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I.M. Berdnikov[1], N.P. Makarov[2], T.M. Savenkova[3], N.E. Berdnikova[1], N.B. Sokolova[1], A.M. Kim[4], and D. Reich[4, 5, 6, 7]

[1]Irkutsk State University,
K. Marksa 1, Irkutsk, 664003, Russia
E-mail: geoarch.isu@gmail.com; nberd@yandex.ru; snb-87@mail.ru
[2]Krasnoyarsk Regional Museum of Local Lore,
Dubrovinskogo 84, Krasnoyarsk, 660049, Russia
E-mail: mnp@kkkm.ru
[3]Voino-Yasenetsky Krasnoyarsk State Medical University,
Partizana Zheleznyaka 1, Krasnoyarsk, 660022, Russia
E-mail: reis_05@bk.ru
[4]Harvard University,
Cambridge, MA 02138, USA
E-mail: akim@genetics.med.harvard.edu; reich@genetics.med.harvard.edu
[5]Harvard Medical School,
Boston, MA 02115, USA
[6]Broad Institute of MIT and Harvard,
Cambridge, MA 02142, USA
[7]Howard Hughes Medical Institute, Harvard Medical School,
Boston, MA 02446, USA

Middle Neolithic Burials in Baikal-Yenisey Siberia: Problems of Cultural Identity and Genesis

The study focuses on the analysis of Middle Neolithic burial complexes of the Baikal-Yenisey Siberia. Based on a series of reliable radiocarbon dates, their age lies within the range of 6190–5900 cal BP. It partly corresponds to the end of the hiatus in the mortuary traditions of Cis-Baikal. Features of the burial rite and funerary offerings are analyzed and compared with those of neighboring territories. One of the most frequent images in the art of the Middle Neolithic Baikal-Yenisey Siberia is that of the waterfowl, rendered as figurines. The common grave goods are leaf-shaped stone arrowheads, shell beads, and pendants made of animal bones and teeth. The funerary rite included the use of fire and reddish mineral pigment, as well as disrupting the anatomical integrity of the skeletons, possibly due to partial burial (the data are tentative). Most burials of the late stage of the hiatus are evidently those of hunter-gatherers manufacturing the Ust-Belaya ceramics, which were found in certain burials. A bone arrowhead with a biconical point and figurines representing waterfowl suggest cultural ties with the Urals and Western Siberia; but their nature has yet to be clarified, which requires large-scale AMS-dating and paleogenetic analysis.

Keywords: *Baikal-Yenisey Siberia, Neolithic, hiatus, funerary rite, radiocarbon dating, waterfowl image.*

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Introduction

In the archaeology of the New Stone Age of Baikal-Yenisey Siberia*, one of the most urgent issues is that of hiatus (absence of burial complexes) in the interval between the early and late stages of the Neolithic (see review: (Berdnikov, Krutikova, Dudarek et al., 2020)). The numerous attempts to solve it have only led to reduction of the chronological interval from ~1300/1200 to ~600 years (Weber et al., 2021). During this process, the main question concerning the identification of the Middle Neolithic population remained open for a long time.

In the last three years, work has been carried out aimed at solving the problem of hiatus, for which a database was created on burials with indeterminate cultural and chronological affiliations (Berdnikov et al., 2021; Sokolova, Berdnikov, 2022). As a result, the materials from cultural horizons with Ust-Belaya and Posolskaya ceramics are proposed to refer to the Middle Neolithic (hiatus). Among the many unattributed burials, especially interesting are the comp lexes with ornithomorphic pendants and the Ust-Belaya-type vessels from Krasnoyarsk and the Angara region, as well as a destroyed burial on the upper Lena, containing a Shigir-type arrowhead. Recently, we have received a series of reliable radiocarbon dates allowing us to discuss the cultural and chronological attribution, and some questions of the genesis, of these unique burials.

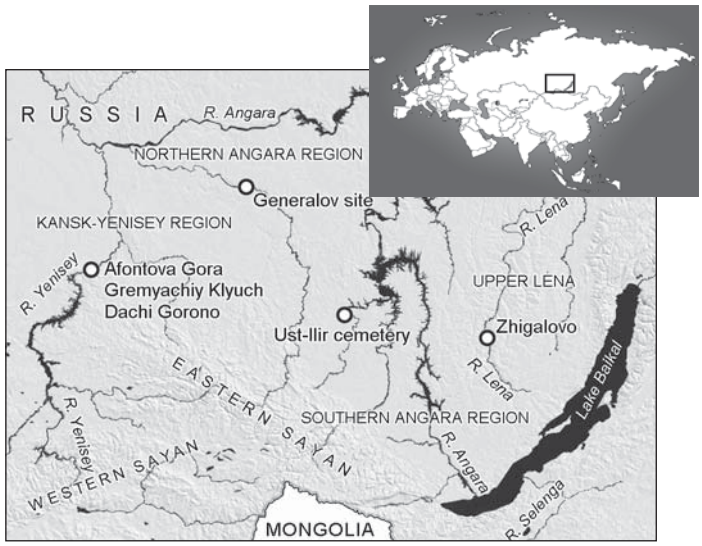

Fig. 1. Archaeological sites with burial complexes of the Middle Neolithic on the map of Baikal-Yenisey Siberia.

Material and methods

The materials of eight burial complexes of Baikal-Yenisey Siberia (Fig. 1), whose cultural and chronological affiliation has been the subject of discussions for many years, are analyzed. These are primarily the graves on the territory of modern Krasnoyarsk: near the brook called Gremyachiy Klyuch, near children's summer camps of the city education authority (Dachi Gorono), and three burials of Afontova Gora (Okladnikov, 1949; Glusskaya, 1963a, b; Vdovin, Makarov, 2016). The rest are represented by graves at the site named after A.G. Generalov (Generalov site) on the Chunya River; at the mouth of the Ilir River (Ust-Ilir cemetery), in the southern Angara region; and on the territory of the airport of the Zhigalovo settlement, on the upper Lena (Dzyubas, Abdulov, Drulis, 1996; Berdnikova, 2013; Berdnikova et al., 2014).

During this study, radiocarbon dates for four burial complexes were obtained. In addition, the dating results for the burial in Zhigalovo were used (Berdnikova, 2013). The values of all radiocarbon dates were calibrated in the OxCal 4.4.4 program (Bronk Ramsey, 2021), using the IntCal20 atmospheric curve (Reimer et al., 2020), with a probability of 95.4 %. To assess the correctness of the results obtained, data on stable isotopes of carbon and nitrogen were analyzed. Methods of comparative analysis and analogs (with the identification of culturally significant features of the funerary rite and categories of grave goods) were used to identify links with the evidence from typologically similar and contemporaneous archaeological complexes of Baikal-Yenisey Siberia and adjacent territories.

Results

Brief description of the archaeological complexes. We give only the main characteristics

*Baikal-Yenisey Siberia is understood as the territory of the south of Central Siberia, which additionally includes part of the southwestern zone of the Baikal Rift (Tunka Valley) and the Oka Plateau of the Eastern Sayan.

of the burials under consideration. They certainly require a fresh look and a separate detailed analysis, but that is beyond the scope of this study. Most of the materials have been published; therefore, to clarify the information, one can refer to the primary information sources (Okladnikov, 1949; Glusskaya, 1963a, b; Dzyubas, Abdulov, Drulis, 1996; Berdnikova, 2013; Berdnikova et al., 2014; Vdovin, Makarov, 2016).

Gremyachiy Klyuch. This object (probably two burials) was discovered in 1959, during construction works on a 35-meter terrace-like surface of the left bank of the Yenisey River, approximately 0.4 km west of the mouth of the ravine of Gremyachiy Klyuch brook. Given the amateur nature of the excavations, it can conventionally be suggested that the deceased were oriented with their heads to the east, downstream of the river; burials could have been partial, and fire was used in the ritual.

The grave goods are quite diverse (Fig. 2, *1–14*, *16–24, 26*). There are 99 finished items made of animal bones and teeth (pendants, points, needle case), 272 items made of shells (beads), 12 items made of stone (a pendant, an abrader, an adze, and arrowheads). The rest of the finds are various blanks, dominated by processed fragments of shells. Bone pieces of art include an ichthyomorphic pendant (Fig. 2, *22*) and an artifact in the form of an elk's head (Fig. 2, *23*) (both with carved ornamentation), as well as 11 pendants with images of waterfowl. Ten of the latter are made in low relief on plates, and are subdivided into three types, in accordance with the

Fig. 2. Materials from the Middle Neolithic burials in Baikal-Yenisey Siberia.
1–14, *16–24*, *26* – Gremyachiy Klyuch; *15*, *30–32* – Afontova Gora, 1977; *25*, *39* – Dachi Gorono; *27–29*, *33* – Afontova Gora, 1932; *34, 35* – Afontova Gora, 1937; *36*, *40–45*, *47–58* – Ust-Ilir cemetery; *37*, *38*, *46* – Generalov site; *59* – Zhigalovo. Author of photos and drawings *1–26*, *30–32*, *36*, *38*, *39*, *43–47*, *50*, *51*, *53* is I.M. Berdnikov, the rest are adapted after (Okladnikov, 1949: Fig. 1; Dzyubas, Abdulov, Drulis, 1996: Fig. 1, 2, 4–6; Vdovin, Makarov, 2016: 345; Berdnikova, 2013: Fig. 2; Berdnikova et al., 2014: Fig. 11).

style of the birds' images: 1) with the head facing forward in relation to the body, and a wide bent neck (Fig. 2, *4*); 2) with the head thrown back on a long neck, and an elongated beak (Fig. 2, *5–7*, *24*); 3) with the head in profile and a noticeably curved beak-tip (Fig. 2, *8–12*). One more pendant is a miniature three-dimensional figurine of a flying (?) bird (Fig. 2, *21*).

Dachi Gorono. This burial was excavated by Z.K. Glusskaya in 1955 on the left bank of the Yenisey River, about 6 km upstream from Gremyachiy Klyuch. The remains of a 30–35-year-old woman were found in the grave (Alekseyev, 1960); her skull was used by M.M. Gerasimov to make a reconstruction (Fig. 2, *25*). The burial is apparently partial. The supposed orientation of the buried is with her head to the north, perpendicular to the river's flow. The total number of finished items from the burial is at least 84, including pendants and beads made of bone, stone, and shells, a bone needle case (Fig. 2, *39*), stone tools (an adze, a biface, scrapers, a knife-shaped item, and a disc-shaped one). The collection of finds also contains a small amount of faunal remains with traces of treatment (probably tool blanks).

Afontova Gora, 1932. The burial was discovered by A.F. Katkov at the edge of a 15–18-meter terrace on the left bank of the Yenisey River (2 km downstream from Gremyachiy Klyuch), 20 m southwest of the museum-estate of G.V. Yudin (his former summer house/dacha). It was partially destroyed, and only a few teeth, bones, and a skull were preserved from the skeleton of a 30–35-year-old man (Solodovnikov, Bagashev, Savenkova, 2020). The deceased was possibly buried with his head directed to the south (perpendicular to the river's flow). Pieces of reddish mineral pigment and traces of its use in a powdered form ("ocher") were recorded in the grave. The grave goods include 373 items: shell beads, pendants made of animal bone and teeth (Fig. 2, *27*, *28*, *33*), and a three-dimensional bone pendant in the form of a swimming bird (Fig. 2, *29*).

Afontova Gora, 1937. This grave was excavated by A.P. Okladnikov, 3 m east of the previous burial. The remains belonged to at least two adults, but their skeletons did not retain anatomical integrity. As was established, the buried were oriented with their heads to the east (downstream of the river). Traces of "ocher" were noted throughout all the unearthed area. The total number of items from the grave is unknown. A significant number of mother-of-pearl beads, a few thin, rounded white beads (made from indeterminate material), bone points, and a stone flake have been found. Of greatest interest are a bone awl-like rod with a pommel in the form of a human head, and a small Ust-Belaya-type ceramic vessel (Fig. 2, *34*, *35*).

Afontova Gora, 1977. This burial complex was identified only by the exhibited finds collected by schoolchildren near the Afontova Gora burials described above. These include 46 shell beads, an item (a pendant or a plate) made of white mineral (talcite?), an arrowhead (Fig. 2, *15*, *31*, *32*), a bone needle case, three pendants made of animal bones and teeth, and one bone pendant with the image of a waterfowl (Fig. 2, *30*), identical to the items of the third type from the Gremyachiy Klyuch collection.

Generalov site. The site (more precisely, a campsite) is located on a 10–13-meter terrace-like surface on the right bank of the Chuna River, about 2 km upstream from the border of the Irkutsk Region and the Krasnoyarsk Territory. The burial was discovered during rescue works at the site. The grave-pit yielded traces of fire, as well as a part of the occipital bone of the skull, four teeth, and unidentifiable skeletal remains. The deceased was likely buried in an extended position, with his head to the northeast (upstream of the river). The sparse grave goods (nine finds in total) were dominated by stone items: an adze, an end-scraper, two arrowheads (Fig. 2, *37*), a knife (Fig. 2, *46*), two fragments of bladelets and a small pebble. In the area of the head of the deceased, there was a small Ust-Belaya-type ceramic vessel, placed upside down (Fig. 2, *38*).

Ust-Ilir cemetery. The grave was found approximately 2 km northeast of the Pribrezhnyi settlement, Bratsky District, Irkutsk Region, on a high (up to 10 m) left mouth section of the Ilir River (left tributary of the Iya River), partially flooded by the waters of the Bratsk Reservoir. A lot of human bones and archaeological artifacts have been collected on the beach surface: fragments of Ust-Belaya-type vessels (Fig. 2, *40–42*, *48*, *49*), pendants made from deer teeth, bone harpoon-tips (Fig. 2, *53*), arrowheads (Fig. 2, *36*), and other stone items, including polished ones (Fig. 2, *43–45*). The grave contained the remains of three individuals, buried in extended positions, with their heads to the

east-southeast, as well as traces of fire and "ocher" spots. Most of the surface finds were also painted with "ocher", which suggests their direct association with the burial.

The grave goods are quite rich and include a total of 107 items: stone tools (arrowheads, a knife, an adze, and an end-scraper), pendants made of deer teeth and bone (Fig. 2, *47*), decorated bone needle cases (Fig. 2, *50–52*), and a blank of a bone tool. In addition, the collection contains five bone pieces of art with representations of waterfowl: a plate with a symmetrical figure (Fig. 2, *57*) and four three-dimensional items, which can be divided into two types. The first includes three figurines, stylistically identical to the images on pendants of the third type from the Gremyachiy Klyuch (Fig. 2, *54–56*). The second one is a figurine of a swimming bird (Fig. 2, *58*), similar to the pendant from the Afontova Gora burial excavated in 1932.

Zhigalovo. This burial was completely destroyed during construction works. Its description was made from the words of local residents: the deceased was laid in the grave on his side (possibly with his legs bent), with his head to the northeast (perpendicular to the Lena River flow). The grave goods contain a bone clip of a side-bladed tool, a boar's tusk, and a bone arrowhead with a biconical point and a broken rod (Fig. 2, *59*).

Results of radiocarbon dating. Six new radiocarbon AMS-dates have been obtained for the burial complexes under consideration. Additionally, we use two more dates for the Zhigalovo burial (one obtained by the AMS-method, the other by the liquid scintillation counting (LSC) method), made more than ten years ago (see *Table*). All the AMS-dates look quite correct, as evidenced by the sufficient content of collagen in the samples, and the values of the carbon-nitrogen atomic ratio (C/N_{at}), which are within the normal range (Kuzmin, 2017: 181).

For almost all the burials (the exception is Afontova Gora, 1932), there are estimates based on bones of mammals that do not require correction for the freshwater reservoir effect (FRE), because $\delta^{13}C$ values (from 4.0 to 5.5‰) show a low trophic level of organisms, typical of herbivorous animals. The calibrated values of these dates range from 6251 ± 99 to 5864 ± 62 cal BP. If we do not take into account the LSC-date Ki 16434, they will range from 6182 ± 70 to 5864 ± 62 cal BP.

Results of radiocarbon dating of Middle Neolithic burials in Baikal-Yenisey Siberia

Lab code	Location	Year of excavations	Sample	$\delta^{15}N$, ‰	$\delta^{13}C$, ‰	Collagen, %	C/N_{at}	^{14}C-date, BP	Calibrated values, BP	
									Interval	Average
IGANams 9455	Gremyachiy Klyuch	1955	Bone (point), Cervidae	4.9	–21.2	35.7	3.1	5280 ± 25	6182–5943	6074 ± 66
PSUAMS 7549	Dachi Gorono	1955	Molar, *Homo sapiens*	13.1	–20.1	14.9	3.3	5845 ± 30	6742–6561	6662 ± 49
"	"	1955	Bone (blank of tool), Cervidae	5.5	–20.9	8.3	3.2	5130 ± 25	5984–5753	5864 ± 62
IGANams 9452	Afontova Gora (1932)	1932	Skull bone (petrous), *Homo sapiens*	13.8	–20.3	9.8	3.0	5790 ± 30	6664–6497	6589 ± 47
PSUAMS 7666	"	1932	"	13.1	–20.3	16.6	3.3	5720 ± 25	6622–6410	6510 ± 48
UCIAMS 260525	Ust-Ilir cemetery	1990	Bone of a large ungulate (harpoon)	4.0	–20.5	1.7	3.3	5370 ± 15	6275–6012	6182 ± 70
Ki 16434	Zhigalovo	1984	Tusk, *Sus scrofa*	…	…	…	…	5470 ± 80	6437–6004	6251 ± 99
TKa unnumb.	"	1984	Bone of a mammal (arrowhead)	5.4	–21.4	…	…	5310 ± 25	6189–5998	6090 ± 60

For the Dachi Gorono burial, in addition to the estimates based on faunal remains, a date from an anthropological sample was obtained, which is expectedly older owing to the radiocarbon offset caused by the FRE. The radiocarbon dating data for the 1932 Afontova Gora burial, obtained in different laboratories, closely matched, which once again testifies to their reliability; however, they do require a correction for FRE. It is also noteworthy that the AMS- and LSC-dates for the Zhigalovo burial showed similar values. Of course, the first looks more reliable, but the second is not much older, although with a wider calibrated interval.

Discussion

Among the burials described in this study, two groups can be distinguished on the basis of the features of grave goods. The first group is characterized by the presence of pendants with images of waterfowl (Gremyachiy Klyuch, Afontova Gora, 1932 and 1977, Ust-Ilir cemetery), the second, Ust-Belaya-type vessels (Afontova Gora, 1937, Generalov site). The Dachi Gorono burial should apparently be attributed to the first group, judging by the similar nature of its grave goods. The destroyed burial in Zhigalovo differs from the above burials and requires separate consideration.

Referring to the first group, it should be noted that, despite the significant remoteness of the Ust-Ilir cemetery from the Krasnoyarsk burials, their grave goods show an apparent similarity both in the tradition of depicting waterfowl (among which, the images of merganser, duck, and loon are well recognizable), and in categories of artifacts—arrowheads, ornamented bone needle cases, pendants made of bone and animal teeth. Some analogs can also be traced in the elements of the funerary rite. The dates of the burials of this group, judging by the data on faunal remains, fall within the range from 6182 ± 70 to 5864 ± 62 cal BP, or rounded to tens of years without indicators of standard deviation 6190–5900 cal BP. In general, these dates (excluding the date for the Dachi Gorono burial) correspond to the end of the hiatus (Fig. 3). The Afontova Gora burial of 1932, according to all archaeological evidence, should be contemporaneous with the burials of the group under consideration.

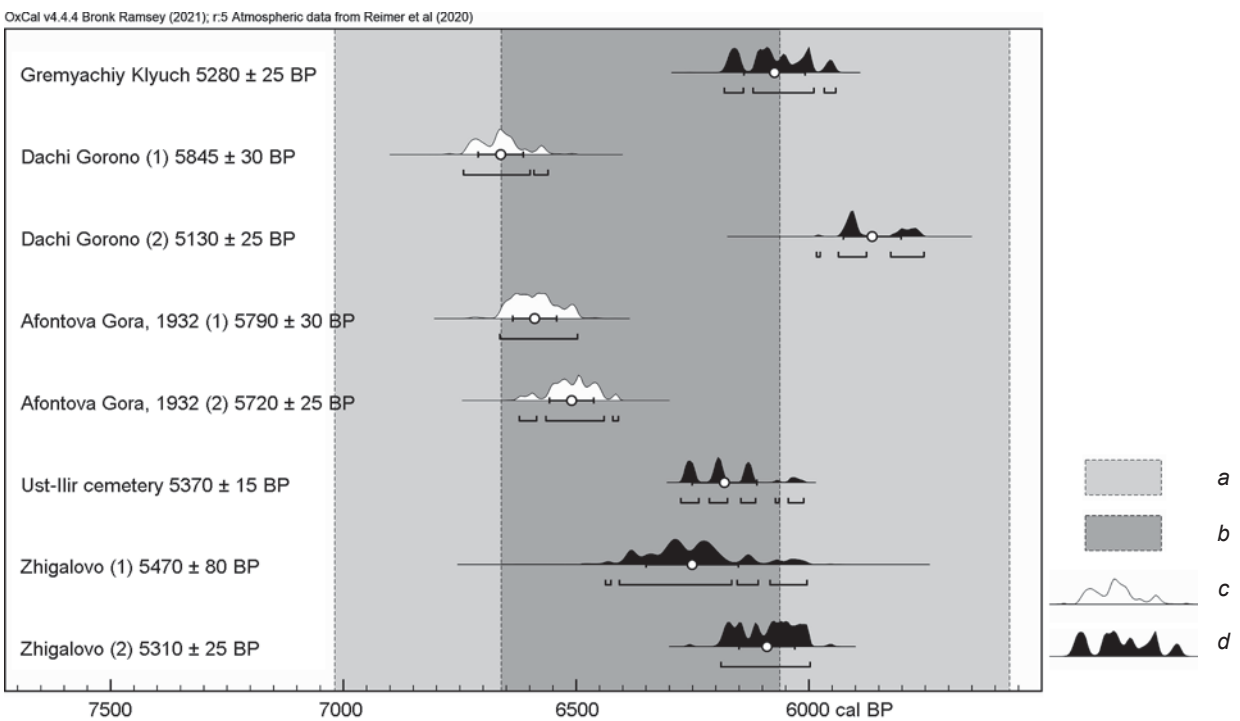

Fig. 3. Calibrated values of radiocarbon dates and their correlation with the period of the Middle Neolithic / hiatus.
a – Middle Neolithic / hiatus, after (Weber et al., 2016); *b* – Middle Neolithic / hiatus, after (Weber et al., 2021); *c* – dates obtained from human bones; *d* – dates obtained from faunal remains.

Burials of the second group are less informative. There are no radiocarbon dates for them either. However, the presence of Ust-Belaya-type vessels in the graves makes it possible to correlate them with the Middle Neolithic hiatus, on the basis of a reliable series of radiocarbon dates (~6.7–6.3 ka cal BP) for the pottery of this type in the southern Angara region (Berdnikov, Goryunova, Novikov et al., 2020). The burial from Generalov site also shows some similarities with the burials of the first group in the form of arrowheads, and partly in the funerary rite.

The burial complexes of the first group were possibly also left by hunter-gatherers who made Ust-Belaya-type ceramics. This assumption is supported not only by the fragments of vessels of this type from the Ust-Ilir cemetery (which are most likely associated directly with the burial), but also by a three-dimensional ornithomorphic figurine from the lower horizons of Sergushkin-1 site (Point A) in the northern Angara region (German, Leontiev, 2013: Fig. 9, *15*), associated with the Ust-Belaya ceramic complex, which is clearly represented at the site.

Analyzing fragmentary data on the funerary rites of both groups, we can say that some burials are probably partial, and the deceased were often oriented with their heads to the east (towards the sunrise?). There are also such manifestations of the rite as the use of fire and "ocher", but these signs are indicative.

The Zhigalovo burial is a unique phenomenon for Baikal-Yenisey Siberia, because its grave goods include a bone arrowhead with a biconical point, which is atypical of the region. We know of only one report of a similar find in the middle Yenisey (Okladnikov, 1957: 49). Such arrowheads were widely spread in the Mesolithic-Chalcolithic archaeological complexes of European Russia and the Urals (see, e.g., (Zhilin, 1996; Serikov, 2018; Lozovskaya, 2019)). If we turn to the materials from the burials, then the closest territorial parallels are the finds from the Neolithic and Early Metal Period sites of Western Siberia, including such cemeteries as Vaskovskiy, Yaiskiy, Lebedi-2, Ust-Aleus, Sopka-2, Vengerovo-2A, Ust-Tartas-2 (Borodkin, 1967; Molodin, 2001: Fig. 2, *1*; 27, *1*; Marochkin, 2014: 18–45, fig. 2, *6*; Molodin, Mylnikova, Nesterova, 2016: Fig. 13, *9*; Molodin et al., 2020: Fig. 3, *4*).

The image of waterfowl is another important category for comparative analysis. In the art of the Neolithic-Chalcolithic of Eastern Europe, the Urals, and Western Siberia, it is a rather common subject (Gurina, 1972; Chairkina, 1998; Zhulnikov, Kashina, 2010; Morozov, Umerenkova, 2015; Serikov, 2019). Ornithomorphic bone images are also found in burials. In the territory of the Urals and Western Siberia, these are known from such cemeteries as Yaiskiy, Korchugan, Vengerovo-2A, Trekino, as well as from the burial in the grotto of the Dozhdevoi Stone (Matyushchenko, 1961: Fig. 47, *1*; Bobrov, 1990: Fig. 1, *1*; Molodin, Novikov, Chikisheva, 1999: Fig. 4, *2–10*; Molodin, Mylnikova, Nesterova, 2016: Fig. 13, *9*; Serikov, 2019: Fig. 2, *9–12*). Leaf-shaped stone arrowheads and bone pendants (drop-shaped and oval) are also rather common categories of Neolithic grave goods in burials of Western Siberia (see, e.g., (Polosmak, Chikisheva, Balueva, 1989: 21–25; Molodin, Novikov, Chikisheva, 1999; Marochkin, 2014; Molodin, Mylnikova, Nesterova, 2016; Molodin et al., 2020; Borodaev et al., 2022)).

It is rather difficult to compare the features of the funerary rite at the burials in Baikal-Yenisey Siberia with those at the above West Siberian complexes owing to the disproportionality of the available data, both in quantitative and qualitative terms. Nevertheless, among the common (but, apparently, not always mandatory) elements, we can single out the partial nature of burials, and the use of fire and "ocher" for ritual purposes (Molodin, Mylnikova, Nesterova, 2016).

Radiocarbon dating results have not yet allowed us to clarify the nature of interregional relations, because of the scarcity of correct determinations for the Neolithic burials of Western Siberia. Recently, sufficiently reliable dates for the circle of burials, which include Vengerovo-2A (with an ornithomorphic pendant and a Shigir-type arrowhead), were obtained for the Avtodrom-1A cemetery (Bobrov, Marochkin, Yurakova, 2020). Their calibrated values lie in the range of 6744–6495 cal BP (our calibration). Taking into account that the dates were obtained from samples of human bones, this cemetery is contemporaneous to the Middle Neolithic burials in Baikal-Yenisey Siberia. However, archaeological complexes of this type are associated with the Artyn culture (Molodin et al., 2020; Bobrov, Marochkin,

Yurakova, 2020), whose ceramics have little in common with the pottery traditions of Baikal-Yenisey Siberia. Consequently, it is inappropriate to speak of direct parallels in this case.

Conclusions

On the basis of reliable radiocarbon data obtained for Baikal-Yenisey Siberia, a group of burial complexes was revealed, whose age (6190–5900 cal years) corresponds to the Middle Neolithic. They partly fill the late stage of the hiatus identified based on the materials from the Cis-Baikal region.

As a result of the analysis of features of the burial practices and grave goods of the Middle Neolithic complexes, a circle of internal and external relations was identified in general terms, allowing the following conclusions to be drawn.

1. One of the leading subjects in the art of the population of this stage is an image of waterfowl, and the most common categories of grave goods are leaf-shaped stone arrowheads, shell beads, and pendants made of animal bones and teeth.

2. The funerary rite shows cases of ritual actions with the use of fire and "ocher", and of disrupting the anatomical integrity of the skeletons (in two cases, the burials are supposedly partial, but this requires verification).

3. Most of the burials were apparently left by the carriers of the Ust-Belaya pottery tradition.

4. The culture of the Middle Neolithic population of Baikal-Yenisey Siberia is quite distinctive, but the presence, among the grave goods, of the Shigir-type arrowhead and figurines representing waterfowl suggests cultural ties with the Urals and Western Siberia.

The issues of the chronological break in mortuary traditions are not fully resolved by the present study. However, in this case, it is important to understand that the Middle Neolithic of the region is a more complex phenomenon than the hiatus, and their chronological ranges may not coincide. The issues raised in this article should be solved with the wide use of interdisciplinary data, primarily those obtained from radiocarbon AMS-dating and paleogenetic studies.

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