Baltic-Pontic Studies
vol. 24: 2019-2020, 87-103
ISSN 1231-0344
DOI 10.2478/bps-2020-0004

Małgorzata Rybicka*, Ghenadie Sîrbu,
Dariusz Król***, Viaceslav Bicbaev*****

NEW RADIOCARBON DATES FOR STAGE CII TRIPOLYE CULTURE, NORTHERN MOLDOVA

* ORCID 0000-0001-9889-3481; Rzeszów University, Institute of Archaeology, 10 Moniuszki str., 35-015 Rzeszów, Poland; mrybicka@interia.eu

* ORCID 0000-0002-4525-1239; Academy of Sciences of the Republic of Moldova, Center for Archaeology, Institute of Cultural Heritage, MD-2001, Chişinău, Ştefan cel Mare bd., 1; ghena_ipc@yahoo.com

*** ORCID 0000-0001-7696-1308; Rzeszów University, Institute of Archaeology, 10 Moniuszki str., 35-015 Rzeszów, Poland; kroldrk@gmail.com

**** National Museum of History of Moldova, MD-2012, Chişinău, 31 August 1989 str., 121 A

ABSTRACT

According to Tamara Movscha, vessels from the Funnel Beaker culture settlement in Zhvanets can be synchronized with the period of existence of the settlements in Zimno, Leżnica and Gródek. Based on the currently available radiocarbon dates, we can say that the long-term settlements in Gródek and Zimno existed from around 3650 BC. The older phase of the settlement in Gródek is dated to 3650-3400 BC, while the younger ones to 3400-3100 BC. The first is characterized by the presence of imports of tableware with the characteristics of the Brînzeni group dated to 3400-3100 BC. In order to verify the current attempts to position the above at a more precise

time, several radiocarbon analyses of the samples from the sites of Brînzeni and Gordinești group in northern Moldova were conducted.

Keywords: Funnel Beaker culture, Tripolye culture, Brînzeni group, Gordinești group

INTRODUCTION

In the last work concerning relationships of the Funnel Beaker culture (FBC) and Tripolye culture (TC) [Rybicka 2017] attention is drawn to the fact the dating of a set of FBC materials, among which imports of TC tableware ceramics with the characteristics of the Brînzeni group were identified, are older than published dating obtained for the settlements of this group, such as Brînzeni or Zhvanets [Rassamakin 2012; Bicbaev *et al.* 2017]. They allow to put the mentioned TC sites in the period of 3300-3100 BC. However, the TC imports within the south-eastern group of FBC can currently be placed in the period of 3600-3300 BC, i.e. in phase I of settlements in Gródek [Włodarczak 2006; Zawiślak 2013] and Zimno [Bronicki *et al.* 2004; Rybicka 2017]. According to Movscha [1985], vessels from the FBC settlements in Zhvanets can be synchronized with the period of existence of the settlements in Zimno, Leżnica and Gródek. Based on the currently available radiocarbon dates, we can say that the long-term settlements in Gródek and Zimno existed from around 3650 BC [Włodarczak 2006]. The older phase of the settlement in Gródek is dated to 3650-3400 BC, while the younger ones to 3400-3100 BC. The first of them is characterized by the presence of imports of tableware ceramics with the characteristics of the Brînzeni group [Zawiślak 2013; Rybicka 2017].

Moreover, the vessels with ceramic stylistics from Holyschiv [Gumiński 1989; Peleshchyshyn 2004], stacked with the Gordinești group [Pozikhovskyj 2019], were recognized both in Gródek and Zimno. These vessels represent the younger stage of the occupation of these settlements [Rybicka *et al.* 2019].

Significant imports of Volhynia raw material identified in the eastern and south-eastern group of the FBC can also be connected to the period of 3600-3300 BC [Rzepecki 2014; Diachenko, Rybicka 2018; 2019]. Therefore, it is necessary to re-date the Brînzeni group. Here, we ought to emphasize that many researchers pay attention to the disputability of radiocarbon dating, which was also highlighted by the authors of the study on materials from the site of Bilcze Złote [Kadrow *et al.* 2003: 120].

In order to verify the current attempts to position the Brînzeni group at a more precise time [Videiko 1999; 2000; Diachenko, Harper 2016], several radiocarbon analyses of the samples from the sites of the Brînzeni and Gordinești group

in northern Moldova were carried out (Table 1). The analyses were made by the method AMS in the Poznań Radiocarbon Laboratory.

As a result of laboratory research, remains of animal bones and cereal grains found in the following settlements were dated (Table 1): Brînzeni IX (XI), Costesti IV, Varatic V-*Holm*, Brînzeni III – *Țiganca*, Hancauti-*La Frasin*, Gordineşti II-*Stinca goala*, and Gordineşti-*La izvor*.

BRÎNZENI GROUP: RESULTS OF RADIOCARBON DATING

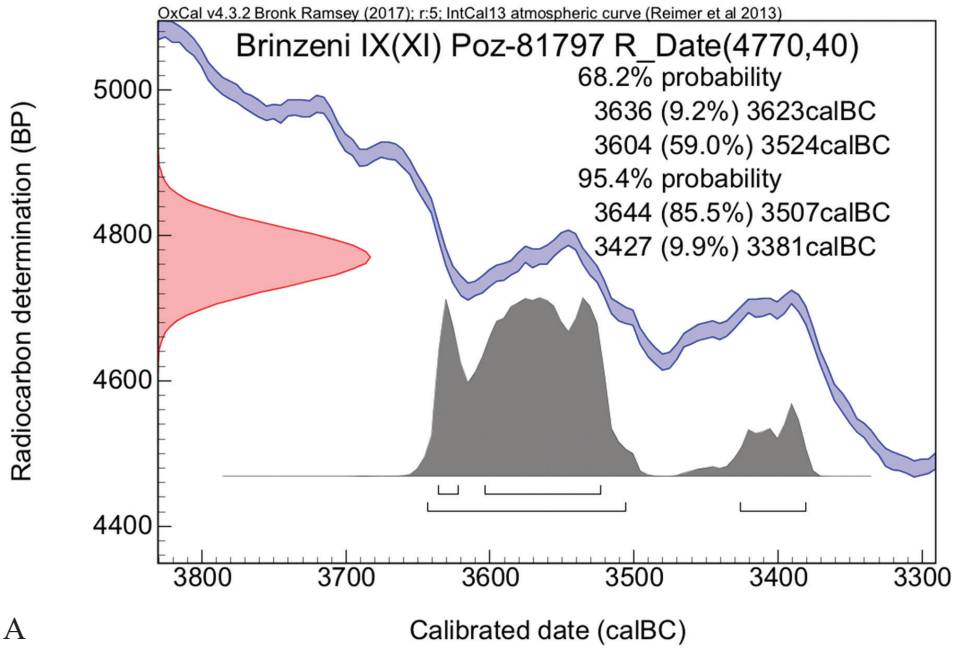
The result obtained for the Brînzeni IX (XI) site is Poz-81797 4770±40 BP, that is, after calibration 3636-3524 BC (68.2% probability) and 3644-3381 BC (95.4%) (Fig. 1.A). One date from Costeşti IV would appear to be quite similar. Its basic uncalibrated value is Poz-81803 4710±35 BP and therefore 3627-3378 BC (68.2%), and 3632-3373 BC (95.4%) respectively (Fig. 1B). The results of the second sample from Costeşti IV is Poz-81799 4635±35 BP, i.e. 3498-3364 BC (62.8%), and 3517-3354 (95.4%) (Fig. 1C). In the case of the sample from the Varatic V-*Holm* settlement, the designation Poz-81798 4690±35 BP was obtained. Its calibrated value is 3519-3376 BC (68.2%), and 3629-3369 BC (95.4%) (Fig. 1D). The youngest date is related to the Brînzeni III – *Țiganca* site. It is Poz-81800 4560±35 BP and after calibration is 3368-3124 BC (68.2%), and 3489-3104 BC respectively (95.4%) [Bicbaev *et al.* 2017].

Unfortunately, the lack of elaboration of the contexts of the analyzed samples is a disadvantage of the obtained radiocarbon determinations. A similar situation pertains to multiphase sites in Zhvanets [Rassamakin 2012; Tkachuk 2005]. Therefore, it is difficult to accept them indisputably.

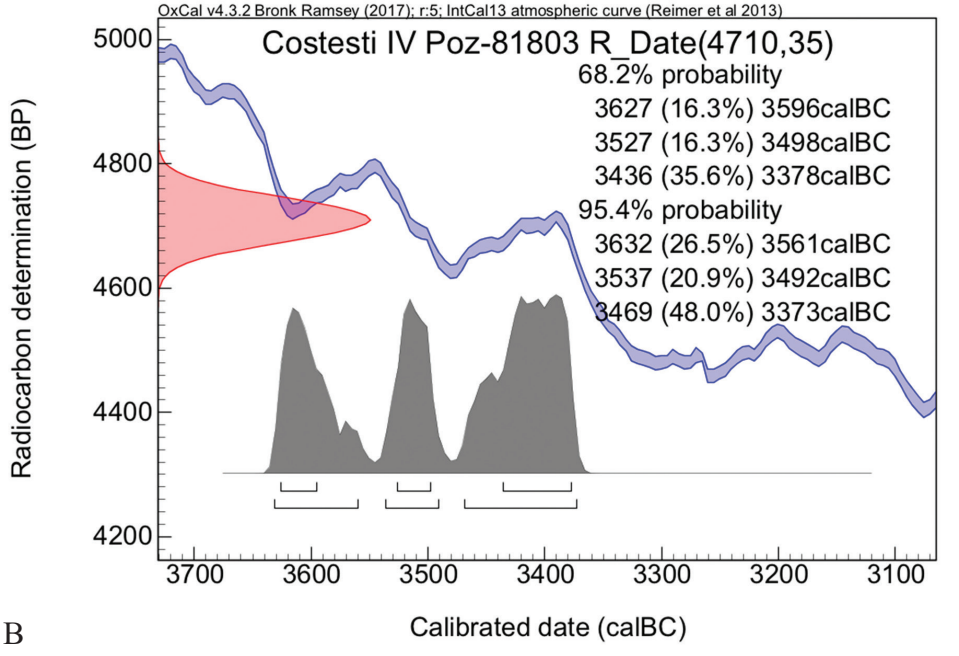
Accepting the presented dating results in a literal way, they generally fit into the chronology of the south-eastern FBC group [Włodarczak 2006]. Based on them, the Brînzeni group can be situated in the period from 3600 to 3100 BC (Fig. 2). This is, however, questionable in the context of the dating obtained for Zhvanets and the site of Brînzeni III-*Țiganca*. Previously published dates indicated a period of 3400-3100 BC [Rassamakin 2012; *cf.* Rybicka 2017]. Here, we should stress that in the set of materials from the Zhvanets site, apart from ceramics with characteristics of the Brînzeni group, there are artefacts of the Gordinești type.

Establishing a chronological position of the Brînzeni group is particularly important to determine a time when interaction between the FBC and TC began. Based on the available data, Piotr Włodarczak [2006] situated the settlement in Zhvanets in the horizon of 3100-2900 BC.

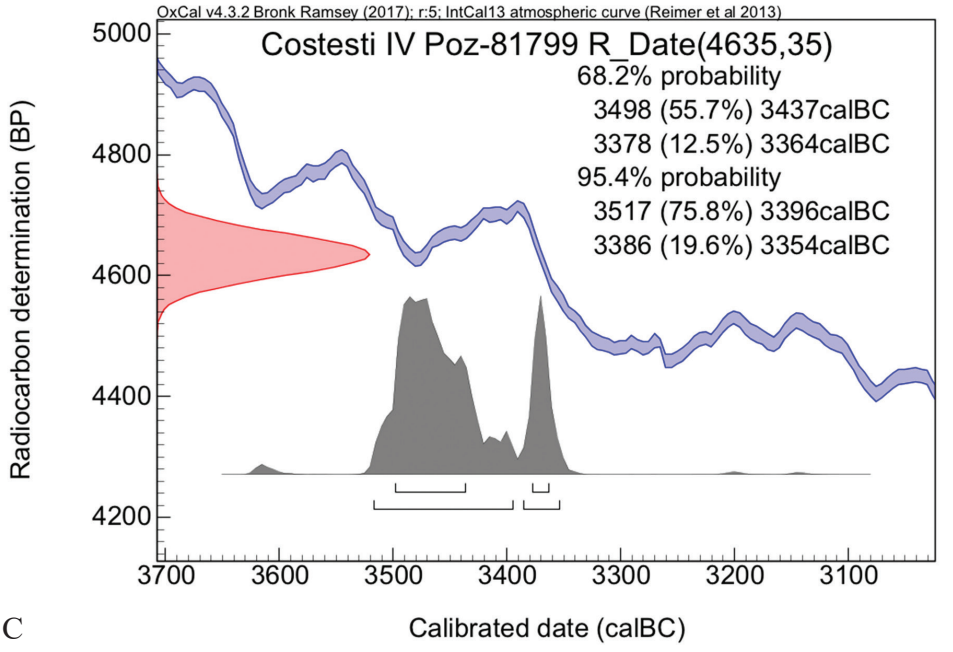
Due to the conservatism of the ceramics style of the western Ukrainian FBC clearly visible e.g. in Kotoryny on the Upper Dniester [Hawinskyj *et al.* 2013], it


OxCal v4.3.2 Bronk Ramsey (2017); r:5; IntCal13 atmospheric curve (Reimer et al 2013)
Brinzeni IX(XI) Poz-81797 R_Date(4770,40)
68.2% probability
3636 (9.2%) 3623calBC
3604 (59.0%) 3524calBC
95.4% probability
3644 (85.5%) 3507calBC
3427 (9.9%) 3381calBC
Radiocarbon determination (BP)
5000
4800
4600
4400
3800
3700
3600
3500
3400
3300
Calibrated date (calBC)

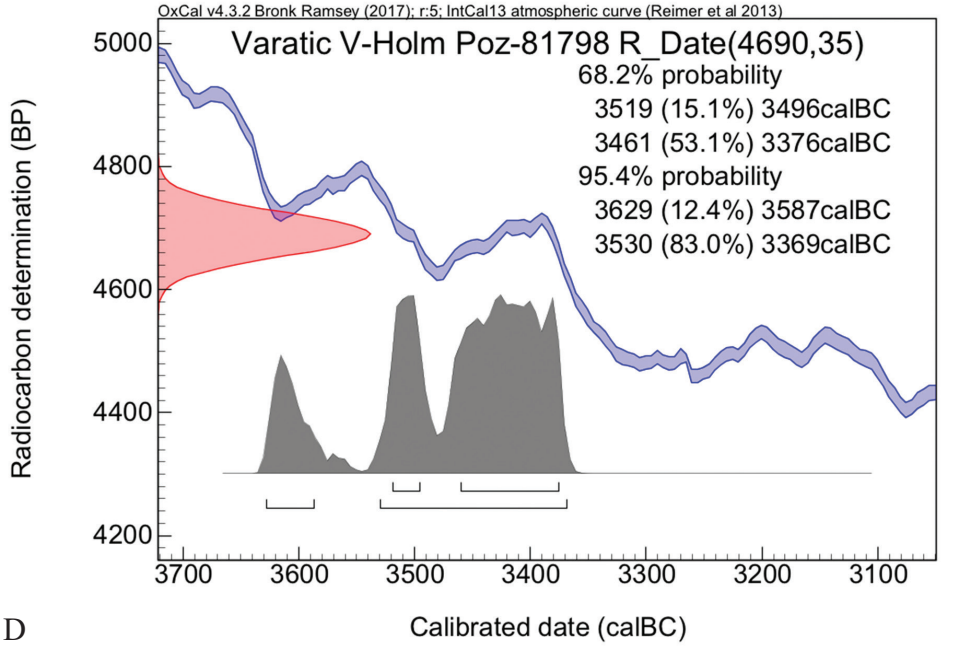
A


OxCal v4.3.2 Bronk Ramsey (2017); r:5; IntCal13 atmospheric curve (Reimer et al 2013)
Costesti IV Poz-81803 R_Date(4710,35)
68.2% probability
3627 (16.3%) 3596calBC
3527 (16.3%) 3498calBC
3436 (35.6%) 3378calBC
95.4% probability
3632 (26.5%) 3561calBC
3537 (20.9%) 3492calBC
3469 (48.0%) 3373calBC
Radiocarbon determination (BP)
5000
4800
4600
4400
4200
3700
3600
3500
3400
3300
3200
3100
Calibrated date (calBC)

B

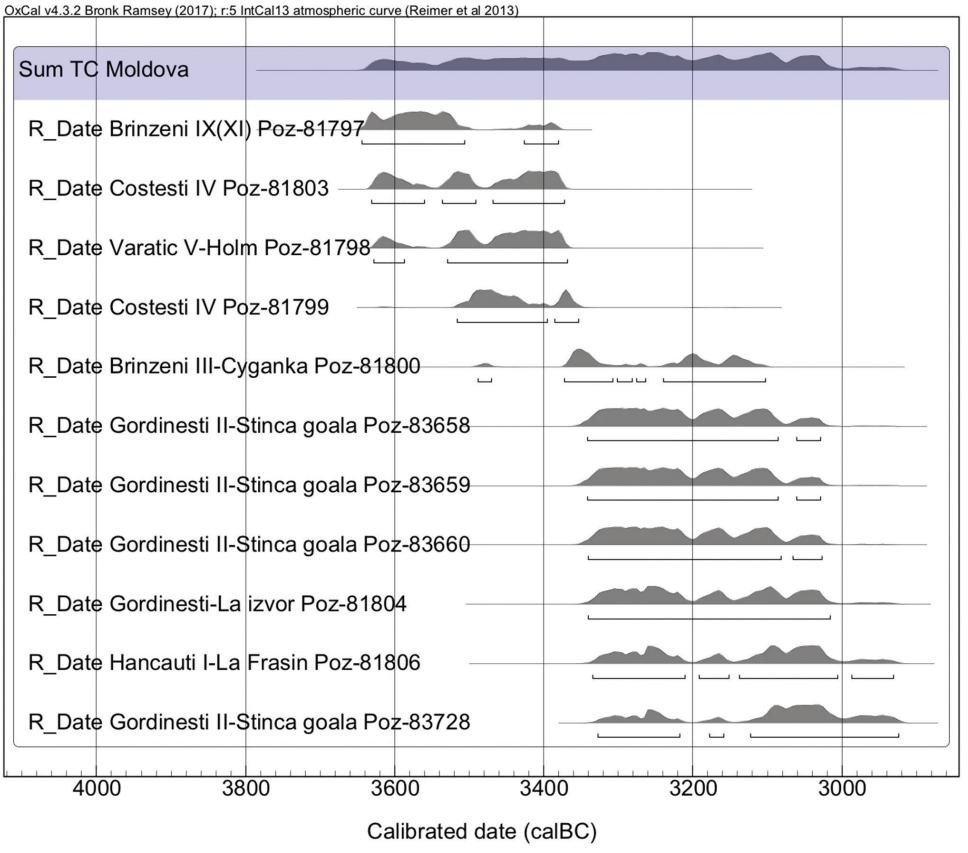


C



D

Fig. 1. Calibration of radiocarbon datings of of the Brînzeni group of the Tripolye culture: A – Brînzeni IX (XI); B and C – Costeşti IV; D – Varatic V-*Holm*. Calibration in OxCal v4.3.2 [Bronk Ramsey 2017], r5 IntCal atmospheric curve [Reimer *et al.* 2013]



F i g . 2. Chronology of sites of the Brînzeni and Gordinesti groups of the Tripolye culture. Calibration in OxCal v4.3.2 [Bronk Ramsey 2017], r5 IntCal atmospheric curve [Reimer *et al.* 2013]

is very difficult to precisely define the chronology of FBC imports discovered in Zhvanets and Brînzeni III-*Ţiganca* [Rybicka 2017; Bicbaev *et al.* 2017]. We may consider whether it is right to place Zhvanets settlements and the FBC ceramics derived from it at the time suggested above. From the perspective of the south-east FBC, contacts between east and west were already initiated during the existence of the first phases of large settlements located on the Western Bug River, such as Gródek or Zimno [Rybicka 2017] dated about 3650-3400 BC. The period about 3500-3300 BC can be seen as the time of intensive use of Volhynian raw material in the eastern group of the FBC and the appearance of imports of copper items with eastern characteristics [Papiernik, Rybicka 2002; Adamczak *et al.* 2015; Grygiel 2016; Papiernik 2016]. Imports of TC pottery were also recorded in a similarly dated older stage of the settlement in Kotoryny located about 100 km north of Zhvanets [Hawinskyj *et al.* 2013; Rybicka 2017].

If we consider the radiocarbon datings obtained for the TC settlements of the Bilschyvtsi type [Tkachuk 2002; 2005] dated 3600-3200 BC, as for the settlement of Sharyn [Kushtan 2015: 438], dated 3600-3250 BC, containing ceramics with visible references to the Brînzeni group, we may assume its earlier appearance. Furthermore, this can be supported by the result of radiocarbon analyses obtained for the settlement in western Volhynia with the characteristics of the Brînzeni group (e.g. Novomalin-*Podobanka*) [Rybicka 2016].

Taking into account the earlier suggestions [Tkachuk 2002: 210; 2005] regarding the presence of characteristics of the Brînzeni group in the Koschylyvtsi group and dating of the latter on the base of Bilcze Złote-*Verteba* site [Nikitin *et al.* 2010; Kadrow 2013], as well as the assumption of parallel development of such settlements as Brînzeni-*Ţiganca* and Zhvanets [Nikitin *et al.* 2010], we can carefully suggest the existence of the Brînzeni group in the period from 3700/3600 to about 3400/3300 BC [Rybicka 2017]. Such dating accords with the chronology of

Table 1

Radiocarbon dates from sites and features of the Brînzeni and Gordineşti groups of the Tripolye culture. Calibration in OxCal v4.3.2 [Bronk Ramsey 2017], r5 IntCal atmospheric curve [Reimer *et al.* 2013]

No.	Site	Lab. code	Sample	BP	BC		Group of the Late Tripolye culture
					68,2%	95,4%	
1	Brînzeni IX (XI)	Poz-81797	animal bone	4770±40	3636-3524	3644-3381	?
2	Costeşti IV	Poz-81803	animal bone	4710±35	3627-3378	3632-3373	Brînzeni
3	Varatic V-*Holm*	Poz-81798	animal bone	4690±35	3519-3376	3629-3369	
4	Costeşti IV	Poz-81799	animal bone	4635±35	3498-3364	3517-3354	
5	Brînzeni III-*Ţiganca*	Poz-81800	animal bone	4560±35	3368-3124	3489-3104	
6	Gordineşti II-*Stinca goala*	Poz-83658	calcined seeds	4480±35	3331-3096	3342-3029	Gordineşti
7	Gordineşti II-*Stinca goala*	Poz-83659	calcined seeds	4480±35	3331-3096	3342-3029	
8	Gordineşti II-*Stinca goala*	Poz-83660	calcined seeds	4475±35	3331-3093	3341-3027	
9	Gordineşti-*La izvor*	Poz-81804	human teeth	4460±35	3326-3030	3341-3017	
10	Hancauti I-*La Frasin*	Poz-81806	animal bone	4445±35	3321-3022	3335-2931	
11	Gordineşti II-*Stinca goala*	Poz-83728	animal bone	4430±35	3308-2941	3328-2925	

imports of the TC within the groups of the eastern and south-eastern FBC, as well as with above presented results for the sites of Brînzeni IX (XI), Brînzeni III-*Ţiganca*, Costeşti IV and Varatik V-*Holm* (Figs. 1-2; Table 1) [*cf.* Markevich 1981].

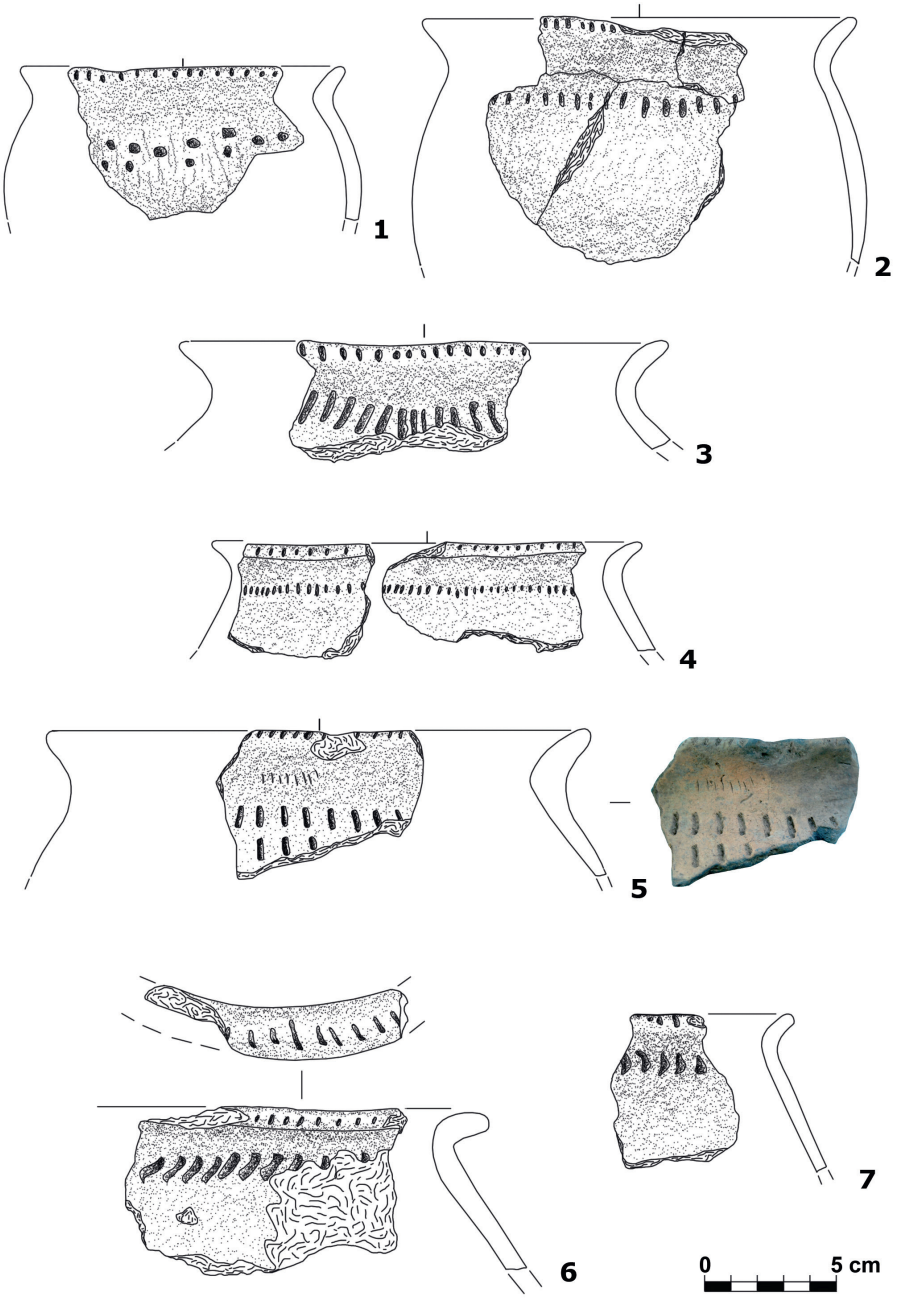
GORDINEȘTI GROUP: RESULTS OF RADIOCARBON DATING

Pottery characteristic to Holyschiv type complexes from western Volhynia were discovered in the set of materials from the FBC settlement in Gródek [Gumiński 1989]. They are treated as bearing the stigma of the Gordinești group [Pozikhovskyi, Okhrimenko 2005; Pozikhovskyj 2019], where it represents the second phase of occupancy of this settlement, which is dated 3400-3100 BC [Włodarczak 2006]. Some references to the youngest stage of the TC were also observed in the set of artefacts from the Zimno settlement [Peleshchyshyn 2004; Kadrow 2005]. According to Sławomir Kadrow [2005], the second phase of this site can be dated 3050-2600 BC. These currently discussed dates [Rybicka *et al.* 2019], taking into account the presence of pottery with stylistics features of the Moldovan group of Gordinești in set from the second phase of Zimno, suggest the very young age of this group or its Volhynia variety represented by the settlement in Holyschiv [Rybicka 2017; Pozikhovskyj 2019]. Valentin Dergachev thought, however, that the handles with one or two lumps present in Gordinești can be linked with the impulses of the Volhynian group of Troyaniv [Dergachev 1980] dated about 3400/3300-3000/2900 [Rybicka *et al.* 2019: Table 4]. These comments show that dating, both the appearance and disappearance, of the Gordinești group is not uniquely clarified.

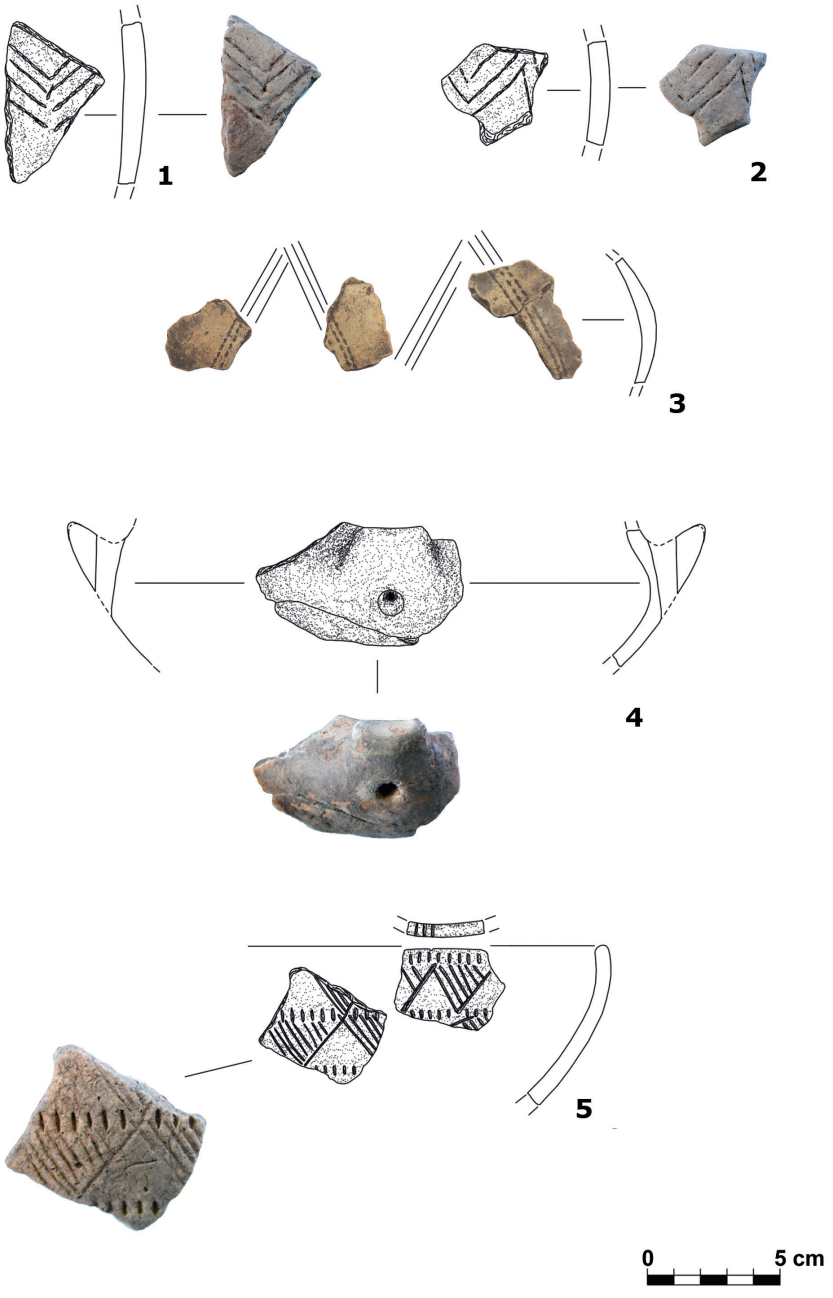
In 2016, a re-examination took place in a settlement at Gordineşti II-*Stinca goala* (Fig. 3) which is the eponymous site of the Gordinești group [Sîrbu *et al.* 2019], well-known from the earlier publication of Dergachev [1980]. In view of the above considerations, organic samples from a homogeneous context, i.e. the interior of the dwelling, were taken for radiocarbon research (Fig. 2; Table 1). Among them there were three samples of cereal grains and one of animal bones. As a result, the following analyses obtained: Poz-83658 4480±35 BP, i.e. 3331-3096 BC (68.2%) and 3342-3029 BC (95.4%); Poz-83659 4480±35 BP, i.e. 3331-3096 BC (68.2%) and 3342-3029 BC (95.4%). Analysis of the third sample brought the result Poz-83660 4475±35 BP, i.e. 3331-3093 BC (65.8%) and 3341-3027 BC (95.4%) respectively. The determination of an animal bone is Poz-83728 4430±35 BP, i.e. 3300-2941 BC (68.2%) and 3328-2925 BC (95.4%).

Similar results were obtained for human bones identified in the grave at the site of Gordinești-*La izvor* located near the Gordinești II-*Stinca goala* settlement: Poz-81804 4460±35 BP, i.e. 3326-3030 BC (68.2%) and 3341-3017 BC (95.4%).

F i g . 3. Gordineşti II-*Stinca goala*, Edinet District. Selected pottery of the Tripolye culture



F i g . 4. Vynnyky-*Zhupa*n, Lviv Province. Selected pottery of the Tripolye culture



F i g . 5. Vynnyky-*Zhupa*n, Lviv Province. Selected pottery of the Tripolye culture

The last dated sample comes from the site of Hancauti I-*La Frasin*. Its uncalibrated value is Poz-81806 4445±35 BP, i.e. 3321-3022 BC (68.2%) and 3335-2931 BC (95.4%) respectively.

All the mentioned results are very similar and indicate a horizon of 3300-3000/2900 BC. Furthermore, they correlate with other radiocarbon dates obtained for materials with characteristics of the Gordinești group on the Middle Dniester [Goslar *et al.* 2015] or with references to it (e.g. a site in Kurgany-*Dubowa*) [Rybicka 2017]. Now, we have the result Poz-84779 4430±35BP, i.e. 3308-2941 (68.2%) and 3328-2925 (95.4%) from the Vynnyky-*Zhupan* site in western Ukraine – a settlement with characteristics of the Gordinești group (Fig. 4 and 5) [Rybicka *et al.* 2019; Verteletskyi 2019]. This may indicate a very fast adaptation of southern patterns within the western Ukrainian variety of the TC. However, it is currently still difficult to determine the place in time of Lystvyn-Holyschiv settlements in the context of the Moldovan group of Gordinești.

CONCLUSION

The presented data show the difficulties in the chronological classification of various TC groups. Many researchers have been examining this problem [*cf.* Kadrow *et al.* 2003; Rybicka 2017, here further references]. The lack of studies on materials from many important settlements of the TC results in problems in the evaluation of radiocarbon analysis effects and the presentation of changes occurring within this culture. Unfortunately, it is currently not possible to conclusively establish whether the Brînzeni and Gordinești groups could develop partially in parallel during the second half of the 4th millennium BC, as literal acceptance of radiocarbon dating could suggest.

ACKNOWLEDGMENT

The analyses were made by the method of AMS in the Poznań Radiocarbon Laboratory as a part of the NCN Opus 8 UMO 2014/15/B/HS3/02486 project entitled *Between the East and the West. Dynamic of Social Changes from the Eastern Carpathians to the Dnieper in the 4th – beginning of 3rd Millennium BC*.

REFERENCES

Adamczak K., Kowalski Ł., Bojarski J., Weinkauf M., Grabacz-Klempka A.
2015 Eneolithic metal objects hoard from Kałdus, Chełmno commune, kujawsko-pomorskie voivodeship. *Sprawozdania Archeologiczne* 67: 199-219.

Bicbaev V., Jakubenko O., Rybicka M., Verteletskyi D.
2017 Ceramika kultury pucharów lejkowatych w kontekście grupy Brynzeny kultury trypolskiej na przykładzie osiedli w Brynzenach-Cygance i Żwańcu. *Materiały i Sprawozdania Rzeszowskiego Ośrodka Archeologicznego* 38: 5-12.

Bronicki A., Kadrow S., Zakościelna A.
2004 Uwagi na temat wzajemnych relacji chronologicznych późnej fazy kultury lubelsko-wołyńskiej oraz kultury pucharów lejkowatych z uwzględnieniem najnowszych wyników badań w Zimnie. In: J. Libera, A. Zakościelna (Eds) *Przez pradzieje i wczesne średniowiecze. Księga jubileuszowa na siedemdziesiąte piąte urodziny docenta doktora Jana Gurby*, 101-125. Lublin.

Bronk Ramsey C.
2017 *OxCal v. 4.3*. Oxford (www. rlaha.ox.ac.uk).

Dergachev V.A.
1980 *Pamyatniki pozdnego Tripolya*. Kishinev.

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

Diachenko A., Rybicka M.
2018 Świeciechów flint and the trans-regional interactions of the Funnel Beaker populations. *Sprawozdania Archeologiczne* 70: 119-137.

2019 Volhynian flint and the trans-regional networks of the Funnel Beaker populations. In: A. Diachenko, M. Rybicka, D. Król, G. Sirbu (Eds) *Beetwen the East and the West. Dynamic of Social Changes from the Eastern Carpatians to the Dnieper in the 4th – beginning of 3rd Millennium BC (Preliminary study)*, 179-196. Rzeszów.

Goslar T., Klochko I.V., Kośko A., Włodarczak P., Żurkiewicz D.
2015 Chronometry of Late Eneolithic and 'Early Bronze' Cultures in the Middle Dniester area: investigations of the Yampil barrow complex. *Baltic-Pontic Studies* 20: 256-291.

Grygiel R.
2016 *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek. Vol. III. Środkowy i późny neolit. Kultura pucharów lejkowatych / The Neolithic and Early Bronze Age in the Brześć Kujawski and Osłonki Region. Vol. III. Middle and Late Neolithic. The Funnel Beaker Culture*. Łódź.

Gumiński W.
1989 *Gródek Nadbużny. Osada kultury pucharów lejkowatych*. Wrocław – Warszawa – Kraków – Łódź.

Hawinskyj A., Pasterkiewicz W., Rybicka M.
2013 Kotoryny, rej. Żydaczów, stan. Grodzisko III. Osadnictwo z okresu neolitu. In: K. Harmata, J. Machnik, M. Rybicka (Eds) *Natural environment and man on the upper Dniester – region of the Halyč-Bukačivci basin – in prehistory and early medieval period*. Polska Akademia Umiejętności. Prace Komisji Prehistorii Karpat VI, 169-284. Kraków.

Kadrow S.
2005 Związki kultury trypolskiej z kulturami środkowej i południowo-wschodniej Europy. In: A. Garbacz, M. Kuraś (Eds) *Kultura trypolska. Wybrane problemy*, 7-31. Stalowa Wola.

2013 Werteba site in Bilcze Złote: Recent 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, 13-22. Kraków.

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

Kushtan D.
2015 Keramichnyj kompleks piznotripilskogo naseleniya Sharin III. In: A. Diachenko, F. Menotti, S. Ryzhov, K. Bunyatyan, S. Kadrow (Eds) *The Cucuteni-Tripolye cultural complex and its neighbours: Essays in memory of Volodymyr Kruts*, 429-439. Lviv.

Markevich V.I.
1981 *Pozdnetripolskiye plemena severnoy Moldavii*. Kishinev.

Movsha T.
1985 Vzaemovidnosyny Tripillya-Kukuteni z sinkhronnymi kulturami Tsentralnoy Evropy. *Arkheologiya* 51: 2-31.

Nikitin A.G., Sokhatsky M.P., Kovaliukh M., Videiko M.
2010 Comprehensive Site Chronology and Ancient Mitochondrial DNA Analysis from Verteba cave – a Trypillian Culture Site of Eneolithic Ukraine. *Interdisciplinaria Archeologica. Natural Sciences in Archeology* 1: 9-18.

Papiernik P.
2016 Materiały krzemienne kultury pucharów lejkowatych z rejonu Brześcia Kujawskiego i Osłonek. In: R. Grygiel, *Neolit i początki epoki brązu w rejonie Brześcia Kujawskiego i Osłonek. Vol. III. Środkowy i późny neolit. Kultura pucharów lejkowatych*, 597-751. Łódź.

Papiernik P. Rybicka M.
2002 *Annopol. Osada kultury pucharów lejkowatych na Pojezierzu Gostynińskim*. Łódź.

Peleshchyshyn M.A.
2004 *Eneolitichnye poseleniya Zimne v zakhidniy Volini*. Ternopil.

Pozikhovskyj O.
2019 An attempt to define a chronology of the Late Tripolye settlement near the village of Holyshiv in the Western Volhynia. In: A. Diachenko, M. Rybicka, D. Król, G. Sîrbu (Eds) *Between the East and the West. Dynamics of Social Changes from the Eastern Carpathians to the Dnieper in the 4th – beginning of 3rd Millennium BC (Preliminary study)*, 31-42. Rzeszów.

Pozikhovskyi O., Okhrimenko G.O.
2005 Piznotripilske poselennya bilya s. Golishiv na Zakhidniy Volini. In: G. Okhrimenko (Ed.) *Arkheologichna spadshchina Yana Fitzke*, 216-278. Lutsk.

Rassamakin Y.
2012 Absolute chronology of Ukrainian Tripolian settlements. In: F. Menotti, A.G. Korwin-Piotrovskiy (Eds) *The Tripolye Culture Giant-Settlements in Ukraine. Formation, development and decline*, 19-69. Oxford.

Reimer P.J., Bard E., Bayliss A., Beck J.W., Blackwell P.G., Bronk Ramsey C., 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., van der Plicht J.
2013 IntCal13 and Marine13 Radiocarbon Age Calibration Curves 0-50,000 Years cal BP. *Radiocarbon* 55 (4).

Rybicka M.
2016 Ceramika o zachodniej lub południowo-zachodniej afiliacji. In: A. Diaczenko, D. Król, A. Kyrylenko, M. Rybicka, D. Werteletski, *Nowomalin-Podobanka i Kurgany Dubowa. Osiedla kultury trypolskiej na zachodnim Wołyniu*, 101-118. Rzeszów.

2017 *Kultura trypolska – kultura pucharów lejkowatych. Natężenie kontaktów i ich chronologia*. Collectio Archaeologica Ressoviensis 37. Rzeszów.

Rybicka M., Hawinskyj A., Pasterkiewicz W.
2019 *Leżnica, stanowisko Czub – osiedle kultury pucharów lejkowatych na zachodnim Wołyniu z analizą zabytków krzemiennych autorstwa Witalija Konopli*. Rzeszów.

Rzepecki S.
2014 *Wilkostowo, stan. 23/24. Neolityczny kompleks osadniczy*. Łódź.

Sîrbu Gh., Rybicka M., Diachenko A., Król D., Sîrbu L.,Burlacu V.
2019 Preliminary results of archaeological investigations at the Gordineşti II-*Stinca goală* settlement. The 2016 campaign. In: A. Diachenko, M. Rybicka, D. Król, G. Sîrbu (Eds) *Between the East and the West. Dynamics of Social Changes from the Eastern Carpathians to the Dnieper in the 4th – beginning of 3rd Millennium BC (Preliminary study)*, 103-126. Rzeszów.

Tkachuk T.
2002 Konets etapa CI i naczalo CII tripolskoy kultury Verkhnego Podnestrovya (na materialakh poseleniya Bilshyvtsy). *Stratum plus* 2 (2001-2002): 196-217.

2005 Lokalno-khronologichni grupy kultury Tripillya-Kukuten z malovanym posudom (etapy BII–CII). In: A. Garbacz, M. Kuraś (Eds) *Kultura trypolska. Wybrane problemy*, 42-56. Stalowa Wola.

Verteletskyi D.
2019 Pottery of Gordineşti group of the Tripolye culture from Vynnyky-Zhupan. Preliminary study. In: A. Diachenko, M. Rybicka, D. Król, G. Sîrbu (Eds) *Between the East and the West. Dynamics of Social Changes from the Eastern Carpathians to the Dnieper in the 4th – beginning of 3rd Millennium BC (Preliminary study)*, 43-90. Rzeszów.

Videiko M.
1999 Radiocarbon Dating Chronology of the Late Tripolye Culture. *Baltic-Pontic Studies* 7: 34-71.

2000 Tripolye and the Cultures of Central Europe: facts and character of interactions: 4200–2750 BC. *Baltic-Pontic Studies* 9: 13-68.

Włodarczak P.
2006 Chronologia grupy południowo-wschodniej kultury pucharów lejkowatych w świetle dat radiowęglowych. In: J. Libera, K. Tunia (Eds), *Idea megalityczna w obrządku pogrzebowym kultury pucharów lejkowatych*, 27-66. Lublin-Kraków.

Zawiślak P.
2013 Obiekty neolityczne ze stanowiska 1C w Grodku, pow. Hrubieszów (z badań w latach 1983-1985 Sławomira Jastrzębskiego). In: A. Pozikhovski, J. Rogoziński, M. Rybicka (Eds) *Na pograniczu kultury pucharów lejkowatych i kultury trypolskiej*. Collectio Archaeologica Ressoviensis 26: 109-214.