2007. Trypillia u konteksti svitovogo tsyvilizatsiynogo protsesu. *Zapysky Naukovogo Tovarystva im. Shevchenka: Pratsi Archeologichnoy Komisii* 153, 67–89.

Dergachev V. A. 1980. *Pamyatniki pozdnego Tripolja*. Kishinev: Shtiintsa.

Dergachev V. A. 2004. Pizniy period Trypilskoy kultury. In M. Videiko (ed.), *Entsyklopediya Trypilskoy tsyvilizatsii* 1. Kyiv: Ukrpoligrafmedia, 109–114.

Diachenko A. 2010. Evstaticheskie kolebaniya urovnya Chernogo morya i dinamika razvitiya naseleniya Kukuten-Tripolskoy obshchnosti. *Stratum Plus* 2, 37–48.

Diachenko A. and Menotti F. 2012. The gravity model: monitoring the formation and development of the Tripolye culture giant-settlements in Ukraine. *Journal of Archaeological Science* 39(4), 2810–2817.

Diachenko A. and Menotti F. 2015. Cucuteni-Tripolye contact networks: cultural transmission and chronology. In A. Diachenko, F. Menotti, S. Ryzhov, K. Bunyatyan and S. Kadrow (eds.), *The Cucuteni-Tripolye Cultural Complex and Its Neighbours: Essays in Memory of Volodymyr Kruts*. Lviv: Astrolabe, 131–152.

Dolukhanov P., Smyontsov A., Svezhentsev Y., Timofeev V., Romanova Y. and Malanova N. 1976. Radiocarbon dates of the Institute of Archaeology III. *Radiocarbon* 18(2), 190–201.

Dumitrescu V. 1963. Oreginea si evolutia culturii Cucuteni-Tripolie. *Studii si Cercetari de Istorie Veche* 14(1-2), 51–74, 285–305.

Furholt M. 2009. *Die Nördlichen Badener Keramikstile im Kontext des Mitteleuropäischen Spätneolithikums (3650—2900 v. Chr.)* (= *Studien zur Archäologie in Ostmitteleuropa* 3). Bonn: Dr. Rudolf Habelt GmbH.

Furholt M. 2011. Polythetic and measures of similarity in material culture: A quantitative approach to Baden Complex material. *Analecta Archaeologica Ressoviensia* 4, 225-252.

Harper T. K. 2013. The effect of climate variability on population dynamics of the Cucuteni-Tripolye cultural complex and the rise of the Western Tripolye giant-settlements. *Chronika* 3, 28–46.

Kadrow S. 2001. *U progu nowej epoki: Gospodarka i społeczeństwo wczesnego okresu epoki brązu w Europie Środkowej*. Kraków: Instytut Archeologii i Etnologii PAN.

Kadrow S. 2013. Werteba site in Bilcze Złote: resent research and analyses. In S. Kadrow (ed.), *Bilcze Złote: Materials of the Tripolye Culture from the Werteba and the Ogród sites* (= *Biblioteka Muzeum Archeologicznego w Krakowie* 5). Kraków: Muzeum Archeologiczne w Krakowie, 13–22.

Kadrow S., Sokhackiy M., Tkachuk T. and Trela E. 2003. Sprawozdanie ze studiów i wyniki analiz materiałow zabytkowych kultury trypolskiej z Bilcza Złotego znajdujących się w zbiorach Muzeum Archeologicznego w Krakowie. *Materiały Archeologiczne* 34, 53–143.

Kohl Ph. L. 2008. Shared social fields: evolutionary convergence in prehistory and contemporary practice. *American Anthropologist* 110 (4), 495–506.

Kośko A. 2003. Radiocarbon chronology of the Mątwy group of the Funnel Beaker culture. The question of chronological and cultural position of the 'linear-komb pottery'. *Baltic-Pontic Studies* 12, 67–81.

Kośko A. and Szmyt M. 2014. *Opatowice. Wzgórze Prokopiaka* 4. Poznań: Wydawnyctwo Naukowe UAM.

Kovalyukh N. N., Videiko M. and Skripkin V. 1995. Chronology of Sovievka-type cemeteries: archaeological and isotopic one. In A. Kośko (ed.), *Cemeteries of the Sofievka Type*. *Baltic-Pontic Studies* 3, 135–140.

Kovalyukh M. M., Skripkin V. and Videiko M. 2007. Osoblyvosti radiovugletsevogo datuvannya davnyoi archeologichnoi keramiky. In M. Videiko and S. Kot (eds.), *Trypilska kultura: poshuky, vidkryttya, svitovyy kontekst*. Kyiv: Spadshchyna LTD, 71–78.

Król D., Pozichowski A., Rogoziński J. and Rybicka M. 2013. Krótka informacja o wynikach badań przeprowadzonych w 2012 roku w Nowomalinie-Podobanka, rejon Ostrog. *Matriały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 34, 103–118.

Kruk J. and Milisauskas S. 1990. Radiocarbon dating of Neolithic assemblages from Bronocice. *Przegląd Archeologiczny* 37, 195–228.

Kruk J. and Milisauskas S. 1999. *Rozkwit i upadek społeczeństw rolniczych neolitu*. Kraków: Instytut Archeologii i Etnologii Polskiej Akademii Nauk.

Kruts V. A. 1977. *Pozdnetripolskie pamyatniki Srednego Podneprovya*. Kiev: Naukova Dumka.

Kruts V. 2008. The relative and absolute chronology of the Tripolye culture settlements between the Bug and Dnepr; and in the Middle Podneprovye region (non-calibrated dates). In A. G. Korvin-Piotrovskiy and F. Menotti (eds.), *Tripolye culture in Ukraine: The giant-settlement of Talianki*. Kiev: Institute of Archaeology of the NASU, 231–238.

Kruts V. O. and Ryzhov S. M. 1997. Verhniodnistrovska grupa pamyatok Trypilskoy kultury ta novi dani pro zvyazky trypiltsiv z naselennyam polgarskoy i lendelskoy kultur. *Archaeologiya* 2, 23–31.

Kushtan D. 2015. Keramichnyy kompleks pizniotrypilskogo poselennya Sharyn III. In A. Diachenko, F. Menotti, S. Ryzhov, K. Bunyatyan and S. Kadrow (eds.), *The Cucuteni-Tripolye Cultural Complex and Its Neighbours: Essays in Memory of Volodymyr Kruts*. Lviv: Astrolabe, 429–440.

Lazarovici C.-M. 2010. New data regarding the chronology of the Precucuteni, Cucuteni and Horodiştea-Erbiceni cultures. In P. Kalábková, B. Kovár, P. Pavúk and J. Šuteková (eds),

PANTA RHEI: Studies on the Chronology and Cultural Development of South-Eastern and Central Europe in Earlier Prehistory Presented to Juraj Pavúk on the Occasion of his 75th Birthday: Bratislava: Comenius University, 71–94.

Leviţki O., Manzura I. and Demchenko T. 1996. *Necropola tumulară de la Sărăteni*. Bucureşti: Vavila Edinf SRL.

Ludwig A., Pruvost M., Reismann M., Benecke N., Brockmann G.A., Castańos P., Cieslak M., Lippold S., Llorente L., Malaspinas A.-S., Slatkin M. and Hofreiter M. 2009. Coat color variation at the beginning of horse domestication. *Science* 324(5926), 485.

Mallory J. 1977. The chronology of the Early Kurgan Tradition (Part 2). *Journal of Indo-European Studies* 5, 339–368.

Mantu C.-M. 1995. Câteva consideraţii privid chronologia absolute a neo-eneoliticului din România. *Studii si Cercetari de Istorie Veche si Arheologie* 46(3-4), 213–235.

Mantu C.-M. 1998. *Cultura Cucuteni. Evoluţie, Cronologie, Legături* (= *Bibliotheca Memoriae Antiquitatis* 5). Piatra-Neamţ: Muzeul Istorie Piatra-Neamţ.

Manzura I. V. 2005. Severnoe Prichernomorye v eneolite i nachale bronzovogo veka: stupeni kolonizatsii. *Stratum Plus* 2, 63–85.

Markevich V.I. 1981. *Pozdnetripolskie plemena Severnoj Moldavii*. Kishinev: Shtiintsa.

Movsha T. G. 1971a. O severnoj gruppe pozdnetripolskih pamyatnikov. *Sovetskaya archeologiya* 1, 31–54.

Movsha T. G. 1971b. Pamyatniki vykhvatinskogo tipa. *Materialy po archeologii Severnogo Prichernomorya* 7, 21–32.

Movsha T. G. 1972. Periodyzatsiya i chronologiya seredniogo ta piznogo Trypillia. *Archeologiya* 5, 3–23.

Müller J. 2001. *Soziochronologische Studien zum Jung- und Spätneolithikum im Mittelelbe-Saale-Gebiet (4100—2700 v. Chr.)*. Rahden/Westf.: Verlag Marie Leidorf Gmb H.

Müller J., Hofmann R., Brandtstätter L., Ohlrau R. and Videiko M. 2016. Chronology and demography: how many people lived in a mega-site? In J. Müller, K. Rassmann and M. Videiko (eds.), *Trypillia-Megasites and European Prehistory, 4100-3400 BC*. London: Routledge, 133–170.

Nakoinz O. 2005. *Studien zur Räumlichen Abgrenzung und Strukturierung der Älteren Hunsrück-Eifel-Kultur* (= *Universitätsforschungen. Prähistorien Archäologie* 118). Bonn: Dr. Rudolf Habelt GmbH.

Nestor I. 1950. Probleme noi in legatura cu neoliticul din R.P.R. *Studii si Cercetari de Istorie Veche* 1(2), 208–219.

Nikitin A. G., Sokhatsky M. P., Kovaliukh M. M. and Videiko M. Yu. 2010. Comprehensive site chronology and ancient mitochondrial DNA analysis from Verteba-cave – a Trypillian culture site of Eneolithic Ukraine. *Interdisciplinaria Archaeologica: Natural Sciences in Archaeology* 1(1-2), 9–18.

Nowak M. 2009. *Drugie etap neolityzacji ziem polskich*. Kraków: Instytut Archeologii UJ.

Passek T. S. 1935. *La ceramique Tripolienne* (= *Izvestiya Gosudarstvennoy Akademii Istrorii Materialnoy Kultury* 122). Moskva-Leningrad: Izdatelstvo Akademii Nauk SSSR.

Passek T. S. 1949. Periodizatsya tripolskih poseleniy (III—II tys. do n.e.). *Materialy i Issledovanija po Archeologii SSSR* 10. Moskva – Leningrad: Izdatelstvo Akademii Nauk SSSR.

Pasterkiewicz W., Pozikhovski A., Rybicka M. and Verteletskyi D. 2013. Z badań nad problematyką oddziaływań kręgu badeńskiego na wschodnie rejony Wyżyny Wołyńskiej. In A. Pozikhovski, J. Rogoziński and M. Rybicka (eds.), *Na pograniczu kultury pucharów lejkowatych i kultury trypolskiej* (= *Collectio Archaeologica Ressoviensis* 26). Rzeszów: Instytut Archeologii UR, 251–292.

Patakova E. F. 1979. *Usatovskoe poselenie i mogilniki*. Kiev: Naukova Dumka.

Patakova E. F., Petrenko V. G., Burdo N. B. and Polishchuk L. Yu. 1989. *Pamyatniki tripolskoy kultury v Severo-Zapadnom Prichernomorye*. Kiev: Naukova Dumka.

Peleshchyshyn M. A. 1997a. *Poselennya midnogo viku bilya sil Kostyanets i Lystvyn u Zahidniy Volyni*. Lviv: Lvivskiy derzhavnyj universytet.

Peleshchysyn M. A. 1997b. Z istorii pershyh trypilskyh obshchyn u Seredniomu Pogorynni. *Archeologichni doslidzennya Lvivskogo universytetu* 2, 47–65.

Petrenko V. G. 2009. Problema 'Tripolye i Step' i pamyatniki eneolita – ranney bronzy Severo-Zapadnogo Prichernomorya. *Materialy po Archeologii Severnogo Prychornomorya* 9, 10–38.

Petrenko V. G. and Kovalyukh N. N. 2003. Novye dannye po radiouglerodnoy chronologii eneolita Severo-Zapadnogo Prichernomorja. In O. G. Korvin-Piotrovskiy, V. O. Kruts and S. M. Ryzhov (eds.), *Tripolian Settlements-Giants: The International Symposium Materials*. Kyiv: Korvin-Pres, 102–110.

Petrescu-Dîmboviţa M. 1950. Date noi asupra îinmormînstărilor cu ocru în Moldova. *Studii si Cercetari de Istorie Veche* 1(2), 110–125.

Quitta H. and Kohl G. 1969. Neue Radiocarbondaten zum Neolithikum und zur frühen Bronzezeit Südosteuropas und der Sowjetunion. *Zeitschrift für Archäologie* 3, 223–255.

Rassamakin Yu. 2004. Stepy Prychornomorya v konteksti rozvytku pershyh zemlerobskyh suspilstv. *Archeologiya* 2, 3–26.

Rassamakin Yu. 2012. Absolute chronology of Ukrainian Tripolian settlements. In F. Menotti and A. G. Korvin-Piotrovskiy (eds.), *The Tripolye Culture Giant-Settlements in Ukraine. Formation, Development and Decline*. Oxford: Oxbow Books, 19–69.

Reimer P. J., Bard E., Bayliss A., Beck J. W., Blackwell P. G., Ramsey C. Bronk, Buck C. E., Cheng H., Edwards R. L., Friedrich M., Grootes P. M., Guilderson T. P., Haflidason H., Hajdas I., Hatté C., Heaton T. J., Hoffmann D. L., Hogg A. G., Hughen K. A., Kaiser K. F., Kromer B., Manning S. W., Niu M., Reimer R. W., Richards D. A., Scott E. M., Southon J. R., Staff R. A., Turney C. S. M. and van der Plicht J. 2013. IntCal13 and Marine13 radiocarbon age calibration curves 0–50.000 cal BP. *Radiocarbon* 55(4), 1869–1887.

Rybicka M. 2015. Eastern peripheries of the Funnel Beaker culture. In A. Diachenko, F. Menotti, S. Ryzhov, K. Bunyatyan and S. Kadrow (eds.), *The Cucuteni-Tripolye Cultural Complex and Its Neighbours: Essays in Memory of Volodymyr Kruts*. Lviv: Astrolabe, 167–182.

Rybicka M. and Diachenko A. in press. New evidence regarding the interactions between populations of the Funnel Beaker culture and Tripolye culture in Western Ukraine.

Ryzhov S. M. 1998. Keramika trypilskogo poselennya koshylovetskoi grupy Blyshchanka II. In V. Olijnyk (ed.), *Mizhnarodna konferentsiya 'Trypilske poselennya Koshylivtsi-Oboz' (do 100-richchya vidkryttya)*. Zalishchyky: Prykarpattya, 43–44.

Ryzhov S. N. 2002. Pozdnetripolskie pamyatniki Bugo-Dneprovskogo mezhdurechya. *Stratum Plus* 2, 187–195.

Ryzhov S. M. 2003. Trypilski pamjatky Pruto-Dnistrovskogo region (kinets etapu BII – etap CI). In D. N. Kozak (ed.), *Archeologiya Ternopilshchyny*. Ternopil: Dzhura, 33–44.

Ryzhov S. M. 2007. Suchasniy stan vyvchennia kulturno-istorychnoi spilnosti Cucuteni–Trypillya. In Yu. Ya. Rassamakin and S. M. Ryzhov (eds.), *O. Olzhych. Archeologiya*. Kiev: Vydavnytstvo im. Oleny Teligy, 437–477.

Ryzhov S. 2012. Relative chronology of the giant-settlement period BII-CI. In F. Menotti and A. G. Korvin-Piotrovskiy (eds.), *The Tripolye Culture Giant-Settlements in Ukraine: Formation, Development and Decline*. Oxford: Oxbow Books, 79–115.

Shmagliy M. M. 1971. Pamyatky gorodskogo typu. In S. M. Bibikov (ed.), *Archeologiya USSR* 1 Kiev: Naukova dumka, 205–210.

Szmyt M. 2010. *Between West and East. People of the Globular Amphora culture in Eastern Europe: 2950 – 2350 BC* (= *Baltic-Pontic Studies* 8). Poznań: Adam Mickiewicz University. Institute of Prehistory.

Szmyt M. 2015. *Late Neolithic landscapes one the Polish lowland: people, culture and economy in Kujawy – 4th and 3rd millennia BC* (= *Studien zur Archäologie in Ostmitteleuropa* 12). Poznań and Bonn: Wydawnictwo Naukowe UAM and Dr Rudolf Habelt GmbH.

Telegin D. Ya. 1985. Radiokarbonne i archeomagnitne datuvannya trypilskoi kultury. *Arheologiya* 52, 10–22.

Tkachuk T. M. 1998. Pohodzhennya ta vidnosna chronologiya koshylovetskoi grupy. In V. Olijnyk (ed.), *Mizhnarodna konferentsiya 'Trypilske poselennya Koshylivtsi-Oboz' (do 100-richchya vidkryttya)*. Zalishchyky: Prykarpattya, 15–17.

Tkachuk T. 2003. Velyki poselennya tomashivskoi grupy u svitli radiocarbonnogo datuvannya. In O. G. Korvin-Piotrovskiy, V. O. Kruts and S. M. Ryzhov (eds.), *Tripolian Settlements-Giants: The International Symposium Materials*. Kyiv: Korvin-Pres, 170–174.

Tkachuk T. M. 2005. *Znakovi systemy Trypilsko-Kukutenskoi kulturno-istorychnoi spilnosti (maliovaniy posud)* 2. *Semiotychnyj analiz Trypilsko-Kukutenskyh znakovyh system (maliovaniy posud)*. Vinnytsia: Nova Knyha.

Tkachuk T. M. 2008. Ceramic imports and imitations in Trypillia culture at the end of Period CI – Period CII (3900 – 3300 BC). In P. F Biehl and Yu.Ya Rassamakin (eds.), *Import and Imitation in Archaeology*. Langenweißbach: Beier and Beran, 35–50.

Tkachuk T.M. 2011. Lokalno-hronologichni grupy kultury Trypillia-Kukuten z maliovanym posudom (etapy BII – CII). Trypillian Civilization Journal: http://www.trypillia.com/index.php?option=com_content&view=article&id=116:taras-tkachuk-local-groups-with-painted-pottery-of-trypillia-cucuteni-culture-stages-bii-cii&catid=54:archaeology&Itemid=66.

Tkachuk T. M. 2014. Kinets etapu CI Trypilskoi kultury. *Archeologichni Studii* 5, 25–66.

Tsvek E. V. 1980. Tripolskie poseleniya Bugo-Dneprovskogo mezhdurechya (k voprosu o vostochnom areale kultury Kukuten-Tripolye). In I. I. Artemenko (ed.), Pervobytnaya archeologiya: poiski i nakhodki. Kiev: Naukova dumka, 163–184.

Tsvek O. V. 2006. *Poselennya Skhidnotrypilskoi kultury: korotkyi narys*. Kyiv: Institute of Archaeology of the NASU.

Tsvek E. V. 2012. Vostochnotripolskaya kultura i nekotorye aspekty struktury Kukuteno-Tripolskoy megaobshchnosti. In V. V. Otroshchenko, V. A. Kruts, M. I. Gladkikh, N. N. Skakun and E.V. Tsvek (eds.), *Zemledeltsy i skotovody drevney Evropy: problem, novye otkrytiya, gipotezy*. Kiev and Sankt-Peterburg: Institute of Archaeology of the NAS and Institute of Material Culture Studies of the RAS, 225–245.

Vasylenko B. and Konoplia V. 1985. Verkhniodnistrovska grupa pamyatok trypilskoi kultury. In I. Vynokur (ed.), *Tezy dopovidej VI Podilskoi istoryko-kraeznavchoi konferentsii (sektsiya archeologii)*. Kamjanets-Podilskiy: Dunaevska rayonna drukarnia, 10–12.

Videiko M. Yu. 1999. Radiocarbon dating chronology of the Late Tripolye culture. In A. Kośko (ed.), *The Foundations of Radiocarbon Chronology of Cultures Between the Vistula and Dnieper: 3150-1850 BC* (= *Baltic-Pontic Studies* 7). Poznań: Adam Mickiewicz University. Institute of Prehistory, 34–71.

Videiko M. Yu. 2002. Localnye gruppy Tripolskoy kultury na Srednem Dnepre. In E. V. Yarovoj (ed.), *Drevneyshie obshchnosti zemledeltsev i skotovodov Severnogo Prichernomorja (V tys. do n.e. – V v. n.e.)*. Tiraspol: NIL «Archeologija» PGU im. T. Shevchenko, 60–62.

Videiko M. Yu. 2004. Absolutne datuvannya pamjatok Trypilskoi kultury. In M. Videiko (ed.), *Entsyklopediya Trypilskoi tsyvilizatsii* 1. Kyiv: Ukrpoligrafmedia, 85–95.

Videiko M. Yu. 2008. Baden culture influences to the East of the Carpathian Mountains. In M. Furholt, M. Szmyt and A. Zastawny (eds.), *The Baden Complex and the Outside World* (= *Studien zur Archäologie in Ostmitteleuropa* 4). Bonn: Dr. Rudolf Habelt GmbH, 289–298.

Videiko M. Yu. 2011. Trypilska kultura u Seredniomy Podniprovyi. *Pereyaslavika. Naukovi zapysky* 5(7), 109–127.

Videiko M. 2013. *Kompleksnoe izuchenie krupnykh poseleniy Tripolskoy kultury V – IV tys. do n.e.* Saarbrücken: Lambert Academic Publishing.

Vogel J. C. and Waterbolk H. T. 1963. Groningen radiocarbon dates IV. *Radiocarbon* 5, 163–202.

Wechler K. P. 1994. Zur Chronologie der Tripolye-Cucuteni-Kultur aufgrund von C14-Datierungen. *Zeitschrift für Archäologie* 28, 7–21.

Weninger B. and Harper T. 2015. The geographic corridor for rapid climate change in Southeast Europe and Ukraine. In S. Hansen, P. Raczky, A. Anders and A. Reingruber (eds.), *Neolithic and Copper Age between the Carpathians and the Aegean Sea* (= *Archäologie in Eurasien* 31). Berlin: Deutsches Archäologisches Institut, 475–494.

Weninger B. and Jöris O. 2008. A ^{14}C age calibration curve for the last 60 ka: the Greenland-Hulu U/Th timescale and its impact on understanding the Middle to Upper Paleolithic transition in Western Eurasia. *Journal of Human Evolution* 55, 772–781.

Vogel J. C., Waterbolk H. T. 1963. Groningen Radiocarbon Dates IV. *Radiocarbon* 5, 163–202.

Włodarczak P. 2013. Projekt badań chronologii absolutnej eneolitu i początkow epoki brązu w Małopolsce. In I. Cheben and M. Soják (eds.), *Otázky neolitu a eneolitu našich krajin*. Nitra: Archeologickỳ ustav SAV, 373 – 387.

Wolf E. 1982. *Europe and the People without History*. Berkley and Los Angeles: University of California Press.

Wolf E. 1984. Culture: panacea or problem? *American Antiquity* 49(2), 393-400.

Zastawny A. 2015a. Absolute chronology of the Baden culture in Lesser Poland – new radiocarbon dates. In M. Nowak and A. Zastawny (eds.), *The Baden Culture around the Western Carpathians* (= *Via Archaeologica*). Kraków: Krakowski Zespół do Badań Autostrad, 191–220.

Zastawny A. 2015b. The Baden complex in Lesser Poland – horizons of cultural influences. In: M. Nowak and A. Zastawny (eds.), *The Baden Culture around the Western Carpathians* (= *Via Archaeologica*). Kraków: Krakowski Zespół do Badań Autostrad, 191–220.

Zbenovich V. G. 1974. *Pozdnetripolskie plemena Severnogo Prichernomorya*. Kiev: Naukova Dumka.