

The Archaeology of the Early Metal Age in Primorsky Krai



Sapporo Gakuin University
Research Institute

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PLATES

PART I

Surveys in the Northern Part of Russian Maritime Province (Primorsky Krai)

Chapter 1

Introduction - Overview of the Survey

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Scientific Research Grant for Basic Research (A): Field surveys were conducted in Primorsky Krai, Russia, from 2009 to 2013, as part of the “Formation and Integration of the Far Eastern Paleozoic Groups.” The aim was to focus specifically on the effects of the Amur River basin, which grew stronger in the latter half of the early Iron Age, and to clarify how regional groups formed and reorganized in the Far East of Russia from the Neolithic Age onward. We focused on the Ussuri River and its tributaries located in the northern part of Primorsky Krai, where the conditions are unknown due to the few study examples at the river’s mouth. Therefore, we consulted with the Institute of History, Archaeology and Ethnography, Far-Eastern Branch of the Russian Academy of Sciences, and conducted this survey as a joint survey between Sapporo Gakuin University and the institute.

In 2009, we explored and prospected ruins from the early Iron Age that were located between the Iman River and the Ussuri River basins to identify excavated ruins and to understand overall trends in site distribution. The survey period was from October 1 to October 9. The Japanese participants were Isao Usuki, Hiroki Obata, Tomotaka Sasada, and Hiromasa Nakasawa. In this survey, we conducted positional measurements and collected relics from the Rosino 6, Goncharovka, and Znamenka 1 sites as ruins from the Bronze to early Iron Ages in the vicinity of the Iman River. In addition, we conducted an exploratory excavation at the Elizavetovka 1 site, which had been newly discovered on the Tamga River basin in Lesozavodsk, and identified the ruins of pit houses from the Pol’tse cultural age. Subsequently, we inspected the Glazovka 1 and Rudanovskoye gorodishe sites, which are typical ruins from the early Iron Age, to understand their topographical features.

In 2010, we conducted a precise survey at the Elizavetovka 1 site, surveys and excavations at the Rosino 6 site, and an exploration of the ruins around the Iman River basin. The survey period was from September 25 to October 9. The participants on the Japanese side were Isao Usuki, Hiroki Obata, Katsuhiko Kiyama, and Tomotaka Sasada. A land survey of the remains of a village settlement on the hills was conducted at the Elizavetovka 1 site, while ruins of a defensive settlement from the Pokrovka cultural age and ruins from the Bronze Age were identified at the Rosino 6 site. In addition, an exploratory excavation was conducted at the Dal’niy Kut 3 site, and ruins of pit houses from the Pol’tse cultural age were identified.

In 2011, an excavation survey of the Elizavetovka 1 site was conducted. The survey period was from October 1 to October 9. The Japanese participants were Isao Usuki, Katsuhiko Kiyama, and Fumito Yamaya. An excavation survey was conducted on the ruins of Pit House No. 3 in the hills.

In 2012, the excavation survey at the Elizavetovka 1 site continued. The survey period was from

September 15 to September 30. The Japanese participants were Isao Usuki, Katsuhiko Kiyama, and Taku Matsumoto. The ruins of Dwelling No. 4 and a group of pits adjacent to the ruins of Dwelling No. 3 were excavated.

In 2013, ruins from the early Iron Age to the Mohe cultural age in the southern part of Primorsky Krai were explored. The survey period was from September 13 to September 20. The Japanese participants were Isao Usuki and Katsuhiko Kiyama. The Bulochka, Mikhaylovka 2,3, Lakovka, and Abramovka 3 sites were explored.

The following is a report on the survey results of the Rosino 6 and Elizavetovka 1 sites from the above investigations.



Fig.1 Survey site and related sites

Survey of the Rosino 6 Site

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1. Location and overview of the site

This site is located in the northwestern suburb of Rosino Village, in the town of Krasnoarmeyski district in Primorsky Krai. The site is centrally positioned, at 45°52'8" north latitude and 134°52'8" east longitude. It is located on a fluvial terrace extending in a lingular shape from east to west, 160 to 168 meters above sea level on the right bank of the Iman River (Bolshaya Ussurka), a tributary of the Ussuri River. The south side of the site forms a steep terrace cliff on the side facing the Iman River, while the north side forms a chasm. The entire site gradually slopes from south to north. Although the northeast side leads to a wide terrace surface, an earth mound was built on this section, cutting off the edge of the terrace. This cut-off edge is the scope of this site. Within the site, there are several shallow depressions in m parameters. These were presumed to be the ruins of pit houses. Relics from the Pol'tse to the Mohe cultural ages were collected and then surveyed to determine whether the settlement was from those ages.

2. Precise survey

Observation of the entire site revealed terrace-like and bluff-like structural remnants in the northern valley, in addition to the earth mounds in the partitioned area. We determined that this was highly likely to be a defensive settlement. These structural remnants were recorded, and a survey conducted to understand their scale. First, we set a reference point by using continuous GPS. We then set the datum point for the entire site using a Total Station based on the UTM53N system coordinates. Finally, we measured the earth mounds, terraces, and similar structures; additionally, we measured the altitude at various locations of the site, using an electronic compass and laser range finder. We merged the above data with a summary survey map from Russia and the ASTER-GDEM, which provides global earth-terrain data acquired through a joint program with the Ministry of Economy, Trade, and Industry in Japan and NASA of the United States. We then created a survey map.

The results of the survey show that the site assumes a lingular shape on the western tip, while the entire site slopes from south to north. The dimensions are as follows: East-West length: approximately 200m; maximum width: approximately 75m; circumference: approximately 450m. The earth mounds that cut off the northeast are bow-shaped and approximately 90 meters long, and are presently 0.5-1m high. Shallow moats surround the outside of the low earth mounds, which are presently 0.3-0.5m high. A 0.5m-wide earthen bridge was revealed in the center of the eastern section. On the southern tip of the ruins, there is a cliff on the Iman River, while on the north side, another cliff faces a valley. In the northwestern section, a terrace approximately 1m wide and a low-lying earth mound approximately 25m in total length have been established on the exterior of the cliff. Some of

the cliffs were possibly altered into a bluff-like shape. In addition, a shallow valley in the northeast section enters from the north. The depressions, which appear to be the ruins of pit houses, are most concentrated in the flat part of the elevated area to the south, and are aligned in a row along the slope. These features suggest that this was a defensive settlement, because a suitable site for defense was chosen, while the facilities were partially prepared. The purpose of the excavation survey was to establish the time period to which this defensive settlement belonged.

3. Excavation survey

To specify the time period of the ruins, we cleaved the earth mounds and conducted an excavation survey on the depressions, which were presumed to be the ruins of pit houses.

a. Survey upon cleaving the earthen walls

We established a 15×1 m survey area that included both the inside and outside of the earthen wall and the moat. The results indicated that the earth mound lay 0.4–0.8m below the topsoil; the survey revealed the surface of the earth mound, base of the moat, and former soil surface of the inside of the earth mound. We believe that the people entered the small valley to establish the earth mounds in the area that slopes from west to east. They first dug the moats, and then used the excavated soil to construct the earth mounds. Due to this method, the height of the embankment is no more than approximately 0.7m, although that height is closer to almost 1.5m if measured from the bank of the moat. The soil was simply piled up; they did not use the hanchiku (stamped earth) technique. However, the gravel that originates from the natural ground is densely accumulated in the stacked soil, and is particularly prominent at the base of the earth mounds. It was possibly intended to strengthen the earth mound. In addition, the construction surface of the earth mound and the former soil surface under the stacked soil is burnt and has turned red. Although we believe that the material had burned for a relatively long time, based on the thickness of the layer, the deposit area, and the carbonized wood inside, it is unclear whether this is a natural or man-made occurrence. A 0.9m-wide berm is attached to the outside of the earth mound. From this, we understand that the original cross-sectional shape of the earth mound was in a staircase pattern. The depth of the moat was created by excavating approximately 0.7m on the earth mound side and 0.1m on the outside, which turned the bottom surface into a flat trench. The outside of the earth mound comprises less than 0.3m of accumulated soil. As we presumed, the excavated soil was used for the earth mound.

We unearthed fragments of earthenware from the Mohe cultural age, which we believed to be from a period after the 9th century, based on the bottom surface of the earth mound construction. We believe the construction era of the earth mounds to be the same. This is largely consistent with the results from the radiocarbon dating of the carbonized materials.

b Excavation survey of the depressions

An excavation survey was conducted on one shallow, dish-shaped depression that appeared circular when viewed from above and was located on the flat part in the highest vicinity of the southern part of the terrace. A 5×5 m survey area was established and excavated. The deposit was shallow, and when the existing topsoil (layer thickness approximately 0.05–0.1m) and black soil (layer thickness 0.1–0.3m) were removed, it became the grayish white color of natural ground mixed with gravel. Although the results of this detailed evaluation showed an irregular-shaped depressed area in the center, the excavation showed no trace that the depression was man-made. Therefore, we ascertained that this was a natural depression, without confirming the time period of any

of the artifacts. However, we unearthed one jar-shaped vessel from the Bronze Age from the center of the depression. This vessel was possibly placed there intentionally. Furthermore, although we unearthed Mohe-culture earthenware (nephrite pendants, cylindrical beads, and iron arrowheads, considered to be 9th century) from the layer of black soil, this was not their original position. Furthermore, although the Russian participants conducted an exploratory excavation in several spots, they could not definitively confirm whether these spots were the ruins of pit houses. Based on the above, we could not deduce whether all of the shallow depressions confirmed in the ruins were pit houses.

4. Sub-conclusion

Although we could not definitively confirm the ruins of the pit houses during the survey of the Rosino 6 site due to time constraints, we believe that the earth mounds and other defense facilities were built in the Mohe cultural age, approximately in the 9th century. The excavation state of the relics also suggests that they resided in the Mohe cultural age. Although this survey could not obtain material on the early Pol'tse cultural age or on the first half of the Mohe cultural age, the central time period of these ruins can be considered to be in the 9th century, approximately.

We have used the term “Mohe culture.” This term is referred to as Bohai culture and Mohe culture in Primorsky Krai, Mohe culture and Pokrovka culture in the middle basin area of the Amur River, and Tongren culture in the Heilongjiang Province of China. We can see regional differences even in the details of the culture. What is common is the existence of a deep-pot type of earthenware called a Mohe-style earthenware, all of which certainly come from the culture of the Mohe tribe. North Primorsky Krai is the intersection area between the Amur basin and Primorsky Krai. The question is, which of these cultures is the closest to the composite of cultures identified in this survey?

In the vicinity, cemeteries from the same period were found on the Rosino site. The group of burial pits were surveyed. Many remarkable rectangular bronze fittings with openwork carvings were discovered among the burial goods in the Amur basin. We confirmed that these items had characteristics similar to those of the Korsakov and other burial sites on the Amur basin. All of the excavated materials are recognized as originating from the Pokrovka culture of the Amur basin; considering the material from the grave excavation, we believe that they can also be categorized as originating from the Pokrova culture. That is, the Iman River basin is closely related to the middle basin of the Amur River in the 9th century. We can consider this to be outside the territory of the Bohai Kingdom.

It is highly suggestive that defensive settlements were built in this area during this period. In the 8th century, the Bohai kingdom sought to expand its territory; thus, their conflict with the northern Mohe tribe—representative of the Blackwater Mohe—intensified. Although, in the 9th century, each tribe of the northern Mohe was incorporated into the Bohai Kingdom, it is believed that their independence strengthened following that integration. The defensive settlements may have been built during these tense relations with the Bohai Kingdom. Although there are few confirmed examples of 9th–10th century defensive settlements both in Primorsky Krai and in the Amur middle basin area, there are settlements from the Mohe cultural age that are located along the Iman River basin and on the hills. In addition, it is necessary to examine the north Bikin, the south Ussuri, and other river basins, to ascertain how the northern Mohe cultures such as the Pokrovka culture were distributed, and the actual state of the ruins.

Regarding the Bronze-Age earthenware identified in this survey, those found in the vicinity of the Iman River

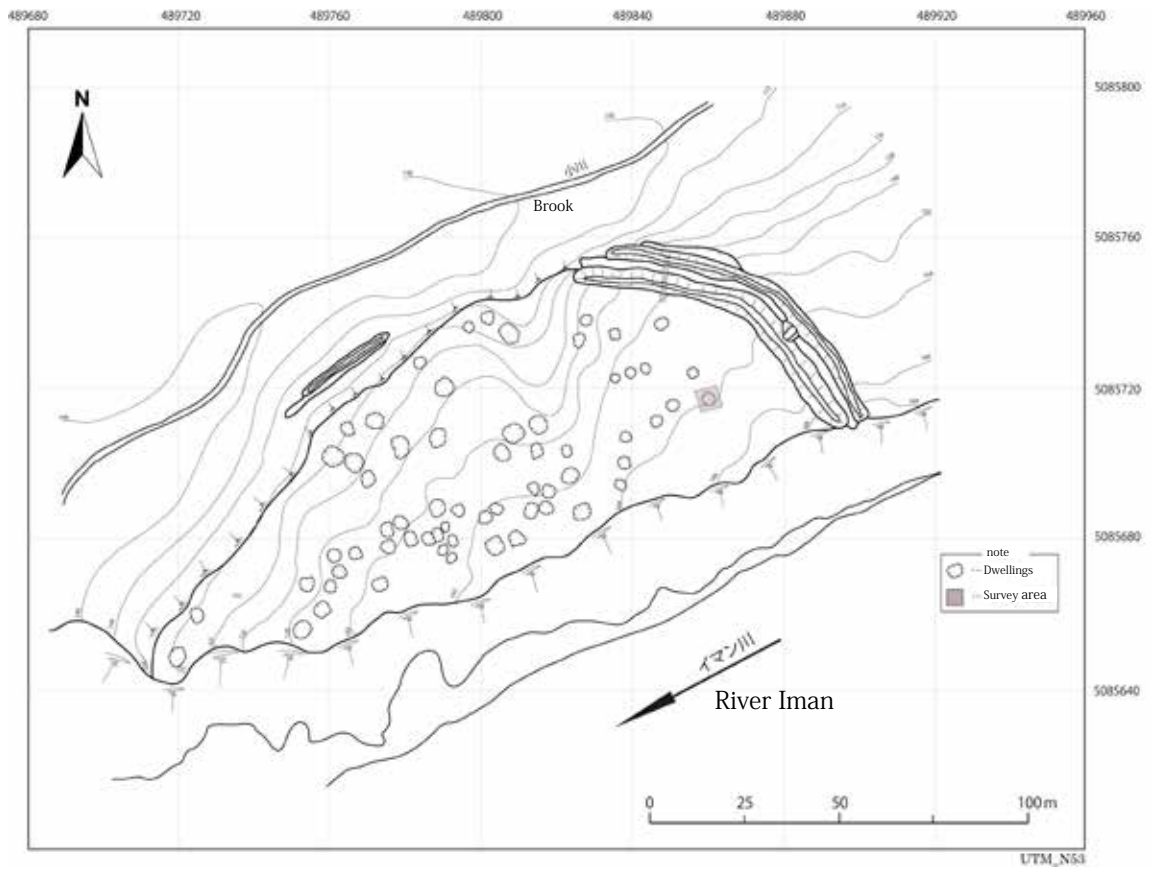


Fig.2 Survey map of Rosino6 site and related sites

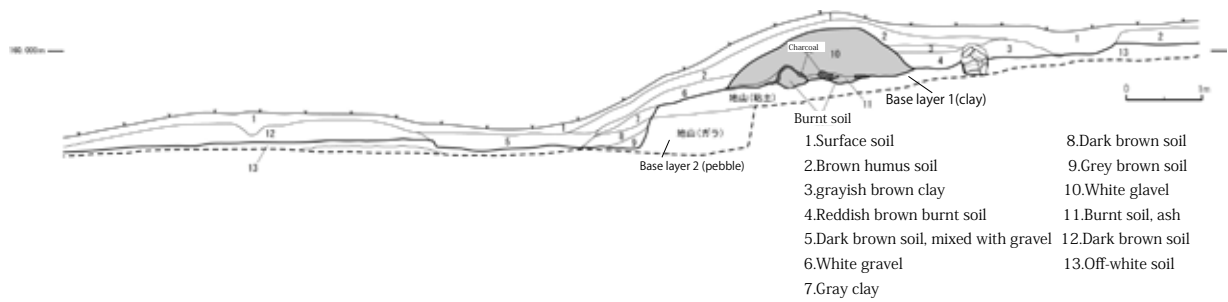


Fig.3 Cross - Section view of earthen wall and moat

have the same characteristics as those located at the Znamenka and Dal'niy Kut 15 sites. Although we could not obtain compiled data during the survey of these sites, it may be possible to obtain them from the local types inland of Primorsky Krai. A good batch of data was obtained from the investigation of the Elizavetovka 1 site, which will be detailed later. We examine the Bronze-Age culture of Primorsky Krai using those data in Part II: Discussion.

Survey of Elizavetovka 1 Site

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1. Overview of the site

The Elizavetovka 1 site is located near of Elizavetovka village, a village in the town of Lesozavodsk in Primorsky Krai, Russia. The site is located on the right bank of the Tamga River, a tributary of the Ussuri River, at 45° 32' 6" north latitude and 133° 44' 53" east longitude. The site was discovered in 2008, when a site planned for the construction of a transmission line was confirmed; the dimensions, cultural layer, and time period of the site were then verified. The ruins have remnants such as pits that are distributed on top of an independent hill formed on the tip of a terrace overlooking a river, and on a terrace surface at the foot of a hill. Relics such as fragments of earthenware could be collected there. Independent hills, where the pits are concentrated, have a long east-west irregular oval shape and a relatively flat terrace surface; the relative height of the top is tens of meters. At the top of the hill, nine pits that appear to surround the top can be identified. In addition, there is one relatively large pit in the slightly lowered portion of both the east and south sides. Furthermore, the east slope, which is about 6 meters below the top, is surrounded by a band-shaped terrace approximately 1 to 2 meters wide. This terrace seems to be associated with the settlement. A portion of the north terrace surface was destroyed when the transmission

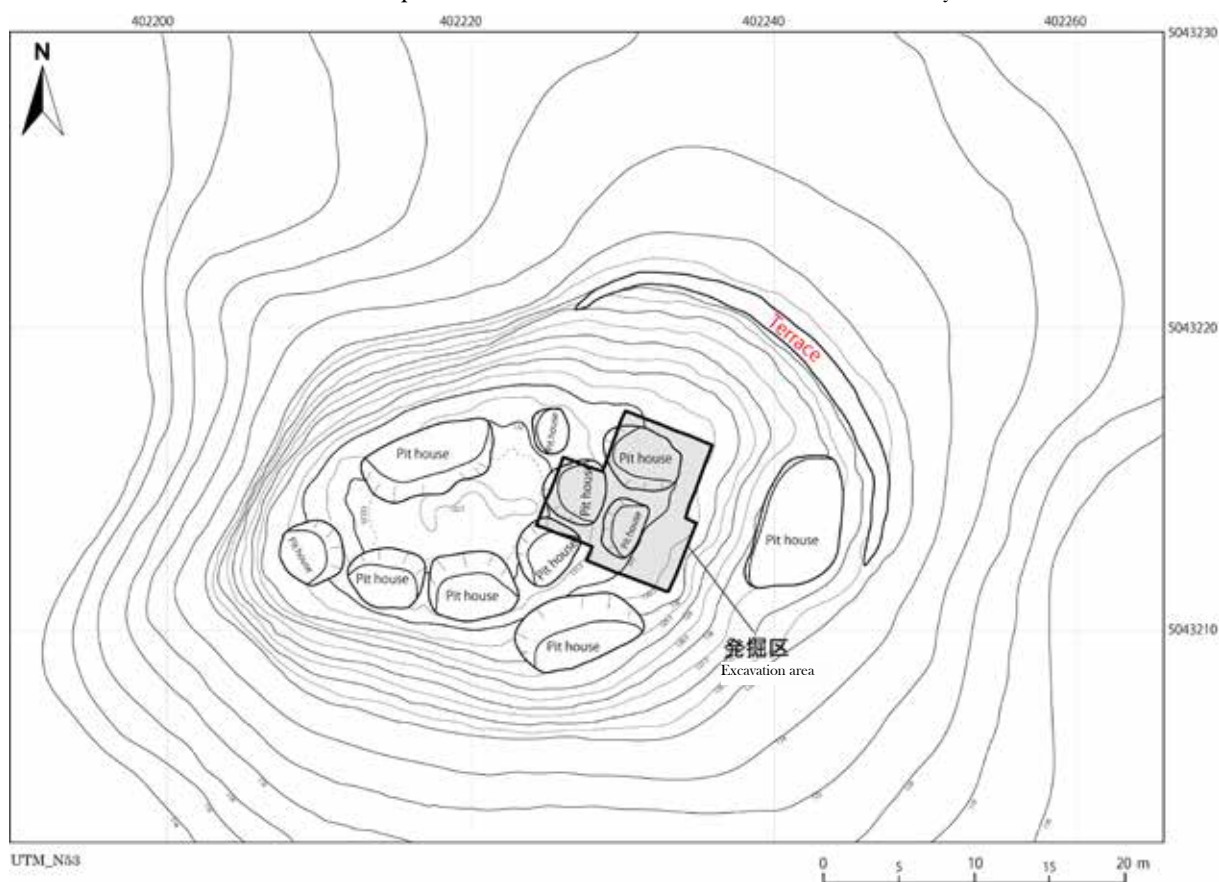
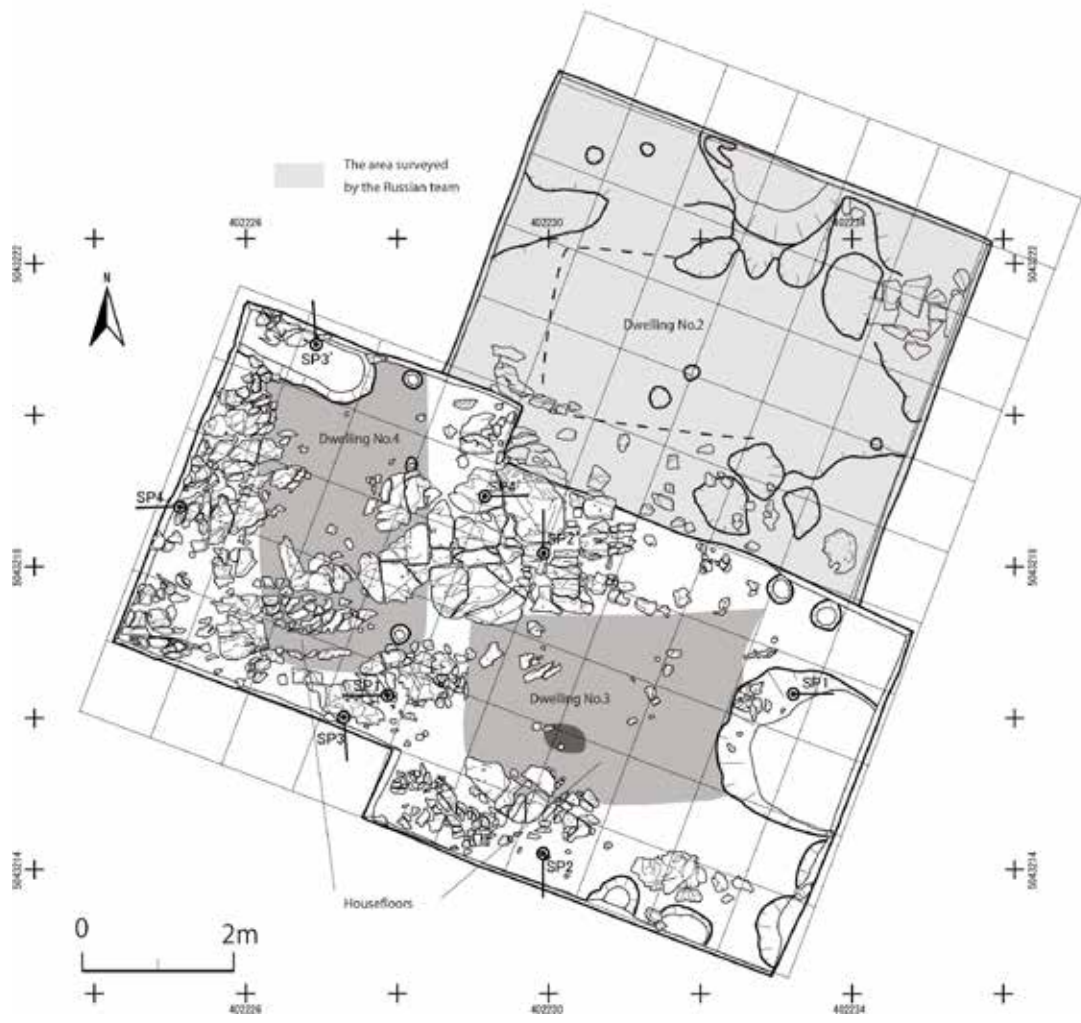


Fig.4 Survey Map and Excavation Area of Elizavetovka 1 Site

line was constructed; however, some of the depressions (pits) can still be identified. The area of the ruins reaches approximately 15,000 square meters, while the thickness of the cultural layer is approximately 50 centimeters. In particular, the pits are concentrated at the top of the independent hills. The earthenware fragments from the Pol'tse culture were excavated during the exploratory excavation, and it was ascertained that they were relics from the early Iron Age. Since it was highly likely that these were ruins of a settlement from the early Iron Age, a terrain and remnants survey of the hill portion of the ruins was conducted as a joint study between Japan and Russia in 2010. Subsequently, since the towers of the transmission lines passed through the ruins, the Institute of History, Archaeology and Ethnography, Far-Eastern Branch of the Russian Academy of Sciences conducted an excavation survey in June 2011 to establish the contents of the ruins. In the June excavation, the excavation survey was conducted at the east foot of the independent hill and the top of the hill. One pit house was detected in each place. This survey will be described in detail later. Subsequently, the construction of the steel tower was completed by bypassing the ruins, thus preserving them.

In October 2011, to ascertain the early Metal Age in the northern part of Primorsky Krai, it was decided to conduct an excavation survey of the site together with the Institute of History, Archaeology and Ethnography, Far-Eastern Branch of the Russian Academy of Sciences (Russian representative, Yu. Nikitin) as a joint survey between Japan and Russia.



2.The horizon and setting of the survey and excavation zones

The survey of the hills conducted in 2010 followed the procedure of setting a reference point based on the UTM53N system coordinates obtained by continuous GPS measurement: metering and conducting elevation measurements of the pits and terrace using an electronic compass and a laser range finder and merging the resulting data with the ASTER-GDEM global topographical data. We then set the top of the hill as the excavation target and, in October 2011, surveyed Dwelling No. 3, which neighbors Dwelling No. 2 in the south (the latter is located on the north-east edge of the top of the hill, and was surveyed by the Russian team in June that same year). We established a 4m × 5m excavation zone that bordered and expanded the 6m × 5m grid established during the Russian team's survey. Each artifact was covered by a 1m × 1m grid. In 2012, we expanded the zone from the 2011 survey by a 4m × 5m area in the west and conducted a survey in the east. After establishing an expanded zone of 2m × 5m in the east, we detected the neighboring Dwelling No. 4 and other relics. However, for this excavation area to be incorporated into the topographic survey map, we had to reestablish the reference point for the UTM53 system coordinates and measure the scope of the entire excavation zone. These were then incorporated into the relic survey map. Then, during the 2012 excavation survey, we conducted a survey of the relics of the entire excavation zone, which included the relics excavated in 2011, by reconducting a photographic survey. We used this to create a finalized record.

The basic horizon of the excavation zone is extremely simple. The hill with the ruins comprises rock beds and their weathered soil. Soil production is inactive. Even within the depressions of the pit houses, the natural ground reaches approximately 50cm. The soil there accumulated in the following order. From the top: 1. topsoil, 2. light brown sandy soil, and 3. yellow-brown soil (natural ground and weathered bedrock). Layers 2 and 3 were deposited as thick as 20cm. In addition, the bedrock was exposed in many places. For the relics that were filled with soil, dark-brown soil accumulated in Dwelling No. 3, while blackish brown soil accumulated in the viscous pits and small holes in the eastern part of the expanded zone.

3.Remains

Two pit houses and eight pits were detected during the 2011/2012 survey. The pit houses are numbered in accordance with what was established by the Russians. Continuing from the two pit houses that were detected during the June 2011 survey by the Russian team, the pit house detected in the (October) 2011 excavation zone was labeled No.3, while the pit house that was detected in the 2012 west expansion zone was labeled No. 4.

In addition, the pits in the joint survey zone were assigned a unique number. The relics detected in the Russian team's second survey zone, which borders this survey, will again be explained in a separate paper.

Dwelling No. 3:

This pit house has been dug into a gentle slope of bedrock. The northern wall is made of bedrock, while the western wall was formed by digging into bedrock and weathered soil. Although the floor is complete and flat, there is a part in the southwest section where bedrock protrudes. This seems to be the southwest corner. In addition, Pit No. 1, on the eastern edge, is slightly destroyed. Although it is difficult to determine the scope of the entire pit house, if the scope of the floor is estimated from the flat part, we can consider the dwelling to have a rectangular shape with rounded corners. Measuring the major axis east to west, the long side is approximately 3.8m and the width approximately 2.4m. We identified a few shallow holes on the inside and outside walls on both sides of the



Fig.6 Surveyed map of remains

1. Topsoil
2. Bright brown sandy soil
3. Dark brown soil (buried soil in pit 3)
4. Dark brown soil (buried soil in pit 1)
5. Yellowish brown soil (ground hill)

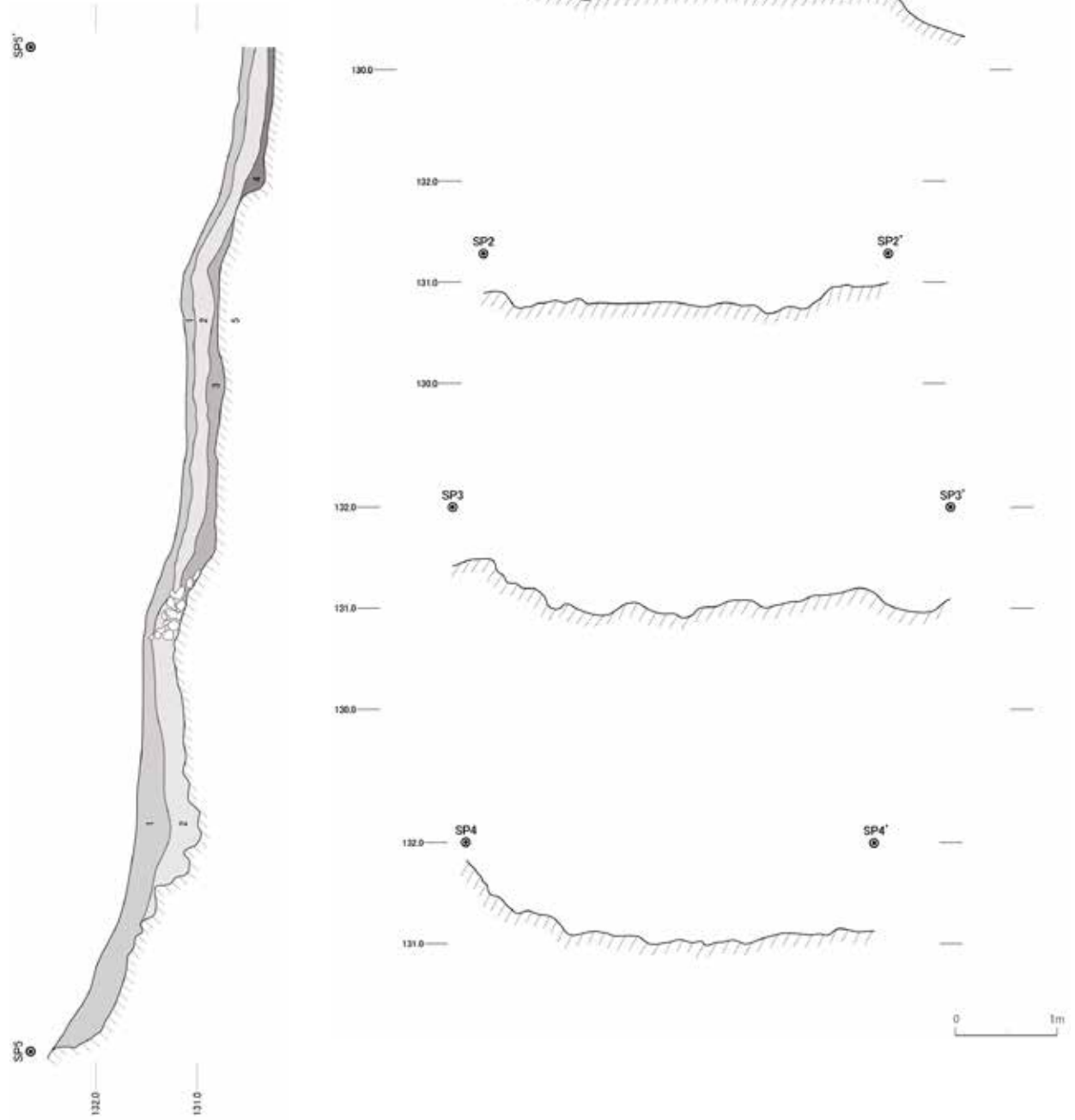


Fig.7 Cross-section of Soils and remains

pit house, which may be pillar holes; however, there is no clear indication of a pillar hole for the main pillar. This is probably something that was built with walls made of thin materials. Burnt soil is spread out from the southwest of the floor's surface in an oval shape. Although we believe that this represents the remains of a furnace, it is possible that it is from something not originally from this pit house, for reasons that will be explained below.

The relics were fully excavated from 1 to 2 layers of buried soil (dark brown soil) of the pit houses. There is a limited number of relics that definitively maintained their original position on the floor, and there is no distinct concentration point. Therefore, it was difficult to identify relics and their time of use in the house. Although the time period of the relics can be broadly divided into the Pol'tse cultural age and the Bronze Age, many items that were unearthed clearly belong to the latter. In addition, a rough trend was that 1 to 2 layers would contain a little more of the relics from the Pol'tse cultural age while, except for some fragments of earthenware in the buried soil and floor, most of the relics were from the Bronze Age. Therefore, we believe that the house is from the Bronze Age. However, when we radiocarbon dated the carbides obtained from the remains of the furnace, the carbides corresponded to the Pol'tse cultural age. It is highly likely that the furnace was reused during that period.

Dwelling No. 4:

This pit house has been dug into bedrock on the east side of a slope, just below the top of the hill. The walls are higher on either the west or south side, depending on the shape of the slope. There are no walls on the east side. Because the bedrock has developed, it is also exposed in the floor surface. Therefore, the floor is severely rugged. There are three small, roughly 10cm-deep holes on the east side, all in one straight line, while there is a recess in the bedrock in the slightly spaced portion. We believe that these are pillar holes. It would appear that the walls of the house were built here. The north end is cut into Pit No. 2, while the precise scale of the floor is unclear because it extends outside the survey area. However, if we presume the range of the floor surface from the slope to the pillar hole, then the width is approximately 2.2m and the major axis is 4m or longer. The pre-excavation depressed area does not differ significantly in scale from that of Dwelling No. 3, thus we can consider the houses to be of a similar scale provided the floor does not extend overly far outside of the house. The major axis then becomes north-south, and goes directly to Dwelling No.3.

Since there are many sloped areas and exposed bedrock, the ancient foundations of the natural ground were exposed immediately on removing one or two layers of topsoil and natural sedimentary soil, without clearly seeing the buried relics of the main pit house. The relics were excavated from both the 1st and the 2nd layers. Items made in the Pol'tse cultural age and the Bronze Age were mixed together, while there was not a single relic excavated that clearly maintained its original position. However, the excavated relics, generally, largely comprised items from the Bronze Age. We can consider the relics excavated from the two layers to be from the Bronze Age, especially since more than half of the items excavated from the floor were from the Bronze Age.

Pit No 1:

This pit is located in the center of the east side of the expanded zone and is excavated slightly at the eastern end of Dwelling No. 3. The flat shape is a circle with a diameter of approximately 2m. The east end extends slightly outside the survey area. Although the east side is shallower because it is excavated on a slope, the depth is approximately 30cm. Although only a few earthenware fragments were excavated from the buried soil, when the carbides that were collected from the pit were radiocarbon dated, they were from the Pol'tse cultural age.

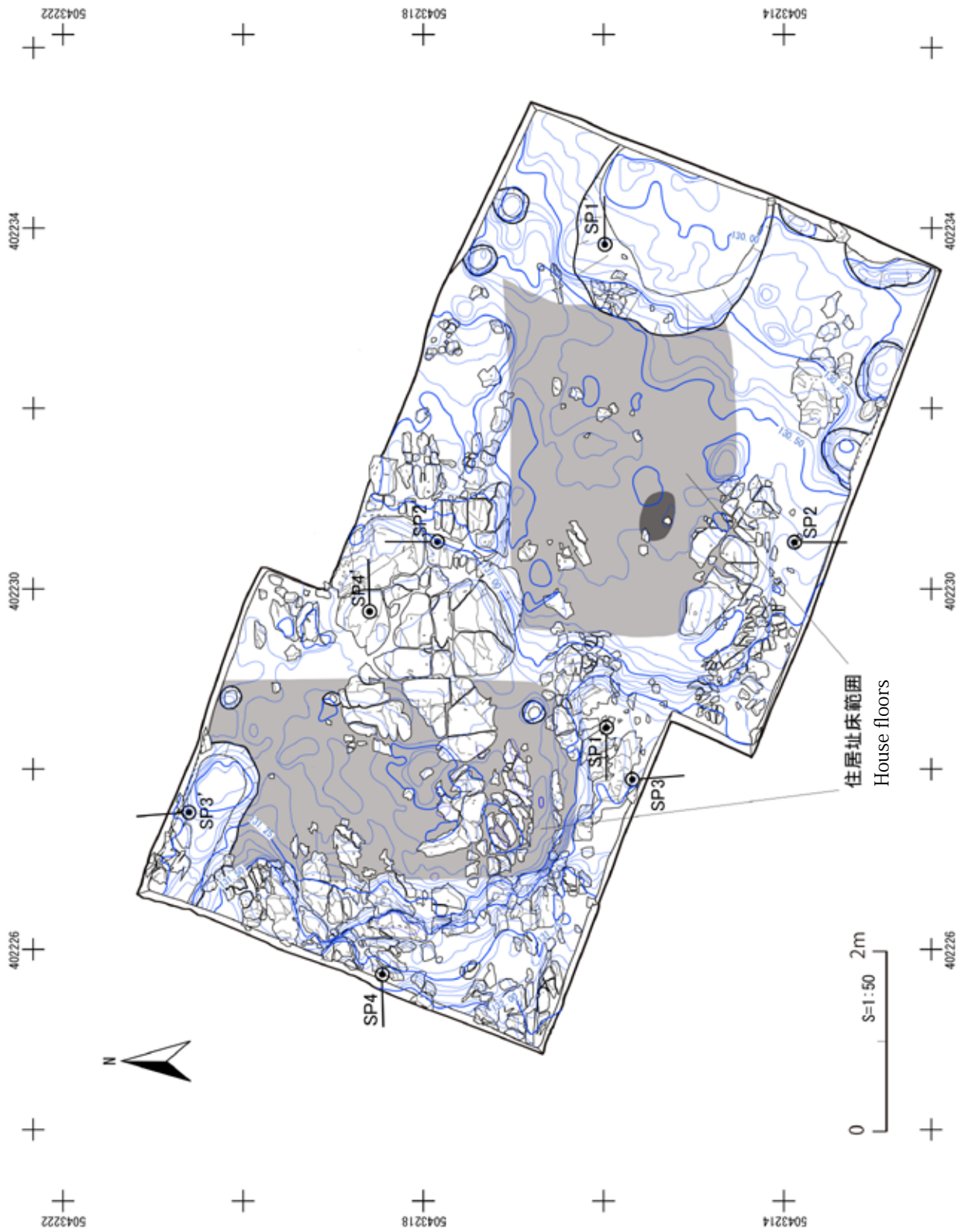


Fig.8 Contour map of the survey area (5 cm contour)

Pit No. 2:

This pit is located in the northwest corner of the west side of the expanded zone. While only the southeastern tip was detected, and therefore the overall size is unknown, the depth is approximately 30cm. It is approximately 1.9m long in the part that covers the survey area, which means that it is a large pit. It appears to have been dug into a rectangular shape, and was possibly a pit house. The radioactive carbon dating of the carbides collected from the pit places it before the 8th century.

Pit No. 3:

Approximately half of the pit was detected at the wall on the southeastern edge of the excavation zone. The flat shape is an irregular circle approximately 50cm in diameter and 30cm deep.

Pit No. 4:

This is an elliptical-shaped pit adjacent to Pit No. 3 on the east, located at the wall on the southeastern edge of the excavation zone. More than half of the pit was detected. It is approximately 70cm long and approximately 25cm deep.

Pit No.5:

Part of this pit was detected at the wall of the southeastern corner of the excavation zone. More than half of the area is outside the excavation zone, and therefore the floor has not been verified. The diameter is 90cm or more, while the depth is 20cm or more.

Pit No.6:

Part of this pit was detected adjacent to Pit No. 5 and near the same wall. The size is unknown. It may be cut into Pit No. 5.

Pit No.7:

This pit was detected at the wall of the northeastern edge of the excavation zone. It has a flat, circular shape with a diameter of approximately 25cm and a depth of approximately 35cm.

Pit No.8:

This pit was detected at the wall of the northeastern edge of the excavation zone, beside Pit No. 7. It has a flat, elliptical shape with a length of approximately 30cm and a depth of approximately 25cm.

4 . Relics

As described above, there were few relics that maintained their original position at the Elizavetovka 1 site, and it was difficult to understand the composition of each relic. Therefore, our report groups the relics from the excavation zone by historical period. Although we have discovered several earthenware fragments with comb-line patterns that we believe are from the Neolithic Age, most of the other relics can be classified as either from the Bronze Age or from the Pol'tse cultural age. Additionally, there seems to be no major period difference between each era, based on the characteristics of the relics; thus, the relics can be considered to be composed of both ages,

to some extent.

Although the total number of excavated relics, including those excavated during the Russian team's survey and the joint survey, is close to 1,000, this number includes many relics that were taken in bundles; thus, we do not know the exact number. Our report will extract the relics with this particular characteristic.

Stoneware (Figures 9-10)

We excavated stoneware that was made both by hitting and by grinding stone. From their shape, they appear to be products from the Bronze Age. We could only identify 6 of the excavated chipped-stone earthenware. All of the stones were shales. Among the wares were sharp-pointed chipped stones, flint arrowheads, and scrapers. Figure 9-1 shows a sharp-pointed, chipped stone tool with a missing tip that is currently 5.8cm long and 3.5cm wide. Figures 9-2 and 9-3 are flint arrowheads; Figure 9-2 is missing the tip and the base, and has an existing length of 1.4cm and width of 1.0cm. Figure 8-3 is the base of a flint arrowhead, with an existing length of 2.3cm and width of 1.8cm.

We identified more than 12 grinding stone tools. This is not a large number, although it is more than the number of chipped stone tools. The types of wares include flint arrowheads, ground stone tools, knives, stone axes, and toishi whetstone. In addition, there were gravels with traces of processing. Although they were not excavated, stone dishes and grinding stones were collected from the periphery.

Figures 9-4 through 9-7 are flint arrowheads. All are made of slate and have a thin finish. The blades are rounded. Figure 9-4 has a leaf shape with a missing tip, with an existing length of 2.9cm and width of 1.8cm. Figures 9-5 through 9-7 have a long triangular shape. Figure 9-5 is intact, and is 3.6cm long and 1.4cm wide. Figure 9-6 is missing the base and tip, and has an existing length of 2.7cm and width of 1.1cm. Figure 9-7 is a fragment of the body of a tool, with a width of 0.8 cm. Figure 9-8 is a small fragment of a ground stone tool, and is the ridge of a sword. The ridge is sharply finished, thus the blade is in the inner bay.

Figures 9-9 and 9-10 are knives made with a grinding stone. They were made on a green slate. The whole body has a long, oval shape, while the blade is sharpened on one edge. Figure 8-9 is a fragment tip, with an existing length of 3.7cm and width of 3.2cm. Figure 9-10 is folded into two but is intact, and is 8.6cm long and 3.9cm wide. Figures 9-11 through 9-14 are stone axes. All have a rectangular cross-section with a flat finish on both sides, while the entire body has a rectangular shape. Figure 9-11 is a side, while Figure 9-12 is a small fragment of a blade tip. Although Figures 9-13 and 9-14 are both blades that are sharpened on both sides, there is a slight bias to one side rather than them being equal. Figure 9-13 is intact, with an existing length of 7.2cm and width of 4.4cm. In Figure 9-14, part of the blade tip is missing; the existing length is 7.6cm, and the width is 4.1cm. Figures 8-15 through 9-17 are bell-shaped grinding stones that use a base. Figures 9-15 and 9-16 have a hanging hole at the top. Figure 9-15 is intact, is 6.9cm long, and 5.0cm wide. After a slight loss of the top of Figure 9-16, the broken portion was used as a grinding surface; it is 6.7cm long and 6.2cm wide. Figure 9-17 has a rectangular cross section and may be a converted stone axe. The entire body has a trapezoidal, plate-like shape; it is 4.6cm long and 4.3cm long. Both the stone axe and the grinding stone use green mudstone materials.

Although the polished stones and stone plates were collected at the foot of the hill, they are reported here as reserve samples. Figures 10-1 and 10-2 are grinding stones formed by shaping a stone into a semilunar shape and grinding the entire surface. The type of stone used for either is unknown. For both items, glossy and linear traces are notable on the polished surface. Figure 10-1 is 26.6cm long and 7.5cm wide. Figure 10-2 is 25.3cm long and 6.8cm wide. Figures 10-3 and 10-4 are both stone dishes formed by using a plate-shaped stone and striking and



Fig.9 Stoneware, Metal,Tuyure,Slug

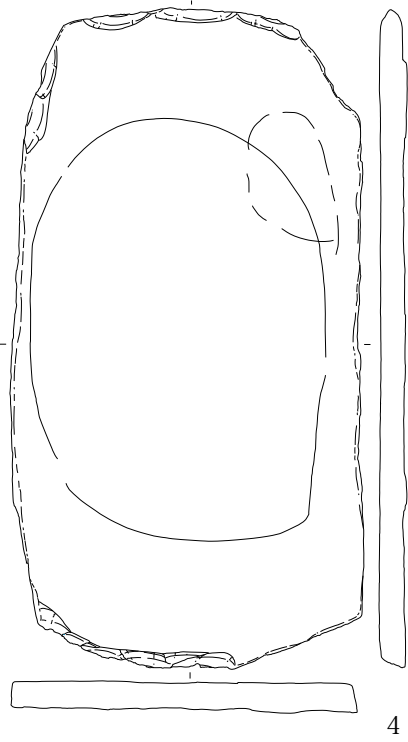
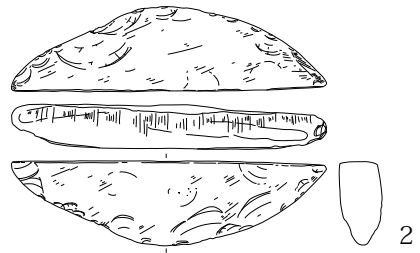
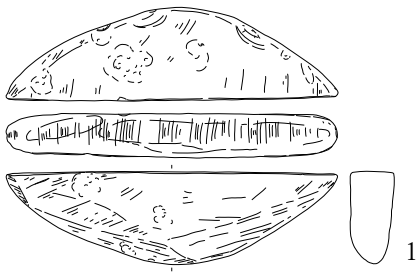


Fig.10 Polishstone and Stoneplates

folding the periphery. Figure 10-3 is made of sandstone, with visible grinding marks on the entire surface. The center is slightly recessed. It is broken in three. It is 56.0cm long and 32.8cm wide. Slight grinding marks are visible on the bottom. Figure 10-4 is a schist whose central portion is especially well worn. There is a slight recess, but no grinding marks on the bottom surface; it is 52.4cm long and 28.0cm wide.

Bronze wares (Figures 9-18,19)

Three fragments of a bronze knife were excavated. Both were made by cutting a thin plate of bronze into an elongated triangle and polishing the blade. The blade is perforated, which seems to be part of the process of attaching the handle.

Clay wares (Figure 11)

The clay wares include bowl-like clay items, spindle whorls, and earthen spindles. Figure 11-1 is a small bowl-shaped clay item. It was produced with a protrusion that faces downward in one place on the major axis of the flat, oval-shaped base. It was kneaded by hand, and the entire body is burnished; it is 4.8cm long and 2.6cm high. Figures 11-2-11-5 are cone-shaped spindle whorls. There are perforations in the center of the umbrella-shaped clay. Figure 11-5 has a radical pattern of lines of points on the concaved surface. Figure 10-2 has a diameter of 2.4cm and a height of 1.6cm. Figure 10-3 has a diameter of 3.4cm and a height of 2.4cm. Figure 10-4 has a diameter of 4.6cm and a height of 2.4cm. Figure 10-5 is missing about one-third of the item, has a diameter of 4.4cm, and a height of 2.1cm. Figure 11-6 is a cone-shaped spindle whorl with a diameter of 2.7cm and a thickness of 0.9cm. Figure 11-7 is a cone-shaped earthen spindle with one end missing. The entire item was carefully burnished; it has an existing length of 3.1cm and a diameter of 1.2cm. Among the above clay wares, Figure 11-6 is considered to be a product of Pol'tse cultural age from the viewpoint of shape; however, the other products can be considered to be from the Bronze Age.

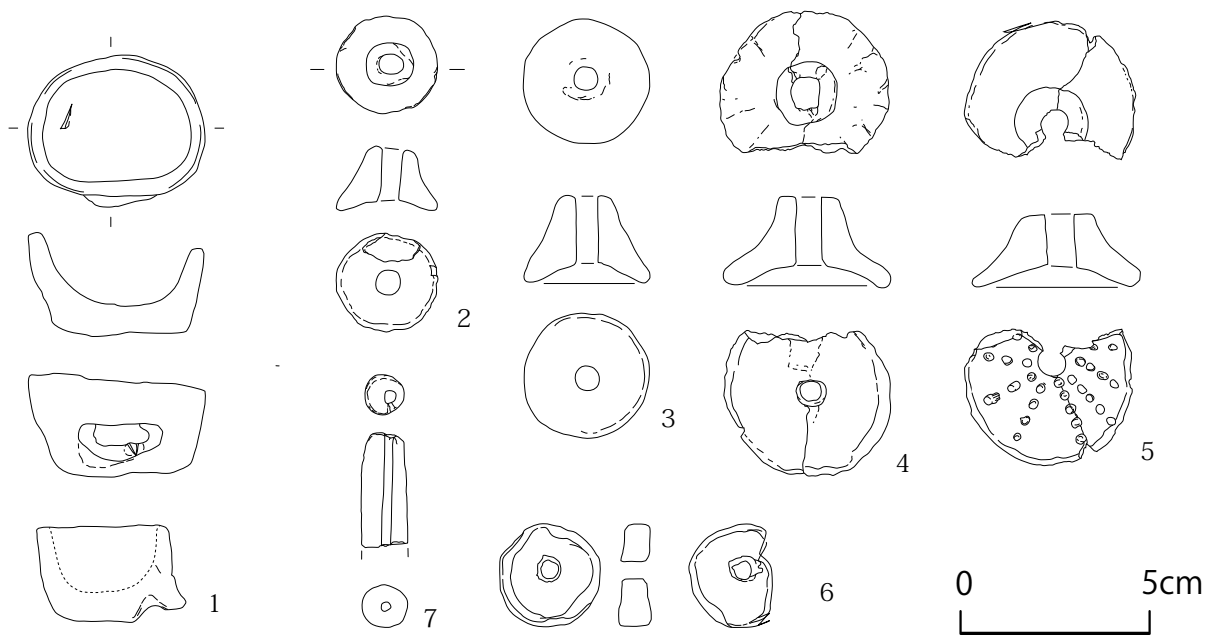


Fig.11 Clayware

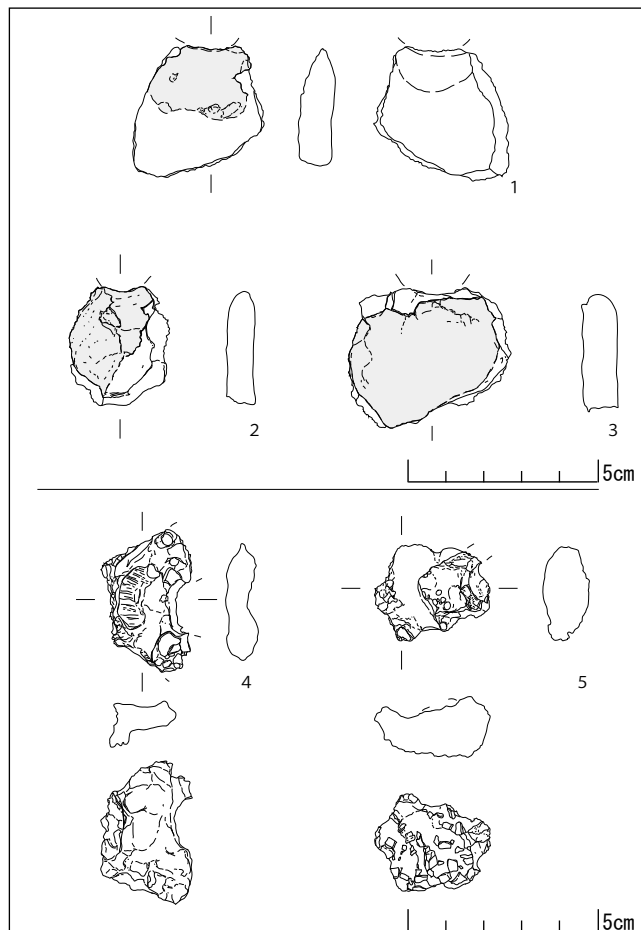


Fig.12 Tuyere and Slug

Relics related to metal working (Figures 9-20-9-21 and 12)

The relics related to metal working were excavated at this site. Although few were excavated, they are valuable materials considered to be from the Pol'tse culture of Primorsky Krai.

Crucible (Pictures 1 and 2)

This is a small earthenware with a cone-shaped apex and a bottom; it has a diameter of 5.5cm and a height of 3.9cm. Since it was kneaded by hand, some places have finger marks. Soil is foamed and melted on part of the inside and outer rim of the earthenware. Traces of metal that melted and adhered to the item could not be identified. In terms of shape, it is highly likely to be a crucible; however, it is not possible to determine the type of metal that was melted in it.

Tuyere (Figures 9-20 and 12-1-12-3; Pictures 3-6)

We could excavate at least 20 pieces from the depression in the ruins of the pit home on which we could identify perforated earthenware fragments that we believe were used as a blowing hole instead of a tuyere.

Although there is no record of the item intact, the fragments of the earthenware were perforated by whittling down both sides; the outside of the earthenware was then used as furnace. The periphery of the holes then became heated and turned red or foamed. Due to the low operating temperature, no material melted onto the black hyaline. The diameters of the restored blowing holes are approximately 2.0-2.5cm. Figure 8-15 was used as



Pic.1 Crucible (side)



Pic.1 Crucible (Top)



Pic.3 Tuyere



Pic.4 Tuyere



Pic.5 Tuyere



Pic.6 Tuyere

earthenware fragments with consecutive nail-shaped designs. This shows that these tuyeres are products from the Pol'tse cultural age.

Iron slag (Figures 9-21 and 12-4-12-5)

Several pieces of iron slag were excavated. Two of the relatively good pieces were brought back to Japan for a metallurgical analysis (for more details, please see Part I, Chapter 4-3). Figure 12-4 is a small smithing slag weighing 9.02g. There is a miniscule amount of charcoal marks on the top surface, while it has gentle irregularities on the bottom. Judging by the characteristics of the shape, we believe it to be iron slag formed directly under a tuyere. Figure 12-5 is an extremely small, bowl-shaped, forging slag weighing 12.4g, with a smooth top and a surface that is partially peeled off. The bottom surface is rounded in a bowl shape and has a large amount of small gravel originating from the natural ground, which is probably soil from the hearth.

In addition, we excavated iron slag, which we believe is slag that bonded to the tool. These are light slags and have a hemispherical shape. The outer surfaces have severe irregularities, while the inner surface is smooth. We believe that the molten furnace walls and ash adhered to the tip when the blacksmith worked with a rod-shaped tool inside the forge.

Earthenware (Figures 12-15)

Although earthenware from the Neolithic Age, Bronze Age, and Pol'tse cultural age were excavated, the only items excavated that belonged to the Neolithic Age were small earthenware fragments; thus, this paper reports on only the earthenware from the Bronze Age and Pol'tse cultural age. Most of the excavated items were fragments of earthenware, which currently total over 700. However, as already mentioned, there are no cases in which the original position in the remnants was clearly preserved. Most of the excavated items were scattered in the sediment layer. Even the fragments excavated from the pit house floors were scattered, while we could not find a concentration of identical pieces. Therefore, of the intact earthenware, only one small earthenware remains. Here, we choose and summarize earthenware with a characteristic shape and pattern.

The Bronze Age (Figures 13-15)

Earthenware from the Bronze Age is made from a dense paste and a mix of fine sand. In many cases, the walls are thin—approximately 5mm; not even the largest items exceed 1cm. The item was formed by the ring-stacking method, while we can see hand-kneaded molding in the small items. The firing was good, which created a hard finish. Shades of dark brown and reddish brown can be seen. The wall of the earthenware is carefully scraped and burnished on the inside and outside. With the burnishing, we can see that this is a carefully made, almost fully polished item.

The composition of the earthenware is simple and of two types: a pot with a short neck and a spherical body, and a deep pot with a wide rim and neck. Jars can have a wide or narrow diameter, but both are widest at the body. There is no significant difference in the shape or pattern of the neck and rim, while it can be distinguished by the spread or curvature of the neck, shoulder, and body. Both pots and deep pots are made such that the edge of the rim is round and slightly turned outward. The neck is either slightly in the inner bay or close to upright, and while the rim does not bend outwards greatly, deep pots tend to suggest a slight outward folding. The bottom is flat, and is produced by stacking clay bands in rings on a circular clay tablet. The pattern is applied only to the neck and shoulder, although many are without a pattern.

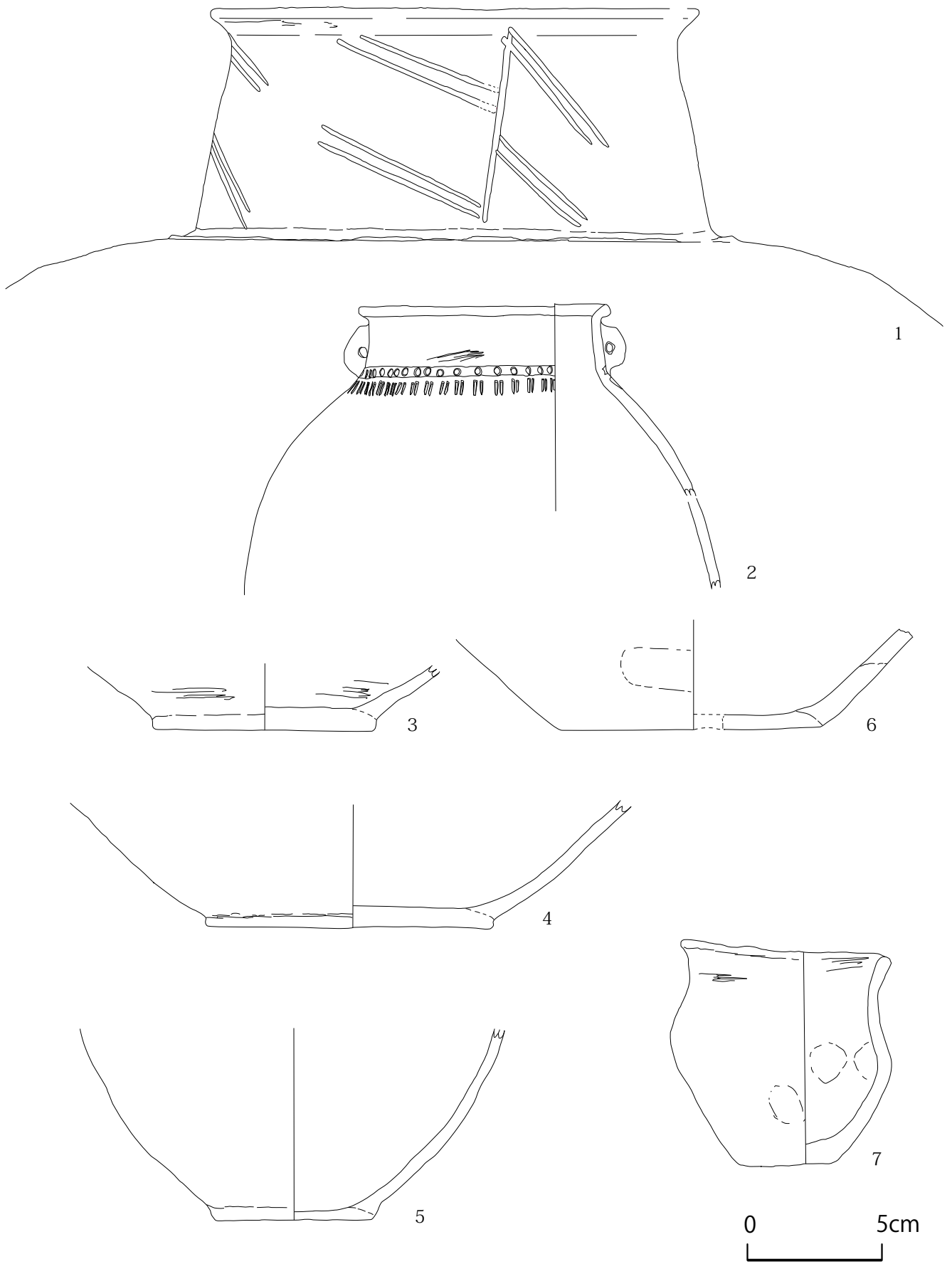


Fig.13 Earthenware (the Bronze age) 1

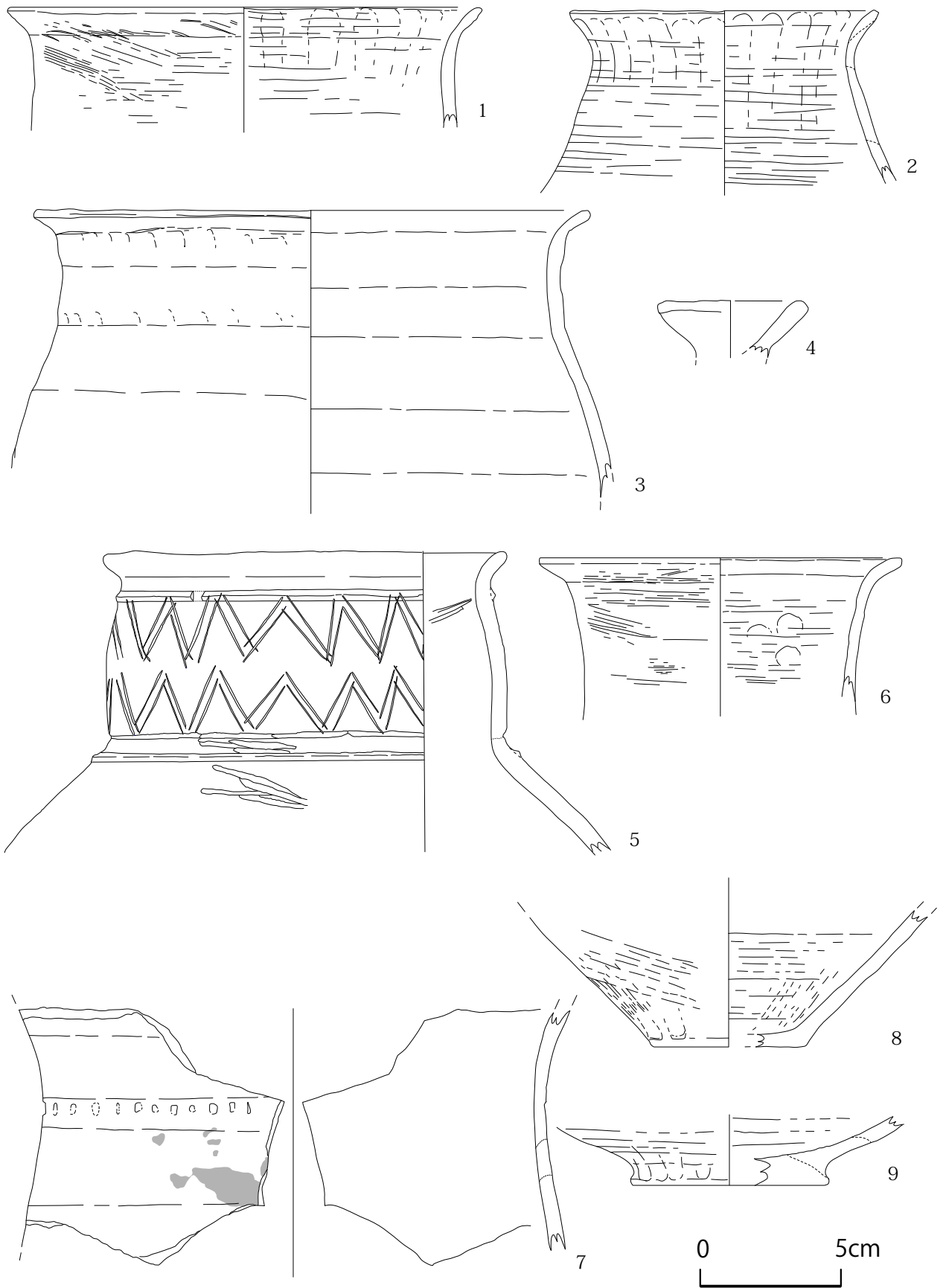


Fig.14 Earthenware (the Bronze age) 2

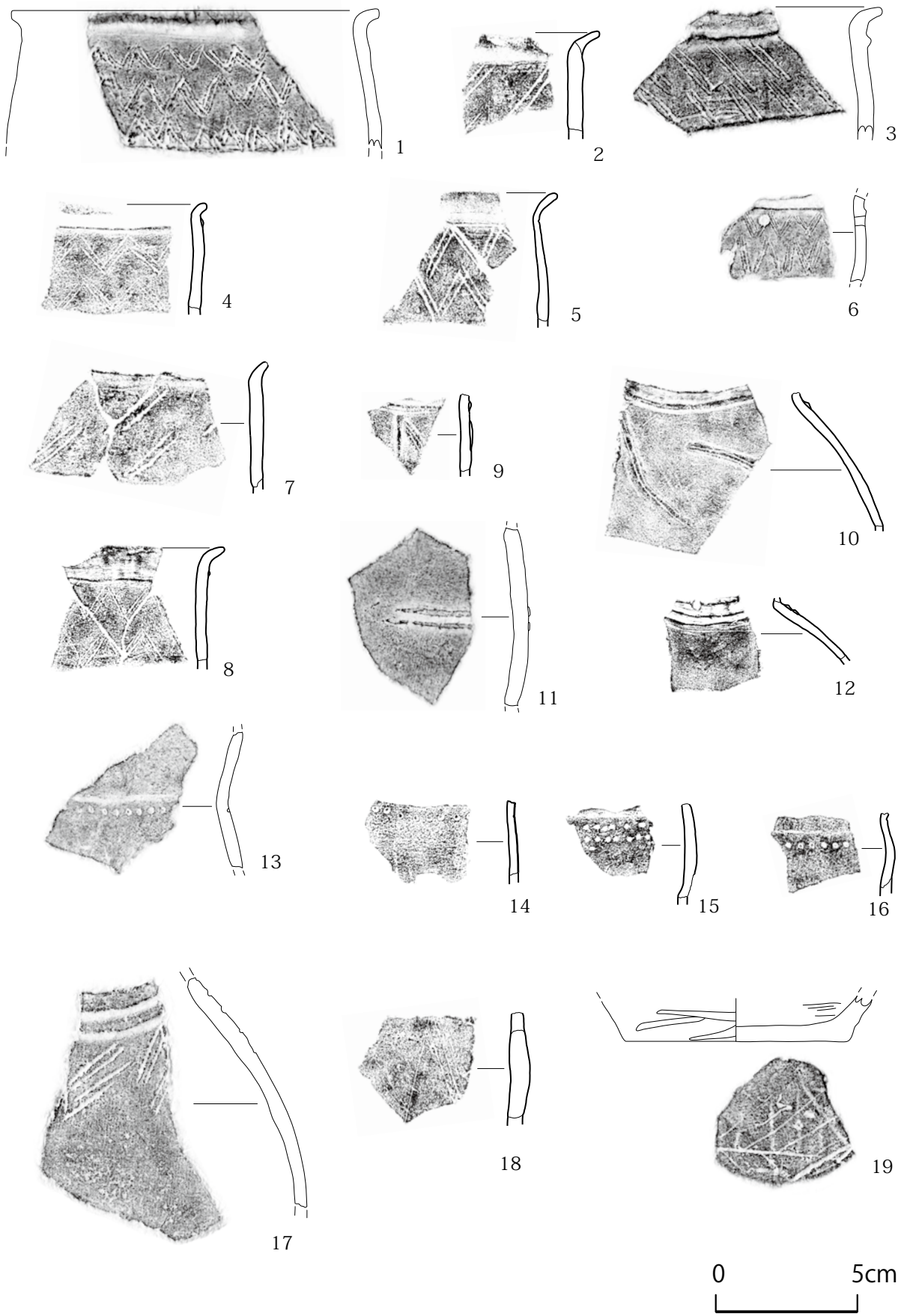


Fig.15 Earthenware (the Bronze age) 3

Figure 13-1 is a large, pot-shaped earthenware approximately 18cm in diameter. The height of the earthenware is believed to reach approximately 50cm. Shallow, engraved lines are applied to the boundary between the neck and shoulder, while arrow-feather-shaped engraved lines are applied to the neck. Figure 13-2 is a jar-shaped earthenware with a circular handle. A wide thalweg has been applied to the lower end of the neck, while a series of points have been applied along the line by a tubular tool. In the lower part, continuous push-pull lines were made with bifurcated tools; the diameter is 9.4cm. Figure 14-5 has a cross-sectional, triangular, thin clay strip on the shoulder and just beneath the outwardly bent rim, with the upper part pushed and pulled by fingertips to partition the neck, and with two rows of engraved lines in a zigzag pattern; the diameter is 14.4cm. Figure 14-6 is the neck of a pot with no design. Both the inner and outer surfaces have been carefully burnished. Figures 13-3, 13-4, and 14-9 show the bottom of a pot-shaped earthenware. Since the body is spherical, the lower half is almost dish-shaped and gently slopes upward. After joining the bottom and the body, the joining area is then trimmed to adjust the thickness, and burnished. The clay strip on the body is joined on the inside to the outer edge of the circular disc base, while the base is trapezoid shaped.

Figures 14-1-14-3, 14-7, and 14-8 are deep-pot earthenware. Many of the items are approximately 10 to 20cm in diameter. Compared to pot-shaped earthenware, the close of the neck is weak, gently connecting the shoulder to the trunk. However, there is almost no difference in adjusting paste, firing, and surface, while the whole surface is carefully scraped and burnished. The wall of the earthenware is also thin. Therefore, it is difficult to judge any earthenware when it is in small fragments. However, we could determine that, compared to pot-shaped earthenware, many of the deep-pot earthenware did not have a design. The neck in Figure 14-2 is in the inner bay, while the edge of the rim is rather strongly bent outwards. In addition, Figure 14-7 has a series of points in the neck, made with a rod-shaped tool with a rectangular cross-section. The bases of Figures 13-5-13-6 and 14-8 are more sloped than the usual pot-type earthenware, while the walls are upright. Figure 13-7 shows an intact, small, deep-pot earthenware. There is no design. There are visible finger impressions from when the surface was formed. The height is 7.6cm and the diameter is 3.9cm. Figure 14-4 is a small, bowl-shaped earthenware, with a diameter of 5.4cm.

Figure 15 shows the fragments. We printed the fragments that have patterns. Although it is difficult to determine the shape of an individual earthenware for the reasons mentioned above, we may be able to consider the item with the pattern on its neck to be a jar-shaped earthenware. Figures 15-1-15-8 have engraved lines on the neck. The engraved lines are two short lines that become one pattern, and can be categorized as either a zigzag (15-1, 15-4, 15-5, and 15-6) or a consecutive diagonal pattern (15-2, 15-3, and 15-7). Figures 15-3, 15-4, and 15-8 have a raised band attached to the rim. In addition, Figures 15-5 and 15-6 were pushed and pulled by fingertips under the rim, which partitioned the pattern band. Figure 15-6 was perforated by a rod-shaped tool. Figures 15-9-15-14 have patterns in the upper half of the shoulder and body. Figures 15-9-15-12 have a string-shaped, raised band attached. In addition to the one on the shoulders, the upper half of the trunk has a short, raised band. Figures 15-9 and 15-10 have two thin engraved lines, in addition to a raised band. Figures 15-13-15-16 have a series of points made by a tubular tool being pressed against them. Figure 15-15 is covered in those points in two lines, while Figures 15-17 and 15-18 have engraved lines. There is a slanted line similar to the one on the neck. Figure 15-17 has two engraved lines that wrap around the shoulder. There are leaf marks on the base of Figure 15-19; however, parallel imprints of something were made before the leaves were placed on the base. After the leaves were peeled off, engraved lines were applied with a rod-shaped tool. It may be traces of an adjustment rather than an intentional pattern. The figure has been provided with that. This is the only item with these marks on the base.

Pol'tse Cultural Age (Figure 16)

The amount of excavated earthenware belonging to the Poltse culture is quantitatively smaller than that of the Bronze Age; therefore, most of the items excavated from the surface soil and earth layers were from that age. Although the earthenware were excavated partly from the pit house ruins, none of the items excavated in batches maintained their original position. There were only fragments. Moreover, the number of items excavated from the pits is small, and include earthenware and iron slags. The earthenware fragments can be easily distinguished because they are quite different from those in the Bronze Age earthenware, in terms of the paste, firing, and pattern. A large amount of sand particles several millimeters in diameter, such as quartz, are mixed into the paste, while the paste itself is also rougher than earthenware from the Bronze Age. Much of the earthenware from this age are made with thick walls approximately 1cm. The firing is good, and they often have a brown or reddish-brown hue. With the ring-stacking technique, earthenware are shaped by stacking part of the paste in rings and then tapping it. Both the inner and outer surfaces are burnished. Many are relatively large, including the long-neck pot-shaped, short-neck pot-shaped, and deep-pot earthenware. Patterns include engraved lines, pasted lines, floating lines made by pushing and pulling, and nail-shaped lines. Engraved lines include comb-shaped lines made using comb-shaped tools.

Figure 16-1 is the rim of a long-neck pot-shaped earthenware. The neck is largely folded outward, while a clay strip is applied to the rim, making it dual rimmed. Two lines are pushed and pulled on the outside rim, while floating lines are applied to create a protruded portion. On the outer surface of the neck, consecutive, nail-shaped lines are made on one side with fingertips. Although Figure 16-2 is also the fragment of a rim, unlike Figure 16-1, the edge of the rim was made thicker to create a sloped surface on the outside rim. The nail-shaped lines on the neck are consecutive, as in Figure 16-1.

Figures 16-3-16-5 are shoulder fragments of pot-shaped earthenware. Figure 16-3 is a pot-shaped earthenware with a spherical body. It has parallel engraved lines on the shoulder, made by a comb-like tool, and consecutive, hemispherical, small, pasted lines thereunder. Figure 16-4 has a raised band wrapped around the shoulder, followed by consecutive impressions made with a rod-like tool. Consecutive nail-shaped lines were made on the body. Figure 16-5 has parallel engraved lines made on one side of the neck with a comb-shaped tool. Oval, pasted lines were then consecutively applied to the shoulder and, finally, short lines were applied to the neck. Figure 16-6 is the rim of a deep pot. A raised band is attached under the rim, and fingertips were then pressed into the earthenware from the lower part to make a wave-like pattern. There are consecutive nail-shaped lines on the neck. Figure 16-7 is a fragment of a base. It appears to be from a pot-shaped earthenware with a gentle, upright neck and a spherical body. After joining the clay band of the body to the base disk, the circumference was whittled down and consecutive, nail-shaped lines were made around the circumference of the base. Figures 16-8 and 16-9 are fragments of the body; both have beating marks on the outer surface from a pattern-stamping paddle with a grid pattern.

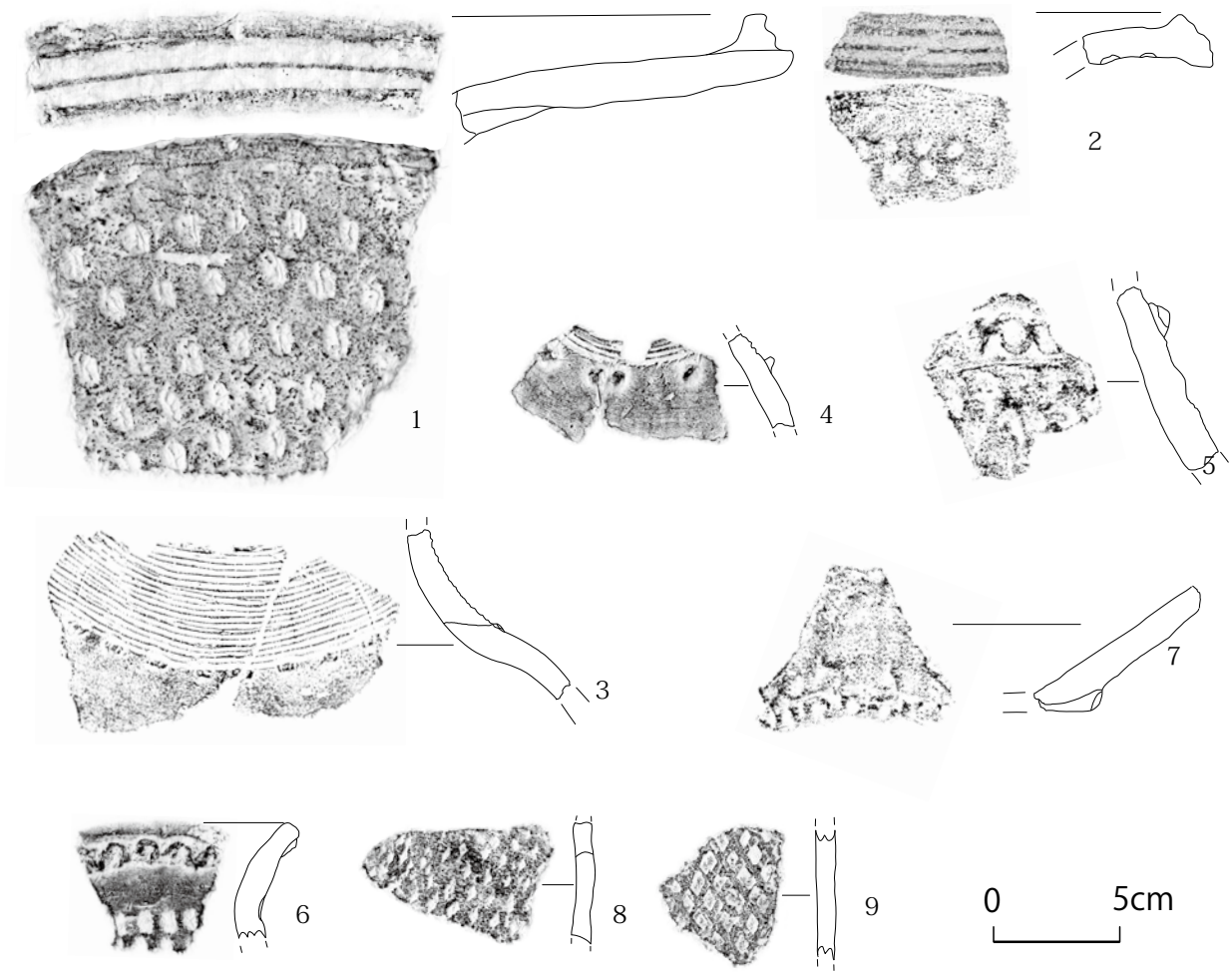


Fig.16 Earthenware (Poltse culture)

Chapter 4

Analysis of Excavated Relics from the Elizavetovka 1 Ruins

1. Use-wear analysis of stone tools

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(Tokyo Metropolitan University)

Analytical procedure

We conducted a use-wear analysis on the stone tools using a high magnification method (Keeley 1977, 1980), drawing on the experimental use-wear analysis of shale by Kajiwara and Akojima (1981). Although the authors did not conduct a use-wear experiment on crystalline schist, previous experimental studies on multiple stone materials, such as sedimentary and volcanic rock, have pointed out that the morphological characteristics of the use traces on a glossy surface that are caused by contact with various workpieces are generally common across the different types of stone (Midoshima 1988, etc.). Although it is necessary to examine whether these indications are also true for metamorphic crystalline schist, this report attempts to deduce what workpieces were used, drawing on the experimental use-wear analysis of shale.

We used DaikoScience's small metallurgical microscope as our observation equipment (DSM-IIIS model) to observe the pieces at 100–200 magnification. Before the start of the observation, we removed any fat and oil adhering to the material surface using absorbent cotton impregnated with ethanol.

Analysis results

Grinding Stone 1

Traces of linear marks on the grinding surface that ran in a direction perpendicular to the long axis of the stone could be observed by the naked eye, while a partially glossy surface could be observed. A blunt, worn, glossy surface of a line running perpendicular to the long axis of the stone could be observed when viewed under the metallurgical microscope (Photo 1). This glossy surface is not spread out entirely, but is distributed in a patch-wise fashion.

Grinding Stone 2

Traces of linear marks and a glossy surface running in a direction perpendicular to the long axis of the stone could be observed on the grinding surface by the naked eye. Additionally, black stains were broadly distributed over the wide area of the grinding surface (Photo 2). Traces of linear marks running parallel and perpendicular to the long axis of the stone (Photos 3–5), a flat glossy surface with a strong shine that accompanies sharp linear marks (Photo 4), and a blunt, worn, glossy surface that has spread evenly (Photos 3 and 5) can be observed when viewed under a metallurgical microscope. The former of the flat glossy surfaces are distributed in a manner that is generally consistent with black stains.

Stone Plate 3

The center of the grinding surface is slightly recessed. In the wide area of this recessed area, linear marks running parallel to the long axis of the stone could be observed by the naked eye. Traces of a linear mark running in a direction parallel to the long axis of the stone could be seen when observed under a metallurgical microscope. A blunt, glossy surface was distributed along this linear mark (Photo 6). In addition, at an elevated area on the surface of the stone, a glossy surface developed in a patch-work shape. It exhibited a fine and slightly smooth appearance (Photo 7). In addition, bright spots (BS) exhibiting a bright, smooth surface were locally distributed (Photo 8).

Deduction of work pieces and usage method

Grinding Stone 1

We believe that the traces of linear marks and linear glossy surfaces perpendicular to the long axis of the stone that were observed by the naked eye and under a microscope indicate the direction of movement of the stone.

Generally, the smoothness of the glossy surface with use traces more or less corresponds to the hardness or softness of the workpiece: the smoother the surface, the softer the workpiece (Kajiwara, Akojima 1981; Keeley 1977, 1980). Based on this broad trend, the dull and rough glossy surface observed on the grinding surface of

Grinding Stone 1 suggests that the workpiece (the object in contact) was a relatively hard object. We can point out the possibility that this trace, which suggests contact with a hard object, probably suggests direct contact with a stone dish during operation rather than direct contact with the workpiece itself.

Grinding Stone 2

We believe that the traces of linear marks perpendicular to the long axis of the stone that were observed by the naked eye and under a microscope indicate the direction of movement of the stone. We can also point out the possibility that the linear marks parallel to the long axis of the stone were perhaps formed during the shaping of the grinding surface when the stone was produced. Below are our observations on the characteristics of the work pieces (objects in contact), which can be categorized as those that left traces of linear marks that run perpendicular and those that left traces of linear marks that run parallel.

First, the traces of linear marks that are parallel to the long axis of the stone are accompanied by a flat, glossy surface with a strong shine and a blunt, worn, glossy surface that spreads planarly (Photos 3-5). The flat, glossy surface and the blunt, worn, glossy surface both indicate that the workpiece (object in contact) was a hard object.

Traces of linear marks that are perpendicular to the long axis of the stone are also accompanied by blunt, worn, glossy surfaces. This indicates that the workpiece (object in contact) was a hard object.

These characteristics indicate that the object that came into contact with Grinding Stone 2 when the stone was produced and during use may have a hardness that is close to that of Grinding Stone 1.

Stone Dish 1

We can presume that the traces of linear marks and linear glossy surfaces that run perpendicular to the long axis of the stone that were observed in the recess in the center of the stone by the naked eye and under a microscope indicate the direction of motion of the workpiece (object in contact).

The blunt glossy surface indicates that the workpiece (object in contact) was a hard object. In addition, the

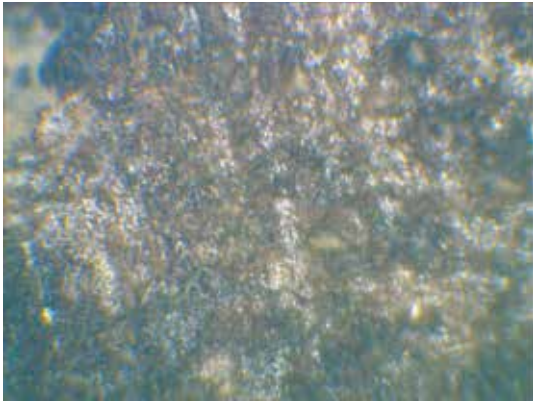


Photo 1 100x



Photo 2

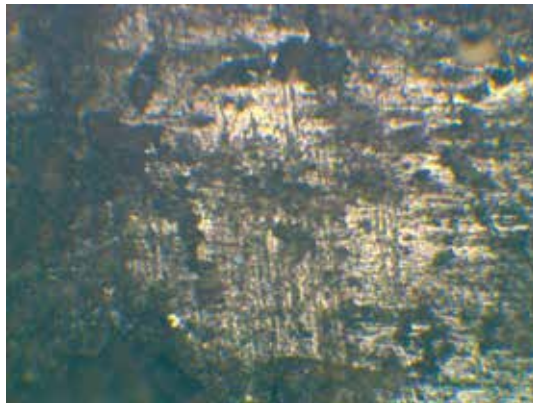


Photo 3 100x

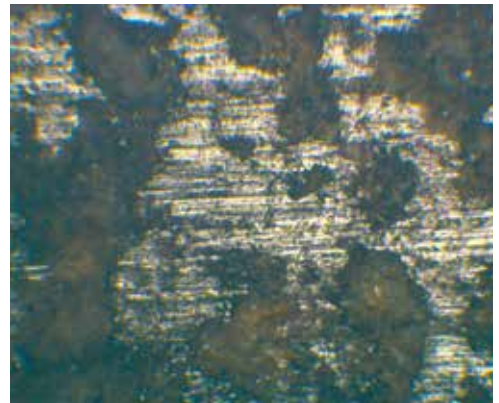


Photo 4 100x

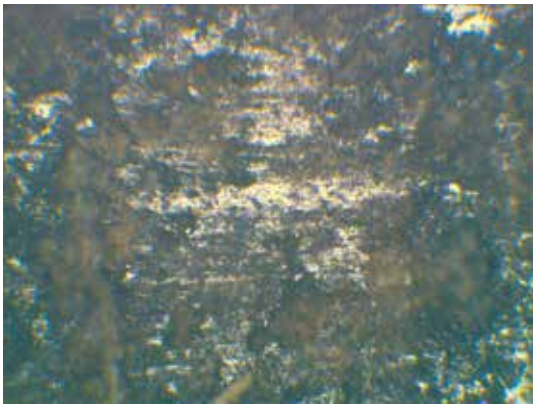


Photo 5 100x

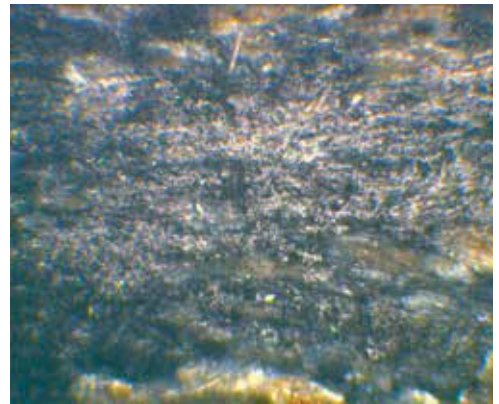


Photo 6 100x

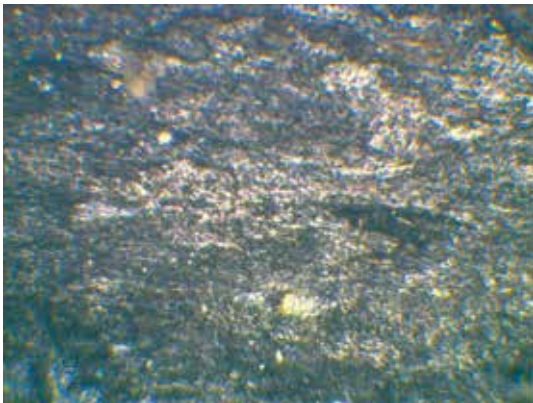


Photo7 100x

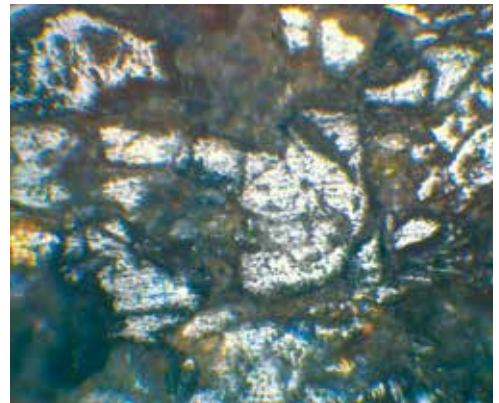


Photo 8 100x

patch-wise, somewhat smooth, glossy surface seen in the elevated area of the stone surface indicates the possibility that the workpiece (object in contact) contained a partially soft object. However, since the researcher did not conduct experiments on the grinding stones or the stone dishes, it is necessary to conduct further experiments and observations using a variety of workpieces. Nonetheless, the locally observed BS could indicate that they might have been formed by factors other than use.

Challenges

It was difficult to draw detailed inferences about the workpieces. We believe it is necessary to conduct an analysis of the residue (Shibuya et al. 2006; Shibuya 2011; and etc.) to draw inferences on the specific details of the workpieces (millet, nuts, etc.).

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2. Impression analysis of earthenware

Takase Katsumori
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Aim

This paper reports on the results of the impression analysis of the remaining earthenware excavated at the Elizavetovka 1 site. There are times when impressions of organic matter remain on the surface of earthenware by being incorporated coincidentally or being combined unintentionally during the production of the base material. This presents a certain effectiveness for detecting plants, insects, or other organic matter from the past. This report analyzes impressions on earthenware, with the aim of detecting the use of cultivated plants during the Bronze and Early Iron Ages in Primorsky Krai, Russia.

Materials and method

The analytical method adopted the replica technique developed by Ushino and Tagawa (1991). We used a Tokuyama Fit Tester and a soft blue mix for the impression agents. The impression models (replica) were prepared in September 2013 by Isao Usuki and Katsuhiko Kiyama at the Russian Academy of Sciences, Far Eastern Branch, in Vladivostok.

We chose 46 earthenware fragments for replica creation (Nos. 1-47; only No. 26 is unassigned). All the replicas of the collected impressions obtained from these earthenware fragments were observed by Takase under a stereomicroscope. Fifteen replicas that possibly had impressions of seeds or shells were selected (Nos. 10, 16, 21, 23-25, 27-30, 38-41, and 45). Since Nos. 29 and 30 contained multiple impressions, we assigned them branch numbers and, upon recording their position, split them into three pieces (No. 29:1-3, No. 30:1-3). We used an electron microscope to observe in detail, and take pictures (Keyence VE-8800) of, 19 items that were selected for primary observation. The identification of the materials derived from the impressions was performed by Takase, based on the real-life counterparts of the replicas and pictures from the electron microscope.

Results

Table 1 describes the basic information on the earthenware in which impressions were found and the analysis results of the individual replicas. Table 2 shows an aggregation of the identification results. Photos 1-3, from the electron microscope, correspond to the photo numbers in Table 1.

As shown in Table 2, we identified 9 *setaria italica*, 2 *panicum miliaceum*, while 39 were unknown. We observed 8 of the replicas marked as “unknown” under an electron microscope; however, we could not identify whence the material derived. The remaining 31 were observed under the electron microscope, a stereomicroscope, and a magnifying glass, and then finally identified as “unknown.”

Of the nine *setaria italica*, three were identified as grain and six as floret. The grains were identified from their overall shape and size, in addition to their “umbilical” form and overall proportions (Tsubakisaka 1993). While we cannot deny the possibility that it could be the *setaria italica* grain, we classified an impression as unknown if we could not definitively observe an umbilicus in the impression or could not clearly explain the formation

Table.1

Replica ID	Excavation Area	Archaeological feature	Grid	Level	Period	Surface of pottery with impression	Taxa	Plate	Remarks
1	2	Dwelling No.3		Surface soil	Bronze Age?	Interior surface	Unknown		
2	2	Dwelling No.3		Surface soil	Bronze Age?	Interior surface	Unknown		
3	2		c-4	Plast-2	Bronze Age?	Cross-section of pottery wall	Unknown		
4	2		b-4	Plast-2	Bronze Age?	Exterior surface	Unknown		
5	2		a-2	Plast-1	Bronze Age?	Interior surface	Unknown		Some fragment as No.6
6	2		a-2	Plast-1	Bronze Age?	Interior surface	Unknown		Some fragment as No.5
7	2	Dwelling No.3		Plast-1	Bronze Age?	Interior surface	Unknown		
8	2		e-1	Plast-3	Bronze Age?	Exterior surface	Unknown		
9	2			Surface soil	Bronze Age?	Exterior surface	Unknown		
10	2		c-3	Upper surface of Plast-1	Bronze Age?	Exterior surface	<i>Setaria italica</i> (grain)	Plate 1	
11	2		e-3	Plast-4	Bronze Age?	Interior surface of bottom	Unknown		Some fragment as No.12
12	2		e-3	Plast-4	Bronze Age?	Interior surface of bottom	Unknown		Some fragment as No.11
13	2		a-2	Plast-2	Bronze Age?	Exterior surface	Unknown		
14	2			Plast-2	Bronze Age?	Exterior surface	Unknown		
15	2		e-3	Plast-1	Bronze Age?	Exterior surface	Unknown	Plate 2	
16	2		c-2	Plast-5	Bronze Age?	Exterior surface	<i>Setaria italica</i> (grain)		
17	2		e-4	Plast-4	Bronze Age?	Exterior surface	Unknown		Some plastic bag as No.18
18	2		e-4	Plast-4	Bronze Age?	Exterior surface	Unknown		Some plastic bag as No.17
19	2		c-2	Plast-3	Bronze Age?	Exterior surface	Unknown		
20	2		c-1~4	Plast-5	Bronze Age?	Exterior surface	Unknown		
21	2			Plast-1	Bronze Age?	Exterior surface	Unknown	Plate 3	
22	2			Plast-2	Bronze Age?	Interior surface	Unknown		
23	2		e-1	Plast-4	Pol'tse	Interior surface	<i>Setaria italica</i> (floret)	Plate 4	
24	2		d-1	Plast-4	Pol'tse	Interior surface	Unknown		
25	2	Dwelling No.3	d-5	Plast-2	Bronze Age?	Exterior surface	<i>Setaria italica</i> (floret)	Plate 5, 6	Some plastic bag as No.27
26	-	-	-	-	-	-	-	-	unused number
27	2	Dwelling No.3	Surface soil	Plast-2	Bronze Age?	Cross-section of pottery wall	<i>Panicum milliaceum</i> (floret)	Plate 7	Some plastic bag as No.25
28	2	Dwelling No.3	a-2	Plast-5	Bronze Age?	Exterior surface	Unknown	Plate 8	<i>Setaria italica</i> (grain)?
29-1	1		H·0·0·1	Plast-2	Pol'tse	Bottom surface	<i>Setaria italica</i> (floret)	Plate 9 to 11	
29-2					Bronze Age?		Unknown	Plate 12	<i>Setaria italica</i> (grain)?
29-3					Bronze Age?		<i>Setaria italica</i> (floret)	Plate 13	
30-1	1		H·0·0·1	Plast-2	Pol'tse	Bottom surface	<i>Setaria italica</i> (floret)	Plate 14, 15	
30-2					Bronze Age?		<i>Setaria italica</i> (floret)	Plate 16	
30-3					Bronze Age?		Unknown		
31	1		H·0·0·1	Plast-2	Pol'tse	Bottom surface	Unknown		
32	2		g-4	Plast-2	Bronze Age?	Exterior surface	Unknown		
33	2		g-4	Plast-2	Bronze Age?	Exterior surface	Unknown		
34	2	Dwelling No.3	e-1	Plast-3	Bronze Age?	Interior surface	Unknown		
35	2	Dwelling No.3	e-1	Plast-3	Bronze Age?	Interior surface	Unknown		
36	2		a-2	Plast-5	Bronze Age?	Exterior surface	Unknown		
37	2		c-2	Plast-5	Bronze Age?	Bottom surface	Unknown		
38	2		c-2	Plast-5	Bronze Age?	Interior surface	<i>Setaria italica</i> (grain)	Plate 17	
39	2		a-3	Plast-2	Bronze Age?	Exterior surface	Unknown		
40	2		e-5	plast2	Bronze Age?	Interior surface	<i>Panicum milliaceum</i> (floret)	Plate 18	
41	2		b-3	Plast-2	Bronze Age?	Interior surface	Unknown	Plate 19	<i>Setaria italica</i> (grain)?
42	2		a-4	Plast-2	Bronze Age?	Interior surface	Unknown		
43	2	Dwelling No.1	b-4	Upper layer	Bronze Age?	Interior surface of bottom	Unknown		Some plastic bag as No.44
44	2	Dwelling No.1	b-4	Upper layer	Bronze Age?	Bottom surface	Unknown		Some plastic bag as No.43
45	2	Dwelling No.1	c-2		Bronze Age?	Interior surface	Unknown	Plate 20	
46	2	Dwelling No.1	d-2	Plast-4	Bronze Age?	Exterior surface	Unknown		
47	2	Dwelling No.1	d-2	Plast-2	Bronze Age?	Interior surface	Unknown		

Table.2

Taxa	Number of specimen
<i>Setaria italica</i> (floret)	6
<i>Setaria italica</i> (grain)	3
<i>Panicum miliaceum</i> (floret)	2
Unknown	39

Table.3

Surface of pottery with impression	Number of specimen	%
Interior surface	3	33.3
Exterior surface	3	33.3
Inside clay of pottery	1	11.1
Bottom surface	2	22.2
Interior surface of bottom	0	0.0
Total	9	100.0

process for the impression. Florets were identified under the criteria of the composition of the surface, how the *palea* and lemma overlapped, and their overall shape and size (especially roundness at the base or a recess at the tip). Although the size of the mammula of the lemma can be an important criterion for distinguishing the *setaria italica* flora from other genus *setaria virides* (Nasu et al. 2007), the data from this analysis were not supported by the mammula since the impression was taken on the lemma side.

Panicum miliaceum was identified based on its size and shape along with its smooth surface condition and how the spikelet overlapped. All of them were florets.

Comments

In Primorsky Krai, Russia, we detected *setaria italica* and *panicum miliaceum* from the Zaisanovka cultural age, which occurred in the latter half of the Neolithic culture; in addition, we excavated rice, barley, and wheat from the early Iron Age (Сергшова 2005, 2006, Komoto and Obata ed. 2005, Yamada 2005, Obata 2011, etc.). Although soil washing using the flotation method and the selection of inclusions were conducted on this site in 2011, with the aim of detecting carbonized seeds, the only thing detected was an abundance of sclerotium, in addition to polygonaceae and other unknown seeds, and therefore the detection of cultivated plants could not proceed.

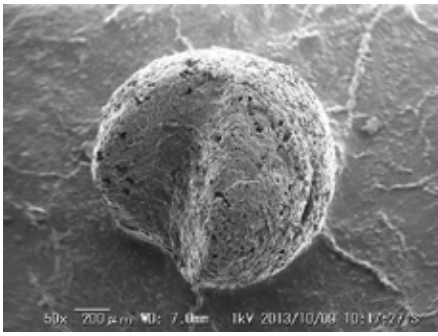
However, the examination of earthenware impressions using the replica method detected *setaria italica* and *panicum miliaceum*. This supports the theory that *panicum miliaceum* was indeed used on this site, which has been placed between the Bronze and the early Iron Ages. Although rice, barley, and wheat were not excavated, continued analyses using the flotation and replica methods will provide clues as to whether this was due to differences in time period and space, or due to differences in the nature of the site. In addition, although *panicum miliaceum* was discovered only in earthenware that could be placed in the Bronze Age in this investigation, we should be able to clarify, through the accumulation of cases, whether *panicum miliaceum* can also be detected in earthenware that can be placed in the early Iron Age.

Analysis cases on the Japanese archipelago and the Korean Peninsula have, until now, shown that floret accounts for more than 9% of the seeds of *setaria italica* and *panicum miliaceum* that can be identified in the impressions of earthenware. Although this study only detected floret *panicum miliaceum*, this is not significantly different from the situation in other regions. Although the floret is predominant in terms of the number of *setaria italica* (67%), the 33% proportion of grain is comparatively high and should be noted. As the number of cases remains small, it is critical to confirm, in the future, whether this phenomenon is peculiar to this period in Primorsky Krai.

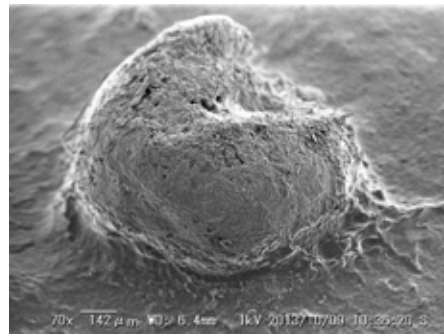
Of the surfaces where impressions have been confirmed, the external, internal, and cross-sectional surfaces account for a little under 8%, while the proportion of impressions found on the bottom surface is low (Table 3). Although there may be impressions that formed when seeds fell and adhered to the floor while the earthenware were made, we predict that there are even more impressions from seeds that were incorporated or blended into the paste when the base material was made. As cases accumulate, we hope to be able to discuss whether this is mankind's intentional work, a reflection of the environment or the seasons when the earthenware were produced, or the effect of the storage method for plant life. In addition, it was difficult to extensively examine the relationship between impressions and the theoretical characteristics of the earthenware types, since the earthenware in this analysis had many pieces that had sections without a design and, moreover, most of the pieces were small fragments. In future, it will be necessary to examine a body of material rich in both quality and quantity.

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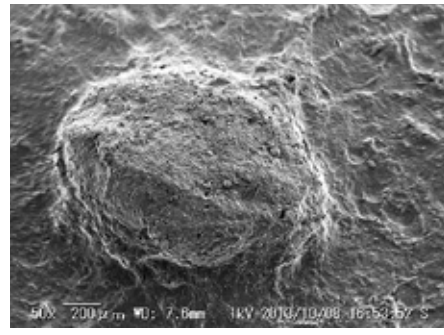
PL. 1



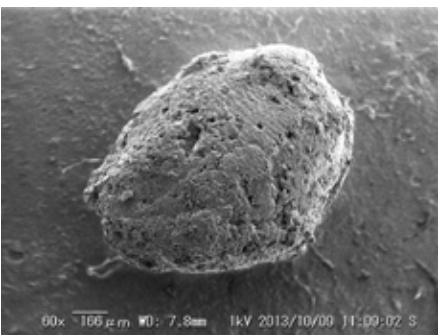
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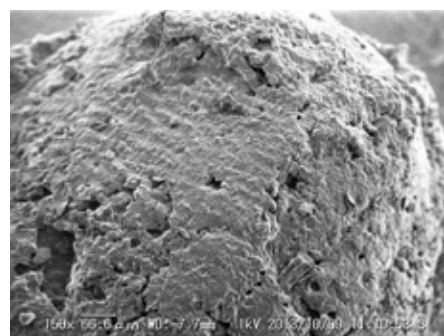
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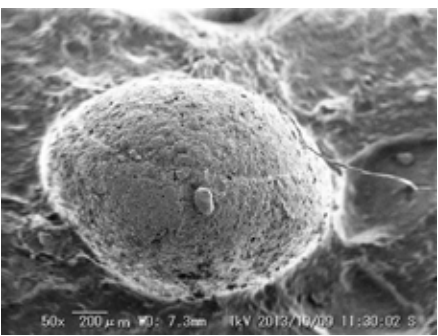
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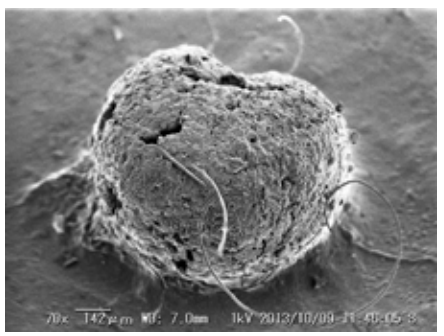
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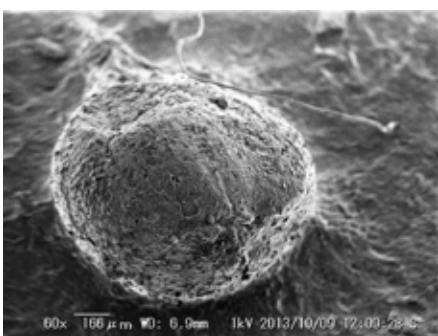
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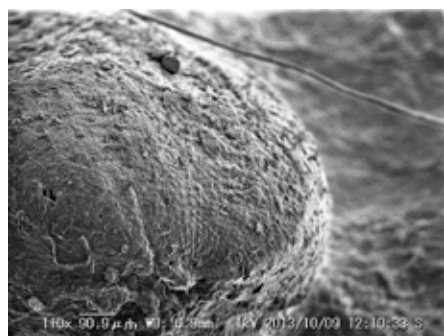
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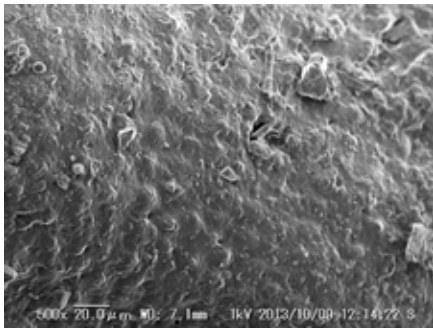
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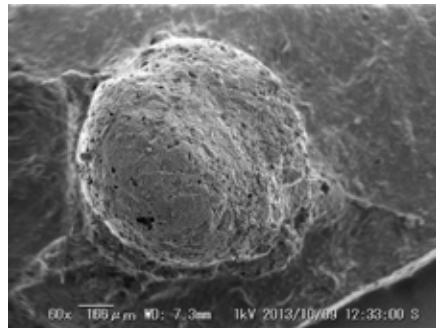
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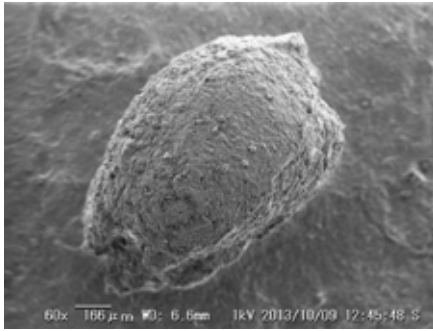
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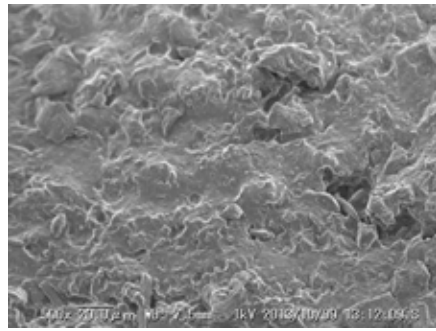
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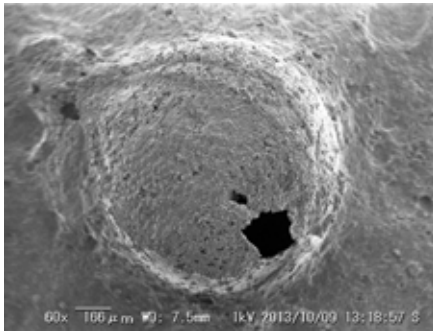
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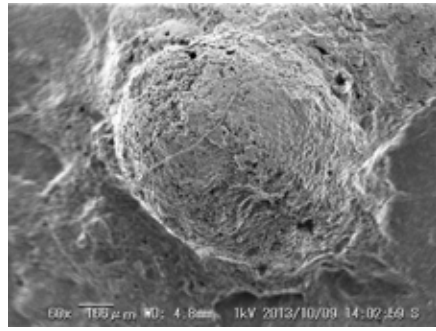
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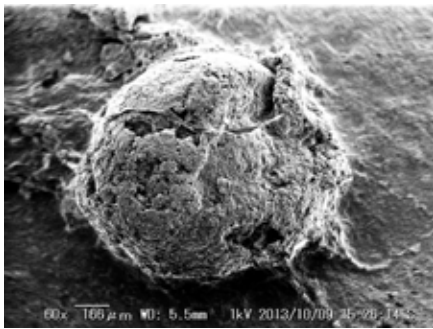
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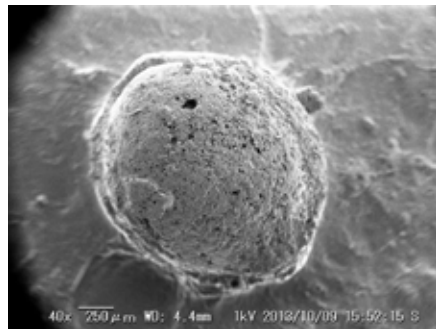
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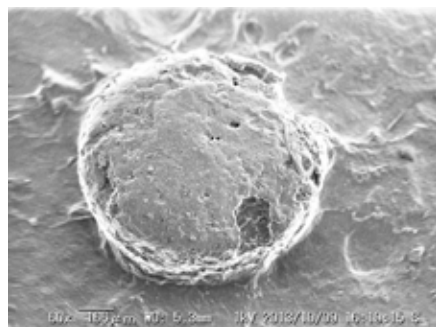
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PL.18



PL.19



PL.20

3. Analytical survey of iron slag

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(Kyushu Techno Research, TAC Center)

Survey overview

We conducted an analytical survey of two small iron slags (9.0–12.4g) excavated from a depression in the ruins of a pit house identified as being from, approximately, the 4th–5th centuries, on the Elizavetovka 1 site in Russia.

Materials 1 (ELZ11-1) and 2 (ELZ11-2) are both small, fluidized slag. Part of the surface on both is a reddish-brown color. The iron content (total Fe) of the slag is not particularly high, at 26–32%, while the glass content ($\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{CaO} + \text{MgO} + \text{K}_2\text{O} + \text{Na}_2\text{O}$) is high, at 54–62%. The mineral phase of these glasses is a furnace melt that contains a large amount of quartz, potassium feldspar, and plagioclase, and has within it crystallized fayalite ($2\text{FeO}/\text{SiO}_2$), wüstite (FeO), iron, etc. From the mineral phase and chemical composition of the slag, it can be classified as forging slag discharged during iron making. This suggests evidence that the forging operation chose a low temperature region with low oxidation loss for the iron materials. However, the variation of the mineral phase is largely due to the uneven temperature of the furnace.

Material 2, which preserved metallic iron particles, is a hypereutectoid steel ($> 0.77\% \text{ C}$) with proeutectoid cementite (Fe_3C) deposited onto a pearlite substrate. From this carbon content, we can infer that it is a small-sized ironware. On the surface layer of the slag from Material 2, we detected relics that appeared to be fragments that had fallen off from the surface oxidized membrane during the forging of the red-hot iron (refer to Photo 2: ④ – ⑥). These flake-like remains are valuable information that substantiates blacksmithing work.

Table.1 Sample history and survey items

				age	size(mm)	weight(g)	magnetism	quality	organization	structure	Hardness	diffraction	EPMA	analysis	resistance	calorie
ELZ11-1	Elizavetovka 1	Packen-2	22	iron slag	4-5AD	36 × 25 × 15	12.41	3なし		○	○	(○)		○		
ELZ11-2			120	iron slag		37 × 24 × 8	9.02	3なし		○	○	(○)		○		

Table 2 Sample composition

sample No.	Site name	excavation	relic-name	estimated age	* * * * *																Σ *			remarks			
					(Total Fe)	(Metallic Fe)	(FeO)	(Fe ₂ O ₃)	(SiO ₂)	(Al ₂ O ₃)	(CaO)	(MgO)	(K ₂ O)	(Na ₂ O)	(MnO)	(TiO ₂)	(Cr ₂ O ₃)	(S)	(P ₂ O ₅)	(C)	(V)	(Cu)	(ZrO ₂)		ingredients	Total Fe	Total Fe
ELZ11-1	Elizavetovka	Packen-2	iron slag	4-5AD	32.17	0.11	36.36	5.43	35.91	8.81	3.62	1.05	3.31	1.80	0.07	0.30	0.02	0.017	0.58	0.24	<0.01	<0.01	<0.01	54.50	1.694	0.009	
ELZ11-2			iron slag		25.73	0.11	21.84	12.36	44.26	10.39	2.21	1.10	3.18	1.24	0.09	0.58	0.03	0.009	0.38	0.19	<0.01	<0.01	0.01	62.38	2.424	0.023	

Table 3 Survey results summary

sample No.	Site name	excavation	relic-name	estimated age	Microstructure	chemical composition (%)							
						Total Fe	Fe ₂ O ₃	basic substance	TiO ₂	V	MnO	Glassy component	Cu
ELZ11-1	Elizavetovka	Packen-2	iron slag	4-5AD	f, W, Fe, q, kf, pl	32.17	5.43	4.67	0.3	<0.01	0.07	54.5	<0.01
ELZ11-2			iron slag		mh, f, Fe, W, q, C、メタルは過共析鋼(Fe+Ce)	25.73	12.36	3.31	0.58	<0.01	0.09	62.38	<0.01

f: fayalite(2FeO·SiO₂), W: Wüstite(FeO)、Fe: α-iron、q: quartz (SiO₂)、kf: k-feldspar(K₂O·Al₂O₃·SiO₂)、pl: plagioclase[(Na, Ca)(Si, Al)AlSi₃O₈]、mh: maghemite (γ-Fe₂O₃)、Pe: Pearlite(Co-deposition of Ferrite and Cementite)、Ce: Cementite(Fe₃C)

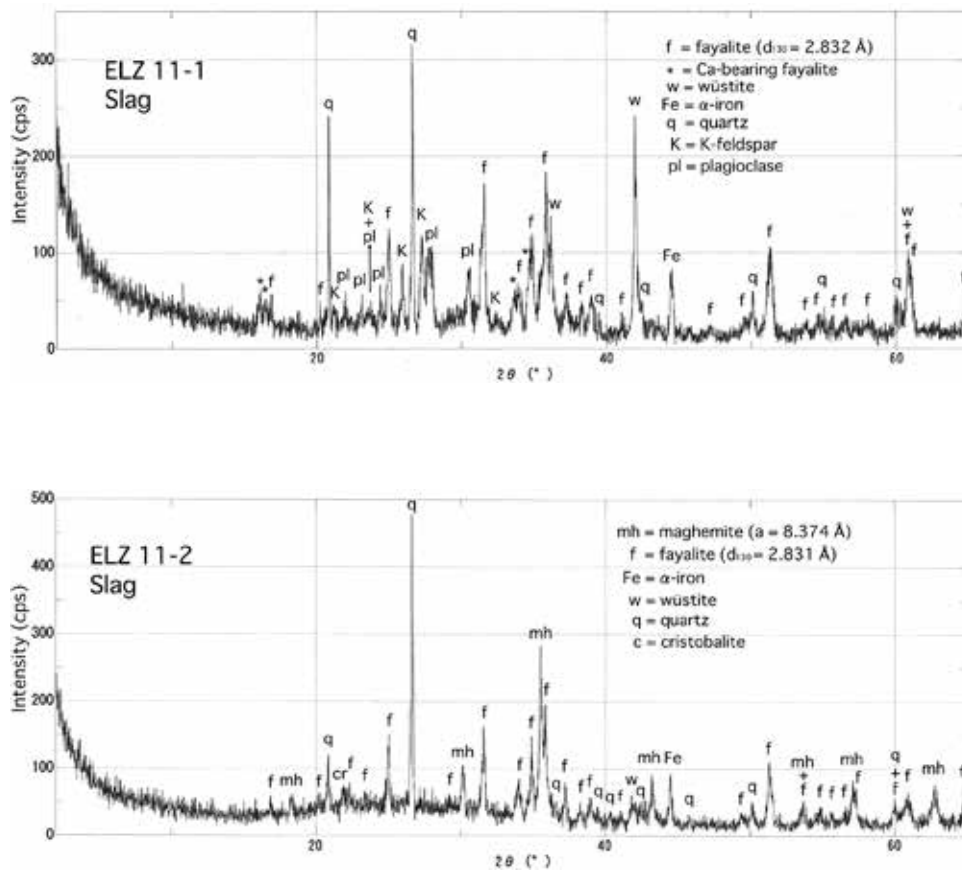


Fig.1 Result of X-ray powder diffraction

① Sampling Procedure	② Sample	③ Microscope-embedded sample
④ Wüstite+fayalite	⑤ Enlarged photo of ④	⑥ Enlarged photo of ⑤
⑦ Wüstite+fayalite	⑧ Enlarged photo of ⑦	⑨ Enlarged photo of ⑧
⑩ glasspart	⑪ Enlarged photo of ⑩	⑫ Enlarged photo of ⑪, long pillar-shaped fayalite
⑬ Vickers hardness analysis fayalite 50gf	⑭ Vickers hardness analysis fayalite, Wustite	⑮ Vickers hardness analysis glass

Photo 1 Microstructure of iron slag (ELZ11-1)



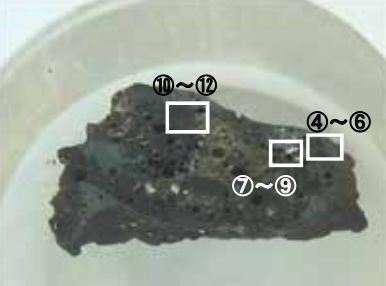
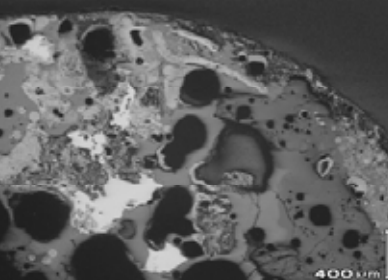
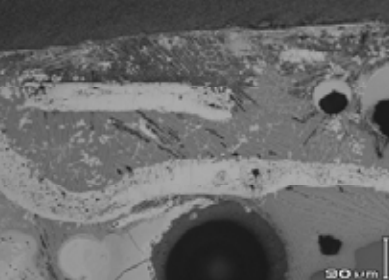
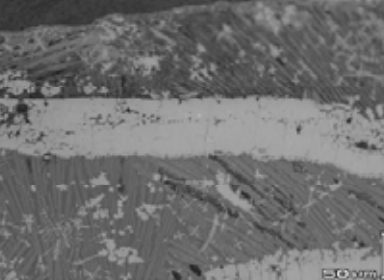
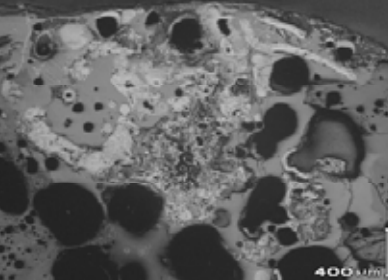
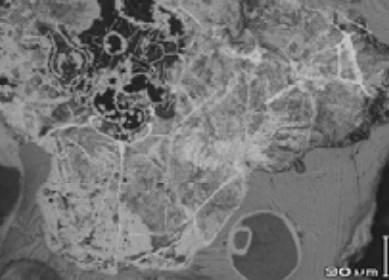
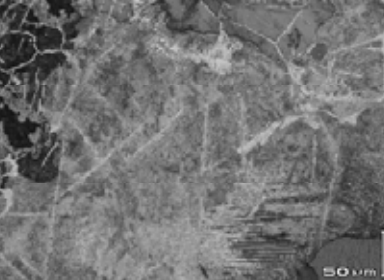
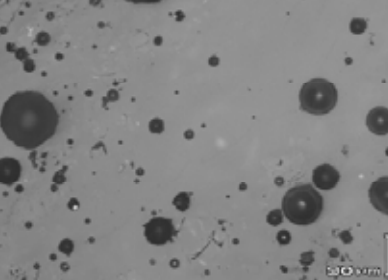
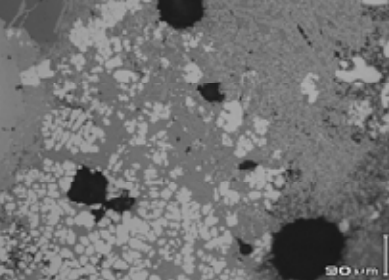
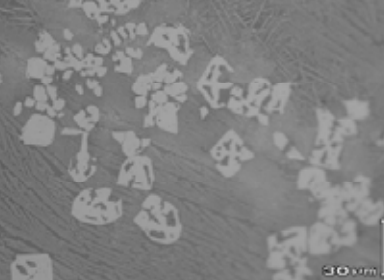
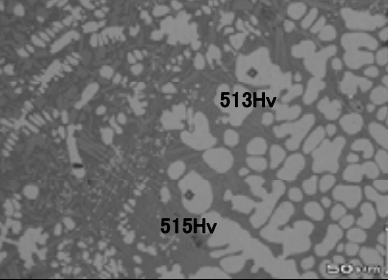
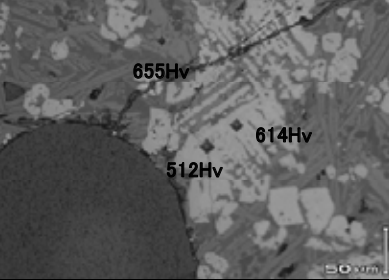
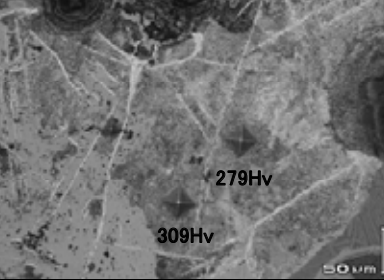
		
① Sampling Procedure	② Sample	③ Microscope-embedded sample
		
④ no etch Flake-like minerals and Metal	⑤ Enlarged photo of ④	⑥ Enlarged photo of ⑤
		
⑦ etch Metal is hypereutectoid steel (>0.77%C)	⑧ Enlarged photo of ⑦	⑨ Enlarged photo of ⑧
		
⑩ mineral phase: glass	⑪ mineral phase: Wüstite+fayalite	⑫ mineral phase: magnetite+fayalite
		
⑬ Vickers hardness analysis Wüstite 50gf	⑭ Vickers hardness analysis fayalite, magnetite	⑮ Vickers hardness analysis hypereutectoid steel (>0.77%C)

Photo 2 Microstructure of iron slag (ELZ11-2)

PART II

Discussion

Chapter 1

Dating the Early Metal Age in Far Eastern Russia

Sakamoto Minoru

(National Museum of Japanese History)

Introduction

With this research grant, we conducted carbon-14 dating of carbon materials, carbides, and earthenware-bonded carbides that were all collected at a site located in Russia. At the dating laboratory of the National Museum of Japanese History, we removed the fats and oils from the samples by cleansing them with organic solvents. We then decontaminated the samples by subjecting them to acid-alkali-acid pretreatment (we sent Sample USREL-302 for further treatment after the acid-alkali-acid pretreatment). Following the washing treatments, we sent the samples to the Institute of Accelerator Analysis., Ltd (institution code: IAAA) and Paleo Co., Ltd. (institution code: PLD) for accelerator mass spectrometry carbon-14 dating. We adjusted the reported calendar ages of the samples using the OxCal4.22 calibration program based on the IntCal13¹ calibration curve.

The carbon/nitrogen (C/N) analysis of the earthenware bonded-carbides was outsourced to SI Science Co., Ltd.

Dating results

Table 1 shows the dating results by archeological site. The sample numbers were assigned by Sakamoto for reference purposes. The carbon-14 dating provided model ages for the samples calculated based on the concentration of carbon 14. It was necessary to adjust the calendar ages of the samples by comparing the model ages to the calibration curve. The actual ages of the samples can be interpreted as having probabilities within the range indicated by the calibration age. The stable isotope ratios of carbon and nitrogen show their respective standard substances in parts per thousand. The concentrations of carbon and nitrogen are expressed as percentages by weight relative to the samples. These concentration ratios are converted and shown as the amount of substance (number of moles).

Although the earthenware bonded-carbides (USR10-7) that were collected at the Iman River basin were expected to indicate a Neolithic Age of northern Primorsky Krai, we believe that the samples are from much more recent ages, based on the calculated calibrated ages (2000 B.C.-1500 B.C.). In addition, the two samples of carbides (USR10-5 and USR10-6) that were excavated from Dal'niy Kut 3 (which was regarded as early Iron Age), which were collected from a prospecting hole, were earthenware fragments believed to be from the Pol'tse cultural age. Consequently, they showed an age nearly consistent with other samples from the Pol'tse cultural age. These samples are excluded from the detailed age examination of the samples from the Bronze, Pol'tse cultural, and Mohe cultural ages, discussed below.

Bronze Age (Figure 1)

We analyzed two carbide and three earthenware bonded-carbide samples excavated from Elizavetovka 1, and

Table 1 The list of results of carbon-14 and C/N Analysis

Sites Sample ID	Date/Culture	Remain	Sample Type (Site sampled)	¹⁴ C BP	calibrated date	$\delta^{13}\text{C}$ (‰)	$\delta^{15}\text{N}$ (‰)	C (%)	N (%)	C/N (m/m)	Instituion No.	¹⁴ C age (BP)	C/N
Iman river													
USR10-7	Neolithic	Ground Surface Mining	earthenware-bonded carbides (interior)	IAAA-1033632260 ± 30	395-350calBC (38.6%) 306-209calBC (56.8%)	-22.3	10.1	56.9	3.7	17.9	IAAA-103363	2260 ± 30	15.4
Dal'nyi Kut3②													
USR10-5	Early Iron Age?	Trench2 inside dwelling	carbides	IAAA-1033611760 ± 20	221-351calAD (94.3%) 369-378calAD (1.1%)						IAAA-103361	1760 ± 20	
Dal'nyi Kut3③													
USR10-6	Early Iron Age?	Trench2 inside dwelling	carbides	IAAA-1033621770 ± 20	143-155calAD (1.3%) 168-195calAD (3.7%) 210-340calAD (90.5%)						IAAA-103362	1770 ± 20	
Elizavetovka1													
USREL-33	Bronze Age	buried soil of pit3-3	carbides	IAAA-1221752700 ± 20	900-810calBC (95.4%)						IAAA-122175	2700 ± 20	
USREL-34	Bronze Age	buried soil of pit3-3	carbides	IAAA-1221762690 ± 20	898-807calBC (95.4%)						IAAA-122176	2690 ± 20	
USREL-301	Bronze Age	cultural layer	earthenware-bonded carbides (interior surface)	IAAA-1307562640 ± 20	833-792calBC (95.4%)	-21.8	8.7	58.6	5.3	13.0	IAAA-130756	2640 ± 20	11.1
USREL-302	Bronze Age	Floor of dwelling No.3 (grid C-2)	earthenware-bonded carbides (interior surface)										
USREL-1	Pol'tse culture period III	pit dwelling	carbides	IAAA-1006271760 ± 30	216-357calAD (93.9%) 366-380calAD (1.5%)						IAAA-100627	1760 ± 30	
USREL-11	Pol'tse culture?		carbides	PLD-200671765 ± 20	223-338calAD (95.4%)						PLD-20067	1765 ± 20	
USREL-12	Pol'tse culture?		carbides	PLD-200681715 ± 20	255-302calAD (32.0%) 315-390calAD (63.4%)						PLD-20068	1715 ± 20	
USREL-31	Pol'tse culture? M5		carbides	IAAA-1221731730 ± 20	247-382calAD (95.4%)						IAAA-122173	1730 ± 20	
USREL-32	Pol'tse culture? и 6		carbides	IAAA-1221741660 ± 20	335-425calAD (95.4%)						IAAA-122174	1660 ± 20	
Zholtyi Yar													
USRZY-1093	Pol'tse culture period I	dwelling no.1	earthenware-bonded carbides (exterior surface)	IAAA-1006292240 ± 20	387-348calBC (25.4%) 316-208calBC (70.0%)	-25.9	7.0	57.1	1.9	35.6	IAAA-100629	2240 ± 20	30.5
USRZY-1163	Pol'tse culture period I	dwelling no.1	earthenware-bonded carbides (rim, interior)	IAAA-1006302140 ± 20	352-298calBC (19.0%) 228-222calBC (0.7%) 211-91calBC (75.7%)	-28.7	6.9	57.5	2.0	32.9	IAAA-100630	2140 ± 20	28.2
USRZY-1546	Pol'tse culture period I	dwelling no.1	earthenware-bonded carbides (interior surface)	IAAA-1006312110 ± 30	197-54calBC (95.4%)						IAAA-100631	2110 ± 30	
Nai													
USRNAI-1	Pol'tse culture period II	dwelling no.10	earthenware-bonded carbides (interior surface)	IAAA-1221671870 ± 20	76-219calAD (95.4%)	-24.9	7.5	14.5	0.1	203.7	IAAA-122167	1870 ± 20	174.7
USRNAI-2	Pol'tse culture period II	dwelling no.10	earthenware-bonded carbides (interior surface)	IAAA-1221682060 ± 20	164-129calBC (12.4%) 121calBC-3calAD (83.0%)	-27.4	7.6	55.4	1.2	52.5	IAAA-122168	2060 ± 20	45.0
USRNAI-3	Pol'tse culture period II	dwelling no.10	earthenware-bonded carbides (exterior surface)	IAAA-1221692190 ± 30	360-272calBC (57.3%) 263-179calBC (38.1%)	-23.6	7.2	64.2	1.9	39.8	IAAA-122169	2190 ± 30	34.1
USRNAI-4	Pol'tse culture period II	dwelling no.10	earthenware-bonded carbides (exterior surface)	IAAA-1221701930 ± 20	24-128calAD (95.4%)	-18.5	6.2	68.2	0.9	88.5	IAAA-122170	1930 ± 20	75.9
USRNAI-5	Pol'tse culture period II	dwelling no.10	earthenware-bonded carbides (exterior surface)	IAAA-1221711990 ± 20	44calBC-61calAD (95.4%)	-20.3	4.8	14.9	0.3	52.8	IAAA-122171	1990 ± 20	45.3
USRNAI-6	Pol'tse culture period II	dwelling no.10	earthenware-bonded carbides (exterior surface)	IAAA-1221721940 ± 20	17-127calAD (95.4%)	-24.9	7.7	62.0	1.3	56.0	IAAA-122172	1940 ± 20	48.1
Blagoslovennoye1													
USRBL-2	Early stage of Mohe culture	dwelling no.1	earthenware-bonded carbides (exterior surface)	IAAA-1006281580 ± 20	419-540calAD (95.4%)	-22.9	19.8	43.5	3.6	14.2	IAAA-100628	1580 ± 20	12.2
Borisov													
USRBO-301	Mohe culture	dwelling no.1	earthenware-bonded carbides (exterior surface)	IAAA-1307571600 ± 20	410-537calAD (95.4%)	-25.2	6.6	62.0	2.6	27.7	IAAA-130757	1600 ± 20	23.7
Rosina 6													
USR10-3	Mohe culture	trench1 on the earthenwork	carbon materials	IAAA-1033591170 ± 20	772-900calAD (85.6%) 921-950calAD (9.8%)						IAAA-103359	1170 ± 20	
USR10-4	Bronze Age	accumulation of pottery on trench No.2	carbides	IAAA-1033602170 ± 30	359-275calBC (52.6%) 261-164calBC (42.8%)						IAAA-103360	2170 ± 30	

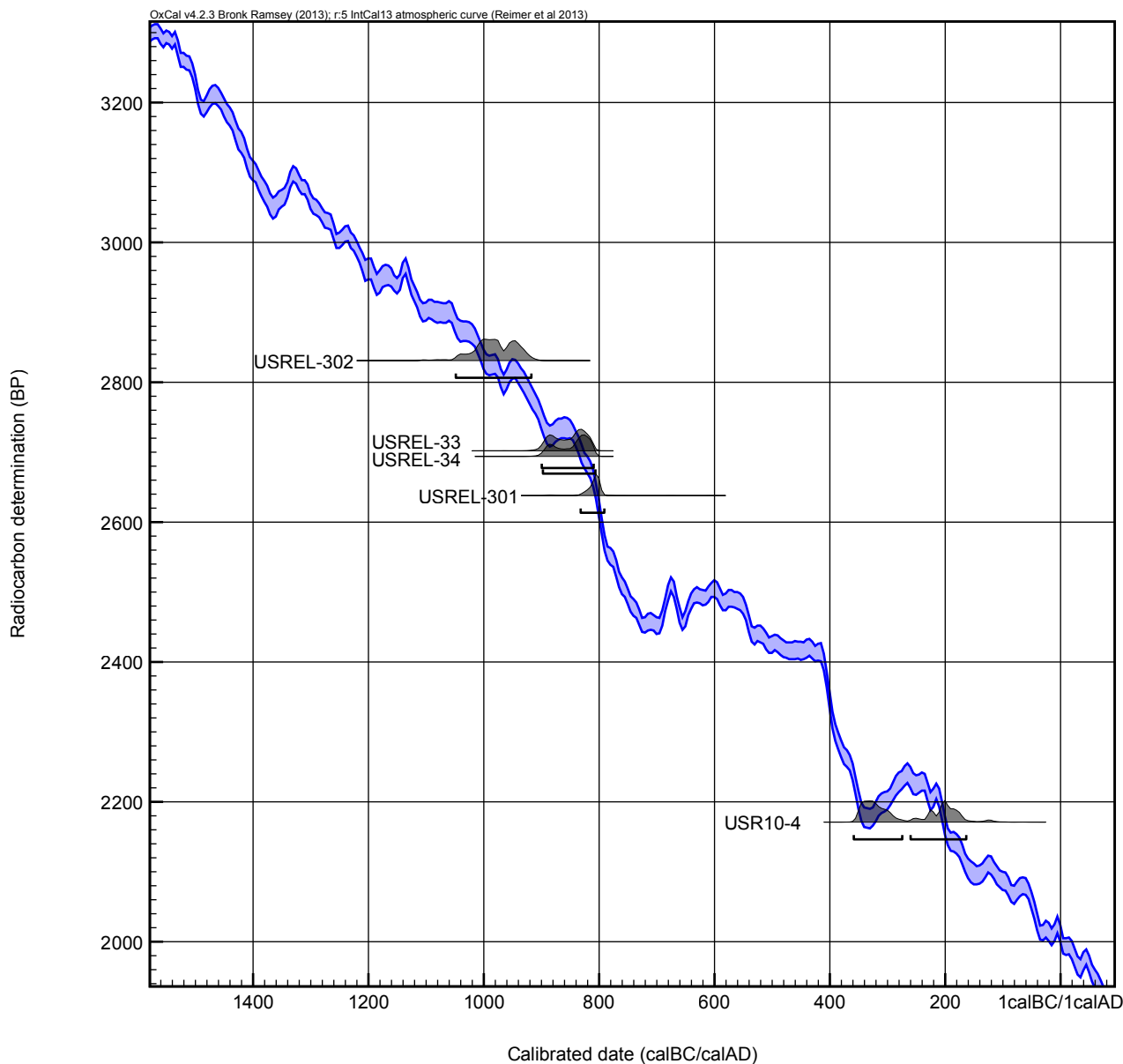


Fig.1 Probability density distribution of carbon-14 and calibrated ages of Russian samples(Bronze age)

one carbide sample excavated from Rosina 6. The sample from Rosina 6 (USR10-4) was excavated from close to an earthenware, and thus is poorly positioned in terms of age. This suggests that it belongs to a more recent age than the other samples.

The carbon-14 date for USREL-302 is 2830 ^{14}C BP. This indicates a rather old age relative to the other three samples (2700–2640 ^{14}C BP). Based on IntCall3, the former's calibrated age corresponds to the 10th century B.C., while the latter samples' corresponds to the 9th century B.C. Intriguingly, the two carbides (USREL-33 and USREL-34), which were excavated from identical pits filled with soil, have nearly identical dates.

USREL-302, an earthenware bonded-carbide, has a low C/N ratio, indicating that it originates from animal proteins. Since the stable isotope ratio of the carbon (value $\delta^{13}\text{C}$) is not very large (-23.7‰), it is difficult to suppose that the carbides derived from a marine organism. However, if the carbides did indeed derive from freshwater fish or other marine organisms, the ratio may have been affected by the freshwater reservoir effect; thus, the age of this carbon should be interpreted with caution.

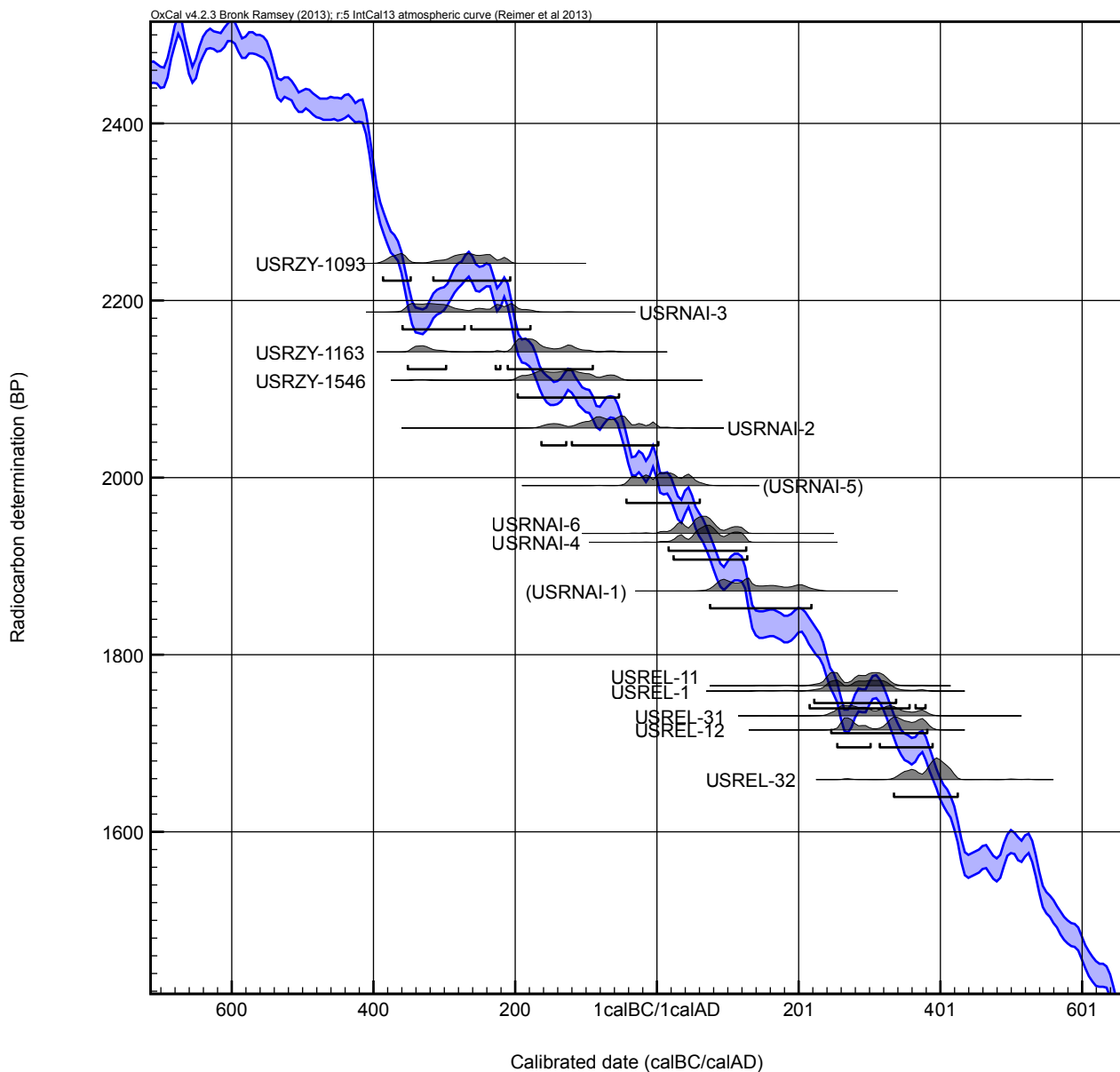


Fig.2 Probability density distribution of carbon-14 and calibrated ages of Russian samples(Poltse culture age)

Pol'tse Cultural Age (Figure 2)

We analyzed two carbide samples excavated from Elizavetovka 1, three earthenware bonded-carbide samples excavated from Zholtiy Yar, and six earthenware-bonded carbide samples excavated from Nai. Of the Nai samples, two (USRNAI-1 and USRNAI-5) had a carbon concentration of approximately 15%, which is lower than the value of ordinary carbide (40% or more). This suggests the presence of mineral substances in the sample, necessitating caution in interpreting the carbon-14 date. The nitrogen concentration is also low, and therefore it is necessary to estimate the large measurement error in its stable isotope ratio. The results of the carbon and nitrogen analyses should be considered in interpreting the carbon-14 date.

Although there are some variations, the carbon-14 dates of the samples may be approximately grouped by site as follows: Zholtiy Yar as 2110–2240 ¹⁴C BP, Nai as 1930–2190 ¹⁴C BP (excluding two samples, USRNAI-1 and USRNAI-5), and Elizavetovka as 1660–1765 ¹⁴C BP. Based on IntCal13, these calibration dates correspond, respectively, to the 3rd century B.C., the 3rd century B.C. to the 1st century A.D., and the 2nd to 3rd century A.D., approximately. Kunikida et al. conducted carbon-14 dating at Zholtiy Yar, and reported that the earthen-

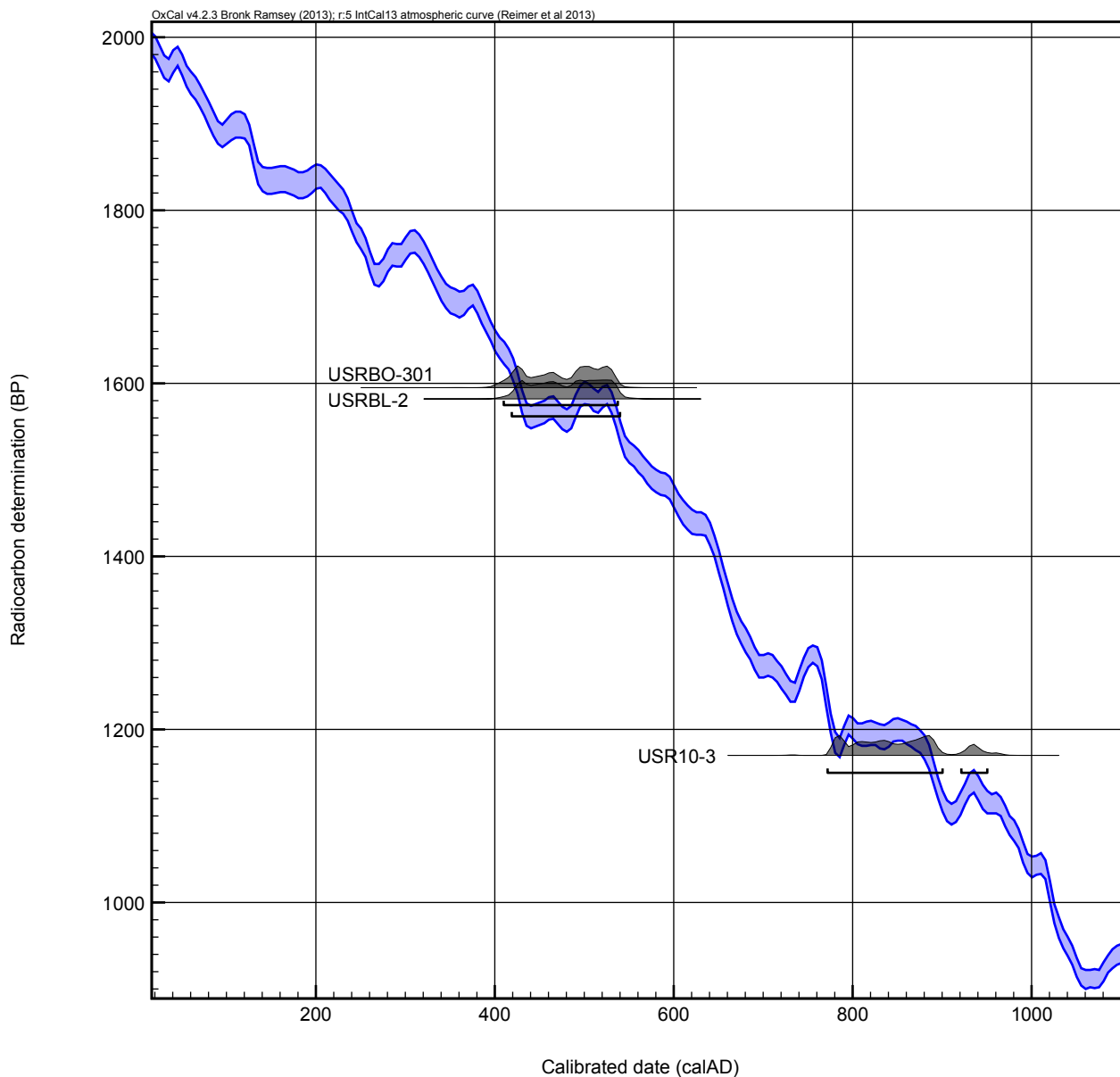


Fig.3 Probability density distribution of carbon-14 and calibrated ages of Russian samples(Mohe culture period)

ware-bonded carbides excavated from the same Dwelling No. 1 had nearly identical dates, 2200 to 2230 ^{14}C BP³.

The C/N ratio for the earthenware-bonded carbides in Nai is 40 or more, which does not corroborate the notion that these carbides originate from animal proteins. In addition, the two samples (USRNAI-4 and USRNAI-6) with nearly equal ages have different $\delta^{13}\text{C}$ values. While the latter has a value for common terrestrial plants, the former has a value that indicates that it originates from C_4 plants such as millet or other types of grains. This study confirms the use of *setaria italica* and *panicum miliaceum* in the Bronze Age; although it has a different date, USRNAI-4 is thought to be of C_4 plant origin.

Mohe Cultural Age (Figure 3)

We analyzed one sample of earthenware-bonded carbide excavated from Blagoslovennoye 1, one sample of earthenware-bonded carbide excavated from Borisov, and one carbide excavated from Rosina 6.

The Rosina 6 sample is clearly more recent than the other two. Its carbon-14 date is 1170 ^{14}C BP, while its Int-Cal3-based calibrated age corresponds to the 8th century A.D., approximately. This is consistent with the estima-

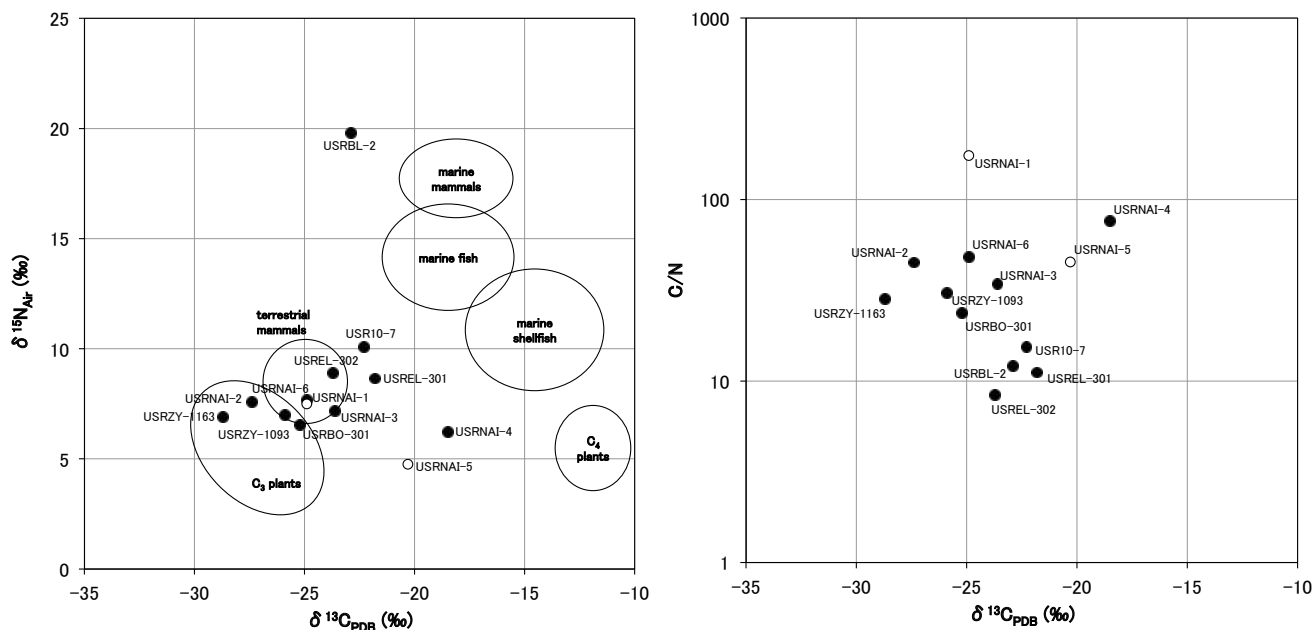


Fig.4 C/N Analysis of earthenware-bonded carbides

tions, based on the earthenware, that the sample is from a new stage of the 8th to 9th century A.D. On the other hand, the other two samples that showed an older age (1580–1600 ^{14}C BP) had a first calibrated date in the 5th–6th century A.D. This is consistent with the archaeological date. The slightly high $\delta^{13}\text{C}$ value and low C/N ratio of USRBL-2 suggests an origin from marine animals. However, since the site is located inland and the C/N analysis of USRBO-301, which is a sample from the same period, suggests an origin from terrestrial plants, we believe there is a negligible marine reservoir effect.

C/N Analysis (Figure 4)

The left side of Figure 4 shows the relationship between the $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values of the earthenware-bonded carbides, while the right side shows the relationship between the $\delta^{13}\text{C}$ value and the C/N ratio. The large circles in the figure on the left show the range of the stable isotope ratio, which is typical. The two samples indicated by small, white circles (USRNAI-1 and USRNAI-5) have low concentrations of carbon and nitrogen. It is important to estimate large measurement errors, especially for nitrogen concentrations. Furthermore, we could not perform a C/N analysis on one sample of earthenware-bonded carbide from the Zholtzi Yar excavation (USRZY-1546) due to insufficient sample volume.

From Figure 4, clearly many of the earthenware-bonded carbides are derived from land resources. The one sample from Elizavetovka 1 (USREL-301) appears to be somewhat influenced by marine resources; however, the carbon-14 date is almost the same as that of carbon materials from the same site (USREL-33 and USREL-33). In addition, USRNAI-4 and USRNAI-5, which came from the Nai site, were found to be affected by millet in terms of their material of origin.

Summary

We carbon-14 dated samples excavated from sites located in Russia. We obtained dates from the Bronze Age, the Pol'tse cultural age, and the Mohe cultural age. These results are largely consistent with archaeological findings,

and we hope they will play some role in the construction of a chronological axis. An increase in carbon-14-dated cases, investigations on the materials of origin of earthenware-bonded carbides, and an assessment of the marine and freshwater reservoir effects while accumulating more accurate dates will all be needed in the future.

Notes

1. Paula J Reimer, Edouard Bard, Alex Bayliss, J Warren Beck, Paul G Blackwell, Christopher Bronk Ramsey, Caitlin E Buck, Hai Cheng, R Lawrence Edwards, Michael Friedrich, Pieter M Grootes, Thomas P Guilderson, Hafliði Hafliðason, Irka Hajdas, Christine Hatté, Timothy J Heaton, Dirk L Hoffmann, Alan G Hogg, Konrad A Hughen, K Felix Kaiser, Bernd Kromer, Sturt W Manning, Mu Niu, Ron W Reimer, David A Richards, E Marian Scott, John R Southon, Richard A Staff, Christian S M Turney, Johannes van der Plicht (2013). IntCal13 and Marine13 radiocarbon age calibration curves 0-50,000 years Cal BP. *Radiocarbon*, 55, pp. 1869-1887.
2. C Bronk Ramsey (2009). Bayesian analysis of radiocarbon dates. *Radiocarbon*, 51, pp. 337-360.
3. Kunikita Dai , personal correspondence

Chapter 2

Bronze Age Culture in Northern Primorsky Krai

Usuki Isao

(Sapporo Gakuin University)

Introduction

The culture in the Bronze Age or early Metal Age that preceded the early Iron Age in Far Eastern Russia represents important material that indicates how regional groups reorganized from the end of the Neolithic Age to the early Iron Age. However, there is much we do not know about the specifics of the culture in northern Primorsky Krai and along the Amur River basin. A review of what is currently established about southern Primorsky Krai—which is comparatively rich in material—is currently underway. Focusing on the Iman River basin, this grant-in-aid study examined the culture in northern Primorsky Krai from the Bronze Age to the Mohe Age, and could obtain a wealth of knowledge on the Bronze Age, especially; until now, information on the age was limited. Based on these results, this paper attempts to describe aspects of the Bronze Age in this area and its relation to the neighboring areas.

1. What Has Been Conventionally Established

What we know about the Bronze Age in Primorsky Krai has been based on the results of the surveys that were conducted by Okladnikov and Derevyanko at the Kirovske and Halina Valley sites. The ages of these sites were regarded to be in the latter half of 2000 B.C., approximately, while the culture was established as one in which imitation bronze stone tools were used (Окладников, Деревянко 1973). Subsequently, our knowledge of the Margaritovka, the Sinegai, and the Lidovka cultures was established through the results of studies such as Dyakov's survey of the Lidovka ruins (Дьяков 1989) and Brodyansky's survey of the Sinegai ruins (Бродянский 1987). Re-adjustments of the details of these culture complexes and their chronological positioning are underway. Of these three cultures, the Margaritovka culture was changed from the raimon (whirlpool)-pattern earthenware group in the second half of the Neolithic Age, and is now characterized by earthenware with no design and bell-shaped earthenware with a compound rim and a row-of-holes pattern. The sets that accompanied stone knives comprised grinding mortars/grinding sticks (cooking utensils), stone knives (harvesting utensils), and stone hoes (plowing utensils), which suggested the existence of agriculture (Окладников, Деревянко 1973). Currently, the age is estimated to be 2000 B.C., approximately, and is positioned as older than the Sinegai and Lidovka cultures. In addition, the Jiandao area in China (Yanbian area) is known as Xingchen culture.

Bronze wares or their imitations came into existence in the stages that followed. Presently, it is common to consider the Sinegai and Lidovka cultures as Bronze Age. The real age is said to be the beginning of 1000 B.C., approximately. The Sinegai culture has been established in southwestern Primorsky Krai. Short-neck pots, deep pots, and shallow-pot earthenware were the mainstream; however, large items for storage were also present. There were stone knives for harvesting on the stone plates and grinding stones, which showed that millet farming oc-

curred. The proportion of stone tools made from grinding increased compared to the previous stage. Among the tools, products that were clearly bronze imitation, such as stone spears and buttons with a spine in the center of the body, were present. Bronzeware itself, including ornaments such as buttons and ornamental boards, as well as small swords, were excavated from the Sinegai ruins (Бродянский 1987). The Lidovka culture is distributed along the northeastern coastal area of Primorsky Krai. As in the Sinegai culture, pots and deep pots with simple patterns such as pattern-less or raised bands and engraved patterns were mainstream, while there were few shallow pots or bowls. There were also red earthenware and large items. Agricultural tools such as stone knives existed, while there were many chipped scrapers, knives, and stone arrowheads, as well as ground knives and stone arrowheads (Дьяков 1989). Regarding the above cultures, which were constructed mainly from research materials from the 1980s and before, an increase in the number of research examples from archeological ruins led to an increase in materials that did not match what was established above in terms of details and time period. Furthermore, it has become necessary to adjust varying time periods, such as the lower limit of the Lidovka culture that was set at the 5th century B.C., and how some of the sites were regarded as concurrent with the early Iron Age. Consequently, there is a need to review what was established, the details, and the time periods; additionally, surveys in areas not covered by what was conventionally established have become necessary.

2. Review of What was Established

Due to the necessities described above, a new survey was conducted, newly accumulated material was added, and what has been established from the Bronze Age to the early Iron Age or the early Metal Age is being reviewed. Among these, the centrally active Yanshina was divided into earthenware from the end of the Neolithic Age to the early Iron Age, while the Bronze Age was re-established into four types: Lidovka/Tipebai, Svorovo, Anuchino/Sinegai, and Kirovske. The Margaritovka group is older than the others and is considered to be the transition stage from the end of the Neolithic Age. In addition, elements that closely resembled the Yankovsky culture were excluded from the Lidovka/Tipebai types, while separate types were established as the Yankovsky complex (Яншина 2004). However, this type of age is not considered the next phase of the early Iron Age, but is instead considered to have parts that overlap with other types.

In addition, Nikitin et al. estimated new types in their survey of the Chernachino ruins. Sidorenko established local types within the Lidovka culture, such as the Pufusun, the Dalnegorsk, the Ahobin, and the Kunarei groups (Сидоренко 2012). Although there is still time to examine the time period and scope of each newly established type or group, we are in the

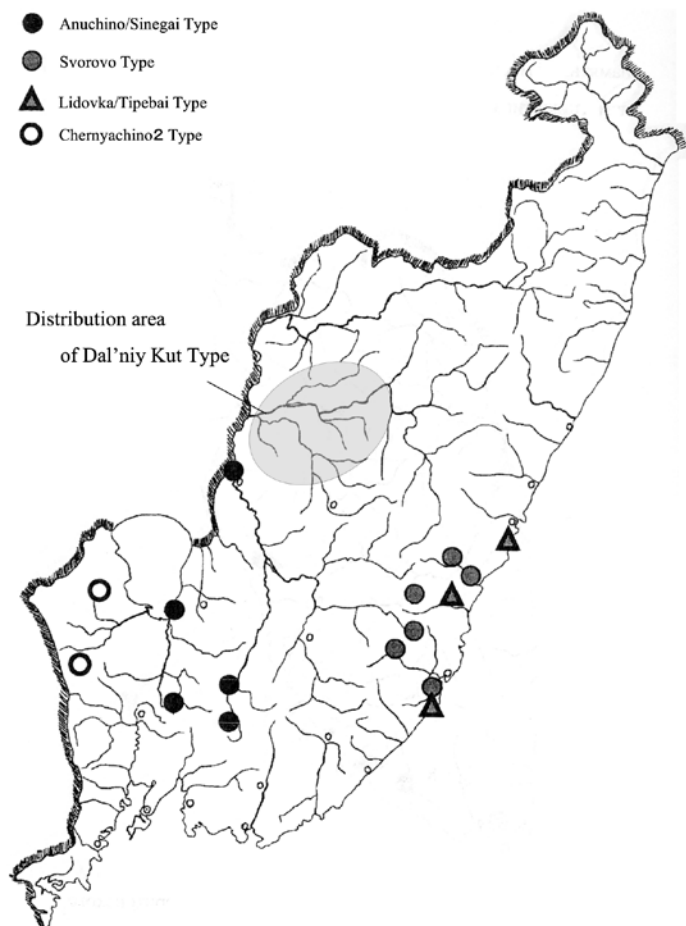


Fig.1 Distribution of Bronze Culture Types in Primorsky Krai
(added to Яншина2004 рис3)

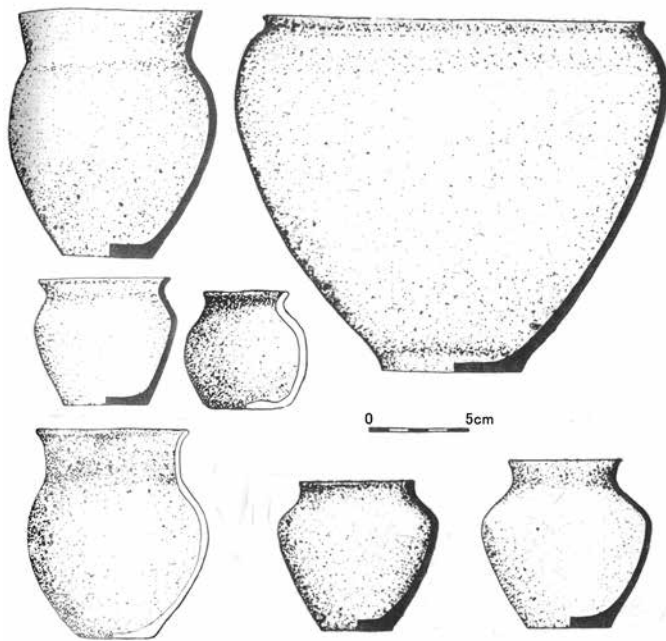


Fig.2 Pottery from Sinegai
(Бродянский, Д.Л. 1987 рис70 • 71)

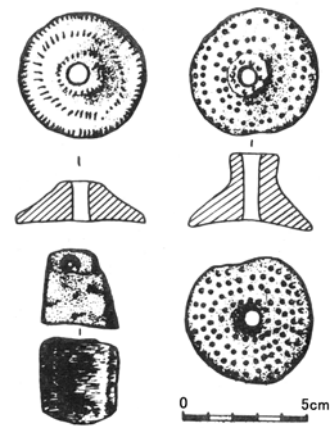


Fig.3 Spindles and grinding wheels

process of adjusting the aspects of the time periods between the Neolithic and early Iron Ages in Primorsky Krai and the Sea of Japan, and further detailing what has been established locally (Figure 1).

Regrettably, the studies have not progressed due to lack of research and data on aspects of the same time period as northern Primorsky Krai, centered on the Ussuri River basin. From the 1990s, we gained insights into the aspects of this time period based on the results of a study on the Iman River basin by Klyuev et al. They estimated the existence of one new type of Bronze Age culture, based on the materials excavated from the Darney Kut 15 site (Клюев, Гарковък 2002). However, there is a theory that, from the same data, we can speculate on a culture that is independent of the types in southern Primorsky Krai. However, the data from all of the studies are fragmented and, since the extent of that culture complex is unclear, the conclusion remains only a hypothesis, which necessitates more detailed surveys.

3. Establishment of Bronze Culture on the Iman River Basin and Surrounding Areas

We excavated materials considered to be Bronze Age at Dal'niy Kut 15, Rosina 6, and Zunamensukoye (located on the Iman River basin and its surrounding areas). The materials collected at these sites mainly comprised earthenware; however, these patterns, shapes, and techniques clearly have a strong commonality with the Elizavetovka 1 site, and can be considered material that belongs to the same culture complex. Due to the relics and sizable amount of materials excavated during the excavation survey at the Elizavetovka 1 site, we can grasp much of the details from this time period.

The excavated remains related to the three pit houses include earthenware, spindle whorls, ground stone axes, ground stone swords, whetstones, ground stone and chipped stone arrowheads, chipped spearheads, and bronze sword fragments, as described above. In the following section, we compare the various data with the data from other regions and consider their position.

Earthenware is most emphasized during regional classification. Thus, first, we consider earthenware. The distinctive shapes found at the Elizavetovka 1 site were pot-shaped earthenware with a short neck and a bulging

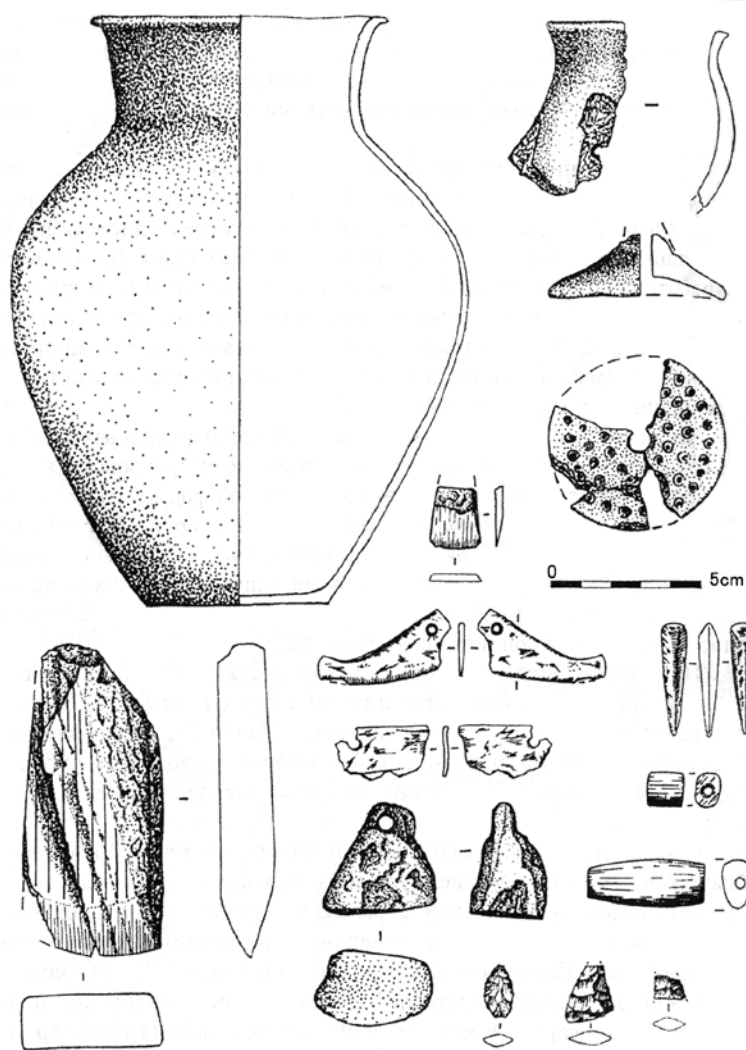


Fig.4 Relics from Glazovka site
(Коломиец и др. 2004 Табл.6)

trunk, as well as wide-rimmed deep pots or wide-ripped pots. In addition, patterns have been applied to the shoulder and neck. The earthenware group with the above characteristics does not exist in other areas of Primorsky Krai. What are especially different are the patterns. There are no examples of a pattern that comprises mainly engraved lines applied to the neck and shoulder. In terms of the composition of ware types, Yanshina has established differences in the pots, deep pots, and, in addition, shallow pots from the different groups, such as the Anuchino/Sinegai, the Lidovka/Tipebai, and the Suvorovo (Figure 2). In addition, among the types of wares, the short-neck pot with a rim whose diameter is small and considerably different from the maximum diameter of the trunk has not been observed in the other groups. Short-necked pots with similar characteristics can be found in the Urril culture on the Amur River basin and in the Qiao nan culture of the Sanjiang Plain in China. In addition, although few, short-neck jars with circular handles exist in the Qiao nan culture.

However, overall, there are too many differences, such as in the pattern and other ware shapes. Short-neck pots such as those described above can be found in the Yankovsky complex established by Yanshina, or in the actual Yankovsky culture; however, there is a large difference in the composition and pattern of the wares.

Considering the above, earthenware groups in northern Primorsky Krai clearly have different characteristics from those in other regions, and are certain to become a single regional type.

Next, I consider the other relics. First, I discuss the composition of the wares. Although few types were excavated, what was found comprised mainly ground stone wares with similarities with the items identified in the Sinegai ruins. There were strong similarities with whetstones with hanging holes that would be used for grinding ground stone tools. Although these are the items that were collected, they are similar to the stone plates and grinding stones found in southern Primorsky Krai, which are believed to be from this time period. In addition, the shape and pattern of the conical spindle whorls are similar to those of the pieces found in Primorsky Krai from the Neolithic Age onward. The small, bowl-shaped earthenware have the same characteristics (for example, having projections) as those excavated from the Sinegai site. The small bronze knives were cut into platelets and perforated, which is another similarity with the items excavated from the Sinegai ruins. In other words, the stone and earthenware have a strong commonality with the items excavated from the Sinegai site (Figure 3). This shows that these

items are closely related to the Anuchino-sinegai type. The similar items that are said to be most closely related to the north are the ones excavated from the Glazovka site (Коломиец et al. 2004). However, that earthenware is actually closer to the earthenware from the Elizavetovka 1 ruins. Perhaps they should be considered the same type (Figure 4): if they were, then the southern boundary of this culture complex could move slightly southward. On the other hand, although there are elements that are common to some earthenware, the culture complex, overall, has little in common with the Uril culture of the Amur basin adjacent to the north. When this aspect is considered, the Bronze culture in northern Primorsky Krai can likely be included in the entire Primorsky Krai group. While the establishment of the archaeological culture and types in Russia have not yet been accomplished in detail, we can speculate on the establishment of large cultures in areas that make up most of Primorsky Krai, and on a number of the local types within those cultures, and consider the culture complex of the Elizavetovka 1 site as a type from the northern inland region. Regarding a name for this type, we consider the “Darl’niy Kut type” conceived by Klyuev et al. as suitable.

Regarding the calendar dates, although the age measurement values have a narrow range, as Sakamoto described in Chapter 1, we settled on a date between the end of 2000 B.C. and the first half of 1000 B.C. This new estimated date is almost the same as the conventional one, which is certain to be located between the Neolithic and early Iron Ages. It is possible to consider the actual calendar date to be within this range. However, we believe that there is still too little data for the dates to be stipulated for certain. We would like to increase the number of measurement examples in the Bronze Age of Primorsky Krai as a whole while increasing accuracy.

Future Challenges

Regarding the Dal’niy Kut type, the compiled data remain limited to the Elizavetovka 1 site. Further investigation examples are necessary for a more detailed understanding of this type. The location of the Elizavetovka 1 site is peculiar in that it is on a hilltop; however, locations such as these are relatively common with ruins from the same time period, such as the Sinegai, Harina Valley, and Glazovka ruins. On the other hand, The Znamenskoe ruins are located on a flat plateau, which is different from the Elizavetovka 1 ruins. It is necessary to clarify the meaning of such differences in the location of villages. In addition, in this survey, the discovery of millet seeds through the replica method and the existence of stone dishes and grinding mortars increased the possibility of the existence of millet agriculture.

However, further examination is necessary because agricultural equipment has not been confirmed. It is necessary to examine both the southern and northern limits of the range for this type of distribution, even if it is already present; it may also be necessary to examine existing data and conduct new surveys in places such as the Bikin River basin. In addition, Although we can obtain a certain outlook for the calendar date through age measurement, it is necessary to increase the number of measurement examples to improve accuracy. It is also necessary to establish the duration period and subsequent cultures, and to examine the relationship between the Uril culture in the north and the other types of cultures in the Primorsky Krai, as well as their relation to the similar Yankovsky culture.

Although this survey on the Bronze Age in northern inland Primorsky Krai could not proceed beyond the first stage, we hope to resolve the many issues mentioned above through future surveys.

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Transition of Earthenware from the Pol'tse Culture to the Early Stage of the Mohe Culture

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The origin of Mohe earthenware, which expanded along the entire far-east region from the second half of the 6th to the beginning of the 7th century, is believed to be the Pol'tse culture (Польцевская культура) that developed along the Amur basin, from the standpoint of the genealogical relationship with the typology of the earthenware. In this project, we continue conducting surveys and research to elucidate the formation of ancient groups in the far-east region. We have observed and analyzed related materials for the formation process of one of these groups, the Mohe. Some findings from our survey will be now reported.

1. Earthenware groups from the Pol'tse culture

The Pol'tse culture, in chronological order from the oldest, can be categorized into three periods: Period I: the Zholti Yar (Желтый Яр) period, Period II: the Pol'tse period, and Period III: the Kukelevo (Кукелево) period (Деревянко 1976, 2000).

Period I: The Zholti Yar period (Figures 1-1 through 1-9) This period is known as a period of transition from the Uril culture (Урильская культура). While there is material indicating that earthenware from the Zholti Yar period had elements in common with the Uril culture, the details of the materials were not specifically explained and, therefore, this link is uncertain. In 2010, we (including the author) observed materials excavated at Zholti Yar as a standard site for this period at the Siberian Branch of the Russian Academy of Sciences. We then proceeded to interpret those materials. The ruins of two pit houses on that site were excavated. Since the materials that were excavated from the ruins of Dwelling no. 2 had Period III characteristics, described later, what was established by Derevyanko for the same period is believed to be based on the materials from the ruins of Dwelling no. 1. According to a report by Derevyanko, some of the materials excavated from the ruins of Dwelling no.2 were labeled as materials excavated from the Amur-Sanatorium site (Деревянко 1973 Табл. LLL III); however, this is probably a misprint.

Period I: The main types of earthenware from this period are pots, deep pots, and cups. They are formed by stacking clay coils without a potter's wheel.

[Pots] (Figures 1-1 through 1-3) It has a spherical body with a wide open shoulder that is bent into the shape of the Japanese character, “ < ” (ku). It has a band pattern from the neck to the shoulder and short engraved lines applied with a comb.

[Deep pots] (Figures 1-4 through 1-7) The neck is slightly contracted. It has a band pattern from the neck

to the shoulder, engraved lines and impressions made by a comb tool, and a ridged band that can be singular or compounded.

[Cups] (Figures 1-8 through 1-9) It is bent near the bottom and slightly folds outward.

Period II: The Pol'tse period (Figures 1-11 through 1-21) The Pol'tse 1 site are the most cohesive. Most earthenware from this period are shaped by clay coil stacking without a potter's wheel. Among the larger items, some pots and split molds seem to have been shaped with a potter's wheel. Pots, deep pots, bowls, and cups are the main varieties. Although the engraved lines, impressions made from a comb-shaped tool, and ridged band are pattern types inherited from the previous period, there are many examples of earthenware with compound designs on the inside. The band patterns are centered on the neck, but tend to extend to the upper half of the trunk.

[Pots] (Figures 1-11 and 1-12) Largely open in a trumpet shape with an elongated neck. The lip is truncated and tilted outward. Some examples have impressions. The band pattern located in the center between the lower half of the neck and the upper half of the torso is a cluster of engraved straight or wavy lines applied by a comb. The engraved lines circumscribe the surface of the earthenware and, when compared to those of former ages, are extended by a single unit.

[Deep pots] (Figures 1-13 through 1-20) A deep pot with an upright mouth and neck are added, along with earthenware shapes with contracted, gentle necks observed in the previous age. The rim of the latter has a "belly-like" shape. Various patterns overlap on the inside of the ware.

[Cups] (Figures 1-22 through 1-24) Most that were observed were short earthenware with large openings and wide bases. On some of the wares, the lip had a discernible band pattern and notches or impressions. Much of the earthenware had pleats with impressions on the outer edge of the base.

Period III: The Kukelevo period (Figures 1-25 through 1-42) There are limited established data and many unclear details about the Amur River basin area. It was indicated that, in the Oliga culture (Олигинская культура) (Индлеева 1977), which was established as late Iron Age in Primorsky Krai, new and old materials were mixed and, although it has a regional characteristic that differs from that of the Amur River basin, the established view is that the Oliga culture exists in parallel with the Kukelevo time period (Бродянский 1987, Usuki 1995, 2004, Деревянко 2000). Recent surveys on the Glazovka (Глазовка) (Коломиец и др. 2002) and Brochika (Брочика) site (Деревянко et al. 2004, 2005) on the Ussuri River enriched the data; now the aspects of earthenware from that period can be understood. The earthenware from this period comprises pots, deep pots, and cups molded by the stacking of clay coils without using a potter's wheels (Note 1).

[Pots] (Figures 1-25 and 1-37) The neck is further elongated than that of the previous period, and the ware has a rim that opens in a dish-like fashion while gently bending outward. There are many items with a band pattern of one to several engraved lines applied on the lip. The thick surface of the lip is produced by thickening the final stack of clay coils (Figure 2-c) or by stacking clay coils at either the tip or slightly inward of the rim, which opens widely in a dish-like fashion (Figure 2-d). The band pattern tends to converge on the neck and is applied as a cluster of engraved

In Period II, engraved lines were clusters of straight or wavy lines or a combination of the two. While these lines were separated (spaced), although dense, engraved lines in Period III were densely packed, without gaps. There were many cases in which impressions from fingertips on the top surface of the outwardly folded area of the rim and the lower half of the trunk were filled.

[Deep pots] (Figures 1-26 through 1-32 and 1-38 through 1-42) Many deep-pot earthenware have short necks directly below the rim. Some have a thin, raised band on the outside of the rim, and are often wavy. Some items have clusters of engraved lines on the neck and, below that, comb-impressions or prodding lines. There are also examples in which the neck is filled with lines of finger-shaped impressions. Some items are filled with a square lattice grid or finger lines below the torso or over the entire surface, which is a marked characteristic of Period III. The bellow-shaped rims found in Period II disappear.

[Cups] (Figure 1-36) Items with a large-diameter base. The materials excavated from the ruins of Dwelling no. 2 at Zholti Yar are earthenware that open linearly, with bases that have wrinkles due to finger impressions (ДЕРЕВЯНКО 1973).

[Other] (Figures 1-34 and 1-35) Pedestaled bowls and porous steaming baskets were excavated from Primorsky Krai. Both can be considered to be elements that were inherited from the Kronovka culture (Кроуновская культура). It is a regional characteristic of the Primorsky Krai.

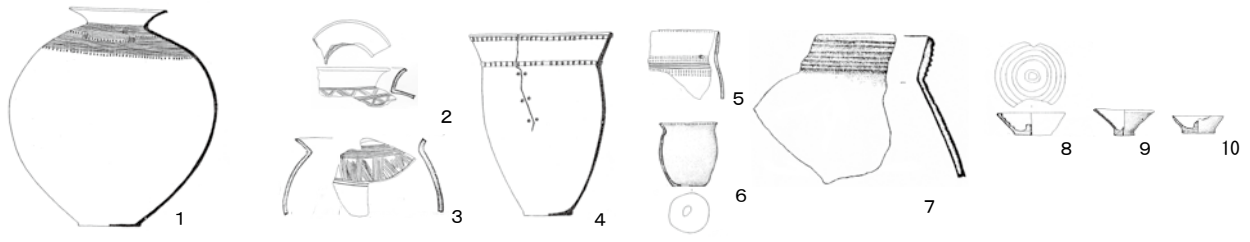
[Segmentation possibilities] Of the two rim-production methods for pot-shaped earthenware, the method shown in Figure 2-c is considered to be in the same family tree as the outwardly leaning lip surface from Period II, while the method from Figure 2-d is considered to have led to the Blagoslovennoye group of the later periods (Figure 2-e). From the above, we can indicate that, typologically, the rim-creating methods of Figures 2-c and 2-d may have an old/new relationship. The rim production method in Figure 2-c was confirmed at the Glazovka site, while the method in Figure 2-d was confirmed at the Brochika site. There were differences in the materials excavated from the ruins of Dwelling no. 12 in the Brochika site, compared to the ruins of the other pit houses in Glazovka and Brochika, such as absent fingertip impressions and square lattice grids covering the earthenware surface (Figures 1 - 37 through 1-42). Although it is a possible regional characteristic of Primorsky Krai, the impressions and strikes covering the earthenware surface are reduced in also the following Blagoslovennoye group and, therefore, combined with the characteristics of the rim creation method, the earthenware from Dwelling no. 12 at the Brochika site could be newer than the other ones of Period III.

2. Early Mohe Earthenware

According to D'yakova, among the 5 types of earthenware in the "Mohe culture," the Blagoslovennoye and Nayfeld groups are early Mohe earthenware. The new/old relationship from the former to the latter has been indicated since the types were first established, and has been recognized through all of the investigations since then (ДЬЯКОВА 1984, etc.).

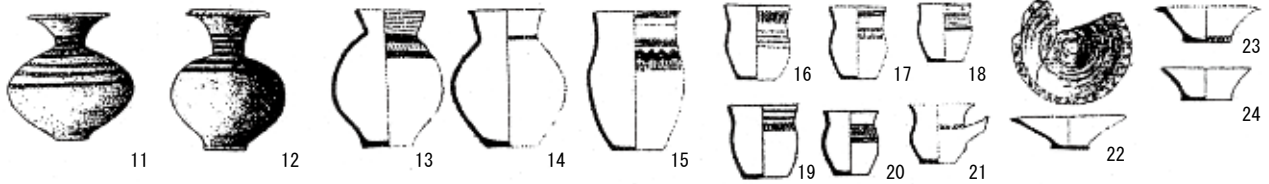
Blagoslovennoye group (Figures 1-43 through 1-52) The ruins that belong to the same group are the two Blagoslovennoye (Благословенное) site, the Petrovskoe lake (Петровское озеро) site (ДЬЯКОВА 1984), the Tuanjie site in Luobei county (羅北团结) (Li1989), and the Tongren (同仁) site (early stage of the first period) (Heilongjiang Provincial Institute of Cultural Relics and Institute of Archaeology, CASS 2006). They are composed of pots, deep pots, cups, and "winnowing basket" shaped earthenware. Although the standard is to shape the earthenware in oxidized flames without a potter's wheel, there are also pot-shaped earthenware shaped using a potter's wheel.

[Pots] (Figures 1-43 and 1-44) Compared with the previous periods, the trunk's tension is weakened from the shoulder, and becomes a long trunk. Flower-vase pots where the contraction of the neck weakens and the rim opens wide into a dish shape are characteristic of this group. The patterns converge from the shoulder to the up-



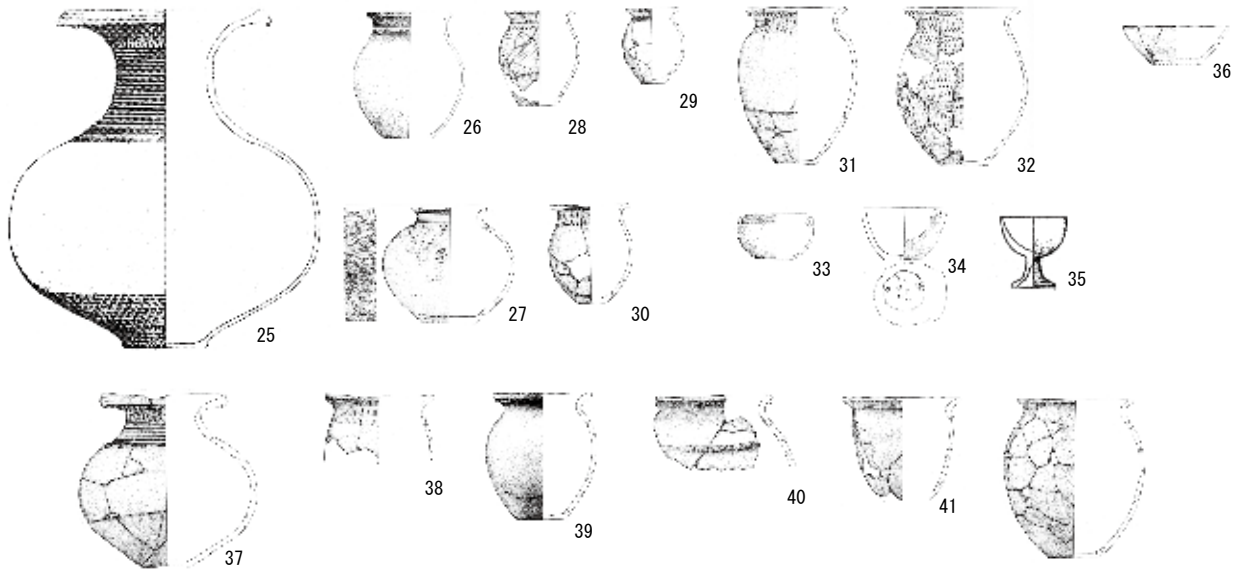
The Poltse culture Period I: the Zholtvi Yar period

Dwelling no.1 at Zholtvi Yar (Деревянко 1972)



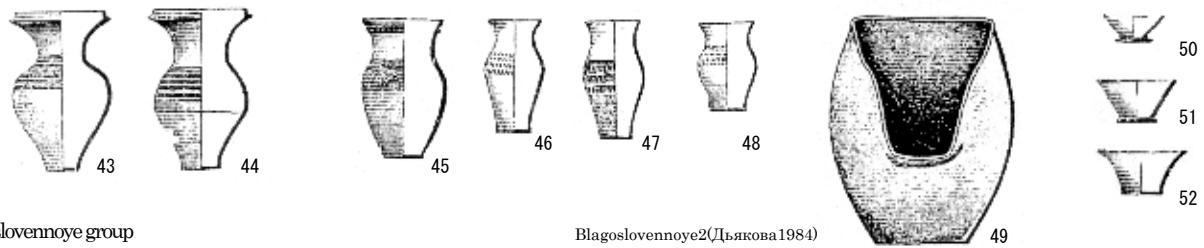
The Poltse culture Period II: the Poltse period

Полтсе (Деревянко 1976)



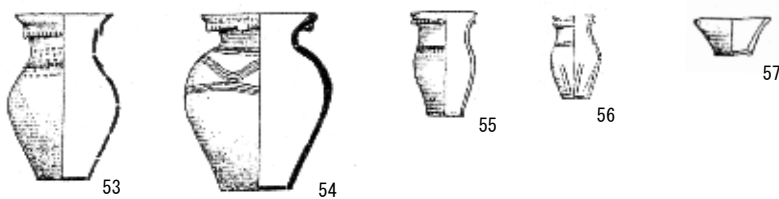
The Poltse culture Period III: the Kukelevo period

25,26,33:Glazovka(Коломиец et al.2002). 28-32,34,36:Brochika(Деревянко et al.2004)
35:Ludanokovskoe(Бродянский2000), 27,37-42:Brochika(Деревянко et al.2005)



Blagoslovennoye group

Blagoslovennoye2(Дьякова1984)



Nayfeld group

Nayfeld(Дьякова1984)

NTS

Fig.1 Earthenware from the Pol'tse Culture to the Early Stage of the Mohe culutre

per half of the torso. A cluster of engraved lines and impressions of a spatula or comb-shaped tool make up the main pattern, while a protrusion or a raised band may encircle the section underneath. The rim has a raised band with notches on it. The production of raised bands comprises two methods (Qiao1994): Some items are made by stacking clay coils slightly inside the inner surface of a large dish-shaped rim (see Figure 2-e), while others are made by sticking a clay coil directly below the edge of the mouth (Figure 2-f). Only the former was excavated from the Blagoslovennoye site, while both types were excavated from the Tuanjie site. Since the former is in the family tree of the Pol'tse culture's method for producing rims (Figure 2-d), as described above, it is possible that there is a new/old relationship between the Blagoslovennoye and Tuanjie site.

[Deep pots] (Figures 1-45 through 1-48)

Deep pots have long trunks similar to those of pots. While many have ridge notches under the rim, items without a ridge also exist and are a characteristic of this group. It has a pattern centered on the shoulder like the pot; however, in some items, that pattern extends to the lower half of the body and the neck. In addition, while items in which the square lattice grid extends to the lower half of the trunk are few, they do exist, and can be items that show another example of the continuity from the Pol'tse culture.

[Cups] (Figures 1-50 through 1-52) Cups are items with coverings on the bottom. Some items have folds around the circumference of the floor.

Nayfeld group (Figures 1-53 through 1-57) Sites that belong to this group have been found not only on the Amur River basin, but also in many other areas. Although there are regional differences when viewed in detail, we are at the stage of recognizing the expansion and uniforming phenomenon of Mohe earthenware that extends over a wide range of areas (Kiyama 2010). This consists of deep pots, cups, and "winnowing basket" shaped earthenware.

Mohe earthenware have a ridge band with notches on the rim and a band pattern that extends from the shoulder to the upper half of the torso. It is characterized by converging engraved lines and crimping patterns/prodding lines. The ridge band on the rim is created by adhering a clay coil to the rim (Figure 2-f) (Note 2). The ridge has a pattern centering on notches and imprints. Although there is a clear genealogical relationship with the Bla-

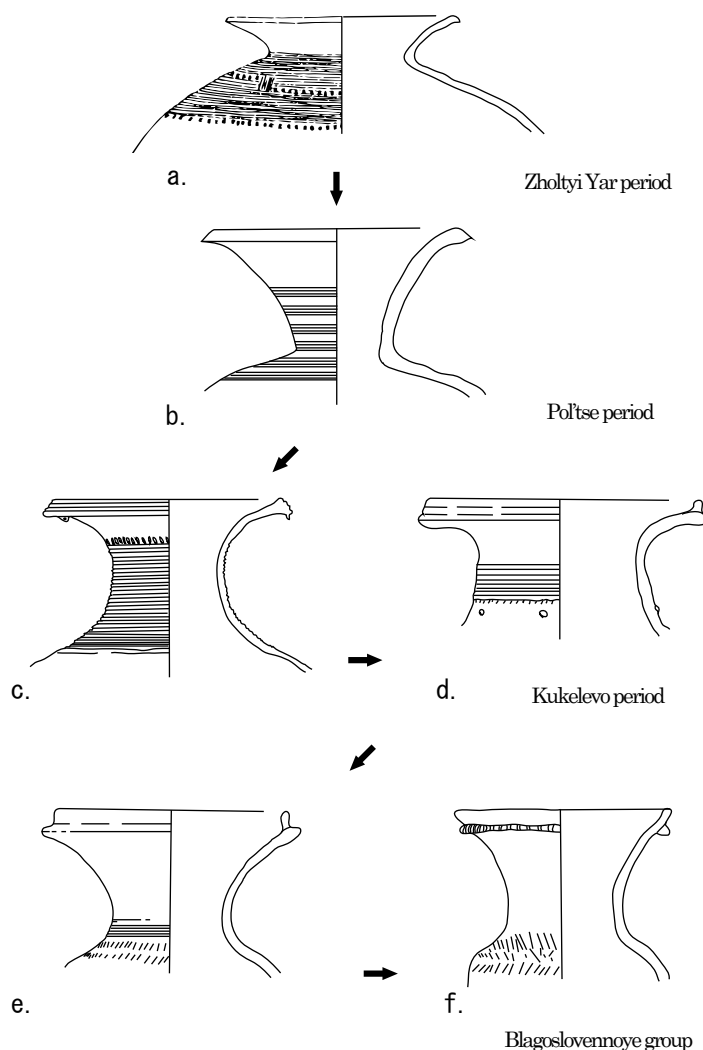


Fig. 2 Transition of pot form from the Pol'tse culute to the Early Stage of the Mohe culute (Addition to Figure7 in Usuki 1995)

goslovennoye group, the absence of large pots and band patterns that converge from the shoulder to the upper half of the trunk have been raised as marked differences. The number of engraved lines, embossed patterns, and prodding lines has also decreased compared to that of the previous period.

3. On the age of each period

Radiocarbon dating was also performed at every step of this series of surveys. The results are described in detail in Chapter 1. In the following, we supplementarily examine these results and compare them to the estimated date of each stage that has been indicated in this paper (Part II Discussion, Chapter 1, Table 1).

Iron axes with dual raised lines, and armor platelets with rounded edges, which were of the same type as those found at the Laoheshen site in China, were excavated from the Pol'tse 1 site. Therefore, Pol'tse Period II is regarded as concurrent with a period that extends from the end of the former Han to the later Han period. This estimated date is one fixed point in the era of the early Iron Age of the Far East (Murakami 1988, 1994, Usuki 2004, etc.). Having analyzed the earthenware-bonded carbides excavated from the Pol'tse Period II Nai (Най), the site was placed between the 2nd century B.C. and 2nd century A.D. There are some samples that seem much older, although these values are roughly consistent with the estimated date. The preceding Pol'tse Period I obtained a value that lay between the 2nd and 3rd centuries B.C. from the earthenware-bonded carbides excavated from Dwelling no. 1 in Zholt'yi Yar 1, which is a consistent numerical value.

Pol'tse Period III is known to be strategically new compared to the Kronovka-Tuanjie culture at the Brochika site (Okladnikov et al. 1982). We can understand that the Tuanjie culture includes at least the former Han. Wu Zhu coins from that time period were excavated at the Tuanjie site at Donging county and, judging by the Lin Yuan, the culture is considered to continue until the 1st century A.D., approximately (Lin 1985). Judging from the commonality with the earthenware group from Period II, this culture followed in relatively close duration and, although it is believed to be more or less concurrent with the time period from Wei-jin to the Three States period, it is unclear where it falls. At the Elizavetovka 1 site, where excavation surveys were conducted as part of this survey project, materials from the Bronze Age and Pol'tse Period III were obtained. Although the earth layers of the two periods were not clearly segregated, the results of dating the carbides from the sites were divided into two groups: the first half to mid-1000 B.C. and A.D., which we believe correspond to the respective materials. For reference, if we consider a value belonging to B.C. as Pol'tse Period III, that becomes 3rd to 4th century B.C., and is consistent with previously presumed dates.

The age of the Nayfeld group is said to be from approximately the latter half of the 6th century to the beginning of the 7th century (Usuki 2004). The earthenware and the Gogyo Ofu (the first casting of the year 574) from that period were excavated from Tomb M33 at the Laoheshen site. It is certain that this stage includes the period after the latter half of the 6th century (Jilin Institute of Archeology 1987). The Blagoslovennoye group in the previous stage is considered to be successive in terms of type. If we consider the age of Pol'tse Period III as the 4th century, approximately, we can almost regard the Blagoslovennoye group to be from the 5th century to the 6th century. The results of dating the earthenware-bonded carbides excavated from the Blagoslovennoye site showed that the carbides were from the 5th to the 6th century B.C. This result is consistent with previous assumptions.

Future Challenges

As described above, there is a clear genealogical relationship between the Pol'tse cultural earthenware and the Mohe earthenware. However, it is also clear that there remains a distinct gap in type between period III of the

Pol'tse culture and the Blagoslovennoye group in the early Mohe culture. It should also be noted that the genealogical relationship between them is evident only on the Amur basin.

In this regard, the materials excavated from the Abramovka(Абрамовка) site, presented by Piscaryova (Пискарева) in this report, are the oldest stage of the Mohe earthenware in Primorsky Krai, while it is important to know the formation of the Mohe earthenware in this region (see Part II: Discussion, Chapter 5). Considering the shape of the rim in the large pots, the band pattern that expands to the trunk, and the existence of deep pots without any ridge band, we can determine these materials to be either in parallel with the Blagoslovennoye group from the Amur basin, or slightly thereafter. The existence of these materials indicates the possibility of a smooth transition, even in Primorsky Krai, from Pol'tse Period III to Mohe earthenware, similar to that on the Amur basin. In other words, this shows a possible coordination of the transfer process of the earthenware form to the subsequent steps in Primorsky Krai and the Amur basin that were transferred to the Pol'tse cultural sphere.

The lack of data is beyond our control; therefore future continual surveys are required to pave the way for detailing each stage and clarifying the relation between the regions.

Notes

1. Although it is not included in the material we witnessed, shaping earthenware using a potter's wheel seems to exist in Primorsky Krai (Андлеева 1977).
2. Although it could not be confirmed by the material we witnessed, items made by the rim-making methods in Figure 2-e and the method for pasting wide clay coils to the lip area seem to be recognized (Дьякова 1984). The quantity of the material shown is small.

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Ironware Production in the Pol'tse Culture

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Introduction

Among the early Iron Age cultures that existed in what is now the Russian Far East, the Pol'tse culture stands out for the considerable progress it achieved in developing ironware, which is attested by the presence of cast-iron socketed axes. However, little attention has been paid to how ironware was produced in this culture.

In this study, we discuss the Pol'tse culture's capacity for producing ironware and the limits of such production, based on observations of ironware excavated from Pol'tse settlements in Russia's Khabarovsk Territory (Khabarovsk Krai), as well as observations of materials related to ironware production excavated from the settlement of Elizavetovka-1 in Russia's Maritime Territory (Primorsky Krai). To the best of our knowledge, Pol'tse Culture 1 (Zhyoltyi Yar period) contains no evidence from which we could draw inferences about the ironware production. Accordingly, we focus on materials pertaining to Pol'tse Culture 2 (Pol'tse period) and Pol'tse Culture 3 (Kukelevo period).

It is worth mentioning that smithery had begun in the neighboring regions by the time of the Krounovka culture, as evidenced by excavations of slag deposits from the settlement of Musanhokok in the Korean Peninsula. Iron slag have also been excavated from the settlement of Petrov Island in the Russian Far East, for example, but it is doubtful whether these deposits constitute iron slag or whether they have been dated accurately.

Ironware production involves several steps, including smelting, refining, forging, and casting. There remains no evidence that any smelting, refining, or casting was performed in the Russian Far East at the time.

1. Ironware Production in Pol'tse Culture 2: The Pol'tse Settlements

The Pol'tse-1 settlement is famous for having yielded socketed iron axes with fan-shaped axe-heads, but the site has yielded many other iron implements as well. For each type of tool, the iron tools can be divided into two variants: one variant features a three-dimensional design attesting to a high level of technological sophistication, while the other variant is simpler and bears conspicuous scarring from chiseling and hammering. From my direct observations of iron tools available at the Far East Branch of the Russian Academy of Sciences (in Novosibirsk), it is clear that many iron tools of the latter category were reproduced from other tools.

The reproduced tools were originally cast-iron double-banded axes and flat iron tools (such as knives or metal plates). After casting, the axe body would have been decarbonized; this process would have enabled warping and grinding. When cast-iron axes were reproduced, they were mostly turned into small-size processed implements. In some cases, a cast-iron axe with some parts missing was forcibly warped to form a chisel (see figures 2-4). In

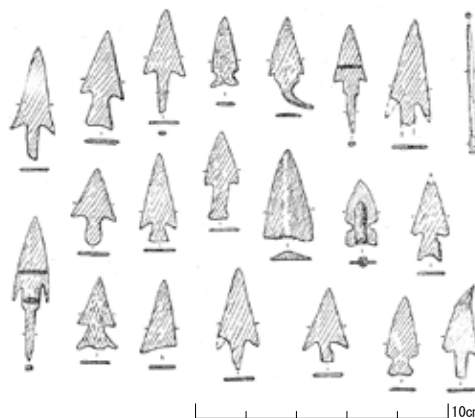
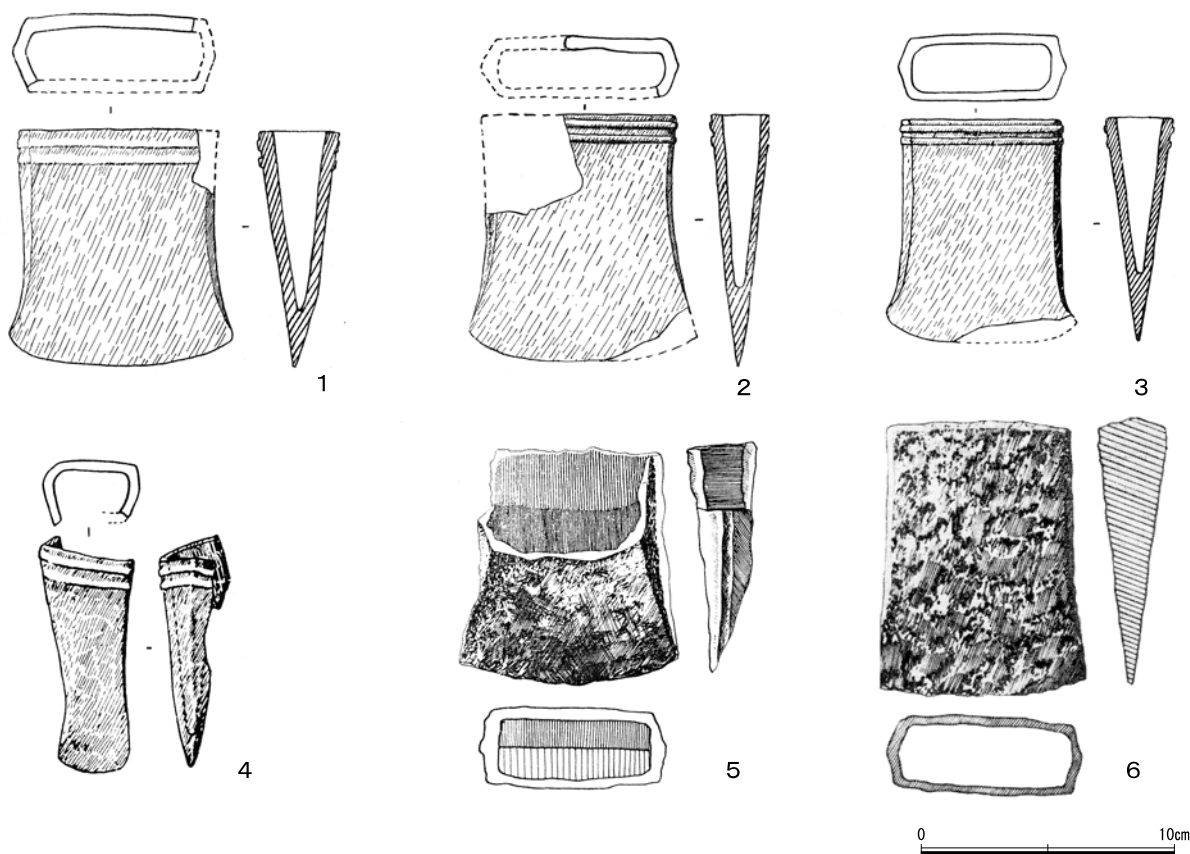


Fig. 1 Iron arrowheads excavated from Dwelling 4
Derevyanko (1976)



1, 2: Dwelling 7. 2, 4: Dwelling 4. 5: Dwelling 5. 6: Dwelling 3

Fig. 2. Cast-iron axes excavated from the settlement of Pol'tse-1 Derevyanko (1976)

other cases, the fragmented edges of cast-iron axes were grinded to create blades for use as small tools (see Figure 3), as was often the case in the Yayoi period of Japan. In some cases, plate-shaped ironware was used to produce flat implements. For example, some iron plates were chiseled into thin iron arrowheads (Figure 1), some into flat knives with hooked tips (Figure 4), and some into daggers with notches running transversely across the blade (Figure 4). The iron knife no. 3 in Figure 4 has two holes near the heel of the blade. Given the cross-section of this iron knife, the holes may imply that the blade was reproduced from a helmet platelet.

Reproducing in this way could be performed without high-temperature forging; all that was needed was access to a stone hammer, a chisel (for cutting), and a grindstone, as well as the technology to produce polished-stone implements. If the settlements possessed such technology, this would imply, conversely, that they lacked forging technology from which iron slag is generated. The advent of high-temperature forging technology would have to wait until the arrival of the next stage of Pol'tse culture, the period of Kukelevo or Mohe culture.

Thus, ironware was brought to the Pol'tse settlements, including axes, knives, arrowheads, and armor (or armor parts). Given that only few items of ironware were brought, these products were probably intended as materials to be reproduced (or waste ironware fit for reproducing) into their desired implements.

2. Ironware Production in Pol'tse 3: The Settlement of Elizavetovka-1

The settlement of Elizavetovka-1, which corresponds to Pol'tse Culture 3, has yielded evidence of slag-generating ironware production, as mentioned in Part I, Chapter 3-4.

Given the tiny size of the bowl-shaped forge furnaces excavated there, and given that excavations have failed to uncover any forge furnaces, any furnaces in the settlement would have been minute, with an extremely shallow

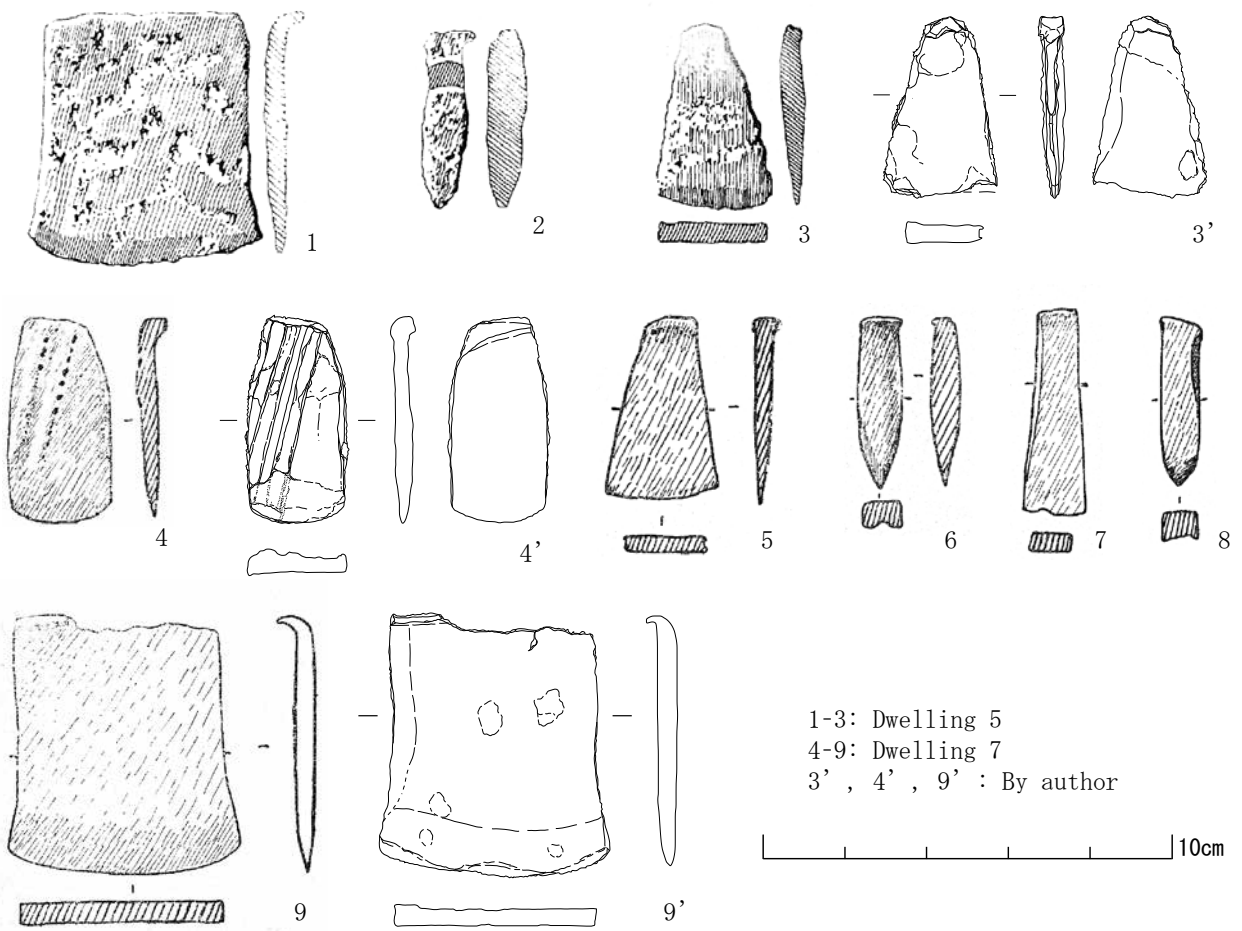


Fig.3 Implements reproduced from cast-iron axes Derevyanko (1976)

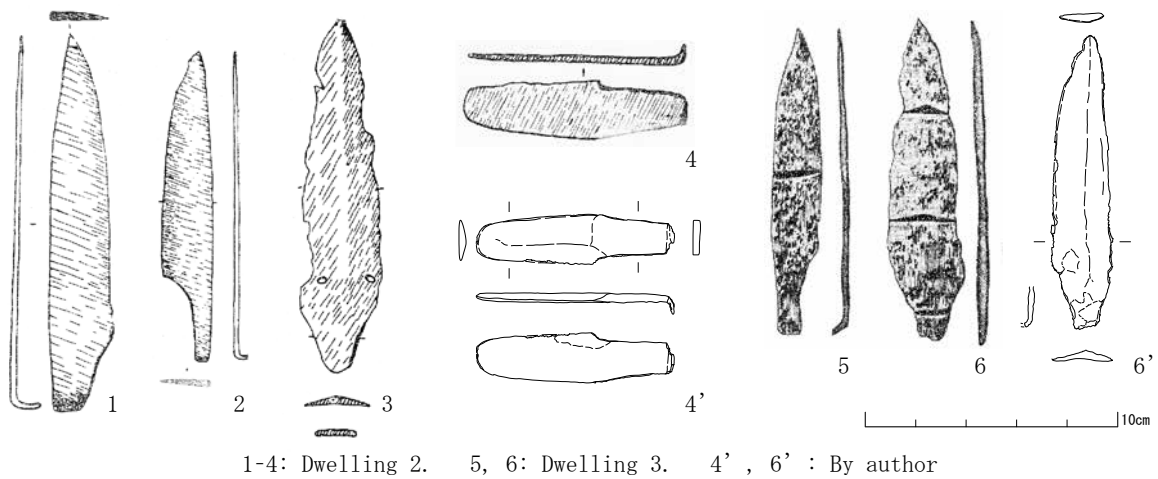


Fig.4 Idiosyncratic knife blades Derevyanko (1976)

dugout. We took two iron slag to Japan for metallurgical analysis (see Part I, Chapter 4-3). The analysis suggested that both iron slag were products of forging under a relatively low heat and were generated during the final forging steps, known in Japan as hizukuri and sunobe. This means that there would have been minimal heat distortion to the earthenware fragments used as perforated furnace walls, with none of the material melting into a black, glassy substance. This finding corroborates the notion that the forging temperature was relatively low.

Given that the iron slag excavated here are so few in number and so small in size, and given the metallurgical findings above, we can conclude that, although forging was likely performed in this settlement, it was performed on a limited scale. Moreover, considering the furnace size and forging temperature, any ironware produced would have been small in size and there would have been limited variations for each type of tool. Thus, any forging in this settlement would have been primarily for the purpose of producing or repairing small-sized ironware.

The materials excavated from Elizavetovka-1 can provide two similar examples. The first example consists of samples from the Osinovoye Ozero site in Russia. The other example consists of samples that are from the kokumon period of the Okhotsk culture in Hokkaido.

The Osinovoye Ozero samples presented by Amano et al. (2012) include containers that were made by taking a piece of earthenware, breaking off the base of the ware, making two holes along the widest part of the body, and then placing the body onto the ground to be used as a furnace. Given that the inner sides of such containers would have changed to a red hue from the high temperatures, the containers may have been used as furnaces for heating small crucible pots. As these cases illustrate, earthenware fragments served as tubes for blowing air into the forge.

The usage of earthenware fragments at Elizavetovka-1 is similar to that of samples known as “furnace wall with air ducts” reported by Utagawa (1975). These earthenware fragments were reused into perforated furnace walls, as seen in the kokumon period of the Okhotsk culture. In this period, the upper sections of a single piece of pottery would be made into multiple perforated furnace walls, which were used together for forging. During forging, the exterior side of these furnace walls would turn red, and effervescence would occur in some parts. Although the materials of Elizavetovka-1 are in themselves insufficient to draw any firm conclusions about their usage, it seems likely that the materials were used in a way similar to how they were used in the kokumon period of the Okhotsk culture.

3. Closing Thoughts

Research on ironware production in Pol'tse culture is challenging, as few excavated samples stand up to close archeological scrutiny. Fortunately, we were able to access some of the few samples that do hold up—including samples from Pol'tse settlements and the settlement of Elizavetovka-1. From these samples, we could offer some insights into ironware production in Pol'tse culture.

Primitive forging began to emerge during Pol'tse Culture 2. In Pol'tse Culture 3, we see furnaces of forging in a wide array of settlements. However, we cannot say for certain whether the forging practices seen in Elizavetovka-1 were typical of ironware production in the Pol'tse culture in the Maritime Territory.

We know little about ironware in Pol'tse Culture 3 of Khabarovsk Krai, the Pol'tse culture of the Maritime Territory, but we find plenty of ironware assemblages, inversely proportionate to stoneware going out of use. These ironware assemblages are plentiful even when compared with those of the Yankovsky and Krounovka cultures, and we also find a several variations for a given item (a large variety of iron arrowheads, for example). These assemblages testify to stable ironware production.

If indeed there was stable ironware production, then we would expect to find large volumes of fired earthenware, charcoal, iron slag, and other archeological evidence that plainly attests to mass ironware production, as opposed to small-scale, passive ironware production as seen in the settlement of Elizavetovka-1.

A South Korean survey team discovered forge furnaces and iron slag in the settlement of Barabash 3. However,

while the team has revealed intriguing findings related to the dating and structural composition of the furnaces, it is yet to report the findings formally. We will, therefore, wait for a formal publication before comparing the findings with the samples from Elizavetovka-1.

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Мохэская культура Приморья.

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Эпоха раннего средневековья в Приморье связана с широким распространением памятников мохэской археологической культуры. Изучение мохэской культуры имеет первостепенно значение для понимания многих исторических процессов, проходивших на Дальнем Востоке.

Нами выделены четыре локально-хронологические группы мохэских памятников: ханкайская (памятники, расположенные в юго-западной части Приморья, в районе о. Ханка), прибрежная (поселения юго-восточной части залива Петра Великого), раковская (памятники бассейнов р. Раковки и Абрамовки), кавалеровская (поселения северо-восточного побережья Приморья)(Fig.1). Самым ярким и массовым материалом является керамика. Отличия керамических комплексов различных групп проявляются в преобладании определенных типов форм сосудов, степени орнаментации, предпочтении определенных типов орнамента, в меньшей степени-в технологии изготовления сосудов. Эти признаки позволяют отличать группы памятников в пространстве и времени. Радиоуглеродные датировки скорее могут рассматриваться как ориентировочные, поскольку имеют значительный интервал. Большинство из них укладывается в период с V по VIII вв. н.э..

Наиболее изучены памятники бассейнов р. Раковки и Абрамовки (раковская группа)(Fig.3):

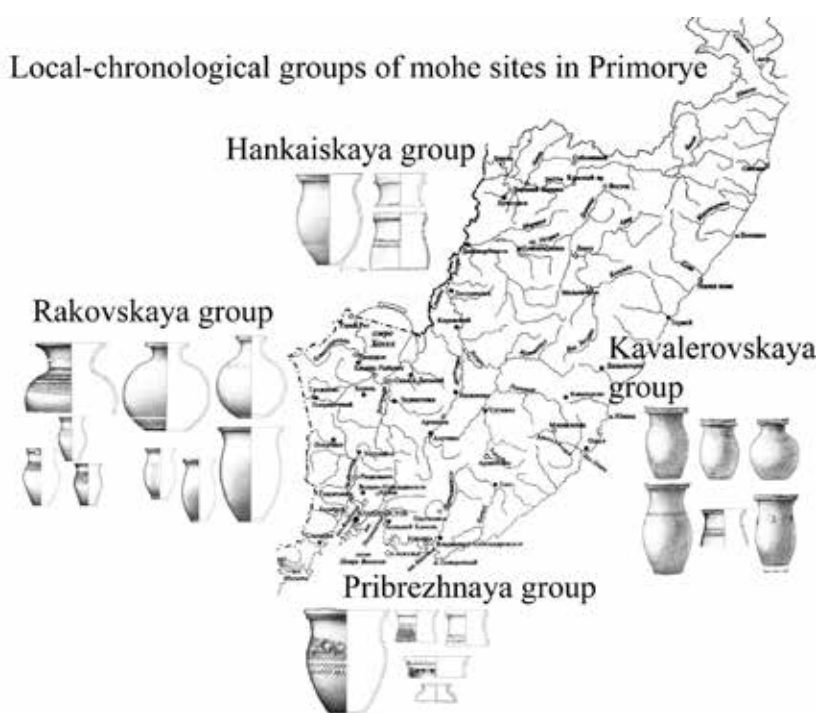


Fig.1 chrolonological and local variety of Mokhe pottery in Primorie

поселения Абрамовка-3, Михайловка-1,2, Раковка-10 и Лузановский могильник. Важным для понимания хронологии мохэской культуры в Приморье является поселение Абрамовка-3 (Fig.2). На нем изучены остатки 6 жилищ и получена уникальная коллекция керамики, демонстрирующая явные черты сходства с ольгинско-польцевской культурой. Прежде всего, это проявляется в орнаментации сосудов: наличии грубого, массивного валика под венчиком с орнаментом в виде глубоких вдавлений или защипов,

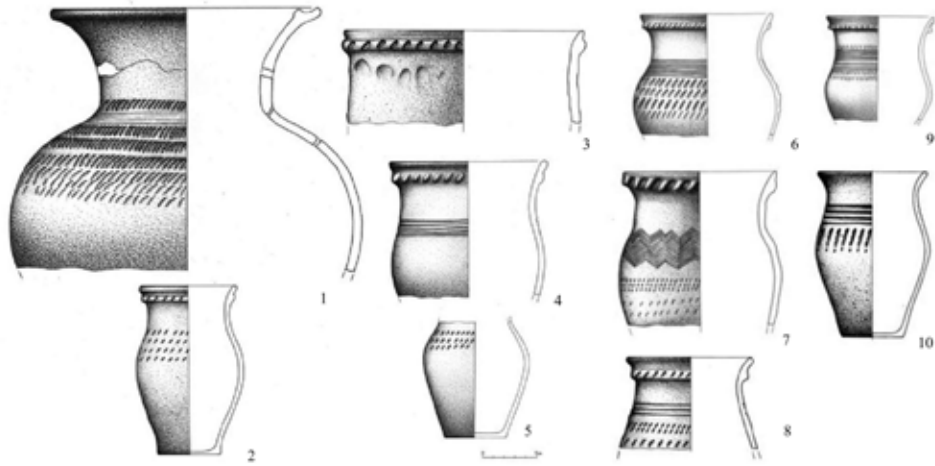


Fig2 Mohe pottery from Abramovka-3

присутствии орнамента на горловине сосуда, многообразии орнаментальных приемов. По форме тулова сосуды делятся на горшковидные и вазовидные, в коллекции присутствуют емкости без валика. Чрезвычайно интересной является находка в жилище 1 двух сосудов [2]. Первый сосуд, большего размера, имел воронкообразную горловину, «блюдовидный» венчик и орнамент, покрывающий плечики сосуда до основания горловины (Fig.2-1). Изделие серого цвета, имеет следы кругового вращения. Такой сосуд встречен на поселении в единственном экземпляре, и вышеуказанные признаки существенно отличают его от остальной керамики поселения. На наш взгляд он имеет высокую степень сходства с посудой могильника Туаньцзе в Китае. Внутри него находился горшковидный сосуд с налипшим валиком, вполне «традиционный» для Абрамовки-3 (Fig.2-2). Эта находка, определяет хронологию данного поселения, поскольку сосуды, подобные изделию из жилища 1, датируются китайскими исследователями периодом Суй-Тан (1 период культуры Тунжэнь), т.е. конец VI-VII в. н.э. [9]. Учитывая достаточно архаичные признаки керамики поселения Абрамовка-3, можно предположить, что это один из самых ранних памятников мохэской культуры Приморья, а, принимая во внимание находку сосуда типа Тунжэнь, мы приходим к выводу, что он не

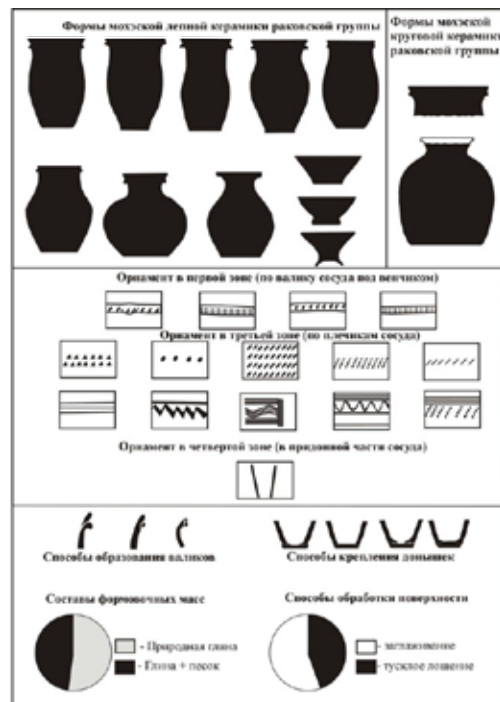
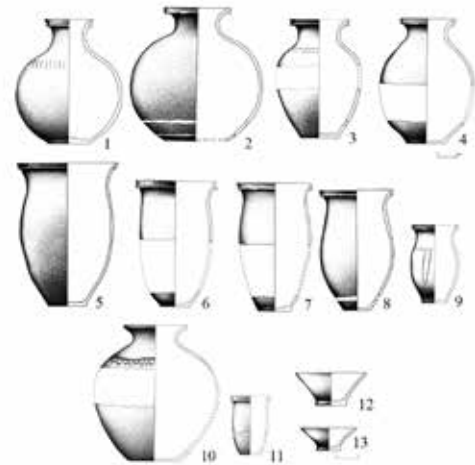


Fig. 3 Mohe pottery - Rakovka group

может быть датирован ранее конца VI в.н.э. С этим вполне согласуются результаты радиоуглеродного датирования: 600-760 cal AD, 610-760 cal AD и 450-1150 cal AD. Керамика остальных памятников этой группы имеет более поздние признаки: появляются круговые сосуды, менее разнообразным становится орнамент, более тщательно обрабатывалась поверхность сосудов, изменяется набор форм посуды. При этом сохраняется определенная керамическая традиция, общая для всех памятников раковской группы. Судя по керамическому материалу, Раковка-10 является самым поздним памятником этой группы, что согласуется и с радиоуглеродным датированием (440-870 cal AD, 650-780 cal AD) [9]. Поселение Абрамовка-3 могло существовать уже конце VI в. н.э., а поселение Раковка-10 продолжало функционировать и в бохайское время.

К ханкайской группе относятся поселения юго-западного Приморья (Fig.4): Куркуниха, Куркуниха-3, Новоселище-2, Аргановка-4, Новоселищенское городище. При раскопках жилищ на поселениях Куркуниха и Куркуниха-3, Новоселище-2 обнаружена только лепная керамика. Ассортимент



Fig.4 Mohe pottery-Khanka group

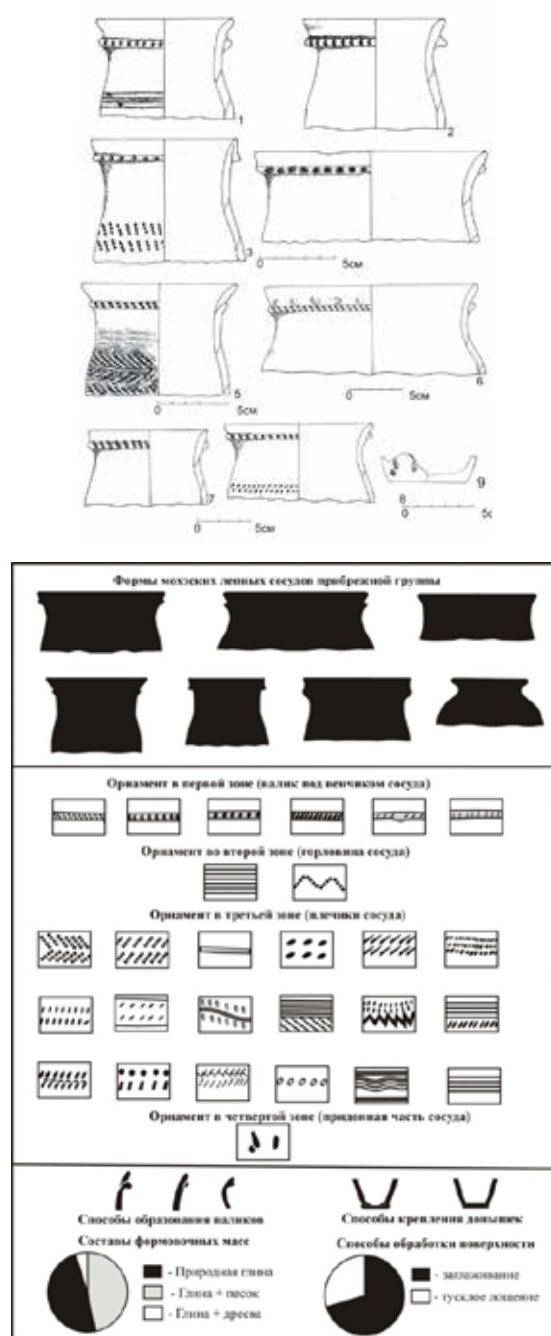


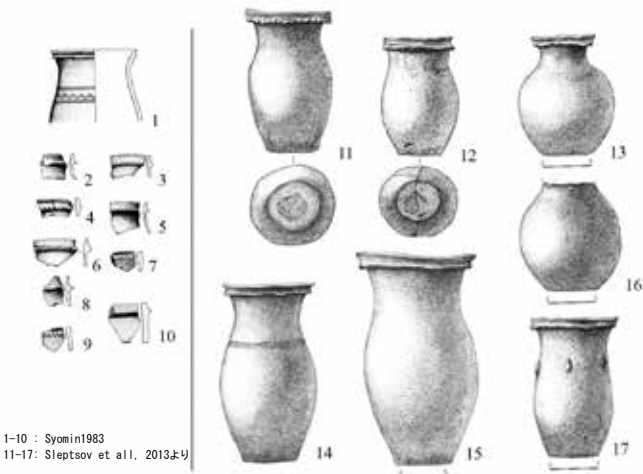
Fig.5 Mokhe pottery- sea coast group

форм сосудов включает два типа горшковидных сосудов, вазовидные и сосуды с вырезом. Орнамент по тулову изделий представлен в основном тисненым, а на валиках под венчиком 25% сосудов присутствуют налпные выступы. Керамика этих памятников не имеет таких явных архаичных признаков, как посуда поселения Абрамовка-3 и вероятно относится к более позднему времени, чем показывает радиоуглеродный анализ (420-562 гг. н.э.) [5].

Прибрежная группа включает поселения юго-восточной части залива Петра Великого: Троица-5, гончарные печи в бухте Троицы, Маньчжур-база-1 и Посьетская пещера, поселение Барабаш-3 (Fig.5). Керамика этих памятников также представлена только лепными изделиями. Среди форм сосудов преобладают различные типы горшковидных емкостей, а вазовидные изделия и чаши встречаются значительно реже. Как и на поселении Абрамовка-3 присутствуют сосуды без валика под венчиком. Сходные черты есть и в орнаментации сосудов: наличие емкостей с орнаментированной горловиной, большое разнообразие типов орнамента и их сочетаний. Эти признаки также могут указывать на относительно раннее время бытования памятников прибрежной группы, возможно близкое к хронологии

поселения Абрамовка-3. Радиоуглеродные даты получены только с памятника Барабаш-5 и относятся к концу VI - началу VIII в.н.э

Кавалеровскую группу можно выделить лишь предварительно, поскольку памятники, входящие в нее (поселения северо-восточного побережья Приморья: Усть-Зеркальная-4,



1-10 : Syomin1983
11-17: Sleptsov et al., 2013a-y

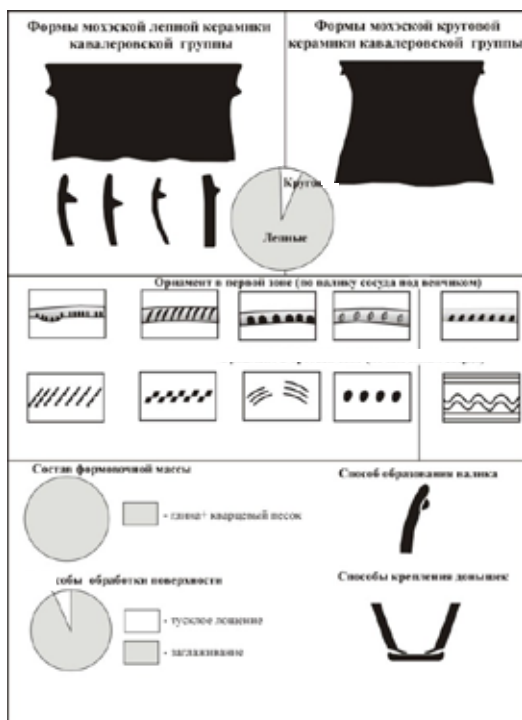


Fig. 6 Mohe pottery- Kavalero group

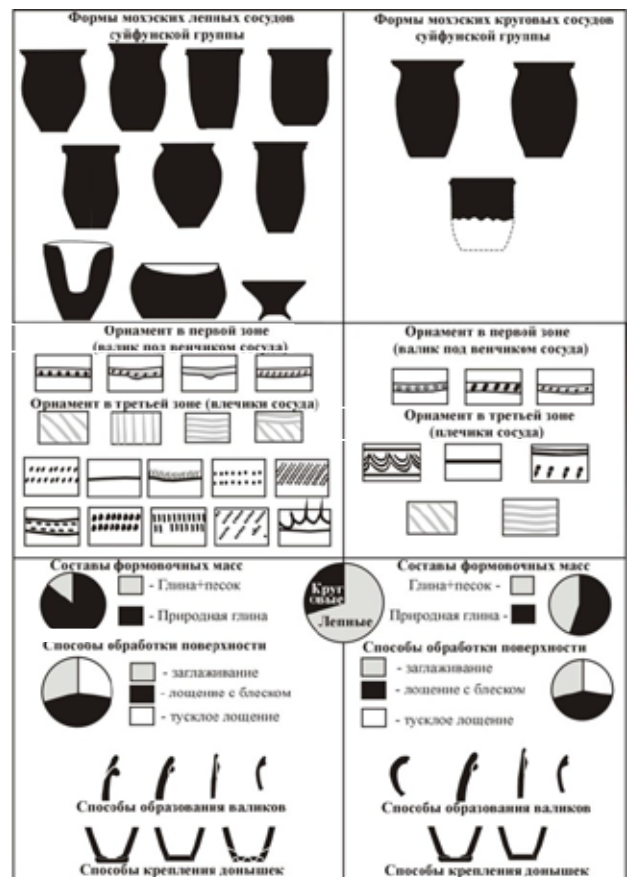


Fig.7 Mohe pottery- Suifun group (Bokkai)

Зеркальное, Ноябрьское-2), исследованы неравномерно и недостаточно (Fig.6). Стационарные раскопки проводились лишь на поселении Усть–Зеркальная-4 (Fig.6-1-9) [7]. Керамика представлена этого памятника лепными и круговыми сосудами, орнаментированными прочерченными волнистыми линиями на тулове и округлыми оттисками на валике под венчиком. К этой же группе можно отнести и поселение Кордон-Дровяник (Лазовский район), исследованное в 2012 г. (Fig.6-11-17) [8]. Из мохэского жилища получено 7 сосудов. Все они лепные, две емкости конструировались на поворотном столике, отпечатки оси которого присутствуют на днищах изделий. Формы и орнаментация сосудов находят аналогии на мохэских памятниках юго-западного Приморья (поселения Раковка-10, Михайловка-1,2): их сближает наличие емкостей с шаровидным и вытянутым туловом, орнаментация в виде аккуратных неглубоких оттисков и налепных «шишечек» на валике под венчиком, тисненый орнамент на тулове. Очевидное сходство также прослеживается с керамикой могильника Чернятино-5. Именно на этом памятнике в погребениях, отнесенных к типу 1 (захоронения в земляных ямах с вертикальными стенами) найдены сосуды, аналогичные емкостям из жилища – небольшого размера изделия, с вытянутым или шаровидным туловом и прямоугольными оттисками поворотного столика на дне. Кроме того, и на том и на другом памятнике присутствуют изделия с крайне редко встречающимся орнаментом – выпуклыми налепными «лепестками» на тулове. Погребения могильника Чернятино-5, в которых был найден материал, аналогичный керамике поселения Кордон-Дровяник, датируются 661-681 и 681-715 гг. н.э. [6]. Жилище 1 поселения Раковка-10, также содержащее керамику со сходными признаками, датировано 440-870 гг. н.э. и 652-776 гг. н.э. [3]. Таким образом, время существования поселения Кордон-Дровяник предварительно можно определить второй половиной VII-VIII вв. н.э., поселение Усть-Зеркальное-4 также может быть датировано этим периодом.

Традиции мохэского гончарства сохраняются на протяжении всего существования государства Бохай: мохэская керамика является неременной частью керамических комплексов, составляя от 2 до 8%. Наиболее отчетливо преемственность традиций проявляется в керамике раннебохайских памятников суйфунской группы (городище Синельниково-1, могильник Чернятино-5, поселение Чернятино-2, Константиновское-1 селище)(Fig.7). В их коллекциях присутствуют сосуды с шаровидным туловом, несколько типов вазовидных изделий, емкости с вырезом аналогичные посуде памятников раковской группы. Близкие черты есть и в орнаментации керамики: такой характерный прием декорирования как выступы-налепы на валике под венчиком сосудов зафиксирован у 30% сосудов раковской группы и у 5% лепной керамики суйфунской группы.

Важным отличием мохэской керамики раннебохайских памятников этого периода является значительное увеличение доли мохэских сосудов, изготовленных с применением круга - до 35-40%, появление новых форм посуды (банки, банковидные сосуды), уменьшение количества орнаментированных изделий.

Значительное количество аналогий между керамикой памятников раковской группы и керамикой могильника Чернятино-5, поселения Чернятино-2, Синельниковского городища позволяет предположить длительное существование памятников суйфунской группы: в предбохайский период и затем, после вхождения области Шуайбинь в состав государства Бохай.

На более поздних бохайских памятниках: городищах горбаткинской группы, расположенных в долине р. Илистая (Горбатка, Николаевское-1 и Николаевское-2)(Fig.8), Марьяновском городище количество мохэской керамики в не превышает 2-3% (на раннебохайских памятниках-7-8%)(Fig.9),

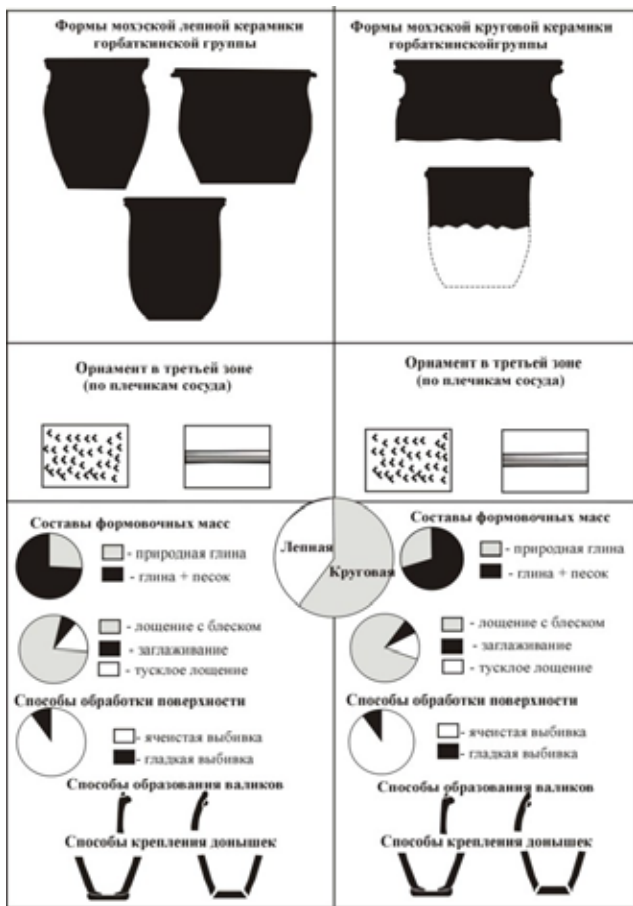
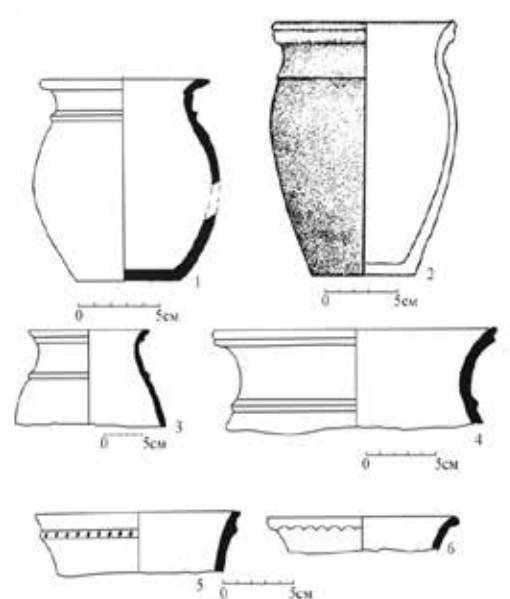


Fig.8 Mohe pottery- Gorbatka group (late Bokkai)



1,3-6 Gelman, 1998, 2 Dyakova, 1993

Fig.9 Mohe pottery from Maryanovka (late Bokkai)

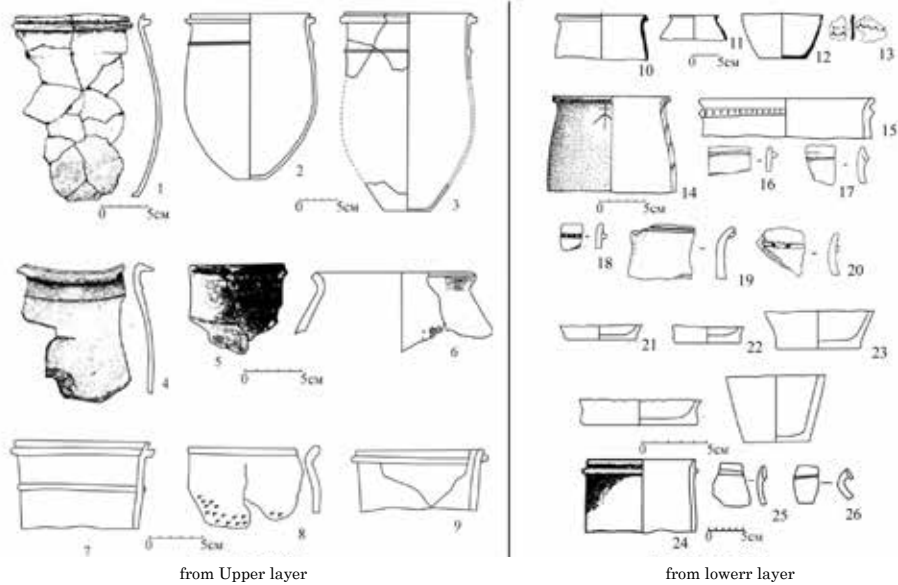


Fig.10 Mohe pottery from Kraskino (Bokkai)

1-6 by: Boldin, 1984; 7-9 by: Dyakova, 1993

но среди этих сосудов значительно увеличивается доля круговых изделий - до 52-57%, кроме того, появляется новый способ обработки поверхности - «ячеистая» выбивка. Доля таких сосудов неодинакова на разных памятниках. Больше всего их на городищах горбаткинской группы - 86-93% лепных и 87-91% круговых емкостей. На Марьяновском городище мелкоячеистой выбивке подвергалась поверхность большей части лепных и не более 20% круговых емкостей. По сравнению с мохэским и раннебохайским



Fig.11 Mohe pottery from northern area(9-10 A.D.)

1-7 Roshino by: Nikitin at all,1998; 9- Novopokrovka; 10-12 - Muziza

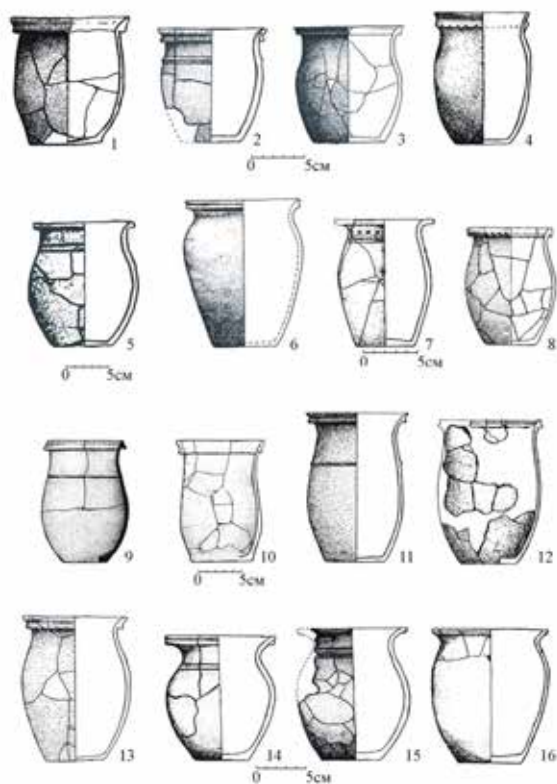


Fig.12 Mohe pottery from Monastyrka-3

(Dyakova,1998)

временем, ассортимент форм керамики значительно уменьшается. Общими признаками керамики можно назвать значительное увеличение числа банок по сравнению с другими формами; появление приземистых горшковидных емкостей.

Для всей мохэской керамики позднебохайских памятников Приморья наблюдается устойчивая «формула»: мелкаячестая выбивка и гладкий валик под венчиком. При условии наличия рельефной выбивки всегда исключается углубленный орнамент не только на валике, но и на тулове сосуда. Характерной особенностью мохэских сосудов Марьяновского городища является наличие сосудов с орнаментированным валиком под венчиком и сосудов с ячеистой выбивкой на тулове в одном комплексе.

За последние несколько лет уникальный материал получен на Краскинском городище(Fig.10). На этом памятнике встречается и керамика, имеющая сходство с керамикой суйфунской группы, и посуда подобная изделиям с памятников горбаткинской группы. Установлено, что к нижним горизонтам доля мохэской керамики увеличивается, в то время как в верхнем горизонте количество таких изделий единично. Подавляющее большинство мохэской керамики имеет признаки изготовления на круге медленного вращения. Особый интерес представляет керамика с ячеистой выбивкой. Первоначально мы связывали такую посуду только с верхним строительным горизонтом, но в ходе раскопок последних лет такие сосуды обнаружены и в нижнем строительном горизонте. Доля керамики с выбивкой составляет не более 25% лепных и круговых мохэских сосудов. Орнаментированных сосудов очень мало, в большинстве случаев неорнаментированным оставался и валик под венчиком, и тулово изделия.

Памятники, расположенные на севере Приморья, городище Музиза, могильники Рошинский, Новопокровский, Монастырка-3 датируются IX-X-XII в [1](Fig.11).

Керамика городища Музиза, Рошинского и Новопокровского могильников явно испытала влияние

покровской культуры. Среди лепных и круговых изделий преобладают горшковидные сосуды. Валики под венчиком всех сосудов этой группы неорнаментированы. На тулове сосудов присутствует либо выпуклый орнамент в виде наклепных гладких валиков, либо прочерченные горизонтальные линии.

В коллекции мохэской керамики могильника Монастырка-3 круговые изделия составляют только 10%, что значительно отличает керамику могильника Монастырка-3 от посуды одновременных памятников. Ассортимент форм сосудов своеобразен и включает как вытянутые, так и приземистые сосуды, находящие аналогии и на бохайских памятниках и в керамике покровской культуры. Половина сосудов украшалась прочерченным орнаментом по плечикам, в том числе в виде сочетания прочерченных горизонтальных и волнистых линий (Fig.12).

Закключение. Таким образом, выделенные ханкайская, раковская, прибрежная, кавалеровская группы мохэских памятников являются локально-хронологическими группами и отражают картину расселения мохэ. Исходя из особенностей материала самым ранним мохэским памятником Приморья на сегодняшний день можно считать поселение Абрамовка-3, время его существования определяется концом VI-VII в. н.э. Такие памятники как поселение Раковка-10, Кордон-Дровяник вероятно продолжали существовать и после включения приморских территорий в состав государства Бохай.

На бохайских памятниках мы можем предварительно выделить три традиции изготовления мохэской керамики. Первая традиция представлена керамикой раннебохайских памятников суйфунской группы. Для нее характерно присутствие гладкостенных мохэских сосудов, с гладким, реже орнаментированным валиком под венчиком. Вторая охватывает памятники горбаткинской группы. Эти памятники относятся к позднему периоду существования государства Бохай. Основным отличительным признаком керамики этого времени – наличие ячеистой выбивки на тулове сосудов. Третья традиция представлена керамикой Марьяновского городища. Отличительный признак керамики городища – одновременное присутствие мохэских сосудов с ячеистой выбивкой и сосудов с орнаментированным валиком под венчиком. Мохэская керамика Краскинского городища также представлена как сосудами с выбивкой, так и гладкостенными емкостями, в том числе с орнаментированным валиком. Но набор типов форм посуды значительно отличается от керамики Марьяновского городища.

Наличие этих традиций изготовления мохэской керамики позволяет высказать предположение о существовании различных процессов, происходивших в государстве Бохай. В первую очередь, таких как ассимиляция и перемещение групп мохэского населения, появление и «вливание» новых групп, несущих иные традиции изготовления керамической посуды.

Памятники севера Приморья городище Музиза, Рощинский могильник, Новопокровский могильник, могильник Монастырка-3 расположены на территориях, не входивших в состав государства Бохай. Население, оставившее эти памятники, несомненно, взаимодействовало с населением бохайского государства, имело с ним политические и экономические связи, что также отражалось на его материальной культуре.

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Plates



1 Survey sites



2 Zunamenka site



3 Dal'niy Kut site
(On the saddle and ridge of the hill)

PL. 2



1 Inside Roshina 6
(from southeast)



2 earthwork and moat in Roshina6
(from northwest)



3 cross-section of earthwork
(from southwest)



1 Beads from Roshina 6



2 Pottery from Roshina 6

PL. 4



1 Elizavetovka 1 site
(from west)



2 Elizavetovka 1 site
(from southeast)



3 After excavation



1 Whole excavated area (from east)



2 Whole excavated area (from west)



1 Dwelling No.4 (from south)



2 Dwelling No.2 (Russian team excavated, from north)



1 Polished Sword, Arrowhead



3 Whetstone



2 Whetstone, Polished stone axe, Arrowhead, Knife



4 Arrowhead



5 Mintage



6 Earthen spindle wheel



7 Earthen sinker



8 Bronze knife



9 Small pottery



1 Pot-shaped earthenware



2 Pot-shaped earthenware



3 Pot with handle



5 Fragments with ornaments



6 Fragments with ornaments



7 Fragments without ornaments, bottom part



8 Fragment of pot (Neck and shoulder part)



9 Fragments with ornaments

1 ~ 7 : Bronze age 8 · 9 : Pol'tse culture

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