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## **TRACING THE BOUNDARY: SOUTHERN PERIPHERY OF THE NEOLITHIC ASBESTOS WARE**

The paper summarizes the current data on Neolithic Asbestos Ware at the southern periphery of its distribution – the Karelian Isthmus and the southern Ladoga area, north-western Russia, to study communication networks within the territory of this phenomenon and to trace its southern border.

Morphology and ornamentation of pottery with asbestos temper from 33 sites (including very recent discoveries) was analysed and compared with the characteristics of the defined Asbestos Ware types. All the main types of Neolithic Asbestos Ware defined on the territory of Finland – Early Asbestos Ware, Typical Combed Ware with asbestos, Kierikki, Pöljä – are presented in Karelian Isthmus including its southern part. Those territories were well connected with the “core” of the Asbestos Ware tradition in the Saimaa area from the beginning of its appearance. Asbestos Ware from the southern Ladoga shore sites resembles both western and eastern (Karelian) traditions, shows some common traits with Volosovo culture from the Upper Volga and ceramics from Modlona sites from Vologda region, but also has local peculiarities. Analysis of sites distribution shows that the southern boundary of spreading of the Late Neolithic Asbestos Ware follows that of the Early Asbestos Ware and the Late Sperrings (Ka1:2) Ware. Although many spatial and chronological differences in material culture, subsistence strategies and communication networks are visible within time and space frames of the Asbestos Ware phenomenon, it may be assumed that the use of the asbestos temper could be indicative of cultural relations that united certain territories.

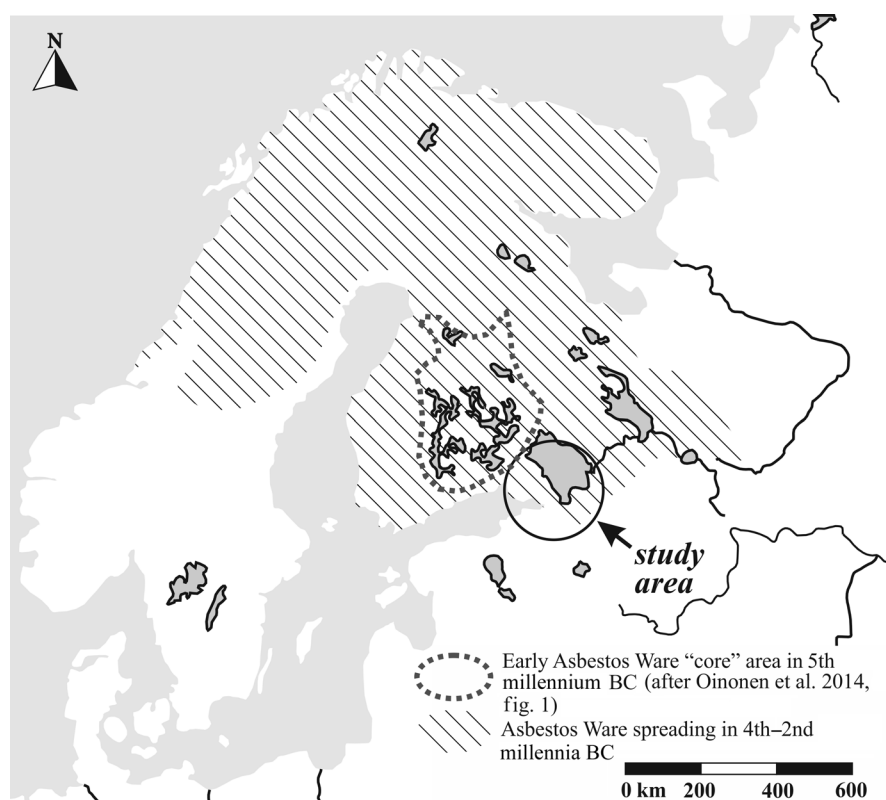
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### **Introduction**

The tradition of making pottery with admixture of asbestos seems to be a unique phenomenon of Fennoscandia and neighbouring regions (Fig. 1). Asbestos Ware (in this paper, the term is used for any pottery with asbestos



**Fig. 1.** Distribution of Neolithic Asbestos Ware in Fennoscandia and north-western Russia (modified from Oshibkina 1966; Jørgensen & Olsen 1988, 4, fig. 1; Zhul'nikov 1999; 2005; Nedomolkina 2007).

temper) seems to appear in the 1st half of the 5th millennium cal BC in the Saimaa area in Finland, next to large asbestos outcrops – the “core area” of the tradition (Oinonen et al. 2014, 1420, fig. 1). But later in the 2nd half of the 4th and in the 3rd millennium BC Asbestos Ware spread throughout a huge region from northern Sweden to Arkhangelsk area in Russia. Although natural sources of asbestos are found in many places around the world, for now, beyond the above-mentioned territory, there is no known Neolithic tradition of making pottery with intentionally admixed asbestos. There are rare mentions of asbestos temper in ancient pottery in the Urals (Voevodskij 1936, 56), talc and mica were also used as temper there (Kosarev 1978, 182; Myl'nikova 2015, 27). The evidence of occasional use of asbestos temper was mentioned for the prehistoric Korean pottery (Kim 1962). However, no long-living tradition of making Asbestos Ware emerged there, even though there is plenty of natural asbestos.

Due to its properties, or rarity and prestige, or any other reason, in the Neolithic, asbestos was transported far from natural outcrops to be used as temper for making pottery. The approximate distance for the discussed region of the Karelian Isthmus is 200–300 km from the southern border of large

anthophyllite deposit in Lake Saimaa region (Lavento & Hornytzkjy 1996, 52) and 200–250 km from Ignoila (Korud-Järvi), chrysotile-asbestos occurrence to the east of Onega Lake. Archaeological sites with asbestos-tempered pottery of Modlona type in Vologda region are the most remote from natural asbestos deposits, with the distance of up to 700 km.

Asbestos-tempered pottery in Finland and Karelia was first described already at the beginning of the 20th century (Ailio 1909; Tallgren 1914; Pälsi 1915). Later several types of Asbestos Ware of a different chronological period were also defined (Meinander 1954; Siiriäinen 1967).

General classification and periodization of Asbestos Ware from Finland was given by Christian Carpelan (1979). He described two types of Early Asbestos Ware – Kaunissaari and Early Comb Ware with asbestos or Ka 1:2(asb); Typical Comb Ware with asbestos (TCW(asb)); several Late Neolithic types: Kierikki, Pöljä and Jysmä; Sarsa-Tomitsa pottery for the Early Metal Epoch; and the Early Iron Age Säräisniemi 2 Ware, including Kjelmoj, Anttila, Sirnihta and Luukonsaari groups.

Asbestos Ware was also quite extensively studied in Karelia (Bryusov 1940; Gurina 1961; Pankrushev 1978). Classification and chronology of Karelian Asbestos Ware was developed by Aleksandr Zhulnikov, based on materials from “sealed” archaeological contexts obtained through the excavation of numerous prehistoric dwellings in the Onega and the White Sea basins (Zhul’nikov 1999). For Karelian Eneolithic period, he defined Voynavolok, Orovnalok, and Palayguba Asbestos Ware types (4th–2nd millennia).

At the eastern periphery of the Asbestos Ware distribution, it is found in archaeological contexts of Modlona type in Russian Vologda and Arkhangelsk regions, also in the materials of Volosovo culture (Oshibkina 1966, 37; 1978, 128; Krajnov 1987, 27).

Morphology, peculiarities of formation technique and decoration of pottery with asbestos differ depending on territory and period and can hardly be considered as the same pottery tradition. In this paper, the term “pottery tradition” means a stable set of features in ceramics that characterizes certain technological methods of making a pot, its specific morphology, and decoration. Different ceramic types can be variants of the same large tradition or represent different traditions, depending on the degree of similarity.

The classification of Finnish Stone Age pottery is based on well-defined local pottery groups, mainly from the southern and coastal territories (Europaeus-Äyräpää 1930; Carpelan 1979; Vikkula 1981; Siiriäinen 1984; Pesonen 1999; Nordqvist 2015). This classification is widely used today, although significant varieties within distinguished classical types, as well as the obscurity of their definitions, was recently pointed out (Mökkönen & Nordqvist 2017; Nordqvist 2018). Less studied pottery with asbestos from northern and interior areas is generally referred to as “Asbestos” or “Asbestos and Porous-Ware” (Nordqvist et al. 2012, 7).

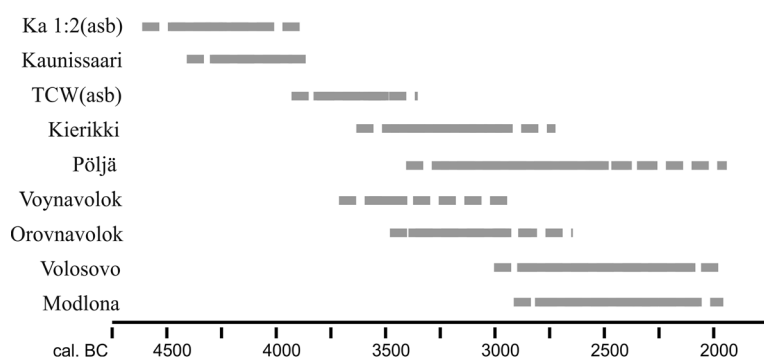
Because different criteria were used to define Neolithic asbestos-tempered pottery types in Finland and Karelia, comparing those types is associated with

many difficulties. Later, comparison of Asbestos Ware types defined by different researchers for different regions, on various methodological principles, revealed some common traits in pottery types from Karelia and Finland (Carpelan 1979; Lavento & Hornytzkyj 1996; Zhul'nikov 1999; Zhulnikov et al. 2012; Mökkönen & Nordqvist 2017). Despite regional peculiarities, the existence of certain stylistic-chronological “horizons” (Kierikki / Voynavolok, Pöljä / Orovnavolok) is generally accepted.

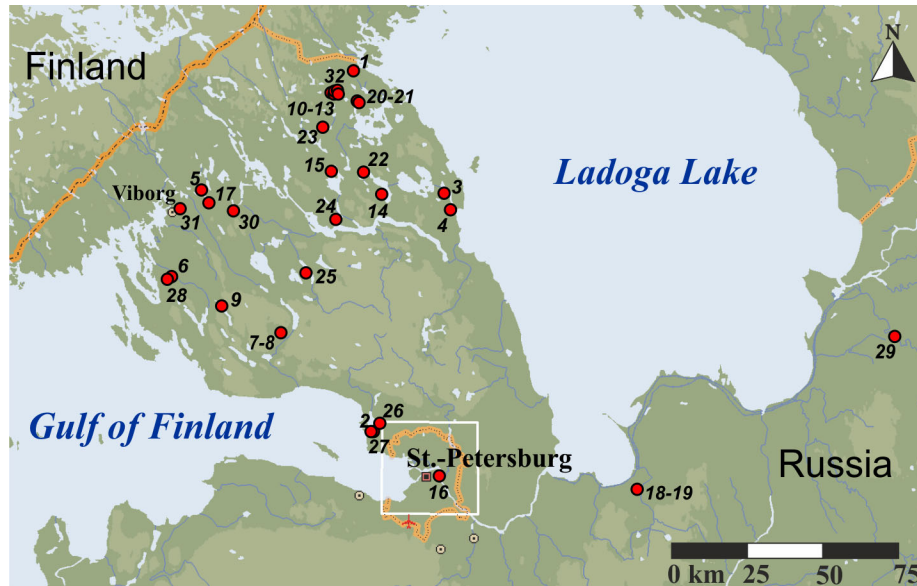
According to regional archaeological periodization, co-existing pottery types could belong to different archaeological periods (e.g. the Late or Final Neolithic in Finland and Estonia are chronologically equal to the Early Metal Period in the Eastern Gulf of Finland (Gerasimov & Krijska 2013, 13, fig. 1; Nordqvist & Mökkönen 2017, 79, fig. 1; Tarasov et al. 2017, 101, fig. 1). Development of radiocarbon dating methods made it possible to chronologically compare these archaeological materials.

Chronological frames of different types of Asbestos Ware from Finland and Karelia (Fig. 2) were recently sufficiently improved by a series of AMS dates (Pesonen et al. 2012; Oinonen et al. 2014; Nordqvist & Mökkönen 2017; Tarasov et al. 2017). However, geographical distribution of this phenomenon was not in the focus of study for a while, even though some new maps of cultural areas were recently published (Nordqvist & Mökkönen 2017, 81). The most recent review of archaeological contexts with Asbestos Ware distant from the mineral sources (Zhul'nikov 2006) was made almost 15 years ago. Since then, new archaeological contexts with Asbestos Ware were studied on the Karelian Isthmus and in the southern Ladoga area; in addition to that, intensive archaeological surveys were conducted at the southern shore of the Gulf of Finland, next to the Russian-Estonian border.

Based on updated data, this paper discusses the southern periphery of Asbestos Ware tradition that includes the Karelian Isthmus and the southern Ladoga area (Fig. 3) and the boundary of its spreading for different chronological



**Fig. 2.** Estimated chronology for the main Neolithic-Eneolithic Asbestos Ware types (by Pesonen 1996; Nedomolkina 2000; Utkin & Kostyleva 2006; Piezonka et al. 2013; Oinonen et al. 2014; Mökkönen & Nordqvist 2017; Nordqvist & Mökkönen 2017; Tarasov et al. 2017; Nordqvist 2018; Macãne et al. 2019).



**Fig. 3.** Map of the sites with Neolithic Asbestos Ware on the Karelian Isthmus and the southern Ladoga area. Numbers correspond to the Table 1.

periods. This required tracing the south-western boundary of geographical distribution of archaeological contexts with Asbestos Ware, typological attribution of pottery with asbestos from analysed contexts, and considering transformations of prehistoric communication networks.

Chronological frames of the study were defined in accordance with the chronology of the Stone Age Asbestos Ware in the studied area (5th–3rd millennia BC).

### Data sources and classification approach

Today, over 30 archaeological sites with Asbestos Ware are known in the Karelian Isthmus and the southern Ladoga area (Fig. 3, Table 1). This is not much compared to Finland and Karelia, but the discussed area is on the periphery of the Asbestos Ware distribution and located as far as some 300–400 km from the asbestos outcrops.

Many archaeological collections with Asbestos Ware were obtained in the northern part of the Karelian Isthmus at the beginning of the 20th century (Viipuri Häyrynmäki, Viipuri Kärstilä Selänkangas, Kaukola Kyöstälänharju, Kaukola Nököpelto, Räisälä Pitkäjärvi, Johannes Kaijala Väntsi and others), now they are stored in the National Museum in Helsinki, Finland – KM (Ailio 1909; Pälsi 1915; Europaeus-Äyräpää 1930; Äyräpää 1934, 51; Huurre 2003, 154 ff.). These collections also originate mainly from mixed archaeological contexts containing pottery of different types and chronological periods that can be separated only by typological criteria. Developing of AMS method of radiocarbon

Table 1. Sites with Neolithic Asbestos Ware on the Karelian Isthmus and the southern Ladoga area

Site name	Pottery type	<sup>14</sup> C dates	Storage place	Analysed fragments with asbestos (min vessels N)	Typological attribution	Analysed fragments without asbestos (min vessels N)	Other ceramic types recognized on the site
1 Berezovo 2	Kierikki, Pöljä, TCW(asb)		MAE	300 (14)	This study	2504 (?)	TCW, LCW
2 Glinjanyj Ruchej	Kaumissaari		MAE	2 (1)	This study	35 (4)	Sperrings
3 Gusinoje 3 (Pyhäjärvi Vanhasniemi 2)	Pöljä		MAE	2 (1)	This study	49 (1)	LCW
4 Gusinoje 6 (Pyhäjärvi Ristilä 1)	Pöljä		MAE	1 (1)	This study	299 (4)	LCW, Corded Ware
5 Gvardejskoje 1	Pöljä	2900–2673 (4205 ± 35, GrA-62068), charred crust on Pöljä potsherd (Nordqvist 2018)	MAE	75 (5)	This study	242 (8)	LCW, Corded Ware
6 Johannes Kajjala Väntsi	Kierikki; Pöljä	3940–3370 BC (4870 + 85, Hela-465), charred crust on Kierikki potsherd (Huurre 2003)	KM	16	Huurre 2003, 154; Nordqvist et al. 2008, 295; this study	29	Sperrings, TCW, LCW, Pitted Ware, Pyheensilta, Corded Ware, Kiukainen
7 Kanneljärvi 1	Pöljä		MAE	7 (1)	This study	2687 (97)	Sperrings, TCW, LCW, Corded Ware, EMP
8 Kanneljärvi 2	Pöljä		MAE	20 (2)	This study	64 (7)	LCW
9 Kaukjärvi Kelonen (Kamenka 1)	Indefinable		KM, MAE	1	Huurre 2003, 156; this study	157	Sperrings, TCW, LCW, Corded Ware
10 Kaukola Kankaanmäki (Riukjärvi 2)	Indefinable		KM	?	Nordqvist et al. 2008, 299	?	Sperrings, TCW, LCW, Pitted Ware, Corded Ware, Kiukainen, EMP
11 Kaukola Kyöstälänharju	Kal.2(asb)		KM	?	Nordqvist et al. 2008, 301	?	Sperrings, TCW, LCW, Pitted Ware, EMP
12 Kaukola Nököpelto (Riukjärvi 8)	Indefinable		KM	?	Nordqvist et al. 2008, 300	?	TCW, EMP
13 Kaukola Tiitummäki Vaapa	Pöljä		KM	?	Nordqvist et al. 2008, 302	?	Sperrings, TCW, LCW, EMP

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Table 1. Continued

Site name	Pottery type	<sup>14</sup> C dates	Storage place	Analysed fragments with asbestos (min vessels N)	Typological attribution	Analysed fragments without asbestos (min vessels N)	Other ceramic types recognized on the site
14 Komsomolskoje 3 (Pyhäjärvi Kunnianniemi 1)	Pöljä	2580–2340 BC (3955 ± 35, Hela-1844), burnt bone from a pit with Pöljä Ware; 2840–2470 BC (4030 ± 35, Hela-1819), charred crust on Pöljä potsherd (Seitsonen et al. 2012)	MAE	28 (1)	This study	5222 (21)	Sperrings, TCW, LCW, Corded Ware, EMP
15 Novoselki 5 (Räisälä Seppälä 2–4)	Kierikki		MAE	27 (1)	This study	–	No
16 Okhita 1	Kierikki / Vojnavolok; Pöljä / Orovnavolok; TCW(اسب) Kierikki	3500–2000 BC series of <sup>14</sup> C dates (Kul'kova et al. 2014)	MAE	130	Kul'kova & Gusentsova 2012	?	Sperrings, TCW, LCW, Corded Ware
17 Ozernoje 3			MAE	2 (1)	This study	27 689 (109)	Sperrings, TCW, LCW
18 Podolye 1	Modlona (?)	3700–2200 BC series of <sup>14</sup> C dates (Kul'kova et al. 2016)	MAE	137 (16)	This study	4493 (88)	TCW, LCW
19 Podolye 3	Not defined		MAE	?	Gusentsova & Kul'kova 2016, 388	?	TCW, LCW
20 Protochnoje 2 (Kaukola Pontuksenhauta 2)	Indefinable		MAE	1	Gerasimov 2006, 48	–	No
21 Protochnoje 3 (Kaukola Rupun kangas 4)	Indefinable		MAE	1	Gerasimov 2006, 49	13	TCW
22 Pyhäjärvi Komitsa Aijö, Antti Aijö	Pöljä		KM	?	Huurte 2003, 156	?	Sperrings, TCW, LCW
23 Räisälä Virrola Pitkäjärvi	Pöljä		KM	21	Nordqvist et al. 2008, 320, this study	87	Sperrings, TCW, LCW, Pitted Ware, EMP
24 Romashki (Sovinihti) Kaunissaari			MAE	1	This study	8	TCW

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Table 1. Continued

Site name	Pottery type	<sup>14</sup> C dates	Storage place	Analysed fragments with asbestos (min vessels N)	Typological attribution	Analysed fragments without asbestos (min vessels N)	Other ceramic types recognized on the site
25 Silino (Muolaa Telkkälä)	Kierikki	3340–2910 BC (4430 ± 65, AAR-7130), charred crust on Kierikki potsherd	MAE	5 (1)	This study	3150 (32)	Sperrings, TCW, LCW
26 Sosnovaja Gora	Indefinable		MAE	1 (1)	This study	365 (11)	TCW, LCW
27 Tarkhovka	Kaunissaari		MAE	2 (1)	This study	486 (58)	LCW
28 Tokarevo 1	TCW(asb)		MAE	1	This study	1276	TCW, LCW
29 Ust-Rybezna 2	Orovnavolok		MAE	1	Gurina 1961, 468; Yushkova 2011, 32	?	EMP
30 Veschevo 1 (Heinjoki Latukangas 1)	Indefinable		MAE	?	Timofeev & Gerasimov 2002, 63	?	Sperrings, TCW, LCW
31 Viipuri Kärsilä Häyrymäki	Pöljä		KM	?	Meinander 1954, 151; Lavento 2001, 255	?	Sperrings, TCW, LCW, Corded Ware
32 Viipuri Kärsilä Selänkangas	Kal:2(asb)		KM	?	Äyräpää 1934, 51; Pesonen 1996, 10	?	Sperrings, LCW, Corded Ware
33 Vuoksenranta Sintola	Early Asbestos Kal:2(asb)		KM	?	Huurre 2003, 157	?	TCW

MAE = Museum of Anthropology and Ethnography /Kunstkamera/ of the Russian Academy of Sciences, Saint Petersburg, Russia; KM = National Museum, Helsinki, Finland; TCW = Typical Combed Ware; LCW = Late Combed Ware.



dating allowed direct dating of foodcrust on pottery with asbestos from old collections (Pesonen 2004; Seitsonen et al. 2012, 105 ff.).

In the southern part of the Isthmus, two sites with Asbestos Ware – Tarkhovka and Glinyanyi Ruchey – were discovered and studied in the beginning of the 20th century, at the southern shore of the Sestroretskiy Razliv Lake (Sosnovskij & Zemlyakov 1917; Sosnovskij 1935, 24; Zemlyakov 1941, 158). There were no full-scale excavations at those sites, and today those sites are totally destroyed (Gerasimov 2003; 2006). These contexts are represented by very scarce materials obtained from those sites and now stored in the Kunstkamera Museum (Saint Petersburg, Russia).

In the 1960s–70s, the central part of the Karelian Isthmus was surveyed by a schoolteacher V. M. Sokolov, who discovered Kanneljärvi 1 and 2 sites and collected archaeological material from the shoreline at Kamenka 1 (Kaukjärvi Kelonen) site (Gurina 1961, 421; Timofeev 1993, 9; Gerasimov et al. 2003, 30; Mökkönen & Nordqvist 2006). More sites with Asbestos Ware were found in the beginning of the 21st century, in the course of a sequence of international multidisciplinary research projects that involved Russian, Finnish, and Estonian institutions (Gerasimov et al. 2018a): Protochnoje 2–3 (Pontuksenhauta 1–2, Rupunkangas-1, 2, 4), Novoselki 5 (Seppälä 2, 4), Komsomolskoje 3 (Pyhäjärvi Kunnianniemi 1), Gusinoje 3 (Pyhäjärvi Vanhasniemi 2), Gusinoje 6 (Pyhäjärvi Ristilä), Ozernoje-3, Gvardeyskoye 1 (Gerasimov et al. 2007a, 2007b; 2008).

About 10 000 sqm of Neolithic – Early Metal epoch cultural layer have been studied in Okhta 1 site in Saint Petersburg in 2007–2013 by Tatyana M. Gusentsova (Sorokin et al. 2009a; 2009b; Kul'kova et al. 2010; Sorokin 2011); the materials including Porous and Asbestos Ware were partly published (Kul'kova & Gusentsova 2012; Gusentsova & Kholkina 2015). Large collections including Asbestos Ware were also obtained on Podolye 1 and 3 sites in the southern Ladoga region (Gusentsova & Kholkina 2015; Kholkina 2016; Kul'kova et al. 2016).

A representative archaeological collection including Asbestos Ware was obtained from Berezovo 2 site, in the very north-western corner of the Karelian Isthmus, adjacent to the north-western Ladoga Area (Gerasimov et al. 2018b). The site was studied in 2018 by 1700 sqm excavation area that covered the whole site extension. The archaeological collection consists of Late Mesolithic, Middle, and Late Neolithic materials (Gerasimov et al. 2018b).

In addition to Okhta 1 and Podolye sites, with thousands of Asbestos Ware sherds (at least 130 vessels in Okhta and at least 16 vessels from Podolye 1), materials from the sites excavated in the 2nd half of the 20th – beginning of the 21st century are rather scarce, resulting from stray finds, cleanings and testpits, or small-scale trial excavations. Some collections include only a few sherds large enough to be used for studying technological, morphological, and ornamentation peculiarities.

Anyway, at least part of the studied material can be attributed to representative Asbestos Ware types described in publications. Main characteristics of Asbestos Ware types that were recognized on the Karelian Isthmus are represented in Table 2. The only exception is Typical Comb Ware with asbestos, as its only

**Table 2.** Main characteristics of Neolithic asbestos-tempered pottery types recognized on the Karelian Isthmus and the southern Ladoga area

Type	Temper	Rim/bottom shape	Elements of decoration	Decoration patterns	Other	Source
Ka I: 2 asb	Asbestos, rarely – talc or mica	Rim is straight or Γ-shaped, inwards thickening; unprofiled	Comb stamp	“Herring bone”, zigzags	Decoration is shallow, the vessel is decorated from top to the bottom	Pesonen 1996
Kaunissaari	Asbestos	Rim is straight or thickened; bottom is rounded; slightly profiled	Bone impressions, oval pits	Horizontal rows of elements	Decoration is more sharp-cut and deeper than for Ka I: 2 asb	Pesonen 1996
Kierikki	Asbestos	Rim is straight or thickened; bottom is rounded; unprofiled	Long and thin comb stamp, shallow pits, drawn lines	Horizontal rows of elements, zigzag, horizontal zigzag, triangles	A lot of space is left empty; the surface is smoothed	Siirriäinen 1967; 1984, 30; Mökkönen & Nordqvist 2017, 86
Vojnavolok	Asbestos and bird feather	Rim is straight or thickened; bottom is rounded; unprofiled	Comb stamp, shallow pits, other stamps	Geometric patterns absolutely prevails, zigzag stripes and rhombs	The inner surface is often striated	Zhul'nikov 1999
Pölja	Asbestos	Rim is Γ-shaped; bottom is rounded; unprofiled	Comb stamp, wound-cord stamp	Horizontal rows of elements	Decoration is shallow, irregular, the surface is smoothed or striated; there are textile imprints	Meinander 1954, 162
Early Orovnavolok	Asbestos and bird feather, shells	Rim is straight, thickening or slanting	Comb stamp, stick impressions, shallow pits, drawn lines	Horizontal rows of elements, zigzag stripes, vertical zigzag	Inner surface is often striated	Zhul'nikov 1999
Late Orovnavolok	Asbestos, sometimes only organics	Rim is Γ-shaped, straight, outwards slanting; bottom is flat or rounded	Mostly comb stamp	Vertical zigzag prevails	Inner surface is often striated	Zhul'nikov 1999
Palajiguba	Asbestos, rarely organics	Rim is Γ-shaped, straight or bent outwards; bottom is flat	Mostly comb stamp, also cord impressions, stick impressions and shallow pits	Vertical and horizontal zigzag, horizontal line, horizontal rows of comb stamp imprints	Inner surface is sometimes striated	Zhul'nikov 1999
Volosovo	Bird feather, shells, occasionally asbestos?	Rim is straight, thickening or slanting outwards; bottom is rounded or flat; unprofiled	Comb stamp, round pits, stick impressions, shallow pits, double comb stamp	Horizontal rows of elements, “net pattern”, “herring bone”, rhombs or triangles, zigzags	Sometimes textile or net imprints on inner or outer surface	Krajnov 1981; 1987; Emel'yanov 2005; Petrova 2008; Tsetlin 2008
Modlona	Shells, undefined organics (rarely – bird feather), asbestos	Rim is thickened inwards or outwards	Comb stamp, rarely – shallow pits and double comb stamp	“Herring bone”, zigzags, vertical patterns	A lot of empty space, decoration is mostly in the upper part	Oshibkina 1966; 1978

difference from Typical Comb Ware is temper (Carpelan 1979, 13). Those characteristics were used to classify the analysed pottery.

Most of the material mentioned in Table 1 was analysed in the course of this study. Clay mass was analysed visually, with a hand magnifier ( $\times 8$ ) and scanning microscope Leica DVM 5000 ( $\times 35$ – $\times 70$ ) in “Geomodel” research park of Saint Petersburg State University. The sherds that were broken at the junctions of structural elements of vessels were analysed to recognize pot-making technique (use of coils or patches). Reconstruction of vessel shapes is based on the analysis of preserved profiled fragments, mainly rims and bottoms. Decoration was analysed at the following structural levels: morphology of decoration elements, combinations of elements used, arrangement of elements in motifs and compositions.

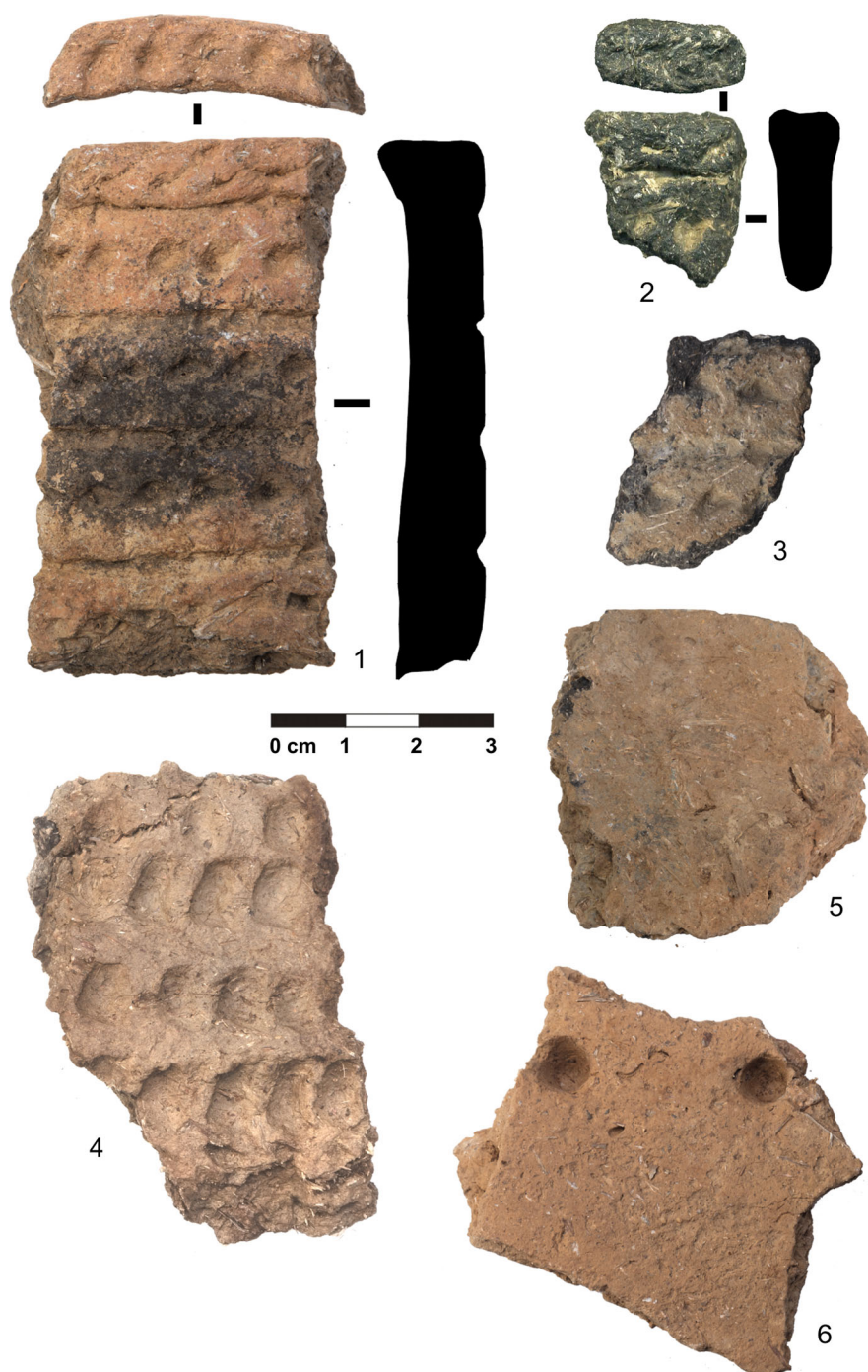
### **Asbestos Ware from the Karelian Isthmus and the southern Ladoga area**

Early Asbestos Ware (Ka1:2(asb) on Karelian Isthmus was identified in Kerstilä Selänkangas (Äyräpää 1934, 51; Pesonen 1996, 10) and Kaukola Kyöstälänharju sites (Nordqvist et al. 2008, 301). Several sherds were found in the collections of Tarkhovka (Fig. 4: 2–3) and Glinyanyi Ruchey (Fig. 4: 1). Those sherds have no other temper but asbestos, the rim is slightly bended inside, the surface was smoothed. Ornament of rows of pits alternated with lines was made with a “retreating” shovel. This ornament resembles one typical for Kaunissaari Early Asbestos Ware in Finland (Pesonen 1996, fig. 5: 3). One more sherd of the Early Asbestos Ware (Fig. 4: 4) that resembles Kaunissaari type (Pesonen 1996, fig. 6: 4, 6) was found by Dr Stanislav Belskiy (MAE RAS) in Sovinlahti (Karelian Isthmus) in 2019, but that one came from a stray find, and no cultural layer was defined in the vicinity.

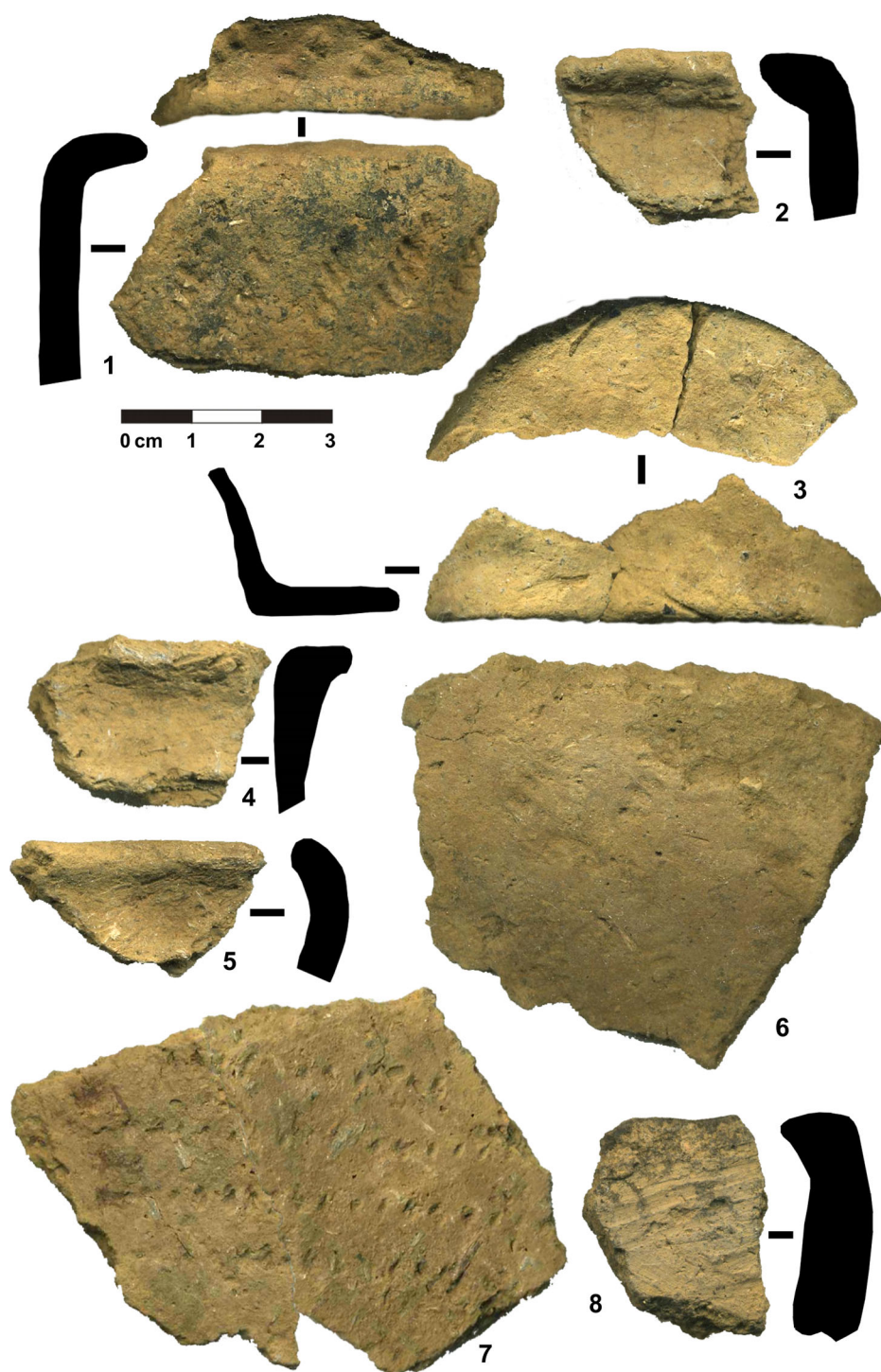
Several sherds of Typical Combed Ware (by morphology and ornamentation), but with asbestos temper, were found in Okhta 1 and Berezovo 2 (Fig. 4: 5) sites.

Pottery resembling Kierikki type was revealed in Silino (Muola Telkkälä) and Novoselki 5 (Räisälä Seppälä – Fig. 4: 6) sites. It includes asbestos temper combined with feather and down, has well-smoothed surface and is ornamented with rows of deep conical pits. Kierikki Ware was also defined in Kajala Väntsi site (Nordqvist et al. 2008, 295) and similar pottery was described in Okhta 1 materials (Kul’kova & Gusentsova 2012).

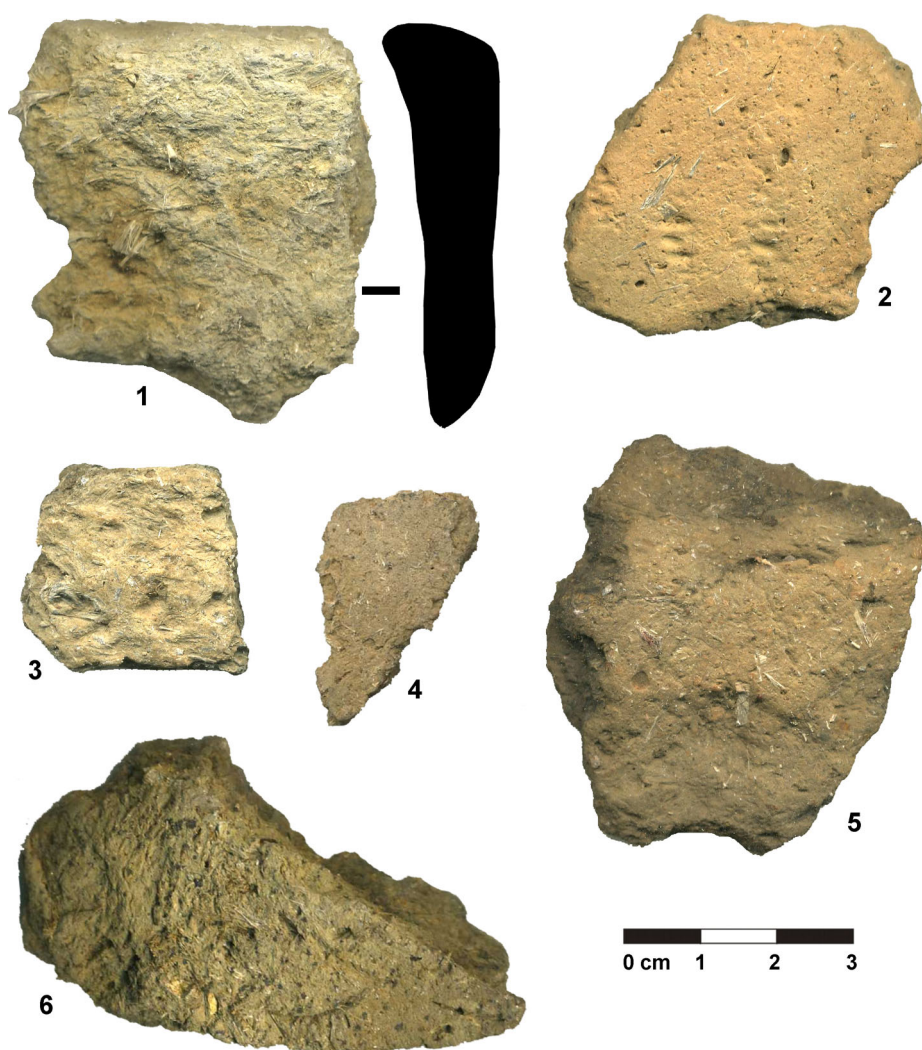
The widest-spread type of Asbestos Ware in the research area seems to be Pöljä (Table 1, Figs 4–6). It is not easy to confidently define such pottery, because studied sherds are often poorly preserved, and the criteria of the Pöljä type definition are uncertain. The sherds may contain asbestos temper only, or else asbestos combined with feather and shells. Rims bended inwards under strait angle that characterize the type are only present in a few cases. At least two vessels from Gvardeyskoye 1 site had flat bottoms 7–8 mm thick (Fig. 5: 3). Surfaces were scratched. Ornamentation consists of “wound cord” imprints or small shallow pits (Fig. 5: 7). There are no deep conical pits. Imprints that



**Fig. 4.** Early Asbestos Ware (1–4), TCW(asb) (5) and Kierikki Ware (6) from Karelian Isthmus. 1 – Glinjanyj Ruchej, 2–3 – Tarkhovka, 4 – Romashki, 5 – Berezovo 2, 6 – Novoselki 5 (Räisälä Seppälä 2–4).



**Fig. 5.** Pöljä Ware from Karelian Isthmus. 1–7 – Gvardejskoje 1, 8 – Kanneljärvi 2.



**Fig. 6.** “Pöljä-like” and unidentified Asbestos Ware from Karelian Isthmus. 1 – Komsomolskoje 3 (Pyhäjärvi Kunnianniemi 1), 2–3 – Kaukola Nököpelto (Riukjärvi 8), 4 – Ozernoje 3, 5 – Kanneljärvi 1, 6 – Silino (Muolaa Telkkälä).

resemble “Textile” ornament were found on a sherd with asbestos temper from Räisälä Pitkjärvi site (KM 6939: 99, 160).

Asbestos Ware from Okhta 1 and Podolye 1 sites bears some peculiarities. The pottery collection from Okhta 1 site is much larger and more diverse than that from Podolye 1 site. Moreover, almost all the pottery groups defined in Okhta 1 have parallels in Podolye 1 materials (Gusentsova & Kholkina 2015, 223). Pottery with asbestos may also include feather and down, shells, sand, and chamotte temper in different combinations. Rims are slightly bended inwards

or straight, the estimated diameter of vessels is 30 to 50 cm. Most rims are decorated with comb stamp imprints or shallow pits. Vessel bodies are decorated with rows of comb stamp, notches, pits and drawn lines, geometrical motifs are also found. In this pottery, some vessels have similarities with Kierikki and Pöljä types, others – with the Karelian types of Voynavolok and Orovnavolok (Kul'kova & Gusentsova 2012).

In Podolye 1, rims of vessels with asbestos temper are also slightly bended inwards (Fig. 7: 1, 4–5). Rim cuts are often ornamented with comb stamp. The only ornamentation elements on those vessels are comb stamp imprints that make rows or geometrical motifs of lines crossing at different angles (Gusentsova & Kholkina 2015; Kholkina 2016). This pottery has many similarities with Karelian Orovnavolok type, especially at its later stage (Zhul'nikov 1999, 50). However, it differs because of its many geometrical motifs (stretched figures, crossing bents, zigzag). Some common traits can be traced in the pottery from Podolye and Volosovo Ware; the area of Volosovo tradition is quite close to the southern Ladoga (Krajnov 1987, 12). Those traits include feather and shells temper, ornamentation with comb stamp imprints in vertical zigzag pattern. However, important peculiarities of the Volosovo Ware, such as frame stamp imprints, decoration with nets of scratched lines or “retreating” shovel (Tsetlin 2008, 136 f.) are absent in Podolye 1.

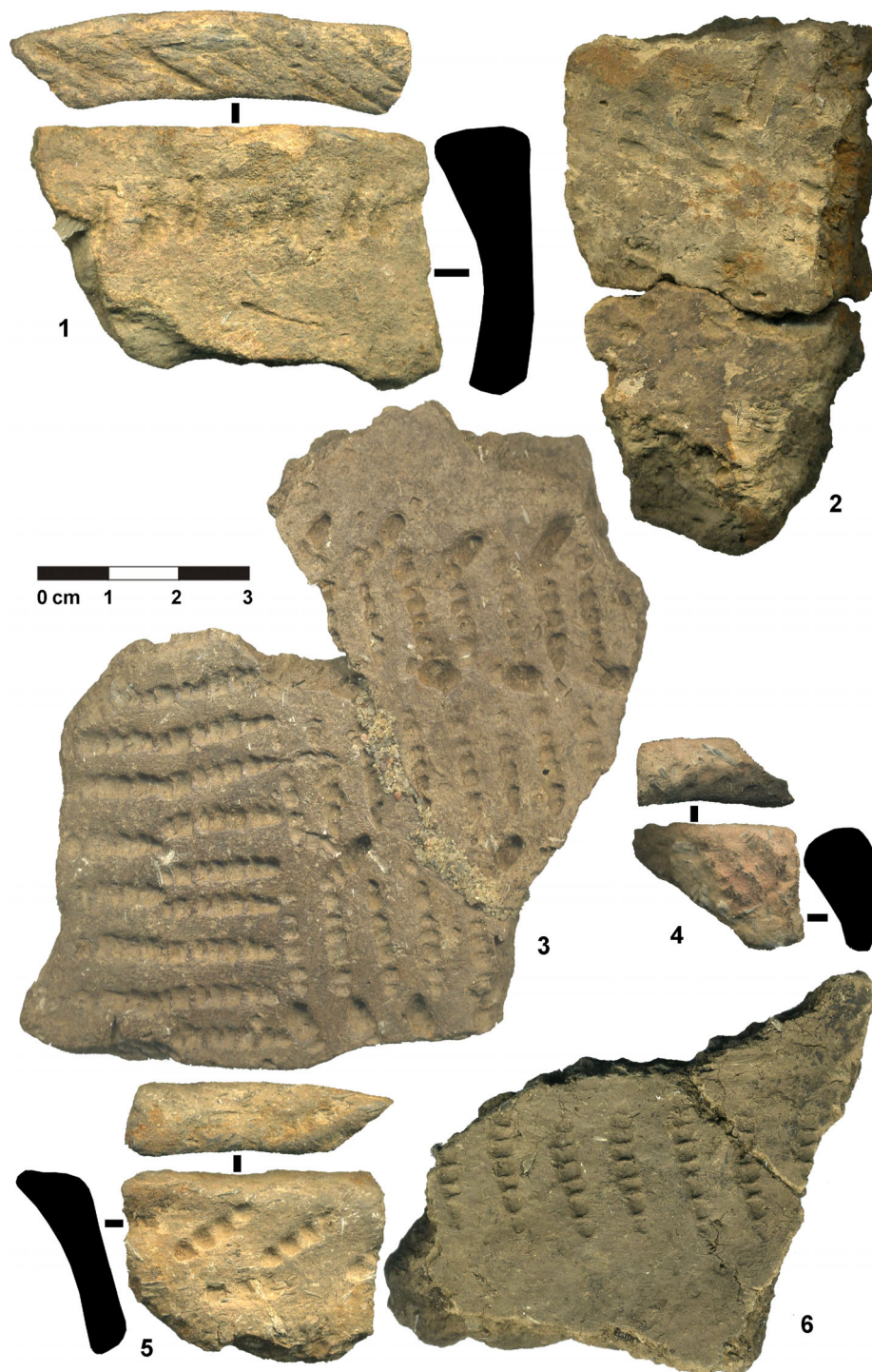
A series of radiocarbon dates were obtained for Okhta 1 and Podolye 1 sites (Sorokin et al. 2009a; 2009b; Kul'kova et al. 2010; Kul'kova & Gusentsova 2012; Kul'kova et al. 2014; Gusentsova & Kul'kova 2016; Kul'kova et al. 2016); however, not many of radiocarbon dates from the Karelian Isthmus and the southern Ladoga can be confidently related to the potsherds of the Asbestos Ware (Table 1). The dates obtained from typologically attributed sherds match the chronology developed for the Asbestos Ware both in Finland and Karelia, while the dates from Okhta 1 belong to the latest stage of wide distribution of Asbestos Ware.

## **Discussion**

Analysis of asbestos-tempered pottery in archaeological contexts from the Karelian Isthmus and Southern Ladoga region shows the presence of almost all the main Neolithic (and Early Metal Period) types defined for both Finland and Karelia.

Two stylistic variants defined for the Early Asbestos Ware – Ka 1:2(asb) and Kaunissaari – seem to generally overlap in space and time, even though the former is wider spread further to the north-west, and the latter is dated slightly younger (Pesonen 1996, 28).

Ka 1:2(asb) does not really differ from the Early Comb Ware Ka 1:2 pottery (Sperrings 2, in the Russian terminology) neither in morphology or ornamentation, nor in technological peculiarities (U-type of coils junction), but it differs in



**Fig. 7.** Asbestos Ware from Podolye 1 site.



temper. Ka I:2 pottery with or without asbestos temper is often present in the same archaeological contexts, and direct radiocarbon dating of sherds indicates the same chronology. Therefore, in a certain sense, they can be considered the same cultural tradition. Collections from Tarkhovka and Glinyanyi Ruchey in the southern part of the Karelian Isthmus include both Ka I:2(asb) sherds and Sperrings 2 sherds with some organic temper (shell?). For now, those sites represent the most south-western extent of the Early Asbestos Ware and the Sperrings Ware distribution. Also, a few sherds of Sperrings pottery (both Ka1:1 and Ka1:2) were found on Okhta 1 site.

Sperrings pottery appears in the eastern part of the Gulf of Finland at the same time as Narva pottery. Simultaneous emergence of the two pottery-making traditions, which pronouncedly differ in their production technology, morphology and ornamentation, displayed quite an obvious boundary between two cultural areas, even though their lithic assemblage and subsistence system were quite similar – both after the emergence of pottery and before it (Krijska & Gerasimov 2014; Gerasimov & Kriiska 2018). No archaeological contexts containing pottery of either Sperrings or Narva types are known. “Hybrid” pottery – Sperrings with shells temper – was found at Berezye site in the Volkhov River mouth, in the southern Ladoga region (Timofeev 1985, 14). But the Early Combed Ware with shells and organic temper was also found in Finland and can be considered as a variant of the Sperrings tradition.

The spread of TCW in the eastern Gulf of Finland region seems to be a short period of “unification” of pottery tradition that continued probably for just few centuries – the recently estimated frameworks are 3950–3500(3400) (Seitsonen et al. 2012, 111). Although one of the characteristics of TCW is the use of medium- and fine-grained mineral temper, pottery of the same type but with asbestos temper was found in the Ancient Lake Saimaa area, in the Karelian Isthmus and at Okhta site.

The settlement pattern and subsistence strategy did not pronouncedly change after the Sperrings/TCW shift (e.g. Gerasimov et al. 2010); however, new types of artefacts, increasing amount of imported flint and amber, subterranean dwellings and other cultural changes definitely reflected changes in the structure of society and interregional communication networks (Tallavaara et al. 2010; Nordqvist & Herva 2013; Oinonen et al. 2014; Mökkönen et al. 2017).

The short stage of “pure” TCW contexts was followed by the period of “diversification” of pottery-making tradition after around 3600 BC. From this time, several types of Asbestos Ware spread in regions far from the natural asbestos outcrops, but also different types of Porous Ware (pottery with organic temper) appeared on the same and neighbouring territories. TCW (meaning Comb Ware with mineral temper and well-structured ornamentation with comb stamp and deep conical pits) was mainly presented in the same archaeological contexts, and direct radiocarbon dating of sherds shows chronological coexistence of these pottery types (Nordqvist & Mökkönen 2017).

The 2nd half of the 4th millennium BC and the 3rd millennium BC is the time when different types of Asbestos Ware were presented on in large region far to the south-east from natural asbestos sources. Asbestos Ware was found in Arkhangelsk and Vologda regions up to the upper course of the Sukhona River, where asbestos temper is contained in the pottery of Volosovo type (Krajnov 1987, 27) and Modlona type (Oshibkina 1966, 37; 1978, 118, 128).

The main Finnish and Karelian Asbestos Ware types – Kierikki / Voynavolok (3600–3200 BC) and Pöljä / Orovnavolok (3400–2800 BC) – are presumably regional variants of the same tradition (Zhulnikov et al. 2012; Mökkönen & Nordqvist 2017). Moreover, some “transitional” pottery was described (Zhulnikov et al. 2012). Those types are often found in the same contexts and their estimated chronology seems to overlap. Thus, it is very probable that Kierikki / Voynavolok and Pöljä / Orovnavolok pottery represents the development of the same pottery style in cultural groups closely connected by well-developed inter-regional networks.

Today, Okhta 1 site is the most south-western site where Late Neolithic Asbestos Ware is found. Intensive surveys along the southern shore of the Gulf of Finland were conducted during the last two decades (see Gerasimov 2015; Kriiska et al. 2016), but they brought no finds of the Asbestos Ware to the south and south-west of the Neva mouth. Moreover, Asbestos Ware does not spread further to the south. Few Neolithic sherds with asbestos temper were found in Pskov region, Russia, but those were considered as evidence of a communication route between the Baltic and Karelia that went through the Velikaya River (Mazurkevitch 2009). Furthermore, no Asbestos Ware finds were reported in the Dvina – Lovat’ interfluvium, although the archaeology and especially Stone Age archaeology of this area was intensively studied for several decades (Miklyaev 1995; Mazurkevich et al. 2009). Thus, it seems that the tradition of making pottery with asbestos temper does not extend further to the south-west than the mouth of the Neva River. To the east, it continues along the southern coast of Lake Ladoga – there are Podolye 1 and Podolye 3, and several sites in the mouth of the Svir’ River – Voznesenye, Zayatskaya, Padan’ 1 and Padan’ 4 (Gusentsova 2009, 98). Further in the direction of Onega Lake, there are more and more sites with Asbestos Ware.

Thus, it appears that the south-western boundary of spreading of the Late Neolithic Asbestos Ware follows that of the Early Asbestos Ware and the Sperrings Ware. At least, from the Early Neolithic time, the Karelian Isthmus and southern Ladoga region were closely connected with Saimaa region and made south-western periphery of the Sperrings Ware and the Early Asbestos Ware. Through the several centuries of a kind of “cultural unification” associated with the TCW, the boundary became less pronounced (although the rare finds of TCW with asbestos temper do not appear beneath the border either). In the Late Neolithic, however, it becomes visible again. The tradition of making

Asbestos Ware on the Karelian Isthmus and in the southern Ladoga region indicates that there was a well-developed delivery system for raw asbestos from remote outcrops.

The Early Asbestos Ware on the Karelian Isthmus is represented by a limited amount of sherds, therefore they may be hypothetically considered as imported vessels (at least until the contrary is confirmed through geochemical analyses). The amount of finds of Asbestos Ware in the Late Neolithic contexts, however, may be interpreted as made-on-place pottery. There are bundles of asbestos fiber found in cultural layers of Okhta 1 and Podolye sites (Gusentsova et al. 2014). This means that asbestos was transported for several hundreds of kilometers, in order to be used as temper. Imported asbestos was documented in materials from other sites with Late Neolithic Asbestos Ware (e.g. Zhulnikov et al. 2012). The pilot geochemical study of asbestos temper in pottery from Okhta 1 showed that asbestos was imported from different outcrops in Finland and Karelia. The chemical analyses of clay in vessels from Okhta 1 revealed that one vessel was obviously imported as a ready-made object, but most of the vessels were made on the site (Kul'kova & Gusentsova 2012).

Long-distance exchange of goods through interregional communication networks is a well-known characteristic of the East European Forest zone in the 4th and 3rd millennium BC. After TCW spread in the eastern Gulf of Finland, the amount of flint artefacts increased rapidly compared to the Late Mesolithic and Early Combed Ware periods (e.g. Gerasimov et al. 2010; Mökkönen et al. 2017). Moreover, there is much evidence that flint tools were made locally. After 3600–3500 BC, however, those networks were used to transport ready-made objects rather than raw materials. Items like amber pendants from the Baltic (e.g. Zhulnikov 2008) or chopping tools of the Russian-Karelian type from Lake Onega (e.g. Kriiska & Tarasov 2011) were produced in specialized workshops for distribution in remote regions. However, Asbestos Ware (just as the raw asbestos) does not spread further to the west than the mouth of the Neva River.

The Asbestos Ware tradition that connected Finland, the Karelian Isthmus, Karelia and the southern Ladoga region, continued till the beginning of the 2nd millennium BC. The youngest dates from Okhta 1 and Podolye 1 match the general periodization (Fig. 2), and archaeological contexts with Late Neolithic Asbestos Ware at the western and southern shores of Ladoga were covered in transgression sediments of the Ladoga (Gerasimov & Subetto 2009), which provides the same chronological estimation. The only exception is a sherd with asbestos temper from Ust'-Rybezha 2 site (Gurina 1961; Zhul'nikov 2006; Kul'kova & Yushkova 2008). The site was located above the transgression maximum, and the upper chronological limit of its functioning is the Neva breakthrough event around 1200 cal BC.

### **Conclusions**

The Karelian Isthmus and southern Ladoga region are the periphery of the spread of Asbestos Ware. Those territories were well connected with the “core” of Asbestos Ware tradition from its very beginning. All the main types of Neolithic Asbestos Ware defined on the territory of Finland (Ka 1:2(اسب); Kaunissaari; TCW(اسب), Kierikki; Pöljä) are also found in the Karelian Isthmus, including its southern part.

In the 3rd millennium BC local traditions of making pottery with asbestos temper spread in the southern Ladoga region. Pottery from Okhta 1 and Podolye 1 sites resembles both western and eastern (Karelian) traditions and shares some typical traits with Volosovo culture from the Upper Volga as well as with ceramics from Modlona sites in Vologda region. It has, however, its own local peculiarities, too.

Local traditions of making Asbestos Ware on the Karelian Isthmus and in the southern Ladoga region at Late Neolithic – Eneolithic time imply well-developed delivery system for raw asbestos from its remote outcrops.

Despite the many spatial and chronological differences in material culture, subsistence strategies, and communication networks within time and space frames of the Asbestos Ware phenomenon, it may be assumed that the use of asbestos temper could be indicative of cultural relations within certain regions.

The south-western boundary of the spread of the Late Neolithic Asbestos Ware follows that of the Early Asbestos Ware and the Sperrings Ware. Starting from the Early Neolithic time at latest, the Karelian Isthmus and the Southern Ladoga region were closely connected with Saimaa region and represented the south-western periphery of the Sperrings Ware and the Early Asbestos Ware. Resulting from several centuries of a kind of “cultural unification” associated with the TCW, this boundary became less distinct; for the Late Neolithic time, however, it is visible again. Nevertheless, the outlined south-western boundary of Sperrings / Asbestos Ware area was not a border for interregional exchange.

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## **PIIRI JÄLGIMINE: NEOLIITILISE ASBESTKERAAMIKA LÕUNAPERIFEERIA**

### *Resüme*

Asbestilisandiga savinõude valmistamise traditsioon näib olevat Fennoskandia ja selle lähialade ainulaadne fenomen (jn 1). Asbestkeraamika valmistamine algas V aastatuhande keskel eKr looduslike asbestipaljandite lähedal Ida-Saimaa piirkonnas Soomes (jn 2). IV aastatuhande teisel poolel ja III aastatuhandel eKr levis see ulatuslikus piirkonnas Põhja-Rootsist Arhangelski oblastini Venemaal. Ehkki looduslikku asbesti leidub paljudes kohtades üle maailma, ei tunta kusagilt mujalt väljastpoolt eelmainitud ala neoliitikumist pärit keraamikat, mille vormimismassi lisandina oleks seda mineraali kasutatud.

Viimane ülevaade looduslikest avamustest eemal paikneva arheoloogilise kontekstiga asbestilisandiga keraamika kohta ilmus 15 aastat tagasi. Selle aja jooksul on uuritud uusi asbestkeraamikaga muistiseid Karjala maakitsusel ja Laadoga lõunakallastel. Lisaks on toimunud intensiivne arheoloogiline uurimis-

töö Soome lahe lõunarannal. Nendele ajakohastatud andmetele tuginedes on käesolevas artiklis arutletud asbestkeraamika lõunapoolse perifeeria ja leviala piiri üle.

Karjala maakitsuselt ja Laadoga lõunakaldalt tuntakse praeguseks umbes 30 asbestkeraamikaga asulakohta (jn 3, tabel 1). Need piirkonnad olid asbestkeraamika leviku äärealad, kuid samas südaaladega seotud selle traditsiooni algusest peale. Kõik Soomes määratletud peamised neoliitilise asbestkeraamika tüübid (Ka 1:2(asb), Kaunissaare, tüüpiline kammkeraamika (asb), Kierikki ja Pöljä) on esindatud ka Karjala maakitsusel, sh selle lõunaosas (jn 4–6). Asbestilisandiga keraamika valmistamise lokaalne traditsioon kujunes III aastatuhandel eKr Laadoga lõunakaldal. Ohta 1 ja Podolje 1 (jn 1) asulakohast leitud keraamika sarnaneb mõlemaga, nii lääne kui ka ida (Karjala) asbestkeraamika traditsiooniga, millel on samas ka mõningaid ühiseid jooni Ülem-Volga Volossovo kultuuri ja Vologda oblasti Modlona asulakohtade keraamikaga ning lokaalseid eripärasid (jn 7). Kohalik asbestkeraamika valmistamistraditsioon Karjala maakitsusel ja Laadoga lõunakaldal eeldas hilisneoliitikumis ning eneoliitikumis hästi arenenud asbesti tarnesüsteemi aladega, kus paiknesid selle mineraali looduslikud avamused.

Asulakohtade leviku analüüs osutab, et hilisneoliitilise asbestkeraamika edelapiir järgib varase asbestkeraamika ja Sperringsi tüüpi keraamika piiri. Sperringsi tüüpi keraamikat hakati Soome lahe idakaldal valmistama samal ajal kui Narva tüüpi keraamikat sellest edela pool. Nõude valmistamistehnoloogia, morfoloogia ja ornamendi poolest selgelt kahe erineva keraamikatraditsiooni samaaegne kujunemine näitab piiri kahe kultuuripiirkonna vahel, kuigi kivitehnoloogia ning elatusviis olid sarnased nii enne kui ka pärast keraamika kasutuselevõttu.

Alates vähemalt varaneoliitikumist olid Karjala maakitsuse ja Laadoga lõunakalda alad seotud Saimaa piirkonnaga, moodustades Sperringsi ning varase asbestkeraamika ääreala. Mitu sajandit väldanud “kultuurilise ühtlustumise” ajal tüüpilise kammkeraamika perioodil muutus see piir ebaselgeks, kuid sai hilisneoliitilises keraamikatraditsioonis taas nähtavaks. Regioonidevahelises kaupade vahetuses, näiteks Läänemere äärest pärit merevaigust ripatsid või Äänisjärve kallastel valmistatud Vene-Karjala tüüpi raieriistad, ei olnud aga Sperringsi tüüpi ja asbestkeraamika edelapoolne raja piiravaks teguriks. Vaatamata paljudele erinevustele materiaalses kultuuris, majandusstrateegiates ja suhtlusvõrgustikes asbestkeraamika ajal ning levialal, võib oletada, et asbesti kasutamine savinõude vormimismassi lisandis osutab nende piirkondade vahelistele kultuurisuhetele.