



Tuija Kirkinen, Jaana Riikonen, Carla Dove & Juha Ruohonen

THE IDENTIFICATION AND USE OF FUR AND FEATHERS EXCAVATED FROM THE LATE IRON AGE AND EARLY MEDIEVAL (12TH–13TH CENTURIES) RAVATTULA RISTIMÄKI CEMETERY IN KAARINA, SOUTHWEST FINLAND

Abstract

The Ristimäki ('Cross Hill') inhumation cemetery in Ravattula village in Kaarina municipality, Southwest Finland, dates to the Late Iron Age and Early Medieval times (12th–13th centuries). In addition to a large cemetery, this site is documented as having remains of the earliest known church in the country. This study presents the descriptions of fur garments, fur-lined artefacts and grave furnishings that were excavated in Ravattula Ristimäki in 2010–16. Animal hairs and feathers were preserved in eight out of the 61 burials excavated in the research project. We identified eight species of mammals and one family of birds (Anatidae) from the burials that contained organic material. Human scalp hair was found in several female burials, adding information on the hairstyles of the period. Together with blankets filled with feathers, these items indicate highly versatile and varied burial customs within the cemetery. This study provides new evidence of the use of fur garments and accessories, as well as grave furnishings, at the dawn of Christianity in Northern Europe.

Keywords: animal hair identification, Christianization, feathers, furs, inhumations, Middle Ages

Tuija Kirkinen, Dept. of Cultures, P.O. Box 59, FI-00014 University of Helsinki, Finland: tuija.kirkinen@helsinki.fi; Jaana Riikonen, Dept. of Archaeology, Akatemiankatu 1, FI-20014 University of Turku, Finland: jaana.riikonen@kaioksanen.fi; Carla Dove, Feather Identification Lab, National Museum of Natural History, Smithsonian Institution, NHB E-600, MRC 116, P.O. Box 37012, Washington, DC 20013, U.S.A.: dovec@si.edu; Juha Ruohonen, Dept. of Archaeology, Akatemiankatu 1, FI-20014 University of Turku, Finland: jukaru@utu.fi.

Received: 15 March 2020; Revised: 22 June 2020; Accepted: 7 September 2020.

INTRODUCTION

The Ristimäki cemetery in the village of Ravattula, in the municipality of Kaarina in Southwest Finland (Fig. 1), is well known because it is located on the site of the earliest known church in the country. The well-preserved church foundations are approximately 4 km from the medieval Cathedral of Turku, near the Aurajoki River, which flows to the Baltic Sea. The site is a low moraine hillock of forest called Ristimäki ('Cross Hill') surrounded by clay fields and situated approximately 250

metres from the village of Ravattula. As part of a comprehensive study of this site (e.g. Ruohonen 2017; 2019) by the Department of Archaeology at the University of Turku, a stone foundation of the small wooden church, a large cemetery and the remains of a wall surrounding the area were partly excavated in 2010–16.

A church with a narrow choir (Fig. 2) was built on the site in the second half of the 12th century and used well into the first half of the 13th century (Ruohonen 2019: 113) by local villages. Ravattula church is the location of the oldest hitherto identified remains of an ecclesiastical



Figure 1. Location of Ristimäki cemetery in Ravattula, Southwest Finland. (Drawing: Juha Ruuhonen.)



Figure 2. Stone footings of Ristimäki church during the excavations. (Photo: Juha Ruuhonen.)

RAVATTULA RISTIMÄKI CEMETERY

The hill of Ristimäki was used as an inhumation cemetery from the first half of the 12th century, several decades before the church was built, while the latest burials probably date to the middle of the 13th century. This time period is of great interest because it sheds light on the Christianization process in Southwest Finland. All burials in Ravattula Ristimäki (henceforth called ‘Ristimäki’) cemetery are classified as Christian, or at least deeply Christian-influenced, on the basis of an almost total lack of tools and weaponry, which were common grave gifts in many other early Late Iron Age sites (e.g. Hiekkänen 2007: 13; 2010: 340–1). Additionally, certain individuals were buried in full dress, including metal items such as penannular brooches, belt buckles, knives, knife sheaths, and bronze spirals, while most of the excavated burials did not contain artefacts other than iron nails from the coffins. Most of these findless graves are probably from the last usage period of the site in the 13th century. The absolute chronology of late inhumation graves is difficult to determine due to the lack of datable material (see Hiekkänen 2010: 343).

In Finland, the preservation of organic material such as bones and plant fibres is poor due to the acidity of soils (Arponen 2008; Hurcombe 2014: 93). The preservation of animal fibres is much better, and especially in contact with copper-bearing items even large pieces of woollen textiles may have been preserved (see Solazzo et al. 2014). This is the situation in Ristimäki, too, where woollen and even some linen textile fragments were preserved in 17 of the total of 61 excavated graves, although most of the pieces were small and badly preserved. Regardless, garments and accessories were identified in 12 burials.

In Ristimäki, female burials were mainly clothed in peplos-type dress, well known from other Crusade Period (c. 1025–1200 AD) cemeteries in southwestern Finland (see, e.g. Lehtosalo-Hilander 1984; 2001; Luoma 2003). The dress was complemented with an apron decorated with bronze spirals and an undergarment made of linen. The deceased were covered with a shawl, and sometimes they were equipped with headgear and mittens in *nålebinding* (Vajanto 2014). In one female grave (41/2016) dated to

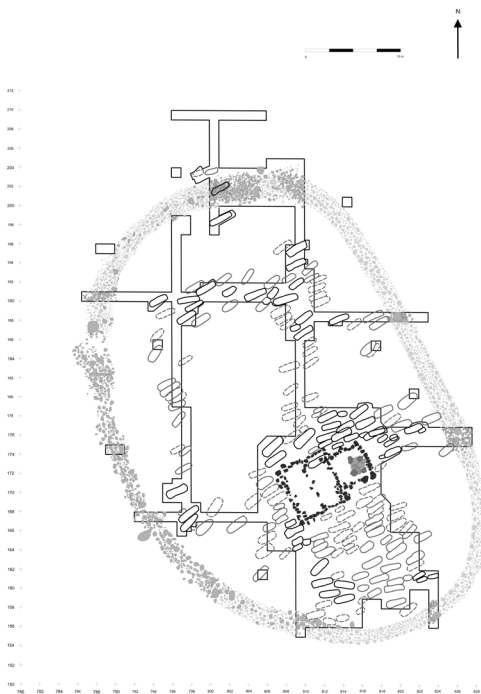


Figure 3. The distribution of inhumation burials around the church. (Drawing: Siiri Tuomenoja.)

building in Finland and, as far as is known, the only one dated to the period of missionary activity in the area. The church buildings that followed date to the 1230s or later and are from the known period of established parishes (Ruohonen 2016: 235).

Evidence of inhumation burials (Fig. 3) is numerous at Ristimäki, especially around the church site. In 2010–16, 61 inhumations of the several hundred graves were excavated as part of the ongoing research project (Ruohonen 2019: 114). This study of fur and pelt remains, and feathers suggesting textiles stuffed with down, provides valuable information regarding the ways the graves were furnished and the manner in which the deceased were dressed at the dawn of Christianity in Finland. We also ask if some of the findings can be linked to the process in which Christianity was adopted. Moreover, the finds illustrate hunting and/or trading of furs in an era during which furs were highly valued.

around 1200, the deceased was clothed in a garment sewn of several pieces to give a moderate width at the hem. This outer garment and the sewn stockings show the influence of medieval fashion, which is unique in the Finnish material of this era (Riikonen 2019: 174–5, 180).

Due to the acidic soil, the human remains were not preserved and most often there was only tooth enamel or a coloured soil layer left from the deceased. Unfortunately, this prevented the determination of gender, which could only be presumed on the basis of the material found in the graves. We determined that 13 of the excavated burials were female graves, two were male graves, and one was a burial of a young girl. Of these, both male graves and five female burials are included in this study.

MATERIAL AND METHODS

Laborative excavation

The burials in which textiles or artefacts were detected were excavated in a conservation laboratory at the Museum Centre of Turku. Intact soil blocks were X-rayed and restored in a refrigerator before micro-stratigraphic excavation under a stereo microscope. The study of the blocks was documented by photographing and by 1:1-scale drawings on plastic sheets. All organic materials (e.g. human hair) were sampled in aluminium foil or Eppendorf tubes for identification. In addition to these samples, the excavated soil from the block, as well as soil samples taken in the field, were analysed for pollen, macrofossils, and minuscule fibres.

Samples

Hair

The fibres were separated from each other and washed by gentle stroking with a soft brush. The most clayed samples were purified by hydrogen fluoride (HF), which effectively destroys sediment residues (e.g. LacCore SOP Collection). The samples were prepared for microscopic examination by mounting them in Entellan Neo after Greaves & Saville (1995: 7). Additionally, the scale structures were studied by preparing longitudinal negative casts with transparent nail polish (after Kirk et al. 1949; Tridico et al. 2014:

3). The cross-sections of the fibres were made after Greaves & Saville (1995: 39–40). The rest of the samples were archived in small Eppendorf tubes. The material was studied with light and polarised microscopy, using a Leica DM 2000 LED microscope with 200x and 400x magnification, and documented with a Leica ICC50 E camera.

In order to study possible fur remains from contexts in which the preservation of organic materials was relatively low, soil samples of ca. 0.5 dl in size were floated in water. The floating material was studied with a microscope (see above) and documented by a camera only. No permanent slides were prepared.

Fibres were identified by the morphology of their longitudinal shafts and by their cross-sections. The key features for identification were the diameter and length of the hair, the structures of medulla and cuticular scales, the shape of root and tip sections, and pigmentation (Goodway 1987). The identification of fibres was based on the identification keys of Tóth (2017), Teerink (2003), and Rast-Eicher (2016). The samples were compared with the reference material at the Zoological Museum of the Finnish Museum of Natural History, University of Helsinki.

The morphology of human scalp hairs was studied with light microscopy, following the same protocol as with animal hairs. The classification of the hairs followed Ogle & Fox (1999). In contrast to animal hairs, the morphological features of human scalp hairs were largely decomposed.

Feathers

A sample of matted feather material (from burial 8/2015) containing plumulaceous (downy) feathers was loaned to the Smithsonian Institution's Feather Identification Lab in Washington D.C., USA for identification. The feather material was not cleaned prior to examination due to the fragile condition of the material. Microslide preparation of the feather fragments followed Dove and Peurach (2002). Microslides were viewed using a Leica® DM750 (Leica Microsystems, Wetzlar, Germany) comparison light microscope. Photomicrographs of diagnostic feather characteristics were taken with a Leica® DFC290 HD camera (Leica Microsystems, Wetzlar, Germany) using the Leica Application Suite®

(version 4.12.0, Leica Microsystems, Wetzlar, Germany). Twelve microslides were made from various areas of the sub-sample that was loaned for identification. Feather analysis focused on the plumulaceous feather types within the burial sample to search for diagnostic characters specific to Orders of birds.

RESULTS

Organic fibres such as textile, fur remains, and feathers were detected in 20 burials in Ristimäki (see Table 1). Animal hairs were relatively well preserved, and most of them could be identified to a species or family level. Fur remains were found in close association with bronze items, where toxic copper alloys were absorbed into the fibres by preventing the activity of micro-organisms (Janaway & Scott 1989; Solazzo et al. 2014). It is very likely that the thin clayed soil surface on top of the finds improved the preservation of the fibres.

As an exception, the human scalp hairs macroscopically looked well preserved, but microscopic examination showed their poor condition (Fig. 4F). As a result, no further analysis of the hairs could be done. Human scalp hairs were preserved in large quantities in seven female burials (1/2015, 2/2015, 6/2015, 8/2015, 18/2016, 20/2016 and 37/2016). Additionally, single hairs were found from graves 4/2014, 15/2015 and 38/2016.

Animal hairs were found from six graves for a total of 11 samples (Table 1). The hairs were mostly loose, and pieces of skin were found intermixed with soil samples taken from a dark layer in graves 3/2015 and 18/2016. Most of the samples that we examined included both coarse and fine hairs, which assisted with the identification of species. Preserved hairs were relatively long, about 0.8–1.5 cm, except for horse tail or mane hairs, which were longer. In most cases, both the scale structure and the medulla of the hairs were identifiable.

From the hair, we identified mostly predators, such as brown bear (*Ursus arctos*), stoat (*Mustela erminea*), Canidae/red fox (*Vulpes vulpes*), and Felidae/lynx (*Lynx lynx*). Besides these, we also identified domestic animal hairs (i.e. horse mane or tail hair), dog (Canidae) skin remains, and sheep (*Ovis aries*) hair most

evidently from textiles. Additionally, one beaver (*Castor fiber*) hair was detected from a soil sample. The diagnostic features of the hairs, the context of the finds, and the identifications are listed in Table 1 (see also Fig. 4).

Feathers were found in large quantities in burials 1/2015 and 8/2015, and small barbs were also detected in burials 4/2014, 11/2014, and 18/2016 (see Table 1). The feather sub-sample from burial 8/2015 that was studied at the Smithsonian contained both pennaceous barbs and plumulaceous barbs with diagnostic microscopic characters for identification. Analysis of the downy material revealed many diagnostic nodes characters of the avian family Anatidae (duck, goose, swan). Species-level identification was not possible due to the degraded condition of the whole feathers and the lack of access to the entire sample. The microscopic structures of plumulaceous (downy) barbs of feathers of Anatidae are diagnostic by triangular-shaped nodes located on the distal portion of the barbules (Dove & Agreda 2007), which were found on all microslides (Fig. 5). We did not find diagnostic feather characteristics of any other avian order. However, because only a small sub-sample of material was submitted for examination, we do not know if other bird species were used in the complete burial garments. Visual differences were noted in the internode length (space between nodes) in some of the barbules, indicating that possibly more than one sub-family of waterfowl was used for the item examined in this study.

Plumulaceous barbule fragments diagnostic to waterfowl (Anatidae) was also identified in a sub-sample from burial 1/2015, from a photomicrograph of the material. This material was highly degraded and species-level identifications were not possible.

DISCUSSION

The Christianization process started gradually in the Turku district in the 11th century at the latest, when the first inhumations were made in cremation cemeteries. In the next stage, farm or family cemeteries were established in the vicinity of old cremation cemeteries. In these inhumation cemeteries, the deceased were buried fully dressed, wearing their personal jewellery. From

Table 1. Description and identification of hair, fur, and feathers excavated from the Ravattula Ristimäki Cemetery in Kaarina, Finland, in 2010–6. The items listed here are archived in the archaeological collections at the University of Turku (TYA).

Catalogue number (TYA)	Grave number	Item and sample origin	Species identification	Diagnostic features of hair, fur and feathers	Identification references
863:217	1/2010	Hairs on the top of a belt buckle, found near the thighs of the deceased.	Stoat (<i>Mustela erminea</i>)	Small amount of 8-mm-long coarse (120 µm) and fine hairs. Medulla cloisonné pattern, medullar margins scalloped. Cuticular scale pattern in coarse hairs is rounded wave-like.	Teerink 2003; Tóth 2017; Rast-Eicher 2016
912:523b	4/2014	Organic material under the head of the deceased, between a bronze sheath and the bottom of the coffin.	Brown bear (<i>Ursus arctos</i>); unidentified bird (Aves)	Unmedullated and non-continuous amorphous medullated hair fragments. Cuticular scale pattern is triangular-shaped and matches best with brown bear fine/intermediate hairs. Width 56.6 µm, max length 11 mm. Unidentified pennaceous feathers present in sample.	Tóth 2017; Rast-Eicher 2016
912:523d	4/2014	Organic material inside a bronze sheath.	Red fox? (<i>Vulpes vulpes</i> / <i>Canidae</i>)	Coarse and possible fine hair fragments, some root sections included. Coarse hair medulla is of cloisonné type, cuticular scales are wave-patterned. Coarse hair width 112.9 µm, max length 6 mm. Best match is red fox.	Teerink 2003; Tóth 2017; Rast-Eicher 2016
912:523f	4/2014	Organic material from the top of a bronze sheath.	Brown bear (<i>Ursus arctos</i>); domestic sheep (<i>Ovis aries</i>); textile	Hair fragments from two species. Fine and intermediate bear hairs (max width 53.8 µm) were identified by their narrow unstructured medulla, triangular/diagonal-shaped petal scale type and oval cross-section. Several additional fine (width about 17 µm) unmedullated sheep hairs (probably domestic). One kemp hair (50.9 µm) with its net-like medulla was present in the sample. Length max 10 mm.	Tóth 2017; Rast-Eicher 2016
912:1631	11/2014	Organic material from the top of a belt buckle, on the pelvis area of the corpse, hairy material side facing the buckle.	Eurasian lynx? (<i>Lynx lynx</i> / <i>Felidae</i>); unidentified bird (Aves)	Coarse hair fragments, some with root sections attached. The medulla is cloisonné-like with fine-grained transparent structure and spaces filled with air. The medullar margins have partly fibril-like fringes. The cuticular scales are wavy-patterned. The colour is very light. Width 52.4 µm, max length 15 mm. Best match is lynx. The sample also included unidentifiable microscopic feather fragments, length 250 µm.	Tóth 2017; Rast-Eicher 2016

Catalogue number (TYA)	Grave number	Item and sample origin	Species identification	Diagnostic features of hair, fur and feathers	Identification references
MN197/2014	11/2014	Soil sample collected near the pelvic area of the corpse beside metal artefacts.	European beaver (<i>Castor fiber</i>); unidentified bird (Aves)	A coarse/intermediate hair fragment, black in colour. The medulla is irregular unicellular. Width 40 µm, length 4 mm. Most similar to beaver. The sample also included unidentifiable microscopic feather fragments.	Tóth 2017; Teerink 2003; Rast-Eicher 2016
914:1259:11	1/2015	Human scalp hairs from a bun.	Human	Badly decomposed human scalp hairs. Width 39 µm.	Ogle & Fox 1998
914:1259:4	1/2015	Organic material under the right side waist of the deceased, on the top of the wooden coffin	Duck, goose, swan (Anseriformes)	Several badly decomposed bird feather fragments. A barbule with diagnostic microscopic triangular-shaped node characteristic of waterfowl. Species undetermined.	Dove & Agreda 2007
914:1269:9	2/2015	Human scalp hairs	Human	Badly decomposed human scalp hairs. Width 47 µm.	Ogle & Fox 1998
914:1276:2	3/2015	Fur from the bottom of the grave, near the lower right corner of the coffin.	Canidae	15-mm-long hairs, in which the continuous medulla is about 1/3 of the width of the hair. The cuticular scales in coarse hairs (max 90.7 µm) are triangular petals and have the best match with Canidae. The cuticular scales in fine hairs (25 µm) are wavy petal-like.	Teerink 2003; Rast-Eicher 2016
914:1316:6	6/2015	Human scalp hairs formed into a bun.	Human	Badly decomposed human scalp hairs. Width 72 µm.	Ogle & Fox 1998
914:1367:7	8/2015	Human scalp hairs.	Human	Badly decomposed human scalp hairs. Width 66 µm.	Ogle & Fox 1998
914:1367:11	8/2015	Organic material from the bottom of the grave, under the right side of the deceased's hip.	Duck, goose, swan (Anseriformes)	Several relatively well-preserved light or white bird feathers with both pennaceous and downy barbs. Barbs with diagnostic microscopic triangular-shaped nodes located distal on barbules characteristic of waterfowl. Species undetermined.	Dove & Agreda 2007
914:1367:20	8/2015	Organic material from the left side bottom of the grave.	Unidentified bird (Aves)	Several badly decomposed bird feather fragments.	
993:173:10b	18/2016	Hair inside headgear.	Horse (<i>Equus caballus</i>)	Tail hair. The identification is based on the width of the hair.	Rast-Eicher 2016

Catalogue number (TYA)	Grave number	Item and sample origin	Species identification	Diagnostic features of hair, fur and feathers	Identification references
993:173:10b	18/2016	Small amount of fibres under a headgear and an apron, on the stomach of the deceased.	Brown bear (<i>Ursus arctos</i>); unidentified bird (Aves)	Coarse and fine/intermediate hairs of a bear. The coarse hairs have uniserial ladder medulla; no scales are visible due to the decomposing of hairs. The intermediate/fine hairs have amorphous interrupted medulla and triangular-shaped scales. Max width 108.9 µm (coarse), max length 4.5 mm. Small amount of feather barbs also found in the sample.	Tóth 2017; Rast-Eicher 2016
993:173	18/2016	Soil sample collected from the grave.	Brown bear (<i>Ursus arctos</i>)	Lots of organic material, skin fragments and hairs floated from the soil sample. Max width 96 µm (coarse) and 12–15 µm (fine). The width of unicellular/continuous medulla is 1/3 of the total width of the hair.	Tóth 2017; Rast-Eicher 2016
993:214:17	20/2016	Human scalp hairs from a bun.	Human	Badly decomposed human scalp hairs. Width 53 µm.	Ogle & Fox 1998
993:214:16a	20/2016	Long hair from the selvedge of a headgear.	Horse (<i>Equus caballus</i>)	A single 16-mm-long and 232-µm-wide hair possibly from the tail. The hair is dark brown and the width of the medulla is difficult to determine in longitudinal photos. No cuticular scales were preserved. The cross-section is oval and it shows a spongy medulla the width of which is about 1/3 of the total width of the hair. Possible identification is based on the cross-section and on the width of the hair.	Rast-Eicher 2016

the middle of the 12th century, roughly east-west-oriented inhumations were made in cemeteries maintained by several villages (Ruohonen 2018). In Finnish archaeological periodization, this era has been called the Crusade Period (1025–1200 AD), which underlines the ongoing Christianization of the area (e.g. Hiekkänen 2010: 325–6).

At Ristimäki hill, the church remains and the cemetery around comprise a vital monument of this epoch. The cemetery was in use from the Late Iron Age until the beginning of the Early Medieval period. It seems that Ravattula church, located at Ristimäki, was in use until the establishment of the first parishes in Aurajoki district

in the beginning of the 13th century. (Ruohonen 2018; see also Hiekkänen 2010.)

One of the most important source materials for the study of the community that buried their dead in the cemetery is the remains of dress details and the accompanying bronze spirals, brooches, and other jewellery. Most evidently, fur and feather remains suggest highly versatile and varied burial customs within the cemetery. We discuss in detail below the use of fur and down-stuffed textiles as grave items.

Grave furnishing

In Ristimäki burials, animal skins and bird feathers were used for furnishing the grave.

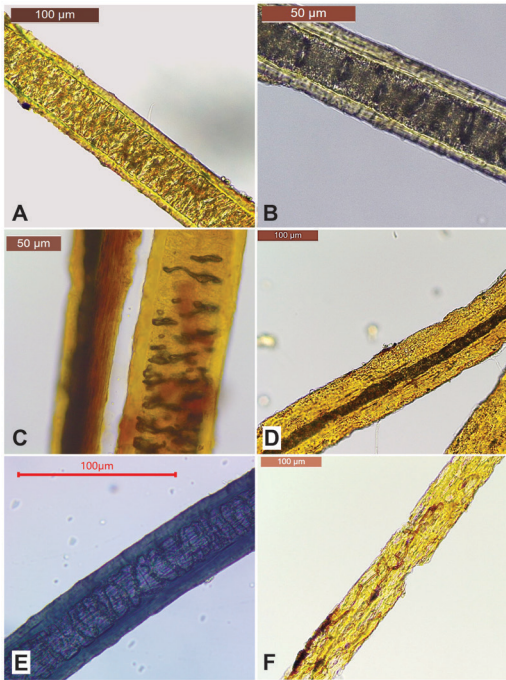


Figure 4. Animal and human hairs recovered from Ristimäki cemetery: A) *Vulpes vulpes* (H4/2014), B) *Felidae/Lynx lynx* (H11/2014), C) *Mustela erminea* (H1/2010), D) *Ursus arctos* (H18/2016), E) *Castor fiber* (H11/2014), F) Human scalp hair (H6/2015). (Photo: Tuija Kirkinen.)

Brown bear (*Ursus arctos*) pelts were identified in two burials (i.e. in female graves 4/2014 and 18/2016). In grave 4/2014, bear hairs were found from the bottom of a coffin as well as from the top of a wide, bronze-plated knife sheath found under the deceased's head (Fig. 6). In grave 18/2016, brown bear hairs were identified near the deceased's waist and from a soil sample taken from the stomach area of the deceased. In these burials, the corpse was evidently wrapped in a bear pelt.

In five burials (see Table 1), feather fragments indicate the use of pillows or quilts filled with down. The large quantity of downy feathers under the deceased's pelvis in grave 8/2015 can be hypothesized as a quilt, which was placed on the bottom of the grave (Fig. 7). Also in burial 1/2015, downy feathers were found on the bottom of the grave near the waist of the deceased. This item has also been hypothesized as a quilt.

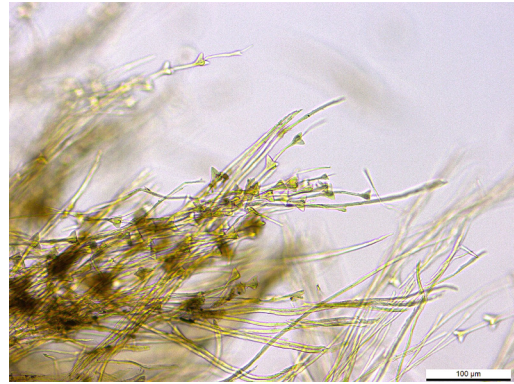


Figure 5. Plumulaceous (downy) microscopic feathers of the Ristimäki sample showing diagnostic waterfowl characters of triangular-shaped nodes located distally on barbules. (Photo: Carla Dove.)

The height of the deceased was approximated to be under 140 cm, which indicates the young age of the girl. She was clothed in a dress, which was fastened with a penannular brooch, and an apron and a spiral-ornamented shawl. These garments, as well as a string of pearls and headgear, point to a status of an adult woman. The probable quilt found from this grave may also indicate the high status of the deceased.

Grave 18/2016 contained small fragments of feathers under an apron and headgear, which was placed above it, possibly indicating a down-stuffed item. In burial 4/2014, single feather remains between the bear skin and the knife sheath under the head may provide evidence of the use of a pillow filled with down. However, down and feathers were preserved only in limited areas, which makes interpretation of the finds difficult.

The furnishing of graves and the covering or wrapping of the deceased in animal pelts is an age-old tradition, which was practised in Finland throughout the Iron Age. In Late Iron Age inhumations, the deceased were most often laid to rest on deer (*Rangifer tarandus*) and European elk (*Alces alces*) skins, sometimes also on brown bear and cattle skins (Cleve 1978: 82; Lehtosalo-Hilander 1982: 68; Asplund & Riikonen 2007: 25; Kirkinen 2019: 62–5). In Ristimäki, the lack of Cervidae skins is exceptional compared to other Late Iron Age and Early Medieval cemeteries in Finland. Also,



Figure 6. Bear hairs in grave 4/2014, found from the bottom of a coffin. (Photo: Jaana Riikonen.)

although brown bear skins were a central element in Merovingian Age (c. 550–800 AD) and Viking Age (c. 800–1050 AD) cremation cemeteries, they have been found from more recent inhumations only occasionally.

Luxurious feather remains are rare in Finnish Late Iron Age and Early Medieval contexts, as a small amount of down has been found in previous research from only one burial in Luistari cemetery, Eura, Southwest Finland, possibly indicating the remains of a pillow (Kirkinen 2015: 107). However, this is partly due to the excavation methods used in the past. This underlines the importance of high-resolution laboratory excavations in producing new data about the use of feathers. Also, microscopic examination of old materials might produce new feather finds.

According to Dove & Wickler (2016: 33), the use of feathers in burials is often associated with precious clothing and costly textiles. In Scandinavia, feather- and down-stuffed pillows and quilts have been found in two Vendel Period boat-graves in Valsjärde, Sweden, and in a number of Viking Age high-status graves (see Gräslund 1980: 14 with references; Berglund 2009; Rast-Eicher 2016: 291 with references). Also in Ristimäki, feathers were found from burials in which the dress, glass beads, metal items, and textiles might indicate the relative wealth of the deceased.



Figure 7. Downy feathers and woollen textile from female grave 8/2015. (Photo: Riikka Saarinen/Museum Centre of Turku.)

Garments

Evidence of fur garments were found from two male graves. In male grave 11/2014, Felidae/lynx hairs were detected on a belt buckle found near the pelvis, of which the skin side was against a thick woollen twill fabric (Fig. 8). Fragments of two different tabby fabrics preserved under the belt buckle were maybe from a shirt and a tunic girded with a leather belt. The deceased was probably covered with a woollen, fur-lined cloak. It is also possible that the lynx skin originated from a fur-lined rug. From the same grave, one beaver hair, black in colour, was found from a soil sample. The grave was found under the foundation of the church, so it was older than the building.

Stoat (*Mustela erminea*) hairs were found on top of a bronze belt buckle found near the thighs of the deceased in male burial 1/2010. This finding, as well as the Felidae hairs presented above, most evidently indicate the lining of fabrics with fur animal skins. A fragment of mineralized tabby fabric was preserved under the belt buckle.

Finally, horse tail hairs were found in two female burials. In grave 20/2016, they were inside the tubular selvedge, and in grave 18/2016 inside the headgear. In both cases, horse tail hairs were used probably for hardening the structure of the garment.

Accessories

In female grave 4/2014, Canidae/red fox skin remains were detected inside a knife sheath,

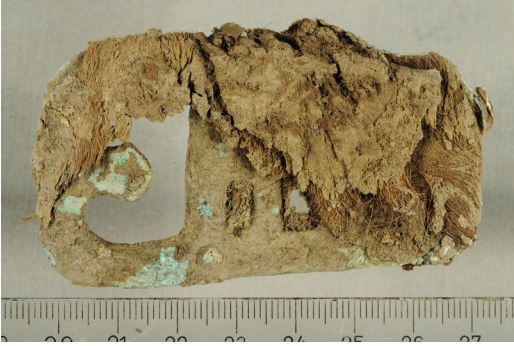


Figure 8. *Felidae/lynx* hairs, recovered from a belt buckle from male grave 11/2014. (Photo: Riikka Saarinen/Museum Centre of Turku.)

indicating the lining of the item with fur. These kinds of large bronze-plated knife sheaths lined with lynx (Luistari in Eura, grave 56), red squirrel (Kirkkomäki in Kaarina, grave 40/1992; Kirkinen 2015: Fig. 10), possibly Phocidae (Kirkkomäki in Kaarina, grave 1/1950; Riikonen 1990: 25–6) and Bovidae (Kirkkomäki in Kaarina, grave 23/1991; possibly calf [Lehto 1993: 33] or sheep [Kirkinen 2015: 119]) have been excavated from other cemeteries in Southwest Finland, too.

Human scalp hairs

The material collected from Ravattula gives us valuable information about the hairstyle and fashion of this time. Before Ristimäki, complete early medieval hairdressings have been found only once, at Kirkkailanmäki cemetery in Hollola (Hirviluoto 1985: 30).

No further information was obtained by the morphological analysis of the hairs. We continue to study the human hair samples in hopes of obtaining aDNA sequences through collaborations with the University of Turku.

Animal remains

In burial 3/2015, at the lower part of the grave on top of the coffin bottom planks, a decomposed dark layer containing Canidae hairs and skin fragments was detected (Fig. 9). We interpret this finding possibly as the remains of a dog, which was placed at the foot of the deceased. This tradition is known especially from the



Figure 9. *Canidae* hairs and skin fragments from grave 3/2015. (Photo: Riikka Saarinen/Museum Centre of Turku.)

Luistari cemetery, where dog bones have been identified from several male burials (Lehtosalo-Hilander 1982: 29–30). According to Anne-Sofie Gräslund (2010: 138), dogs are commonly present in Late Iron Age graves. On the basis of Old Norse texts, she interprets dogs as facilitators between the living and the underworld. Alternatively, Canidae fur fragments might be interpreted as remains of footwear or gaiters.

CONCLUSIONS

Before homogenized Christian burials, funerary practices varied greatly. The rituals sought to equip the deceased for the afterlife and helped them to become a member of the ancestors. In turn, in Christian burials, the deceased were released to God, and all members of the society were buried in a dedicated churchyard (Gräslund 2010: 134–5). Archaeologically, these graves appear as “invisible” due to their findless nature, except for a couple nails or coffin wood. The deceased was not clothed in full dress but wrapped or covered with a fabric. An example of a body being carried to the grave pit, covered only by a shroud, can be seen on the Bayeux tapestry dated to the 11th century (Gräslund 1980: 15). No remains of coffins can be found when the deceased started to be buried with shrouds only.

Ristimäki cemetery in Ravattula village is truly a unique site in Finland because of the location near the earliest known church. The burying of the dead started before the church was built and probably continued for some time after

the building was abandoned. As such, the graves evidence the Christianization process of the society in southwestern Finland.

This study describes and identifies the hair, fur and feather material from the Ristimäki cemetery and provides an interpretation of their origins as grave furnishings, garments, accessories and accompanying animals. The wide variety of fibres and feathers traced to the graves were obtainable through high-scale laboratory excavation and documentation.

Compared to other Crusade Period or Early Medieval cemeteries in Finland, where Cervidae, mountain hare (*Lepus timidus*) and fur animal skins were used especially for mittens, seal skins for trousers or gaiters, reindeer skins for outer garments and furs for linings and collars, Ristimäki fur garments are one of the most luxurious ones. Black beaver skins, which are known to have been one of the most valuable furs in the past (Pylkkänen 1955: 90; Seppälä 2009: 164), have been previously found in a male burial in Kekomäki in Kaukola, Karelian Isthmus (nowadays Russia), and in Luistari cemetery in Eura, southwestern Finland (Kirkinen 2019: 67–8, 73). Also, lynx skins were of special value, and they have been found from Finnish medieval inhumation burials only once, from a burial of a baby girl in Luistari cemetery (Kirkinen 2015; see Zachrisson & Krzewińska 2019).

The resulting fur, hair, and feather material indicates a gradual change in burial customs, which can – at least partly – be interpreted by the Christianization process of the community. On a broad scale, Ristimäki followed a long-lasting tradition in furnishing the graves with pelts and clothing the dead in furs, documented widely in the Late Iron Age cemeteries in Finland (see Kirkinen 2015; 2019). The differences between Ristimäki and the other Late Iron Age sites can be best formulated by comparing Ristimäki with Kirkkomäki (‘Church Hill’) cemetery in Kaarina (Turku), which is located only two kilometres away from Ristimäki on the Aurajoki River, and in which the excavation and documentation methods are nearly parallel in accuracy. The results of this comparison show that in Kirkkomäki, the species combination is different, especially in regard to the grave furnishing. In Kirkkomäki, the coffins were often furnished with Cervidae pelts or moss, and in one case

also with cattle skin (Asplund & Riikonen 2007: 25; Kirkinen 2019: 219). Equally, there were no signs of bear pelts or bird feathers, although the preservation conditions in contact with bronze items were relatively good. Neither were there significant differences in wealth, as Kirkkomäki also had several very richly equipped graves.

To conclude, these nearby cemeteries differ from each other in respect to the ways in which the graves were furnished. This might relate to the stage of Christianization of the sites. Kirkkomäki represents a cemetery for a single house, being slightly older (11th–12th centuries) than Ristimäki (12th–13th centuries). The change from cremation burials to inhumations provides evidence of the early influences of Christianity on the community, although most of the deceased were still equipped with tools, weapons and meals (Asplund & Riikonen 2007). However, in grave 15 at Kirkkomäki the deceased was carried to the grave on a bier and probably wrapped in a shroud. In grave 17, there was a coffin and probably a ring head iron pin with mineralized tabby weave textile, possibly from the shroud (Riikonen 2011: 212). In Ristimäki, the clear evidence of Christianity was the church, built in the second half of the 12th century, at a site which was already in use as an inhumation cemetery. It was probably used by the local residents from the surrounding villages from the very beginning, without having a history of a single farm cemetery. As Kirkkomäki is earlier than Ristimäki, it is possible that its cervid pelts represent an older Late Iron Age tradition. In Ristimäki, a quilt stuffed with down replaced cervid pelts and was most probably a luxury product of its time. The change in fashion is seen also in grave 41/2016, dated to around the year 1200, in which the deceased was clothed in an outer garment and sewn stockings, indicating the medieval influence on fashion (Riikonen 2019: 174–5, 180).

The reasons behind the observed differences can also be a result of local traditions, even though the sites are located close to each other. In Ristimäki, the change in burial tradition happened gradually; and the dead being buried wrapped only in simple shrouds, with or without coffins, took place only in the final phase (see Hiekkanen 2007: 13–14). This last stage of the

cemetery is challenging to study, as the preservation of organic material is poor.

However, the use of furs and pelts in commemoration rituals was an element which the Church aimed to stop. From the 15th century onwards, the Church tended to Christianize bear skins by collecting them from parishioners and using them in front of the altar as carpets (Korhonen 1982a; 1982b; see also Østergård 2009: 120–1). Later on, animal skins were replaced by textiles, in burials especially by rugs (pall-clothes), the tuft of which probably imitated fur (Pyökkänen 1974: 27–31).

ACKNOWLEDGEMENTS

We are grateful to Teija Alenius for her kind help with laboratory analysis. The research has been funded by the Alfred Kordelin Foundation.

REFERENCES

Unpublished sources

Lehto, L. 1993. Ruumishaudasta varastoon. Esimerkki konservoinnista laboratiivisen arkeologian osana: Turun (ent. Kaarina) Kirkkomäen haudan osan kaivaus ja konservointi. Thesis, Conservation dept., Vantaan käsi- ja taideteollisuusoppilaitos.

Literature

Arponen, A. 2008. Arkeologisen materiaalin konservointi. In P. Halinen, V. Immonen, M. Lavento, T. Mikkola, A. Siiriäinen & P. Uino (eds.) *Johdatus arkeologiaan*: 225–35. Helsinki: Gaudeamus.

Asplund, H. & Riikonen, J. 2007. Kirkkomäki. In M. Söderström (ed.) *Arkeologisia kaivauksia Turussa 1990-luvulla*: 9–45. Turun maakuntamuseo, Raportteja 20.

Berglund, B. 2009. *Fugela Federum* in archaeological perspective: Eider down as a trade commodity in prehistoric northern Europe. *Acta Borealia* 26(2): 119–135.

Cleve, N. 1978. *Skelettgravfältet på Kjuloholm i Kjulo II. Vikingatid och korstågstitid. Gravfältet C*. Suomen Muinaismuistoyhdistyksen Aikakauskirja XLVI:2.

Dove, C. J. & Peurach, S. C. 2002. Microscopic analysis of feather and hair fragments associated with human mummified remains from Kagamil Island, Alaska. In B. Frohlich, A. B. Harper & R. Gilberg (eds.) *To the Aleutians and Beyond. The anthropology of William S. Laughlin*: 51–62. Publications of The National Museum Ethnographical Series, Vol. 20.

Dove, C. J. & Agreda, A. 2007. Differences in plumulaceous feather characters of dabbling and fiving ducks. *The Condor* 109(1): 192–9.

Dove, C. J. & Wickler, S. 2016. Identification of bird species used to make a Viking Age feather pillow. *Arctic* 69(1): 29–36.

Goodway, M. 1987. Fiber identification in practice. *Journal of the American Institute for Conservation* 26: 27–44.

Greaves, P. H. & Saville, B. P. 1995. *Microscopy of Textile Fibres. Microscopy Handbooks* 32. London & New York: Taylor & Francis.

Gräslund, A.-S. 1980. *Birka IV. The Burial Customs. A Study of the Graves on Björkö*. Stockholm: Kungl. Vitterhets Historie och Antikvitets Akademien.

Gräslund, A.-S. 2010. Religionsskiftet speglar i gravskicket: Ny svensk forskning kring senvikingatida gravar och gravskick. In B. Nilsson (ed.) *Från hedniskt till kristet. Förändringar i begravningsbruk och gravskick i Skandinavien c:a 800–1200*: 131–164. Sällskapet Runica et Mediaevalia, Opuscula 14.

Hiekkänen, M. 2007. *Suomen keskiajan kivikirkot*. Suomalaisen Kirjallisuuden Seuran toimituksia 1117.

Hiekkänen, M. 2010. Burial practices in Finland from Bronze Age to the Early Middle Ages. In B. Nilsson (ed.) *Från hedniskt till kristet. Förändringar i begravningsbruk och gravskick i Skandinavien c:a 800–1200*: 271–379. Sällskapet Runica et Mediaevalia, Opuscula 14.

Hirviluoto, A.-L. 1985. Hollolan vaiheet ennen kristinuskon tuloa: Kivikaudesta keskiaikaan. In H. Mantere (ed.) *Hollolan kirkko. Asutuksen, kirkon ja seurakunnan historiaa*: 7–36. Hämeenlinna: Hollolan seurakunta.

Hurcombe, L. 2014. *Perishable Material Culture in Prehistory. Investigating the Missing Majority*. London & New York: Routledge.

- Janaway, R. & Scott, B. (eds.) 1989. *Evidence Preserved in Corrosion Products. New Fields in Artifact Studies*. United Kingdom Institute for Conservation of Historic and Artistic Works, Occasional Papers 8. London: United Kingdom Institute for Conservation.
- Kirk, P. L., Magagnose, S. & Salisbury, D. 1949. Casting of hairs: Its technique and Application to Species and Personal Identification. *J. Crim. L. & Criminology* 40 (2): 236–41.
- Kirkinen, T. 2015. The role of wild animals in death rituals: Furs and animal skins in the Late Iron Age inhumation burials in Southeastern Fennoscandia. *Fennoscandia archaeologica* XXXII: 101–20.
- Kirkinen, T. 2019. *Between skins. Animal skins in the Iron Age and historical burials in Eastern Fennoscandia*. PhD thesis, Archaeology, University of Helsinki. Helsinki: Unigrafia.
- Korhonen, T. 1982a. Saaliseläimen talja kirkko-uhrina. *Suomen Museo* 89: 45–68.
- Korhonen, T. 1982b. Saaliseläimen taljan ja kotieläimen vuodan käyttö uhreina. *Suomen antropologi* 3: 96–121.
- LacCore SOP Collection (dated 26/5/2016). Pollen Preparation Procedure. <<http://lrc.geo.umn.edu/laccore/assets/pdf/sops/pollen.pdf>>
- Lehtosalo-Hilander, P.-L. 1982. *Luistari III. A Burial Ground Reflecting the Finnish Viking Age Society*. Suomen Muinaismuistoyhdistyksen Aikakauskirja 82(3).
- Lehtosalo-Hilander, P.-L. 1984. *Ancient Finnish Costumes*. Helsinki: Suomen Arkeologinen Seura ry.
- Lehtosalo-Hilander, P.-L. 2001. *Euran puku ja muut muinaisvaatteet*. Vammala: Vammalan kirjapaino Oy.
- Luoma, H. (ed.) 2003. *Sinihameet kultavyöt. Suomalaisia muinaispukuja*. Tampere: Pirkanmaan käsi- ja taideteollisuus ry.
- Ogle, R. & Fox, M. 1999. *Atlas of Human Hair. Microscopic Characteristics*. Boca Raton: CRC Press LLC.
- Østergård, E. 2009. *Woven into the Earth. Textiles from Norse Greenland*. 2nd edition. Aarhus: Aarhus University Press.
- Pylkkänen, R. 1955. *Säätyläispuku Suomessa vanhemmalla Vaasa-ajalla 1550–1620*. Suomen Muinaismuistoyhdistyksen Aikakauskirja 55.
- Pylkkänen, R. 1974. *The Use and Traditions of Medieval Rugs and Coverlets in Finland*. Helsinki: Suomen Muinaismuistoyhdistys.
- Rast-Eicher, A. 2016. *Fibres. Microscopy of Archaeological Textiles and Furs*. Budapest: Archaeolingua.
- Riikonen, J. 1990. *Naisenhauta Kaarinan Kirkkomäessä*. Karhunhammas 12.
- Riikonen, J. 2011. White linen: Cloth of luxury. In J. Harjula, M. Helamaa & J. Haarala (eds.) *Times, Things & Places: 36 Essays for Jussi-Pekka Taavitsainen: 198–221*. Raisio: Newprint Oy.
- Riikonen, J. 2019. Sukkia ja säärisiteitä: Jalan ja säären verhot myöhäisrautakauden Suomessa. In J. Harjula, V. Immonen & J. Ruohonen (eds.) *Puukenkien kopinaa. Henrik Asplundin juhlakirja: 155–187*. Karhunhammas 19.
- Ruohonen, J. 2016. Built of wood and turned to soil: Perspectives of research history and new observations concerning Finland's oldest churches with reference to Ristimäki in Ravattula. In J. Harjula, S. Hukantaival, V. Immonen, A. Randla & T. Ratilainen (eds.) *New Sites, New Methods. Proceedings of the Finnish-Russian Archaeological Symposium, Helsinki, 19–21 November, 2014: 229–245*. Iskos 21.
- Ruohonen, J. 2017. Ristimäki in Ravattula: On the remains of the oldest known church in Finland. In J. Harjula, S. Hukantaival, V. Immonen, A. Randla & T. Ratilainen (eds.) *New Visits to Old Churches. Sacred Monuments and Practices in the Baltic Sea Region: 46–60*. Cambridge: Cambridge Scholars Publishing.
- Ruohonen, J. 2018. Viimeisistä polttohaudauksista ensimmäisiin kirkkoihin: Aura- ja Vähäjokilaaksojen kristillistyminen hautauspaojen ja kalmistojen perusteella. In J. Harjula, S. Hukantaival, V. Immonen, T. Ratilainen & K. Salonen (eds.) *Koroinen, Suomen ensimmäinen kirkollinen keskus: 51–65*. Turun Historiallinen Yhdistys, Turun Historiallinen Arkisto 71.
- Ruohonen, J. 2019. Identifying a stone structure in the Medieval church at Ravattula in Finland: Reflections on free-standing crosses in Northern Europe. *Zeitschrift für Archäologie des Mittelalters* 46: 113–135.

- Seppälä, S. 2009. *Viljana, nahkoina, kapakalana. Talonpoikien maksamat kruununverot Suomessa vuosina 1539–1609*. Bibliotheca Historica 125. Suomalaisen Kirjallisuuden Seura.
- Solazzo, C., Walton Rogers, P., Weber, L., Beaubien, H., Wilson, J. & Collins, M. 2014. Species identification by peptide mass fingerprinting (PMF) in fibre products preserved by association with copper-alloy artefacts. *Journal of Archaeological Science* 49: 524–535.
- Teerink, B. J. 2003. *Hair of West-European Mammals. Atlas and Identification Key*. Cambridge: Cambridge University Press.
- Tóth, M. 2017. *Hair and Fur Atlas of Central European Mammals*. Hungary: Pars Ltd.
- Tridico, S., Koch, S., Michaud, A., Thomson, G., Kirkbride, K. P. & Bunce, M. 2014. Interpreting biological degradative processes acting on mammalian hair in the living and the dead: Which ones are taphonomic? *Proceedings of the Royal Society B* 281: 20141755.
- Vajanto, K. 2014. Nålbinding in prehistoric burials: Reinterpreting Finnish 11th–14th-century AD Textile Fragments. In J. Ikäheimo, A.-K. Salmi & T. Äikäs (eds.) *Sounds Like Theory. XII Nordic Theoretical Archaeology Group Meeting in Oulu 25.–28.4.2012*: 21–33. Monographs of the Archaeological Society of Finland 2.
- Zachrisson, T. T. & Krzewińska, M. 2019. The ‘Lynx Ladies’ : Burials furnished with lynx skins from the Migration and Merovingian periods found in present-day Sweden. In M. Augstein & M. Hardt (eds.) *Sächsische Leute und Länder. Benennung und Lokalisierung von Gruppenidentitäten im ersten Jahrtausend*: 103–119. Wendeburg: Verlag Uwe Krebs.