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Archaeological Textiles of the 10th to the 12th Century from the Gaigovo barrow Group (Russia, Leningrad oblast)

Introduction

Most of the extant funerary monuments of the 10th-13th centuries in the southeastern Ladoga area (Russia, Leningrad oblast) and the Republic of Karelia are barrows. These are situated on the banks of the rivers S'as', Tikhvinka, Voronezhka, Pasha, Kapsha, Oiat', Svir', Olonka, Tuloksa, Vidlitsa and on the north bank of Lake Onega (Fig. 1). The past 150 years' work has created a substantial database of many aspects of material culture and history from this period (for more details, see: Кочкуркина and Линевский 1985, 118-130; Кочкуркина 1989; 1996, 286-310 – the authors have not been able to find literature about these monuments in other languages). The barrows are securely dated owing to such datable articles as Scandinavian brooches and weapons such as swords and spearheads, as well as western European, Byzantine and oriental coins. Coins with riveted loops were used, along with beads, to form necklaces; perforated coins could have been sewn onto clothes (Кочкуркина 2013). As far as textile remains are concerned, organic materials survive poorly in sandy barrow mounds. Textiles tend to be found alongside bronze articles and birch bark.

The first investigator of the textiles from burials of the Ladoga Kurgan culture was O. I. Davidan (Davidan 1989, 316-336) more than 20 years ago. In the meantime, techniques for working with archaeological textiles have improved with the use of methods from the natural sciences, and the database of archaeological artefacts has increased substantially. Moreover, some of the textile samples from the barrows found by A. M. Linevsky had not yet been subjected to careful analysis

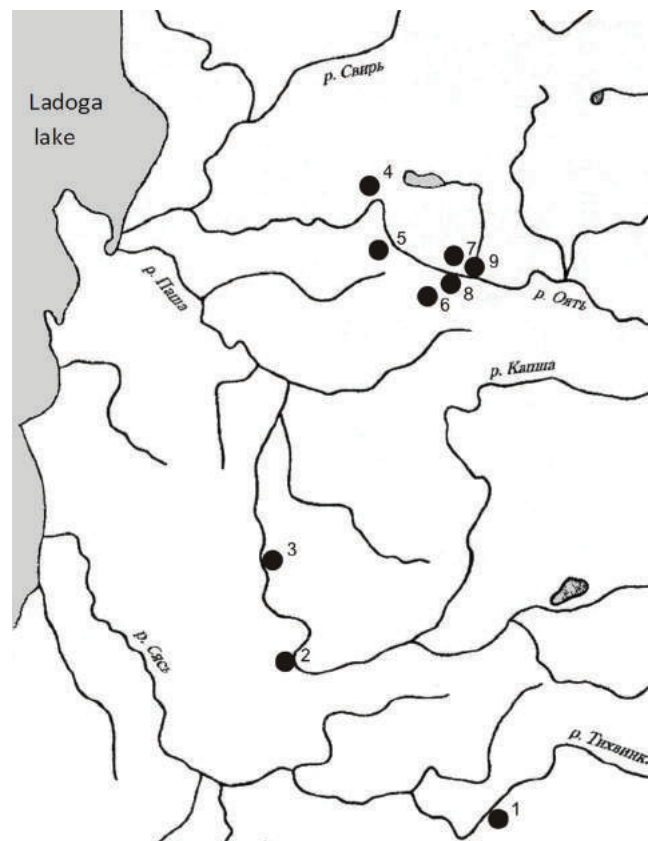


Fig. 1. Map of barrows with textile remains.

- | | |
|------------------|-----------------------|
| 1 – Novoselsk 14 | 6 – Alekhovshchina-1 |
| 2 – Zaozer'e-6 | 7 – Gaigovo |
| 3 – Leonovo-112 | 8 – Niubinichi |
| 4 – Akulova Gora | 9 – Kiagino-Kruglitsy |
| 5 – Kurgino | |



at all. We therefore decided to return to the textiles in the hope of gaining some new information about the textile qualities and origins, and possibly also about the dress styles of the Ladoga population in the 10th to the 12th century.

Textile preservation

Where textiles were in contact with bronze objects and bark, they were preserved in the sandy ground. The storage facility of the Institute of Language, Literature and History of the Karelian Research Centre of the Russian Academy of Sciences received those textile fragments and archaeological objects in the years 1947-1949. They were kept between glass panes (a storage method of that time); photo fixation and preservation description were not carried out. The textiles were taken out of their glass containers for this study. Dry and fragile fabrics were washed in 5-10% polyethylene glycol solution in water (a restoration technique developed in the Department of Archaeological Textile and Leather Restoration of the Igor Grabar Restoration Centre (Moscow) led by Natalia Sinitsyn) and thus became softer; any deformations were removed during washing. Other tissues that were in a stable state were not subjected to such techniques. The fabric fragments were then put into individual packages made from special museum paper and documented. The state of the textiles were monitored, and appropriate temperature and humidity conditions were provided.

The Gaigovo Kurgan group

The Gaigovo Kurgan group of barrows consisted of 14 mounds situated on the right bank of the Oiat' River 0.7 km upstream from the village of Gaigovo on a high ridge some 30 m above the river level between two forest roads. By the 1980s, all traces of the barrow group had been obliterated. Eleven mounds excavated by A. M. Linevski in the 1940s were set in a row, whilst mounds 2 and 3 were located somewhat aside. Mounds 1-4 (12 x 10 m) were relatively high and steep-sloped, mounds 3 and 4 had deep hollows reaching to the bottom, and barrows 1 and 2 had shallow pits. Barrows 5-14 were low and disintegrated. All mounds except 8 and 12 (apart from 5, 7 and 14, which had been empty), had been looted. The cemetery was an important find as a result of the rich materials from the first four barrows, including western European coins.

Research methods

Textile remains were discovered beneath three barrows. Whilst it would have been desirable to have used thin layer chromatography to determine the colourants on the textiles and to explore the Sr isotopes in the wool,



Fig. 2. Gaigovo-1. Birch bark fragment with remains of twill (1) and a tabby (2) fabric.

the resources available only made it possible to use general microscopic techniques as follows:

- the structure of fabrics and ribbons was investigated by optical microscopy in non-polarised light with 10-40x magnification
- optical microscopy in transmitted and reflected polarised light with 200-400x magnification was used to define the nature of textile fibres.

Chemical methods of research for the presence of protein were also used to determine the plant fibres and the sinew threads of the fragments in a poor state of preservation.

Results

Barrow 1

(11 x 10.5, 2.5 m high, 0.9 m to ground level)

General description: This barrow, containing a cremation burial, was located on the western border of the Gaigovo cemetery. About half of the mound was dug over. The burial contained three sets of women's ornaments belonging probably to a single (adolescent) female.

The first set was wrapped in birch bark and measured 0.4 x 0.2 x 0.1 m. It consisted of three parts divided by sand layers. The first part of this set, unharmed by the fire, yielded 18 beads (cornelian of various shapes, mosaic glass and crystal) and three bronze pendants. There were no calcified bones. The second part was divided from the first by a layer of pure sand 5-6 cm thick and contained calcified bones mixed with women's dress objects in bronze partially damaged by fire – arm-rings, duck-shaped pendants, wire spirals and horseshoe-shaped fasteners – as well as three Czech coins of the following dates: 1) Boleslav I (AD 935-967); 2) during an interregnum (1003); 3) unknown date. The sand layer may have originally contained textiles. The third part of the bundle was

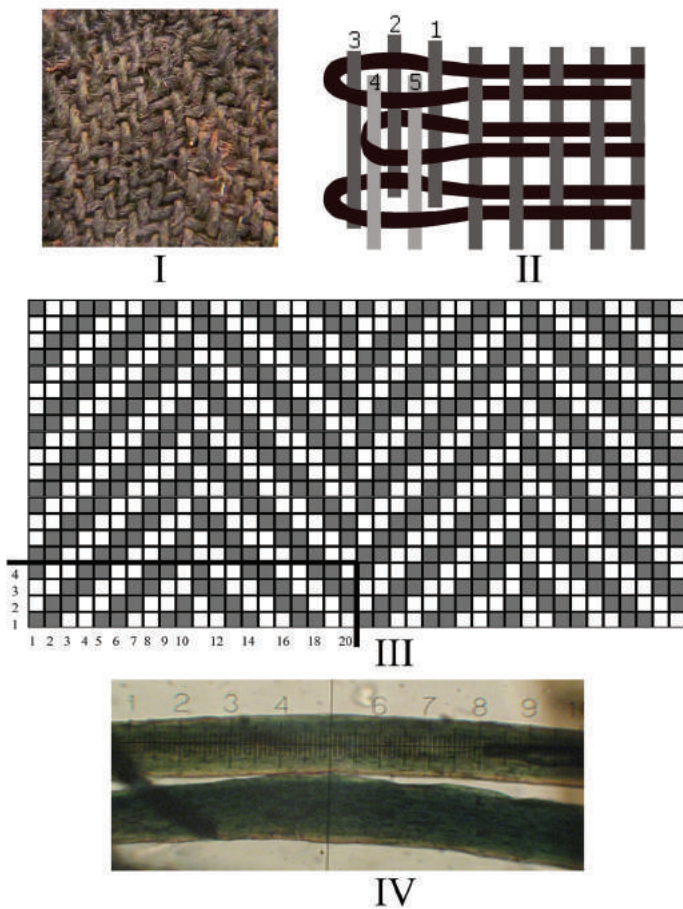


Fig. 3. Gaigovo-1. Twill fabric (2/2).

I – Microphoto of fabric.

II – Pattern of round selvage of fabric from five threads.

III – Pattern of weave with twill pattern unit of 20 threads.

IV – Microphoto of woollen fibres (division 0.0017 mm).

The second set of artefacts was located on the surface of the ground in the south-western section. A handmade vessel contained bronze articles – two duck-shaped slotted pendants and two undecorated lamellar arm rings – and two teeth of a ruminant. These articles had not been subjected to fire.

The third set was discovered at the same level 0.9 m to the west. They contained textile remains tied with a long, decorated woollen ribbon, which survived in a birch bark bundle. Inside the bundle there was also a necklace 130 cm long and consisting of 53 double bronze beads; these were attached with thongs to two fasteners, one made from wire and another braided as a plait from three wires and fragments of decorated bone appliqué as well as one twisted and four narrow lamellar arm rings (a votive deposit?). This burial is dated to the early 11th century AD. There was an oval pyre site (1.8 x 1 m) in the mound and three handmade vessels.

Textiles: The first and third bundles in Barrow 1 yielded a dark, almost black, broken twill fabric made from woollen fibres (Fig. 3). In total, it was found in 29 small fragments. The largest fragment had a size of 10 x 2 cm, the smallest 1 x 1 cm. The warp and weft threads were similar in thickness and spinning (Z-spun). The thickness in different samples varied from 0.2 to 0.8 mm, mainly owing to differing states of preservation. The average thickness of threads was 0.5-0.6 mm. The thread count in the various fragments was 14-22 warp threads and 12-17 weft threads per cm². The average thread count of these fabrics is 18/15 per cm². Microscopic examination shows that woollen fibres of the cloth contain a blue dye, namely indigo. (The indigo particles are clearly visible on the micrographs of the fibres.) Thus, the fabric may have been either navy blue, or black if a brown dye was added. The tubular selvage made from 5 warp threads has survived on three fragments.

A light-coloured tabby weave fabric with painted decoration was recovered from the third bundle (Fig. 4) in 15 fragments. The largest fragment has a size of 5 x 4 cm, the smallest 0.5 x 0.8 cm. The

also divided from the second by a 5-6 cm-wide layer of pure sand, again perhaps originally containing textiles. It yielded such bronze articles as 19 round decorated bells, seven fragments of spirals about 3.5 cm long from which the bells hung, two fastenings with knotted tips, a decorated ear-pick with a ring for hanging and a knife binding with a ring. Iron articles included a chain for a cauldron 39 cm long, a key, two knives melded together with calcified bones, a whetstone and four beads. The birch bark inner surface bore the remnants of a black woollen broken twill cloth (Fig. 2). It appears that human bones and articles used in the cremation were wrapped in a black cloth or an unidentified article made thereof after the cremation. Ornaments not subjected to fire, probably votive articles, were put into the same package. The division of the birch bark package into three parts by sand layers 5-6 cm thick can be accounted for by the presence of a completely vanished organic material. Similar sand layers can be seen in a birch bark basket from a 10th-century chamber grave at Pskov (Зубкова and Орфинская 2007, 56-75).

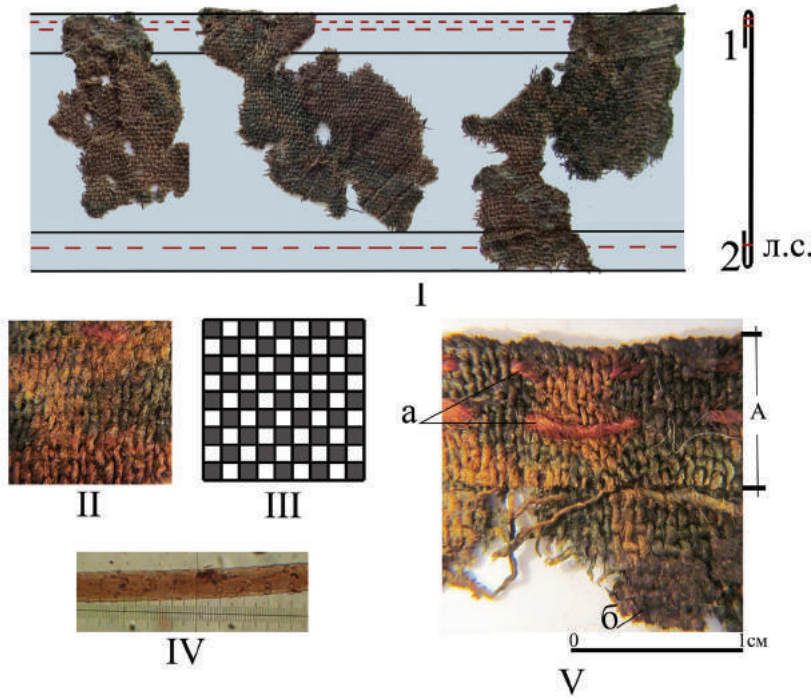


Fig. 4. Gaigovo-1. Light-coloured tabby fabric:

I – Pattern of the strip of light-coloured fabric (reconstruction).

II – Microphoto of the fabric (square side 1 cm).

III – Pattern of textile weaves.

IV – Microphoto of woollen fibres (division 0.0017 mm).

V – Microphoto of part of the light-coloured fabric:

A – tuck-in section;

a – stitching threads;

б – remains of badly damaged dark-coloured fabric.

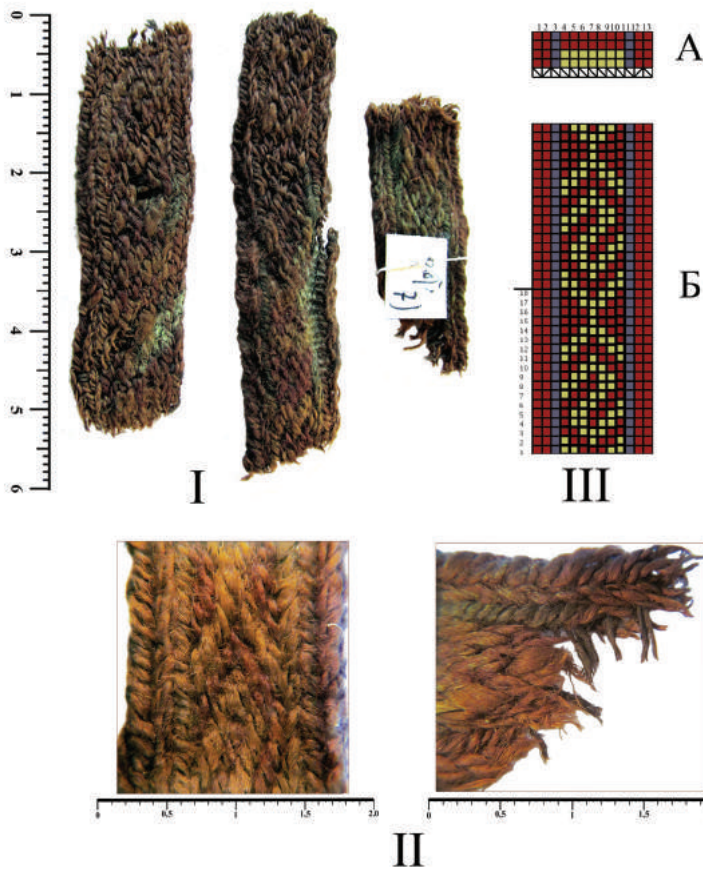


Fig. 5. Gaigovo-1. The ribbon with red-yellow design:

I – General view of fragments.

II – Microphoto of ribbon.

III – Pattern of textile weaves:

A – pattern of tablet threading;

Б – design pattern.

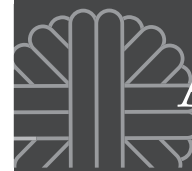


Fig. 6. Gaigovo-1. Fabric fragment with a sewn-on ribbon:

I – General view of fragment:

1 – reverse;

2 – face.

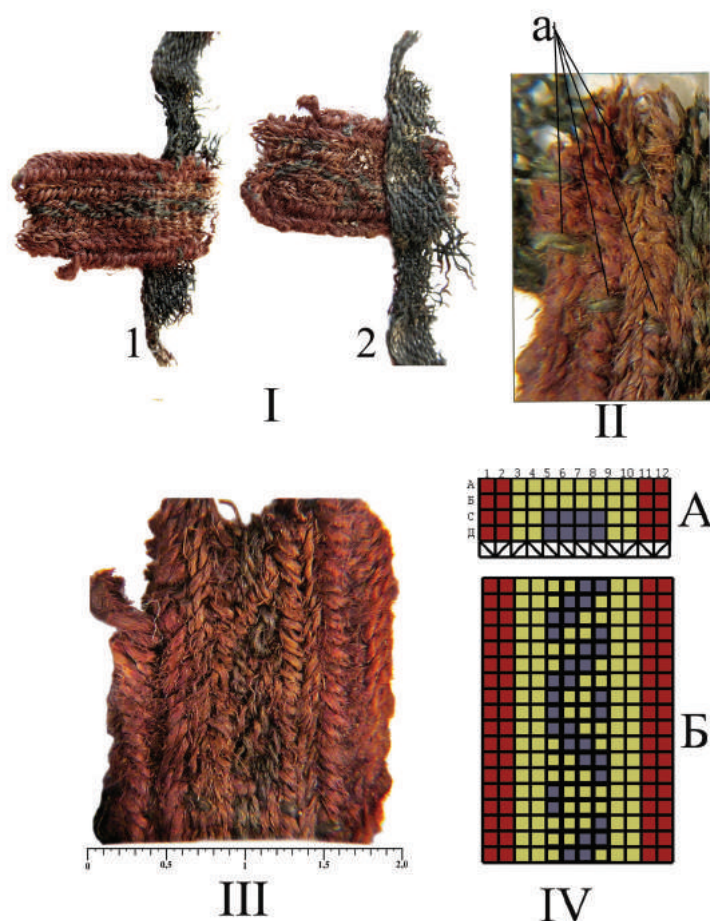
II – Microphoto of part of ribbon joining fabric: a – stitching threads.

III – Microphoto of ribbon.

IV – Pattern of textile weaves:

A – pattern of tablet threading;

Б – design pattern.



fabric has a woollen warp and weft threads similar in thickness and spinning (Z-spun). Their average thickness is 0.5 mm. The space between the warp threads is much less than that between the weft threads. The average thread count of the fabric is 18/10 per cm². Blurred outlines of painted decoration in blue/green and yellow on a light brown background can be seen on the cloth. The fragments in question are too small to identify the painting technique, so we called this 'cloth printed fabric'. The fragments have tucked-in hems and seams made from red woollen thread. One fragment was tucked in on two opposite sides, which implies that a strip of the fabric was cut and sewn onto another fabric. The width of the strip without tucked-in hems is 5 cm. On its inner side there is a thin dark layer identified by microscopic investigation as a dark woollen fabric in an advanced stage of decomposition. In other words, the woven strip was an appliqué sewn onto an object which was probably made from the woollen fabric detected in this bundle. The seams were made with the forward movement of the needle and a red woollen thread of the second order (S,2z) was used.

The third bundle contained four varieties of ribbons woven on the tablets that can be divided into two groups based on their technological characteristics:

1. A ribbon 1.6-1.8 cm wide made of relatively thick threads (0.6-1.0 mm) with S,2z spun red, yellow and dark blue/green wool where the brown weft thread is also woollen (Z) and is used in double weaving. The ribbon bears impressions of bronze articles on both sides (Fig. 5) and is in three fragments (6, 7 and 4 cm in length). Thirteen tablets were used to weave the ribbon, each with 4 holes, producing a density of 32 warp and 6 weft threads per cm². In addition, a broken twill fragment has a ribbon perpendicularly sewn onto a side selvage with a green woollen thread (width 1.8 cm / length 3.2 cm). This ribbon has a blue design on a yellow background (Fig. 6). The warp threads are red, yellow and blue wool, 0.8 mm thick, with twist S,2z. The weft threads are brown wool 0.6 mm thick with a double Z twist. This ribbon needed 12 tablets with 4 holes in each, producing a density of 27 warps and 8 weft threads per cm². Small fragments of this ribbon were found embedded into the birch bark that was probably used to wrap the fabric. The characteristics of



the threads of these ribbons are similar; the difference is in the design and the number of tablets used.

2. A ribbon about 1 cm wide was made of thinner woollen warp threads (0.6-0.8 mm) (Fig. 7). There were 11 such fragments (3-18 cm in length). Its main distinctive trait is the presence of weft fibres derived not from wool but from a plant; these are almost completely lost. The weaving was performed using 8 tablets with 4 holes each. This second group can be

divided into two subgroups: a) those with a design of woollen threads and b) those without it (as of 2013). A thin, plant-derived thread used as warp thread was encountered in several samples. It implies that this group once had a more elaborate decoration. Narrow ribbons could have been either clothes trimmings or separate articles, or could also have been included in a headdress system involving straps and metal decorations.

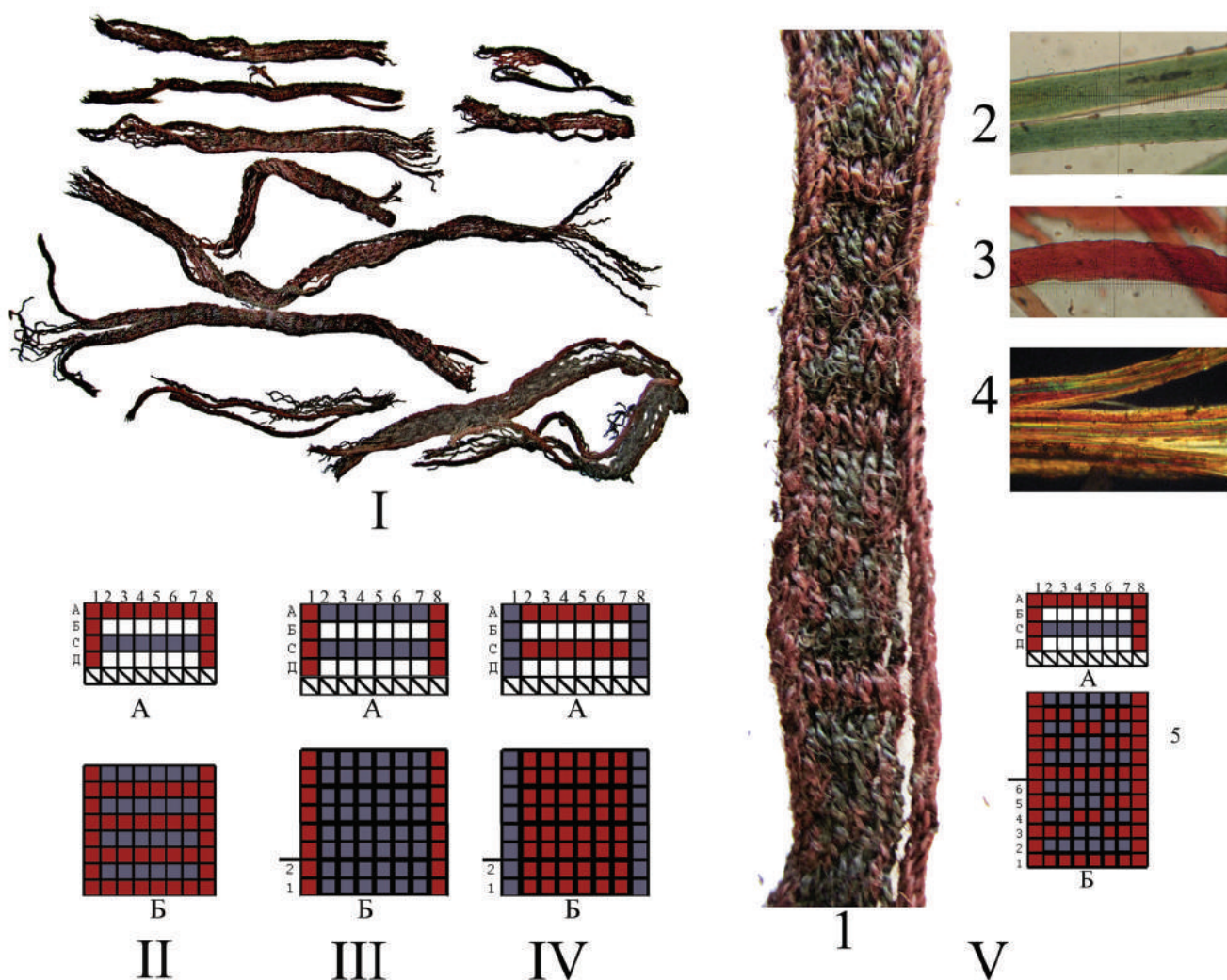


Fig. 7. Gaigovo-1. Second group of ribbons.

I – General view of fragments.

II – Cross-striped ribbon; pattern of textile weaves.

III – Blue ribbon with blue selvage; pattern of textile weaves.

IV – Red ribbon with blue selvage; ribbon with geometric design:

1 – general view of ribbon;

2 – microphoto of either blue or green woollen threads;

3 – microphoto of red woollen threads;

4 – microphoto of plant fibres (темное поле);

5 – pattern of textile weaves.

A – Pattern of tablet threading;

Б – design pattern.



Results: The existence of the following items can now be stated:

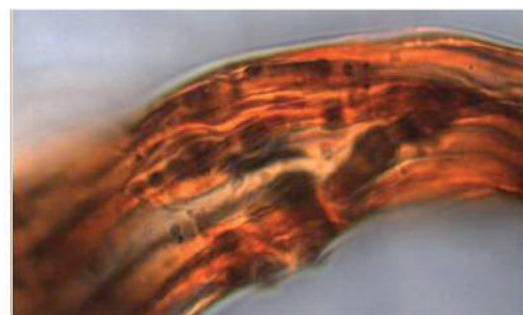
- black (or at least dark) woollen fabric used to wrap the bones and the metal jewellery after cremation;
- precious metal products, probably funerary gifts, wrapped in the same fabric or wrapped in the something made from that fabric (such as a bag, dress or apron);
- fabric ribbons which may have been used for tying the birch bark scrolls, as belts, as clothing decoration or as part of the headdress system involving straps and metal decorations;
- black fabric with a tubular selvedge (round frame) which was woven on the vertical loom.



Fig. 8. I. The archaeological material from Barrow 2 at Gaigovo.
II. The female costume design from the Barrow 2 (after V.A. Bazegsky).



1



3



2

Fig. 9. Gaigovo-2. Fragment of fur article sewn with sinew threads. 1 – Section of fur with a seam. 2 & 3 – Microphoto of sinew thread at different magnifications.

Barrow 2

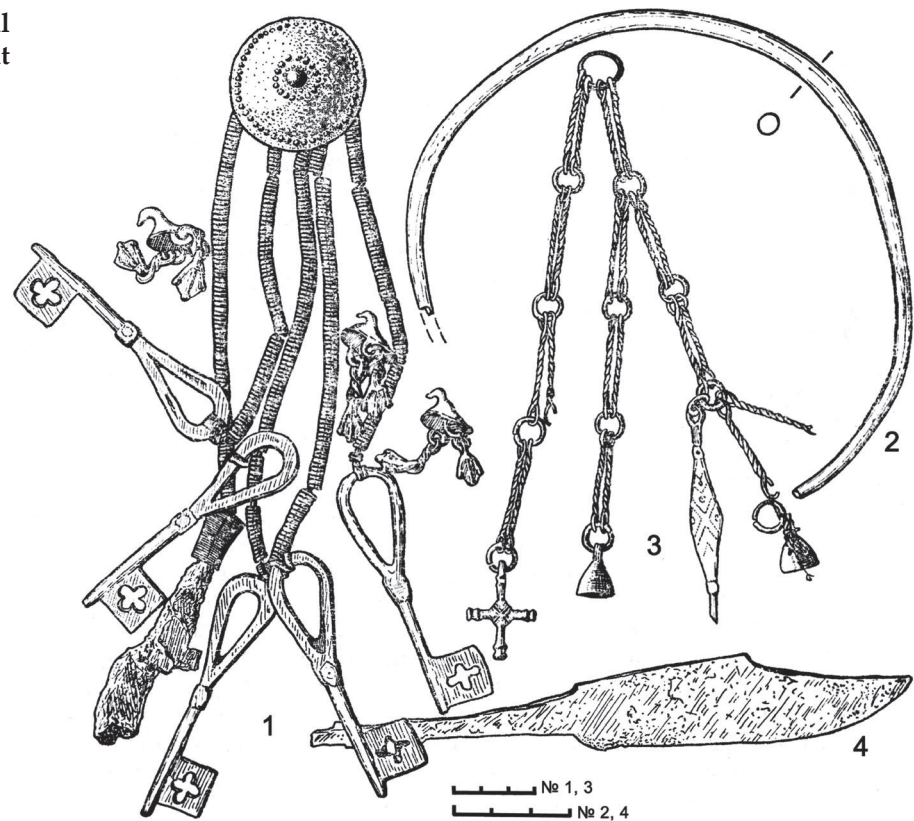
(9 x 9.5 m, 1.5-2 m high, 0.8-1 m to ground level)

General description: This barrow with two inhumations was located 20 m away from the main group. A burial pit (2.3 x 1.4 x 1.5 m) in the southwestern section contained a burial of a man lying with the head to the southwest. Inside the pit there was a single-row timber

structure affixed with eight nails, two at every corner. The bottom was covered with bearskin. The remains of the skull including fragments of the upper and lower jaws were encountered in the southern end of the burial. No traces of the skeleton bones were found on the thick fur bedding. A spearhead pointing west lay on the bottom of the burial pit near its north wall.



Fig. 10. The archaeological material from Barrow 3 at Gaigovo.



On the ground surface near the edge of the burial pit there was a woman's inhumation (the deceased's height was 160-165 cm) with the head pointing south. The body was wrapped up in birch bark which provided a high degree of conservation. Four bronze temple rings with a scroll at one tip, worn two on each side, were found at the head of the deceased. One ring had a shallow bead of the same metal strung on it and a bronze wire wound around it. There were 15 glass beads and a ribbon around the neck, the latter of which was not preserved. (The archaeological report mentions the ribbon but does not contain any more information about it.) A complex ornament including a ring-shaped fastening with a chain made of double and triple rings 24 cm long, from the end of which hung a crucifix and conical pendants, lay a little below the collar-bone on the right side of the chest. Another complex ornament consisting of a fastening, a chain of triple rings 20 cm long with an attached needle-case, a fang and an ear-pick with decoration was also found. Yet another set was found to the right of the pelvis. It included a decorated belt ring, seven spirals with beads (each 34-37 cm long), two rattling, shallow duck-shaped pendants and two key amulets. The next spiral had a similar duck-shaped pendant and a single-sided comb with decorated appliqués (Fig. 8). An unclosed arm ring, a decorated finger ring, a flat

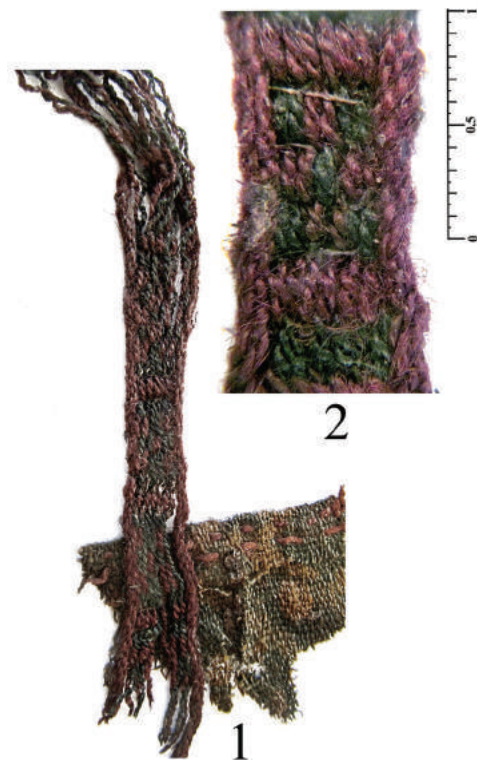


Fig. 11. Barrow 3 at Gaigovo. Fragment of tabby fabric with sewn-on ribbon. 1 – General view of fragment. 2 – Microphoto of ribbon.



finger ring and three Frisian coins minted in Emden under count Hermann von Kalvelage in 1020-1051 and in Dokkum and Garrelsweer (or Groningen) under Ekbert II, margrave of Friesland in 1068-1090 (two items) were placed near the left arm stretched out along the body. Two woollen cloth scraps one over the other and a few pieces of squirrel fur survived under the bronze spirals. A one-sided comb with decorated bone appliqué and a fragment of a bronze binding of a leather case were found on the ground under the mound.

Fragments of five wheel-thrown vessels were discovered east of the burial pit. Fire remains were identified 0.5 m. above the ground surface near the burial pit and partially above it. Both burials date to the 11th-early 12th century. A cylindrical black bead with spiral-waved inlay and small fragments of a fur article sewn with sinew threads (Fig. 9) were found in the north-eastern section in a looter's pit near the centre of the barrow. The remains of a tabby fabric made from plant fibres have survived on the hair side. It may be inferred that those are fragments of a fur coat and a certain piece of clothing made from plant fibres, either a shirt or a gown.

Textiles: The ribbon, which was described in the report, has not been preserved, and there was no information recorded about its structure and composition. Small areas with heavily damaged tissue were found on the separate fur fragments. The technological characteristics of the textile could not be determined because of the poor state of preservation. Plant fibres were identified in these parts. The only indication for a reconstruction of the garments is the set of metal jewellery in that barrow.

Results: The existence of the following items can now be suggested:

- fur clothing in one of the graves, probably closed at the top using fabric made of plant fibres;
- fur fragments that may have been remnants of clothes or a headdress, perhaps overlapped with cloth that covered all of the buried body;
- underclothes (shirt or dress), if the side with fur was facing inward to the person.
- a ribbon on the woman's neck which may or may not have held the glass beads;
- the two layers of textile and fur fragments on the right-hand side of the pelvis (not preserved), which may have belonged to a bag.

Barrow 3

(10 x 10.5 m, 2 m high, 0.9 m to ground level)

General description: This barrow contained an inhumation and a destroyed burial and was located 12 m east of Barrow 2. The central part of the mound

(5 x 5 m) was destroyed by a looter's pit 2 m deep. An unidentified western European silver coin was found at its bottom.

A female inhumation pointing south was revealed on the ground surface in the southwestern section. Two temple rings with a scroll at the tip survived at the head of the deceased, along with a wire torque and cornelian beads around the neck. Chains 11-12 cm long consisting of doubled twisted sticks and loops at the tips alternating with rings hung from a wire ring near the left shoulder; a cross similar to that from Barrow 2, a conical pendant with a geometric design, an ear-pick and another conical pendant hung from the tips of the chains at the same level. A jewellery set was found on the right side of the chest yet somewhat lower, nearer to the waist. The set included a circular fastening with small protrusions along the rim and at the centre, five key amulets hanging from it on five spiral threads and a knife wrapped with bronze wire with a partially surviving leather case. There were three hollow, rattling, duck-shaped pendants (Fig. 10). Eight Frisian coins were found approximately at the same level. They were struck in Ewer under Ordulf, Duke of Saxony, in 1059-1071 (three items); in Groningen under Emperor Heinrich IV and Wilhelm de Ponte in 1056-1076; in Emden under count Hermann von Kalvelage in 1020-1051; in Dokkum under Ekbert II in 1068-1090; in Groningen under Ekbert I in 1057-1068; and in Garrelsweer under Count Hermann in 1059-1086. The ninth coin is unidentifiable. A knife was found separately in the north-western section of the mound. A decorated wheel-thrown vessel with a stamp in a perfect state of preservation was discovered on the surface of the ground. The burial dates to the early 12th century.

Textiles: Textile samples were recovered from this burial but were not described in relation to the deceased. These were a light-coloured, patterned, woollen tabby cloth, a composite ribbon with white, red and black colours and a woollen broken twill fabric.

The light-coloured woollen fabric was found in three fragments (3.5 x 4.5, 2 x 3.5 and 2 x 2 cm). The fabric has the same thickness and degree of (Z-)twist in the warp and the weft. The medium thickness is 0.5 mm. The density is 20/10 threads per cm². Fuzzy outlines of a pattern in blue/green and yellow on a light brown background are visible on the textile. Hems and seams made of red woollen thread are preserved on one fragment.

The ribbon, which is 1 cm in width and 14 cm in length (Fig. 11) was sewn to this fragment, perpendicularly to the hemmed edge. The warp threads of this are red and black wool with a thickness of 0.5-0.8 mm and S₂Z twist with some residues of warp threads from



plant fibres. The weft was made from plant fibres (in a poor state of preservation) about 0.2 mm thick; the twist could not be determined. Together it seems the original ribbon had a pattern of red, black and white, as the weft was almost certainly of linen. The ribbon was made on 8 wooden tablets with 4 holes each. The thread density we have calculated is 32 warp and 8 weft threads per cm².

Eight fragments of broken twill made from black woollen threads also survived, the largest of which was 8 x 5 cm and the smallest 1.5 x 0.8 cm. The warp and weft threads of this are approximately the same thickness (about 0.6 mm) and degree of (Z-)twist. The average tissue density is 18/18 cm². The microscopic study results have shown that there is blue indigo dye in the wool fibre of the textile. The tubular selvedge of 10 warp threads is preserved on one of the fragments.

Results: The examined fabrics and ribbons are akin to those from Barrow 1, yet the side selvage of the twill cloth from this barrow has 10 selvage cords instead of five. Ribbons sewn onto fabric were found both in Barrow 3 and in Barrow 1 (Fig. 11), although in Barrow 1 it was wide woollen ribbon and in Barrow 3 it was narrow half-woollen ribbon. The yellow-brown fabric made of plant fibres and mentioned in the excavation report is of interest, but unfortunately has been lost.

Conclusion

Barrows 1 and 3 contained similar textile sets consisting of two kinds of fabrics and ribbons. It seems likely that the patterned cloth in Barrow 1 acted as a decoration for the twill article. The presence of untreated side selvages implies that the article was rectangular rather than of an elaborate cut. It is possible that a strip of tabby cloth was sewn to the short sides of this rectangle while ribbons were sewn either to both sides of a corner or to all four corners. This similarity suggests similar dress articles were worn by the buried women. However, the difference in funerary rites is worth noting: cremation in Barrow 1 and inhumation in Barrow 3. There is also a time lag of about 100 years between the construction of the two barrows, which may mean a certain amount of continuity in burial practices and weaving traditions between the Finnic and Baltic populations of the Oiat' River area, suggesting a community (in ritual and weaving) formed in the area.

The combining of western European and local ornaments is a characteristic of women's garments of the 10th century, particularly those of the population of the Oiat' River area. Many western and northern European articles disappear in the 11th century. Ring-shaped fasteners with spiral tips become typical of women's ornaments instead of Scandinavian brooches

with two catchplates that fasten the clothes on the shoulders. They were replaced by the ring-shaped fasteners – which performed the same role – under the influence of fashion or ethnic movements. This means the shape of the garments may not have changed, becoming the local traditional for this place. Complex breast ornaments with diverse animal- and bird-shaped pendants also appear. The set of women's ornaments also changes in the 12th-13th centuries: temple rings become widespread under Slavic influence.

Some details of men's dress can be discerned from the archaeological record of other barrows from the Ladoga area, although grave goods in male burials are scarce: the shirt collar was usually fastened using a brooch with spiral tips, and a knife, a steel and a flint for striking fire hung from a leather belt sometimes decorated with bronze plaques.

Black woollen twill fabric with decorations made from other materials similar to those discussed here was found in the burial ground of the Vetluzhsky-Vyatka region dating to the 9th-11th centuries (Орфинская and Никитина 2014, 70-92). Broken twill fabrics were found all over Europe in that era (Bender Jørgensen 1992, 85): they form around 35% of textile remains at Birka (Geijer 1938, 37-39) and around 32% of those at Volin (Nahlik 1958, 257). The Scandinavian broken/diamond twill finds (Viking periods) were discussed by Bender Jørgensen in 1986 (Bender Jørgensen 1986, 357-358). This type of fabric is also known in the central and north-western parts of Russia (Нахлик 1963, 228-313; Ефимова 1966, 127-134; Давидан 1982, 100-113; Bender Jørgensen 1992, 85; Елкина 2005, 141-146; Орфинская 2005, 147-156; Иванова and Орфинская 2014, 64-68). Cybulska and Maik considered broken twill fabric in the 11th-12th centuries to have been both locally-made and imported to Poland (Cybulska and Maik 2014, 317-331).

Where exactly the broken twill fabric for the Lake Ladoga region was made is still an open question. We see a high level of technological sophistication in the spinning and weaving, as well as the ability to dye wool fibres in black colour: this shows a relatively high level of craft development. However, it is not clear if the people who left those burials had such skills. Tablet-woven woollen ribbons were almost certainly made by local production. Ribbons made from plant fibres (probably linen), cannot confidently be attributed to local production as we have so little information on the qualities of these threads and their source.

Acknowledgements

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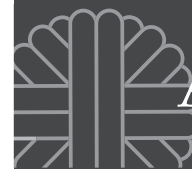
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Abbreviations

РАН – Russian Academy of Sciences

ИА РАН – Institute of Archaeology Russian Academy of Sciences.

ИЦ РАН – Science Centre of the Russian Academy of Sciences

АН РТ – Academy of Sciences of the Republic of Tatarstan

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