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CHRONOLOGICAL DEVELOPMENT OF THE TRIPOLYE CULTURE GIANT-SETTLEMENT OF TALIANKI (UKRAINE): ^{14}C DATING VS. POTTERY TYPOLOGY

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ABSTRACT. The long tradition of relative chronology based on pottery typology has often hindered the development of radiocarbon dating amongst the Tripolye giant-settlement in Ukraine. Although it is fairly reliable, relative chronology encounters insurmountable obstacles in identifying internal phases of development within a single settlement. This paper presents the first attempt to use ^{14}C dates to monitor the chronological development of the Talianki giant-settlement, from its formation to the various phases of development and the final decline. It then goes one step further by proving genetic links between 2 "neighboring" settlements, confirming that one is the result of migration processes of the other. This study does not intend to prove that one of the dating techniques is better than the other, but to demonstrate that a synergetic combination of the 2 methods will certainly lead to more reliable results.

INTRODUCTION

The "giant-settlements" of the Tripolye culture in Ukraine are an exclusive phenomenon, crucial for our understanding of social and political organization during the Chalcolithic period in Europe. They are referred to as giant settlements because they were significantly larger than the earliest cities in Mesopotamia, but they were not urban in any accepted sense of the word, since they had no temples, palaces, city walls, or differentiated occupational sectors. Also, they did not survive and evolve into more complex forms, but instead were abandoned after some centuries, and settlements of this size were not seen in this region again until the historic era. Because of their enormous size, archaeological study of these unique sites has been slow. One crucial aspect of the sites is their chronology and their chronological inter-relationships.

Thanks to the remarkable variability of ceramic forms and decorative patterns, thorough studies of pottery typology have allowed archaeologists to reconstruct a fairly precise relative chronology of the formation, development, and decline of those large residential agglomerates. Through meticulous studies of contextual seriations, it has been possible to link the various settlements and distinguish between a number of local groups, thereby reconstructing a range of migration processes in which Tripolian communities were involved, probably in response to the need for new, more productive soils.

Despite its fairly reliable precision, ceramic typology does not allow archaeologists to identify chronological differences within the internal development of a single settlement. This shortcoming can however be overcome by developing an absolute chronology based on radiocarbon dates obtained from a number of dwellings of the settlement. Unfortunately, old-fashioned research traditions associated with a lack of funding have hindered the development of systematic ^{14}C dating in the past 40 yr or so. Only recently have a number of ^{14}C dates been obtained from methodically collected organic material.

The paucity of organic material other than bones in excavated Tripolian settlements has initially forced scholars to focus on the latter as prime samples for ^{14}C dating. The introduction of wet sieving has then facilitated the identification of tiny charcoal particles, which, thanks to the accelerator mass spectrometry (AMS) technique, could easily be ^{14}C dated. The dates of the 2 materials could

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eventually be compared and the discrepancies (if any) overcome, as a result of recent developments on bone dating (Bronk Ramsey et al. 2004; Brock et al. 2007).

The advantage of using Talianki as pioneer site for the development of the settlement's internal absolute chronology is that it is the best researched of all the Tripolian giant-settlements, with 46 systematically excavated and thoroughly studied dwellings so far. Moreover, the different locations of the dated houses allow for selective consideration of the various areas of this large residential agglomeration, giving archaeologists the possibility of identifying different phases related to purposely selected zones, themselves shaped by the influx and outflux of people within the settlement. As a result, not only could the internal chronology of the settlement itself be understood, but light could also be shed on the external migration processes that influenced the demographic aspect of the single settlement.

TRIPOLYE GIANT-SETTLEMENTS IN UKRAINE

The formation of the Tripolye culture giant-settlements in the Southern Bug and the Dnieper interfluve is a unique phenomenon in the development of the early agricultural communities of prehistoric Europe. According to relative chronology (see below), the development of these huge settlements occurred during the Tripolye BII and CI (see Table 1), although the very first of these large residential agglomerates (Veselyi Kut, 117 ha) had appeared much earlier (BI/II) (Shmagliy 1980; Kruts 1989, 2008a; Tsvek 1995, 2006:22–6; Videiko 1995).

Table 1 Tripolye culture periodization in Ukraine.

Name	Period	cal BC
Tripolye	A	5100/5000(?)–4700/4600
Tripolye	BI	4700/4600–4400/4300
Tripolye	BI/II	4400/4300–4200/4100
Tripolye	BII	4200/4100–3900
Tripolye	CI	3900–3450/3350
Tripolye	CII	3450/3300–3000/2900(?)

The giant-settlements were first identified by Shishkin, who, while decoding aerial photographs in the late 1960s, noticed circle and oval shapes in the landscape. A careful examination of these shapes revealed that they were large settlements of the Tripolye culture (Kruts 2008a:42). The first investigations began in the 1970s and were mainly concerned with defining the exact sizes of those large settlements (Shmagliy 1980:198–9; Kruts 2008a:33–4; Videiko 1995:45–51). Scholars were astonished by the dimensions of those residential units, with some of them reaching almost 400 hectares (ha). It has to be pointed out, though, that initial calculations did not take into account the elliptical form of the settlements, and their size was simply calculated using the rectangular areas formula. As a result, their dimensions were initially reported to be larger than they really were. After recalculating with the proper formula for the ellipse, the settlements became considerably smaller (e.g. Maidanetske was reduced from an initial estimate of 270 to 214 ha, and Talianki from 450 to just 350 ha; Diachenko 2010:78–9, 197–204). This reduction in size also influenced the number of dwellings within the settlement. For instance, the initial 2700 houses of Talianki became 2050 (Diachenko 2009: Table 1). The number of houses for both Talianki and Maidanetske have been calculated according to magnetometer surveys, but, since part of the area of both settlements encompass present-day villages, the missing surfaces were recalculated approximately. These approximations were later rectified by Diachenko's mathematical models (see below).

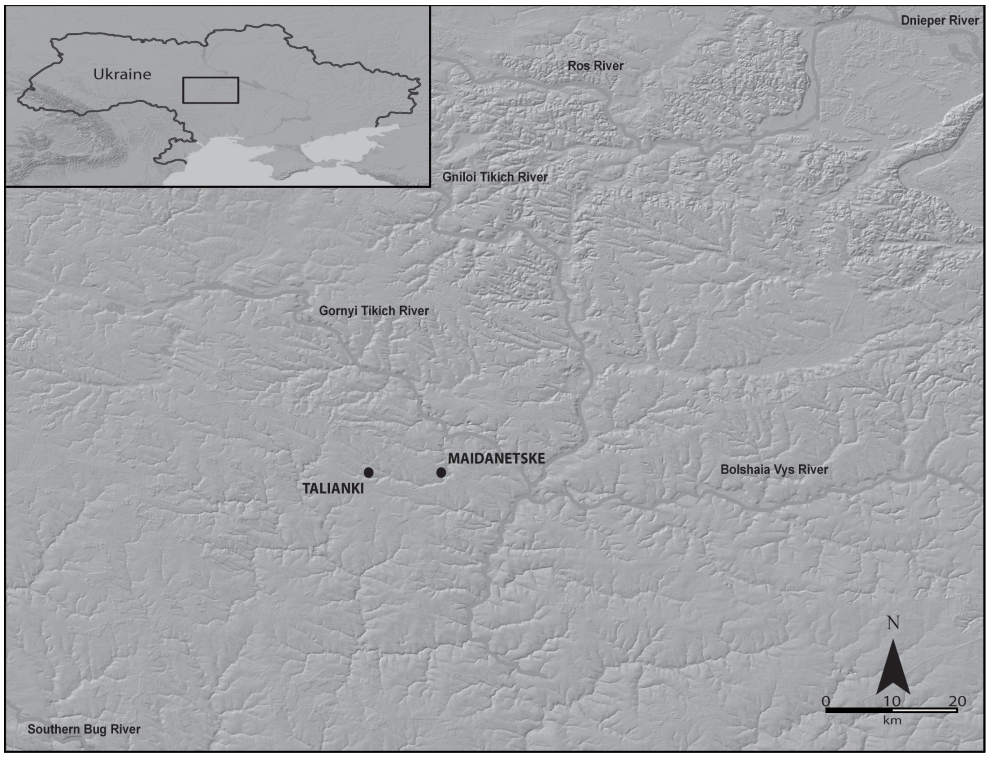

Figure 1 Geographical location of Talianki and Maidanetske giant-settlements (graphic by Ben Jennings; base map created using STRM data and ArcWorld River and Lake Overlay).

Although a number of giant-settlements have been investigated since the 1970s, most of the research was focused on two of the largest sites: Talianki and Maidanetske (Figure 1). In almost 4 decades, 44 dwellings and 25 pits have been excavated in Maidanetske (Shmagliy and Videiko 2003:66), and 46 dwellings in Talianki (Korvin-Piotrovskiy and Menotti 2008; Kruts et al. 2009; Menotti 2010; A Korvin-Piotrovskiy personal communication, 2011). Despite this considerable effort, very little research has been performed on the function and development of these large settlements. The total absence of an absolute chronology and its correlation to the well-developed relative one (see below), hinders paleoeconomic and paleodemographical studies of the Tripolye population, preventing scholars from gaining a more complete understanding of the formation, development, and decline of the fascinating phenomenon of the giant-settlements (Diachenko 2008, 2009, 2010).

CHRONOLOGY OF GIANT-SETTLEMENTS BASED UPON POTTERY TYPOLOGY

The remarkable variety of Tripolian pottery in terms of forms and decorative patterns has allowed the development of one of the most impressive and reliable relative chronologies in European prehistory. Technology, form, and ornamentation have been used to define cultural and chronological properties of archaeological sites. It is indeed by distinguishing between technical and technological, morphological, functional, and stylistic indicators, noting that the former are more conservative and the latter more dynamic, that genetic connections between different groups can be identified (Kruts and Ryzhov 1985; Ryzhov 1993, 1999, 2000, 2007).

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The development of the Tripolye culture giant-settlements took place in the interfluve area between the Southern Bug and the Dnieper rivers, following the eastwards migration from the Dniester River region during the BII period (Kruts and Ryzhov 1985:53–4; Popova 1989; Ryzhov 2007; Diachenko 2010:177–80). The entire process of formation, development, and decline spans 3 main local groups' genetic lines: Vladimirovskaya (BII), Nebelevskaya (BII–CI), and Tomashovskaya (CI), but it is within the latter that the most well-known settlements exist (Kruts 2008a:44). The complexity of the Tomashovskaya (previously named Tomashovskaya-Sushkivskaya) local group's line of the development has required a more detailed division into 4 phases (Kruts and Ryzhov 1985:52), allowing scholars to place the various settlements of that group in chronological order as follows: Phase 1 = Popudnia and Staraya Buda; Phase 2 = Kolodiste, Talne, Rossokhovatka, Sushkovka, and Dobrovody; Phase 3 = Talianki, Moshurov, Maidanetske, Chichirkozovka, and Kocherzhintsy-Pankovka; Phase 4 = Tomashovka and Vasilkov. The chronology became even more detailed when Diachenko (2010) proposed a further division of Phase 3 into 2 more stages. Using mathematical modeling, and taking into account issues of demography and settlement size (especially linked to migration processes), Diachenko (2010:99–102) gives the various medium- and large-size settlements a more precise chronological order within the different phases of the Tomashovskaya local group's genetic line of development:

Phase 1 – Sushkovka (76.9 ha);

Phase 2 – Dobrovody (210.9 ha), Yatranovka 1 (60 ha), Chichirkozovka (254.3 ha);

Phase 3, stage 1 – Talianki (350 ha), Vasilkov (113 ha);

Phase 3, stage 2 – Maidanetske (214 ha), Romanovka (57.7 ha);

Phase 4 – Tomashovka (117.4 ha).

Although Diachenko's model rearranges the chronology of the Tomashovskaya local group giant-settlements in a slightly different way, it is still supported by pottery typologies (Ryzhov 1999, 2000) as well as by a number of scholars (Kruts 1989, 2008a). However, Diachenko's work highlights 2 important points: a) the chronological order of Talianki and Maidanetske (first Talianki then Maidanetske) (Diachenko 2008:11); and b) the duration of the settlements.

These 2 points have always triggered incandescent dispute amongst scholars. It was in fact believed that Talianki and Maidanetske were synchronous throughout their existence (Shmagliy and Videiko 2003:122–5), or at least at some specific point (Kruts 1989; Ryzhov 1990:87). The hypothesis of contemporaneity between the 2 settlements at a specific period is also supported by Diachenko's study; the migration from Talianki to Maidanetske (and the consequent settling of the latter) began when Talianki was still functioning. The issue concerning the duration of the single settlements is more problematic. It was previously thought that giant-settlements would have functioned for around 50 yr (Kruts 1989:120–1; Kruts et al. 2008:44), but according to Diachenko's mathematical analysis of ceramic typologies at these sites, it can be extended to 80 yr and maybe even longer (Diachenko 2010:102).

Another important topic of research that has emerged lately is the microchronology of the settlements; in other words, the development of the settlement itself from the very first settling in the area to its final abandonment. According to Shmagliy and Videiko (1990, 2003:116–22), Maidanetske was constructed in 3 stages (from the center to the outer perimeter), with the burning (and abandonment) of it considered to be the last (fourth) stage. A similar situation can be spotted in Talianki. In fact, Ryzhov argues that the oldest dwelling in the settlement is House 2, as some fragments of ceramics found there belong to the preceding phase of the development of the Tomashovskaya local

group. As a result, the construction of the settlement can be divided into 2 stages. The inside circle was built during the first stage, while the outer circles were built during the second stage. Yet, Ryzhov does not exclude that, at some stage, both parts were under construction at the same time (Ryzhov 1990:87).

By highlighting and refining relative chronology based upon pottery typology, Diachenko's work has also pointed out its limitations. While he partially agrees with a development from inner to outer rows, Diachenko also sees a high percentage (~78.4%) of dwellings functioning at the same time (e.g. 1600 in Talianki and 1470 in Maidanetske). The remaining 21.6% is distributed between the settling of the settlement (the arrival of the group and the time spent building the dwellings) and the migration processes from one place to the other (Diachenko 2009, 2010). The rotating movement of the population from one settlement to the other, previously advanced by Kruts (1989, 2008a:44), is in this case confirmed.

At this point, an obvious question arises: can ^{14}C dating explain the chronological correlation between the various giant-settlements and, most importantly, shed light on the internal chronology of a single settlement?

RADIOCARBON DATING OF THE GIANT-SETTLEMENTS: A SLOW START

As discussed earlier, it is rather unfortunate that, despite a 40-yr-long research tradition on the Tripolye giant-settlements (especially those of the Tomashovskaya local group – CI), only a handful of ^{14}C dates are available today to archaeologists. It is difficult to pinpoint the precise reasons why such an important aspect of chronology studies has been neglected so significantly. There might not be a single cause, but rather a combination of factors, as to why this has happened. First and foremost, a crucial role was played by the over-conservative approach to research, encouraged by the well-developed (and quite reliable) relative chronology based on pottery typology (see above). Migration processes and settlement deployment could be easily explained (from "a" to "z"), without placing calendric values on chronological sequences. It was not until the first decade of the 21st century that issues of synchronicity or internal chronological formation of the single settlements questioned, for the first time, the undisputed reliability of relative ceramic chronology (Diachenko 2010). Another, more recent, factor that contributed to the slow start of the development of an absolute chronology based on ^{14}C dates was the severe financial situation that hit Ukraine after the collapse of the Soviet Union. The crisis eased as the new millennium began, but there was still reluctance to accept the value of ^{14}C dating (Kruts 2008c). Amongst the new ^{14}C dates of the Tripolye culture settlements published in the late 1990s to early 2000s, none of them (except 4 obtained more than a decade earlier, see below) belonged to the giant-settlements (Burdo and Kovaliukh 1998, 1999; Videiko 1999, 2003). What is even more surprising is that, despite the amelioration of the financial conditions of academic research, which resulted in intensive investigations of the Talianki settlement and some other giant-settlements (e.g. Kosenivka and Dobrovody), ^{14}C dating, as well as other scientific analyses, was still not in use as standard procedure during the projects in the first few years of the 2000s. A sign of thawing was first noted in the late 2000s when thanks to collaborative international projects, systematic collection of organic material for ^{14}C dating was finally initiated (Kruts et al. 2008, 2009).

FIRST ^{14}C DATES

The very first 2 ^{14}C dates of a giant-settlement are from Maidanetske and were published in 1985, despite the fact that the settlement was excavated in 1975 (Telegin 1985:12, 1986:94) (Table 2, nr 12 and 13). The piece of charcoal from which the 2 dates originated was found in complex "Ж" in the

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southwestern part of the settlement (Shmagliy and Videiko 2003:125). Five dwellings and 6 pits were investigated within the complex, but the exact location of the piece of charcoal is not clear. The charcoal fragment was split into 2 pieces and each was sent to 2 different laboratories: Berlin and Kiev (Shmagliy and Videiko 2003:125). Despite the samples being identical, the results were visibly different; the date from the Kiev laboratory was around 200 yr younger (see Table 2, nr 12, 13). Considering the close genetic link of Maidanetske to Talianki (see below), scholars concluded that the date from the Kiev laboratory was probably incorrect.

Table 2 List of ^{14}C dates of the Talianki (48°48′22″N, 30°31′30″E) and Maidanetske (48°49′07″N, 30°41′51″E) giant-settlements. Laboratory ID: OxA = Oxford; Ki = Kiev; Bln = Berlin. Conventional dates calibrated with OxCal 3.10 (Bronk Ramsey 1995, 2001) and the IntCal04 calibration curve (Reimer et al. 2004).

Nr	Giant-settlement	Sample material	Lab ID nr	cal BP	Date cal BC
	Talianki				
	1986 Excavation				
1	House 13/14	Animal bone	Ki-6867	4810 ± 55	**68.2% probability** 3660 (17.7%) 3620 3600 (50.5%) 3520 **95.4% probability** 3710 (88.8%) 3500 3430 (6.6%) 3380
2	House 13/14	Animal bone	Ki-6868	4780 ± 60	**68.2% probability** 3650 (68.2%) 3510 **95.4% probability** 3660 (76.7%) 3490 3470 (18.7%) 3370
3	House 13/14	Animal bone	Ki-6865	4755 ± 50	**68.2% probability** 3640 (64.0%) 3510 3400 (4.2%) 3380 **95.4% probability** 3650 (72.6%) 3490 3460 (22.8%) 3370
4	House 13/14	Animal bone	Ki-6866	4720 ± 60	**68.2% probability** 3640 (24.6%) 3560 3540 (15.7%) 3490 3450 (27.9%) 3370 **95.4% probability** 3640 (95.4%) 3370
	2008 Excavation				
5	House 40 (Grid coordinates: И-8)	Animal bone	Ki-16026	4990 ± 80	**68.2% probability** 3940 (20.3%) 3870 3810 (44.3%) 3690 3680 (3.6%) 3660 **95.4% probability** 3960 (95.4%) 3640
6	House 40 (Grid coordinates: К-6)	Animal bone	Ki-15994	4550 ± 70	**68.2% probability** 3370 (26.5%) 3260 3240 (41.7%) 3100 **95.4% probability** 3520 (10.0%) 3420 3390 (85.4%) 3020
7	House 41 (Grid coordinates: И-10)	Animal bone	Ki-15993	4910 ± 70	**68.2% probability** 3770 (68.2%) 3630 **95.4% probability** 3940 (7.5%) 3850 3820 (80.9%) 3620 3590 (7.0%) 3520

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Table 2 List of ^{14}C dates of the Talianki (48°48′22″N, 30°31′30″E) and Maidanetske (48°49′07″N, 30°41′51″E) giant-settlements. Laboratory ID: OxA = Oxford; Ki = Kiev; Bln = Berlin. Conventional dates calibrated with OxCal 3.10 (Bronk Ramsey 1995, 2001) and the IntCal04 calibration curve (Reimer et al. 2004). *(Continued)*

Nr	Giant-settlement	Sample material	Lab ID nr	cal BP	Date cal BC
8	House 41 (Grid coordinates: Б-10)	Animal bone	Ki-16025	4970 ± 50	**68.2% probability** 3800 (62.9%) 3690 3680 (5.3%) 3660 **95.4% probability** 3940 (15.8%) 3850 3820 (79.6%) 3640
9	House 41 (Grid coordinates: З-4)	Charcoal (Ash - *Fraxinus*)	OxA-19840	5048 ± 33	**68.2% probability** 3940 (53.4%) 3830 3820 (14.8%) 3790 **95.4% probability** 3960 (95.4%) 3760
	2009 Excavation				
10	House 42 (Grid coordinates: Е-4)	Charcoal (Oak - *Quercus*)	OxA-22348	5032 ± 31	**68.2% probability** 3940 (46.1%) 3870 3820 (22.1%) 3770 **95.4% probability** 3950 (90.7%) 3750 3740 (4.7%) 3710
11	House 43 (Grid coordinates: Д-7	Charcoal (Ash - *Fraxinus*)	OxA-22515	4976 ± 29	**68.2% probability** 3780 (68.2%) 3705 **95.4% probability** 3910 (4.3%) 3870 3800 (91.1%) 3660
	Maidanetske				
	1975 Excavation				
12	Complex "Ж" (4 houses)	Charcoal (one half of the piece)	Bln-2087	4890 ± 50	**68.2% probability** 3710 (68.2%) 3635 **95.4% probability** 3790 (90.8%) 3630 3580 (4.6%) 3530
13		Charcoal (the other half of the same piece)	Ki-1212	4600 ± 80	**68.2% probability** 3520 (47.7%) 3320 3240 (11.5%) 3170 3160 (9.1%) 3110 **95.4% probability** 3650 (95.4%) 3000

The first 4 ^{14}C dates of the Talianki settlement come from 2 neighboring houses (13 and 14) excavated in 1986, underneath an Early Bronze Age (EBA) burial mound that was constructed on the older abandoned settlement. Due to the close proximity of the houses, the exact location(s) of the 4 samples was not properly recorded (they are referred to as being from House 13 or 14—possibly even between them). The dates (Table 2, nr 1–4) have never been properly considered and, unfortunately, they were published only 13 yr later as a footnote to the article concerning the EBA burial mound (Klochko and Kruts 1999:79).

TALIANKI'S NEW ^{14}C DATES

Systematic collections of samples for ^{14}C dating within the Talianki settlement were initiated by an international collaborative project between Ukraine and Switzerland in the late 2000s (Menotti 2009). In 2008, while investigating houses 40 and 41 in the northwestern part of the settlement (see

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Figure 2), 5 samples (4 from domestic animal bones and 1 from charcoal) were selected for ^{14}C dating. The 4 bone samples were sent to Kiev Radiocarbon Laboratory, and the fragment of charcoal was sent to the Oxford Radiocarbon Accelerator Unit (Table 2, nr 5–9) (Kruts et al. 2008:54). Two more fragments of charcoal were obtained during the excavation campaign of 2009 (Kruts et al. 2009:53). One fragment comes from House 42 (northwestern part of the settlement), whereas the other comes from House 43 (southwestern part of the settlements) (Figure 2); both samples were dated at the Oxford laboratory (see also Table 2, nr 10 and 11).

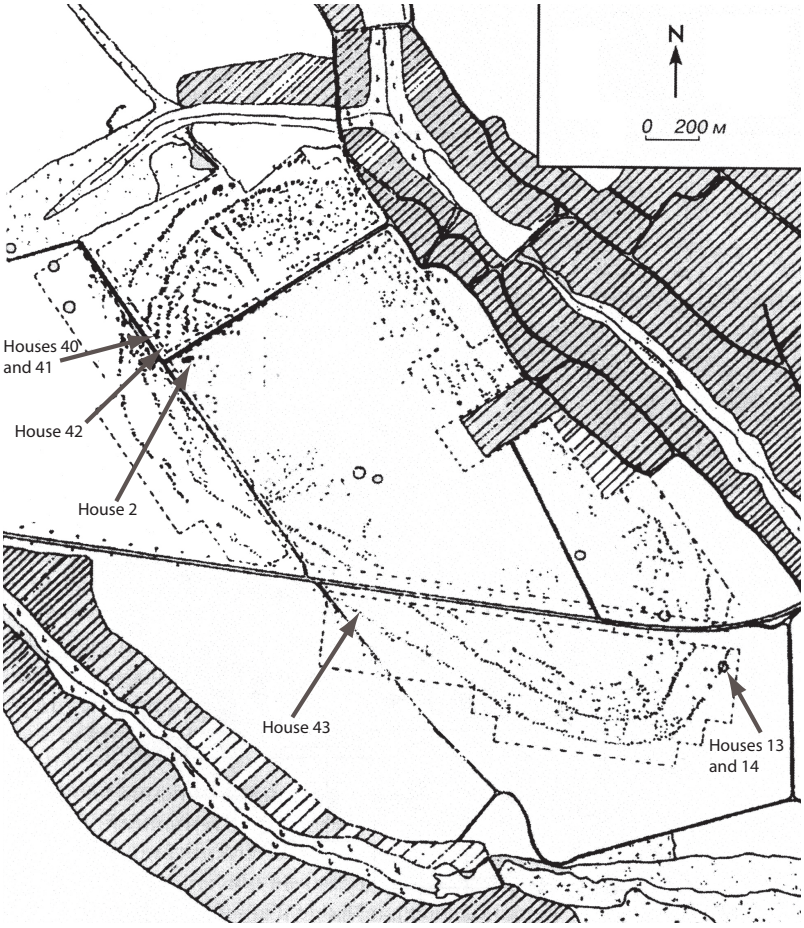

Figure 2 Plan of the Talianki giant-settlement with the location of the various houses discussed in the paper (modified from Kruts et al. 2008).

It is interesting to note that despite the fact that the 7 samples were of different materials (4 of animal bones and 3 of charcoal) and dated in 2 different laboratories, all the dates except one (e.g. Ki-15994, which is considered to be incorrect), are more or less of the same time. Two charcoal dates from houses 41 and 42 (Table 2, nr 9 and 10) are somewhat older, but this could be due to either the "old wood factor," or the fact that the bones, from which the dates were obtained, were discarded at the very end of the settlement life.

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After a careful look at the series of dates listed in Figure 3, one cannot help but notice 2 distinct phases of settling (a and b), which divide the settlement into 2 distinct areas, northwestern and southeastern, whereby the former was settled earlier than the latter. Therefore, if this is the case and we consider the usual lifespan of a typical dwelling, houses 13 and 14 (southeastern area) could have been built as houses 40, 41, and 42 (northwestern area) were being abandoned (or had just been abandoned), and maybe even when the northern part of the settlement was no longer functioning (see also Figure 4). The fact that the Talianki settlement could have been started in the northwestern part and subsequently developed towards the south is also sustained by the chronological placement of House 2 (considered to be the oldest in the settlement), which is also situated in the northwestern part (Ryzhov 1990:87) (see Figure 2). Finally, further support for this theory is provided by the date of House 43, which occupies a slightly central position chronologically and geographically (see Table 2, nr 11, and Figure 2).

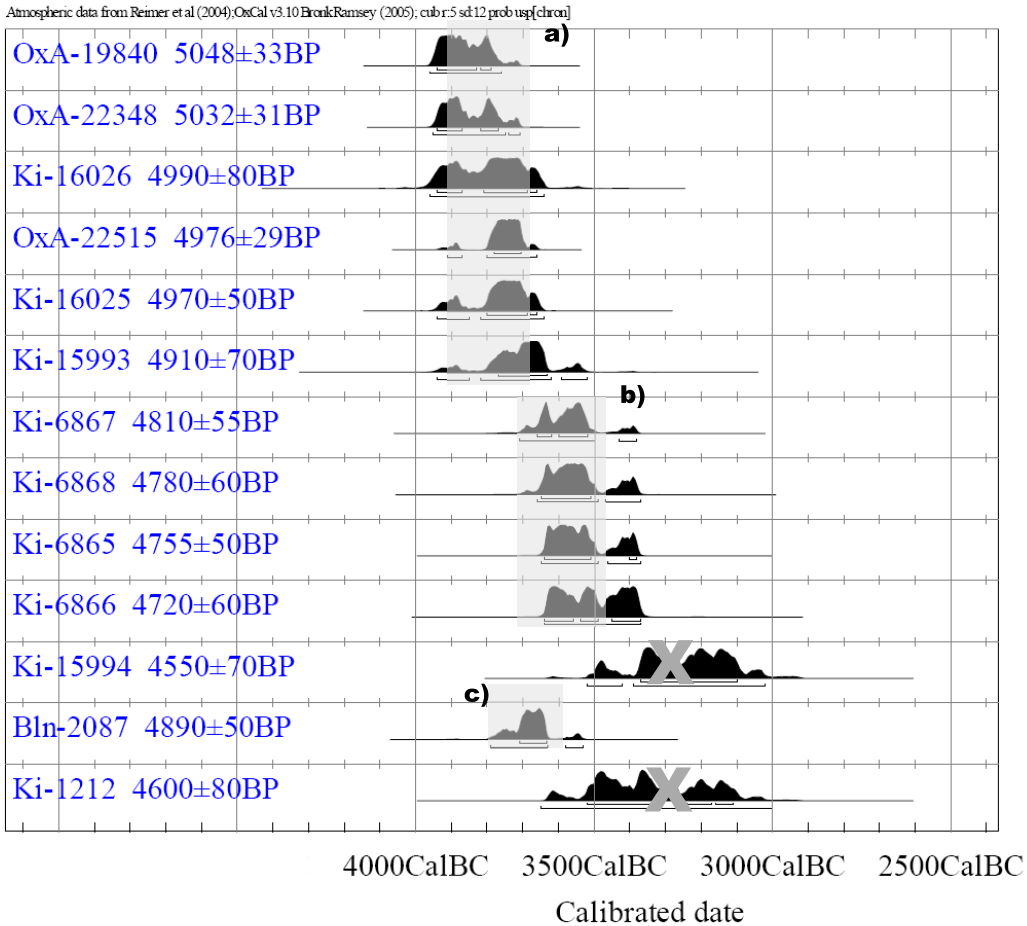

Figure 3 Calibration of ^{14}C dates of the giant-settlements of Talianki and Maidanetske (2 last dates Bln-2087 and Ki-1212): a) Phase 1 of the chronological development of the Talianki giant-settlement; b) Phase 2 of the chronological development of the Talianki giant-settlement; c) Maidanetske date; the 2 dates covered by a gray X (Ki-15994 and Ki-1212) are considered incorrect. Conventional dates calibrated with OxCal 3.10 and the IntCal04 calibration curve (Bronk Ramsey 1995, 2001; Reimer et al. 2004).

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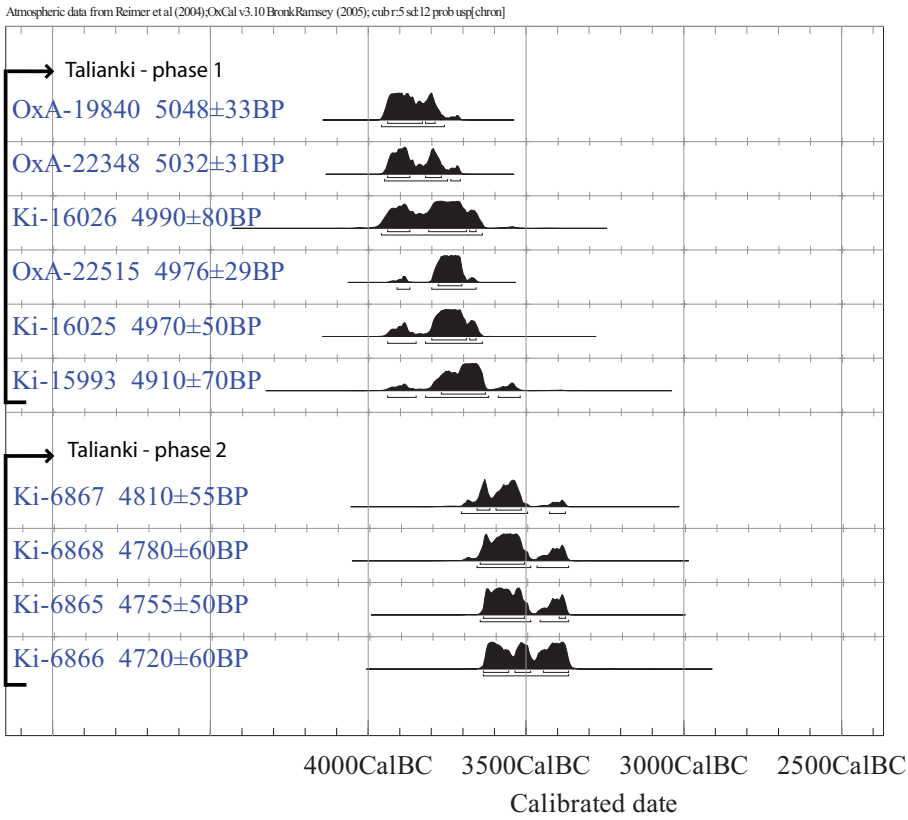

Figure 4 The 2 chronological phases of the Talianki giant-settlement identified by the various ^{14}C calibrated dates.

DISCUSSION

The importance and usefulness of ^{14}C dating in understanding the internal development of a Tripolye culture giant-settlement is highlighted by the Talianki settlement. In fact, despite the still-limited number of ^{14}C dates available, it has already been possible to point out the various shortcomings of the pottery-typology-based relative chronology, identifying at the same time possible theoretical models of settlement formation, development, and rotation.

Three potential ways of settlement development (all tightly interwoven) have been clearly identified: a) a concentric development of the various rows (possibly from the inner to the outer rows of dwellings); b) a zone-related development (diachronically as well as synchronically) of specific groups of buildings within the settlement; and c) a 2-phase northwest-southeasterly chronological development of the entire settlement.

A careful space-time correlation between the ^{14}C dates of houses 40, 41, and 42 and their locations shows that these chronologically ordered dwellings were part of the first inner rows of the Talianki settlement, whereas houses 13, 14, and 43 (built later) belonged to the outermost row (see Figure 2). Although this theory is supported by the relative chronology based on pottery typology (see for instance the position of House 2, considered to be the oldest in the settlement), recent studies based upon mathematical modeling (Diachenko 2010) seem to agree more with alternative "b," whereby

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different groups of houses developed diachronically (and some of them possibly even synchronically) in different areas of the settlement.

What the ^{14}C dates of Talianki have clearly pointed out, however, is the presence of 2 distinct phases of construction that divide the residential agglomeration of buildings diagonally into 2 chronological zones. The oldest dwellings seem to belong to the northwestern part of the settlement, while those of a much later date are situated in the southeastern area. At 68.2% probability, Phase 1 spans from 3940 to 3630 cal BC, whereas Phase 2 dates from 3660 to 3370 cal BC (see Figure 4, Table 2). It is interesting to note that even considering the "old-wood factor" (<40 yr) of the dated charcoal (the main material used for the ^{14}C dates of the houses in the northern part of the settlement), and the possibility that the bones (from where the ^{14}C dates of the southern houses were obtained) could have been much younger than the houses themselves, the 2 phases remain clearly evident. Therefore, the first occupants of Talianki settled in the northwestern quarter of the settlement, expanding it southeasterly as new people or communities arrived in the area. It is also interesting to note that the dwellings of inner rows were built first (see above), contradicting the theory of the outermost row of houses serving as "living walls" (a sort of protective fence for the entire settlement) (Videiko 1998).

A final major achievement of ^{14}C dating within the giant-settlement studies is the confirmation of the genetic link between Talianki and Maidanetske (Figure 1). Maidanetske's date supports, in fact, the hypothesis (developed through pottery typological analyses and mathematical calculations) that the settlement formed from the initial migrations of Talianki's people at approximately the final stage of the settlement's existence. It is interesting to note that at some point (the latest phase of Talianki and the early one of Maidanetske), the 2 giant-settlements were synchronic (see Figure 3).

CONCLUSIONS

Lack of a reliable absolute chronology within the Tripolye culture giant-settlement studies has prevented scholars from gaining a satisfactory understanding of the formation, development, and decline of those enormous settlements, which are characteristic of the final stage of the Tripolye tradition in Ukraine. Despite the highly precise relative chronology (based on pottery typology) being able to identify migration processes linked to settlement rotation of the various Tripolian local groups, this method still does not allow archaeologists to recognize important aspects of the single settlements' internal development.

The recently developed absolute chronology (based on ^{14}C dates) of the Talianki giant-settlement's internal formation and development has proven vital for overcoming the shortcomings of the relative chronology. Although still in its embryonic state, the ^{14}C chronology has not only already confirmed old theories advanced by pottery typological analyses, but it has also identified 2 distinct phases of the settlement's internal chronological development, hitherto unrecognized by relative chronology. Additionally, the selective consideration of the various areas within the settlement obtained by dating dwellings in different locations gives us the possibility to identify special intentionally selected zones, and study how they were affected by new arrivals and departures of internal and external small communities (this is proven by the confirmation of genetic links between Talianki and Maidanetske).

It is finally clearly understood that the development of a solid absolute chronology alongside the well-affirmed relative one is not to reject the value of the latter, but to generate crucial comparisons, in order to obtain a more comprehensive understanding of the Tripolye giant-settlement phenomenon in Ukraine.

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