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Examining the White Karelian Textile Tradition of the Late Nineteenth Century—Focus on Plant Fibers

Collection SU4522 in the Finno-Ugric Collections of the National Museum of Finland consists of 143 items, mainly textiles from nineteenth-century White Karelia, now part of the current Russia. Forty-one linen textiles were chosen for closer examination, with the aim of evaluating the area's textile culture and identifying the materials using microscopic methods. Flax, hemp and nettle have all been traditional materials for clothing in northern Europe. Additionally, cotton became established in the region during the nineteenth century. Previous research lacked such a deep examination of the textile materials used, leaving room for speculation. Stinging nettle has

not been shown before to have been used as a textile material in the Karelian area. Our results show that it appeared commonly in *rätsinä*-shirts and *käspaikka*-towels. Against the consensus hemp was rare and appeared only in one of the items. The results are mirrored by concurrent pictorial and written material from I. K. Inha who visited the region in 1894 and collected most of the items in the collection. White Karelian textile traditions from clothing to fabrics, weaving, spinning and fiber production are discussed in the article. Nevertheless, questions concerning the origins of the materials and the effects of the peddling tradition would need further research.

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Introduction

White Karelia is part of the current Russia, between the Finnish border and the west coast of the White Sea (Figure 1). It is situated close to the Arctic Circle and belongs to the northern boreal climatic zone. Growth conditions in the region are harsh for plants, and the soil is barren. Crop yields were poor especially after the prohibition of slash and burn agriculture in the nineteenth century.

White Karelian textiles have previously been studied by Finnish textile researchers such as Vahter (1944), Sihvo (1981) and Lehtinen (2008). Additionally, EU-funded research collaboration for collecting and recording textile traditions from White Karelia and the Kainuu area connected researchers from both Finland and Russia for RIHMA-seminars which resulted two publications (RIHMA 1999, 2000). These researchers looked at the White Karelian textile culture from distinctive points of view, though scientific fiber material analysis has been lacking.

Of bast fibers, flax, hemp and nettle were widely used as textile materials in northern Europe especially before the arrival of cotton. Cotton has been found in Finnish textiles since the fifteenth century, but it became much more commonly used at the end of the nineteenth century, at the time of the Industrial

Revolution in Finland (Arponen 2011). The ability to identify and distinguish between different bast fibers has improved recently with the aid of advancements in microscopic methodology. Previously, Suomela, Vajanto, and Räisänen (2018) developed a three-stage procedure for identifying flax, nettle and hemp fibers and distinguishing them from each other. In this study, the procedure is applied to the ethnographic textile collection.

Collection SU4522 from the Finno-Ugric Collections of the National Museum of Finland formed the basis for the research material in this study. Collection SU4522 contains 143 objects, mainly textiles, 121 of which were collected by Into Konrad Inha, a famous photographer who traveled around the area in summer 1894. This collection represents the majority of surviving White Karelian objects held by the National Museum of Finland. Musketti, which is the National Museum of Finland's own electronic collection management database program, consists of 215 items from White Karelia. Hence, this collection has a significant role as the preserver of White Karelian material culture in Finland.

As Inha collected most of the items in the collection, his written and pictorial material was used as supplementary information. Through



Figure 1

White Karelian region between the Finnish border and the White Sea. Map: Jenni Suomela.

his concurrent descriptions, it is possible to gain a glimpse of the daily life of the White Karelians, and in this article his visions of the textile culture of the region have been re-interpreted.

The Fennomans movement and I. K. Inha as a collector

Finland had a strong nationalistic Fennomans movement at the turn of the twentieth century. One of the aims of this national romantic movement was to collect and restore the somewhat mysterious and imagined past of the Finnish people. Collecting both tangible and intangible cultures was among their interests. Finland was a Grand Duchy of the Russian Empire at that time, and the region of White Karelia had already been separated from Finland and made a part of Russia, yet the Fennomans had the idea that Finnish culture had survived as its highest form in that area. White

Karelia is the place where Elias Lönnrot collected the poems that comprise the Kalevala, the Finnish national epic (Laaksonen 1990; Nyström 2011).

I. K. Inha ([1911]1999) wrote a lengthy travel account of more than 400 pages, 17 years after his travels. In addition to this written source, he took 219 photographs during his journey. The book depicts the folk lifestyle, collecting process, discusses certain objects in the collection and mentions different textile materials by name. The photographs act as silent witnesses to region's clothing fashion in 1894.

Inha's (1894) letter to the Muinaistieteellinen toimikunta (MTT), the predecessor to the Finnish Heritage Agency, reveals that he had collected the artifacts that form most of the collection SU4522 independently and without a commission. After the journey, he offered to sell the

items to the MTT for 100 Finnish marks.

In general, Inha was not particularly interested in textiles and usually only referred to them in passing. Since the textiles were closely associated with the everyday life that Inha was depicting, it is nonetheless possible to acquire a comprehensive idea of the textile culture of the White Karelian people through his texts. Common themes that emerge in Inha's travel account include the value of the textiles as gifts and as ceremonial objects, how the poverty of the people impacted the use of the textiles, and the way in which the Karelian peddling tradition probably affected the material choices of the White Karelian people.

Research aim and questions

The aim of this study is to identify, re-interpret and understand what materials, especially bast fibers,

the White Karelians were using in their textiles at the end of the nineteenth century and earlier. The focus is at the fiber level. Additionally, textile making, clothing choices and the textile culture in general are within the scope of the research. As explained in various studies previously, micro-level research can provide access to wider cultural concepts and accumulated knowledge and understanding from much larger entities than what can be seen under the microscope (see for example: Jakes, Thompson, and Baldia 2010; Wimberley and Thompson 2010). In this study, the findings from the microscope analysis are discussing with the descriptions and photographs of I. K. Inha and what has been learnt from the textiles themselves.

The Textile Collection

Of the 143 items contained in collection SU4522, a total of 41 artifacts were selected for this study. The decision about what to include was based on the photographs and background information available in the Finna.fi database, which is an open, co-operational electronic database for Finnish museums, libraries and archives. Priority was given to those textiles that possessed a notable amount of background information. In the late nineteenth century, it was not common to depict museum objects with much detailed information—it was thought that the year and collecting site were an appropriate amount of information. The current collection management policy is quite the opposite, demanding a great deal of information and possible narrative on each item.

The selected items were textiles, with whole ones made at least partly of plant fibers being the preference. The selection criteria excluded all textile items made of wool and almost all embroidery samples or smaller pieces cut from larger entities. Additionally, some shirts were excluded because they were over-represented in the collection; we wanted to study as wider range as possible of samples of the textiles. Even though the main interest was in bast fibers—flax, hemp and nettle—cotton had to be included among the interests, because sometimes it is impossible to make a reliable distinction with the naked eye, or by the feel of the textile. In this study, with the term linen we refer to plant fiber material when the species is not precisely known. The use and the difficulties in terminology will be addressed later in the article.

Collection SU4522 correlates quite well with the collections in other museums. The Russian Museum of Ethnography in St. Petersburg, Russia, has an extensive collection of White Karelian textiles (Fishman and Komarova 2000). Its collection is for most part slightly younger, with most of the textiles being from the first half of the twentieth century and industrially made, at least in terms of the materials. This indicates the rapid transition in textile production and consumption habits at the time, and the move from home production to commercial consumerism, which is what was affecting the White Karelian textile tradition at the time when Inha was visiting the area. Additionally, the National Museum of the Republic of Karelia, in Pedrozavodsk, Russia, has a collection of more than 200 pieces

of Karelian headgear, dating back to the 1870s (Kapusta 2000).

Sample-taking procedure

A total of 108 plant fiber samples were taken from the 41 selected artifacts, mainly from woven fabrics. A few samples were taken from cords and sewing or embroidery yarns. The sample size ranged from two to five mm, the objective being to minimize invasiveness. The samples were taken from seams or frayed yarn, as inconspicuously as possible. A few items had to be excluded from the examination because the sewing had been so well done that sampling without redundant unstitching was impossible. Additionally, the objective of undertaking research into the textiles by studying both the warp and weft yarns from the same cloth had to be dismissed most of the time. This would have increased the number of samples beyond the scope of this research project.

Analysis of the samples was conducted by the authors in the Nanomicroscopy Center of Aalto University by using a transmitted light microscope Leica DM4500P with rotating stage and polarized light features. The microscope was integrated with the Leica application suite LAS Core 4.5.0 software and Leica DFC420 camera with 5 megapixel resolution.

The samples were analyzed using the three-stage procedure introduced by Suomela, Vajanto, and Räsänen (2018). Even though the method was originally created for bast fibers, it was also possible to identify cotton by following the procedure. Bast fibers and cotton can be produced as products that look quite similar to one another, and so fibers can only be reliably identified with specific microscopic methods.

The first stage of the procedure is to identify the sample as a bast fiber by tracing cross-markings and dislocations on the surface of the fiber. Secondly, the microfibrillar orientation of the fiber is studied using the modified Herzog test.¹ Finally, the shape of the fiber's cross-sections is observed. By combining these methods, it is possible to distinguish flax, hemp, nettle and cotton from each other. The special case of the cotton identification will be discussed later in the article.

The textiles were visually analyzed at the same time the samples were taken. The information from the Musketti Database (2018) was re-checked and supplemented. The artifacts were carefully examined, and notations were made regarding their size, the thread count (yarns/cm), seam structures, the construction of the garment, and possible embroidery. Textile analysis was done systematically, but not by following any formula, such as those introduced by Mida and Kim (2015) or Komarova (2000).

White Karelian Textile Culture

To understand White Karelian textile material choices, a brief overview of the textile culture and the aspects that had an influence on it are essential. Geographic location, the peddling tradition, and changes in textile production and consumption habits are all subjects to consider.

According to Inha ([1911]1999, 404) in 1897, White Karelia had only 20,000 inhabitants, with women being in the majority. All the capable men traveled to Finland to peddle goods during the winter season and left the households for women to manage alone. Inha explains the situation:

So not only do inherited habits and natural tendencies encourage Karelians to peddle, but in fact it is absolutely a must. In present circumstances, even those few inhabitants who own land cannot make a living from it. ([1911]1999, 394, author's translation)

In the travel account, Inha reveals the depressing sight of extreme poverty that Lönrot had witnessed half a century earlier in 1837. The following quotation shows the importance of adequate clothing in the harsh climatic conditions of White Karelia:

Children did not have shirts or other clothes on, and that is why they always lounged on the stove when I was there. I asked [the mother] why she did not go with her children to better villages to beg, and she answered that she could not take naked children out into the freezing winter frost. (Inha [1911]1999, 180, author's translation)

On the one hand, such extreme poverty is visible in the textile collection. The materials are upcycled, patched and for the most part, were often worn until they completely fell apart. Then again, whenever possible, the most precious of materials were utilized. Textiles were valued. Numerous times Inha discussed the irreplaceable significance of textiles as gifts in social encounters and on ritual occasions. The use of textiles as ritual objects in White Karelia was dealt with earlier, for example by Konkka (1999).

Inha ([1911]1999) wrote a lengthy description of the wedding tradition. During such occasions, textiles had an important role as ritual objects

and, furthermore, as gifts and objects of exchange between two families. In addition, textiles had another important role for women on the verge of marriage. In a patriarchal society, the only item of property that a girl had and that she could take with her, were the textiles and artifacts that she had made during her childhood and youth. Inha ([1911]1999, 141) noted that:

a continuous display of ladies' clothing was hanging from the walls, including, calicos in many colors, old-fashioned, blue dyed frieze clothes, more expensive silk clothing and muslins, essentially whatever could belong to a proper dowry. The only wealth that daughters here possess, where women do not have a proper right to inherit, is their wardrobe, and that is why every purse holder tries to gather as many items of clothing as possible. On the floor were huge chests full of Seni's linens. (Author's translation)

Peddling tradition

White Karelian people were famous for the peddling tradition that they had practiced since the sixteenth century. The men traveled for the winter season from White Karelia throughout Finland to trade goods. These goods, which were in large part textiles, were purchased from Archangelsk, Kemi by the White Sea, Petrozavodsk, St Petersburg and the Shunga market among other places (Lehtinen and Sihvo 2005, 26; Nevalainen 2016, 159; Virtaranta 1958, 346). At the end of the nineteenth century, many wealthier Karelian masters had their own trading shops far away in coastal Finland, and they tended to hire other

men from smaller villages to do the peddling (Inha [1911]1999, 325). The region's poor agricultural conditions raise questions about how much of the textile fiber production was local, and how much was imported from the same trading centers where the merchandise was bought. In the nineteenth century, merchants from Archangelsk traded for goods with the Dutch, who brought silk and linen cloths from various destinations (Lehtinen and Sihvo 2005, 26). According to Inha ([1911]1999, 394–395), changes in trading customs had occurred before his arrival:

(Before) all kinds of industrial products, especially fabrics, were brought from interior parts of Russia down to the White Sea and then transported across the border into Finland. ... At that time, men were not away from home three-quarters of the year, like nowadays. The older men say that when they were boys, the actual 'Swedish trade' started; they probably meant that the trade changed to peddling.² Now, the peddlers do not take the merchandise with them when they go to Finland; they go empty-handed. The goods are bought from Finland, or produced in St Petersburg, while the peddlers only profit from what they get as provision. (Author's translation)

Inha had no interest in collecting such 'modern' examples of merchandises since his mission was to collect items as old as possible. However, as for the clothing culture that is depicted in Inha's photographs, it must have been changing quite quickly at the time. When the photographs were taken in 1894, printed

cottons and dark colors had made their way into the female wardrobe. Of course, the colors cannot be interpreted further due to the black-and-white photography. The collection includes only one shirt with a 'modern' pattern and materials (SU4522:84; Figure 19).

Clothing practices

It should be remembered that at the time when Inha was visiting White Karelia, the local clothing habits were in a period of transition. Men had already begun wearing Western-style suits, but women were still attached to the more traditional clothing. Inha made note of the fact that women adhered more to Karelian culture than did the men. Men had been more influenced by Western culture and habits while peddling goods in Finland, and the change was already visible in 1894, at least in terms of clothing (Inha [1911]1999, 400–401). The same phenomenon can also be seen in other cultures. For example, in Asian and African cultures, where cultural transformations are currently taking place, men more quickly adjust to wearing Western-style clothing. Traditionally, women are the caretakers of the home and are less influenced by the outside world. On the other hand, in a patriarchal world, one could also say that they are less free to choose.

In nineteenth century White Karelia, clothing practices were regulated by strict codes of conduct stemming from religious beliefs. Engaging in unorthodox behavior could cause a *reähkä* (Inha [1911]1999, 51). The concept of *reähkä* closely resembles what is understood as a sin, though it is considered to be more like a subject, something that can be possessed or obtained. Female clothing

regulations were directed by *reähkä* rules. Some *reähkä* rules were better followed than others. As can be seen in the photographs, most of the women wore Russian origin pinafore-style dresses with narrow shoulder straps, called *sarahvana* (Figure 2). In older times, women wore traditional *kosto*-dresses which had wide shoulder straps. According to Inha ([1911]1999, 54–55), wearing a short skirt or a dress with narrow shoulder straps could cause a possible *reähkä*. One could also get *reähkä* by wearing pleated clothing, high heels, an apron tied too low on the waist or the colors red or brown during Lent. Women had several types of headgear under their scarves, but they had to cover their hair all the time. However, girls would wear an *otsipanta*, a band around their forehead, under the scarf. If a married woman was wearing an *otsipanta*, she would receive *reähkä*.

Inha ([1911]1999, 122) was not that impressed by the male clothing tradition:

If we have a look at the male wardrobe, it does not give as stylish an impression. Nowadays, it lacks uniformity and a certain distinctive style. Mostly, they have acquired their clothes from the Finnish side, and that is why there is such diversity. In addition to normal short coats, they also wore a surtout, yellow celluloid collars, dirty ties and headgear in many shapes ranging from shabby fur caps to faded bowler hats. (Author's translation)

Inha's photographs substantiate his impression. Traditional long linen shirts are worn by old men in few of the photographs, but otherwise the outfits are as miscellaneous and



Figure 2

Men and women at a wedding. Photo: I.K. Inha, 1894. Finnish Literature Society Archives, No. 183.

westernized as depicted by Inha (Figure 2). None of these traditional male shirts are included in the collection. When considering the whole textile history of northern Europe, men's clothing has been under-represented in archeological finds as well as in museum collections. This applies to the collection in this study as well. Only two of the knitted clothing items in the collection are labeled as male clothing (SU4522:71 and SU4522:87).

Results of Textiles and Their Materials

Table 1 shows all the items that were chosen for study and the amount and points of the sampling. Identification results are marked to the right. As can be seen, flax and cotton are

chiefly presented, but also the number of nettle identifications surprised us. We were not able to identify all the samples—the unidentified are marked with a question mark and uncertain ones are combined with a question mark.

The most abundant textile groups in the collection were *rätsinä*-shirts, various types of headgear, and *käspaikka*-towels. All these textiles included embroidery on linen fabric. For Fennomans, embroidery was greatly appreciated as a form of textile expression. In his letter to MTT, where Inha suggested that the bureau could buy the textiles from him, he mainly talks about the *rätsinä*-shirts and embroidered *muiska* patches on their shoulders. This indicates that at least

to Inha, these shirts were the most valuable part of his collection (Inha 1894).

Rätsinä—female shirts

Inha saw the *rätsinä*-shirts as an important relic from the legendary past that he and the other Fennomans were trying to preserve. The way he writes about them in his letter expresses the high value the Fennomans placed on the embroideries and indicates how they viewed them as one of the representations of the old mysterious Finnish past.

In practice, all the embroideries had disappeared about 30–40 years earlier, and that is why they have been difficult to find anymore. I have bought every

Table 1. Research data (items and samples) and the results from the fiber analysis: (* item SU4522:18 was studied earlier by the authors: Suomela, Vajanto, and Räsänen 2018).

Item number	Object	Sampling place	Identification
SU4522:1a	Woman's shirt, rätsinä	Hem, vertical	Cotton
SU4522:1b		Sleeve, vertical	Nettle
SU4522:1c		Red patch	Cotton
SU4522:1d		Sewing thread	Cotton
SU4522:2a	Upper part of a shirt, rätsinä	Weft	Nettle
SU4522:2b		Shoulder	Nettle
SU4522:5a	Upper part of a shirt, rätsinä	Vertical	Flax
SU4522:5b		Horizontal	Flax
SU4522:7a	Upper part of a shirt, rätsinä	Hem	?
SU4522:7b		Shoulder, vertical	?
SU4522:7c		Red patch	Cotton
SU4522:8a	Upper part of a shirt, rätsinä	Hem	Cotton
SU4522:8b		Bodice	?
SU4522:9a	Woman's shirt, rätsinä	Loose weave, horizontal	Flax
SU4522:9b		Sleeve, vertical	Nettle
SU4522:9c	Upper part of a shirt, rätsinä	Patch	Cotton
SU4522:13a		Back	Nettle
SU4522:13b		Loose weave	Nettle
SU4522:13c		Red patch	Cotton
SU4522:15a		Horizontal	Cotton
SU4522:18a*	Upper part of a shirt, rätsinä	Middle of the right sleeve	Nettle
SU4522:18b*		Back of the left sleeve	Nettle
SU4522:18c*		Backside, bottom	Nettle
SU4522:18d*		Left sleeve, front bottom	Nettle
SU4522:20a	Sholder piece of a shirt, rätsinä	Horizontal/vertical	Flax
SU4522:20b		Vertical	Nettle
SU4522:21a	Sholder piece of a shirt, rätsinä	Weft	Flax
SU4522:21b		Warp	Flax
SU4522:46a	Female headgear, sorokka	Horizontal	Flax
SU4522:46b		Vertical	Flax
SU4522:47a	Female headgear, sorokka	Loose weave, horizontal	Flax
SU4522:47b		Dence weave	Cotton
SU4522:47c		Sewing thread	?
SU4522:47d		Red	Cotton
SU4522:48a	Female headgear, sorokka	Warp	Flax
SU4522:48b		Weft	Flax
SU4522:48c		End of the side piece	Flax
SU4522:49a		Vertical	Flax
SU4522:49b	Forehead piece of a headgear, sorokka	Horizontal	Flax
SU4522:50a		Horizontal	Flax
SU4522:50b		Vertical	Flax
SU4522:50c	End pieces of a towel, käsipaikka	Piece horizontal	Nettle
SU4522:52a		Warp	Nettle
SU4522:52b		Weft	Nettle
SU4522:53a	Towel, käsipaikka	Fringe	Cotton
SU4522:53b		Warp	Flax
SU4522:54a	Towel, käsipaikka	Weft	Flax
SU4522:54b		Embroidery	Cotton
SU4522:55a		Warp	Cotton
SU4522:55b	End pieces of a towel, käsipaikka	Weft	Cotton
SU4522:55c		Lace	?
SU4522:73a		Socks of deceased	Angle
SU4522:74a	Female fur cap, treuhka	Ribbon	Cotton
SU4522:75a	Mosquito hat, kukkeli	Vertical	Flax

(Continued)

Table 1. (Continued).

Item number	Object	Sampling place	Identification
SU4522:75b		Horizontal	?
SU4522:77a	Forehead piece of a	Horizontal	Flax
SU4522:77b	headgear, harakka	?	Flax
SU4522:79a	Female headgear, sorokka	Side piece	Flax
SU4522:79b		Embroidery yarn	Flax
SU4522:80a	Female headgear, sorokka	Interlining	Cotton
SU4522:80b		Cover	Cotton
SU4522:80c		Ribbon	Cotton
SU4522:81a	Girl's headband, otsipanta	Ribbon	Cotton
SU4522:81b		Reddish brown	Wool
SU4522:81c		Brownish green	Cotton
SU4522:81d		Yellowish green vertical	Wool
SU4522:81e		Yellowish green horizontal	Cotton
SU4522:82a	Dress, feresi	Warp	Cotton
SU4522:82c		Checked fabric	Cotton
SU4522:83a	Maiden's apron	Vertical	Cotton
SU4522:83b		White ribbon	Cotton
SU4522:84a	Female shirt	Hem	Cotton
SU4522:84b		Printed fabric	Cotton
SU4522:85a	Dress	Natural sewing yarn	Cotton
SU4522:85b		Blue fabric	Cotton
SU4522:85c		White sewing yarn	Nettle
SU4522:85d		Hem's interlining	Nettle
SU4522:88a	Female headgear	Interlining	Cotton
SU4522:90a	Female headgear	Interlining	Flax
SU4522:90b		Embroidery	Cotton
SU4522:92a	Towel, käsipaikka	Weft	Nettle
SU4522:92b		Weft in the end	Nettle
SU4522:93a	Towel, käsipaikka	Warp	Nettle
SU4522:93b		Weft	Nettle
SU4522:93c		Embroidery	Cotton
SU4522:94a	Towel, käsipaikka	Weft	Nettle
SU4522:94b		Warp	Nettle
SU4522:95a	Towel, käsipaikka	Weft?	Flax
SU4522:95b		Embroidery	Cotton
SU4522:98c	Bridal fur cap	Blue fabric	?
SU4522:99a	Female under-headgear	Checked fabric	Cotton
SU4522:99b		Blue fabric	Flax
SU4522:99c		Interlining	Cotton
SU4522:113b	Quiver	2-Ply	Hemp?
SU4522:113c		3-Ply	Hemp?
SU4522:113d		Net	Hemp?
SU4522:136aa	Ritual belt for a bride	Blue fabric	Cotton
SU4522:136ab		Red-white fabric	Cotton
SU4522:136ac		Oval	Flax
SU4522:136ba	Ritual belt for a bridegroom	Twill	Nettle
SU4522:136bb		Oval	Cotton
SU4522:136bc		Loose weave	Nettle
SU4522:136cb	Ritual belt for the magician,	Dence weaver	Cotton
SU4522:136cc	patvaska's belt	Loose weave	?
SU4522:136db	Magician's whip	Tabby weave	Flax
SU4522:136ha	Ritual belts for wedding guests	Tabby weave	Flax
SU4522:136hb		Cord	?
SU4522:136hc		Satin	Cotton



Figure 3
An upper part of a shirt, *rätsinän hiemat* (SU4522:13), turn of 19th century, Suurijärvi. Photo: Jenni Suomela.



Figure 4
Various fabrics and tacking yarns used in a *rätsinän hiemat* (SU4522:13). Photo: Jenni Suomela.

muiskarätsinä that I have found, excluding a few totally worthless ones. According to the common people, they were all made in Karelia, and I have encountered in many places these kuosali-like objects,³ which were used in sewing muiska embroideries. Similarly, I have seen some old muiska embroiderers that have these short, loosely spun silk yarns used in muiska embroidery. I went to Uhtua and inquired in

almost every one of the 200 houses, based on conservative estimates, in the village, and here are all the old fashion embroideries that I was able to acquire. It is possible that for one reason or another I could not acquire them all. (Inha 1894; Author's translation)

Inha had found many *rätsinä*s or *rätsinän hiemat* (upper part of a shirt, literally meaning the sleeves,

Figure 3), including two full shirts and seventeen upper parts of a shirt. In addition to these finds, Inha had collected 25 *muiska* embroidery samples. This selection of *rätsinä*-shirts forms a major part of the collection.

Rätsinä is a traditional White Karelian shirt, the use of which had already decline before the end of the nineteenth century. It is a long shirt with sleeves usually made of various linen fabrics. It was possible to distinguish up to four types of fabric in the

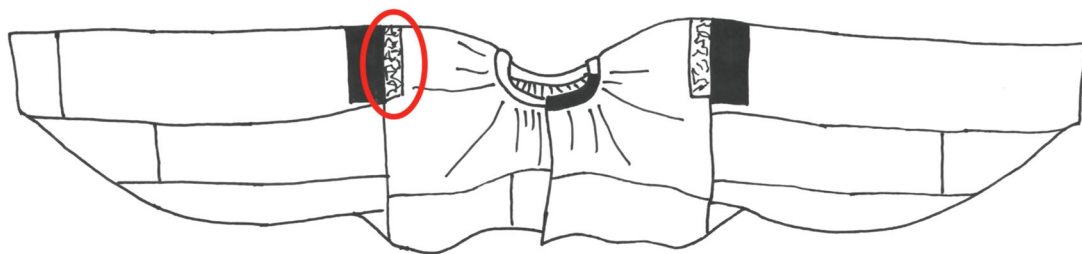


Figure 5

Line-drawing of the seams in a *rätsinän hiemat* (SU4522:18), from Uhtua. Muiska embroidery is shown as red. Drawing: Jenni Suomela.

upper parts of the shirts, *rätsinän hiemat* (Figures 4 and 5). The seams were usually sewn with neat fell seams, and the full width of the cloth was utilized whenever possible. The hem of the shirt was made from harsher material that could be removed or replaced. Both the upper part and the hem of the shirt had either hemming or selvedge in the waist, and the parts were connected only by tacking (Figure 4). There is some speculation that perhaps they could be removed due to a more frequent need for washing because of menstrual bleeding.

The embroidery patches on the shoulders are called *muiska*, and they are considered to be the most valued part of the shirt (see Figure 5). Since the 1820s, White Karelians had started to purchase and use fabric called *kumatshu* (bright red, tabby weaved cotton fabric) as a decorative element in the shirts (Lehtinen 2008, 38). It was used similarly as patches on the shoulders. In many shirts the *muiska*-patches were embroidered on a separate piece of fabric, which made it easier to recycle and re-use them. Most likely the *kumatshu*-patches have been added later to the oldest shirts. If not, the timeframe would have been incorrect, because it has been stated that some of the

shirts with *kumatshu*-patches were made prior to the 1820s (SU4522:1, 8, and 13). As the analysis results in this study clearly state, this red *kumatshu* fabric was always cotton (Table 1).

In many cases, only the detached embroidery patches ended up in the collection. The museum catalog refers to these loose embroidery patches as ‘pattern for the embroidery—*muiska*’. Perhaps they were being preserved for the future as a sort of embroidery design library. Women had no other way to store the models from generation to generation.

This is how Inha ([1911]1999, 78) depicted the collecting process and the reasons he saw for the discontinued use of the shirts,

I also bought embroideries that can be found only in old-fashioned women’s shirts. The shoulders and collars of these garments used to be embroidered with skilled craftsmanship; nowadays, these shirts have disappeared from use and are difficult to find from a land where poverty forces people to use all utility articles until they are totally worn out. (Author’s translation)

Of those 44 *rätsinä*-related items in the collection, eleven were chosen

for closer examination (Table 2). As Table 2 shows it was impossible to draw direct typological lines or areal classifications.

The results of the material analysis can be seen in Table 1. One of the shirts was made fully of cotton (SU4522:15). The other ones were made of bast fiber fabrics, excluding the hem and sewing thread in SU4522:1 and the *kumatshu* patches, which were of cotton. Of the 28 *rätsinä* fiber samples, six were flax fibers and 11 nettle. The result is at least surprising, because nettle has not previously been recognized as textile material in White Karelia by textile historians.

Female headgear

Another major group of textiles in collection SU4522, is various forms of female headgear. The collection includes 19 kinds of headgear, 13 of which we studied in detail: six of them were archaic *sorokka*-type headgear or pieces of such headgear; three caps; two *treuhkas* (female fur cap worn at weddings); one *sampsuri* (sort of an undergarment for the headgear) and one *otsipanta* (a head band).

The *sorokka*-headgear in its various forms is known by many of the Finno-Ugric peoples in Russia. The

Table 2. Characteristics of the rätsinä-shirts in collection SU4522.

	Village	Dating	Height (cm)	Lenght (cm)	Pleading in the neckline	Embroidery (or red) in the neckline	Embroidery patches	Red patches	Embroidery (or red) in the cuffs	Patches in the ampits	How many fabrics possible to recognize?	Shape of the sleeves s/n/w	Tread count (yarns/cm)	Price (kopek)
SU4522:1	Kenttijärvi	1770-90	about 27, with hem 107	~150	Yes	Yes	Yes	Yes	No	No	2	Normal	16-18 (30-32 in hem)	50
SU4522:2	Kostamus	1840	35.5	161	Yes	Yes	Yes	No	No	Yes	>1	Wide	13	50
SU4522:5	Enonsuu (Jyskylä)	Before 1894	26	158	Yes	Yes	Yes	No	Yes	Yes	1	Slim	14-16	25
SU4522:7	Vaasjoki, Kiestinki	Before 1894	34	150	Yes	Yes (red)	Yes	Yes (also longitudinal stripes)	Yes (red)	Yes	3	Wide	14-15	60
SU4522:8	Kiisjoki, Suurijärvi	Early 19th century	29	157	No	Yes (and red patches)	Yes	No	No	Yes	2	Slim	12-16 (22-24 bottom of bodice)	45
SU4522:9	Kiisjoki, Kiestinki	Before 1894	120	~160	Yes	Yes	Yes	No	No	Yes	4	Normal	12-14 (7-10 in hem)	40
SU4522:13	Suurijärvi	Turn of 19th century	22	140	No	No	Yes	Yes	No	?	4	Normal	14 (11-12 bottom of left bodice)	50
SU4522:15	Kiestinki	Before 1894	27	163	No	Yes	Yes	Yes (also longitudinal stripes)	Yes (red)	?	2	Normal	30	60
SU4522:18	Uhtua	Before 1894	33	149	Yes	Yes (and red)	Yes	Yes	No	Yes	>4	Wide	15	50

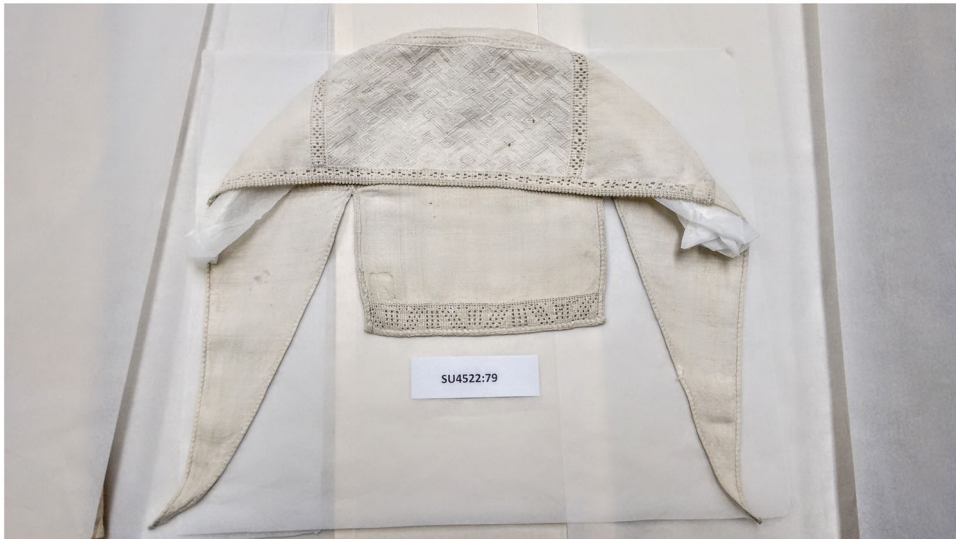


Figure 6
Female headgear, *sorokka* (SU4522:79), from Repola, Kolvaisjärvi. Photo: Jenni Suomela.



Figure 7
Female headgear, *sorokka* (SU4522:48), from Valasjärvi. Photo: Jenni Suomela.

sorokkas in this collection are quite consistent. Three of the four pieces represent an older form of a *sorokka* with frontal horn pockets. The fourth does not have these pockets, and it originated from further south in

Karelia (SU4522:79, [Figure 6](#)). These types of *sorokkas* are made of linen and constructed with four pieces: a rectangular front piece, which is decorated with embroidery and sometimes *kumatshu*, two triangular side pieces

for tying, and the cover piece, which usually has a decorative band at the end of the neck piece. In this collection, two of the *sorokkas* (the ones with *kumatshu* decorations), have a plain cover piece (SU4522:47 and 48;



Figure 8
Female headgear [SU4522:90], from Repola, Saarenpää. Photo: The National Museum of Finland.

Figure 7); one has a silk embroidery band and one has exceptional drawn-thread embroidery work (SU4522:79, Figure 6). According to Lehtinen (2008, 46) using bead embroidery in the neck piece became fashionable around the mid-nineteenth century, but these are not presented in the collection.

The appearance of the *kumatshu*-fabric suggests that the *sorokkas* were made after the 1820s, but it is possible that it was added afterwards. This type of *sorokka* had gone out of fashion before Inha's visit. All these *sorokka* samples were analyzed for flax, except for the cover and side pieces from one particular *sorokka* (SU4522:47), and the ones from *kumatshu*, which were cotton.

Contrary to the archaic *sorokkas*, the cap-modelled hats which were also confusingly called *sorokkas*, are colorful and usually covered with silk and other adornment. According to Kapusta (2000), almost all the *sorokkas* from the Kargopol district in

Archangelsk that the National Museum of the Republic of Karelia has in its collections are made of either red silk or cotton, in contrast to the ones collected by Inha, which are made of white linen (Table 1). Kapusta points out that women in northern Karelia also wore cap-modelled *sorokkas*, which were typologically younger than the linen ones. Inha's photographs reveal that this type of headgear was still in use in 1894 and was worn under a headscarf (Figure 2). Cap-modelled *sorokkas* were in fashion until the 1940s (Lehtinen 2008, 48). It is clear that headgear called *sorokka* has changed its shape over the times.

One of the caps in the collection SU4522 is made entirely of cotton (SU4522:80). It contains simple, red-striped fabric without any adornment. It is possible that this cap was used as an item worn under the more decorated covering. The second cap (SU4522:90) is made of blue silk brocade fabric, decorated with metal

lamella yarn with yellow cotton fibers as a core (Figure 8). The metal band has been loosely spun around the cotton yarn with no intention of covering it fully. The third cap (SU4522:88) contains beautiful metal lamella embroidery on salmon pink silk (Figure 9). Contrary to what was stated in the National Museum's Musketti database, our study shows that the interlining material is cotton, not flax.

One interesting, but quite controversial item is the *sampsuri*, an item worn under the actual headgear (SU4522:99, Figure 10). The *sampsuri* (SU4522:99) has a blue front piece made of flax and a checked cover piece of cotton. On the top of the frontal piece are strangely shaped, hardened small 'horns'. Often, these horns were made of iron or brass wire and covered with leather (Musketti SU4887:5). In this item, the horns are covered with fabric. The database informs readers that a *sampsuri* was used as an undergarment for "a cap



Figure 9
Female headgear (SU4522:88), from Repola, originally from Lappland. Photo: Jenni Suomela.



Figure 10
An item worn under the headgear, *sampsuri* (SU4522:99), early 19th century, from Vuokkiniemi. Photo: Jenni Suomela.

that had places for the horns shaped like fingers in gloves". As mentioned before, most of the linen *sorokkas* had these frontal pockets on the forehead. The *sorokka* in Figure 7 and *sampsuri* in Figure 10 have this corresponding shape in the frontal pieces. According to the database information,

the use of *sampsuri* declined during the 1820s, but it was probably widely used in the eighteenth century (Musketti SU4522:99). According to Lehtinen (2008, 44) and her informant Iivo Martini, the kind of checked cotton fabric that is used in the item arrived in White Karelia in the 1830s.

Either this *sampsuri* is younger than mentioned in the Musketti database, or else checked cotton fabrics arrived earlier in the region than previously thought. Also, the use of *kumatsu* fabric in the frontal decorations of the linen *sorokkas*, which required the *sampsuri* with horns be worn



Figure 11
A girl's headband, *otsipanta* (SU4522:81). Photo: Jenni Suomela.

underneath it, depicts a later time-frame for this garment. We can conclude that the headgear fashion in early nineteenth century White Karelia was defined by a horn-shaped *samp-suri* covered with a linen *sorokka*.

In Inha's photographs, married women were wearing scarfs with the previously introduced cap shaped *sorokkas* underneath them. Girls and maidens had headbands, or *otsipantas*. On festive occasions, if the owner was from a wealthy-enough family, the *otsipanta* was made of silk and was bright red (Inha [1911]1999, 122).

This collection does not include any of the scarfs, but it contains one *otsipanta* (SU4522:81, Figure 11). It is in poor condition, but nonetheless is a beautiful piece. The back is lined with natural-colored plain-woven fabric, while the front contains five types of fabric. The rim of the headband has red printed fabric, followed by brown diamond-weave-patterned fabric, then plain-woven greenish fabric. The middle of the headband contains a piece of bright fuchsia-colored fabric, probably silk. Samples for analysis were taken from the ribbon and both brown and green fabrics as well. The analysis revealed that in both brown and green fabrics the thinner yarn system was cotton and the thicker

system wool. This kind of half woolen, half plant fiber fabric, called *puoliviljalainen* is common among ethnographic textiles in Finland.

***Käspaikka* towels**

Collection SU4522 has eight examples of *käspaikka* towels (Figure 12). They are widely known and studied household textiles that were used throughout Karelia by Greek Orthodox people (Lukkarinen and Heikkilä-Palo 1995; Komulainen and Tirronen 1979; Sihvo 1981, 171–173). *Käspaikkas* have both religious and practical functions.

Käspaikkas are long white linen towels that have red embroidery designs at both ends. Usually, the embroidery is made with a double running stitch, which gives the design an angular appearance but is identical on both sides. Exceptions are possible: two of the eight towels have woven designs, one has both running stitch and satin stitch embroidery, and one has crocheting design.

Regardless of the sources, experts have typically believed that the material was always flax, but the results from this study reveal differences (Lukkarinen and Heikkilä-Palo 1995, 7; Komulainen and Tirronen 1979, 3; Sihvo 1981, 173). Four of the *käspaikkas* had been collected from the village of Repola, which is

situated on the southern border of White Karelia, and five of the fiber samples taken from those towels revealed the use of nettle. All the embroidery yarn samples taken from the *käspaikkas* were cotton.

***Burial* socks**

From the wide range of interesting textile items in the collection, one pair of socks is highlighted in this article. This is done for two reasons: the material and the special purpose of use.

Hemp was found only in one of the samples—the socks (SU4522:73ab). Inha made some notations about burial clothing traditions. According to him, out of fear of committing *reähkä*, the sin, everyone had to make their own *kuolinkosto*, or burial dress (Inha [1911]1999, 60). This was a long white dress made of harsh linen yarn, which had to be spun using a spindle (Figure 13). Additionally, some old women had saved their old *rätsinä*-shirts to be used as their burial clothing (Inha [1911]1999, 78).

The deceased was also dressed in socks and other specified garments (Paulaharju 1924, 98–99). The Musketti database information from the National Museum gives varying information about the material used



Figure 12

Käspaikka-towel, decorated with double running stitch embroidery (SU4522:93), from Repola, Saarenpää. Photo: Jenni Suomela.

for the burial socks—wool, flax and hemp are all mentioned (SU4522:73ab, SU4905:10ab). The pair of socks in this collection is made of loosely spun thick hemp yarn (Figure 14). These socks were made with the nalbinding technique by using two parallel yarns. The database also claims that they were shaped like tubes without heels. This must be a misunderstanding or misinterpretation. The form for the angle is clearly visible in the socks, but it is done without an actual heel flap.

Interestingly, both heels have huge holes and some brownish stains on them. They look like being corroded or eaten by a rodent. It is difficult to believe that the holes would come from wear when the socks were meant only for the deceased. Samuli Paulaharju ([1924]1995, 98–99) offers an explanation which could also be applied to these socks: all the burial clothing had to be made so that it would easily tear apart, meaning sewing only by tacking and with no

knots. The reason for this was that in this manner the deceased would then obtain new clothing in the afterlife. The same applied to the shoes as well: holes were intentionally made in the insoles of the shoes. It is assumed that this same idea could be applied to socks as well. These socks were made by a woman for her to wear for her burial; probably she had burnt holes in the heels of the socks intentionally for them to be ready when death arrived.



Figure 13

Woman dressed in her *kuolinkosto*, a burial dress. Photo: I.K. Inha, 1894. Finnish Literature Society Archives, No. 124.

Textile Materials and Manufacturing

Based on the results from this study, the most common bast fiber materials in White Karelia were flax and nettle. A transition phase in clothing practices also influenced the materials chosen. This demonstrates how cotton had replaced traditional plant fiber materials on many occasions. The origins of the bast fiber materials are a subject to debate. Were they

locally produced or imported from Russian trading centers further away? The origin of cotton products was undoubtedly somewhere far away from the barren soil of White Karelia. It would be possible to detect the provenance of textile fibers using strontium isotope analysis, but this method was beyond the scope of this research project (Bergfjord et al. 2012). Furthermore, north-western Russia is still lacking in strontium

isotopic baseline data, so comparisons are not possible (Oras et al. 2016).

At least some of the textile production has been local. Even though Inha does not discuss any farming or fiber crop cultivation, he had taken some photographs of the fields surrounding the villages. They serve as a proof of agricultural life in White Karelia, though it is impossible to tell from the photographs if any of the fields



Figure 14

Pair of nalbinded burial socks (SU4522:73ab), from Kontokki. Photo: Jenni Suomela.

produced bast fiber plants. It is also possible that unspun fibers were imported from elsewhere.

One of Inha's photographs shows a young girl spinning unidentified bast fibers with a spindle (Figure 15). The picture convincingly demonstrates local yarn production. The picture correlates with Sihvo's (1981, 156) and Vahter's (1944, 212–213) argument that in White Karelia spinning was done with a spindle. As can also be interpreted from the picture, it was done using a low whorl spindle. The spinner's position leads to a motion that twists the yarn in Z-direction. All the bast fiber yarns in the research material were twisted in this direction.

Additionally, Vahter (1944, 213) described the loom type that was used in the area at that time. According to her, a vertical loom was used with a narrow reel and rods, which made it possible to weave only narrow strips of cloth, about

30–40 cm. This is the familiar fabric width of *käspaikkas*, or *rätsinä* sleeves, for example.

In the following list we have collected all the itemized names for fabric materials that Inha mentions in his travel account:

- *Hursti* = a homespun and woven harsh linen fabric made of tow. It often implies the use of hemp;
- *Sarka*, 'sviitka' = a fulled, woolen fabric, coarser than broadcloth;
- *Palttina* = linen fabric. Literally, *palttina* implies a plain/tabby weave;
- *Karttuuna* = an imported, cotton fabric; calico. It was cheaper than traditional materials;
- *Sulku* = silk, imported material. Status symbol and used as an indication of wealth;
- *Muslin* = light-weight, plain woven cotton fabric;

- *Aivina* = fine linen fabric, usually implies the use of flax.
- *Shiitsa* = probably quite similar to *karttuuna*; white cretonne (Virtaranta 1958, 175–177);
- *Ahliskoinen shiitsa* = red *karttuuna*, usually with printed yellow patterns.

This list shows that the local Karelian language does not distinguish between flax, nettle and hemp. The fabrics that were manufactured from those fibers were identified using the general terms *palttina*, *hursti* or *aivina*, which refer to the appearance or feel of the textile. This is quite understandable and logical because it is impossible to identify the fibers from different plant species based solely on their appearance. All of plant fibers discussed in this article can be produced with confusingly similar outcomes. It is also possible that textile materials were imported to the area and people did not have



Figure 15

Young girl spinning yarn. Photo: I.K. Inha, 1894. Finnish Literature Society Archives, No. 154.

actual knowledge of the fiber materials. This could have caused the misunderstanding about the fibers.

The perplexing textile-related vocabulary does not clarify the situation. In Finnish, linen can refer either to the fibers from the flax plant, or in eastern Finland to the fibers from the hemp plant or additionally to just about everything made of whitish, tabby-weaved fabric. Nettle can refer

to the actual fibers from the plant, but certain textile types are also called by a name that include the word nettle, even though the material can be something else. For example, Virtaranta (1962) gives a lengthy description of coarse sacks that are called as nettle sacks, but the material could be anything suitable for the purpose. Kaukonen (1964, 24) again, gives an example of fine fabrics made

of cotton or linen fibers and were called as “nettledug”, “neslelin” or “nesseltuch”.

In general, the term linen has been used as a synonym for flax fiber cloth, or as a name for a household textile that is white and tabby weaved, often a table-cloth, bedsheet, towel or similar. Fairly common misunderstandings have been generated from its dual meaning. Based on this,

we suggest that the term linen should be used to refer to all three of these source materials and additionally to cotton. The term linen was a general name for certain types of fabrics without making any reference to the actual material. When referring to flax fiber textiles, for clarity, they should be described as flax, not linen.

Fiber plants

Of all the fiber samples studied, flax was the most common. This finding was not a surprise. Based on what had been written before about the fiber materials in the area, the results would have shown mostly flax as well as some hemp. Our results were quite divergent, though. Of the 108 samples, hemp was reliably found in only one pair of socks and nettle in 23 samples. Cotton again was extensively present. This was expected because the collection contains numerous items that are clearly from the end of the nineteenth century when the transition to easily available and cheaper material cotton was occurring.

When comparing the fiber analysis results with oral ethnographic material collected concerning the subject, the results are somewhat contradictory. In the ethnographic questionnaire material from the archives of Kotus (Institute for the Languages of Finland), nettle is rarely mentioned, and hemp is regularly highlighted and equated with flax in both textile historical and oral ethnographic materials. Ethnographic questionnaires were commonly used in early twentieth century Finland to collect lexicological information about the folk life. The utilization and processing of flax and hemp were subjects addressed in multiple questionnaires (see e.g., Niemimaa 1939 on the matter). In

questions and topics, flax and hemp were typically dealt with together, most likely increasing the common idea of the frequent use of hemp in textiles.

Fishman and Komarova (2000) do not mention any bast fiber material other than flax used in the White Karelian items in the collections of The Russian Museum of Ethnography. In Heikkinen's (2000) interview material, with women born in the 1920s–1930s in Southern Karelia, only flax is mentioned as textile material, not nettle nor hemp.

The knowledge Virtaranta (1958) acquired from his informants is contradictory. One informant said that flax does not thrive in White Karelia—the climate is too cold. They received flax from flour sacks and re-used it for table covers and *käspaikkas*. In contrast, another of his informants was proud of their flax production and felt offended when asked if they used nettle as a textile material: 'Only the Finns used nettle for textiles and food, not us!' Some of Virtaranta's informants said that hemp, in this connection referred to as linen, was grown in some villages in White Karelia (1958, 194–195; 395). Then again, Lukkarinen (1918, 37), who traveled in White Karelia in the early twentieth century, was certain that neither flax nor hemp was ever cultivated in the area. Textile material was bought from elsewhere and manufactured to make clothes and fishing nets on the spot. In conclusion, ethnographic references do not present a consistent picture of the used plants and the results can be argued in every direction.

Nettle as a textile plant has a peculiar spot in the history of textile materials. Archeological finds from the previous decades in northern

Europe do recognize the fiber, as do agricultural handbooks from Sweden in the nineteenth and early twentieth centuries (see, von Möller 1881; Rodenstam 1918). Yet it has not acquired a place beside flax and hemp in the general textile history books. Furthermore, something can be interpreted from the fact that it is not mentioned in the Finnish ethnographic questionnaires in the early twentieth century but is known at least as a name for textiles in the estate inventory deeds from the seventeenth to nineteenth centuries. Its use had diminished quite quickly, and after a few generations it was forgotten and left behind.

Notions of Microscopic Analysis

When analyzing the fiber samples by using microscopic methods, we noticed some issues worth mentioning. This concerned both bast and cotton fibers. When following the three-stage protocol for identifying bast fibers, we noticed that it was impossible to make any predictions of the bast fibers species based on the surface morphology of the fibers. Even though it is said that flax fibers are straighter with less frequent cross-markings compared to hemp or nettle, and that nettle has more deformities and extremely dense cross-markings, this study showed that identifications based on observations of these surface characteristics are inadequate. There were nettle fibers with scattered cross-markings (Figure 16) and flax fibers with malformations (Figure 17).

In this textile collection, it was possible to detect the development and change in cotton fiber properties. Several older items contained some truly archaic, rural versions of cotton fibers (Figure 18). The fibers had few



Figure 16
Sample SU4522:92b, nettle fibers. Käspaikka towel from Repola. Photo: Jenni Suomela.



Figure 17
Sample SU4522:9a, flax fibers. *Rätsinä*-shirt from Kiestinki, Kiisjoki. Photo: Jenni Suomela.

twists which appeared irregularly. The shape of the fiber can easily be confused with silk that is not properly

degummed and still has two parallel filaments. The unflattened cotton fibers often have cross-markings on

their surface, and for that reason they resemble the appearance of the bast fibers. Modern cotton fibers are flat



Figure 18
Sample SU4522:88a, from a cap. Photo: Jenni Suomela.

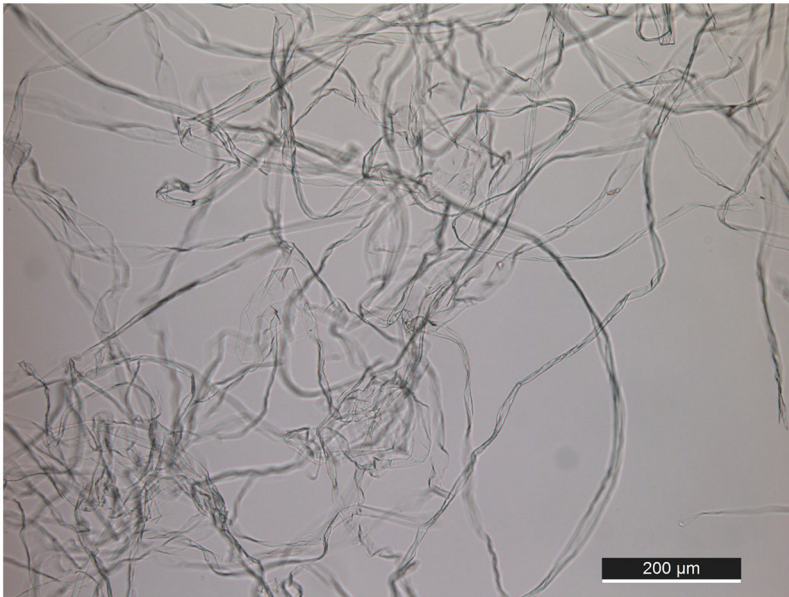


Figure 19
Sample SU4522:84a, a modern-style female shirt, from Repola. Photo: Jenni Suomela.

and ribbon-like, and even though the twist is divergent, it is still regular (Figure 19).

The cross-sections were equally instructive. Hemp and flax are difficult to distinguish by cross-sectioning because they are both polygonal in shape. Similarly, nettle and cotton are alike when examined in a transverse direction. Their cross-sectional shape is oval or kidney in appearance, while cotton has more variation and it can be strongly curved. When the identification is based on the three-stage procedure applied in the study, the only way to distinguish cotton from bast fibers is using the modified Herzog test. Problems also appear in this respect if the cotton is in such a degraded form that the color modifications do not show when using in polarized light.

With fiber cross-section preparations, it is important to pay attention to the cutting angle of the fibers. If they are not cut exactly transversally, then the shape of the fiber might change. Roundish flax fiber with a small lumen oblique cut might easily seem to be oval with a long lumen, as with nettle.

Conclusions

In this article, we have figuratively traveled to White Karelia, Russia in the nineteenth century, with I. K. Inha as our guide and Counselor. Our aim was to know more about the plant fiber textile materials that were used in the region. Without specific microscopic methods, we would have touched the clothing, in an imaginary way, and tried to make educated guesses about the materials. Now it is different. We know what materials they used at that time, but we do not yet have a clear picture of where the material was acquired or from whom,

and how it was produced as textile items. The effect of the peddling tradition on the materials and textile manufacturing in the area requires further research.

This study shows how microscopic analysis throws light on the complex materiality of Karelian textiles collected by I. K. Inha and his colleagues. Through the realism of Inha's photographs and travel account, we glimpse what he saw and understood about the daily life of the people, especially the women, in the places he visited in 1894. The photographs reveal the fact that the items in the collection mostly represent older fashion styles that still prevailed at the end of the nineteenth century. Additionally, the photographs and textiles themselves extend the possibility of description and analysis by allowing interpretation of the place and context. Overall, the study has enabled the illumination of the precious and original textile culture of the White Karelian people.

Notes

1. In the modified Herzog test, a lambda plate is applied to polarized light. When bast fibers are positioned horizontally or vertically, they appear in blue or yellow hue according to the twist of the S₂-layer of the microfibrils (see e.g., Suomela, Vajanto, and Räisänen (2018) for more information).
2. Finland became an independent nation in 1917. It had been a Grand Duchy of the Russian Empire from 1809, and before that it had been under Swedish rule.
3. *Kuosali* is known as a Russian distaff.

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