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New Absolute Dates for the Trans-Uralian and Western Siberian Neolithic

This article deals with the absolute chronology of the Neolithic cultures of the eastern Ural, Middle Irtysh-Baraba, and Upper Ob regions. Twenty-two new radiocarbon dates for the ceramic assemblages of the Trans-Uralian Neolithic and thirteen for those of the western Siberian forest-steppe suggest that the Kozlov Mys, Poludenka, and Boborykino sites in the forest-steppe coexisted with those of the Makhandzhar type in eastern Ural and Kazakhstan during the early Neolithic and in the beginning of the Late Neolithic. Late Neolithic Artyn settlements on the Middle Irtysh and in Baraba are contemporaneous with the Protoka and Vengerovo-2A burial grounds (middle and second half of the 5th millennium BC). Boborykino sites in the Trans-Urals are contemporaneous with Avtodrom-2/2, representing the same culture (first half and mid-5th millennium BC). The Izylinka/Zavyalovo stage of the Middle Neolithic on the Upper Ob dates to the late 6th to early 5th millennia BC. Late Neolithic Kiprino/Novo-Kuskovo sites on the Upper Ob date to the mid-5th to early 4th millennia BC. The Bolshoy Mys sites date to the 4th millennium BC.

Keywords: *Radiocarbon dating, AMS-dating, absolute chronology, Neolithic, Trans-Urals, southwestern Siberia.*

Introduction

An essential task of archaeology is to reconstruct historical and cultural processes. Reliance upon a verified regional chronological scale will allow objective reconstruction of the genesis, spread, and possible mutual influence of the various traditions that existed in the territory under study in the Neolithic epoch. At present, the radiocarbon dates obtained for Neolithic sites in the forest-steppe region from the Ural Mountains to the Ob River are distributed very non-uniformly. For example, there are more than 100 dates available for the Trans-Urals, while only a few for the vast territory of western Siberia. It is imperative to increase the analytical database. Over two years after generalization of all available radiocarbon dates on the Neolithic in the Urals (Vybornov, Mosin, Epimakhov, 2014), for the forest-steppe zone of the Trans-Urals and western Siberia, more than 30 new dates have been

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obtained, among which both conventional radiocarbon dates and those determined by the AMS-method are present. This article presents mostly the results of radiocarbon dating of ceramics. This is a rather new area of Russian archaeology. At the same time, such practice is on the rise throughout the world, especially in the case of deficiency of organic material samples (see review in (Kulkova, 2014)). The obtained data, on the one hand, have confirmed the chronological positions of individual cultural assemblages and, on the other hand, have indicated the problem of comparing the results obtained from ceramics dating and the AMS-dates determined from the soot on ceramics.

Results of radiocarbon dating of Trans-Uralian Neolithic assemblages

One of the main problems in periodization of the Neolithic in the Trans-Urals is the chronological relationship between the Koshkino and Boborykino cultural traditions (Kovaleva, 1989: 62; Zakh, 2009: 250–253). For the first of these, which is considered by the majority of Ural archaeologists to be the earliest one in the Neolithic of the region (Vybornov, Mosin, Epimakhov, 2014), a series of 27 radiocarbon dates was earlier obtained, in the interval from 7150 ± 100 (LE-8901) to 5840 ± 90 (Ki-16169) BP. Four dates for the Koksharovsky Kholm, in the range from 7440 ± 200 (LE-7882) to 7610 ± 80 (Ki-16386) BP, were recognized to be strongly overestimated, and were not included in the statistics. New dates for the Koshkino tradition, obtained from the soot-deposits on ceramics from the peat-bog site of Beregovaya II and from a bone found at the Mergen-6 site (Zhilin, Savchenko, Zaretskaya, 2015; Zakh, Enshin, 2015), are 7325 ± 40 (KIA-42074) and 7147 ± 38 (OxA-27706) BP, respectively. They close the gap between the main series of dates and four of these that were considered too ancient. However, such a serious "oldering" of the neolithization process for the forest and forest-steppe zones of the Trans-Urals can be barely viewed as realistic so far, as the dates of 7700 BP are considered debatable even for the steppe-zone of the Volga-Urals and the Caspian Sea region.

According to the concept introduced by V.T. Kovaleva (1989: 48–59), which was subsequently confirmed by 23 radiocarbon dates ranging from 6210 ± 90 (Ki-16862; Vtoroy Poselok) to 5180 ± 90 (Ki-15118; Tashkovo III) BP (Vybornov, Mosin, Epimakhov, 2014) for Basyanovsky-Boborykino assemblages, this tradition pertains to the Late Neolithic. V.A. Zakh (2009: 252), on the basis of two dates for the site of Yurtobor-3—7701 ± ± 120 BP (UPI-559; dwelling 1), and 9025 ± 70 BP (SOAN-531; dwelling 2))—regards it as an Early Neolithic one. To solve the existing problematic situation, new data were required.

In 2014, on the basis of a Boborykino pottery fragment from the Yurtobor-3 settlement, a date of 6064 ± 100 BP (Table 1, No. 14) was obtained, which corresponds to the chronological interval earlier established for this tradition, as well as the new dates for Boborykino assemblages from the Pikushka I and Ust-Suerka-4 settlements (Table 1, No. 16–18). In 2015, an AMS-date, 1000 years older (7110 ± 70 BP), was obtained in Germany from the soot-deposits found on the same vessel (Table 1, No. 15). This could suggest attribution of the Yurtobor-3 assemblage to the Early Neolithic. However, the value of ^{13}C amounted to –29.67 ± 0.19, which presumes a high probability of the reservoir effect, owing to which the dates can be made older by 500–2000 years (oral report by M.A. Kulkova).

Currently, the presence of the reservoir effect during dating poses a substantial problem. For example, the dates for the Kozlov Mys assemblage of the Kochegarovo-1 settlement have shown a chronological interval from 6073 ± 100 (SPb-1272) to 5740 ± 90 (Ki-16856) BP (Mosin, Strakhov, 2012). Their accuracy is confirmed by the data obtained at the Mergen-7 site, where the assemblage, being close in terms of its material culture but somewhat younger typologically, is dated by charcoal and ceramics to the range from 5520 ± 120 (Ki-17081) to 5790 ± 115 (SOAN-8897) BP (Enshin, 2015). However, as with Yurtobor-3, the AMS-dates obtained in Arizona for the Kozlov Mys assemblage of Kochegarovo-1 proved to be much more ancient: 6539 ± 41 and 6619 ± 38 BP (Table 1, No. 6, 7). Again, ^{13}C values amounted to –34.6 and –31.9, respectively, which also presumes making the artifacts considerably older owing to the reservoir effect.

Two dates obtained for the Makhandzhar tradition in the Northern Kazakhstan, at the Solenoye Ozero I and Ekindin 24 sites (5966 ± 120 and 5662 ± 120 BP, respectively (Table 1, No. 11, 12)) have become important for understanding the cultural situation in the Late Neolithic in this region; and also the date of the vessel belonging to this tradition from the Kochegarovo-1 settlement (6049 ± 130 BP) (Table 1, No. 13), which is very close to the date obtained from a fragment of such ceramics found at the Boborykino site Uk VI (6040 ± 80 BP (Ki-15960)). A vessel of Makhandzhar appearance has also been found at the Mergen-7 settlement (Ibid.). All these data allow us to state with confidence that Kozlov Mys, Poludenka, and Boborykino forest-steppe and Makhandzhar steppe assemblages of the Trans-Urals and Kazakhstan co-existed from the end of the Early Neolithic to the beginning of the Late Neolithic.

Another example of the reservoir effect is introduced by two dates obtained for the Iska III settlement of the Tashkovo culture (Table 1, No. 21, 22). The more ancient of these two dates is accompanied by the indicator $\delta^{13}C(VPDB) = –32.45 \pm 0.05$ ‰, which implies a considerable overestimation due to the reservoir effect.

Table 1. **New radiocarbon dates of the Trans-Uralian Neolithic sites**

No.	Site	Laboratory index	^{14}C-date, BP	Calendar date, years BC
1	Kochegarovo-1	SPb-1271_1	5815 ± 150	4841–4494 (1σ)
				5034–4354 (2σ)
2	"	SPb-1273_1	5817 ± 130	4806–4521 (1σ)
				5307–4685 (2σ)
3	"	SPb-1274_1	5878 ± 120	4865–4591 (1σ)
				5044–4461 (2σ)
4	"	SPb-1269	5952 ± 100	4964–4723 (1σ)
				5080–4591 (2σ)
5	"	SPb-1272	6073 ± 100	5077–4843 (1σ)
				5228–4729 (2σ)
6	"	AA104958	6539 ± 41	5530 – 5475 (1σ)
				5612 – 5384 (2σ)
7	"	AA104959	6619 ± 38	5615 – 5525 (1σ)
				5621 – 5491 (2σ)
8	"	SPb-1669	5630 ± 120	4593–4348 (1σ)
				4744–4251 (2σ)
9	"	SPb-1270	4115 ± 100	2780–2576 (1σ)
				2917–2458 (2σ)
10	"	SPb-1668	5130 ± 120	4054–3762 (1σ)
				4241–3657 (2σ)
11	Ekindin-24	SPb-1670	5662 ± 120	4615–4363 (1σ)
				4790–4322 (2σ)
12	Solenoye Ozero I	SPb-1671	5966 ± 120	5007–4709 (1σ)
				5209–4581 (2σ)
13	Kochegarovo-1	SPb-1667	6049 ± 130	5079–4793 (1σ)
				5307–4685 (2σ)
14	Yurtobor-3	SPb-1275	6064 ± 100	5076–4836 (1σ)
				5226–4724 (2σ)
15	"	KIA-51100	7110 ± 70	6090–5840
16	Pikushka I	SPb-1674	6120 ± 120	5322–4769 (2σ)
17	Ust-Suerka-4	SPb-1675	6226 ± 120	5469–4906 (2σ)
18	"	SPb-1676	5505 ± 120	4606–4045 (2σ)
19	Nizhneye Ozero III	SPb-1672	5953 ± 110	4984–4715 (1σ)
				5080–4550 (2σ)
20	"	SPb-1673	5481 ± 110	4458–4231 (1σ)
				4541–4046 (2σ)
21	Iska III	SPb-1639	3965 ± 120	2632–2286 (1σ)
				2872–2194 (2σ)
22	"	SPb-1640	5130 ± 150	4058–3713 (1σ)
				4263–3649 (2σ)

Note: Dates No. 6, 7, 15 were obtained from the soot, the rest from ceramics.

Also, an inconsistency between the dates obtained from charcoal and from organic remains in ceramics is often encountered. In the Trans-Urals, this has been clearly recorded for the first time when dating the Koksharovsky Kholm materials (Shorin, Shorina, 2011). For the Nizhneye Ozero III settlement (Chairkina, Dubovtseva, 2014), two dates (5953 ± 110 and 5481 ± 110 BP) have been determined from the organic remains in ceramics (Table 1, No. 19, 20). They proved to be much younger than those obtained earlier in Kiev: 6510 ± 90 (Ki-15394) and 6250 ± 90 (Ki-15395) BP. Even more ancient dates were obtained for charcoal from the floors of dwellings of this settlement: 7735 ± 90 (SOAN-6203) and 6645 ± 140 (SOAN-6944) BP.

Absolute chronology of the Baraba forest-steppe Neolithic settlements in terms of correlation with radiocarbon dates of burials

Correct comparison of cultural and chronological diagrams based on studying settlement and burial assemblages remains pertinent for research into the Neolithic of the Baraba forest-steppe. The concept proposed by V.I. Molodin is based predominantly on the materials from burials studied in the 1970s to 1990s. He suggests that in the Late Neolithic, Baraba and the forest-steppe Irtysh basin became the places of interaction between the indigenous communities with retreating-pricked pottery and the bearers of the comb-pit ceramic tradition of western and northwestern origin (Molodin, 1977: 33; 1985: 5–7; 2001: 26–27).

The ^{14}C dates obtained for Sopka-2/1, 3, Protoka, and Korchugan burial grounds in laboratories of Novosibirsk (Russia) and Edmonton (Canada) form the main database for the absolute chronology of the Neolithic and Early Metal Age in the Baraba forest-steppe (Molodin, 2001: 117; Molodin et al., 2004). According to the calibrated values at ± 2σ, Z.V. Marchenko (2009) has proposed the following chronological column: Sopka-2/1 (the second half of the 7th to the beginning of the 6th millennium BC) – Korchugan (the second quarter to the mid-6th millennium BC) – Protoka/the 1st stage (the second third of the 6th to the first quarter of the 5th millennium BC) – Protoka/the 2nd stage (the mid-5th millennium BC), and Sopka-2/3 (the second half of the 5th millennium BC) – Tartas-1 (the second quarter to the mid-3rd millennium BC). In this diagram, the second stage of existence of the Neolithic burial ground of Protoka is synchronous with the Early Metal Age burials of the Ust-Tartas culture at the Sopka-2/3 burial ground, while relatively late Ust-Tartas burials of Tartas-1 have indicated the problem of periodization of this culture (Ibid.: 143). Quite recently, on the basis of the radiocarbon dating results, calendar dates of the Neolithic burials from the Vengerovo-2A cemetery were determined: 5363–5001 (SOAN-8738) and 5358–4864 (SOAN-8739) BC (Molodin et al., 2012: 121). The revealed range corresponds to the chronology of the Protoka burial ground (Ibid.).

Over the past decade, Kemerovo specialists under the supervision of V.V. Bobrov have conducted large-scale excavations of the Avtodrom-1 and -2 Neolithic settlements in northwestern Baraba. The materials from the latter settlement are of especial importance here. Typical of this site is a compact arrangement of large mixed-culture villages belonging to the Artyn (Avtodrom-2/1) and Boborykino (Avtodrom-2/2) traditions, represented by remains of dwellings, ceramics, and stone tools, which is unique for southwestern Siberia (Bobrov, Marochkin, Yurakova, 2012). On the basis of these materials, it was proposed to refine the Baraba Neolithic diagram by distinguishing two lines of development: the autochthonous line represented by the original Artyn culture at the Late Neolithic stage, and the allochthonous one relating to local migrations of the Boborykino population from the Trans-Urals (Bobrov, Marochkin, 2011a; 2013). Chronostratigrapy of the Boborykino and Artyn assemblages suggests that the latter is more recent (Bobrov, Marochkin, 2011b), but dating the ceramic materials of these assemblages by the TL-method has demonstrated their contemporaneity at the second half of the 5th to the beginning of the 4th millennium BC (Bobrov, Komarova, 2008). In 2014–2015, ^{14}C-dates were obtained for the Boborykino and Artyn ceramics. This makes it possible to correlate the assemblages with other sites.

On the basis of organic inclusions in the Artyn ceramics from Avtodrom-2/1, four dates were obtained: 5795 ± 100, 5914 ± 150, 5350 ± 100, and 5342 ± 100 BP (Table 2, No. 4–7). At ± 1σ, the calibrated values are divided into two chronological groups: 1) the first half of the 5th millennium BC (Table 2, No. 4, 5); 2) the last quarter of the 5th millennium BC (Table 2, No. 6, 7). At ± 2σ, the grouping continues to persist with widening of probable intervals: 1) the last quarter of the 6th to the first half of the 5th millennium BC; 2) the second third of the 5th to the beginning of the 4th millennium BC. Such a considerable deviation is recorded for typologically uniform ceramics that, however, originate from different dwellings. The earlier group includes samples from the layer and dwelling 4, the later one from spatially close dwellings 15 and 18. In theory, the relation between the designated chronological groups and various objects of the site allows their interpretation within the internal periodization. However, such an approach requires a larger number of dates and chronostratigraphic observations. The results of dating the Artyn ceramics from Stary Tartas-5 do not solve the problem, since they demonstrate the same discrepancy for spatially close

Table 2. **New radiocarbon dates of the Western Siberian Neolithic sites, obtained from ceramics**

No.	Site	Laboratory index	^{14}C-date, BP	Calendar date, years BC
1	Avtodrom-2/2	SPb-1276_1	5748 ± 130	4780–4451 (1σ)
				4980–4331 (2σ)
2	"	SPb-1277	5967 ± 100	4964–4726 (1σ)
				5081–4605 (2σ)
3	"	SPb-1278	5884 ± 100	4851–4651 (1σ)
				5000–4505 (2σ)
4	Avtodrom-2/1	SPb-1279	5795 ± 100	4770–4536 (1σ)
				4857–4447 (2σ)
5	"	SPb-1280_1	5914 ± 150	4987–4611 (1σ)
				5208–4485 (2σ)
6	"	SPb-1281	5350 ± 100	4266–4145 (1σ)
				4358–3971 (2σ)
7	"	SPb-1282	5342 ± 100	4263–4052 (1σ)
				4353–3970 (2σ)
8	Tanai-4A	SPb-1680	2938 ± 120	1429–891 (2σ)
9	"	SPb-1681	4694 ± 120	3707–3095 (2σ)
10	Stary Tartas-5/12	SPb-1683	5799 ± 120	4940–4441 (2σ)
11	"	SPb-1684	5040 ± 120	4073–3633 (2σ)
12	Dolgaya-1	SPb-1677	6165 ± 110	5229–4978 (1σ)
				5358–4835 (2σ)
13	"	SPb-1679	5804 ± 110	4787–4536 (1σ)
				4939–4446 (2σ)

and typologically identical vessels: 5799 ± 120 and 5040 ± 120 BP, which at ± 2σ corresponds to the first half of the 5th millennium BC and the end of the 5th to the first third of the 4th millennium BC, respectively (Table 2, No. 10, 11). Thus far it is apparently expedient to use averaged indicators and date the Artyn assemblage of Avtodrom-2 and the Artyn culture in general to the period from middle to the second half of the 5th millennium BC*. Even at this stage, the contemporaneity of the Artyn settlements and the Late Neolithic cemeteries of Protoka and Vengerovo-2A is shown, which raises the question of their integration within a single culture. Probable chronological ranges of the Artyn settlements and Ust-Tartas burials of the Early Metal Age at the Sopka-2/3 burial ground are close to each other in their extreme values. This serves as more evidence of interaction between the Ust-Tartas groups of the Early Metal Age and the indigenous Late Neolithic population, which is reflected in the construction of burial grounds of Sopka -2/3, -3A (Molodin, 2001: 106) and confirmed by their radiocarbon chronology (Marchenko, 2009: 143).

Three dates have been obtained for the Boborykino ceramics: 5748 ± 130, 5967 ± 100, and 5884 ± 100 BP (Table 2, No. 1–3). Having taken the calibrated values at ± 2σ, the Boborykino assemblage of the Avtodrom-2 settlement should be dated to the first half to the middle of the 5th millennium BC, which narrows the distance between its chronological position and the main series of dates for Boborykino antiquities of the Trans-Urals (see the previous section) and suggests its synchronization with the earliest Artyn assemblages. This makes it impossible to adopt the viewpoint of V.A. Zakh and D.N. Enshin regarding the relationship between the Avtodrom-2/2 settlement and migration processes during the early stage of the neolithization of western Siberia (2015: 42). In contrast, the obtained results confirm the idea of the existence, in the Late Neolithic, of the Middle

*For more detailed information about the chronology of the Artyn antiquities and their place in the Neolithic of western Siberia see (Bobrov, Marochkin, Yurakova, 2017).

Irtysh-Baraba Boborykino cultural exclave surrounded by indigenous communities with simplified retreating-incised-pricked ornamentation of pointed-base pottery (Bobrov, Marochkin, 2013).

New results of radiocarbon dating of the Upper Ob Neolithic and Chalcolithic settlement assemblages

Current knowledge of the Neolithic and Chalcolithic in the Upper Ob region is based on the results of multi-year studies of settlement and funerary assemblages in the Kuznetsk-Salair mountain area, Tomsk, Barnaul, and Novosibirsk Ob regions, northern foothills of Altai (for review of historiography see (Marochkin, 2013)). These studies have led to the formation of a concept of an original Upper Ob Neolithic culture, the development of which is divided into two stages: the earlier (Zavyalovo stage according to Molodin, or Izylinka stage according to Zakh) and the later (Kiprino) (Matyushchenko, 1973: 60–61; Molodin, 1977: 11–25; Zakh, 2003: 146). In the southeastern areas of the Upper Ob region, the Kuznetsk-Altai Neolithic culture of East-Siberian origin has been distinguished (Anikovich, 1969; Molodin, 1977: 25–30; Okladnikov, Molodin, 1978; Bobrov, 1988). The Chalcolithic period is characterized by the Novo-Kuskovo culture of the Chalcolithic to Early Bronze Age in the Tomsk Ob region (Kosarev, 1974: 43; Kiryushin Y.F., 2004: 12–13) and the Bolshoy Mys Chalcolithic culture in forest-steppe Altai and the Northeastern Salair region (Kiryushin Y.F., 2002: 36–38; Bobrov, 2010). A large number of sites have a debatable epochal and chronological attribution. The Neolithic age of the Kiprino stage is contested, and its identity with the Novo-Kuskovo stage is proposed (Kosarev, 1974: 43; Kiryushin Y.F., 2004: 12–13); the Neolithic appearance of the Bolshoy Mys material assemblage in the northeastern part of its area is substantiated (Bobrov, 2010). The controversy about the chronology of the Novo-Kuskovo and Igrekovo sites in the Tomsk Ob region still persists: both Neolithic attribution (Komarova, 1952; Matyushchenko, 1973: 60–61, Marochkin, 2014: 25; Bobrov, 2015) and belonging to the Early Metal Ages (Drevnyaya istoriya, 1953: 43–44; Kosarev, 1974: 43–47; Molodin, 1977: 36–44; Kiryushin Y.F., 2004: 25–28) are well-founded. The situation is aggravated by the small number of the available radiocarbon dates and the absence of their correlation with ceramic assemblages.

At present, a series of dates is available for a number of ceramicless Neolithic flat-grave burials in the Altai Mountains and their northern foothills, and also on the southern periphery of the Kuznetsk Basin (Kuznetsky, Bolshoy Mys, Ust-Isha, Solontsy-5, Kaminnaya, NTP-1) (Kungurova, 2005: 57, tab. 4). In the calibration value, at ± 2σ, the dates for most of these assemblages are distributed in the interval from the second half of the 5th to the beginning of the 4th millennium BC, while for a number of burials of the Bolshoy Mys burial ground oldering to the last quarter of the 6th millennium BC is possible (Marochkin, 2014: 24). Along with the calibrated values of radiocarbon dates obtained with birch-bark from burials of the Old Muslim cemetery (forest areas of the Tomsk Ob region) within the limits of the 5th millennium BC (Kiryushin Y.F., 1988), this series determines the chronology of the Late Neolithic in the Upper Ob region.

Chalcolithic attribution of the Bolshoy Mys settlement assemblages dated within the 3rd millennium BC has been substantiated by Y.F. Kiryushin on the basis of the Tytkesken-2 settlement's stratigraphy (2002: 33). Relying on the absolute date of the most-ancient copper-ore minings of the Altai Mountains, he tolerates the possibility of oldering these settlements to the second half of the 4th millennium BC (Ibid.: 32–35). Quite recently, data on the Bolshoy Mys assemblage of the Novoilyinka VI settlement in the Kulunda forest-steppe have been introduced (Kiryushin Y.F., Kiryushin K.Y., 2015). Judging by the results of radiocarbon dating of the bones, researchers assign this site to the first half of the 3rd millennium BC but; at the same time, they do not rule out the oldering of the lower limit of calibrated values to the middle of the 4th millennium BC (Ibid.: 164). For the Tanai-4a settlement, which marks the northeastern periphery of the Bolshoy Mys area, there are three dates obtained from bones in the Institute of Geology of the SB RAS, and one date obtained from fish-scale in the German Archaeological Institute. They correspond to the middle of the 3rd millennium BC according to their uncalibrated values, and to the beginning of the second half of the 4th millennium BC after calibration (Bobrov, 2010). That is, it can be stated that the settlements with Bolshoy Mys ceramics were relatively contemporaneous in various areas where this culture spread. At the same time, the obtained results once again point to the incorrectness of cultural identification of these settlements with the Bolshoy Mys burial ground (northern foothills of Altai), which, as previously noted, demonstrates the most ancient dates in the series for Neolithic settlements of the Upper Ob region. The Novoaltaysk-Razvilka flat-grave burial ground (which, according to the radiocarbon dating of bones, pertains to the turn of the 4th to 3rd millennium BC) is the closest to the Bolshoy Mys culture settlements in terms of chronology (Kiryushin K.Y., Volkov, 2006). The calibrated value of this date corresponds to the first half of the 4th millennium BC.

In 2015, several radiocarbon dates were obtained for Izylinka, Kiprino-Novo-Kuskovo, and Bolshoy Mys settlement ceramics from the Kuznetsk Basin in the Isotope Center of the Department of Geology and Geo-Ecology of

the Herzen State Pedagogical University of Russia. These results play a pivotal role in refining the chronology of the early assemblages of the Upper Ob region.

A date of 6165 ± 110 BP has been obtained for the Izylinka vessel from the Dolgaya-1 site. The calibrated values determine the following ranges: the last quarter of the 6th to the early 5th millennium BC at ± 1σ, the last third of the 6th to the first quarter of the 5th millennium BC at ± 2σ (Table 2, No. 12). When substantiating the Izylinka stage, Zakh assigned it to the first half of the 5th millennium BC (2003: 146), which was supported by us when analyzing the Izylinka ceramics from the Lower Tom region (Marochkin, Yurakova, 2014). Later on, Zakh and Enshin (2015), judging by the palynological analysis of the layers of Inya settlements, dated this stage within wide limits from 6600 to 5410 BP (i.e. the second third of the 5th to the middle of the 4th millennium BC), having related it to the middle of the Atlantic Period. The date of the vessel found at the Dolgaya-1 site makes the Izylinka settlements older, which generally corresponds to the existing understanding of their lower chronological position relative to the Kiprino-Novo-Kuskovo assemblages. Zakh and Enshin (Ibid.), who insist on the introduced neolitization of western Siberia, line up the Boborykino sites of the Trans-Urals, the Boborykino assemblage of the Avtodrom-2 settlement in the Baraba forest-steppe, and settlements with Izylinka ceramics in the Upper Ob region in a chronological sequence that allegedly reflects the stages of spread of ceramic tradition to the east. This seems contrary to numerous radiocarbon dates obtained for the Boborykino sites of the Trans-Urals, and is not confirmed by the above group of dates for the Boborykino assemblage of Baraba.

In 2010 and 2015, two dates for the Kiprino-Novo-Kuskovo ceramics from the Dolgaya-1 site were first obtained. The date for one of them (a pointed-base jar ornamented with horizontal rows made by smooth rocking-stamp) is 5804 ± 110 BP. The calibrated values determine the following intervals: the first quarter to the middle of the 5th millennium BC at ± 1σ, the beginning to the second quarter of the 5th millennium BC at ± 2σ (Table 2, No. 13). For another vessel (a jar ornamented with bands of pit-pricks), a date of 5200 ± 100 BP (SPb-570) was obtained from the soot (Marochkin, Yurakova, 2014). Giving consideration to the calibrated value at ± 2σ, it should be dated to the last third of the 5th to the first quarter of the 4th millennium BC. This has supported the contemporaneity of the Kiprino-Novo-Kuskovo sites with some Late Neolithic burial grounds of the region (Ibid.). The obtained dates, even though single ones, raise the question of periodization of the assemblages belonging to this cultural area. The date of the first vessel closes the gap between the Izylinka/Zavyalovo settlements and the Kiprino-Novo-Kuskovo assemblages, thus, probably, marking the earliest formation-stages of the latter.

The experience of radiocarbon dating of the Bolshoy Mys culture ceramics should be recognized as less successful (Table 2, No. 8, 9). For one sample, a maximally underestimated date of 2938 ± 120 BP was obtained, which gives upon calibration (± 2σ) the middle of the 2nd to the beginning of the 1st millennium BC. Undoubtedly this result is obviously discordant with the above dates, and it should be excluded from consideration. The radiocarbon date of the second sample is 4694 ± 120 BP; but the calibrated values at ± 2σ cover a quite considerable range from the second quarter to the end of the 4th millennium BC. This basically confirms the earlier obtained information, but is actually useless for elucidating the chronological relationship between the Bolshoy Mys settlements and other early sites of the region.

Conclusions

The main task of this article is to solve such most debated issues of western Siberian archaeology as the chronology of assemblages of the Neolithic and the Early Metal Ages. Accordingly, the task-specific selection of samples for dating was carried out by natural science methods. Geographically, these samples are related to the assemblages of the Trans-Urals, Baraba forest-steppe, and Upper Ob region. Despite the small number of absolute dates obtained for such a vast area, these have allowed certain conclusions to be drawn.

In the perception of many specialists in the archaeology of the Trans-Urals, the chronology of Neolithic assemblages is contradictory. This applies especially to the Boborykino culture. New absolute dates obtained from materials of this culture, both from the central regions of its area and from the assemblages beyond its limits (western Baraba), coincide with the majority of those determined earlier by natural science methods. They support the dating of this culture to the first half of the 5th millennium BC, and allow the conclusion to be drawn of the co-existence of the Boborykino assemblages with the Kozlov Mys and Poludenka ones in the Trans-Urals for some period of time. At the same time, the conducted study has indicated the problem of AMS-dating, relating to the so called reservoir effect. This is not an archaeological problem, but it should be taken into account when questioning the reliability of the data.

The new absolute dates obtained for the assemblages of eastern areas of the western Siberian forest-steppe also comply with the main task. The date of the Izylinka/Zavyalovo stage not only confirms its established relative chronology, but also suggests its contemporaneity with the Boborykino assemblages. As for the Kiprino-type/

Novo-Kuskovo stage, many specialists attribute these to the transitional period. In terms of traditional dating methods, it is later than the Izylinka/Zavyalovo stage. This is confirmed by the absolute dates; however, they indicate that this stage pertains to the Neolithic chronological range. Naturally, solving this problem will require a representative series of absolute dates and analysis of new archaeological sources.

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