UDK 903'23(571.1/.5)''633/634''
Documenta Praehistorica XXXIV (2007)

The earliest Neolithic complex in Siberia: the Ust-Karenga 12 site and its significance for the Neolithisation process in Eurasia

Yaroslav V. Kuzmin[1] and Viktor M. Vetrov[2]

1 *Pacific Institute of Geography, Far Eastern Branch of the Russian Academy of Sciences, Vladivostok, Russia*
ykuzmin@tig.dvo.ru

2 *Irkutsk State Pedagogical University, Irkutsk, Russia*, a116@pochta.ru

ABSTRACT – *The discovery of Neolithic (*i.e. *pottery-containing) components at the Ust-Karenga 12 site in northern Transbaikal brought to light new data on the appearance of pottery in Siberia. Excavations and geoarchaeological studies identified the pottery complex in layer 7, ^{14}C-dated to* c. *12 180–10 750 BP (charcoal dates) and* c. *11 070–10 600 BP (pottery organics dates). The pottery is thin and plant fibre-tempered; vessels are round-bottomed and with a comb-pattern design. Ust-Karenga 12 thus preserves by far the earliest Neolithic assemblage in Siberia, and is only slightly younger than the Initial Neolithic complexes of the Amur River basin, Russian Far East (*c. *13 300–12 400 BP).*

IZVLEČEK – *Odkritje neolitskih komponent na severno transbajkalskem najdišču Ust-Karenga 12 prinaša nove podatke o pojavu keramike v Sibiriji. Z izkopavanji in geoarheološkimi študijami so določili keramični kompleks v plasti 7, ki je ^{14}C datirana na ca. 12 180–10 750 BP (datirani vzorci oglja) in na ca. 11 070–10 600 BP (datirani so organski ostanki v/na keramiki). Keramika je tanka in vsebuje vlakna rastlin, posode imajo kroglasto dno in glavnikast okras. V najdišču Ust-Karenga 12 je ohranjen najzgodnejši neolitski zbir v Sibiriji in je le neznatno mlajši od najstarejšega neolitskega kompleksa v kotlini reke Amur na ruskem daljnem vzhodu (okoli 13 300–12 400 BP).*

KEY WORDS – *Neolithic; Siberia; earliest pottery; radiocarbon dating*

Introduction

The definition of the term 'Neolithic' in Siberia and the northern and eastern parts of Asia implies first of all the presence of pottery (*e.g. Oshibkina 1996a; Barnes 1999; Kuzmin 2003, 2006; Kuzmin and Orlova 2000*). In this case, pottery is determined as containers made of fired clay (*e.g. Darvill 2002. 337–338)*. Therefore, the concept of Neolithisation for Siberia as well as East Asia means the emergence of pottery-making. In this paper, we present a systematic description of the earliest pottery assemblage from Siberia known so far, Ust-Karenga. Previously, it was published only in brief (*e.g. Vetrov 1985; Kuzmin 2002; Kuzmin and Orlova 2000.361*).

The cluster of 16 prehistoric sites in the Karenga River mouth, located on the boundary between the upper and middle courses of the Vitim River in northern Transbaikal, Siberia (Figs. 1–2), was discovered in the second half of the 1970s when a systematic survey was conducted in the Vitim River basin by researchers from Irkutsk State University (*Aksenov and Vetrov 1977; Vetrov et al. 1978*). The geographical coordinates of the Ust-Karenga cluster are: 54° 28' northern latitude and 116° 31' eastern longitude, as determined with the aid of a U.S. Operational Navigation Chart, scale 1:1 000 000 (sheet ONC E–8). The Ust-Karenga sites lie in the Vitim River valley; the water level elevation at the confluence of the Vitim and Karenga rivers is about 600 metres above sea level (asl). The Vitim River cuts through the low mountain system of the Vitim Tableland with heights of about 800–1200 m asl (*End-*

rikhinsky 1974), and the highest points in the vicinity of Ust-Karenga are about 1200–1700 m asl. The climate of the Vitim Tableland is of ultra-continental type, with hot summers and cold winters (*e.g. Suslov 1961*). The mean January temperature is –30° to –33 °C; and average July temperature is up to +20 °C. The annual amount of precipitation is about 350–400 mm (*Gvozdetsky and Mikhailov 1978.350*). The area is covered with dense conifer forests (taiga), consisting mainly of Dahurian larch [*Larix dahurica*, in some sources *Larix gmelinii* (*e.g. Shahgedanova et al. 2002*)].

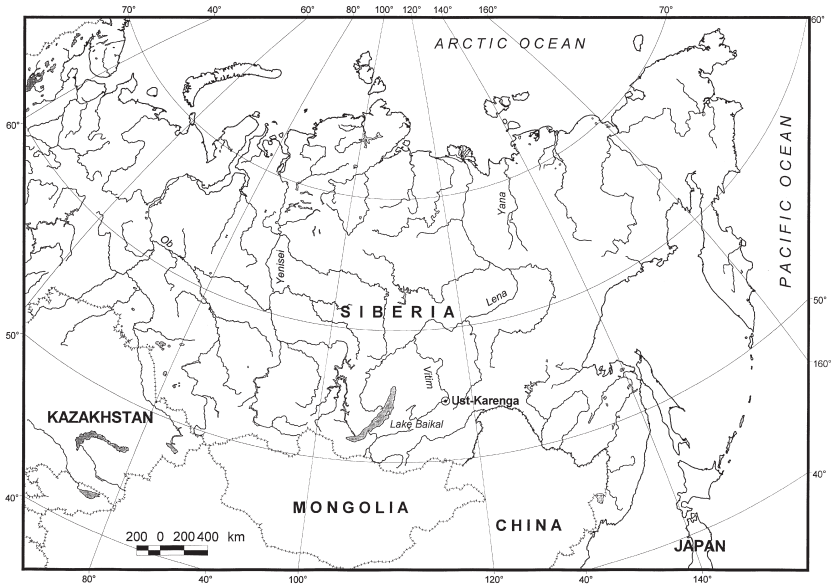

Fig. 1. General position of the Ust-Karenga cluster of prehistoric sites in Northern Asia.

Materials and Methods

The Ust-Karenga 12 site, which is the most representative for our study, was discovered in 1976. The finds in cultural layer 7 included pottery fragments, along with stone artefacts of typical final Upper Palaeolithic appearance (wedge-shaped cores, Araya type transversal burins, bifaces, and scrapers). It was separated from the underlying and overlying cultural layers by about 1 metre of sterile sediments both above and below (Figs. 3–4). Excavations of Ust-Karenga 12 were conducted in a series of periodical campaigns, from 1976 until recently. The total excavated square at Ust-Karenga 12 for layer 7 is 214 m^2. As for geoarchaeological studies, palynological data were obtained for layer 7 (*Vetrov and Kuzmin 2005*), and a series of radiocarbon (hereafter – ^{14}C) dates was generated. The first ^{14}C dates were released in the mid-1990s (*Vetrov 1995a*), and new results were produced and published in the late 1990s and the 2000s (*e.g. Vetrov and Kuzmin 2005; Vetrov et al. 2006*).

Results

The cluster of archaeological sites at the confluence of the Vitim and Karenga rivers is located on the alluvial terrace of the Karenga River, at a height of 20–25 m above the water level (Fig. 2). The general stratigraphy of the Ust-Karenga cluster, mainly derived from the Ust-Karenga 12, 14, and 16 sites, is as follows (Fig. 3):

Lithological layer	*Depth from surface, m*
1. Taiga soil	0.0 – 0.10
2. Brown sandy loam, humified	0.10 – 0.22
3. Pale-yellow fine sand	0.22 – 0.28
4. Brown fine sand (palaeosol)	0.28 – 0.38
5. Pale-yellow fine sand	0.38 – 0.44
6. Pale-yellow fine sand with greenish tint, with ice-wedge structures	0.44 – 0.52
7. Gray laminated sands (thickness is approximate)	0.52 – 3.50
8. Pebbles and rock pieces (bedrock)	3.50 – 3.70

The cultural layer 1 is situated in lithological layer 1; cultural component 2 – in layer 2; cultural layer 3 – in layer 3; and component 4 – in layer 4. Cultural layers 5 and 6 are located in lithological layer 6. The cultural components 7, 7a, 8, and 8a are incorporated into the matrix of lithological layer 7 (*Vetrov 2006*) (Fig. 3). As for the determination of cultural complexes, layer 1 dates to the time of the Iron Age (or Palaeometal) to the ethnographic period. The ^{14}C dates for this component at different locales of the Ust-Karenga cluster are from 1890 ± 40 BP (LE–2653) to 3670 ± 40 BP (LE–2650) (*Vetrov 1986*) (Fig. 3). Cultural component 2 is associated with the Late Neolithic, the so-called 'Ust-Yumurchen archaeological culture', and still has no ^{14}C dates. Components 3–7 are combined into the single 'Ust-Karenga archaeological culture' of the Early and Middle Neolithic (*Vetrov 1982; 1997; 2000*). It should be noted

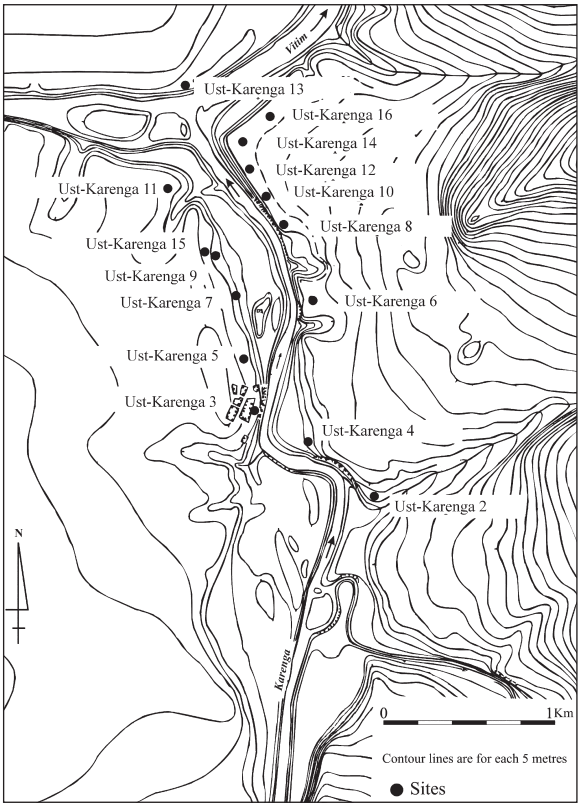

Fig. 2. Position of individual sites in the Ust-Karenga cluster.

that in Russian archaeology the term 'culture' is very similar to 'cultural complex' in Western anthropology and archaeology. The ^{14}C dates from cultural component 4 at the Ust-Karenga 3 site are 6100 ± 400 BP (IM–922) and 6890 ± 80 BP (LE–1961) (*Aksenov et al. 2000*) (Fig. 3). The ^{14}C dates for cultural component 7 are considered separately (see below). Components 8 and 8a are of final Upper Palaeolithic type (*e.g. Vetrov and Kuzmin 2005; Vetrov 2006; Aksenov et al. 2000*), and without any pottery. The charcoal ^{14}C dates from component 8 at the Ust-Karenga 12 site are 12 710 ± 380 BP (GIN–8065), 12 880 ± 130 BP (GIN–6469a), 13 560 ± 195 BP (GIN–8070), and 16 430 ± 240 BP (GIN–8668) (*e.g. Vetrov and Kuzmin 2005; Vetrov et al. 2006*) (Fig. 3). The oldest value of *c.* 16 430 BP was considered to be an outlier and rejected (*e.g. Vetrov and Kuzmin 2005.60–61*), establishing the ^{14}C age of the pre-pottery component as *c.* 12 700–13 600 BP.

Cultural layer 7 as the earliest component of the Ust-Karenga Neolithic culture is the main focus in this report. It was excavated at several sites; the most representative locale is Ust-Karenga 12 (Fig. 2), for which a major part of archaeological and palaeo-environmental information was obtained. The thickness of layer 7 is from 2 to 10 cm (Figs. 3–5). It contains several well-preserved hearths and artefact concentrations around them; these spots are up to 6 m in diameter.

The total number of stone artefacts recovered from cultural layer 7 is several thousands; the exact number remains to be determined. Cores are represented by wedge-shaped, prismatic, and subprismatic types (Fig. 6) (*Vetrov 1995b*). Major tool types include transversal (Araya) burins, scrapers, knives on blades, chisels, microblade tools, points, and bifaces (Fig. 7). Five kinds of burin were classified:

❶ burins made on blade spalls as preforms;
❷ core-like burins;
❸ burins made on wide prismatic blades;
❹ burins made on prismatic segmented microblades; and
❺ burins made on segmented blade spalls (*Vetrov 1995b*).

The predominant raw material is flint obtained from pebbles collected in the channels of the Vitim and Karenga rivers.

In terms of raw materials used for the manufacture of the stone tools, it is important to note the pre-

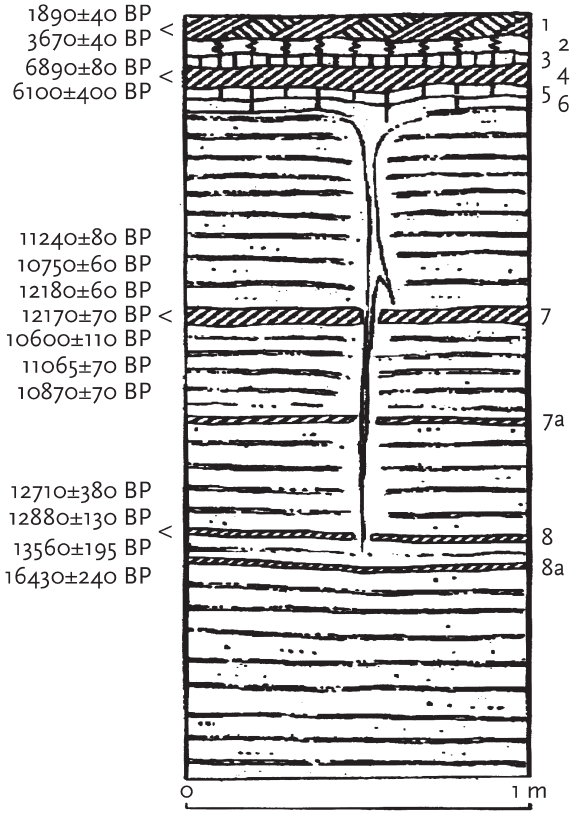

Fig. 3. General stratigraphy and ^{14}C dates at the Ust-Karenga cluster.

sence in cultural layer 4 of the Ust-Karenga 16 site of some artefacts made on rocks 'exotic' for the middle stream of the Vitim River, hyalodacite and graphitite (*Vetrov et al. 2000*). The sources of these raw materials are located downstream from the Ust-Karenga cluster, at a distance of up to 400 km. This fact demonstrates that the inhabitants of the middle course of the Vitim River had active contacts with the neighbouring territories of Eastern Siberia, with distances of 400 km and possibly up to 600 km (*Vetrov et al. 2000*).

The pottery from cultural layer 7 is unique in all Siberia. Numerous potsherds were excavated, including large fragments, and this allows the reconstruction of the size and shape of vessels. The vessels are of parabolic type, from 17–20 to 35 cm high, and from 12 to 20 cm in diameter. The sharp-based bottom looks mammiformed. The design is mainly comb-pattern (Fig. 8), and also zigzag, herringbone, and cogged stamped (Figs. 9–10) (*Vetrov 1985; Kuzmin and Orlova 2000.361*). Both external and internal sides have traces of grooves made with grass fibre or comb trail to smooth the surface of the clay during the pottery-making process (Figs. 11–12). Ornamentation was made mainly by cog-wheel (*Vetrov 2006*). The distinctive feature of the Ust-Karenga pottery is that it is plant fibre-tempered. The number of vessels used at the Ust-Karenga 12 site may be estimated as about ten. For the whole Ust-Karenga cluster, about 16–18 vessels can be reconstructed.

^{14}C dating of cultural layer 7 was conducted using two kinds of datable material – charcoal from hearths and the cultural layer in general, and pottery temper (Tab. 1). The extraction of carbon from organic-tempered pottery was performed by low temperature combustion with oxygen (*O'Malley et al. 1999; Derevianko et al. 2004; Vetrov et al. 2006*). The carbon yield of three pottery samples was about 0.8–

Fig. 5. Stratigraphic profile of Ust-Karenga 12 site.

Fig. 4. Stratigraphic profile of Ust-Karenga 12 site with position of cultural layer 7 (indicated by dash line).

1.0 %, which makes the ^{14}C dates on pottery temper quite reliable in terms of the origin of carbon. We assume that the ^{14}C-dated carbon comes predominantly from short-lived plant fibre temper, and not from clay carbon itself, which may be much older than the time of vessel manufacture. Calibration was done with the aid of Calib Rev. 5.0.1 software (available online: www.radiocarbon.org).

The results of ^{14}C dating are presented in Table 1. Charcoal from cultural layer 7 at a depth of 1.00 m below the surface, found in small depressions in direct association with pottery, was dated to *c.* 12 180–12 170 BP (or *c.* 12 200–11 900 calBC). The hearth charcoal gave slightly younger ages, *c.* 11 240–10 750 BP (or *c.* 11 300–10 700 calBC). Three pottery temper ^{14}C dates, *c.* 11 070–10 600 BP (or *c.* 11 200–10 200 calBC), are similar to those on charcoal. Therefore, it is safe to say that the age of cultural layer 7 at the Ust-Karenga 12 site is about 12 200–10 600 BP (or *c.* 12 200–10 200 calBC; 14 150–12 150 calBP), and this makes the pottery from cultural component 7 the oldest in Siberia. The quite 'advanced' appearance of the Ust-Karenga pottery may mean that it originated even earlier, if we take into account that an area of only 25 m^2 of cultural layer 8 has been excavated so far. Thus, we should not exclude the possibility that pottery at the Ust-Karenga 12 site may be found in the earlier component 8, dated to *c.* 12 700–13 600 BP.

The palaeo-environmental reconstruction of cultural later 7 is based on the results of palynological analysis. An environment of cold grass steppe and open pine-larch forest, with dwarf birch, alder, and cold-adapted lycopodium moss (*Selaginella sibirica*) existed at the time of site activity at *c.* 12 200–10 600 BP. This kind of vegetation is typical of the Pleistocene-

Holocene transition in Eastern Siberia (*e.g. Krivonogov et al. 2004*).

Discussion

In the light of Late Glacial pottery in Transbaikal, we should examine the adjacent regions of Siberia to see if there are any other Neolithic complexes known with ages similar to the Ust-Karenga culture. In Transbaikal, two other sites may contain pottery of the final Pleistocene age. At the Ust-Kyakhta site, in the southernmost part of the region near the border with Mongolia, the 1978 excavation campaign of the first cultural layer revealed stone artefacts, wedge-shaped cores and scrapers, ostrich eggshell beads, and about 10 small pieces of pottery, including two rim fragments about 2 cm long (*Aseev 2003.35–37; Medvedev 1995*). The pottery is tempered with mineral particles and crushed ostrich eggshells. The diameter of the vessel was up to 10 cm. A ^{14}C date on animal bone from cultural layer 1 is 11 505 ± 100 BP (SOAN–1552). At the Studenoe 1 site in the Chikoi River basin, southern Transbaikal, the earliest pottery was found in cultural layers 9 and 8 (*Khlobystin and Konstantinov 1996.306*). It is represented by fragments of a sharp-based vessel with thin walls and string impressions. This thin-walled (0.2–0.3 cm) pottery was made using the paddle and anvil technique (*Tseitlin and Aseev 1982.110*). The overlying cultural layers 7 and 6 have similar pottery. The ^{14}C dates associated with this pottery are: 10 450 ± 300 BP (GIN–5493) for cultural layer 7b; 9620 ± 250 BP (GIN–5492) for layer 7; and 10 780 ± 150 BP (GIN–4577) for layer 6 (*e.g. Konstantinov 1994.85; Kuzmin and Orlova 2000.359*). However, Konstantinov (*1994.85*) rejected these ^{14}C values; he also stated that the reason for such an old age of the Transbaikal Neolithic remains unclear, and determined the age of the Early Neolithic in Transbaikal as *c.* 6500–5500 BP (*Konstantinov 1994.153–155*). Therefore, the situation with final Pleistocene ^{14}C dates in possible association with pottery at the Studenoe 1 is still obscure.

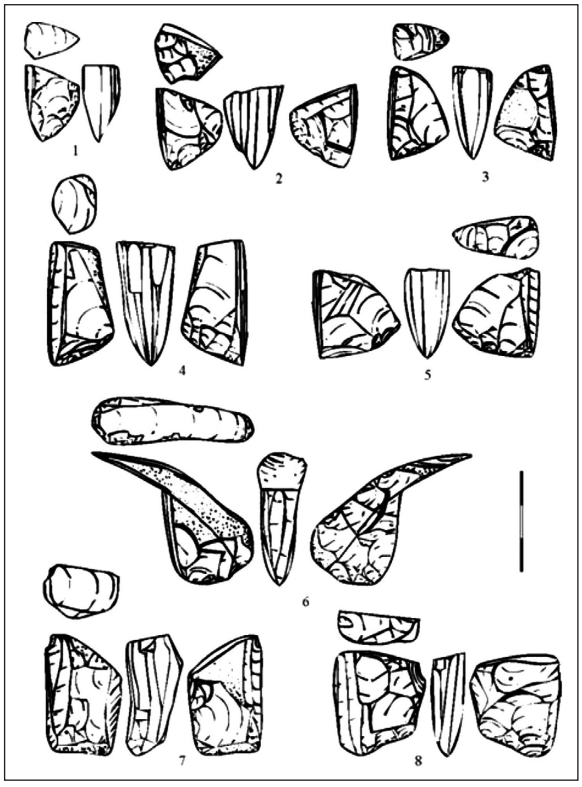

Fig. 6. Cores from the cultural layer 7 of Ust-Karenga 12 site (on Figures 6–11, each bar unit is 1 cm long).

String and cord impressed pottery became common in Siberia after *c.* 7000–6000 BP (*e.g. Kuzmin and Orlova 2000*). Nowadays, in the light of the very early ^{14}C age of the Ust-Karenga complex pottery, the question 'How old is comb-patterned pottery in Siberia?' becomes an important issue related to the Neolithisation of the region. The earliest sites with pottery decorated with a comb-pattern and incised ornamentation, besides the Ust-Karenga complex,

Material dated	^{14}C age, BP	Lab Code and No.	Calibrated age, calBC (with ± 2 sigmas)*	Reference
Charcoal from cultural layer	12 180 ± 60	AA–60210	12 140–11 920	*Vetrov and Kuzmin 2005*
Charcoal from cultural layer	12 170 ± 70	AA–60202	12 240–11 990	*Vetrov and Kuzmin 2005*
Charcoal from hearth	11 240 ± 80	GIN–8066	11 320–11 010	*Vetrov 1995a*
Charcoal from hearth	10 750 ± 60	GIN–8067	10 920–10 740	*Vetrov 1995a*
Organic temper in pottery	11 065 ± 70	AA–38101	11 160–10 930	*Kuzmin and Keally 2001*
Organic temper in pottery	10 870 ± 70	AA–60667	10 990–10 840	*Vetrov and Kuzmin 2005*
Organic temper in pottery	10 600 ± 110	AA–21378	10 890–10 220	*O'Malley et al. 1999*

* Calib Rev. 5.1.0 software was used for calibration.

Tab. 1. Radiocarbon dates for the cultural layer 7, Ust-Karenga 12 site.

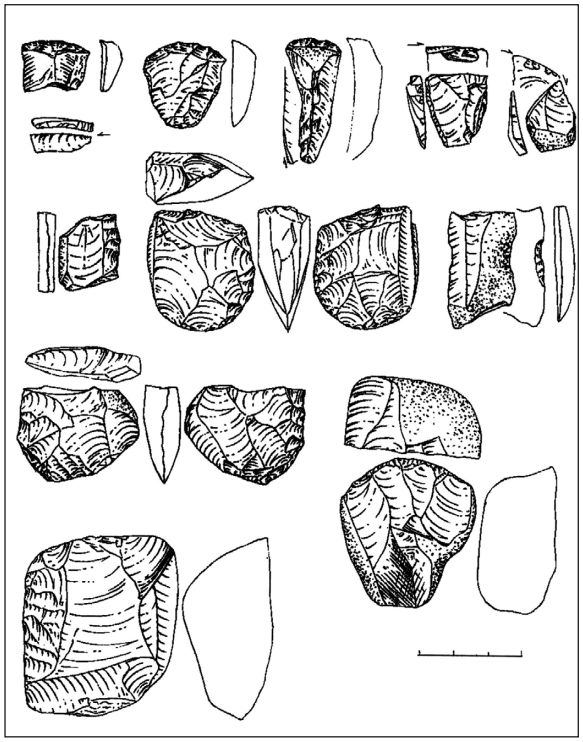

Fig. 7. Stone tools from the cultural layer 7 of Ust-Karenga 12 site.

are known now in the central West Siberian Plain. They are located in the upper reaches of the Konda River, within the larger Ob River basin, about 3000 km west of the Ust-Karenga sites (Fig. 1). A cluster of Neolithic sites was found in the 1960s on the shore of the Satyiginsky Tuman Lake, in the Sumpanya River mouth area (geographical coordinates: 59° 48' N, 64° 49' E). Pottery with both incised and comb ornamentation on the surface of sharp-bottomed vessels was determined as the 'Sumpanya' type (*Kovaleva et al. 1984; Krizhevskaya and Gadzhieva 1991*). At the Sumpanya IV site, a series of charcoal ^{14}C dates were obtained: 6850 ± 60 BP (LE–1440) from a hearth; 6520 ± 70 BP (LE–1813) from a burnt tree log; and 6590 ± 70 BP (LE–1814) from the dwelling floor. At the Sumpanya II site, charcoal collected in association with Sumpanya-type pottery was dated to 6530 ± 70 BP (LE–1818) (*Kovaleva et al. 1984.38*). At the Sumpanya VI site, three ^{14}C dates on charcoal from the cultural layer with Sumpanya pottery were generated: 6100 ± 70 BP (LE–2540); 9130 ± 80 BP (LE–2554); and 9920 ± 80 BP (LE–2772) (*Krizhevskaya and Gadzhieva 1991.85*).

Kosarev (*1996.262*) and Timofeev and Zaitseva (*1996.344*) accepted the ^{14}C dates from these sites in the range of *c.* 6850–6100 BP. However, they did not include the ^{14}C values of *c.* 9130–9920 BP from the Sumpanya VI site in their databases (*Timofeev and Zaitseva 1996; Timofeev et al. 2004*). Furthermore, ^{14}C dates for Sumpanya IV sites in excess of *c.* 10 000 BP, released after the original publication of the site's materials, *i.e.*, 10 100 ± 100 BP (LE; No. is not given); 10 910 ± 100 BP (LE–1817); and 11 970 ± 120 BP (LE–1812) (*Krizhevskaya and Gadzhieva 1991.85*), were not taken into account. Indeed, it is hard to explain such a large variation in a date series from the same site, especially in the case of Sumpanya IV. This was noted by Krizhevskaya and Gadzhieva (*1991*) due to the absence of earlier cultural complexes at the Sumpanya IV site.

New archaeological and chronological data were recently gained from other sites in central Western Siberia with the Sumpanya type of pottery. At a cluster of sites on the shore of Lake Andreevskoe near the city of Tumen (geographical coordinates: 57° 01' N, 65° 51' E), four pottery types were determined at locality VIII (*Usacheva 2001*). The earliest pottery of Sumpanya appearance with incised and comb ornamentation from dwelling 7 is associated with a ^{14}C date of 9140 ± 60 BP (LE–2296).

Therefore, it is possible to correlate tentatively the Sumpanya pottery type from Western Siberia with ^{14}C dates of *c.* 9900-6100 BP; more research is needed to explain the older values of *c.* 10 100–12 000 BP. Currently, it is safer to accept the 'conservative' opinion on the Holocene age of the Sumpanya pottery (*e.g. Kosarev 1996; Usacheva 2001*).

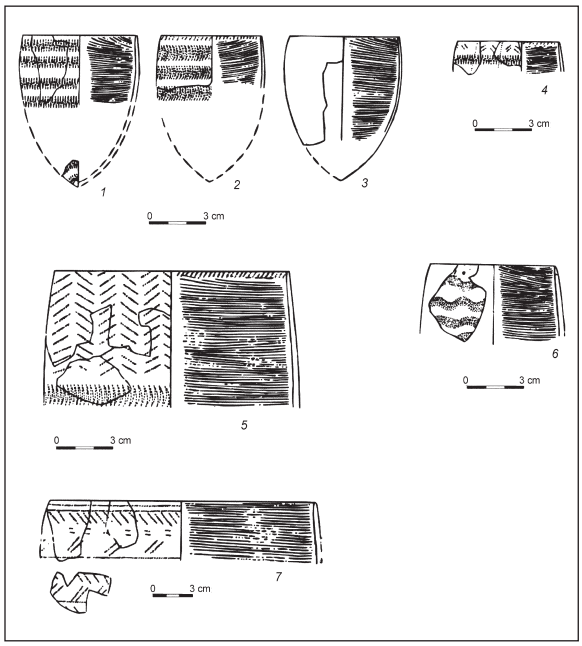

Fig. 8. Reconstruction of pottery vessels from the cultural layer 7 of Ust-Karenga 12 site (after* Vetrov 1985*).

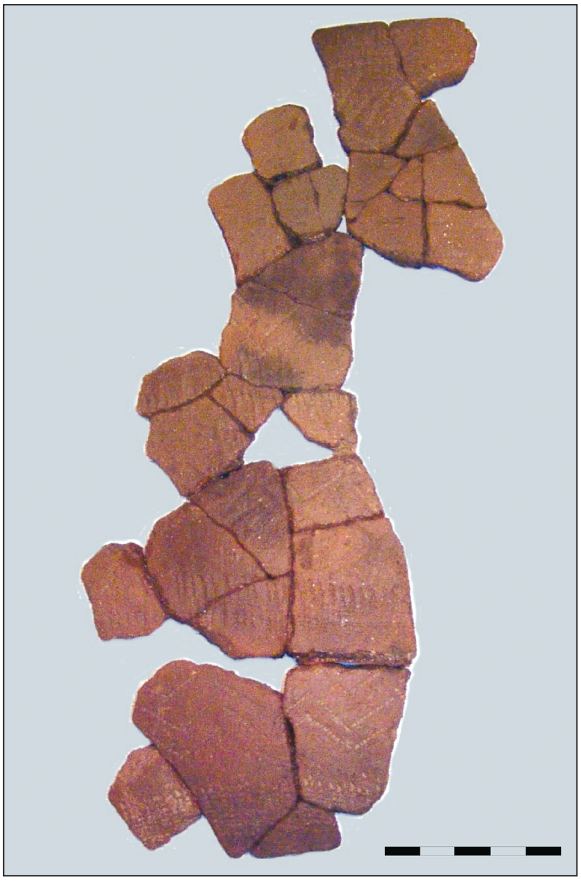

Fig. 9. Pottery from the cultural layer 7 of Ust-Karenga 12 site.

As was recently highlighted, the discrepancy between the ^{14}C and archeological ages in West Siberian prehistoric complexes is most commonly connected with uncertain taphonomic situations, when carbon material which could not be related to human occupation was ^{14}C-dated (*Kosintsev et al. 2004.21*).

Another important issue is the search for the 'roots' of the Ust-Karenga culture. Based on the most recent results, final Pleistocene pottery is known from East Asia, including the southern part of China, the Japanese Archipelago, and the Russian Far East (Amur River basin) (*e.g. Derevianko and Medvedev 1995; Barnes 1999; Lapshina 1999; Keally et al. 2004; Kuzmin 2006; Nesterov et al. 2006*). Pottery seems to appear almost simultaneously in these three different regions of East Asia, at *c.* 13 700–13 300 BP, and in each case pottery-making technology was most probably invented independently (*e.g. Kuzmin 2006.368–369*). There are some similarities and differences between the pottery from the Ust-Karenga complex, the Incipient Jomon of Japan, and the Initial Neolithic of the Amur River basin. For example, plant fibre tempering is common in the Initial Neolithic complexes of Osipovka and Gromatukha in the Amur River basin (*e.g. Kuzmin 2006; Derevianko and Medvedev 2006.130*), although some plant-tempered pottery is known in the Incipient Jomon (*e.g. Jomon Jidai Sosoki 1996.46, 63; Keally et al. 2003.5*). On the other hand, pottery from the Amur River basin is flat-based, while most of the Incipient Jomon vessels are sharp-based. Therefore, the possible source of pottery origins for the Ust-Karenga complex may be provisionally suggested in the Amur River basin. This does not exclude the possibility of the independent invention of pottery-making in northern Transbaikal at the end of the Pleistocene, *c.* 12 200–10 700 BP. At the modern stage of research, the final answer to the question 'What is the origin of the Ust-Karenga pottery?' remains open to discussion.

As for the implications of the Ust-Karenga pottery to the broader Eurasian aspect of the emergence of the Neolithic (*sensu Chard 1974; Barnes 1999; Kuzmin 2006.362*), it is important to keep in mind the very early emergence of pottery-making in remote northern Transbaikal, far from traditional 'centres' of the origin and spread of prehistoric technological innovations such as East Asia and the Near East (*e.g. Sherratt 1980*). Based on the results of archaeological studies in East Asia, Siberia, and Europe in the last few decades, it becomes clear that the process of Neolithisation was very 'unlinear' (*e.g. Budja 2005; 2006*), and there is no direct correlation between environmental conditions and the appearance of pot-

Fig. 10. Pottery from the cultural layer 7 of Ust-Karenga 12 site (closer view).

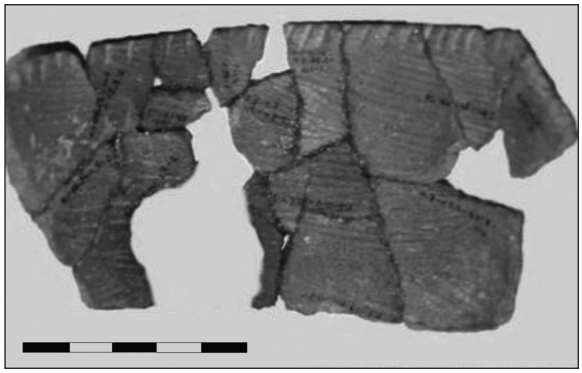

Fig. 11. Internal side of potsherd from the cultural layer 7 of Ust-Karenga 12 site (with grooves).

tery. The general vector of Neolithisation from the eastern part of Asia to the west – proposed about ten years ago (*van Berg 1997; van Berg and Cauwe 1998*) – remains valid today. However, no clear trend has been observed in terms of the time-progressive emergence of pottery from East Asia toward Europe. The possible movement of populations with a pottery-making tradition in Eurasia from the east to the west can not be proved, because of the absence of any scientific evidence of contacts and migrations, such as the exchange of raw materials between East Asia and Siberia. It is quite possible that in several places in Siberia the tradition of pottery-making appeared independently.

On the other hand, some authors (*Dolukhanov 2004. 231–235; Dolukhanov et al. 2005.1456–1457*) have accepted early ^{14}C dates from the pottery sites in East Asia and Siberia, and suggested the spread of pottery-making from the east to the west, reaching the southeastern periphery of Eastern Europe at *c.* 7000 calBC, which roughly corresponds to *c.* 8000 BP (*Reimer et al. 2004.1054*). This conclusion remains quite debatable, and more research is needed in order to understand the spatial-temporal patterns of the Neolithisation of Eurasia.

Fig. 12. Internal side of potsherd from the cultural layer 7 of Ust-Karenga 12 site (with grooves).

It is feasible to see two main trajectories of the Neolithisation process in Eurasia: the 'agricultural' route from the Levant towards Europe (*e.g. Mellaart 1994*), and the 'hunter-gatherer' route from East Asia towards Siberia and Europe (*e.g. van Berg 1997*). They represent two fundamentally different processes: the emergence of food production and the appearance of food containers, and should be treated separately in terms of the meaning of the term 'Neolithisation'. In this case, extreme caution should be taken when one is trying to model the spread of the Neolithic in Eurasia. A recent attempt by Davison et al. (*2006*) (see also *Timofeev et al. 2004.36, 63, 70–72*) seems to mix 'apples and oranges', by determining the Neolithic as an agricultural phenomenon which emerged in the Near East. However, their model (*Davison et al. 2006.648*) shows the spread of the 'Neolithic' from the Levant, where it is dated to *c.* 10 300 BP at Jericho (*e.g. Kuijt and Bar-Yosef 1994*), to the southern and central parts of Eastern Europe about 3000 years after its emergence, *i.e.*, at

ACKNOWLEDGEMENTS

We are grateful to our colleagues who conducted the ^{14}C dating of the Ust-Karenga samples, L. D. Sulerzhitsky (Geological Institute, Russian Academy of Sciences, Moscow, Russia); A. J. T. Jull, G. S. Burr and R. J. Cruz (NSF-Arizona AMS Laboratory, University of Arizona, Tucson, AZ, USA); and G. I. Zaitseva (Institute of the History of Material Culture, Russian Academy of Sciences, St.-Petersburg, Russia). T. I. Nokhrina (Institute of Archaeology and Ethnography, Russian Academy of Sciences, Novosibirsk, Russia) supplied us with some publications about the Neolithic in Western Siberia; and Anastasia V. Abdulmanova (Novosibirsk) helped with preparation of figures. We are pleased to acknowledge Professor M. Budja (University of Ljubljana, Slovenia) for his hospitality and a chance to share knowledge about the Ust-Karenga 12 site with participants at the 13th Neolithic Seminar 'The Mesolithic and Neolithic Cultural and Population Trajectories in Eurasia', in Ljubljana on November 10–12, 2006. This research was supported by the Russian Foundation for Basic Research (RFFI), grants 06–06–80258, 06–06–80108, and 05–06–97208; and by the Russian Foundation for the Humanities (RGNF), grant 06–01–00466A. The Department of Archaeology, University of Ljubljana, kindly provided accommodation for Y. V. Kuzmin during the 14th Neolithic Seminar.

c. 7000 BP, while agriculture was unknown in these regions until at least the beginning of the Bronze Age, *c.* 4500–4000 BP (*e.g. Merpert 1994; Oshibkina 1996b*). This is due to combining two different phenomena, the Levantine-derived 'agricultural' Neolithic and the pottery complexes of 'hunter-gatherer' type originating somewhere in East Asia.

Conclusion

The discovery and excavations of the Ust-Karenga cluster in northern Transbaikal brought to light new data on the emergence of the Neolithic in Siberia. It is evident that cultural layer 7 at the Ust-Karenga 12 site contains the oldest pottery west of the Amur River basin, and it is also one of the earliest ceramic complexes in northern Eurasia, dated to *c.* 12 200–10 700 BP (*c.* 12 200–10 200 calBC). The modelling of the Neolithisation process in Eurasia should be conducted with a more complete understanding of the nature of this phenomenon. In East Asia and Siberia, the origin of the Neolithic is related to the appearance of pottery vessels for storing and processing food in hunter-gatherer communities long before the invention or adoption of agriculture and/or animal husbandry.

∴

REFERENCES

AKSENOV M. P. and VETROV V. M. 1977. Issledovaniya v Gorno-Taezhnykh Raionakh Doliny r. Vitim [Research in the Mountain-and-Taiga Regions of the Vitim River Valley]. In B. A. Rybakov (ed.), *Arkheologicheskie Otkrytiya 1976 Goda*. Nauka Publisher, Moscow: 185–186.

AKSENOV M. P., VETROV V. M., INESHIN E. M., TETENKIN A. V. 2000. Istoriya i Nekotovye Rezultaty Arkheologicheskikh Issledovanii v Basseine r. Vitim (Vitimskoe Ploskogorye i Baikalsko-Patomskoe Nagorye) [History and Some Results of Archaeological Investigations in the Vitim River Basin (Vitim Tableland and Baikal-Patom Highland)]. In G. I. Medvedev (ed.), *Baikalskaya Sibir v Drevnosti. Vypusk 2, Chast 1*. Irkutsk State Pedagogical University, Irkutsk: 4–35.

ASEEV I. V. 2003. *Yugo-Vostochnaya Sibir v Epokhu Kamnya i Metalla* [Southeastern Siberia in the Stone and Metal Ages]. Institute of Archaeology and Ethnography Press. Novosibirsk.

BARNES G. L. 1999. *The Rise of Civilization in East Asia: The Archaeology of China, Korea and Japan*. Thames & Hudson. London.

BUDJA M. 2005. The Process of Neolithisation in South-Eastern Europe: From Ceramic Female Figurines and Cereal Grains to Entopics and Human Nuclear DNA Polymorphic Markers. In Budja M. (ed.), *12th Neolithic Studies. Documenta Praehistorica 32: 53–72*.

2006. The Transition to Farming and the Ceramic Trajectories in Western Eurasia: From Ceramic Figurines to Vessels. In Budja M. (ed.), *13th Neolithic Studies. Documenta Praehistorica 33: 183–201*.

CHARD C. E. 1974. *Northeast Asia in Prehistory*. University of Wisconsin Press. Madison.

DARVILL T. 2002. *The Concise Oxford Dictionary of Archaeology*. Oxford University Press. Oxford.

DAVISON K., DOLUKHANOV P., SARSON G. R., SHUKUROV A. 2006. The Role of Waterways in the Spread of the Neolithic. *Journal of Archaeological Science 33: 641–652*.

DEREVIANKO A. P., KUZMIN Y. V., BURR G. S., JULL A. J. T., KIM J. C. 2004. AMS ^{14}C Age of the Earliest Pottery from the Russian Far East: 1996–2002 Results. *Nuclear Instruments and Methods in Physics Research B 223–224: 735–739*.

DEREVIANKO A. P. and MEDVEDEV V. E. 1995. The Amur River Basin as One of the Earliest Centers of Ceramics in the Far East. In H. Kajiwara (ed.), *Higashi Ajia – Enkaishu no Doki no Kigen*. Tohoku Fukushi University, Sendai: 13–25.

2006. Neolithic of the Nizhnee Priamurye (Lower Amur River Basin). In S. M. Nelson, A. P. Derevianko, Y. V. Kuzmin and R. L. Bland (eds.), *Archaeology of the Russian Far East: Essays in Stone Age Prehistory* (BAR International Series S1540). Archaeopress, Oxford: 123–149.

DOLUKHANOV P. M. 2004. Prehistoric Environment, Human Migrations and Origin of Pastoralism in Northern Eurasia. In E. M. Scott, A. Y. Alekseev and G. I. Zaitseva (eds.), *Impact of the Environment on Human Migration in Eurasia* (NATO Science Series. IV. Earth and Environmental Sciences – Vol. 42). Kluwer Academic Publishers, Dordrecht: 225–242.

DOLUKHANOV P., SHUKUROV A., GRONENBORN D., SOKOLOFF D., TIMOFEEV V., ZAITSEVA G. 2005. The Chronology of Neolithic Dispersal in Central and Eastern Europe. *Journal of Archaeological Science 32: 1441–1458*.

ENDRIKHINSKY A. S. 1974. Vitimskoe Ploskogorye [The Vitim Tableland]. In N. A. Florensov (ed.), *Nagorya Pribalkalya i Zabaikalya*. Nauka Publisher, Moscow: 210–244.

GVOZDETSKY N. A. and MIKHAILOV N. I. 1978. *Fizicheskaya Geografiya SSSR. Aziatskaya Chast* [The Physical Geography of the USSR. Asiatic Part]. Vyschaya Shkola Publisher. Moscow.

JOMON JIDAI SOSOKI [The Incipient Jomon of Japan]. 1996. Toppan-Insatsu Publisher. Yokohama.

KEALLY C. T., TANIGUCHI Y., KUZMIN Y. V. 2003. Understanding the Beginning of Pottery Technology in Japan and Neighboring East Asia. *The Review of Archaeology 24(2): 3–14*.

KEALLY C. T., TANIGUCHI Y., KUZMIN Y. V., SHEWKOMUD I. Y. 2004. Chronology of the Beginning of Pottery Manufacture in East Asia. *Radiocarbon 46: 345–351*.

KHLOBYSTIN L. P. and KONSTANTINOV M. V. 1996. Neolit Zabaikalya [The Neolithic of Transbaikal]. In S. V. Oshibkina (ed.), *Neolit Severnoi Evrazii*. Nauka Publisher, Moscow: 306–310.

KONSTANTINOV M. V. 1994. *Kamenny Vek Vostochnogo Regiona Baikalskoi Azii* [The Stone Age of the Eastern Part of Baikal Asia]. Institute of Social Sciences, Buryat Scientific Centre of Siberian Branch of the Russian Academy of Sciences and Chita State Pedagogical Institute. Ulan-Ude and Chita.

KOSAREV M. F. 1996. Neolit Vostochnogo Zauralya i Zapadnoi Sibiri [The Neolithic of Eastern Trans-Urals and Western Siberia]. In S. V. Oshibkina (ed.), *Neolit Severnoi Evrazii*. Nauka Publisher, Moscow: 253–269.

KOSINTSEV P. A., BOBKOVSKAYA N. E., BESPROZVANNY E. M. 2004. Radiouglerodnaya Khronologiya Arkheologicheskikh Pamyatnikov Taezhnoi Zony Zapadnoi Sibiri [Radiocarbon Chronology of Archaeological Sites in the Taiga Zone of Western Siberia]. In Y. A. Yakovlev (ed.), *Khanty-Mansiisky Avtonomny Okrug v Zerkale Proshlogo*. Tomsk State University, Tomsk and Khanty-Mansiisk: 17–32.

KOVALEVA V. T., USTINOVA E. A., KHLOBYSTIN L. P. 1984. Neoliticheskoe Poselenie Sumpanya IV v Basseine Kondy [The Neolithic Site of Sumpanya IV in the Konda River Basin]. In V. E. Stoyanov (ed.), *Drevnie Poseneniya Urala i Zapadnoi Sibiri*. Urals State University, Sverdlovsk: 32–44.

KRIVONOGOV S. K., TAKAHARA H., KUZMIN Y. V., ORLOVA L. A., JULL A. J. T., NAKAMURA T., MIYOSHI N., KAWAMURO K., BEZRUKOVA E. V. 2004. Radiocarbon Chronology of the Late Pleistocene–Holocene Paleogeographic Events in Lake Baikal Region (Siberia). *Radiocarbon 46: 745–754*.

KRIZHEVSKAYA L. Y. and GADZHIEVA E. A. 1991. Neoliticheskoe Poselenie Sumpanya VI i Ego Mesto v Neolite Vostochnogo Zauralya [The Neolithic Site of Sumpanya VI and its Place in the Neolithic of Eastern Trans-Urals]. In L. Y. Krizhevskaya (ed.), *Neoliticheskie Pamyatniki Urala*. Urals Branch of the USSR Academy of Sciences, Sverdlovsk: 80–99.

KUIJT I. and BAR-YOSEF O. 1994. Radiocarbon Chronology for the Levantine Neolithic: Observations and Data. In O. Bar-Yosef and R. S. Kra (eds.), *Late Quaternary Chronology and Paleoclimates of the Eastern Mediterranean*. Radiocarbon, University of Arizona, Tucson: 227–245.

KUZMIN Y. V. 2002. The Earliest Centres of Pottery Origin in the Russian Far East and Siberia: Review of Chronology for the Oldest Neolithic Cultures. In Budja M. (ed.), *9th Neolithic Studies. Documenta Praehistorica 29: 37–46*.

2003. Introduction: The Nature of Transition from the Palaeolithic to the Neolithic in East Asia and the Pacific. *The Review of Archaeology 24(2): 1–3*.

2006. Chronology of the Earliest Pottery in East Asia: Progress and Pitfalls. *Antiquity 80: 362–371*.

KUZMIN Y. V. and KEALLY C. T. 2001. Radiocarbon Chronology of the Earliest Neolithic Sites in East Asia. *Radiocarbon 43: 1121–1128*.

KUZMIN Y. V. and ORLOVA L. A. 2000. The Neolithization of Siberia and the Russian Far East: Radiocarbon Evidence. *Antiquity 74: 356–364*.

LAPSHINA Z. S. 1999. *Drevnosti Ozera Khummi* [The Antiquities of the Lake Khummi]. Amur Geographic Society. Khabarovsk.

MEDVEDEV V. E. 1995. K Probleme Nachalnogo i Rannego Neolita na Nizhnem Amure [To the Problem of Initial and Early Neolithic in the Lower Amur River Basin]. In A. P. Derevianko and V. E. Larichev (eds.), *Obozrenie Rezultatov Polevykh i Laboratornykh Issledovanyi Arkheologov, Etnografov i Antropologov Sibiri i Dalnego Vostoka v 1993 Godu*. Institute of Archaeology and Ethnography, Novosibirsk: 228–237.

MELLAART J. 1994. Western Asia during the Neolithic and the Chalcolithic (about 12,000–5,000 Years Ago). In S. J.

de Laet (ed.), *History of Humanity. Volume 1. Prehistory and the Beginnings of Civilization*. UNESCO & Routledge, Paris & London: 425–440.

MERPERT N. J. 1994. The European Part of the Former USSR during the Neolithic and Chalcolithic. In S. J. de Laet (ed.), *History of Humanity. Volume 1. Prehistory and the Beginnings of Civilization*. UNESCO & Routledge, Paris & London: 557–569.

NESTEROV S. P., SAKAMOTO M., IMAMURA M., KUZMIN Y. V. 2006. The Late-Glacial Neolithic Complex of the Gromatukha Site, Russian Far East: New Results and Interpretations. *Current Research in the Pleistocene 23: 46–49*.

O'MALLEY J. M., KUZMIN Y. V., BURR G. S., DONAHUE D. J., JULL A. J. T. 1999. Direct Radiocarbon Accelerator Mass Spectrometry Dating of the Earliest Pottery from the Russian Far East and Transbaikal. *Mémoires de la Société Préhistorique Française 26: 19–24*.

OSHIBKINA S. V. 1996a. Ponyatie o Neolite [The Concept of Neolithic]. In S. V. Oshibkina (ed.), *Neolit Severnoi Evrazii*. Nauka Publisher, Moscow: 6–9.

ed. 1996b. *Neolit Severnoi Evrazii* [The Neolithic of Northern Eurasia]. Nauka Publisher. Moscow.

REIMER P. J., BAILLIE M. G. I., BARD E., BAYLISS A., BECK J. W., BERTRAND C. J. H., BLACKWELL P. G., BUCK C. E., BURR G. S., CUTLER K. B., DAMON P. E., EDWARDS R. L., FAIBANKS R. G., FRIEDRICH M., GUILDERSON T. P., HOGG A. G., HUGHEN K. A., KROMER B., MCCORMAC G., MANNING S., BRONK RAMSEY C., REIMER R. W., REMMELE S., SOUTHON J. R., STUIVER M., TALAMO S., TAYLOR F. W., VAN DER PLICHT J., WEYHENMEYER C. E. IntCal04 Terrestrial Radiocarbon Age Calibration, 0—26 Cal Kyr BP. *Radiocarbon 46: 1029–1058*.

SHAHGEDANOVA M., MIKHAILOV N., LARIN S., BREDIKHIN A. 2002. The Mountains of Southern Siberia. In M. Shahgedanova (ed.), *The Physical Geography of Northern Eurasia*. Oxford University Press, New York: 314–349.

SHERRATT A. (ed.). 1980. *The Cambridge Encyclopedia of Archaeology*. Cambridge University Press. Cambridge.

SUSLOV S. P. 1961. *Physical Geography of Asiatic Russia*. W. H. Freeman. San Francisco.

TIMOFEEV V. I. and ZAITSEVA G. I. 1996. Spisok Radiouglerodnykh Datirovok Neolita [The List of the Neolithic Radiocarbon Dates]. In S. V. Oshibkina (ed.), *Neolit Severnoi Evrazii*. Nauka Publisher, Moscow: 337–348.

TIMOFEEV V. I., ZAITSEVA G. I., DOLUKHANOV P. M., SHUKUROV A. M. 2004. *Radiouglerodnaya Khronologiya Neolita Severnoi Evrazii* [The Radiocarbon Chronology of the Neolithic in Northern Eurasia]. Teza Publisher. St.-Petersburg.

TSEITLIN S. M. and ASEEV I. V. (eds.). 1982. *Geologiya i Kultura Drevnikh Poseleniy Zapadnogo Zabaikalya* [Geology and Culture of Ancient Settlements in Western Transbaikal]. Nauka Publisher. Novosibirsk.

USACHEVA I. V. 2001. Stratigraficheskie Pozitsii Neoliticheskikh Tipov Keramiki Poseleniya "VIII Punkt" na Andreevskom Ozere i Nekotorye Obshchie Voprosy Neolita Zauralya [Stratigraphic Positions of the Neolithic Types of Pottery from the "Locality VIII" at the Andreevskoe Lake and Some General Questions of the Neolithic of Trans-Urals]. In V. A. Zakh (ed.), *Problemy Izuheniya Neolita Zapadnoi Sibiri*. Institute of Problems for Development of the North Press, Tumen: 116–133.

VAN BERG P.-L. 1997. Le Céramique et son Décor en Eurasie. *Cahiers de l'Association pour la Promotion de la Recherche Archéoloqique en Alsace (Supplément 1997): 223–264*.

VAN BERG P.-L. and CAUWE N. 1998. The Early Pottery in Northern Asia: Relations with the European Peninsula. In A. P. Derevianko (ed.), *Paleoekologiya Pleistotsena i Kultury Kamennogo Veka Severnoi Azii i Sopredelnykh Territorii. Tom 2*. Institute of Archaeology and Ethnography Press, Novosibirsk: 464–475.

VETROV V. M. 1982. Kulturnye Razlichiya Arkheologicheskikh Pamyatnikov Verkhnego i Srednego Techeniya Vitima [Cultural Differences of the Archaeological Sites in the Upper and Middle Courses of the Vitim River]. In G. I. Medvedev (ed.), *Problemy Arkheologii i Etnografii Sibiri* (*Tezisy Dokladov k Regionalnoi Konferentsii*). Irkutsk State University, Irkutsk: 78–79.

1985. Keramika Ust-Karengskoi Kultury na Vitime [The Pottery of Ust-Karenga Culture at Vitim River]. In P. B. Konovalov (ed.), *Drevnee Zabaikalye i Ego Kulturnye Svyazi*. Nauka Publisher, Novosibirsk: 123–130.

1986. Stratigrafiya i Problemy Periodizatsii Arkheologicheskikh Pamyatnikov Verkhnego Vitima [Stratigraphy and Problems of Periodization of Archaeological Sites in the Upper Vitim River Basin]. In I. N. Rezanov (ed.), *Chetvertichnaya Geologiya i Pervobytnaya Arkheologiya Yuzhnoi Sibiri (Tezisy Dokladov Vsesouznoi Konferentsii). Tom 2*. Buryat Scientific Centre of Siberian Branch of the Russian Academy of Sciences, Ulan-Ude: 49–53.

1995a. The Ancient Cultures of the Upper Vitim: Early Pottery. In H. Kajiwara (ed.), *Higashi Ajia – Enkaishu no Doki no Kigen*. Tohoku Fukushi University, Sendai: 31–35.

1995b. Reztsy i Nukleusy Ust-Karengskoi Arkheologicheskoi Kultury (Opyt Tipologii) [The Biruns and Cores of the Ust-Karenga Archaeological Culture (Attempt of Typology)]. In G. I. Medvedev (ed.), *Baikalskaya Sibir v Drevnosti*. Irkutsk State University, Irkutsk: 30–44.

1997. Ust-Karengskaya Kultura i ee Mesto v Sisteme Arkheologicheskikh Pamyatnikov Sopredelnykh Territoriy [The Ust-Karenga Culture and its Place in the System of Archaeological Sites in Neighbouring Regions]. In B. D. Pak (ed.), *Vzaimootnosheniya Narodov Rossii, Sibiri i Stran Vostoka: Istoriya i Sovremennost. Kniga 2*. Irkutsk State University, Moscow, Irkutsk and Taegu: 176–180.

2000. Arkheologiya Kamennogo Veka Vitimskogo Ploskogorya (Kultura i Khronologiya) [The Stone Age Archaeology of the Vitim Tableland (Culture and Chronology)]. In M. G. Turov (ed.), *Arkhaicheskie i Traditsionnye Kultury Severo-Vostochnoi Asii: Problemy Proiskhozhdeniya i Transkontinentalnykh Svyazei*. Irkutsk State University, Irkutsk: 28–36.

2006. Problemy Skhodstva v Tekhnike Izgotovleniya i Ornamentatsii Sosudov Rannykh Keramicheskikh Kompleksov Severnoi Evrazii [Problems of Similarity in Techniques of Making and Ornamentation for Vessels from the Early Pottery Complexes in Northern Eurasia]. In A. P. Derevianko and V. I. Molodin (eds.), *Sovremennye Problemy Arkheologii Rossii. Tom 1*. Institute of Archaeology and Ethnography Press, Novosibirsk: 173–176.

VETROV V. M., INESHIN E. M., REVENKO A. G., SEKERIN A. P. 2000. Artefakty iz Ekzoticheskikh Vidov Surya na Arkheologicheskikh Pamyatnikakh Vitimskogo Basseina [Artefacts Made of Exotic Raw Materials on Archaeological Sites of the Vitim River Basin]. In G. I. Medvedev (ed.), *Baikalskaya Sibir v Drevnosti. Vypusk 2, Chast 1*. Irkutsk State Pedagogical University, Irkutsk: 98–116.

VETROV V. M., INESHIN E. M., MIRONOV A. Y., TRIFONOV A. P. 1978. Issledovaniya v Doline r. Vitima [Research in the Vitim River Valley]. In B. A. Rybakov (ed.), *Arkheologicheskie Otkrytiya 1977 Goda*. Nauka Publisher, Moscow: 216.

VETROV V. M. and KUZMIN Y. V. 2005. K Istorii Izucheniya Drevnei Keramiki na Verkhnem Vitime [To the History of Study of the Ancient Pottery in Upper Vitim River]. In A. V. Kharisnky (ed.), *Sotsiogenez v Severnoi Azii. Chast 1*. Irkutsk State Technical University, Irkutsk: 59–63.

VETROV V. M., KUZMIN Y. V., BURR G. S. 2006. The Final-Pleistocene Pottery of Siberia: Ust'-Karenga 12 Site Case Study. *Current Research in the Pleistocene 23: 49–51*.