

THE METAL AGES AND MEDIEVAL PERIOD

DOI: 10.17746/1563-0110.2017.45.2.045-055

E.N. Chernykh¹, O.N. Korochkova², and L.B. Orlovskaya¹

¹*Institute of Archaeology, Russian Academy of Sciences,
Dm. Ulyanova 19, Moscow, 117036, Russia
E-mail: evgenij.chernykh@gmail.com; orlovskaya.l@yandex.ru*
²*Ural Federal University,
Mira 19, Yekaterinburg, 620002, Russia
E-mail: olga.korochkova@urfu.ru*

Issues in the Calendar Chronology of the Seima-Turbino Transcultural Phenomenon

The Seima-Turbino (ST) transcultural phenomenon was unique in the Eurasian Bronze Age. Its very rare but highly specific memorial sanctuaries and randomly found bronze artifacts are scattered across a gently sloping arc spanning territories from northern China to the Baltic and the Lower Dniester—nearly 4 mln km². However, until recently, no reliable radiocarbon database relating to ST has been available. The situation changed after the discovery of the Shaytanka memorial sanctuary in the Middle Urals, and its detailed excavation. As a result, a considerable series of radiocarbon dates has appeared, enabling us to arrive at a more reliable pattern of absolute chronology for ST in a vast territory from western Siberia (Sopka, Tartas) to the Upper Volga basin (Yurino). The earlier dates in the eastern part of the ST distribution area uphold the theory concerning the ultimate source of a long-range east-to-west migration. Important new features in the overall pattern of dates on the vast territories of the Eurasian forest and forest-steppe zones make it possible to reconstruct the nature of the contacts between the ST people and representatives of other cultures—especially those of the Abashevo-Sintashta-Petrovka community advancing in a west-to-east direction.

Keywords: *Seima-Turbino transcultural phenomenon, Eurasia, Bronze Age, radiocarbon chronology.*

Introduction

For over a century, archaeologists (experts in the Bronze Age) have been trying to learn the secrets of the Seima-Turbino (ST) transcultural phenomenon, unique in Eurasia. A start was made in 1912 when a set of relics was found at Seima dune at the confluence of the Oka and Volga rivers; and at approximately the same time, 1500 kilometers to the southwest of Seima, the Borodino hoard was discovered, immediately becoming famous. Soon these discoveries attracted the attention of V.A. Gorodtsov (1914, 1915) and A.M. Tallgren (1915); and the works of these researchers provided a good

basis for the debates, lasting several decades, about this interesting phenomenon. At that time, this phenomenon was referred to as the Seima culture, following Gorodtsov's terminology.

Initially, research focused on three main topics: 1) the origins of the Seima-Turbino artifacts; 2) the interrelations of ST with other Eurasian cultures; and 3) ST's relative and absolute chronology. However, the boundaries between these topics were not particularly strict. They concerned mostly the issues of the interactions between ST and other Eurasian cultures, and the former's relative and absolute chronology. Since the initial stages of research, scholars had been faced with the necessity of

explaining the existence of the vast areas separating Seima and Borodino that lacked any similar archaeological evidence. In 1924–1927, A.V. Schmidt (1927) excavated the Turbino site, the discovery of which expanded considerably the area of distribution of this archaeological trend in the northeastern direction. Since that time, this phenomenon has acquired the name, common nowadays, of Seima-Turbino.

The situation became more complicated after the findings by V.I. Matyushchenko. In 1954–1958, he excavated the remarkable site of Samus IV, where he found numerous clay molds for casting celts and spearheads similar to the Seima-Turbino artifacts (Matyushchenko, 1973: 24–30). In 1966–1969, he investigated a site in the vicinity of the village of Rostovka, on the Om River, close to its confluence with the Irtysh (Matyushchenko, 1975; Matyushchenko, Sinitsyna, 1988: 3). Seima, Turbino, and Rostovka were generally referred to as cemeteries. In those decades, it was usually required, at least in the Soviet archaeology, to establish a local reference culture for each such cemetery. The list of reference cultures, which was compiled at the initial stage of studies, is of considerable interest, owing to the great diversity of its components. We shall provide only a short list of randomly selected reference cultures: Fatyanovo culture (Tallgren, 1920: 1–23), established as reference for Seima; the Neolithic cultural community of the Kama basin (like the Astrakhantsevsky burial ground), which was attributed by O.N. Bader to Turbino (1961, 1964); the Chirki-Seima culture (Khalikov, 1969: 200–201); the Samus cultural community (Kosarev, 1981: 86–105); and the whole unit of the Ural-Siberian cultural-historical province (Matyushchenko, 1973: 120–125), etc.

Traditional sources of chronological attribution: Marija Gimbutas and her followers

The issue of the ST chronology was initially raised by Gorodtsov, who contended that the Seima culture should be attributed to the 14th–13th century BC, though he did not provide any reliable grounds for this. There were many attempts to establish absolute dates for ST, both well-based and baseless, which are not important enough to be listed here. We shall focus on two particular viewpoints on this issue. Firstly, there is a paper by Marija Gimbutas (1957), wherein she proposed three possible connections providing grounds for assessing the absolute age of the Seima-Turbino relics. The first is the Balkan connection based on the parallels in metal ornamentation from Mycenaean shaft graves; the second is the Caucasian connection; and the third is the Chinese connection based mostly on the materials from Anyang cemetery. Gimbutas regarded the Borodino hoard as a reference collection for estimating the age of the

whole ST unit, having attributed it to 1450–1350 BC. Seima bronze ware was assigned by her to the 15th–13th centuries BC, but not later than the 13th century, which was the period of abrupt changes in the ST area, to which it was already known that the Seima ware could not have pertained.

Another attempt to assess the ST calendar's age may be summarized briefly as follows. In 1968, V.A. Safronov (1968) and V.S. Bochkarev (1968) published a paper in the collection of articles on the issues of archaeology edited by L.S. Klein. The two authors attempted, although contradicting each other, to establish a well-grounded absolute date for the Borodino hoard; yet in reality they referred to the chronology of the whole ST unit. They followed the methodological constructions proposed by Gimbutas; radiocarbon dates were not mentioned in the articles (notably, at that time, no ¹⁴C-dates for Seima-Turbino relics were yet available). It is also noteworthy that Bochkarev has completely changed his article, initially prepared for publication, because of his disagreement with Safronov's viewpoint. However, new arguments did not ensure the success of the paper. But neither was Safronov's paper convincing. This author followed practically all recommendations proposed by Gimbutas a decade before, yet he attributed the Borodino hoard to the 13th century BC.

The chronological intervals of ST proposed by various researchers varied over a range of a thousand years: from the 17th to the 8th century BC. This diversity of age estimates is striking, not only because of the astonishing range and difference of dates, but especially because of the unreliability of the grounds supporting the attempts to identify the indicators of the absolute age of the Seima-Turbino relics, ranging from the Balkan-Mycenaean or Caucasian to the ancient Chinese parallels. The Borodino hoard was often claimed as a reference point in these determinations. Anyway, the approach to correlating some ornamental motifs on the Borodino hoard artifacts with those on the objects from the Mycenaean shaft graves, and to basing thereon some far-reaching estimations of the absolute chronology of the whole enormous corpus of ST relics, seems rather strange today—all the more so as the hoard was recovered in the extreme southwestern point of the vast area of Seima-Turbino distribution (Fig. 1).

ST prior to radiocarbon dates: the most important findings

In the late 1980s and early 1990s, two important works were published, summarizing the results of research carried out during the previous seven decades. These include a book on the ancient metallurgy of Northern Eurasia (the Seima-Turbino phenomenon) (Chernykh, Kuzminykh, 1989), focusing on the most important

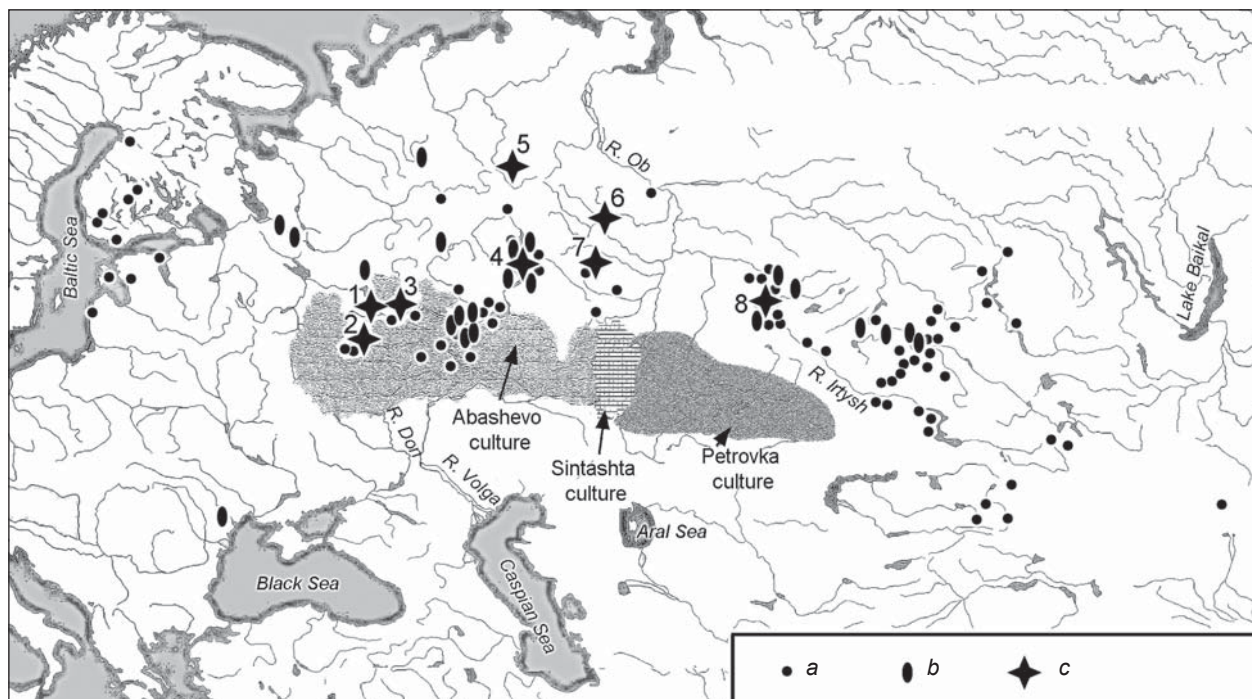


Fig. 1. Map showing the locations of the most important sites and solitary copper/bronze artifacts of the Seima-Turbino transcultural phenomenon, as well as the areas of the Abashevo, Sintashta, and Petrovka cultures.
a – isolated accidental finds; *b* – isolated finds in foreign cultural contexts; *c* – memorial sanctuaries and cemeteries:
 1 – Seima, 2 – Reshnoye, 3 – Yurino, 4 – Tubrino, 5 – Kaninskaya Cave, 6 – Satyga, 7 – Shaytanka, 8 – Rostovka.

issues of formation and history of this transcultural phenomenon; and three years later, a monograph entitled *Ancient Metallurgy in the USSR: The Early Metal Age*, published by Cambridge University Press. The latter book focused on more general topics, though it included a separate chapter dedicated to ST (Chernykh, 1992: 215–234).

The novelty of the Russian version of this book was represented by a comprehensive database describing practically all metal and non-metal artifacts available at that time. The book provided the fullest possible information on the morphological-typological features and chemical composition of copper and bronze artifacts. It also included a set of maps showing the distribution of the ST metal ware. References were made to stone tools, ceramics, and jade artifacts. The main area of distribution of ST materials was rather well established. The spatial distribution area of ST was really huge, and occupied not less than 4 mln km² in Eurasia (Chernykh, 2013: 267–287, fig. 15.1) (Fig. 1).

The authors of the book did not agree with the various previously published hypotheses correlating the so-called cemeteries with one or another archaeological culture/community. They admitted only the evidence of possible contacts, both long- and short-term, of the Seima-Turbino migrants with representatives of numerous cultures in their 1000-km long journey from

the east to the west. Exactly because of this, the term of Seima-Turbino transcultural phenomenon was proposed. This rather vague cultural context contrasted with the specific but undoubtedly close (though hardly friendly) contacts of the Seima-Turbino migrants with the tribes of Abashevo (Abashevo-Sintashta) community advancing in the west-east direction. Nearly every large Seima-Turbino site has revealed quite obvious inclusions of the typical Abashevo-Sintashta materials. The assessments of the absolute chronology showed no significant changes. For instance, the authors of the book dated the Borodino hoard to the 16th, or no younger than the 15th, century BC, like other more eastern archaeological materials of this kind (Chernykh, Kuzminykh, 1989: 259–261).

Notably, during the two decades after the publication of the book on the ancient metallurgy of Northern Eurasia in 1989*, the topic of the Seima-Turbino phenomenon became less popular, and the abovementioned issues were no longer debated in the literature. The reason for decreasing interest in ST apparently lay in the facts that, firstly, no new spectacular Seima-Turbino sites had been discovered; and secondly, traditional methods of interpretation of archaeological materials had been

*In 2010, the book was translated into Chinese and published in China in the series “Turfan Studies”.

exhausted, and their effects had become negligible. The latter reason especially concerned the chronological aspect of research.

Shaytanka: discovery of the site, and new developments in the study of the Seima-Turbino phenomenon

At last, the long-awaited discovery has been made; in 2009, there appeared a publication announcing the new important site of Shaytanskoye Ozero II in the Middle Urals, with clear Seima-Turbino features (Serikov et al., 2009). Shaytanka (the name of the site was shortened for convenience) has immediately attracted the attention of archaeologists because of its specific features (Fig. 2). The geographical position of Shaytanka is in the center of the vast ST distribution area; and it is located very close to the nominal border between Asia and Europe (see Fig. 1). Also, there is one more important feature in the location of the site. It is situated in the area where the upper reaches of the Neiva and Revda rivers come very close to one another. These rivers belong to different drainage areas: the Neiva runs eastwards, joining the Tura and further the Ob, while the Revda runs westwards to the Kama. The distance from the confluence of the Revda with the Chusovaya to the Chusovaya's joining the Kama does not exceed 500 km. Exactly in front of the confluence of the Chusovaya and the Kama rivers was the location of Turbino, one of the most important ST sites. This means that Shaytanka marks an impressive point in the migration

route of the Seima-Turbino tribes moving from east to west along the rivers, from the Ob basin to the Volga-Kama region.

Another important feature is the apparent similarity of Shaytanka's structure and composition with other important ST sites. This conclusion is based on the results of thorough studies at this site, as compared with insufficient data from excavations at the earlier discovered monuments. It has become obvious that the site represented not burial grounds, but ST sacral and memorial sanctuaries (Chernykh, 2009: 265–268). The former interpretation of practically all major ST sites as cemeteries lacked strong arguments. The considerable distinctions between ST sites and real necropolises of various Eurasian cultures were noted long ago; but the long-term tradition of defining such sites as cemeteries had survived since the early works by Gorodtsov, Tallgren, and others*.

The Shaytanka excavation area of 1109 m² (Fig. 3) revealed materials and features of practically all periods, from the Mesolithic to the Middle Ages, and also remains of charcoal-burning structures dating to the 18th–19th centuries. Deep in the terrace, at some distance from the lake shore bank, a Bronze Age sanctuary was located. Exactly in this area, the main categories of metal (both bronze and copper) artifacts were accumulated: 94 intact tools, 50 fragmented tools, and over 35 personal ornaments, as well as metal-working waste in the form of copper and bronze drops and splashes. The same excavation grids revealed scattered stone arrowheads and ceramic fragments, which were attributed to the local Koptiyaki culture (Korochkova, Stefanov, 2010: 120–125; 2013: 87–93).

Stratigraphic observations suggest that during rituals the majority of metal pieces at Shaytanka were deliberately placed under the sod, while lithic artifacts and ceramic ware might have been left on the daylight surface. Close to the lake shore, several pits were disclosed, which resembled graves, although they were empty. Additionally, traces of four cremation graves were noted. One of them (grave 3) was associated with the sanctuary on the basis of an accompanying bronze knife-dagger with an ornamented haft.

The greatest concentration of objects diagnostic of the ST (primarily metal ones) has been recorded in the western part of the excavation area, which is comparatively far from the bank of the shore (Fig. 3). Notably, exactly this portion of the site showed a drastic decrease in the amount of artifacts associated with other periods.

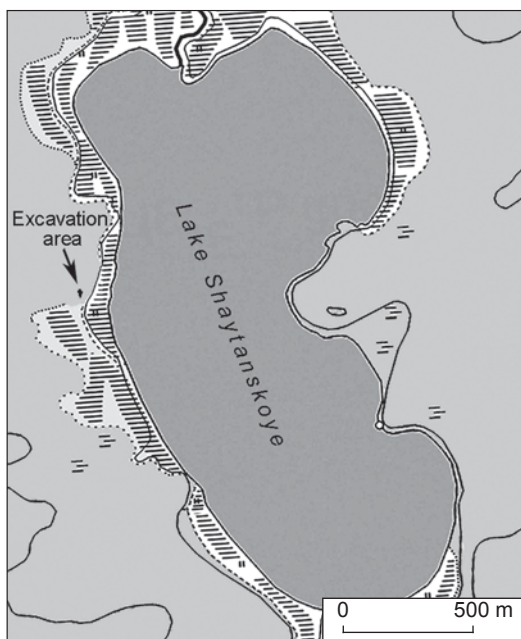


Fig. 2. Map showing the location of the studied area of the memorial sanctuary at Lake Shaytanskoye.

*Notably, when the Seima site was uncovered by a military detachment in 1912–1914, even the poorly informed but high-ranking Nizhny Novgorod officials were in doubt: “Is this really a cemetery? If yes, than surely a catastrophic one” (Chernykh, 1972: 38).

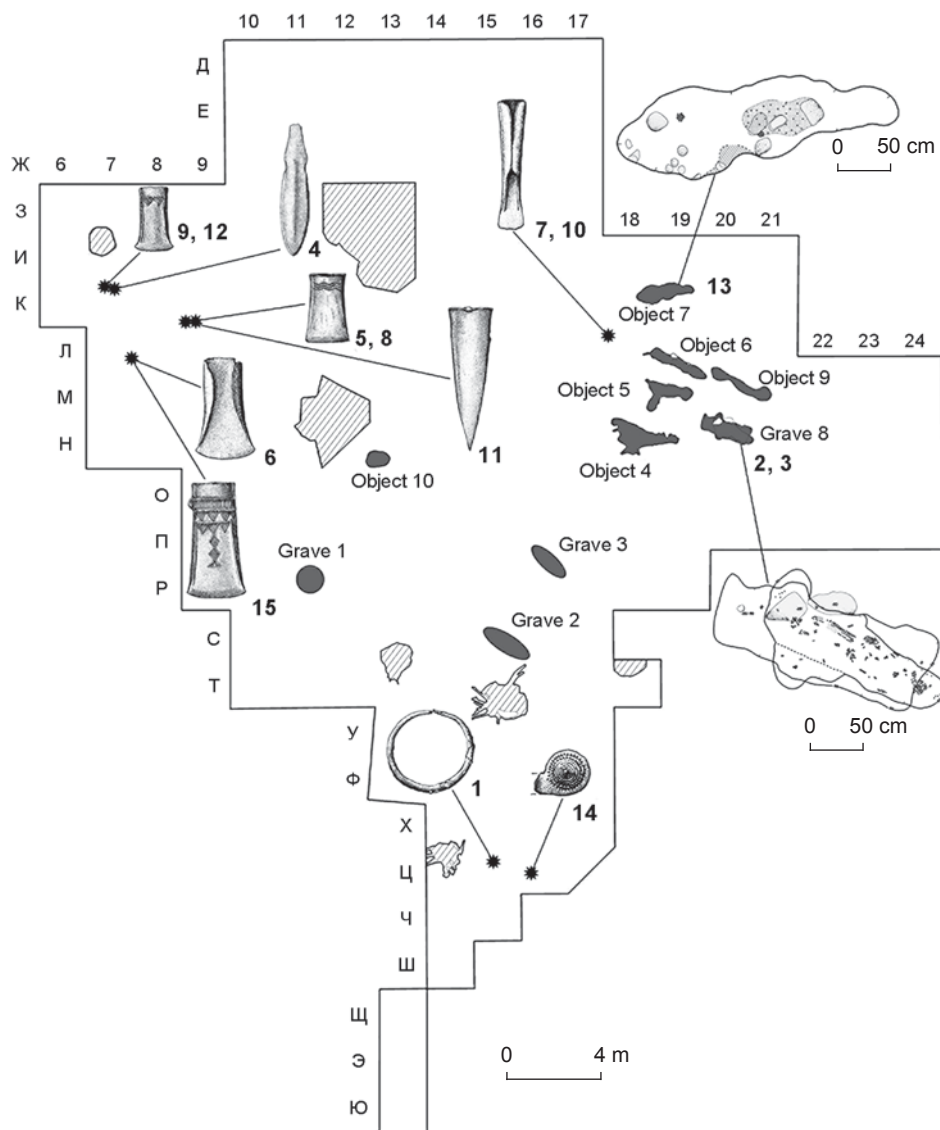


Fig. 3. Spatial distribution of the dated samples over the excavation area at Shaytanka (numbers are given in accordance with Table 1).

Series of radiocarbon dates for ST sites

An important new impact on the situation with the ST's absolute chronology was determined by the real boom in the use of radiocarbon dating methods, which added considerably to our understanding of the chronological succession of cultures and communities in Northern Eurasia. However, eventually, these innovations affected only our idea of the age of ST sites, and even then primarily owing to their parallels with the Abashevo-Sintashta materials (Fig. 4). And when radiocarbon dating technique was applied to the Seima-Turbino relics, the majority of dates have again been generated for the Shaytanka materials.

Currently, only 22 radiocarbon dates for the entire ST phenomenon are available—an extremely small number for this vast area*. The majority of dates ($n=15$) in the

*The extremely small number of dates for the giant ST area of 4 mln km² looks especially striking when compared to other social systems. Let us give only two examples. The Balkan-Carpathian Metallurgical Province represents the strongest example. Here, on an area of 1.6–1.7 mln km², a total of 1230 dates associated with 281 sites have been recorded and systematized. Another example relates to the community of Abashevo-Sintashta-Petrovka with 112 dates for 27 sites on the total area of 1.0–1.2 mln km² (see Fig. 4) (Chernykh, Orlovskaya, 2015).

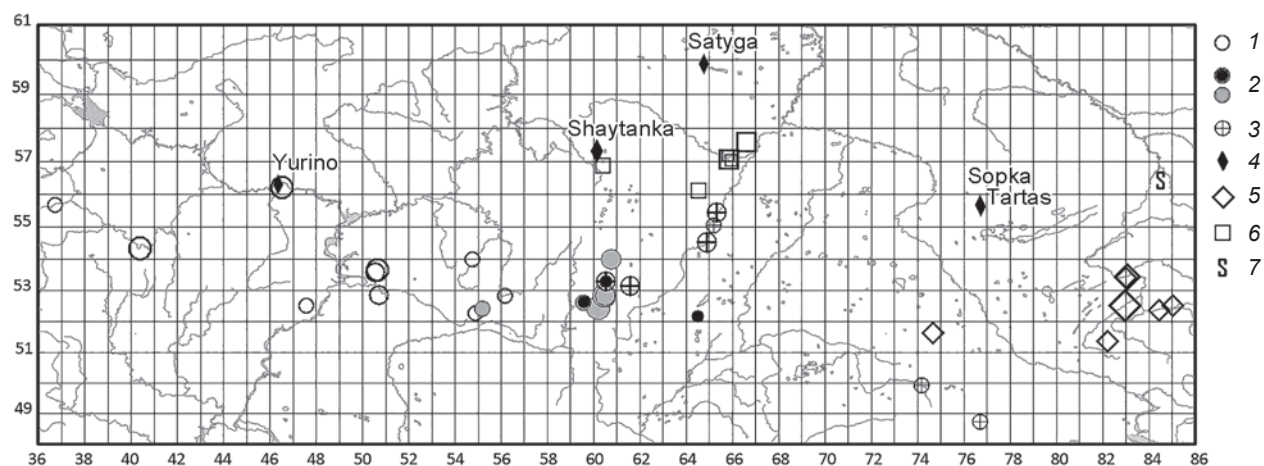


Fig. 4. Spatial distribution of ^{14}C -dated samples at the sites representing various cultures.

1 – Abashevo; 2 – Sintashta; 3 – Petrovka; 4 – Seima-Turbino; 5 – Elunino; 6 – Tashkovo-Koptyaki; 7 – Samus IV settlement.

series refer to Shaytanka (Table 1). However, only 12 of these can be somehow correlated with the ST materials. Two dates definitely belong to considerably younger sediments, while another one (OxA-X-2485-57) has been considered unreliable by researchers from the Oxford Laboratory (Table 1, No. 13–15).

Apart from Shaytanka, three dates were recorded for the site of Yurino, located at the confluence of the Vetluga and Volga rivers (Soloviev, 2005: 111; Yungner, Karpelan, 2005: 112), and also one for the cemetery of Satyga XVI in the Konda basin (the lower Irtysh tributary) (Epimakhov, Hanks, Renfrew, 2005: 97;

Table 1. Shaytanka radiocarbon dates

No.	Laboratory code	Material	^{14}C date, BP	Calendar date, BC		Site
				$\pm 1\sigma$ (68.2 %)	$\pm 2\sigma$ (95.4 %)	
1	MAMS-23963	Wood coated with bronze foil	3707 \pm 27	2140–2037	2198–2026	Sq. 3/6, depth 0.65 m
2	MAMS-23961	Charcoal	3575 \pm 29	1956–1886	2024–1784	Sq. H/20, 21, grave 8, depth 0.90–0.95 m
3	Poz-7112	"	3575 \pm 30	1961–1886	2026–1782	Same
4	Poz-7113	Birch-bark	3560 \pm 35	1959–1785	2020–1773	Sq. K/7
5	OxA-26482	Birch	3452 \pm 32	1871–1694	1880–1688	Sq. K/9
6	OxA-26596	"	3535 \pm 26	1919–1781	1944–1771	Sq. П/7
7	OxA-26595	Pine	3521 \pm 28	1895–1775	1926–1756	Sq. П/7, depth 86–97 m
8	OxA-26481	Birch	3483 \pm 34	1878–1752	1893–1695	Sq. K/9
9	MAMS-22662	"	3480 \pm 20	1876–1752	1882–1744	Sq. K/9, depth 0.71–0.74 m
10	MAMS-22665	"	3419 \pm 20	1743–1690	1860–1658	Sq. П/17, depth 0.39 m
11	MAMS-22663	Larch	3311 \pm 19	1622–1532	1636–1528	Sq. K/9, depth 0.62 m
12	MAMS-22664	Birch	3097 \pm 19	1411–1308	1421–1298	Sq. K/7, depth 0.75–0.78 m
13	Poz-7114	Charcoal	1810 \pm 30	140–242 AD	128–322 AD	Object 7, pit filling
14	MAMS-23962	Wood coated with bronze foil	1921 \pm 25	57–123 AD	24–130 AD	Sq. 3/6, depth 0.65 m
15	OxA-X-2485-57	Birch	2797 \pm 28	994–911	1016–849	Sq. П/7, depth 83–87 m

Note: No. 5–8, 15 – after: (Bronk Ramsey et al., 2015: 205).

Table 2. Radiocarbon dates from several ST sites

Site	Laboratory code	Material	¹⁴ C date, BP	Calendar date, BC		Reference
				1σ (68.2 %)	2σ (95.4 %)	
Tartas-1, grave 487	SOAN-8703	Human bone	3935 ± 85	2566–2296	2836–2144	(Marchenko et al., 2014: 466)
Sopka-2/4C, grave 282	SOAN-7725	Same	3805 ± 75	2431–2138	2466–2036	(Molodin et al., 2010: 242)
Sopka-2/4B, grave 427	UBA-25027	"	3787 ± 31	2282–2146	2334–2062	(Marchenko et al., 2014: 466)
Satyga XVI, grave 39	OxA-12529	"	3655 ± 29	2122–1972	2135–1944	(Epimakhov, Hanks, Renfrew, 2005: 97)
Yurino, grave 8	Hela-929	Wood	3545 ± 50	1950–1776	2023–1746	(Soloviev, 2005: 111; Yungner, Karpelan, 2005: 112)
Same, grave 12	Hela-928	"	3400 ± 50	1750–1628	1879–1540	(Ibid.)
Same, grave 9	Hela-930	"	3395 ± 35	1740–1642	1862–1614	"

Korochkova, Stefanov, 2011: 74). Three more dates are available for the easternmost Seima-Turbino graves at the cemeteries of Sopka-2/4B, -2/4C, and Tartas-1 in the Baraba steppe (Molodin et al., 2010: 242; Marchenko et al., 2014: 466), which have been correlated primarily with the Krotovo culture (Molodin, Epimakhov, Marchenko, 2014: 151–153) (Table 2). The spatial distribution of the ¹⁴C-dated materials belonging to the Seima-Turbino and other cultures that have been contacted by ST people is shown in Fig. 4.

Despite the comparatively small number of dates in the series, it cannot go unmentioned that the ages of the sites in the eastern periphery of the ST area are apparently greater. This trend is obviously illustrated by both individual diagrams (Fig. 5) and by probability sums for the four sites or their groups, Tartas-Sopka (Fig. 6)*. The identified trend should not be surprising, since it has been generally accepted until now that ST tribes migrated mainly from east to west.

One more interesting result from the radiocarbon dating may be important for 12 samples from Shaytanka. Ten early dates (Fig. 5, No. 1–10) form a compact group; while the two youngest dates (Fig. 5, No. 11, 12) fall out of strict chronological sequence. This discrepancy is especially vivid on the diagram, where the pattern of probability sums at ± 1σ (68.2 %) is discontinuous, while

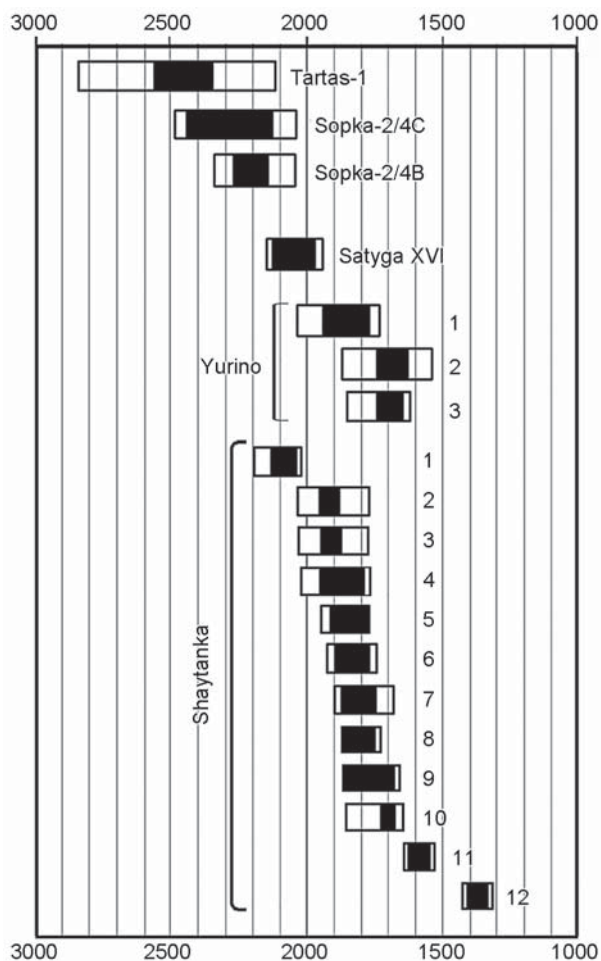


Fig. 5. Chronological ranges of each of the analyzed samples from ST sites.

Contour rectangles show the range at ± 2σ (95.4 %), black rectangles at ± 1σ (68.2 %).

*Calibration of the conventional radiocarbon dates has been carried out by the Oxford Laboratory methods: OxCal vers. 4.2 for individual assessments, and OxCal vers. 3.10 for probability sums, which was proposed by the authors as the most reliable for such calculations (see (Bronk Ramsey, 2001; Bronk Ramsey, Buck, Manning et al., 2006; Bronk Ramsey, Dee, Lee et al., 2010; Bronk Ramsey, Higham, Brock et al., 2015)).

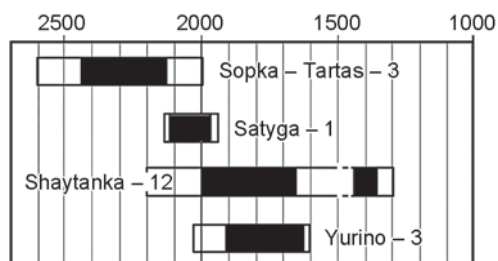


Fig. 6. Cumulative chronological ranges of the samples from ST sites.

Figures after the site names designate the numbers of available dates. Legend same as on Fig. 5.

at $\pm 2\sigma$ (95.4 %) it is very expanded (see Fig. 6). From this, the question arises whether these two samples really belong to ST complexes. However, they were located in the central cluster of finds, where Seima-Turbino materials predominated (Table 1; Fig. 3). These wood pieces were taken from the sockets of bronze weapons: a typical Seima-Turbino celt (Table 1, No. 12; Fig. 3) and a socketed, pointed, wedge-shaped hammer, which was relatively far from the Seima-Turbino morphological standards though (Table 1, No. 11; Fig. 3). Therefore, there were no grounds for any doubts concerning their association with the ST complexes. The situation might become more clear only with an increase of the series of dates for this site. Anyway, on the basis of the available systematized data, we consider it most reasonable to estimate the probability of the Shaytanka chronological range at $\pm 1\sigma$ as 2000–1650 BC, without commenting on the two-hundred-year-long gap between the main corpus of ^{14}C -dates and the two comparatively younger dates No. 11 and 12 (see Fig. 5).

Seima-Turbino – Samus – Abashevo-Sintashta

The ST people, rapidly moving to the west from their ultimate source, came into various contacts with representatives of multiple cultures. However, two communication channels have attracted most attention from researchers: firstly, with the Abashevo-Sintashta-Petrovka community (formerly referred to as Abashevo-Andronovo or Petrovka); and secondly, with the Samus-Kizhirovo culture.

Clear traces of Abashevo-Sintashta representatives at the ST sites have led to the conclusion that these two counter-flows of migration were roughly contemporaneous. Interactions with the tribes of the Samus-Kizhirovo cultural community, inhabiting the northern forest zone, appear to have been very different, and are not quite clear. Layers of the famous Samus IV site (Tom River basin) yielded over 400 fragments of casting molds (Matyushchenko, 1973: 24–30),

many of which represented clear features of the ST morphological standards. It was believed that these materials demonstrated the development of the types of molds; but this was not a trend towards refinement of their morphology or technology. They rather showed the opposite tendency: degradation of the proposed metal casts and of their main varieties. The proportions between the clay molds and the metal artifacts were also surprising: at ST sites, 15 copper and bronze artifacts accounted for one mold, while in the Samus-Kizhirovo complexes, only one metal object accounted for three molds (Chernykh, Kuzminykh, 1989: 145). All these observations suggested attribution of the Samus-Kizhirovo relics to the younger, post-Seima period.

Unfortunately, we have very few radiocarbon dates, not only for ST sites, but also for the Samus IV settlement, which hampers the reconsideration of previous hypotheses concerning chronological relationships between the Seima-Turbino phenomenon and the said communities. This is especially evident as compared to the rich series of dates available for the Abashevo and Sintashta cultures. However, the results of the comparisons made are noteworthy. In our comparative analysis, we used the probability sum of all 19 dates available for Seima-Turbino (Fig. 7).

A quite unexpected gap of nearly one thousand years between the main body of ST radiocarbon dates (Fig. 7) and the five Samus IV radiocarbon dates* is even more surprising, taking into account that the shift was towards a much earlier age than was anticipated. Apparently, the obtained results require additional comprehensive research. For instance, what is the link between the ceramics and the rich set of casting molds at this site? It might be that the issue is not only about the small number of analyzed samples. Analysis was performed on the soot deposits from ceramics, but this material does not always provide reliable results. Thus, the results of radiocarbon analysis of soot on clay vessels from the Volga-Ural region significantly overestimated the large series of dates for the so-called Repin culture belonging to the Pit Grave community (Chernykh, Orlovskaya, 2011). The major reason for this might have been the inclusion of abundant tiny particles from the fossilized river-shells in the samples under study. This would have indicated an older age for the samples, owing to the so-called reservoir effect.

Comparison of the ST and the Abashevo-Sintashta dates has shown an absolutely different result. Despite the mentioned scarcity of the ST dates, the diagrams (Fig. 7) attest to the approximate contemporaneity of

*The results of the Samus IV materials dating (HELA-1776–1780) have not yet been published (personal message from the laboratory in Helsinki).

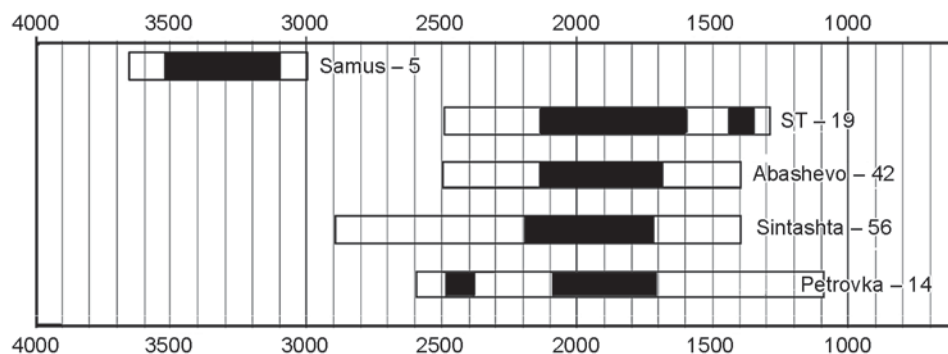


Fig. 7. Cumulative chronological ranges of the samples from the sites of ST, Abashevo, Sintashta, Petrovka cultures, and Samus IV settlement.

Figures after the names of sites or cultures designate the numbers of available dates. Legend same as on Fig. 5.

the two migrant flows moving in the counter directions. Apparently, before the new dates are obtained, it can be assumed that the ST chronological range is 2150–1600 BC at $\pm 1\sigma$ (68.2 %), and 2500–1300 BC at $\pm 2\sigma$ (95.4 %); however, researchers almost always prefer to use a $\pm 1\sigma$ version.

Finally, in addition to the established contemporaneity of Seima-Turbino and Abashevo cultures, let us compare the calendar ranges of the two adjacent sites (located about 15 km from each other): the Yurino site and the famous Abashevo kurgan near the settlement of Pepkino in the upper Volga basin (Khalikov, Lebedinskaya, Gerasimova, 1966). The kurgan revealed a burial pit containing the remains of 27 or 28 cruelly murdered young men. On the basis of 9 dates*, at $\pm 1\sigma$, the Pepkino is dated to 2140–1930 BC. The results of dating the three samples from Yurino suggest a rather vague range of 1910–1620 BC (see Fig. 5, 6). While the Pepkino dates fit well with the Abashevo chronological range, Yurino represents the youngest of the five ST sites studied. It cannot be excluded that it was the Seima-Turbino warriors who won the battle; but we do not have any direct archaeological evidence supporting this hypothesis. The only reliable assumption is the construction of the foreign memorial site on the territory of previous (?) domination by the Abashevo culture.

Conclusions

The Seima-Turbino transcultural phenomenon has long been excluded from the development of calendar chronology based on systematization of the available radiocarbon dates. The situation has now changed

*Codes/reference numbers of the Pepkino kurgan dates: MAMS-11195–11198 (personal message from the laboratory in Mannheim). See also (Kuznetsov, 2001; Dobrovolskaya, Mednikova, 2011).

radically with the discovery and comprehensive study (which included obtaining a series of radiocarbon dates) of the important memorial sanctuary of Shaytanka (Shaytanskoye Ozero II). The site is located close to the generally recognized Middle Urals segment of the borderline between Europe and Asia, which lies in the middle of the vast ST distribution area. Currently, the systematic analysis of the comparatively small series of 14C-dates has been carried out, and tentative ST chronological boundaries in the range of 2150–1600 ($\pm 1\sigma$) / 2500–1300 ($\pm 2\sigma$) BC have been established. The obtained results are very close to the corresponding intervals of existence of the Abashevo-Sintashta community, which were identified on the basis of a considerably greater number of radiocarbon dates. The established coincidence is important because it supports the previously assumed contemporaneity of the Abashevo-Sintashta cultures with the Seima-Turbino records. At the same time, the five radiocarbon dates obtained from samples of soot deposits on ceramics from the Samus IV settlement showed a crucial difference from the generally accepted ideas: the cumulative chronological range of the Samus IV turned to be one thousand years older than the ST range. This finding will definitely require additional archaeological research aimed at addressing the issue of interactions between the ST and the related Samus-Kizhirovo cultural community.

Acknowledgements

We express our deep gratitude to Thomas Higham (Oxford Radiocarbon Accelerator Unit), Elke Kaiser (Institute of Prehistoric Archaeology, Free University of Berlin), Rüdiger Krause (Goethe University Frankfurt), Christian Carpelan (University of Helsinki), and S.V. Kuzminykh (Institute of Archaeology RAS) for their help in the organization of research and radiocarbon analysis of the Seima-Turbino archaeological materials.

References

- Bader O.N. 1961**
Poseleniya turbinskogo tipa v srednem Prikamye. Moscow, Leningrad: Izd. AN SSSR.
- Bader O.N. 1964**
Drevneishiye metallurgi Priuralya. Moscow: Nauka.
- Bochkarev V.S. 1968**
Problema Borodinskogo klada. In *Problemy arkheologii*. Iss. I: Absolyutnaya khronologiya eneolita i bronzovogo veka Vostochnoi Evropy (Yugo-Zapad SSSR). Leningrad: Izd. Leningr. Gos. Univ., pp. 129–154.
- Bronk Ramsey C. 2001**
Development of the radiocarbon calibration program OxCal. *Radiocarbon*, vol. 43 (2A): 355–363.
- Bronk Ramsey C., Buck C.E., Manning S.W., Reimer P., van der Plicht H. 2006**
Developments in radiocarbon calibration for archaeology. *Antiquity*, vol. 80 (310): 783–798.
- Bronk Ramsey C., Dee M., Lee S., Nakagawa T., Staff R. 2010**
Developments in the calibration and modelling of radiocarbon dates. *Radiocarbon*, vol. 52 (3): 953–961.
- Bronk Ramsey C., Higham T.F.G., Brock F., Baker D., Ditchfield P., Staff R.A. 2015**
Radiocarbon dates from the Oxford AMS System: *Archaeometry* Datelist 35. *Archaeometry*, vol. 57 (1): 177–216.
- Chernykh E.N. 1972**
Metall – chelovek – vremya. Moscow: Nauka.
- Chernykh E.N. 1992**
Ancient Metallurgy in the USSR: The Early Metal Age. Cambridge: Cambridge Univ. Press.
- Chernykh E.N. 2009**
Stepnoi poyas Evrazii: Fenomen kochevykh kultur. Moscow: Rukopisnye pamyatniki Drevnei Rusi.
- Chernykh E.N. 2013**
Kultury nomadov v megastrukture Evraziyskogo mira, vol. 1. Moscow: Yazyki slavyan. kultury.
- Chernykh E.N., Kuzminykh S.V. 1989**
Drevnyaya metallurgiya Severnoi Evrazii (seiminko-turbinskiy fenomen). Moscow: Nauka.
- Chernykh E.N., Orlovskaya L.B. 2011**
Keramika i radiouglerodnoye datirovaniye v ramkakh yamnoi aryheologicheskoi obshchnosti: Problemy interpretatsii. In *Analiticheskiye issledovaniya laboratorii estestvennonauchnykh metodov*, iss. 2. Moscow: IA RAN, pp. 63–78.
- Chernykh E.N., Orlovskaya L.B. 2015**
Radiouglerodnaya khronologiya kultur Zapadnoi Evrazii v epokhu rannego metalla. In *Estestvennonauchnyye metody issledovaniy i paradigma sovremennoi arkheologii*. Moscow: Yazyki slavyan. kultury, pp. 10–15.
- Dobrovolskaya M.V., Mednikova M.B. 2011**
“Copper people” of the Bronze Age: The reconstruction of their health and social status. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 39 (2): 143–156.
- Epimakhov A.V., Hanks B.K., Renfrew A.C. 2005**
Radiouglerodnaya khronologiya pamyatnikov bronzovogo veka Zauralya. *Rossiyskaya arkheologiya*, No. 4: 92–102.
- Gimbutas M. 1957**
Borodino, Seima and their contemporaries. *Proceedings of the Prehistoric Society*, vol. 22: 143–172.
- Gorodtsov V.A. 1914**
O nakhodke bliz stantsii Seima Moskovsko-Nizhegorodskoi zheleznoi dorogi. *Drevnosti*, vol. 24: 360–361.
- Gorodtsov V.A. 1915**
Kultury bronzovoi epokhi v Srednei Rossii. In *Otchet Imperatorskogo Rossiyskogo Istoricheskogo muzeya v Moskve za 1914 g.* Moscow: [Sinod. tip.], pp. 59–104.
- Khalikov A.K. 1969**
Drevnyaya istoriya Srednego Povolzhya. Moscow: Nauka.
- Khalikov A.K., Lebedinskaya G.V., Gerasimova M.M. 1966**
Pepkinskiy kurgan (abashevskiy chelovek). Yoshkar-Ola: Marknigoizdat.
- Korochkova O.N., Stefanov V.I. 2010**
Kultovyi pamyatnik epokhi bronzy na Shaitanskom ozere pod Ekaterinburgom (po materialam raskopok 2008 g.). *Rossiyskaya arkheologiya*, No. 4: 120–129.
- Korochkova O.N., Stefanov V.I. 2011**
Satyga XVI v sisteme kultur epokhi bronzy Zauralya i Zapadnoi Sibiri. In *Satyga XVI: Seiminko-turbinskiy mogilnik v taezhnoi zone Zapadnoi Sibiri*, ch. 5. Yekaterinburg: Ural. rabochiy, pp. 60–85.
- Korochkova O.N., Stefanov V.I. 2013**
Kultovyi pamyatnik epokhi bronzy na Shaitanskom ozere pod Ekaterinburgom (po materialam raskopok 2009–2010 gg.). *Rossiyskaya arkheologiya*, No. 1: 87–96.
- Kosarev M.F. 1981**
Bronzovyi vek Zapadnoi Sibiri. Moscow: Nauka.
- Kuznetsov P.F. 2001**
Territorialnye osobennosti i vremennyye ramki perekhodnogo perioda k epokhe pozdnei bronzy Vostochnoi Evropy. In *Bronzovyi vek Vostochnoi Evropy: Kharakteristika kultur, khronologiya i periodizatsiya: Materialy Mezhdunar. nauch. konf. “K 100-letiyu periodizatsii V.A. Gorodtsova bronzovogo veka Vostochnoi Evropy”*. Samara: pp. 178–182.
- Marchenko Z.V., Molodin V.I., Grishin A.E., Orlova L.A. 2014**
Pogrebalnye komplekсы s predmetami seiminko-turbinskogo i kenkolskogo tipov v Barabinskoi lesostepi (Zapadnaya Sibir) i ikh radiouglerodnaya khronologiya. In *Trudy IV (XX) Vseros. arkheol. syezda v Kazani*, vol. I. Kazan: Otechestvo, pp. 463–468.
- Matyushchenko V.I. 1973**
Drevnyaya istoriya naseleniya lesnogo i lesostepnogo Priobya (neolit i bronzovyi vek). Pt. 2: Samusskaya kultura. Tomsk: Izd. Tom. Gos. Univ. (Iz istorii Sibiri; iss. 10).
- Matyushchenko V.I. 1975**
Mogilnik u der. Rostovka. In *Arkheologia Severnoi i Tsentralnoi Azii*. Novosibirsk: Nauka, pp. 129–137.
- Matyushchenko V.I., Sinityna G.V. 1988**
Mogilnik u d. Rostovka vblizi Omska. Tomsk: Izd. Tom. Gos. Univ.
- Molodin V.I., Epimakhov A.V., Marchenko Z.V. 2014**
Radiouglerodnaya khronologiya kultur epokhi bronzy Urala i yuga Zapadnoi Sibiri: Printsipy i podkhody, dostizheniya. *Vestnik Novosib. Gos. Univ.* Ser.: Istoriya, filologiya, vol. 13. Iss. 3: Arkheologiya i etnografiya: 136–167.
- Molodin V.I., Marchenko Z.V., Grishin A.E., Orlova L.A. 2010**
Novyye dannyye po radiouglerodnoi khronologii pogrebalnykh kompleksov mogilnika Sopka-2 epokhi rannei – razvitoi bronzy.

In *Problemy arkheologii, etnografii, antropologii Sibiri i sopredelnykh territorii*, vol. XVI. Novosibirsk: Izd. IAE SO RAN, pp. 240–246.

Safronov V.A. 1968

Datirovka Borodinskogo klada. In *Problemy arkheologii*. Iss. I: Absolyutnaya khronologiya eneolita i bronzovogo veka Vostochnoi Evropy (Yugo-Zapad SSSR). Leningrad: Izd. Leningr. Gos. Univ., pp. 75–128.

Schmidt A. 1927

Die Ausgrabungen bei dem Dorf Turbina an der Kama. In *Finnisch-Ugrische Forschungen: Anz.*, Bd. 18, Hf. 1–3. Helsinki: pp. 1–14.

Serikov Y.B., Korochkova O.N., Kuzminykh S.V., Stefanov V.I. 2009

Shaitanskoye Ozero II: New aspects of the Uralian Bronze Age. *Archaeology, Ethnology and Anthropology of Eurasia*, vol. 37 (2): 67–78.

Soloviev B.S. 2005

Yurinskiy (Ust-Vetluzhskiy) mogilnik (itogi raskopok 2001–2004 gg.). *Rossiyskaya arkheologiya*, No. 4: 103–111.

Tallgren A.M. 1915

Ett viktigt forfund från mellersta Ryssland. *Suomen Museo*, vol. 22: 73–86.

Tallgren A.M. 1920

L'âge du cuivre dans la Russie Centrale. Helsinki: K.F. Puomies. (Suomen Muinaismuistoyhdistyksen Aikakauskirja; t. 32, No. 2).

Yungner K., Karpelan K. 2005

O radiouglerodnykh datakh Ust-Vetluzhskogo mogilnika. *Rossiyskaya arkheologiya*, No. 4: 112. Appendix to: Soloviev B.S. Yurinskii (Ust-Vetluzhskii) mogilnik (itogi raskopok 2001–2004 gg.), pp. 103–111.

Received June 24, 2016.

Received in revised form July 12, 2016.