The problem of the neolithisation process chronology in Povolzhye

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ABSTRACT – *The Lower and Middle Volga basin regions border the Caucasus and Central Asia in the South. These regions are important in the study of the neolithisation process in Europe and the chronology of Neolithic cultures is of great significance in this respect. New ^{14}C dates of different organic materials from archaeological sites in these regions have been obtained in the last five years. According to these data, the beginning of neolithisation in North Caspian region can be dated to the beginning of the 5th millennium BC; but in the Povolzhye it happened at least a millennium earlier.*

IZVLEČEK – *Področje spodnjega in srednjega dela reke Volge meji na jugu na Kavkaz in Centralno Azijo. To področje je pomemben del študij neolitizacije v Evropi in kronologije neolitskih kultur. V zadnjih petih letih smo pridobili celo serijo novih radiokarbonskih datumov, pridobljenih iz različnih organskih snovi, za arheološka najdišča v tej regiji. Glede na te najnovejše podatke lahko začetek neolitizacije na področju severnega Kaspijskega morja postavimo na začetek 5. tisočletja BC; na območju ob Volgi pa se je začela vsaj tisočletje prej.*

KEY WORDS – *Povolzhye; Northern Caspian Sea; neolithisation; pottery; radiocarbon dating*

Introduction

Most archaeologists accept the considerable role of Povolzhye Neolithic cultures in the neolithisation of bordering areas, although numerous questions still remain open to discussion (*Vasiliev, Vybornov 1988; Mamonov 1999; Timofeev 2002; Dolukhanov 2003; Vybornov 2008a; Dolukhanov* et al. *2009; Vybornov* et al. *2009a; 2009b; 2012a; 2012b; Gronenborn 2009*). Thus, there are certain discrepancies between data on the chronology of younger Povolzhye sites. At present, investigations of typological and technological characteristics of pottery as well as radiocarbon dates of organic matter found in pottery allow us to consider some problems relating to the abovementioned questions. The method of direct dating of pottery has been published elsewhere (*Skripkin, Kovalyukh 1998; Kovalyukh, Skripkin 2007; Zaitseva* et al. *2008; 2009; 2011*) and it already gave positive results (*Vybornov 2008b*).

Dating the Early Neolithic in the Northern Caspian Sea area

The first radiocarbon dates for Early Neolithic sites in the Povolzhye region were obtained in the mid-1990s. For the Kairshak III site, the charcoal soil from the bottom of the lowest layer was dated to 6950±190 BP (Gin 5905), and to 6720±80 BP (Gin 5927) from the top of this layer; the upper layer is dated to 6100 BP. The date of 5500±150 BP (Gin 6777) (*Lavrushin* et al. *1998*) was obtained from soil at the Tenteksor site, which contained artefacts typologically dated to a younger period. These results allowed researchers to hypothesize that the Early Neolithic period in the southern Caspian Sea area can be dated from the beginning of the 5th millennium BC and up to the middle of the 4th millennium BC.

In 2007, the radiocarbon laboratory of the Institute of the Geochemistry of Environment, National Aca-

demy of Sciences of Ukraine in Kiev obtained the following dates for the Early Neolithic: 7780±90 BP (Ki–14471), 7740±70 BP (Ki–14095), and 7680±90 BP (Ki–14096) from organic matter found in pottery at the Kairshak III site. From the Tenteksor site the 6640±80 BP (Ki–14101) date was obtained (*Vybornov 2008a*). The date of 6695±40 BP (Ua–35227) from the same site, obtained at Uppsala radiocarbon laboratory from carbon preserved in pottery, confirms the date of the Kiev laboratory. Thus, these dates turned out to be 1000 years older than the dates obtained in the mid-1990s. These dates offered the possibility of placing the Early Neolithic period in the northern Caspian Sea area from the beginning of the 6th millennium BC to the second quarter of the 5th millennium BC.

At the same time, the dates of 7190±80 BP (Ki–14633) and 7010±80 BP (Ki–14634) were obtained at the Kiev laboratory, and 7030±100 BP (SPb–316) at the laboratory of the Herzen State Pedagogical University of Russia in 2011 from bone samples from Kairshak III. These dates are similar to the dates from charcoal, although the dates of bones are younger than those for the pottery. Thus, there is some disagreement between the dates obtained in the mid-1990s and those in the past ten years. The older age of the pottery could be explained by its composition since Neolithic pottery in the Northern Caspian Sea area was made of lake silt with shell inclusions (*Vasilieva 1999*), which could give older dates due to the freshwater reservoir effect (*Fisher, Heinemeier 2003*).

The radiocarbon dating of shells inside the pottery fabric, found at the Tenteksor site, confirms this suggestion. In 2007, shell fragments extracted from the pottery were dated to 7235±45 BP (Ua–35226). The organic matter inside this pottery was dated to 6695±40 BP (Ua 35227). The reservoir effect in this case thus consists of more than 500 years (*Zaitseva* et al. *2008*). However, it should be noted that the shell-tempered pottery was treated with hydrofluoric acid to remove the mineral inclusions. For this reason, the reservoir effect is less likely. Confirmation of the validity of these dates comes from the laboratory of the Herzen State Pedagogical University of Russia with the date 6650±100 BP (Spb–423), that was obtained from organic matter inside pottery from the Tenteksor site in 2012. Moreover, there is another date available from this laboratory, 6540±100 BP (Spb–315a) obtained from bone collagen from Tenteksor that corresponds with the date from pottery. Furthermore, a similar date 6070±290 BP (Le–9476) was obtained from bones from the same site in the laboratory of the Institute for History of Material Culture, Russian Academy of Sciences. If we correct this date to 6400 BP, it conforms to the previous results.

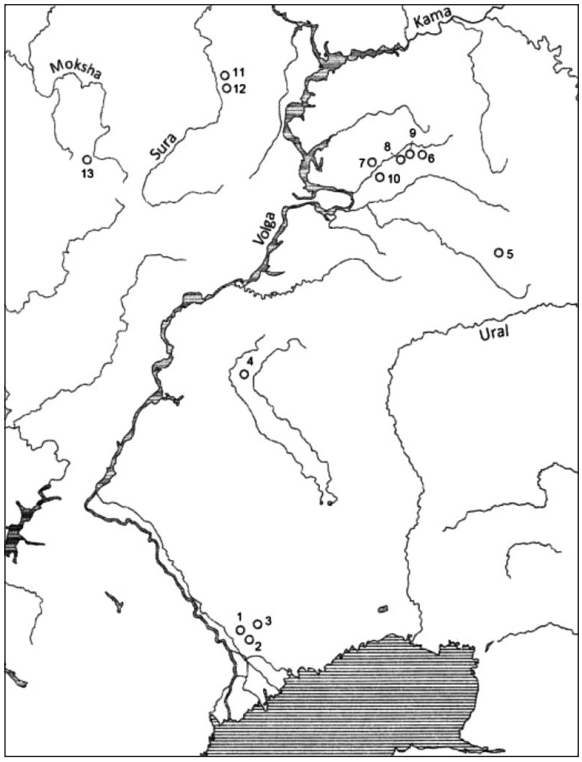

Fig. 1. Map of Neolithic sites in the northern Caspian Sea area and Povolzhye: 1 Kairshak III; 2 Kairshak I; 3 Tenteksor I; 4 Varfolomeevskaya; 5 Ivanovskaya; 6 Chekalino IV: 7 Lebyazhinka IV; 8 Iliinskaya; 9 Bolshaya Rakovka II; 10 Krasnyi Yar; 11 Lake Vjunovo I; 12 Utyuzh I; 13 Imerka VII.

A date of 5560±100 BP (SPb–315), obtained from charred bones from Tenteksor, was measured in 2011 and corresponds with the date from the charcoal inside soil samples. This younger date can be explained by collagen loss during burning of the bones. It is possible that the dates of the charred bones and charcoal from soils are connected with a younger burning event at the site. These dates place the Tenteksor site to the 5th millennium BC. Archaeologists studying the Neolithic of the southern regions have concluded that there are close similarities between the artefacts from Tenteksor and layer 2A at the Varfolomeyevskaya site. Varfolomeyevskaya dates to 6693±39 BP (Ua–41362) and 6544 ±38 BP (Ua–41361) were obtained from food crust preserved on pottery (*Zaitseva* et al. *2011*). These dates correspond with the dates obtained by the Kiev laboratory and the dates of the pottery and bones from Tenteksor.

Some researchers (*Kuzmin 2012*) have noticed a discrepancy between the dates of the bones and pottery of several hundred years for the European Neolithic. This could also be a problem in the dating of the Neolithic in the Povolzhye steppe: dates of 6693± 39 BP (Ua–41362) and 6540±80 BP (Ki–14613) for layer 2A at Varfolomeyevskaya were obtained from pottery, and dates on bones range from 5430±60 BP (Ki–3589) to 5220±50 BP (Ki–3596).

The ^{14}C dates of bones from the Kairshak III site are 500 years younger than those obtained from pottery. The bones probably came from the upper layer of the cultural deposits (*Vybornov 2008b*). This horizon is 500–600 years younger than the lower horizon, according to Spiridonova's data (*Lavrushin* et al. *1998*). The koulan bones that have been radiocarbon dated were excavated in 32–33 grid squares of the Kairshak III site and they were well preserved. The bones from other grid squares were in a much worse state of preservation and quite porous. Three pottery sherds of the same vessel were found in grid square 28 (located next to grid square 33) in the upper layer of the site. They are different from the Kairshak pottery and more similar to those from Tenteksor. We suggest that the pottery and bones belong not to the main (Kairshak) collection, but to the later, early Tenteksor type. The pottery samples are similar to earlier types than the Tenteksor III ceramics, which were dated to 7005±90 BP (Ki–14445) (*Vybornov 2008a*). We can suppose that these pottery samples are the same age as the bones, and the dates of 7190±80 BP (Ki–14633), 7010±80 BP (Ki–14634) and 7030±100 BP (Spb–316) are valid, but do not refer to artefacts of the Kairshak type, but to the earlier Tenteksor type. To resolve this contradiction, new dates of the Neolithic material in the north Caspian Sea area were obtained.

The date of 7775±42 BP (Ua–41359) (*Zaitseva* et al. *2011*) on food crust on the pottery surface from Kairshak III site was obtained on AMS in the Uppsala laboratory in 2011 and confirmed the previous dates from the Kiev laboratory. The confirmation of these dates comes from another sample of food crust on pottery from the same site, which is dated dates to 7700±120 BP (Spb–377); the analysis was performed at the laboratory of the Herzen State Pedagogical University of Russia. According to Jan Heinemeier (oral presentation in 2012), charred food crust could also give older dates due to the reservoir effect if aquatic food was cooked in ceramic vessels. The deviation in this case could be approx. 500 years (B. Philippson's report in 2012 at the radiocarbon seminar in Helsinki). It should be noted that the Kairshak III site is located some 600m from the nearest water source and no fishing tools made from stone or bone were discovered at the site. According to paleogeographic data, no suitable trees for boat construction were available near the site in the Neolithic (*Lavrushin* et al. *1998*). Additionally, the analysis of faunal remains showed that no fish bones had been found at the Neolithic sites in the northern Caspian Sea area (report by P. A. Kosintsev, 2011, Samara). Therefore we presume, that fish was rarely used for cooking at the Kairshak III site and the dates obtained from the charred food crust should be assumed to be valid.

According to typological analysis, artefacts from the Kairshak I site are younger than those from Kairshak III (*Vybornov 2008b*). This is supported by radiocarbon dates 7230±90 BP (Ki–14094) and 7180±80 BP (Ki–14132), obtained from organic matter inside pottery. Moreover, these dates are also supported by dates obtained from the laboratory of the Herzen State Pedagogical University of Russia (*e.g.*, 7100± 200 BP; SPb–425). This contradicts the typological analysis that interprets Kairshak I artefacts as earlier than those from Kairhak III, where profiled and biconical vessels were found (*Viskalin 2010*). It should be mentioned that early pottery from the Elshanka sites has similar characteristics. Another argument for the younger dates of the Kairshak I assemblage are trapezes stone tools, which are typical of the younger Neolithic period. The dates and artefact analyses confirm that Kairshak I is indeed younger than Kairshak III.

Therefore, we conclude that the Neolithic at sites such as Kairshak and Tenteksor in the North Caspian Sea area developed from the second quarter of the 6th to the middle of the 5th millennium BC.

Dating the Early Neolithic in the forest-steppe of Povolzhye

One of the oldest Neolithic cultures in Eastern Europe is the Elshankaya culture from the Middle Povolzhye region. This culture influenced the neolithisation process of other regions (*Dolukhanov* et al. *2003; Vybornov 2008b; Vybornov* et al. *2009a; Gronenborn 2011; Vybornov, Vasilieva 2012*). There are approx. 70 radiocarbon dates obtained for the Elshanskaya culture and measured at different laboratories from various materials such as organic matter in pottery, clam shells, charcoal, bones and adjoining soils. The earliest dates were obtained from

shells from sites such as Chekalino IV, Lebyazhinka IV and Ilyinka, and the formation of the Elshankaya culture is placed in the second half of the 7th millennium BC (*Mamonov 2006*).

Some researchers insist that these early dates are valid and that the dated shells are of anthropogenic origin; additionally, this is supported by palynological analyses at these sites. Nevertheless, other archaeologists are critical of this view and argue that radiocarbon dating of shells is problematic since shells usually show dates that are too old due to the reservoir effect (*Kotova 2002; Vybornov 2005; Stavitsky 2005; Viskalin 2006*). We argue that the ambiguity of radiocarbon dates from Chekalino IV can be explained by the fact that deposits with shells were formed earlier than layers with the main cultural assemblage; the same situation can be also noted at Ilyinka and Lebyazhinka IV. The dates of the shells contradict the dates of the main cultural assemblage and the chronology of Early Neolithic cultures in bordering areas. There is an effect of isolation of Elshanka materials, which, according to the technological analysis of pottery, appeared in the region already developed (*Vasilieva 2006a*). Therefore, these dates could not be taken into consideration.

The next group of ^{14}C dates for Elshanskaya culture date this culture to the first half of the 6th millennium BC. These dates were obtained at several laboratories from various types of organic material (*Vybornov 2011*). The oldest dates from this package are from shells from the Chekalino IV site and bones from the Ivanovskaya site; these dates could also be connected to the reservoir effect, re-deposition or a Mesolithic context.

The date 7660±200 BP (Spb–424), recently obtained for pottery from Chekalino IV in the laboratory of the Herzen State Pedagogical University of Russia, correlates well with the dates of shells from the same site, and the pottery is typologically similar to vessels from Ivanovskaya. Considering the large dispersal of this date, it almost coincides with the other dates mentioned above. This is an argument for their reliability and their dating to the Neolithic.

No.	Site	Index	Material	Culture	Age (BP)	Age, calBC (2 σ)
1	Kairshak III	GIN 5905	Humic acids	Kairshakskaya	6950±190	6250–5450
2	Kairshak III	GIN 5927	Humic acids	Kairshakskaya	6720±80	5740–5480
3	Kairshak III	Ki–14 097	Pottery carbon	Kairshakskaya	7890±90	7100–6500
4	Kairshak III	Ki 14 471	Pottery carbon	Kairshakskaya	7780±90	7050–6400
5	Kairshak III	Ki 14 095	Pottery carbon	Kairshakskaya	7740±70	6700–6430
6	Kairshak III	Ki 14 096	Pottery carbon	Kairshakskaya	7680±90	6700–6260
7	Kairshak III	Ua 41 359	Ceramic food crust	Kairshakskaya	7775±42	6690–6490
8	Kairshak III	SPb–377	Ceramic food crust	Kairshakskaya	7700±120	7050–6250
9	Kairshak III, upper layer	Ki 14 633	Animal bone	Kairshakskaya	7190±80	6230–5890
10	Kairshak III, upper layer	Ki 14 634	Animal bone	Kairshakskaya	7010±80	6020–5720
11	Kairshak III	SPb–316	Animal bone	Kairshakskaya	7030±100	6073–5718
12	Kairshak I	Ki 14 094	Pottery carbon	Kairshakskaya	7230±90	6390–6010
13	Kairshak I	Ki 14 132	Pottery carbon	Kairshakskaya	7180±90	6230–5840
14	Kairshak I	SPb–425	Pottery carbon	Kairshakskaya	7100±200	6375–5637
15	Tenteksor I	GIN 6177	Humic acids	Tenteksorskaya	5500±150	4700–3950
16	Tenteksor I	SPb–315	Burning bone	Tenteksorskaya	5560±100	4620–4230
17	Tenteksor I	Ua 35 266	Shells from pottery	Tenteksorskaya	7235±45	6220–6000
18	Tenteksor I	Ua 35 267	Pottery carbon	Tenteksorskaya	6695±40	5670–5520
19	Tenteksor I	Ki 14 101	Pottery carbon	Tenteksorskaya	6640±80	5720–5470
20	Tenteksor I	SPb–423	Pottery carbon	Tenteksorskaya	6650±100	5735–5464
21	Tenteksor I	SPb–315a	Animal bone	Tenteksorskaya	6540±100	5640–5315
22	Tenteksor I	Le–9476	Animal bone	Tenteksorskaya	6070±290	5600–4300
23	Varfolomeevskaya 2A	Ua–41 362	Ceramic food crust	Varfolomeevskaya	6693±39	5680–5530
24	Varfolomeevskaya 2A	Ua–41 361	Ceramic food crust	Varfolomeevskaya	6544±38	5620–5580
25	Varfolomeevskaya 2A	Ki 14 613	Pottery carbon	Varfolomeevskaya	6540±80	5622–5340
26	Varfolomeevskaya 2A	Ki 3589	Animal bone	Varfolomeevskaya	5430±60	4350–4040
27	Varfolomeevskaya 2A	Ki 3595	Animal bone	Varfolomeevskaya	5390±60	4350–4040
28	Varfolomeevskaya 2A	Ki 3590	Animal bone	Varfolomeevskaya	5270±50	4230–3970
29	Varfolomeevskaya 2A	Ki 3596	Animal bone	Varfolomeevskaya	5220±50	4230–3940

Tab. 1. ^{14}C dates of Neolithic sites in the Northern Caspian sea.

Furthermore, the radiocarbon date 7790±200 BP (Spb–426), obtained from organic matter in pottery from Bolshaya Rakovka II, also correlates well with the dates of pottery and bones from Ivanovskaya and shells and pottery from Chekalino IV.

We accept the validity of this early dates since there are several known Mesolithic-Neolithic sites in the Ust'-Tashelka region (*Vybornov 2008b*) and their dates coincide with Chekalino IV and Ivanovka sites. Therefore, this series of dates places the Elshanskaya culture of the Povolzhye forest-steppe into the first half of the 7th millennium BC. However, this hypothesis needs more evidence. There is a date of 7250±60 BP (Poz–42051), obtained from a small piece of charcoal in the pointed base of an Elshanka vessel from Chekalino IV and dated at the Poznan laboratory with the AMS method. The calibration date relates to the end of the third quarter of the 7th millennium BC. According to this date, the age of this site could be younger than previously assumed, but this date could also be the result of discrepancies between the dates from different organic materials. In this pottery sample, we suppose that Elshanskaya pottery was made from silty clay without shells and not from silt with natural lake or river shells inclusions (*Vasilieva 2006b*), and the reservoir effect is unlikely for this date. Some pottery was made with the application of organic solutions (*Zaitseva* et al. *2011*). Similar AMS radiocarbon dates from two laboratories, from Arizona and Poznan, were obtained on organic material from Lake Vjunovo I pottery, *i.e.* 7222±58 BP (AA–96017) and 7160±40 BP (Poz–47870) respectively (*Vybornov* et al. *2012*).

The largest group of ^{14}C dates was obtained from Samarskoye and Ulyanovskoye Povolzhye sites and dates the Neolithic from the end of the 7th to the middle of the 6th millennium BC. The spread of Elshanskaya culture population from the western part of the River Volga to Primokshanye, the Oka area, and probably to Middle Posurye, can be dated to the turn of the 6th and 5th millennium BC (*Vybornov, Vasilieva 2012*). Most of the artefacts related to this chronological stage are connected to the second stage of the Elshanskaya culture that is characterised by the appearance of vessels with flat bottoms, bands of pearl-pits under the rim and no ornamentation (*Vasiliev, Vybornov 1988*). This confirms that the Elshanskaya culture lasted up to the beginning of the 5th millennium BC. We suggest that sites were occupied at least twice within an interval of 1000 years, or the artefact assemblages should be more precisely determined. Finally, a date for Lebyazhinka IV, obtained from pottery, which is typologically close to the data from the Ilyinka and Krasny Gorodok sites, corresponds with the chronological position of this group into the first half of the 5th millennium BC. Nevertheless, another set of dates, also obtained from pottery, dated this group to the beginning of the 4th millennium BC. Therefore, the ages of Elshanskaya culture from Lebyazhinka IV should be verified. Most of the dates for this culture were obtained at the Kiev radiocarbon laboratory.

The small amount of samples for radiocarbon dating found at Early Neolithic sites complicates the formation of the Neolithic chronological sequence. However, the existence of Elshanskaya culture at the turn of the 6th to the 5th millennium till the middle of the 5th millennium BP is supported by archaeological analysis. The formation and development of pottery of the second type can be connected with this chronological gap, as well as the spread of the Elshankaya population from this area to the west of the River Volga.

Recently obtained dates for Elshanskaya culture allow researchers to date the development of this culture to the end of the 5th millennium BC (*Vybornov 2011*). These dates present certain contradictions with traditional typological schemes and sets of other radiocarbon dates for the same sites. According to this data we assume that typologically and technologically similar pottery existed within 2000 years. Certain problems still exist regarding the early dates of this culture, obtained from pottery, shells, soils, charcoals and measured in different laboratories. This position can be clarified by dating the material from Chekalino IV, the Early Neolithic age of which was confirmed by some dates, but also technologically and typologically. Radiocarbon dates of soil, shells and pottery of this culture are known, but from a younger phase. As we have explained, the dates of the humus, obtained from pottery, are unreliable.

It is also interesting that in some laboratories samples of Elshanskaya pottery were dated to the Bronze Age. These younger dates were obtained from pottery traditionally dated to the Early Neolithic and gave results such as 4850±80 BP (Ki–17056) for Nizhnyaya Orlyanka II site from the Kiev laboratory, 4541±41 BP (AA96017) for Vjunovo lake I at the Arizona laboratory, and 4450±50 BP (Poz–42055) for Plautino I at the Poznan laboratory. We propose that specialist for radiocarbon dating should explain this phenomenon. We believe that this series of ra-

No.	Site	Index	Material	Culture	Age (BP)	Age, calBC (2 σ)
1	Chekalino IV	GIN 7085	Shells	Yelshanian	8680±120	8250–7500
2	Iliinskaya	Le–5839	Shells	Yelshanian	8510±60	7650–7370
3	Iliinskaya	Spb–589	Pottery carbon	Yelshanian	6820±150	6000–5450
4	Lebyazhinka IV	GIN 7088	Shells	Yelshanian	8470±140	7950–7050
5	Lebyazhinka IV	Ki 14	Pottery carbon	Yelshanian	6680±80	5720–5480
6	Chekalino IV	Le–4782	Shells	Yelshanian	8000±120	7350–6550
7	Chekalino IV	Le–4784	Shells	Yelshanian	7940±140	7300–6450
8	Chekalino IV	GIN 7084	Shells	Yelshanian	7950±130	7300–6450
9	Ivanovskaya	Le–2343	Animal bone	Yelshanian	8020±90	7300–6650
10	Ivanovskaya	Ki 14 568	Pottery carbon	Yelshanian	7930±90	7100–6550
11	Ivanovskaya	Ki 14 631	Pottery carbon	Yelshanian	7780±90	7050–6400
12	Ivanovskaya	SPb–587	Pottery carbon	Yelshanian	7560±70	6530–6240
13	Bolshaya Rakovka II	SPb–426	Pottery carbon	Yelshanian	7790±200	7184–6231
14	Chekalino IV	SPb–424	Pottery carbon	Yelshanian	7660±200	7047–6202
15	Chekalino IV	Poz 42 051	Crust	Yelshanian	7250±60	6229–6016
16	Vjunovo lake I	AA 96 017	Pottery carbon	Yelshanian	7222±58	6120–6010
17	Vjunovo lake I	Poz 47 870	Pottery carbon	Yelshanian	7160±40	6091–5981
18	Krasnyi Yar	SPb–755	Crust	Yelshanian	6700±70	5730–5490
19	Utyuzh I	Ua 44 377	Crust	Yelshanian	6568±49	5620–5470
20	Utyuzh I	Spb–834	Pottery carbon	Yelshanian	6500±100	5640–5290
21	Utyuzh I	Spb–586	Pottery carbon	Yelshanian	6500±100	5640–5290
22	Imerka VII	Ki 15 097	Pottery carbon	Yelshanian	6270±80	5380–4990
23	Imerka VII	Poz 52 651	Crust	Yelshanian	6200±50	5301–5026
24	Lebyazhinka IV	Ki 14 468	Pottery carbon	Yelshanian	5970±80	5100–4600
25	Chekalino IV	Ki 14 686	Pottery carbon	Yelshanian	5910±90	5000–4540
26	Nizhnaya Orlanka II	Ki 14 123	Pottery carbon	Yelshanian	5720±80	4730–4360

Tab. 2. ^{14}C dates of Neolithic sites in the Povolzhye forest-steppe region.

diocarbon dates of the Elshanskaya culture is incorrect and should be excluded from consideration of the Early Neolithic in the Povolzhye forest-steppe or at least used cautiously.

The valid dates for the genesis of the Elshanskaya culture are placed at the turn of the 7th and 6th millennium BC, which is confirmed by a considerable set of radiocarbon dates from different organic materials. According to the radiocarbon dates, Elshanskaya culture existed in the Povolzhye forest-steppe at least to the turn of the 6th to the 5th millennium BC, and perhaps even in the middle of the 5th millennium BC. In the northwestern part of the Elshanskaya culture, in the forest zone of Primokshanie, this pottery tradition existed until the last quarter of the 5th millennium BC. The formation and development of the second type of pottery and the beginning of occupation of western areas by Elshanskaya people relate to this time. At present, one group of dates of the Elshanskaya culture at the turn of the 6th to 5th millennium BC is probably incorrect, since it overly extends the period of the existence of the period of this culture. Regardless of the large number of radiocarbon dates for this culture, there are many questions about the chronological position of certain sites and stages of their development. Therefore, the elaboration of the absolute chronology of Elshanskaya culture should be continued.

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