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NEW REMARKS ON THE CHRONOLOGY OF PIT-COMB WARE IN KARELIA (NORTH-WEST RUSSIA)

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INTRODUCTION

Pit-Comb Ware of Karelia is part of the large entity of (Pit-)Comb Wares of northern boreal zone. Its distribution covers much of the Karelian Republic (Russian Federation): Pit-Comb Ware is extremely numerous in the Lake Onega region and found all the way to the White Sea area (Fig. 1). It is distributed to the east of Lake Onega but rarely recognized in the areas further to the west, in the present-day Finland. Pit-Comb Ware, occasionally also discussed under the term 'Karelian culture', is seen to represent a local variant of central Russian Pit-Comb or Lyalovo Ware and its origins have been derived to the Volga-Oka region (Bryusov 1952: 121; Pankrushev 1978: 89). However, origins north of the actual Lyalovo area and to the south-east of Lake Onega have been suggested as well (Oshibkina 1978: 154–8; Lobanova 1991: 101–2).

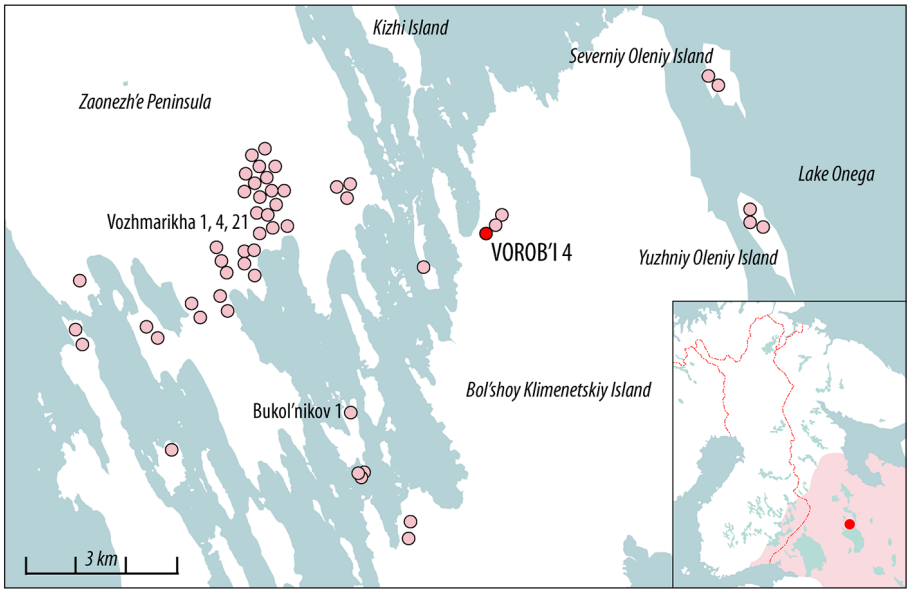

Fig. 1. Location and environment of the Vorob'i 4 settlement site and the other sites mentioned in the text; approximate distribution of Pit-Comb Ware is presented in the smaller map. Illustration: K. Nordqvist (after Mel'nikov & German 2013: Fig 1; base map © OpenStreetMap contributors).

Sample	Lab-index	BP	±	calBC (2σ)	Median	δ13C	δ15N	C/N	Type (surface)
59	GrA-68145	5360	70	4341–4005	4190	-27.18	12.00	6.03	rim (inner)
59	SPb-1779	4427	150	3621–2678	3122	-23.67	-	-	rim (inner)
182	GrA-67742	5135	45	4040–3799	3938	-24.90	12.56	6.60	body (inner)
182	SPb-1785	5100	120	4229–3653	3894	-24.05	-	-	body (inner)
54	GrA-68144	5030	60	3961–3700	3835	-30.60	12.17	10.44	rim (inner)
54	SPb-1782	4626	120	3647–3021	3378	-26.23	-	-	rim (inner)
271	GrA-67744	5000	40	3945–3665	3786	-28.09	13.28	7.60	body (inner)
271	SPb-1778	4632	150	3691–2927	3374	-24.50	-	-	body (inner)
107	SPb-1786	5136	120	4238–3666	3940	-22.94	-	-	body (inner)
-	SPb-1822	5115	120	4231–3660	3912	-26.68	-	-	body (inner)
81	SPb-1775	4948	110	3976–3520	3752	-19.98	-	-	body (inner)
14	SPb-1783	4790	120	3938–3138	3563	-23.08	-	-	body (inner)
38	SPb-1777	4779	110	3904–3142	3554	-24.58	-	-	body (inner)
55	SPb-1781	4641	120	3652–3025	3403	-25.58	-	-	rim (inner)

Table 1. Radiocarbon datings from the Vorob'i 4 site. All datings are made of charred residues (crusts) from the inner surfaces of pottery sherds. The dates in the table and in the text are calibrated using software OxCal 4.2.4 (Bronk Ramsey 2009) and given a 2-sigma confidence level.

According to the periodization used in northwest Russia, Pit-Comb Ware belongs to the Middle Neolithic. Its beginning is placed to the earlier 5th millennium calBC, although some conventional charcoal dates, obtained from ambiguous contexts at multi-period sites, have been taken to show that it appeared in Karelia already in the late 6th millennium calBC (Lobanova 2004: 254–9). However, these datings can be justifiably questioned (German 2002: 264; Tarasov et al. 2017: 105; Nordqvist & Mökkönen 2018: 43; also Sidorov 1997; Tarasov & Khoroshun 2016), and such an early beginning would also basically predate the appearance of Lyalovo pottery in the Volga area (see Zaretskaya & Kostyleva 2011: 180–2; Hartz et al. 2012: 1045). The only previously-published AMS dates of Pit-Comb Ware derive from the southern White Sea area and date not earlier than the mid-5th millennium calBC (Tarasov et al. 2017: 104–5; Nordqvist & Mökkönen 2018: 43–4), although they cannot be thought to represent the earliest appearance of this pottery type in the whole Karelia. The termination of Pit-Comb Ware is usually placed to the turn of the 5th and 4th millennia calBC, and seen largely to coincide with the introduction of Comb-Pit Ware (in Finnish terminology Typical Comb Ware) as well as of Rhomb-Pit Ware, although some typological overlap has been also proposed between these types (Lobanova 2004: 259–61; Khoroshun 2013: 126–7).

Recently, a series of ten radiocarbon dates was obtained from the Vorob'i 4 settlement site (Medvezh'egorskiy District, the Karelian Republic) (Fig. 1).[1] The datings were made of charred residue (foodcrust) on pottery through conventional liquid scintillation counting method. They suggested that the use of Pit-Comb Ware would have continued long into the 4th millennium calBC, or even to the early 3rd millennium calBC (Table 1). As the datings clearly contradicted the previous age estimations, four of the dated sherds were re-dated with AMS method to control the age of the original determinations. This paper presents these dates and the dated materials, as well as discusses briefly the chronological position of Pit-Comb Ware, and especially its termination in Karelia.

SITE VOROB'I 4 AND THE DATED SHERDS

The settlement site Vorob'i 4 is located in the southern part of the Zaonezh'e Peninsula, on the western coast of the Bol'shoy Klimenetskiy Island of Lake Onega, and belongs to a cluster of over 60 prehistoric sites dating from the Mesolithic to the Eneolithic (Fig. 1). The site is located 30–60 m from the present-day shore of Lake Onega, c 5 m above the lake (i.e. c 38 m asl.). A test pit of 12 m^2 was opened at the site in 2010 by the archaeologists of the Kizhi State Open-Air Museum of History, Architecture and Ethnography. The total area of the settlement is estimated to be c 3000 m^2 (Mel'nikov & German 2013: 121).

Even if the investigated area was only 2 x 6 m in size, rich pottery material was recovered at the site: altogether almost 800 fragments deriving from c 75 Pit-Comb Ware vessels, making the assemblage one of the most representative Pit-Comb Ware materials in the whole southern Zaonezh'e area (Mel'nikov & German 2013: 34, 122). In addition to its size, the assemblage is special because it is practically non-mixed: only individual sherds of the preceding Sperrings Ware and later asbestos- and organic-tempered pottery, as well as ceramics of the historical period were found. The finds came from cultural layer and no clear structures were discovered in the small excavation area. Other finds are fairly typical for the Karelian Neolithic and are dominated by lithic debitage and artefacts (slate, quartz, flint, lydite, and quartzite) and include also fragments and preforms of ground stone tools and whetstones.

The first dating series consisted of 10 sherds of Pit-Comb Ware, out of which four sherds were re-dated. The latter include two rim and two body sherds and are shown in Fig. 2:

No 54: a rim fragment with a straight and flat rim, thickness 0.6–0.7 cm, decorated with horizontal rows of oblique rectangular stamps made with a stick, and round pits applied in rows and interlaced fields;

No 59: a rim fragment with a straight and flat rim, thickness 0.6–0.7 cm, decorated with horizontal rows of oblique rectangular stamps made with a stick, and small round pits applied in rows (large pits) and interlaced fields (smaller pits);

No 182: a body sherd, thickness 0.6–0.7 cm, decorated with round pits applied in interlaced fields;

No 271: a body sherd, thickness 0.6–0.7 cm, decorated with round pits applied in interlaced fields.

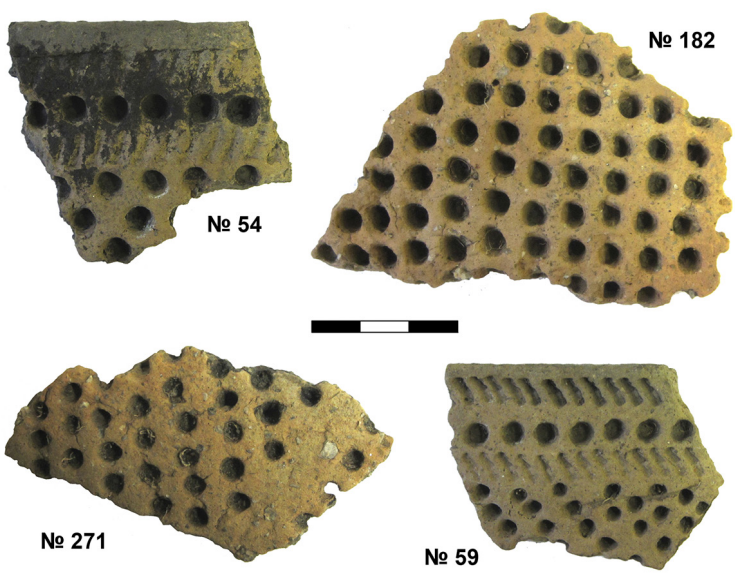

Fig. 2. AMS-dated Pit-Comb Ware sherds from the Vorob'i 4 site. Scale bar 3 cm. Photos: K. German.

The dated sherds do not differ from the remaining Pit-Comb Ware pottery obtained from the Vorob'i 4 site (see Mel'nikov & German 2013: 123). The vessels are usually tempered with coarse sand, 0.5–0.7 cm thick, and 18–40 cm in rim diameter. Rims are regularly thickened and dominated by even and inwards sloping tops, but also flat, rounded and pointed rim tops exist. Decoration consists predominately of horizontal rows of oblique stamps executed with a stick (rarely with a comb stamp) that alternate with rows and fields of round (interlaced) pits. Also vessels decorated with combination of horizontal lines, either drawn or applied with comb or other stamps, and rows and fields of round pits are quite common. The remaining material includes small vessels decorated throughout with small pits and vessels with unclear or weathered decoration. Rim tops of large vessels may be decorated with diagonal stick imprints or, more rarely, with comb stamps. On typological grounds, pottery from Vorob'i 4 corresponds with the so-called first phase of Pit-Comb Ware in Karelia (Mel'nikov & German 2013: 38, 124; for typological periodization, see Lobanova 1991; 2004).

DATINGS

The datings obtained from Vorob'i 4 are presented in Table 1. The first series of datings was made in the laboratory of the Department of Geology and Geo-ecology, the Hertzen State Pedagogical University, St. Petersburg (Russia), employing liquid scintillation counting method. The second set was analysed in the Centre for Isotope Research, Groningen (the Netherlands), by AMS method. The second series included three sherds (No 54, 59, 271), which gave the three youngest ages in the first series. The new datings of sherds 54 and 271 gave results, which are 350–400 radiocarbon years older than the original ones. Moreover, the re-dating of sherd 59, the youngest of all the dated sherds in the first round, made it the oldest of all the dated samples in the two series – the difference between the two dates obtained for this sherd is over 900 radiocarbon years. However, the fourth re-dated sherd (No 182), which was among the three oldest (and among themselves coeval) datings of the first series, gave practically similar result in the second series: the AMS dating is only 35 radiocarbon years older than the conventional one, although has a much tighter calibrated distribution due to smaller standard error.

Thus, the datings in the first series seem to be too young, but only partially. Deviation is not systematic and varies from a virtually identical age to a difference of almost 1000 radiocarbon years. Reasons for this are most likely related to the amount of crusts dated in the first series. After pre-treatment, the samples obtained from sherds that were later re-dated weighed less than 0.5 g (SPb-1778, 1779, 1782) and 1.1 g (SPb-1785), and their carbon content varied between 13.2% and 23.9%. The only sample with more material (SPb-1785; carbon content 20.2%) is also the only one that did not produce a deviant dating in the second series. Of the samples not re-dated, only the ones giving the oldest ages (SPb-1786, SPb-1882) contained sufficient amount of material – all samples giving younger ages were (too) small (Kul'kova pers.comm.).

The example from Vorob'i 4 brings up the question related to the reason behind and reliability of dating pottery crusts with conventional methods – samples smaller than 0.5 g and with carbon content less than 25% are generally not suitable for liquid scintillation counting (Kul'kova pers.comm.). In addition, datings of the first series have large standard errors (±110–150 years), which seriously diminish their usability. Still, standard errors of the AMS dates vary as well: two of them are relatively large (±60–70 years), which according to laboratory's correspondence is due to small sample sizes (no more material was available after the initial dating round).

The origins (contents) of the dated residues and the reliability of the dates can be roughly estimated through bulk stable isotopes ($\delta^{13}C$, $\delta^{15}N$, C/N ratio), acknowledging the limitations of this approach (see Heron & Craig 2015: 715). The $\delta^{13}C$ values of the AMS-dated samples are between -24.9‰ and -30.6‰, suggesting that no marine component and therefore no marine reservoir effect is present (see Fischer & Heinemeier 2003; Craig et al. 2007). The high $\delta^{15}N$ values (12.00‰–13.28‰) on their behalf indicate that the samples must derive from the long aquatic food chains of freshwater origin (see Yoshida et al. 2013; Piezonka et al. 2016; Kunikita et al.

2017). In the context of southern Zaonezh'e, this means freshwater predatory fish – or most likely seal. No reference material from Lake Onega exists, but isotopic ratios of modern Saimaa ringed seal from the Lake Saimaa area present similar values (Auttila et al. 2015). The existence of freshwater organisms in the context of lakeshore hunter-fisher-gatherer settlement is highly plausible, although unfortunately no bones that could set more light on the species utilized at the site were recovered during the excavations.

In general, osteological assemblages from the Lake Onega region are highly limited due to taphonomy and find recovery -related issues. Consequently, the evidence of the presence of seal in Lake Onega during the Neolithic is scarce (currently, there is no seal population). Seal bones from a Neolithic context have been published only from the Kladovets II site (Savvateev & Vereshchagin 1978: 185, 205–6), located on the eastern shore of lake and next to the Onega petroglyphs, where five figures have been also interpreted to depict seals (Savvateev 1996: 132) – or beluga (see Lobanova 2015: 62, 210–8; also Zhul'nikov 2006: 113–5) (Fig. 3). In the surrounding areas (the Baltic Sea, Lake Ladoga and Lake Saimaa, the White Sea), seals have been important beasts of prey during the Neolithic, even if their significance has varied in different regions (see Savvateev & Vereshchagin 1978; Ukkonen 1996; Seitsonen et al. 2017). There is no comparable archaeological isotopic data of charred crusts either, as isotopic values (apart from $\delta^{13}C$) have not been published much from north-east Europe. The only references to Pit-Comb Ware are the four determinations from the southern White Sea area, which present more marine $\delta^{13}C$ values and generally much lower $\delta^{15}N$ values than the samples from Vorob'i 4 (see Mökkönen & Nordqvist submitted).

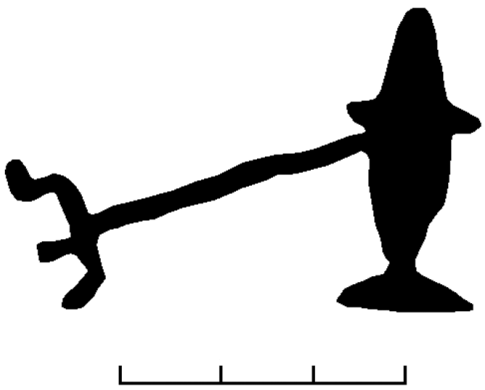

Fig. 3. One of the carvings on the Cape Besov Nos, interpreted variously as seal, beluga or fish. Scale bar 30 cm. Illustration: K. Nordqvist after Lobanova 2015: 211, Fig. 145.

Despite the presence of freshwater components in the residues, it is not possible to estimate the magnitude of reservoir effect in the datings, as no studies have been made on the local offsets in the Lake Onega region (see Tarasov et al. 2017: 101–2; Nordqvist & Mökkönen 2018: 48–51 for discussion). Nevertheless, considering the original question – the termination of Pit-Comb Ware – it seems clear that the use of this pottery type continues to the 4th millennium calBC. As all the samples derive from inner surfaces of vessels and from the same relatively small pieces of pottery (see Fig. 2), it is unlikely that there would have been big differences in the composition of foodcrusts dated in the two different series, and the divergence in the age determinations is related to technical issues of analysis methods.[2]

DATING OF PIT-COMB WARE IN KARELIA AND THE SOUTHERN ZAONEZH'E AREA

On the basis of the AMS dates, the dating of Pit-Comb Ware habitation at the Vorob'i 4 site can be placed to the end of the 5th and especially to the first centuries of the 4th millennium calBC. Those dates of the first series, which contained sufficient amount of sample material, also support this. Thus, the end of Pit-Comb Ware use at the site seems to date to around 3700 calBC, and most likely not later than 3600 calBC.

There are only two other datings from the southern Zaonezh'e area, which have been connected with Pit-Comb Ware activities, both conventional charcoal dates sampled in fireplaces (the site Vozhmarikha 4, 5560±45 BP, LE-6604; and the site Bukol'nikov 1, 5600±25 BP, LE-8908; see Mel'nikov & German 2013: 39). They are older than any of the Vorob'i 4 dates, and represent the time usually proposed as the main period of Pit-Comb Ware use, the mid- and sec-

ond half of the 5th millennium calBC (see Kosmenko 2003: 32; Lobanova 2004: 254–9; Nordqvist & Mökkönen 2018: 43). In other words, Vorob'i 4 presents currently the youngest dates for Pit-Comb Ware in the southern Zaonezh'e area – and in the whole Karelia.

Despite the problems in the dates of the first set, the second series confirms that the use of Pit-Comb Ware at Vorob'i 4 has continued longer than customarily thought. The results show that at least in some areas it overlaps a few centuries with Comb-Pit and Rhomb-Pit Wares. Generally in Karelia, the latter types are dated 3900–3400 calBC and 3800–3400 calBC, respectively (see Tarasov et al. 2017: 105–6; Nordqvist & Mökkönen 2018: 44–5). In the southern Zaonezh'e region, four radiocarbon dates have been previously connected with Comb-Pit Ware (no dates exist for Rhomb-Pit Ware; Mel'nikov & German 2013: 47). Unfortunately, these dates are problematic and suffer from several quality-related issues and are of not much help in further discussion.[3]

The results presented in this short paper indicate that cultural development has been more complicated and included more regional variation than presented in the traditional chronological frameworks constructed on the basis of quite few conventional charcoal dates and general(ized) pottery typology alone. Problems in typologies' ability to deal with time is well-illustrated by the current material. Despite of pottery from Vorob'i 4 has been typologically identified with the oldest phase of Karelian Pit-Comb Ware, the present radiocarbon datings point to the opposite direction: the ceramics from the Vorob'i 4 site date to the very end of Pit-Comb Ware use in the area.

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NOTES

[1] The new datings were presented for the first time at the Tver archaeological seminar in March 2016 (presentation by K.E. German: Novye radiouglerodnye opredeleniya po nagaru s neo-eneoliticheskoy keramiki Karelii).

[2] Differences observed between the dates obtained from residues on inner and outer surfaces of vessels do not play a role here, and neither does the present material seem to exhibit major differences in the radiocarbon ages and isotopic values between the rim and body sherds (see Teetaert et al. 2017; Mökkönen & Nordqvist submitted).

[3] The date from Vozhmarikha 1 (4900±130 BP, LE-6798; charcoal from a dwelling; Mel'nikov & German 2013: 60) suggests that there may not have been large temporal difference between Comb-Pit Ware use at this site and Pit-Comb Ware use at Vorob'i 4, although dating's standard error is large. The date from Bukol'nikov 1 (4740±60 BP, LE-9391; birch bark from a grave) is problematic, as there are no Comb-Pit Ware finds from the site (Mel'nikov & German 2013: 118, 120), just Pit-Comb Ware and asbestos-tempered Voynavolok Ware – as the date fits well with the AMS dates recently obtained for Voynavolok Ware in Karelia (Tarasov et al. 2017: 106–8; Nordqvist & Mökkönen 2018: 46–7), it could be connected with this cultural context, too. Two crust/birch bark pitch samples of Comb-Pit Ware sherds from the Vozhmarikha 21 site were dated simultaneously with the first series of dates discussed in this paper, and gave the results 4497±110 BP (SPb-1776) and 4700±120 BP (SPb-1784). Even if they can, in principle, belong to the end of Comb-Pit Ware use, they are likely to suffer from similar problems as discussed in the text and should be treated with caution.

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