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Radiocarbon Dating of Pottery from Karaga Bay Coast, Northern Kamchatka, Russia

Katsunori TAKASE

Abstract: This study aims to determine the age of prehistoric pottery from Karaga Bay coast, northern Kamchatka, Russia. From a typological viewpoint, pottery in this region is divided into four types: Ivashka type, Kavran type, pottery with clay rope ornamentation, and pottery covered by a square/rectangular-shaped impression. The ceramic set is classified into two patterns: a composition solely consisting of Kavran type (“composition-I”) and a composition consisting of various types as well as Kavran type (“composition-II”). According to AMS (accelerator mass spectrometry) radiocarbon dating, the typological features of Kavran type were largely unaltered from the 11th to the 17th century CE. However, ceramic composition can be an effective indicator of age; “composition-I” is dated to the older stage between the 11th and the 13th century CE, and “composition-II” can be assigned to the newer stage during the second half of the 15th to the first half of the 17th century CE. This chronological scheme suggests that cultural interaction in the newer stage between Karaga Bay coast and adjacent areas is more active than in the older stage.

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Introduction

In 1981, A. K. Ponomarenko discovered characteristic pottery decorated with the impression of coiled code and punctured/nail-pressed ornamentation in the northeastern Kamchatka Peninsula (Figure 1). Even today, this unique group of clay vessels is mainly distributed in relatively narrow areas: the Ivashka River basin and Karaga Bay coast. Recently, Ponomarenko (2012) proposes a material culture complex called the Ivashka Culture, based on the results of his own excavations in this area in 1981 and 1998. The diagnostic artifact type of this archaeological culture is Ivashka type pottery. Its date is roughly assigned to the middle of the second millennium CE on the basis of radiocarbon dating. However, the date has not yet been thoroughly revealed, and the chronological relationship of this pottery with other types also remains obscure. Therefore, there is still room for investigating the date of Ivashka type pottery; this study aims to clarify the date of clay vessels from Karaga Bay coast using AMS dating.

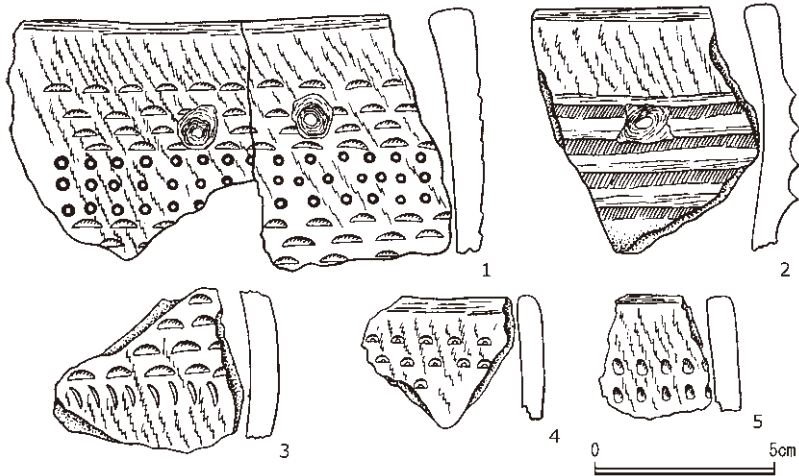


Figure 1 Fragments of pottery from Ivashka River basin (Ponomarenko 1985)

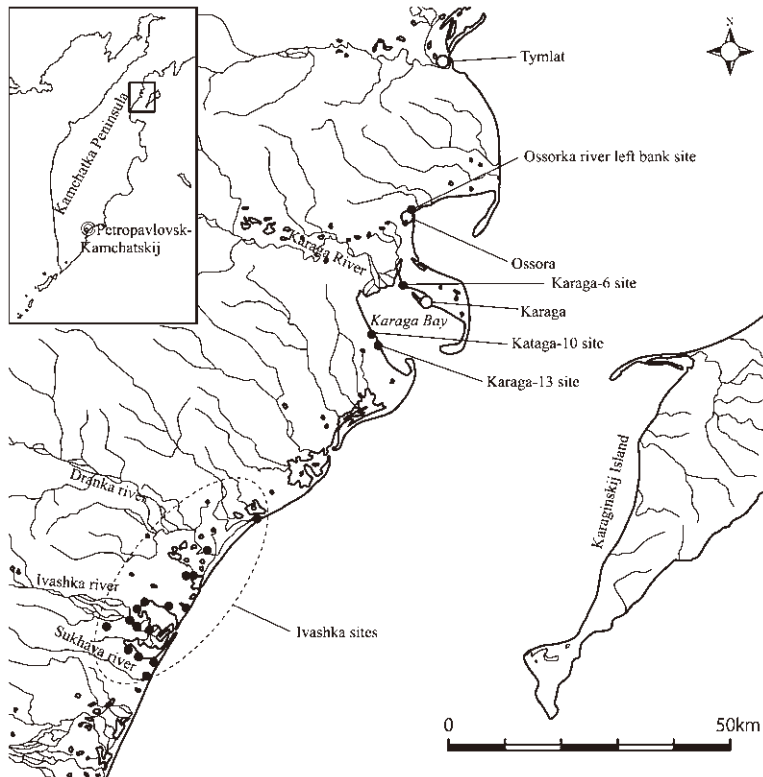


Figure 2 Map showing the location of archaeological sites around Karaga Bay

1. Materials and Method

Materials examined in this study were collected from three sites around Karaga Bay coast in 2012 (Figure 2). We excavated part of a semi-subterranean residence in each site. Charcoal and



Plate 1 Karaga-6 site



Plate 2 Karaga-10 site



Plate 3 Stratigraphy of the Karaga-10 site

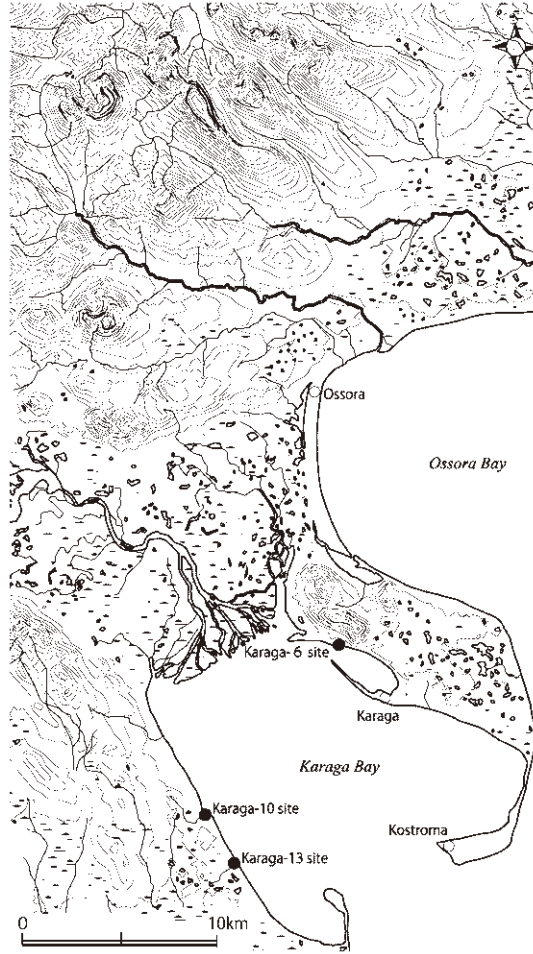


Figure 3 Location of investigated sites and topographical features around Karaga Bay

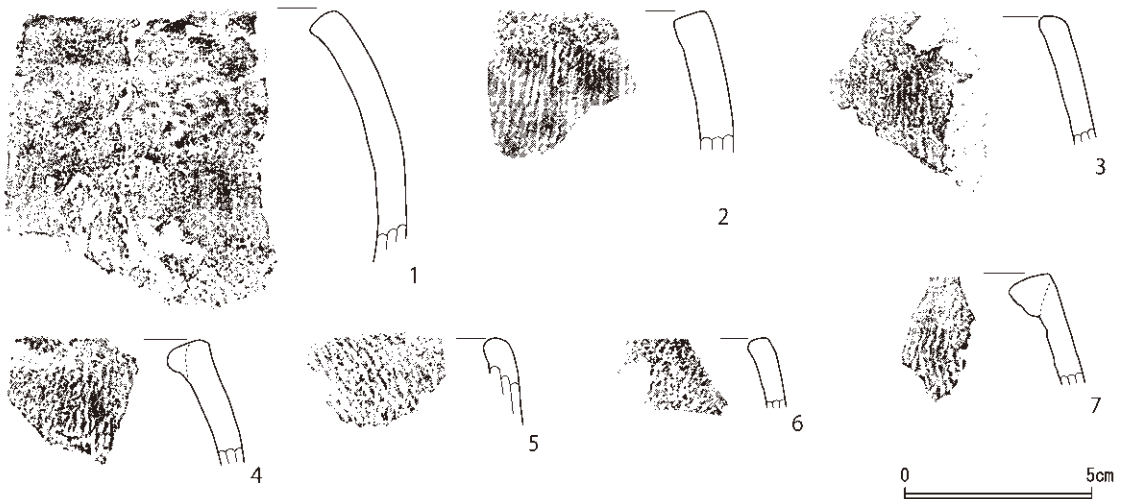


Figure 4 Fragments of pottery from the Karaga-6 site



Plate 4 Karaga-13 site



Plate 5 Stratigraphy of the Karaga-13 site

wood fragments for radiocarbon dating were sampled from all residences, as well as artifacts and ecofacts. The radiocarbon date was measured using a ^{14}C -AMS system based on the tandem accelerator. Stable isotope analysis by isotope ratio mass spectrometer was not conducted in this study.

The total number of excavated artifacts is more than 800 (Table 1). Among them, pottery fragments are a major artifact; we found 675 ceramic fragments. In this study, Figures 4–15 illustrate all the rim and bottom fragments of pottery, stone tools except for flakes and chips, distinct wooden tools, and bone/antler tools. Brief description of the sites and the materials

Table 1 Number of artifacts

	Artifact class	Karaga-6	Karaga-10	Karaga-13
Pottery	Ivashka-type		6	1
	Kavran-type	65	401	102
	Clay rope ornament		1	8
	Square-stamped ornament		1	
	Unknown fragment	13	72	5
	Sub-total	78	481	116
Stone tool	Point/arrowhead (Obsidian)		2	3
	Scraper (Obsidian)	5		7
	Scraper (Chert)	1		
	Scraper (Chalcedony)	1		
	Scraper (Basalt)		1	
	Flake (Obsidian)	9	12	11
	Flake (Chert)	2		
	Flake (Agate)		6	
	Flake (Basalt)		1	
	Wedging piece (Obsidian)			1
	Wedging piece (Agate)		1	
	Utilized flake (Obsidian)	1	1	3
	Core (Shale)		1	
	Polished knife (Slate)		3	
	Chipped knife (Slate)		1	
	Hammer stone (Andesite)		2	3
	Weight (Andesite)	2		
	Fragment (Mudstone)	1	6	4
	Flat pebble (Sandstone)		1	3
	Pebble		1	1
	Sub-total	22	39	36
Wooden tool	Dish			6
	Stick with holes			7
	Bow element		1	
	Fire tool			1
	Masher			1
	Unknown		2	6
	Sub-total		3	21
Antler/tusk/bone tool	Hoe	1		2
	Harpoon/spear		2	1
	Shaft stopper		1	1
	Circular ornament			1
	Comb			2
	Unknown			7
	Sub-total	1	3	14
Bone	Fragment	1	+	+
	Total	102	526+	187+

excavated in each site are as follows:

(1) Karaga-6 site

This site is located near the settlement of the First Sandbar (*Pervaja Koshka*), on the northern coast of Karaga Bay (Figure 3, Plate 1). The altitude of the site is approximately 2–3 m. On the rim of the bar, three dwelling pits can be recognized along the coast (Ponomarenko 1999). Because this site has been partially destroyed by ocean waves, some fragments of pottery were scattered on the seashore during our survey. A large portion of artifacts collected at this site is from the eroded surface of a semi-subterranean residence that is likely to be the central dwelling in Ponomarenko's report. We investigated a cross-section of this residence using the eroded surface of the sandbar.

Seventy-eight pottery fragments were found at this site, and among them, 65 fragments (83%) have the impression of a code-coiled shaft known as “textile-like ornamentation” in the Russian archaeological context (Figure 4). They have a common characteristic in their shape: a flat rim



Figure 5 Stone tools from the Karaga-6 site

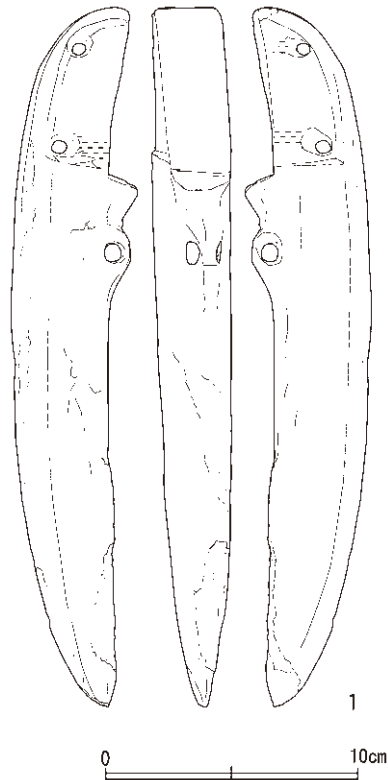


Figure 6 A hoe edge made of walrus tusk from the Karaga-6 site

that tucks inward, a curved vessel wall, and a rounded bottom. Chipped stone tools consist of scrapers, flakes and utilized flakes (Figure 5: 1-8). Obsidian is the most frequently used stone in this site, although chert and chalcedony can be also seen (Table 1). Distinct pebble stone tools are two stone weights made of andesite (Figure 5: 9, 10). They have notches or a groove to fasten ropes around the tool. Although a different kind of stone weight with a hole has been reported in the Ivashka sites (Ponomarenko 1985: 153), we could not find such a type of artifact. The edge of a hoe made of walrus tusk is a representative material from this site (Figure 6). The tip of the edge is heavily abraded, and traces of rope for binding it to a haft can be seen around its holes.

(2) Karaga-10 site

This site is a fortification that is located on a terrace on the southern coast of Karaga Bay (Figure 3, Plate 2). Latitude is approximately 12-16 m. According to Ponomarenko's general survey, nine pit dwellings were discovered on the surface of the ground. We excavated a cross-section of dwelling "No.4," which is exposed on the cliff of the terrace due to natural abrasive action. Its plan view is estimated to be circular, and the diameter is approximately 13 m (Ponomarenko 1999).

Buried soil inside the residence can be classified into 9 layers (Figure 7, Plate 3). Part of a wooden pillar remained in the bottom of a post pit because buried soil under Layer-7 is permafrost. More than 500 artifacts were collected at this site (Table 1). Figure 8 shows pottery

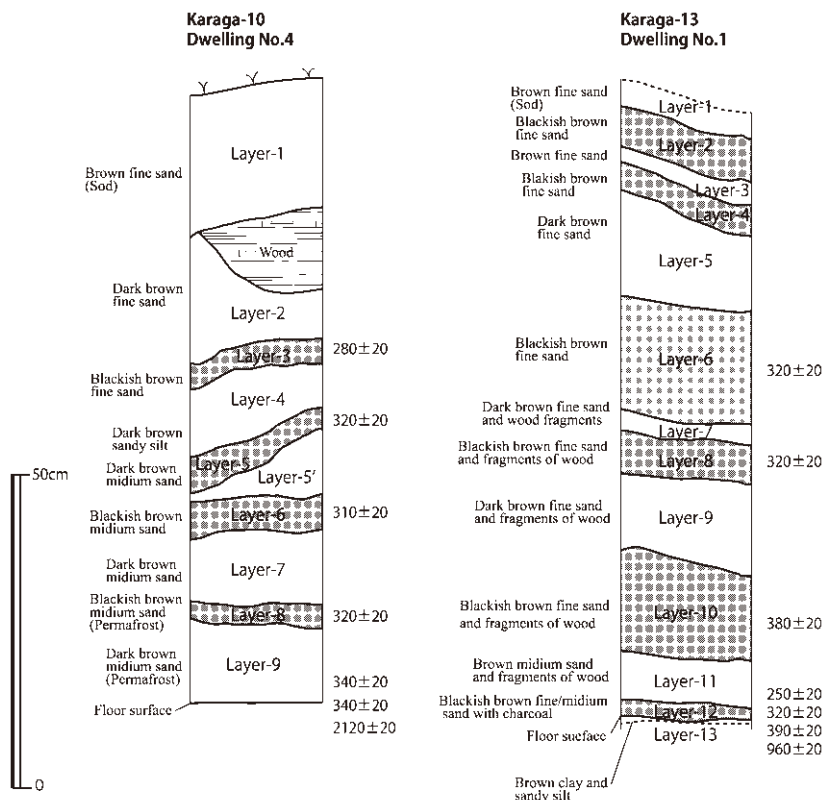


Figure 7 Stratigraphy of the Karaga-10 and -13 sites

fragments with the impression of a coiled cord around a shaft. The rim is always straight, and the bottom is round shaped. Figure 9 illustrates pottery with other ornaments or technical traces. Clay rope lines (Figure 9: 1–3) and punctured ornamentation (Figure 9: 4, 6 and 7) are used with the impression of coiled cord. A clam impression is also used with these techniques in an example (Figure 9: 6). A specimen has the impression of a paddle with a gridwork surface known as “waffle-like” ornamentation (Figure 9: 5).

Chipped stone tools consist of points/arrowheads, a scraper, a wedging piece, a core, flakes and utilized flakes (Table 1). They are made of various stones such as obsidian, chert, basalt, chalcedony, shale, and agate (Figure 10). Slate and andesite are used for pebble stone tools, especially for stone hammers and polished stone knives (Figure 10: 7, 8, 10 and 11). There is no grindstone or stone lamp. Although the number of wooden tools is not necessarily large, a well-preserved long implement that is estimated to be a bow element was found (Figure 11: 3). Additionally, a spear-like bone tool and a harpoon head were discovered (Figure 11: 1 and 2).

(3) Karaga-13 site

Like the Karaga-10 site, this site is a fortress on a marine terrace on the southern coast of Karaga Bay (Figure 3, Plate 4). The distance from the Karaga-10 site is approximately 3 km, and latitude is approximately 10–13 m. Ponomarenko (1999) reports that one residence can be seen on the surface of the ground at this site. We excavated the buried soil of this pit dwelling (“No.

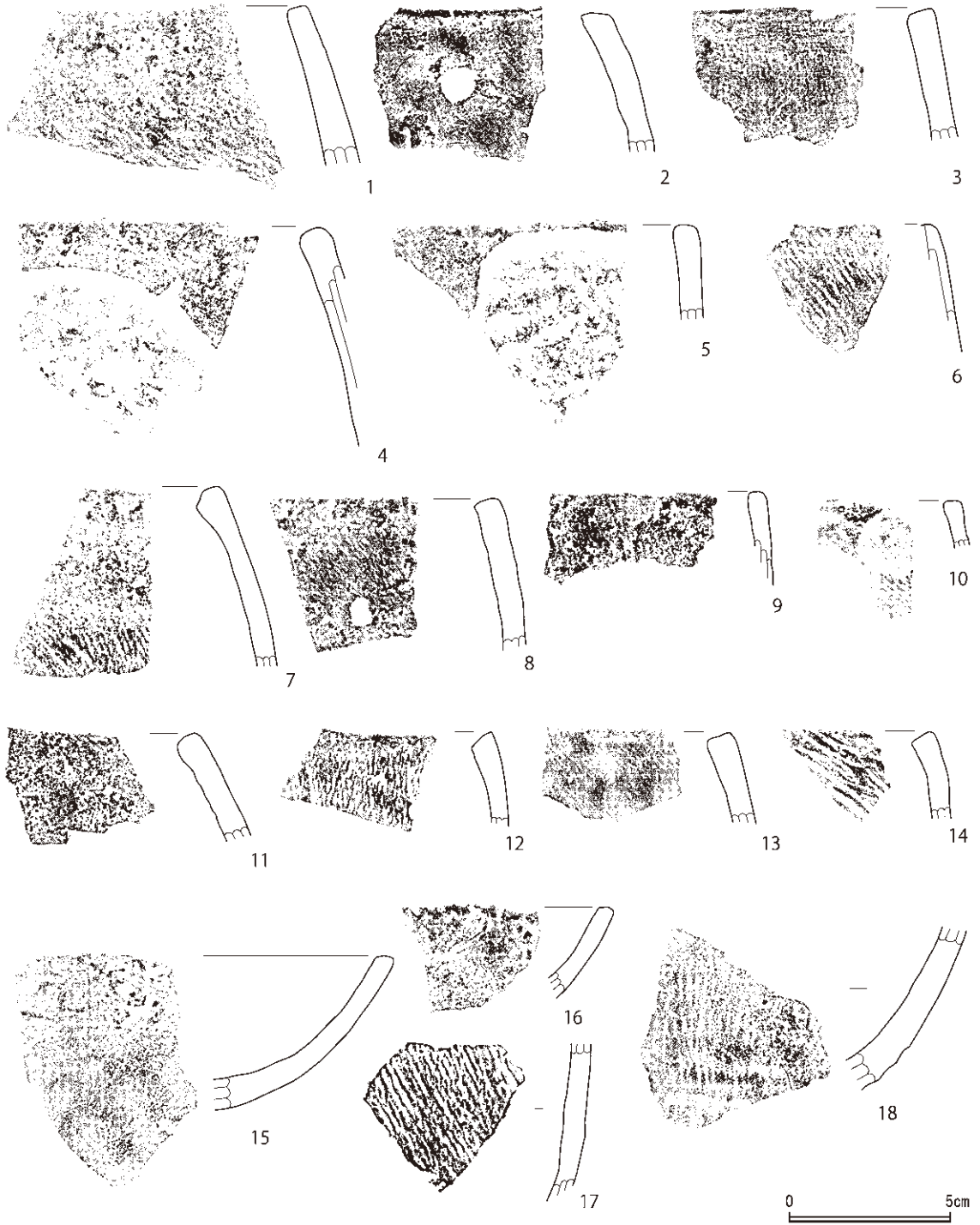


Figure 8 Fragments of pottery from the Karaga-10 site (1)

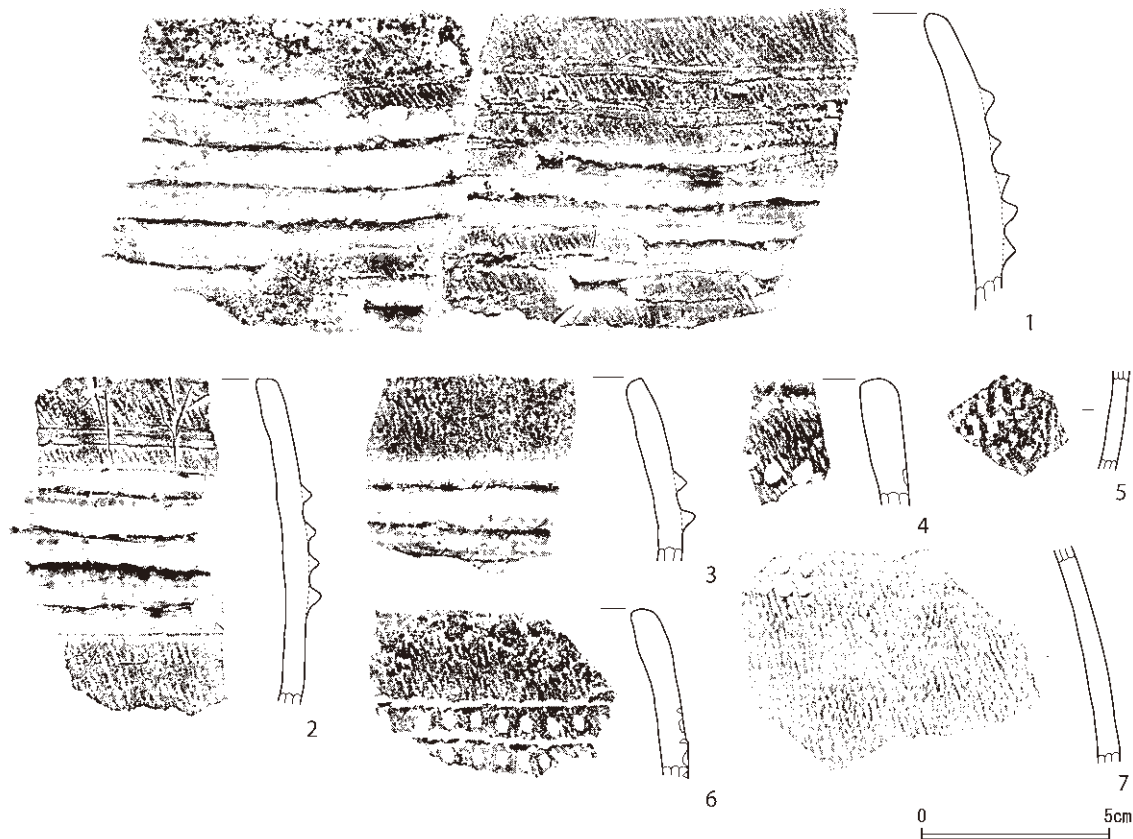


Figure 9 Fragments of pottery from the Karaga-10 site (2)

1”) using the eroded surface on the cliff of the terrace. Due to natural abrasion, part of this residence had moved downward approximately 70 cm. However, the layers of buried soil and the floor of this residence are restored as same as the original position. With consideration for conservation of the site, artifacts and specimens for physicochemical analyses were excavated from this moved body of buried soil that had been moved (Figure 7, Plate 5).

The number of excavated pottery fragment is 116 (Table 1). Almost all of them have a coiled cord impression (Figures 12 and 13: 1–5), while some specimens have other ornaments such as clay rope lines and clam impressions (Figure 13: 6–8). The lithic composition, which is basically similar to that of the Karaga-10 site, consists of points/arrowheads, scrapers, flakes and utilized flakes (Figure 14). Obsidian is more frequently used in this site than in Karaga-10 (Table 1). Representative pebble stone tools are hammer stones (Figure 14: 12–14). We found various organic materials such as dishes, a masher, hoes, a harpoon, combs and an ignition tool (Figures 15 and 16). However, there is no distinguishable wooden implement for excavating a lily bulb as Ponomarenko (2012) reports.

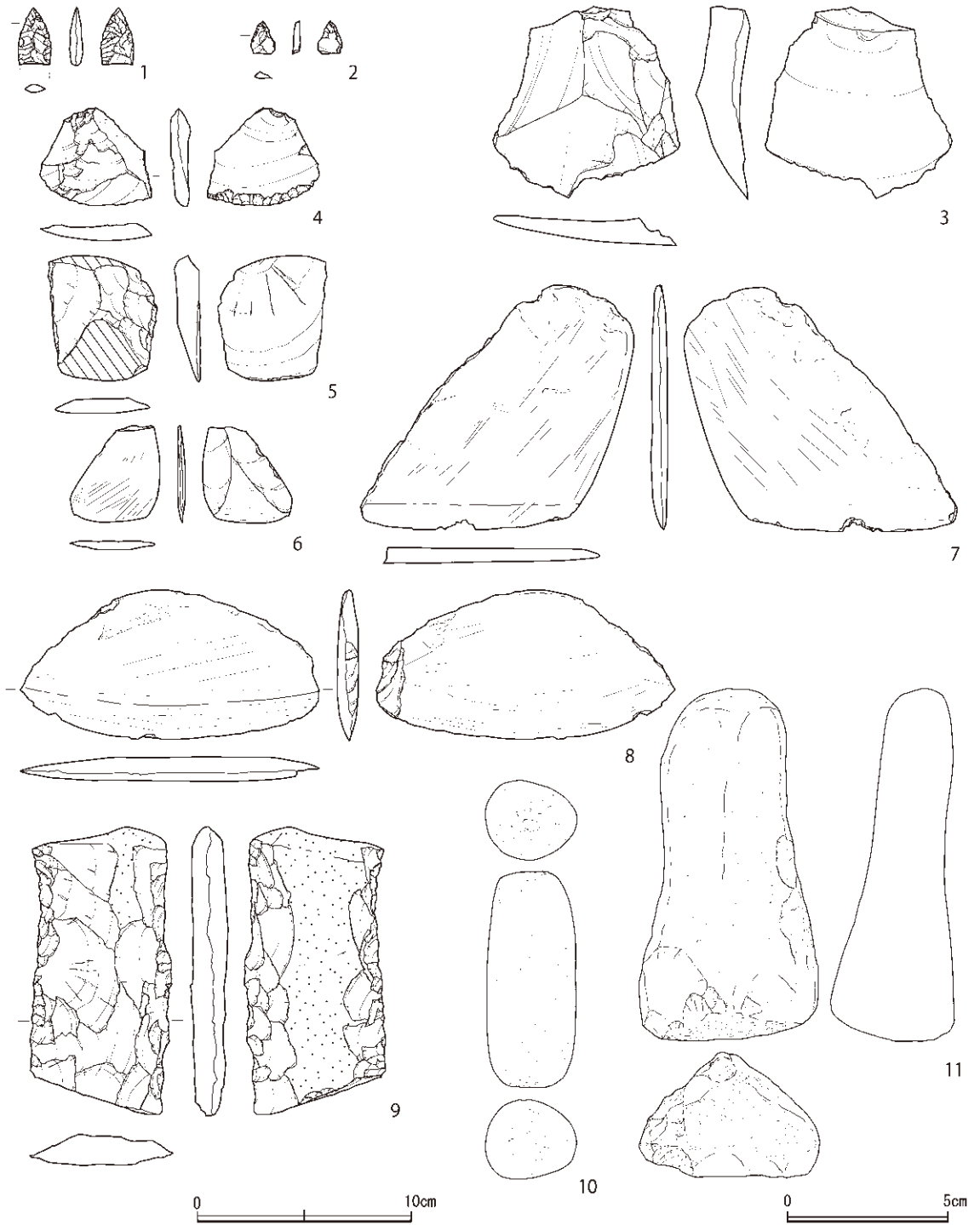


Figure 10 Stone tools from the Karaga-10 site

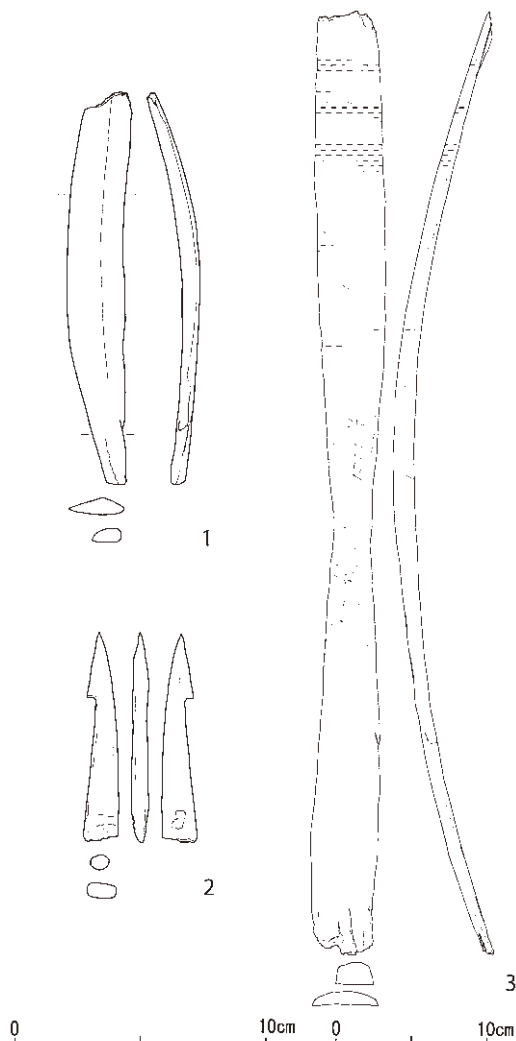


Figure 11 Bone/antler and wooden tools from the Karaga-10 site

2. Types and compositions of pottery

Pottery from this area can be classified into four types. The first is clay vessels with punctured ornamentation and clam indentation on the impression of coiled cord (Figures 9: 4, 6, 7 and 13: 7), which is characteristic in the Ivashka Culture (Ponomarenko 2012). They have a restricted or open mouth, and the rim is always straight. Though there are little specimens that show the whole shape from rim to bottom, its form is likely to be spherical. In this study, we classify this kind of pottery as “Ivashka type,” which is distributed, as mentioned above, in a relatively narrow area from the southern coast of Karaga Bay to the Ivashka/Sukhaya River basin of the northeastern Kamchatka. However, there are also some examples from the west coast. In 2012, the author confirmed a few ceramic fragments of this type from Palana or Kul’ki, located on the opposite side of the peninsula from Karaga Bay, in Waldemar Jochelson’s collection that

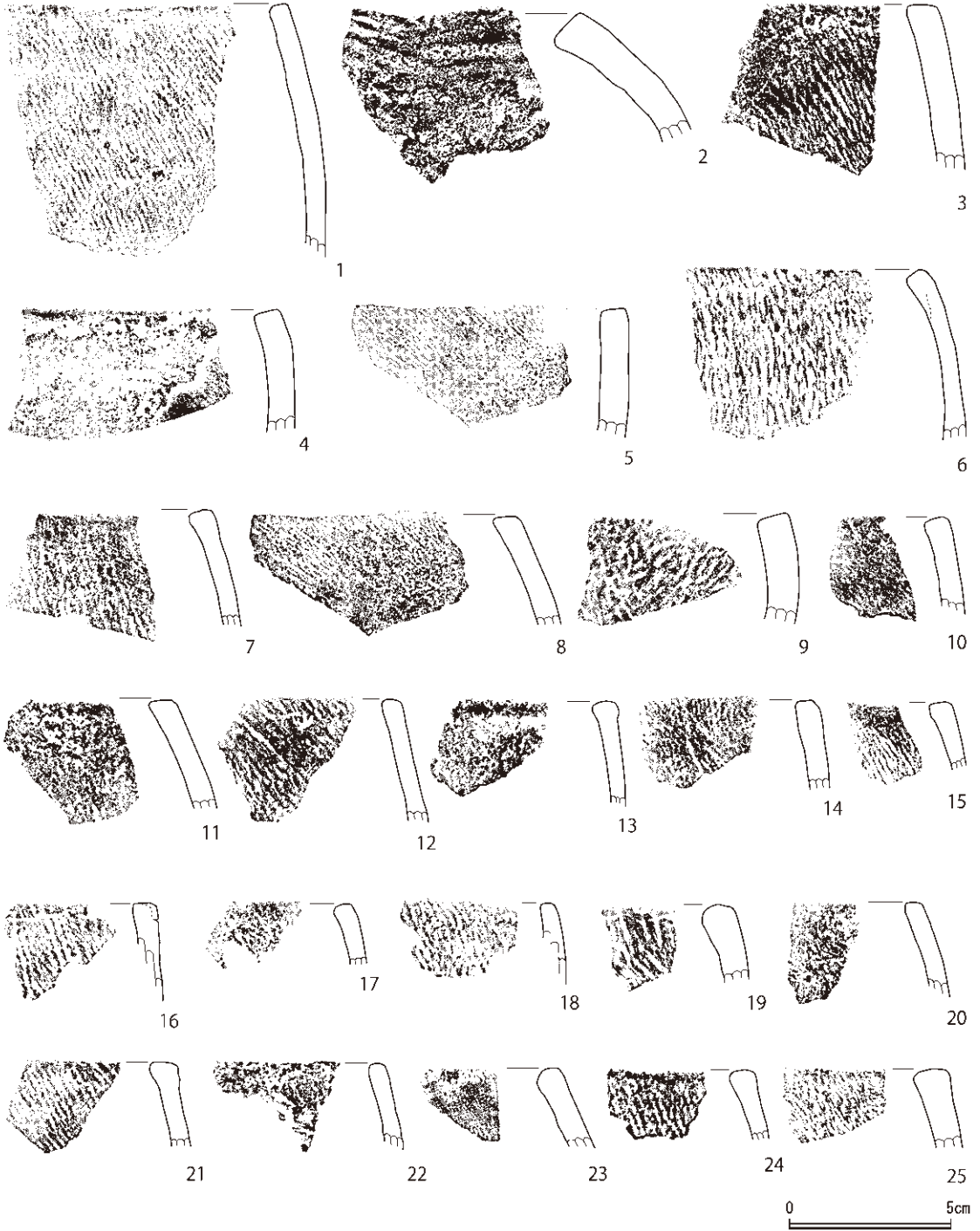


Figure 12 Fragments of pottery from the Karaga-13 site (1)

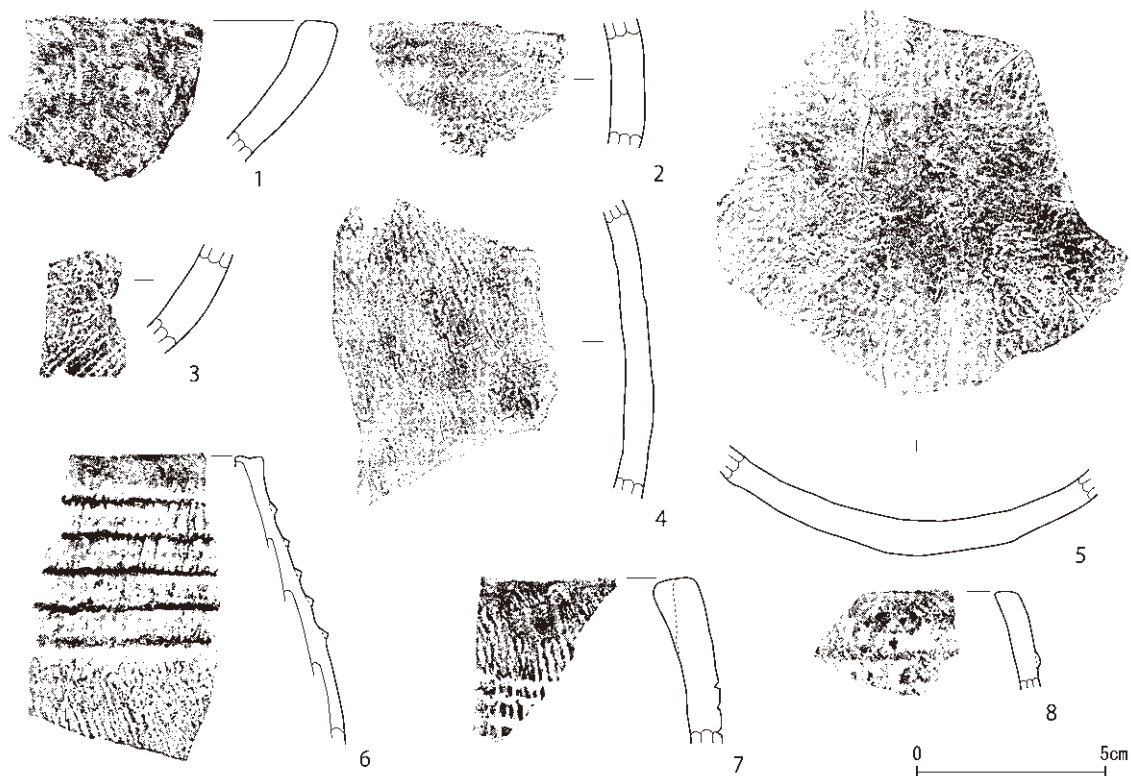


Figure 13 Fragments of pottery from the Karaga-13 site (2)

is housed in the State Historical Museum in Moscow. Quimby's (1947) "Kul'ki punctated" pottery group is likely to correspond approximately to Ivashka type.

The second type is characterized by the simple impression of coiled cord, a rounded bottom, and a straight rim inclining inward (Figures 4, 8, 12 and 13: 1-5). This type of pottery is distributed in a wide area of the northern Kamchatka Peninsula; for example, on the west coast from Kavran to Penzhina Bay, and around the Karaga Bay and Verhoturuva Island on the east coast. For descriptive purposes, the author classifies this pottery as "Kavran type" pottery (Jochelson 1908, Fig. 165). We ascertained that Jochelson's collection also contains some fragments of this type from Kavran.

The third type is pottery with a few lines of clay rope near the rim surface (Figures 9: 1-3 and 13: 6). The impression of coiled cord is also often used as a base ornament. This type is widely distributed in the northern Kamchatka, although Rudenko (1948) believes that its core distribution area is the central and southern Kamchatka. The bottom of this type is rounded, and the rim is predominantly straight and inclines inward. Jochelson (1908, Fig. 165) also illustrates a potsherd of this type.

The last type has a "waffle-like" impression that is formed by pressing a wooden paddle with square/rectangular-shaped embossments (Figure 9: 5). This byproduct trace of pottery construction has been also called the checked stamp or the grid stamp that is often adopted in the Neolithic clay vessels of the Northeastern Siberia (e.g., Mochanov 1969, Dikov 1979, Slobodin



Figure 14 Stone tools from the Karaga-13 site

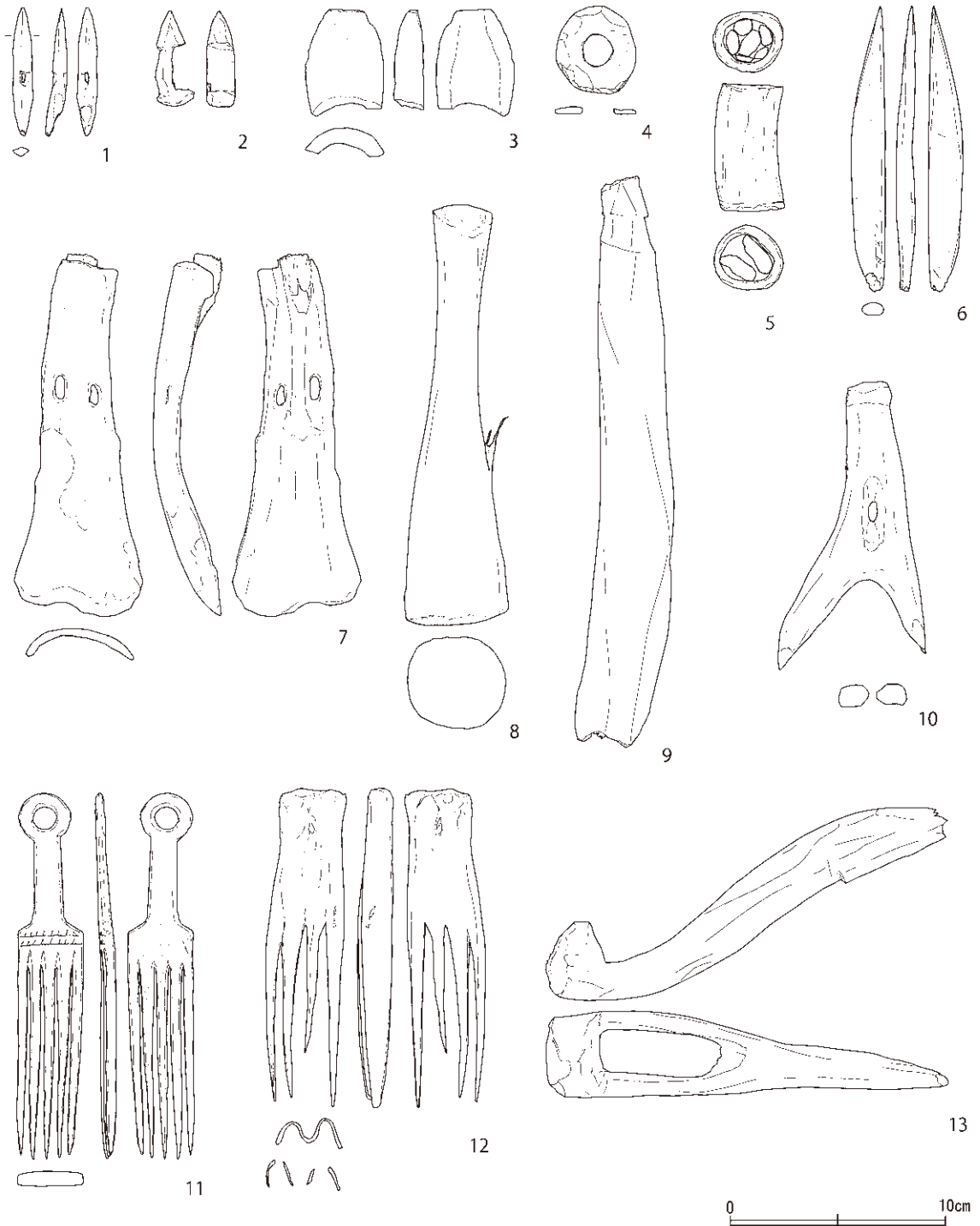


Figure 15 Bone and wooden tools from the Karaga-13 site (1)



Figure 16 Bone/antler and wooden tools from the Karaga-13 site (2)

2001). The shape of this pottery is similar to that of other types.

Researchers have supposed that these clay vessels are local types of the Old Koryak Culture or Paleometal period in the Kamchatka Peninsula (Ponkratova 2006). Therefore, their date is assigned to a period between the 5th and the 17th century CE, though the age of each type has not yet been determined. Only the second type of pottery, ceramics with a coiled-cord impression, from the west coast of the Kamchatka Peninsula has many physicochemical ages. Krenke (2002) reports more than 20 radiocarbon dates of charcoal collected in the Kavran River basin and adjacent areas. The absolute age of Kavran type pottery is roughly dated to a period between the 8th and the 11th century CE and after, especially based on radiocarbon dates from the Kavran-28 site. It is, however, still unclear whether this result can be safely adapted to similar pottery from

the east coast of the Kamchatka Peninsula.

On Karaga Bay coast, we discovered 675 potsherds from three sites (Table 1). The most popular type is Kavran type pottery (568 pieces, 84.1%), while the ratio of Ivashka type (7 pieces) is only 1.0%. In addition, the number of pieces of pottery with clay rope ornamentation (the third type) and pottery covered by a square/rectangular-shaped impression (the fourth type) is extremely small. The ceramic set indicates that it is difficult to reveal the date of each type, because it consists basically of the major type (Kavran type), and other minor types account for only a small percentage. However, we can recognize two patterns of ceramic composition: the ceramic set consisting solely of Kavran type pottery (“composition-I”), as at the Karaga-6 site, and the other ceramic set that includes several types of pottery as well as Kavran type (“composition-II”), as at the Karaga-10 and -13 sites.

We also must pay attention to the fact that minor types of pottery tend to be distributed only in the southern part of Karaga Bay. This is the case not only with in our excavations but also with the artifacts collected so far. Thus, ceramic composition has the potential to be an effective indicator that shows regional differences in addition to temporal changes. Therefore, this study aims to reveal the date of the pottery, taking proper account of the pottery composition, in this region.

3. Results of radiocarbon dating

Specimen type, provenance, and the results of AMS analysis are shown in Table 2. Figure 17 shows the probability distribution of the calibrated dates of the conventional ^{14}C age shown in Table 2, with the exception of the rejected dates. In this study, the marine reservoir effect need not be taken into consideration, since charcoal and wood are used for analysis. Even though there are some dates with $\delta^{13}\text{C}$ values that are suspected to be influenced by the marine reservoir effect, this is simply caused by the large margin of error of AMS.

At the Karaga-10 and -13 sites, the ^{14}C age of specimens collected from the buried soil of pit dwellings falls in a range between 280 ± 20 BP and 380 ± 20 BP. Similarly, the date of wood and charcoal from the floor surface is concentrated with a range between 250 ± 20 BP and 390 ± 20 BP. According to Figure 17, the calibrated calendar date of the pit dwellings at the Karaga-10 and -13 sites is from the second half of the 15th to the first half of the 17th century CE. The oldest ages in each site (2120 ± 20 BP and 960 ± 20 BP) are rejected, since other results indicate that they are not appropriate dates for when the pit dwellings were constructed.

The radiocarbon dates of the Karaga-6 site are 860 ± 20 BP to 920 ± 20 BP, and their calibrated calendar date is between the 11th and the 13th century CE. Thus, the date of the pit dwelling at the Karaga-6 site is definitely older than that of the Karaga-10 and -13 sites. We believe that there is a time lag between the residences at the Karaga-6 and the Karaga-10 and -13 sites.

4. Discussion

The AMS analysis demonstrates that the “composition-I” is dated from the 11th to the 13th century CE, and that “composition-II” is dated after the second half of the 15th to the first half of

the 17th century CE. Though the major type of clay vessel is Kavran type in both stages, some other types began to be involved in pottery composition in the newer stage¹⁾. In general, there is no distinct difference in Kavran type pottery throughout the two stages. The only difference is that the rim of the older stage sometimes has a clay rope attachment on the interior surface (Figure 4: 4, 7), while there is no such morphological feature in the newer stage²⁾. However, this is not necessarily an all-round criterion by which to identify the period of each pottery fragment. This is one of the reasons why the date of pottery can be identified from the viewpoint of ceramic composition in this study.

There is a hiatus between the older and the newer stages in this study. However, this does not mean that the northeastern Kamchatka was a desolate wilderness during this period, especially in the 14th century CE, since there are some archaeological sites that are dated to the blank period. The conventional ¹⁴C age of charcoal collected from the cultural layers in the Ivashka and Dranka River basins, as reported by Ponomarenko (2012), and their calendar dates in the two sigma ranges, as calibrated by a program (Ramsey 2010) based on IntCal09 (Reimer *et al.* 2009), are as follows:

- 1) 470±40 BP (ГИИ-10781, Ivashka-4 site) [1331 to 1338 (0.7%), 1397 to 1489 (98.8%), 1604 to 1608 (0.4%)]
- 2) 660±60 BP (ГИИ-10787, Ivashka-23 site) [1261 to 1411 (100%)]
- 3) 570±30 BP (ГИИ-10784, Ivashka-12 site) [1304 to 1365 (60.3%), 1384 to 1423 (39.7%)]
- 4) 450±30 BP (ГИИ-10790, Ivashka-29 site) [1415 to 1478 (100%)]

They are assigned to a period between the 13th and the 17th century CE, in particular, the 14th and the 15th century CE. Therefore, there are archaeological sites at least in the Ivashka and Dranka River basins even in the 14th century CE, and in this region, there is the possibility that Ivashka type pottery had already emerged in the 13th century CE (Table 3). The wide range in the ornamental variation of pottery strongly indicates that the home province of Ivashka type is in the Ivashka and Dranka River basins. After the 15th century CE, it can also be seen on the southern coast of Karaga Bay. At present, the northern boundary of Ivashka type pottery is located in the mouth of the Karaga River. Thus, the pottery composition can be an indicator not only of the period but also of regionality around Karaga Bay coast.

In addition to Ivashka type, the third and fourth types of pottery are also assigned to the newer stage (15th–17th centuries CE). The third type, with clay rope line ornaments, from the Karaga-10 site widely distributes in the northern Kamchatka including the west coast. On the east coast, many pottery fragments of this type are found on Verkhoturova Island³⁾, while the number of pottery fragments of this type in each site on the mainland of the peninsula is still small. The paucity of this type indicates that it might have been imported from other areas between the 15th and the 17th century CE.

Only one fragment of the fourth type, pottery with the impression of a paddle with square/rectangular-shaped embossment, was found at the Karaga-10 site. This type of pottery was also found in the Ivashka River basin. Ponomarenko (2012) assumes that it was brought from other areas, because similar ornamentation is more popular in the northern regions, for example, the Vakarev Culture in Chukuchi Autonomous Okrug territory (e.g., Dikov 1977, 1979). We can frequently see such ornamentation in the Old Koryak Culture pottery on the northern coast of the

Table 2 Results of radiocarbon dating

[The Acid-Alkali-Acid (AAA) pretreatment process was used for eliminating carbonates and secondary organic acids. After the treatment, the sample was neutralized with ultra pure water, and dried. In the acid treatments of the AAA, the sample is treated with HCl (1 M). In the alkaline treatment, the sample is normally treated with NaOH, by gradually raising the concentration level from 0.001 M to 1 M. If the alkaline concentration reaches 1 M during the treatment, the treatment is described as “AAA” in the table, while “AaA” if the concentration does not reach 1 M.]

Specimen ID	Provenance	Material Type	Pretreatment	$\delta^{13}\text{C}$ (‰)	Conventional ^{14}C Age (yrBP)	Lab Number
2012-1	Dwelling No. 4, floor surface; Karaga-10 Site	charcoal	AAA	-25.80 ± 0.29	$2,120 \pm 20$	IAAA-120927
2012-2	Dwelling No. 1, floor surface; Karaga-13 Site	charcoal	AAA	-20.81 ± 0.48	960 ± 20	IAAA-120928
2013-1	Dwelling No. 4, Layer 3; Karaga-10 Site	wood	AAA	-24.06 ± 0.42	280 ± 20	IAAA-123861
2013-2	Dwelling No. 4, Layer 5; Karaga-10 Site	charcoal	AAA	-22.34 ± 0.46	320 ± 20	IAAA-123862
2013-3	Dwelling No. 4, Layer 6; Karaga-10 Site	wood	AAA	-24.25 ± 0.33	310 ± 20	IAAA-123863
2013-4	Dwelling No. 4, Layer 8; Karaga-10 Site	charcoal	AAA	-23.60 ± 0.44	320 ± 20	IAAA-123864
2013-5	Dwelling No. 4, floor surface; Karaga-10 Site	wood	AAA	-22.35 ± 0.4	340 ± 20	IAAA-123865
2013-6	Dwelling No. 4, wooden pillar; Karaga-10 Site	wood	AAA	-26.14 ± 0.41	340 ± 20	IAAA-123866
2013-7	Dwelling No. 1, Layer 6; Karaga-13 Site	charcoal	AaA	-23.48 ± 0.35	320 ± 20	IAAA-123867
2013-8	Dwelling No. 1, Layer 8; Karaga-13 Site	charcoal	AAA	-23.48 ± 0.59	320 ± 20	IAAA-123868
2013-9	Dwelling No. 1, Layer 10; Karaga-13 Site	charcoal	AAA	-22.43 ± 0.33	380 ± 20	IAAA-123869
2013-10	Dwelling No. 1, floor surface; Karaga-13 Site	charcoal	AAA	-19.32 ± 0.35	390 ± 20	IAAA-123870
2013-11	Dwelling No. 1, floor surface; Karaga-13 Site	charcoal	AAA	-25.18 ± 0.35	250 ± 20	IAAA-123871
2013-12	Dwelling No. 1, floor surface; Karaga-13 Site	charcoal	AaA	-26.00 ± 0.44	320 ± 20	IAAA-123872
2013-13	Dwelling No. 1, floor surface; Karaga-6 Site	charcoal	AAA	-26.32 ± 0.43	860 ± 20	IAAA-123873
2013-14	Dwelling No. 1, floor surface; Karaga-6 Site	charcoal	AAA	-23.02 ± 0.29	880 ± 20	IAAA-123874
2013-15	Dwelling No. 1, floor surface; Karaga-6 Site	charcoal	AAA	-22.04 ± 0.29	920 ± 20	IAAA-123875

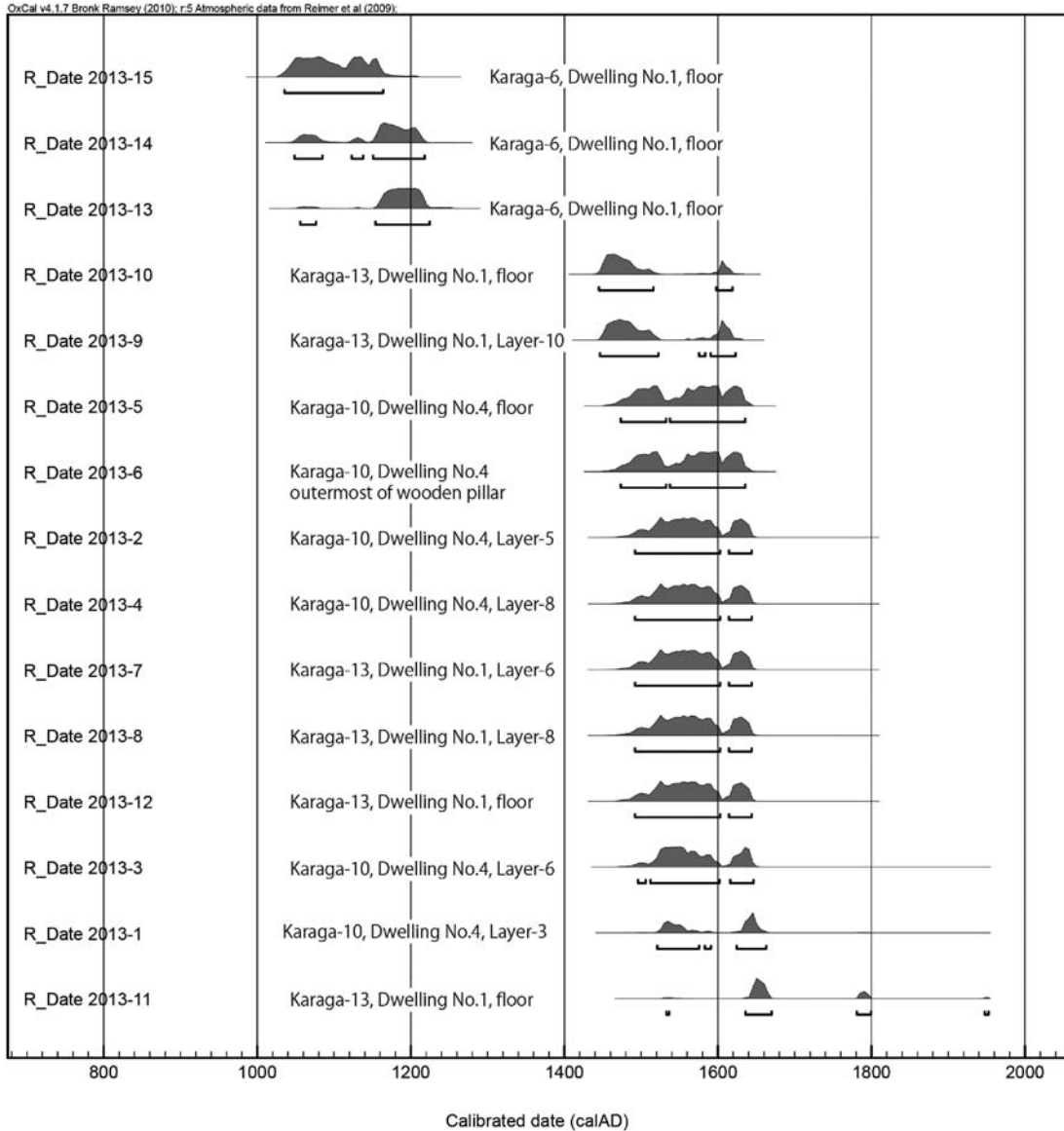


Figure 17 The calibrated calendar dates (2σ) in Karaga Bay coast
 [calibrated by OxCal v4.1.7 (Ramsey 2010)]

Okhotsk Sea and Penzhina Bay coast (e.g., Vasil'evskij 1971, Lebedintsev 1990, Takase *et al.* 2013), while it is rare on the east coast of the Kamchatka Peninsula. Thus it might be also imported from northern areas, as Ponomarenko surmises.

The transition from “composition-I” to “composition-II” suggests that the cultural interaction around Karaga Bay was more active between the 15th and the 17th century CE than between the 11th and the 13th century CE. Although the major type of pottery in this region is consistently Kavran type from the 11th to the 17th century CE, the active cultural influence from other areas makes pottery composition more complex after the 15th century CE. According to Jochelson

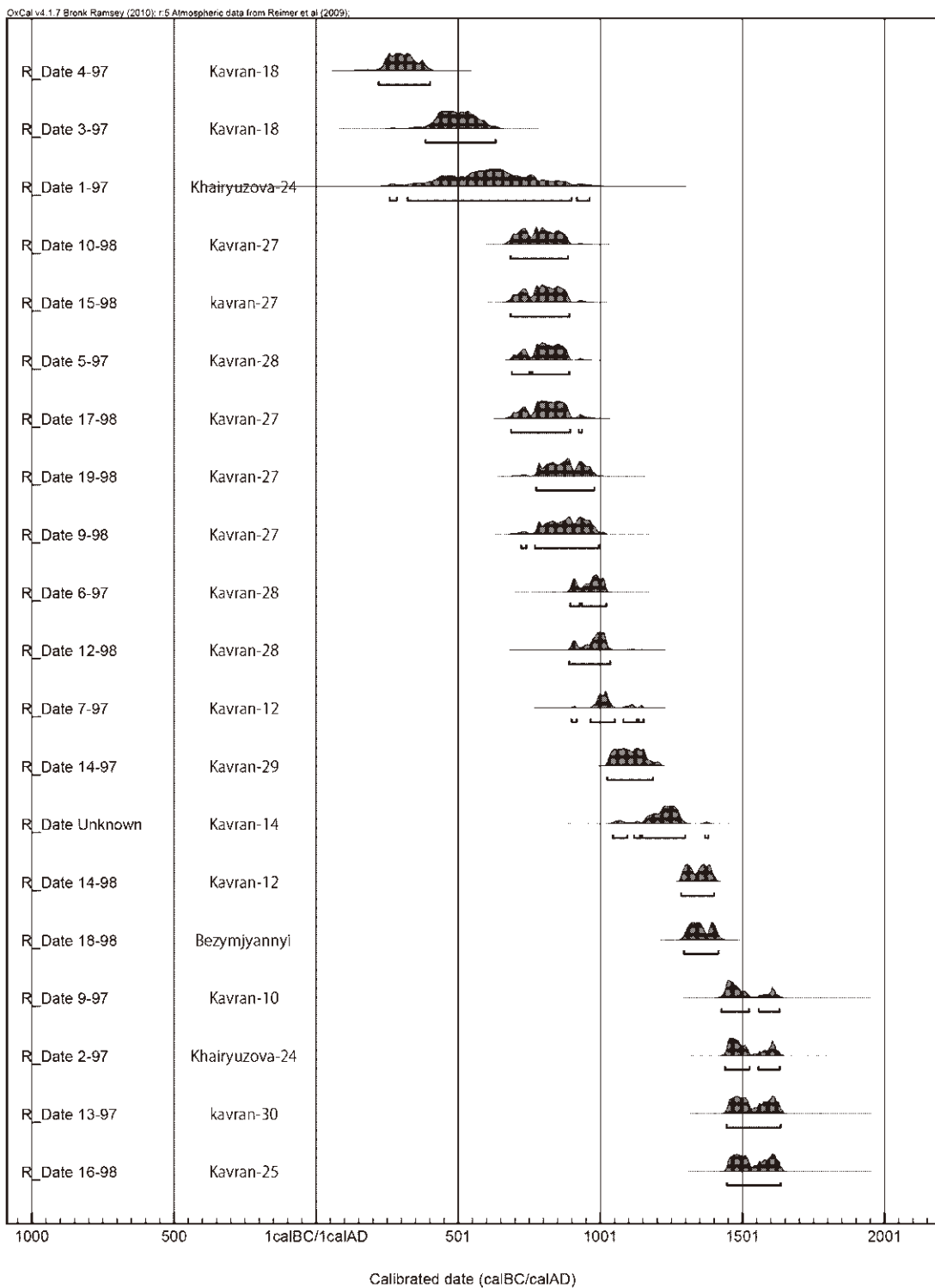


Figure 18 The calibrated calendar dates (2σ) in the Kavran River basin (1)

[calculated by OxCal v4.1.7 (Ramsey 2010) calibration program based on IntCal09 (Ramsey 2010), source of the conventional ¹⁴C ages: Krenke (2002)]

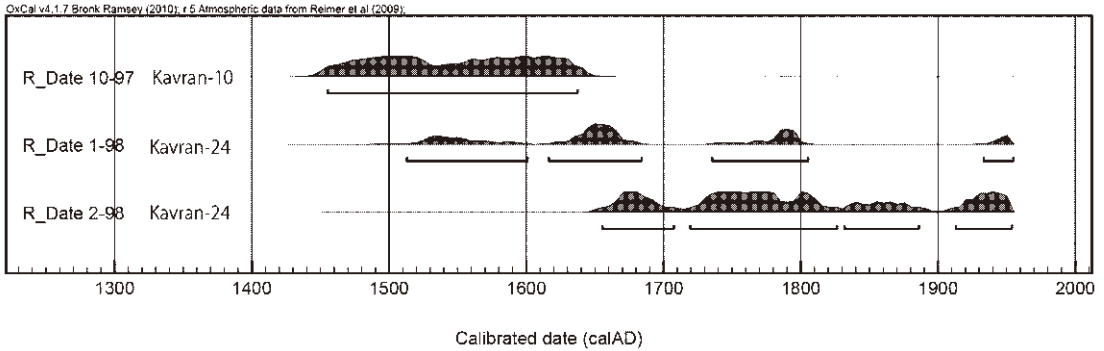


Figure 19 The calibrated calendar dates (2σ) in the Kavran River basin (2)

[calculated by OxCal v4.1.7 (Ramsey 2010) calibration program based on IntCal09 (Ramsey 2010), source of the conventional ^{14}C ages: Krenke (2002)]

Table 3 Age of pottery from Karaga Bay coast and Ivashka and Dranka River basins

Area	Type of pottery	century						
		11th	12th	13th	14th	15th	16th	17th
Karaga Bay coast	Kavran type	+	+	+				
	Ivashka type	"composition-I"						
	Pottery with clay rope					+	+	+
	Pottery with wooden paddle with square-shaped embossments					+	+	+
						"composition-II"		
Ivashka and Dranka River basins	Ivashka type and Kavran type			+	+	+	+	+

(1908: 574), walrus used to be particularly numerous in Karaga Bay and on Karaginskij Island, and Koryak hunters visited these areas in the summer to hunt⁴). The formation of such a resource-use strategy may have a relationship with "composition-II."

The newer stage is an important epoch not only in the northern Kamchatka but also the southern Kamchatka. In the Northern Kuril Islands and the southern Kamchatka, *Naiji* pottery emerged in this period (Takase 2013). In addition, it has a wide distribution from the Northern Kurils to the Shipnski Peninsula, the east coast of the middle Kamchatka. However, its area rapidly reduced after the second half of the 17th century CE in Kamchatka, as territory of the Kuril Ainu, as seen in documents after the 19th century CE.

Recent studies have revealed that even reindeer group herding, a symbolic economy in the northern Kamchatka and Chukuchi peninsulas, occurred after the 18th century CE (e.g., Krupnik 1993, Sasaki 2006). The modern framework for ethnic groups and their subsistence, which is recorded in ethnographic documents, developed during the 18th and the 19th centuries. Immediately before that, a different group relationship should be considered. For this reason, a ceramic set can provide a significant clue to revealing the undocumented relationship between groups and regions. We can expect that the period from the 15th to the 17th century is an important epoch for the ethnohistory of the indigenous peoples in Kamchatka. Future archaeological study based on various kinds of artifacts will reveal more specific historical changes in the group relationships and economics in this peninsula.

5. Conclusion

Conclusions of this study are summarized as follows:

- 1) From a typological viewpoint, pottery from Karaga Bay coast is divided into four types: Ivashka type, Kavran type, pottery with clay rope ornamentation, and pottery with a square/rectangular-shaped impression.
- 2) The ceramic set is classified into two patterns: a composition consisting solely of Kavran type pottery (“composition-I”), and a composition consisting of various types as well as Kavran type pottery (“composition-II”).
- 3) AMS radiocarbon dating demonstrates that “composition-I” is dated to a period from the 11th to the 13th century CE, while “composition-II” is assigned after the second half of the 15th to the first half of the 17th century CE.
- 4) In the older stage (the 11th to the 13th century CE) of Kavran type pottery, the rim sometimes has a clay rope on the interior surface, while there is no such morphological feature in the newer stage (the 15th to the 17th century CE). However, there is, in general, no large typological change in Kavran type throughout the older and the newer stages.
- 5) The newer stage is likely to be a significant epoch for the ethnohistory of the indigenous peoples in the entire Kamchatka Peninsula. Archaeological investigations of this period are a high-priority issue for revealing the formation process of the modern indigenous peoples based on archaeological methods.

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Notes

- 1) The precise age of the emergence of Kavran type pottery is still unknown. Krenke (2002) supposes that they date back to a period between the 8th and the 11th century CE. If this estimation is correct, this type of pottery emerged on the west coast, and then the breadth of its distribution expanded to the east coast after the 13th century CE. This hypothesis should be examined carefully in the future.
- 2) On the west coast, there may be an example with a clay rope on the interior surface, and its age should be dated to the newer stage (Krenke 2002: 133). Thus, it is uncertain whether such a rim morphology is effective in identifying the period on the west coast.
- 3) This collection was excavated in 1998 by A. V. Ptashinski, and the author investigated it in 2010 in Petropavlovsk-Kamchatskij.
- 4) Kikuchi (2003, 2004, 2005) demonstrates that walrus tusk can be seen in Chinese historical documents between the Tang (618–907) and Ming (1368–1644) periods. Additionally, he proposes a hypothesis that walrus tusk was collected on the northeastern coast of the Kamchatka Peninsula by the Old Koryak Culture people, and was carried by the indigenous peoples along the northern coast of the Okhotsk Sea even in the Tang period (Kikuchi

2005:14). However, there is little possibility that people in the Kamchatka Peninsula hunted walrus in Karaga Bay before the 11th century CE, based on the results of this study. At present, there is no archaeological site that is likely to go back to the first millennium CE around Karaga Bay. Furthermore, the age of the diffusion of the Old Koryak Culture to the east coast of Kamchatka is still a controversial topic. Therefore, walrus tusk collected in other areas was brought in during the Tang dynasty, while materials from Karaga Bay might have been transported into China in the Ming period.

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