Interpreting clothing culture in late Mesolithic burials of Northern Europe based on animal tooth ornaments

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Zusammenfassung

Interpretation der Bekleidungskultur in spätmesolithischen Bestattungen Nordeuropas anhand von Tierzahnornamenten

Tierzahnanhänger waren die wichtigsten Schmuckstücke der spätmesolithischen Menschen in Nordosteuropa. Die Anhänger hatten verschiedene Funktionen, wie zum Beispiel Verzierung, Schutz, Ausdruck der Identität und Klangerzeugung. In diesem Beitrag untersuchen wir Tierzähne in Gräbern als Indikatoren für Kleidung und Accessoires wie Kopfbedeckungen, Gürtel, Rasseln und Masken. Unser Material besteht aus Zähnen von eurasischem Elch (Alces alces), *europäischem Biber* (Castor fiber) *und Braunbär* (Ursus arctos) *aus dem spätmesolithischen Bestattungsplatz Yuzhniy Oleniy Ostrov in Karelien, Nordwestrussland.*

Schlagwörter Mesolithische Gräber, Tierzahnanhänger, Kleidung, Kopfbedeckung, Gürtel

Summary

Animal tooth pendants were the most important ornaments for the late Mesolithic people occupying north-eastern Europe. Pendants had various functions, such as ornamentation, protection, expression of identity, and sound production. In this paper, we study the animal teeth in graves as indicators of clothing and accessories like headgear, belts, rattles and masks. Our material consists of teeth from Eurasian elk (Alces alces), *European beaver* (Castor fiber) *and brown bear* (Ursus arctos) *from the late Mesolithic hunter-gatherer burial site Yuzhniy Oleniy Ostrov in Karelia, north-western Russia.*

Keywords Mesolithic graves, animal tooth pendants, clothes, headgear, belts

Introduction

Furs and skins of mammals, birds, and fish were materials commonly used for clothing in the Mesolithic. Such soft materials are perishable and prone to rapid decay, leading to the current situation where scholars rarely have much evidence of clothes from the Stone Age (see e.g. Gilligan 2018). Bones and especially teeth survive better, and tooth artefacts have been found in many Stone Age graves in northern Europe. Animal teeth are the skeletal elements most frequently used for making pendants in the Stone Age. Previous research suggests several functions for tooth pendants in addition to aesthetic or decorative realms. They could have been used for ornaments, for embroidery on clothes or as part of jewellery, and they can carry symbolic and magical meanings. For example, P. Vang Petersen (2016) suggests that the main purpose of tooth pendants was protection. According to C. M. Taksami (2001, 12), the peoples of Siberia historically used teeth as protective amulets, for example, placing a bear tooth at the foot of a child's cradle. The Nenets of North Siberia hung polar bear *(Ursus maritimus)* and grey wolf *(Canis lupus)* canines from their belts to protect them from evil spirits, as a cure for pain and to promote success (Ermolova 2005, 197). R. Rainio et al. (2021) have shown that a remarkable sound is produced by sets of teeth from Eurasian elk *(Alces alces)* when they are struck against each other, concluding that such sets were used as musical instruments in ceremonies.

Most animal teeth found in the Late Mesolithic (c. 8200–8000 cal BC) cemetery at Yuzhniy Oleniy Ostrov (YOO) (north-western Russia) had been fashioned into pendants. Some of the elk teeth are without any human-made and visible attachment system, but earlier research suggests that they were also attached to a cloth or wrap, but the attachment system was different (Mannermaa et al. 2021; Rainio et al. 2021).

In the only major publication analysing the YOO burials and their inventories, N. N. Gurina (1956, 187) concluded that the presence and location of animal tooth and bone pendants indicated that the people using the YOO cemetery buried their dead in warm clothes. She used elk teeth to interpret the costumes' appearance, assuming that the ornaments were originally attached to leather or fur clothing. Gurina suggested that both men and women mostly wore long-sleeved dresses or coats, which extended slightly below the knees but never reached the feet. She also mentioned that some graves contained evidence of footwear and headdresses (Gurina 1956, 189; 256). Furthermore, she noted that the men buried in the YOO cemetery wore elk teeth sewn onto the sleeves and chest area and that more belts can be observed in female than in male burials. Otherwise, N. N. Gurina did not observe any biological sex-related aspects of clothing.

In this paper, we take a second look at the locations of the teeth in the YOO graves and propose interpretations

Fig. 1a–c Animal tooth pendants from the Yuzhniy Oleniy Ostrov cemetery, Republic of Karelia (Russia). a Eurasian elk *(Alces alces)* incisors from a triple grave 55–57 (MAE 5716-184); b A brown bear *(Ursus arctos)* canine from grave 118a (MAE 5716-566); c Eurasian beaver *(Castor fiber)* incisor plates from a triple grave 55–57 (MAE 5176-183).

Abb. 1a–c *Tierzahn-Anhänger aus dem Gräberfeld von Yuzhniy Oleniy Ostrov, Republik Karelien (Russland). a Schneidezähne des Elchs* (Alces alces) *aus dem Dreifachgrab 55–57 (MAE 5716-184); b Eckzahn eines Braunbären* (Ursus arctos) *aus Grab 118a (MAE 5716-566); c Schneidezahnplatten des Bibers* (Castor fiber) *aus dem Dreifachgrab 55-57 (MAE 5176-183).*

regarding what kinds of clothes, garments or accessories the teeth might have adorned. We use new biological sex identifications of the dead proposed by Batanina et al. (in prep.), which combine morphological estimations and molecular analysis (peptides and DNA).

Material and methods

The Yuzhniy Oleniy Ostrov (YOO) cemetery was excavated more than 80 years ago, and the artefacts have been studied by various researchers over the years (e.g. Mannermaa et al. 2021; Rainio et al. 2021; Mannermaa et al. 2022). The most detailed description of the burial inventory of 177 burials was published in 1956 by archaeologist N. N. Gurina, who also participated in the excavations. In total, the YOO inventory comprises almost 6000 animal tooth pendants. According to N. N. Gurina (1956), 4372 of them are made from Eurasian elk, 1155 from Eurasian beaver *(Castor fiber)* and 170 from brown bear *(Ursus arctos)* (Fig. 1). In addition, a few teeth of domestic dog *(Canis familiaris)*, grey wolf, wild reindeer *(Rangifer tarandus)* and wild boar *(Sus scrofa)* are present. Eurasian elk tooth pendants have been found in 82 separate burials, often

in great numbers. The number of elk teeth can be as high as several hundred per grave, whereas the numbers of beaver and bear teeth are much lower. Animal teeth can appear side by side in tight rows, in row-like formations on the skull, neck, arms, chest, pelvis, thighs or feet of the deceased, or in more scattered patches. The garments and the suspension loops for pendants have decayed in the ground, but researchers have proposed that the pendant rows or formations represent fringes or decorations on garments or accessories.

Previous research has shown that systematic attachment methods were used on tooth pendants at the YOO cemetery (Gurina 1956; Mannermaa et al. 2021). All Eurasian elk teeth were fashioned into pendants by making a groove or grooves in the proximal part of the root, while the brown bear teeth either show grooves or perforations. Eurasian beaver tooth pendants were made by cutting the tooth longitudinally into halves and using the enamel part as a pendant. They can have bilateral grooves on either one or both ends. R. Rainio et al. (2021) studied a sample selection of elk teeth in detail and concluded that grooves in each grave were made somewhat systematically, possibly by one person using different tools. They likewise concluded that the string forming the loop must have been quite thin, judging from the depth of the grooves in many teeth. Although the depth, breadth and number of grooves on teeth varied, they usually allowed for a durable hold (Mannermaa et al. 2021).

The unbroken crowns of most elk teeth show severe pitting and strong polishing, which can be associated with the general wear from carrying and wearing the pendants. It indicates that they were used before being placed into a grave (Rainio 2021, 648). Pendants were not only grave goods; they were also carried extensively and worn in contact with soft and solid materials, likely during a considerably long period before interment. Most likely, garments were owned and used by the deceased person.

Attachment types on individual pendants can offer information as to whether they were attached tightly, loosely, or perhaps not attached at all. Individual teeth were not investigated for this study, and we cannot know precisely what kind of attachment was made for each tooth. Neither have we investigated the precise location of each individual tooth in the grave – a simple reason for this decision is that the original documentation did not provide enough detail to have allowed for such an investigation. In addition, the number of teeth belonging to each species in the graves was generally not considered.

The body positions of the deceased at the YOO cemetery are relatively homogeneous, but some variation does exist. The deceased are mostly placed on their back, but in some cases, they lie slightly or completely on their sides. In four burials the buried was placed in a leaning position. The head may have been turned to the right or left. The arms may be bent, with hands resting on the abdomen, or they can be straight, lying parallel to the sides of the body. The position in which the deceased was lying was not considered in this study, with a few exceptions: we registered whether the face was directed to one side to a remarkable degree.

Artefacts or human skeletal elements found in graves may have moved from their original position due to the decomposition of the soft parts of the body and/or the garments. Despite this fact, here we do not consider whether the objects may have moved from their original position during and/or after decomposition of the body (i.e. archaeothanatology). The deceased was buried in a leaning position in at least four of the graves (graves 25, 68, 100, 125 and possibly 123). In such cases, the material may have slid towards the feet as a result of gravity.

In this article, the species, type, number and location of animal teeth in the YOO burials were studied, based on the burial descriptions and drawings provided by N. N. Gurina (1956, Appendix 1). The data retrieved were drawn with simple symbols and relative accuracy on a plan (Fig. 2), showing a total of 82 burials. On the plan, the body size and body position of the deceased were schematically plotted to enhance the comparability of burials and burial equipment. The plan summarises a large amount of information and enables a general examination of the burials and their tooth finds. Since the original purpose of the plan was to summarise information for our research on Eurasian elk tooth pendants, it comprehensively shows the graves with teeth from this species. Although brown bear and Eurasian beaver teeth are also marked on the graves, it should be noted that around 20 graves that exclusively contained teeth from these species are missing from the plan. Furthermore, while the number of Eurasian elk teeth is given precisely, the number of bear and beaver teeth is only very roughly indicated. The purpose of this article is to show the preliminary results of our research on ornaments and clothes based on a study of elk tooth pendants. The type of burial, i.e. single or multiple burials, preservation stage of the skeletal remains, or the age of the deceased individual were not considered in our analysis.

Results

Our analysis of the simplified location of pendants shows that many graves have complex constellations and contain many animal teeth but also that some graves contain just one or a few animal teeth (Fig. 2). The locations of animal teeth vary remarkably, indicating that individuals received not only differing numbers of teeth from different species but also that the teeth were attached to clothes, garments or ornaments in varying ways.

Eurasian elk teeth

Eurasian elk teeth are usually found in sets on all parts of the skeleton. Their number varies from one to 303 in different graves. 27 graves contain just a few (1–7) elk teeth, clustered on one spot of the skeleton. For example, one or two elk teeth were found by the right hand of the deceased in graves 20 and 21.

15 graves contained more than 100 Eurasian elk teeth. Five of these graves contain a deceased male, two a probable male, four a female and one a probable female.

In graves with more than 100 Eurasian elk teeth, the pendants are usually found on all parts of the body. A

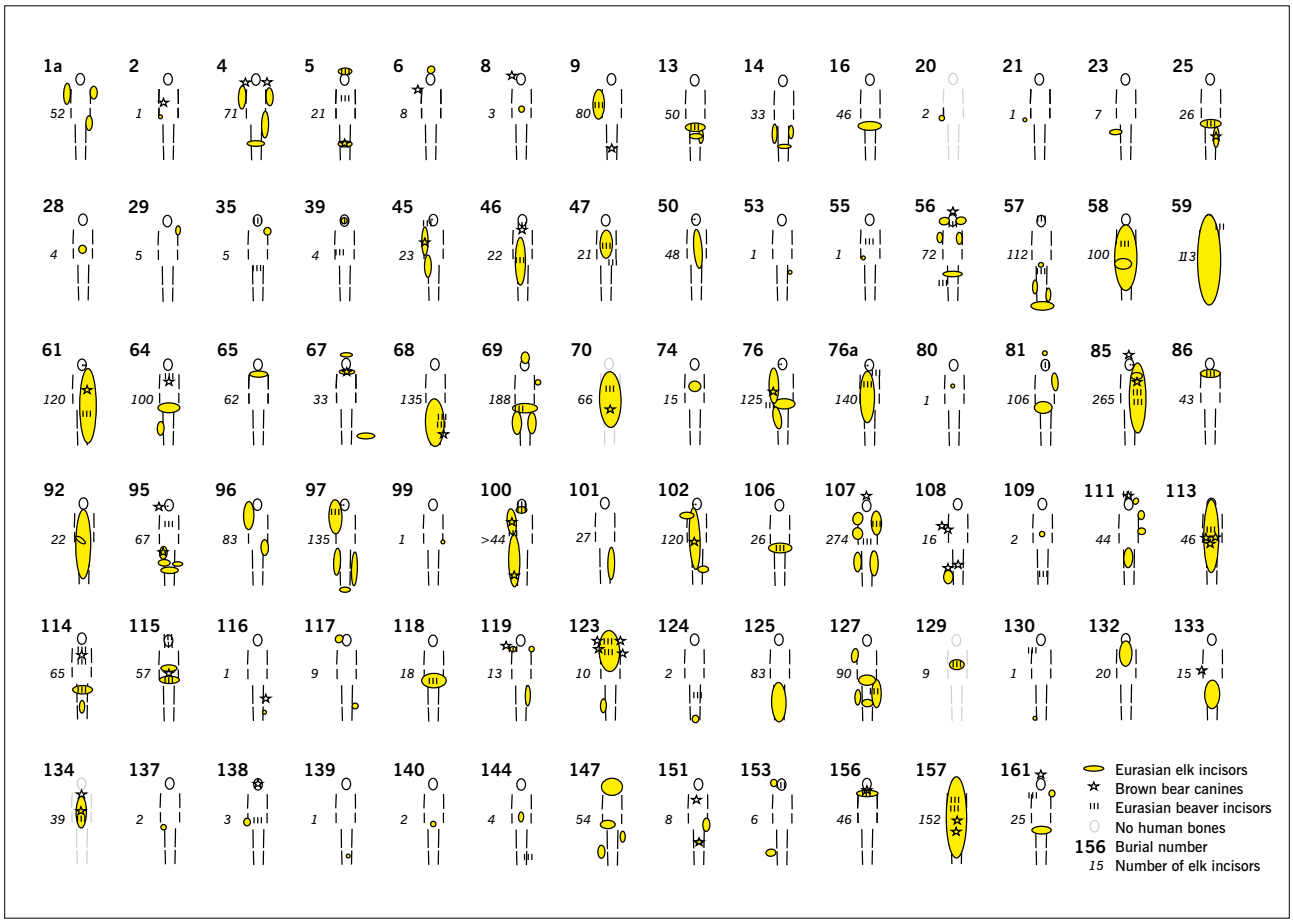

Fig. 2 Location of the incisors of Eurasian elk, canines of brown bear and Eurasian beaver tooth plates at Yuzhniy Oleniy Ostrov cemetery, Republic of Karelia (Russia). Only graves including Eurasian elk teeth are presented. The grave numbers and number of Eurasian elk teeth are indicated.

Abb. 2 *Lage der Elchschneidezähne, der Braunbär-Eckzähne und der Biber-Zahnplatten auf dem Gräberfeld Yuzhniy Oleniy Ostrov, Republik Karelien (Russland). Es werden nur Gräber mit Elchzähnen gezeigt. Die Grabnummern und die Anzahl der Elchzähne sind angegeben.*

good example is grave 107, where 274 Eurasian elk teeth are concentrated on the shoulders, the right arm and the legs, giving the impression that elk teeth were attached to a garment that covered the entire body. Grave 68 is an exception, as all 135 elk teeth are concentrated in the area of the lower body. The grave is one of the leaning burials, though, and so the teeth might have slid downwards from their original position. Clusters of elk teeth are often found in the area of the waist or pelvis (e.g. graves 13, 16, 106, 64, 114, 161 and 118).

Brown bear teeth

The number of bear canines found in the graves under study ranges from zero to eight. Brown bear teeth have been found in the neck or chest area in eight graves (46, 64, 67, 86, 95, 114, 151 and 156), and they may be associated with necklaces or collar ornaments. Seven graves (25, 70, 95, 102, 113, 151, 157) contain one or several bear teeth on the waist, hips or upper leg area. These could be ornaments attached to belts or hanging from such belts. In ten graves, bear teeth are found in association with the skull (either above or by the left or right side of the deceased) (graves 4, 8, 56, 107, 111, 123, 138 and 161). Grave 138 contains a bear tooth on the deceased person's face, without any other artefacts.

Eurasian beaver teeth

Beaver tooth plates have been documented in 47 graves, and their numbers in our sample of graves range from one to 125. They are located in the area of the head (5, 57), on the face (35, 56, 100, 115), neck (46, 86, 156), chest (5, 47, 70, 76a, 95, 114, 157), shoulders (119, 130, 191), waist or pelvis (13, 25, 38, 46, 47, 55, 69, 113, 114, 115, 134, 138), between or on the femora (35, 56, 57, 61, 68, 108, 127), and on the feet (109, 144).

The attachment method of the beaver teeth differs from the teeth of Eurasian elk and bear. The beaver tooth ornaments found at YOO cemetery are made by breaking the tooth in half lengthwise and using only the enamel part of the tooth. The enamel of a beaver's incisors is bright orange in colour, which makes them particularly beautiful (Fig. 1c). On the other hand, enamel breaks quite easily and thus may not be durable enough, for example, for use as a rattle. Therefore, we suggest that beaver teeth were attached tightly to the garments and did not hang free from them,

i.e. differing from the interpretation of the elk teeth. This interpretation is supported by the location of the grooves; most beaver tooth artefacts have grooves on both sides of the specimen. At YOO cemetery, beaver teeth were often found in clusters consisting of several specimens placed in rows (single teeth also appear in some of the graves).

Animal teeth on the head and face

Several individuals have pendants around the head or on the face[1]. In grave 115, potentially that of a male, several beaver teeth were found arranged in a row on the face (the eye orbit), which can be interpreted either as headgear ornamentation or a mask. The individual in grave 35 (male) may have worn a mask containing beaver teeth. In some graves the teeth are on or even on top of the head (6, 85, 107, 111, 161), giving the impression of a different headdress. Of these, graves 85, 107, 111 and 161 have a pair of bear teeth.

Animal teeth in the area of the neck

Pendants are located on the area of the neck in at least five burials (65, 67, 86, 114, 156; both males and females). In most cases, they form a compact, horizontal row or row-like formation in relation to the neck. These pendants may have been attached to a collar, or they may have been necklaces and not attached to fur or skin clothes at all. Most such sets combine elk and beaver teeth, and sometimes also bear teeth. Grave 65 is interesting because it contains 62 elk teeth in a cluster around the neck and no other tooth ornaments. Grave 156 contains elk and bear teeth and they are limited to the neck and shoulder area, while grave 86 contains elk and beaver teeth around the neck but no other pendants.

Animal teeth on the upper body/shoulders and arms

Graves 1a, 4, 56, 96 and 107 are good examples of graves where clusters of pendants, mostly consisting of Eurasian elk teeth, are found almost symmetrically by the shoulders and arms of the deceased person. A logical explanation for this type of arrangement would be ornaments attached to the long sleeves of an item of clothing. N. N. Gurina (1956) mentioned that especially men found buried in the YOO cemetery wore elk teeth sewn on their sleeves and in the chest area, but we cannot confirm this interpretation as the biological sex of so many deceased persons remains unknown. Some graves (45, 76, 97) seem to have elk teeth on only one arm (instead of both), and in those cases, the decoration on the chest may have fallen off to one side, onto the arm. Such mid-chest beads are found in graves 50, 47 and 132. On the other hand, decorations on the torso extend to the thighs/knees in graves 61, 85 and 102, suggesting that they did not only serve as sleeve ornaments.

As already mentioned, we did not conduct a systematic analysis of the skeletal position or completeness of the human skeleton. However, we have made one observation of note: in several cases, the direction of the face (i.e. head is turned towards the left or right shoulder) and the teeth pendants are concentrated on the same side of the body (graves 61, 76, 85 and 102 and perhaps also 97). This potentially refers to a position where a cloth or wrap with tooth ornamentation has slid to one side, in the same direction toward which the head was tilted. In grave 85, all the Eurasian elk teeth are found on the left side of the body. Here, the face of the individual is bent towards the left, which might indicate that the whole body may have been tilted somewhat to the left, potentially resulting in the teeth pendants sliding into a new position. Thus, it is possible that the teeth were originally more evenly distributed over the body area.

Graves 46, 58, 61, 76a, 85, 92, 102, 113 and 157 contain a huge number of Eurasian elk teeth arranged from the upper torso to the legs and knees of the deceased. They seem to form a group of their own on a large, fully decorated garment. The graves almost always contain beaver and bear teeth as well (Fig. 3).

Animal teeth at the waist

Teeth found at the waist of the deceased can derive from belts; they were either attached to the belt itself (in clusters) or hung from it. Tooth pendants are found in the waist area of the deceased in 18 graves[2]. Four of the deceased are males, one is potentially a male, five are females, one is potentially a female, and seven are of unknown biological sex. Graves 13, 25, 64, 69, 114, 127 and 161 contain elk and beaver teeth in the pelvic region, perhaps from a similar type of garment, possibly a belt, a waistband or the garment's hem. The decorations form a dense horizontal row running from the right to the left side of the body (Fig. 4).

The individual in grave 115 (the one furnished with a potential mask) seems to have been wearing a belt with elk and beaver teeth as ornaments and two bear teeth, perhaps hanging from it. An almost identical type of ornamented garment exists in graves 70, 113 and 157 (two females and one individual with unknown biological sex). In the latter case, elk tooth pendants are attached over a large area of the body, with beaver teeth in the area of the waist and bear teeth in the region of the pelvis and upper femora. The garment might have included a belt or a waistband ornamented with beaver tooth plates and suspended bear teeth.

Animal teeth in the pelvic area and near the upper legs

In 23 graves, animal teeth are found in the pelvic area and on the upper legs[3]. Most often, teeth found in the pelvic area belong to the Eurasian elk or Eurasian beaver. Animal teeth found in the pelvic and upper leg area could be from orna-

1 E.g. graves 5, 6, 8, 35, 39, 56, 57, 67, 69, 81, 85, 107, 111, 115, 123, 138, 147, 153 and 161.

2 8, 21, 28, 39, 45, 47, 55, 58, 70, 95, 107, 109, 113, 114, 115, 129, 134 and 157.

3 Graves 13, 16, 25, 35, 46, 47, 57, 58, 64, 69, 76, 81, 106, 107, 111, 114, 115, 118, 127, 138, 147 and 161 potentially also 85.

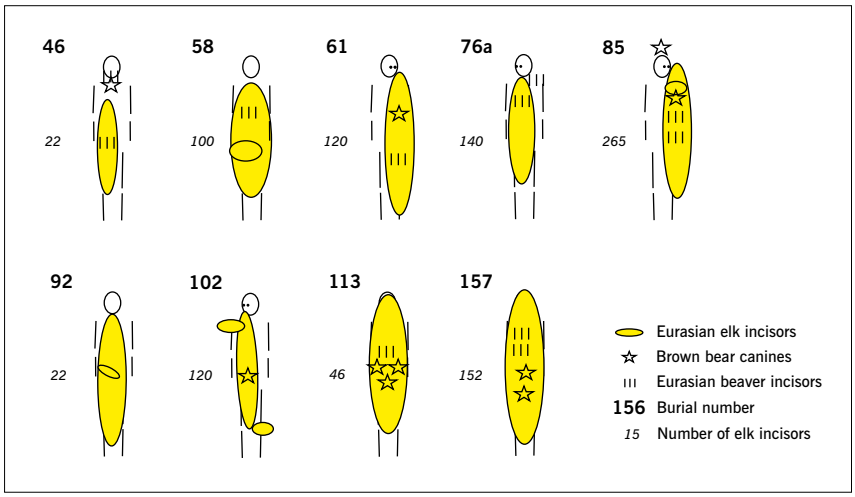

Fig. 3 Some individuals at Yuzhniy Oleniy Ostrov, Republic of Karelia (Russia), have a fully decorated garment ornamented with Eurasian elk, brown bear and beaver teeth.

Abb. 3 *Einige Individuen in Yuzhniy Oleniy Ostrov, Republik Karelien (Russland), haben ein vollständig dekoriertes Gewand, das mit Zähnen von Elch, Braunbär und Biber verziert ist.*

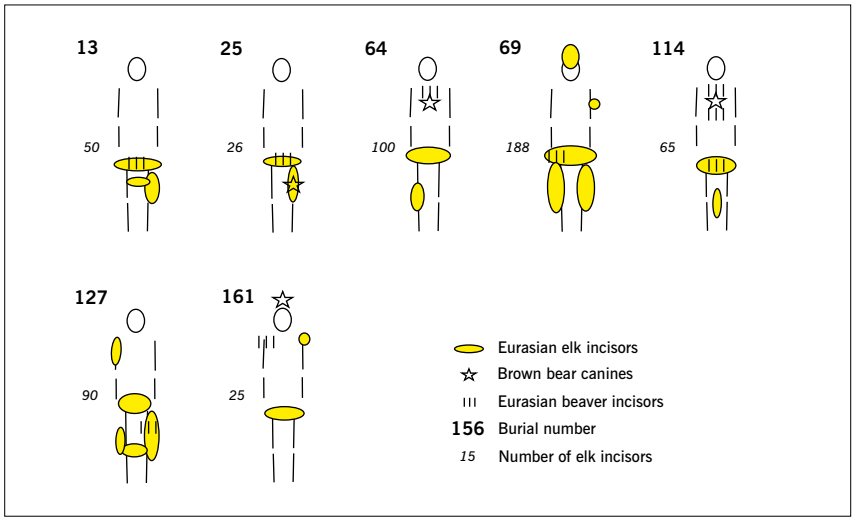

Fig. 4 Similar garments could have been in several graves at Yuzhniy Oleniy Ostrov, Republic of Karelia (Russia). Individuals in these graves have Eurasian elk and Eurasian beaver teeth in the pelvic region. These decorations form a dense horizontal row running from the right to the left side of the body.

Abb. 4 *Ähnliche Kleidungsstücke könnten sich in mehreren Gräbern in Yuzhniy Oleniy Ostrov, Republik Karelien (Russland), befunden haben. Die Individuen in diesen Gräbern haben Zähne von eurasischem Elch und eurasischem Biber in der Beckenregion. Diese Verzierungen bilden eine dichte horizontale Reihe, die von der rechten zur linken Seite des Körpers verläuft.*

ments worn with tunic-type fur or skin clothing (or a dress, coat or apron). Clusters of pendants in the shape of a potential apron can be observed in graves 14, 57, 69, 95 and 127 (three females and two individuals with unknown sex). The decorations form not only horizontal but also vertical rows running parallel to the lower limbs of the deceased (Fig. 5).

Animal teeth on the lower body, between the legs or knees and on the feet

Tooth pendants are found dispersed in the area of the lower body in several graves (e.g. 14, 57, 68, 69, 76, 125, 127 and 133). Sometimes, the clusters of elk teeth found on the upper legs are in well-defined vertical rows. Such is the case in graves 97 (135 teeth, some also lying on the right shoulder and arm), 69 (188 teeth), 57 (112 teeth), 127 (90 teeth, also on the waist and right arm) and 14 (33 teeth). Each of these graves contains a female individual, except one where the individual is of unknown sex. Such patterning may suggest that the teeth served as hem or apron ornamentation, but they might also have been used with leggings or long-legged footwear, especially when the ornaments are located in the immediate vicinity of the feet (Fig. 6). It is notable that footwear ornamentation is indicated in very few of the YOO burials, only in graves 57, 76, 97, 116, 124, 139 and 116 and perhaps 144 (half of these graves contain females and half males) (Fig. 7).

Discussion

Despite the rather simplified approach, our analysis has made it possible to identify different types of clothing or accessories with which the deceased were equipped in YOO burial contexts. Some individuals have ornaments on the arms and hands (wrists), potentially indicating wristbands or long-sleeved coats or garments. Several individuals wore a long garment or coat with animal tooth ornamentation. Judging from the location of the pendants, similar types of clothing were worn by both males and females. Long-sleeved, lengthy garments ornamented with elk teeth seem to have been worn by both sexes. N. N. Gurina (1956) suggested that women, in particular, wore a garment or skirt adorned with elk incisors on the hem. It sometimes extended only to the hips, but in other cases the dress appears to have been longer, reaching down below the knees. We have outlined that the clothing of both sexes may potentially have been equipped with hem ornaments (of both elk and beaver teeth or of just one species).

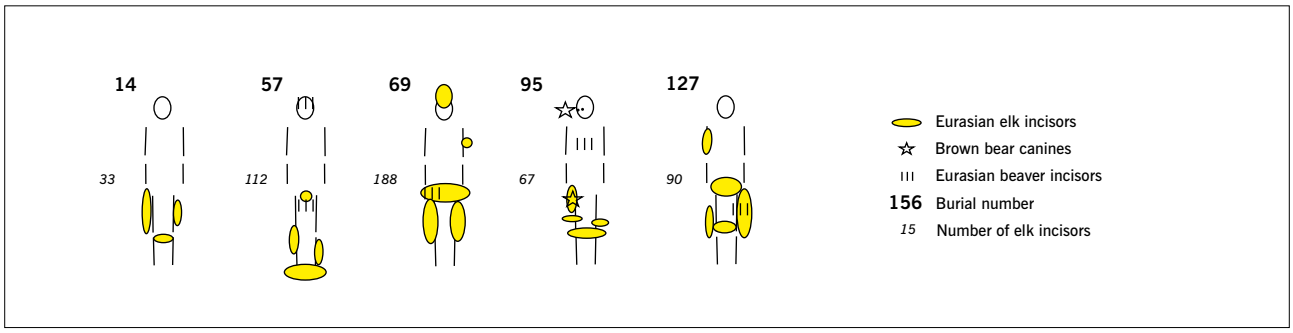

Fig. 5 Several individuals have clusters of pendants in the shape of a potential apron. These decorations form not only horizontal but also vertical rows running parallel to the lower limbs.

Abb. 5 *Mehrere Individuen haben Gruppen von Anhängern in der Form einer möglichen Schürze. Diese Verzierungen bilden nicht nur horizontale, sondern auch vertikale Reihen, die parallel zu den unteren Gliedmaßen verlaufen.*

One difference between the sexes, however, is that vertical clusters of elk teeth by the legs of the deceased are found almost exclusively in the graves of females. They might have served as hem decorations or been worn in combination with leggings or footwear. Animal-skin footwear is known to have been used by several North Eurasian Indigenous populations. For example, leg skins from Eurasian elk and reindeer were traditionally used for footwear in eastern Lapland (Storå 1971, 213; Itkonen 1948, 323–326; Kirkinen et al. 2019) (Fig. 8).

Considering the high number of Eurasian elk teeth clusters found in some graves, it seems probable that such sets may have been used for sound-making purposes, perhaps as rattles (Rainio et al. 2021; see also Shaham/Belfer-Cohen 2017). When people move quickly, as when dancing, the hands and feet are the body parts most in motion, and it is easy to control the rhythm of the rattles with one's hands and feet. In that sense, such richly ornamented outfits could be considered similar to instruments that were primarily used on special occasions. A costume with approximately 300 Eurasian elk teeth (such as found in graves 85, 100 and 107) would be heavy, uncomfortable and impractical, making it unlikely that such clothes were worn in everyday life or when hunting. The possibility should be considered that those individuals found with a high number of pendants were buried in their festive outfits.

Some graves at the YOO cemetery contain several pendants on the head of the deceased; this probably indicates some type of headgear, such as a hat, hood, or even a crown-like head covering as is often linked with a distinct social status (as a shaman, for example)[4]. Indications of headgear are found in both female and male graves. It is quite difficult to estimate the type of headgear just by considering the locations of the tooth pendants. Most likely, all Mesolithic people living in the Onega region used headgear such as a hat or hood, at least during the winter when it was too cold to be bare-headed outdoors (Fig. 9). However, perhaps only shamans or other leaders used richly ornamented headgear.

It can be difficult to distinguish between a headdress and a mask if judging just by the pendants' location. Grave 115 can be interpreted as containing a mask since the beaver teeth lay on the glabellar area and orbits, showing that the eyes might indeed have been covered (Fig. 10). Possible masks with tooth pendants have also been found in other Mesolithic cemeteries, for example in a male burial in Donkalnis, Telšiai County (Lithuania; Butrimas 2012). In the existing ethnographic literature, the mask has been interpreted as a medium for transforming or changing a person's identity (see Pizzorno 2010); it has likewise been suggested that masks were worn for such purposes in prehistoric contexts (Mannermaa 2025). E. A. Kashina et al. (2020) have suggested similar intentions related to the tradition of burying the dead in a prone position, as observed in some hunter-gatherer cemeteries: the purpose may have been to hide the eyes of the deceased, as can be done by using masks. One reason for covering the eyes with a mask could relate to a belief known from studies of Indigenous cultures in the Altai area in Mongolia, according to which the soul was in an individual's eyes (Harva 1933, 175). Shamans commonly wore masks to hide their souls from the spirits they encountered, and the eyes or the face of the deceased were also covered, for example with fish skin or textiles (Harva 1933, 192–193).

We suggest that belts were an important part of Mesolithic clothing for everybody, including all age groups. Some researchers argue that belts are more commonly found in female burials than male burials. For example, N. N. Gurina (1956, 186) observed that in several graves, especially those of females, elk incisors were concentrated around the pelvic area. Scholars have made the same observation at Skateholm I and II, Skåne County (Sweden), where ornamented bands around the hips have been found particularly in female graves (Larsson 2024). However, our analysis, using updated data on biological sex, does not definitively support this argument. Although belts for women and men could have differed in appearance, our data reveal that elk and beaver tooth ornaments may well have been used on belts or waistbands by

4 Holmberg 1922, 15–17; Zagorska/Lõugas 2000; Butrimas 2016; Mannermaa/Kirkinen 2020.

Fig. 6 Skolt Sámi (eastern Sámi) men wear ›leg-pants‹ (Fin. *koipihousut*), over their pants and fur-lined shoes on their winter trips. The garment consists of overshoes, an upper part made of untanned reindeer *(Rangifer tarandus)* hide (made from the legs of six reindeer) and a pair of tanned reindeer hide pieces, which are fastened at the hips with a cord (nowadays also with buttons) Reindeer skin and fur. Length 91 cm.

Abb. 6 *Die Männer der Skolt Sámi (Ostsámi) tragen auf ihren Winterausflügen ›Beinkleider‹ (Finn.* koipihousut*) über ihren Hosen und pelzgefütterten Schuhen. Das Kleidungsstück besteht aus Überschuhen, einem Oberteil aus ungegerbtem Rentierfell* (Rangifer tarandus) *(hergestellt aus den Beinen von sechs Rentieren) und einem Paar gegerbter Rentierfellstücke, die an der Hüfte mit einer Kordel (heute auch mit Knöpfen) befestigt werden. Rentierhaut und Fell. Länge 91 cm.*

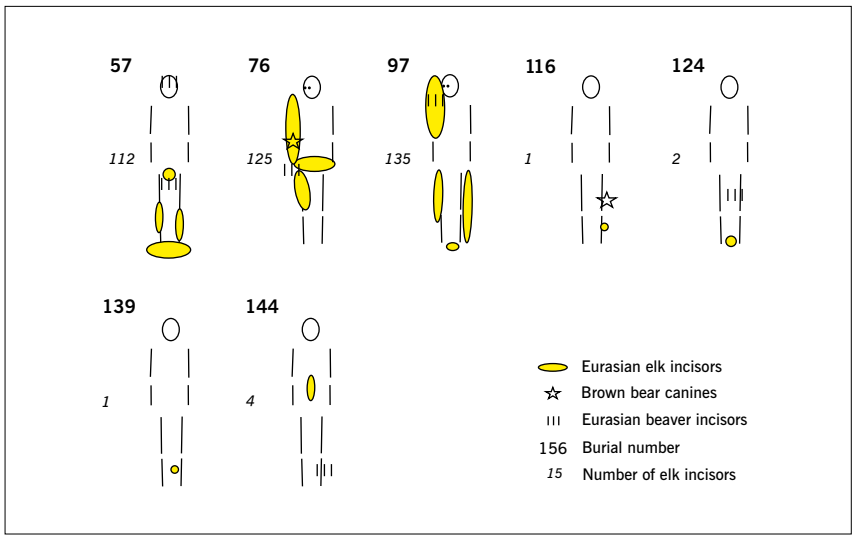

Fig. 7 The location of the ornaments in the immediate vicinity of the feet may indicate the presence of footwear.

Abb. 7 *Die Lage der Ornamente in unmittelbarer Nähe der Füße könnte auf das Vorhandensein von Schuhen hinweisen.*

Fig. 8 Screenshot from a video showing a hypothetical reconstruction of tooth pendants sewn onto an apron and rattling against each other. The reconstruction, inspired by YOO's graves, features 94 Eurasian elk incisors.

Abb. 8 *Screenshot aus einem Video, das eine hypothetische Rekonstruktion von Zahnanhängern zeigt, die auf eine Schürze genäht sind und gegeneinander klappern. Die Rekonstruktion, die von YOOs Gräbern inspiriert wurde, enthält 94 Elchschneidezähne.*

both sexes. While indications of belts are not found in all the graves with animal teeth in the YOO cemetery, it is possible that everyone was buried with a belt, but some were made solely of soft, perishable materials that have not been preserved. Soft materials, like feathers, down or different types of furs or skins (and other body parts) can be used for decoration instead of teeth, and bird skins may have been used for insulation (see Kirkinen in this volume), as indicated by the microscopic find of a potential bird barbule in soil samples from grave 29 at YOO cemetery (Mannermaa/Kirkinen 2020).

In addition to being an important functional clothing item, belts have carried other meanings as well. For historical populations of Russia, belts were loaded with symbolic, religious and protective meanings (Bayburin 1992; Ermolova 2005). Male Sámi reindeer herders in northern Finland had several different skin belts, some of which were ornamented and used only on special occasions (Itkonen 1948, 362–363). Belts were also a significant part of a shaman's costume. Among the Nenets of northern Siberia, artefacts like bear teeth and bird claws have been found hanging on shamanic belts; they helped the shaman reach other worlds (Hoppál 2001, 84).

Clothing culture

Ethnographic studies have revealed that animal skins and furs were traditionally used for making clothes (e.g. Itkonen 1948). In some graves at the YOO cemetery, skin and fur manufacturing are indicated by tools associated with skin craft, such as awls for piercing and polishers for skin softening. Based on a study of all the graves containing elk teeth, we can conclude that the ornament culture has been relatively similar among the group(s) using the YOO cemetery, as indicated by the rather restricted materials used in ornamentation, i.e. particular teeth from Eurasian elk, bear and Eurasian beaver. Animal teeth were clearly an important part of the clothing culture in Mesolithic Karelia, but we did not detect any single dominant style in the use of pendants. At Skateholm, animal teeth were found mainly in the pelvic region (Larsson 2024). In Saktysh cemetery, Ivanovo Oblast (Russia; Lyalovo and Volosovo Cultures), animal teeth have mainly been found in the pelvic region and by the legs, while at Zvejnieki, Valmiera Municipality (Latvia), they have been found by the head and on the torso (Macāne 2022, 307).

Fig. 9a–b a Ostyak (Siberia) man's fur coat. It is made of light brown and white reindeer fur. The hood is made of light, thick reindeer fur. The cuffs have a red border 10 cm wide. b The seams on the back of the fur coat are decorated with red and dark blue textile stripes.

Abb. 9a–b *a Pelzmantel eines Ostyak (Sibirien) Mannes. Er ist aus hellbraunem und weißem Rentierfell gefertigt. Die Kapuze besteht aus hellem, dickem Rentierfell. Die Manschetten haben eine 10 cm breite rote Borte. b Die Nähte auf der Rückseite des Pelzmantels sind mit roten und dunkelblauen Textilstreifen verziert.*

Based on ethnographic evidence, we know that specialised winter and summer garments were used in northern Europe (Itkonen 1948). However, our own relatively general analysis could not determine whether people were customarily buried in their winter, summer, daily or ceremonial clothes.

Although this paper approaches animal teeth as ornaments on clothing, other accessories, such as bags, skin or fur containers, blankets, and wrappings may also have been decorated (e.g. Rainio/Tamboer 2018). For example, N. N. Gurina (1956, 193–195) identified eight graves that probably contained quivers made of some organic material based on clusters of arrowheads. In some Stone Age hunter-gatherer burials at Zvejnieki, animal tooth pendants were found outside the area of the body, indicating that they were also used with garments that cannot be directly associated with the clothes of the deceased (Macāne 2022, 307).

Richly ornamented headgear or masks may indicate that the deceased occupied an important social or spiritual role in the community. Sometimes, the number of tooth pendants in a grave has also been interpreted as an indication of spiritual leadership, i.e. that the deceased was a shaman. Caution must be taken, though, when basing conclusions about a population´s social identities on preserved material culture; such objects probably represent only a fraction of the materials the original grave contained. Just like animal teeth, paws, feathers, skins and other soft materials from various animals may have been important symbols or markers of social or kin identity (Mannermaa et al. 2021). Such materials are usually invisible in archaeological contexts because they do not preserve as well as bone, antler and tooth.

Conclusions

From the personal ornaments found in the graves, it is possible to deduce patterns of clothing and accessories. In this preliminary study, we have shown that in the YOO cemetery, both women and men wore various types of clothing decorated with animal teeth. Belts appear in both female and male graves, as does headgear. The latter can be hoods, hats, or more elaborate constructions resembling ceremonial headdresses. Hem ornaments and various vertical decorations on the legs are found in many graves. There are indications of

Fig. 10 Grave 115 in Yuzhniy Oleniy Ostrov, Republic of Karelia (Russia), cemetery contained Eurasian beaver *(Castor fiber)* incisor plates on the frontal bone and eyebrows.

Abb. 10 *Grab 115 im Gräberfeld von Yuzhniy Oleniy Ostrov, Republik Karelien (Russland), enthielt Schneidezahnplatten des Eurasischen Bibers* (Castor fiber) *am Stirnbein und an den Augenbrauen.*

possible leggings, especially in women's graves. The way the tooth pendants are made suggests that the teeth of Eurasian elk and bears were suspended, while beaver teeth were more firmly attached to garments. The clothing culture that we reconstruct here, based on the animal teeth in the graves, seems more like ceremonial clothing than everyday garb.

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Source of figures

1 K. Mannermaa; objects Peter the Great Museum of Anthropology and Ethnography (Kunstkamera), St. Petersburg
2 R. Rainio; data for this compilation derived from N. N. Gurina (1956; Appendix 1)
3–6 R. Rainio
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