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Helsinki 2023

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SISÄLLYS – INNEHÅLL – CONTENTS

ARTICLES

NOTES & NEWS

BOOK REVIEWS

Teemu Mökkönen

THE URHEILUPUISTO HOUSE AND OTHER CORDED WARE HOUSES FROM FINLAND: MINGLING BETWEEN TRADITIONS

Abstract

Although numerous settlement sites of Corded Ware culture have been discovered in Finland, only a few houses have been identified. This is in stark contrast to the abundant number of pithouses of local hunter-gatherers. This paper takes a closer look at the houses associated with Corded Ware culture, first, by introducing a recently excavated Corded Ware house from southern Finland and other houses connected to Corded Ware culture from Finland and the Karelian Isthmus, Russia, and second, by outlining the various types of Corded Ware houses around the Baltic Sea. After that, the emerging picture suggesting interaction between the regional variants of Corded Ware culture as well as between Corded Ware cultures and local hunter-gatherers will be discussed. Even if the remains of Corded Ware houses are few and often quite ambiguous, it will be concluded that several types of houses have existed in the area north of the Gulf of Finland, and the contacts between cultural traditions affected settlement types and house structures in each party involved in the process.

Keywords: Corded Ware, Neolithic, Stone Age houses, Finland, Northern Europe, Baltic Sea

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INTRODUCTION

Corded Ware Complex dating to 2800–2200/2000 calBC is, above all, known through its graves. In contrast to other areas, the great number of Corded Ware settlement sites in Finland (over 350, Nordqvist & Häkälä 2014) makes the area of the country an exception within the whole Corded Ware Complex (hence CWC). Despite numerous settlement sites, only one study on a site with established house structures connected to Corded Ware culture has been published in Finland (Edgren 1970: 40–41). When it comes to the rarity of Corded Ware houses, Finland is quite similar to the Baltic countries, and to a degree to Sweden, where a small number of houses have been discovered (e.g., Larsson 2008; Kriiska et al. 2015; Kriiska & Nordqvist 2021).

Finland is a country located between the East and the West, both geographically and culturally, and this has been the case during the Corded Ware period, too. Traditionally, people connected to CWC in Finland have been considered to relate to the eastern Baltic unit of the CWC (e.g., Äyräpää 1973: 204–205; Edgren 1993: 92), and the east-west oriented contacts over the Baltic Sea to Sweden – evidenced by some pottery vessels (Äyräpää 1973: 200; Larsson 2009: 409–410) and battle axes (Lindström 2003: 151; Nordqvist & Häkälä 2014: 12, Table 1) – were estimated as a less significant direction in the development Corded Ware culture in Finland (Edgren 1993: 96). Here, it is worth noting that

it was not so long ago when the eastern branch of CWC in Russia (i.e., Fatyanovo and Balanovo cultures) was considered approximately half a millennium younger than the western branch (e.g., Carpelan 1999: 261) in which the Finnish Corded Ware culture is considered to belong.

A recent study on grog used as a temper in a clay matrix of Corded Ware vessels has evidenced frequent contacts over the Baltic Sea between Estonia, southern Finland and Sweden (Holmqvist et al. 2018; Holmqvist 2021). This has altered the previous ideas of contact networks and brought the east-west oriented interaction into discussion. At the same time, the connections between the Gulf of Finland and Fatyanovo culture has been put forth (Nordqvist 2016: 61–62). The movement of artefacts and the ability to manufacture new artefact types required movement of people who carried also other cultural aspects with them. In this regard, the Finnish position in the middle of the eastern and the western branches of CWC is even more underlined than before.

Previously, the Corded Ware culture in Finland has often been regarded as a static phase which was steadily kept segregated from the local hunter-gatherers (Nordqvist 2018: 112–113). During the last decades, several views on CWC have changed. The idea of pan-European A-horizon has been evidenced as incorrect, and instead of unity, the local traits of Corded Ware cultures which originate from the previous cultural backgrounds has been put forth into discussion (e.g., Furholt 2014; Kristiansen et al. 2017). In north, this mingling between CWC and local hunter-gatherers has been evidenced first and foremost in the appearance of new pottery traditions that were born out of merging diverse production practices (Larsson 2009: 356–366; Nordqvist 2016; Kholkina 2017).

This article studies the houses[1] connected to CWC in the area north of the Gulf of Finland. The new results that prove the overseas contacts in the Baltic Sea, demonstrated interaction between CWC and local cultural traditions, and the excavation of the Urheilupuisto Corded Ware settlement site in 2018 have been the driving forces of the study. The aim is to introduce the excavated Corded Ware houses discovered in the northernmost part of CWC, to compare them to the houses found in the context of CWC elsewhere around the Baltic Sea, and lastly, to discuss the interaction between CWC and local hunter-gatherers (Fig. 1) and its consequences on the archaeological data with an emphasis on site location and houses. The sites referred to in the discussion on the interaction between CWC and hunter-gatherers in Finland are not based on a wholesale archival survey. Instead, the observations have been picked up along the author's career, and not the least as a by-product of the archival survey made on the project for identifying the nationally significant archaeological sites in Finland (see Tiitinen & Halinen 2022). In this regard, the aim of this article is merely to introduce the idea, instead of giving a full list of the sites relevant to the topic.

The article starts by introducing the recently excavated Corded Ware house discovered in the Urheilupuisto settlement site, and then continues to the other houses connected to CWC located north of the Gulf of Finland in Finland and in Russia (one example). First, the well-grounded and excavated Corded Ware houses with Corded Ware artefacts will be presented, and second, the uncertain Corded Ware houses, which on

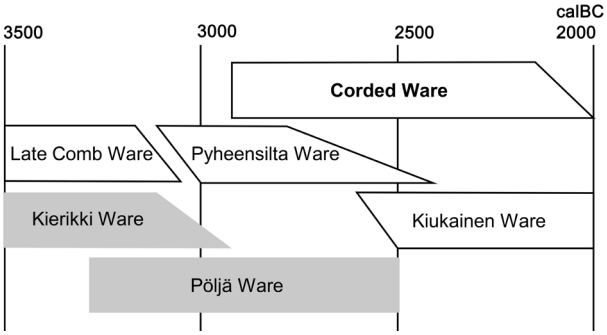

Figure 1 . Chronological schema on pottery traditions in Finland from 3500 to 2000 calBC. The pottery types that are present in the area of Corded Ware distribution are in white boxes. The asbestos- and organic-tempered potteries located mainly north of the Corded Ware Complex are in grey boxes. The schema is based on dated organic residues attached on pottery, except in case of the Pyheensilta Ware (Nordqvist 2018; Nordqvist & Mökkönen 2021; Pesonen 2021).

the basis of circumstantial evidence, potentially belong to the context of CWC, will be outlined. Then, a short review of houses found in the context of the CWC around the Baltic Sea will be provided. The focus will be in the areas that were in close connection to CWC in Finland (Baltic Countries, Russia, and Sweden). Before the conclusions, different types of Corded Ware houses and the consequences of the interplay between CWC and other local cultures in Finland will be discussed.

THE URHEILUPUISTO SETTLEMENT SITE

The Urheilupuisto settlement site is located in the city of Espoo, coastal southern Finland (Fig. 2). The site lies in a flat sandy pocket (c. 400 m^2 in size) in the middle a steep slope terrain (Fig. 3). According to the shore displacement chronology (Hyvärinen 1999), the site could have been occupied at the earliest between 3500 and 3000 calBC, and due to steep topography, it was located rather close to the seashore even in the beginning of the Bronze Age (c. 1800 calBC). Before the excavation, roughly a half of the site was already destroyed in the construction of sport routes and drainage (Jussila 1990; 2016; Lindholm 1996). At this point, no Corded Ware artefacts were recorded at the site.

In 2018, the renewal of skiing routes led to the rescue excavation of the site (Mökkönen 2018). The digging was conducted in artificial layers, except for the bottom sections of the postholes which were excavated as stratigraphic units. The excavation area (122 m^2 in total) was divided topographically into two: the eastern part was covered by a boulder field, while the western stoneless and flat part was likely cleared by a man. When excavated, cultural layers were found only in the western part.

In the western part, weakly coloured and thin cultural layers (c. 5 cm in thickness) comprised a roughly rectangular area (5 metres in length and 3.5 metres in width) which was cut by a modern ditch in the south and continued beyond the excavation area in the north (Fig. 4)[2]. In the margin of the cultural layers, two postholes filled with some stones and coloured sand (c. 40 to 50 cm in diameter) were dug 20 to 30 centimetres deeper than the cultural layers. Remains of a fireplace, represented by a grey

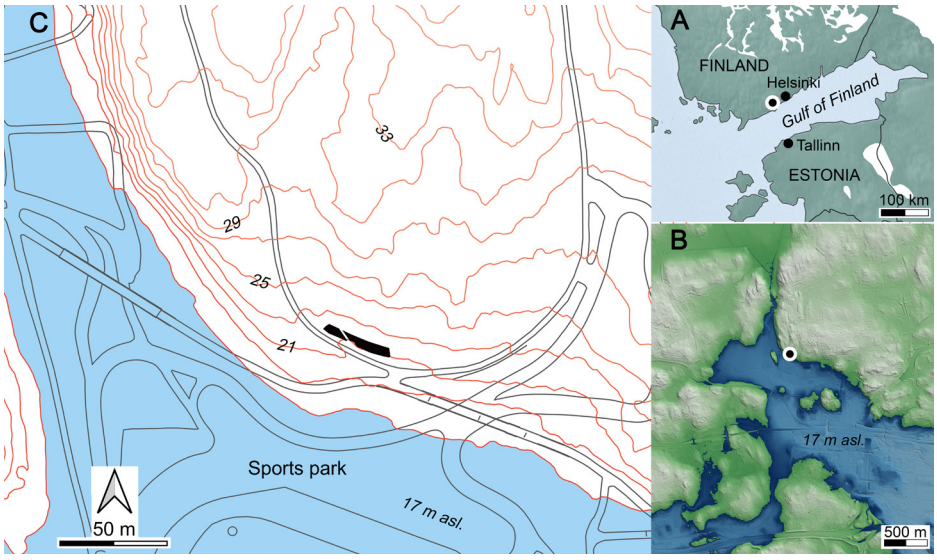

Figure 2. Location of the Urheilupuisto site: A – site location by the Gulf of Finland (Natural Earth free vector data), B – site location and the shore line around 2700 calBC at the level 17 m asl. (according to Hyvärinen 1999, digital elevation data by National Land Survey of Finland), and C – excavation area (in black), topography of the settlement site around 2700 calBC and the current sport routes (map by J. Seppä & T. Mökkönen, base map © Espoon kaupunkimittaus, City of Espoo).

Figure 3. The Urheilupuisto site is located in a sandy pocket. In the photo, the house structure in the western part of the excavation area is under excavation. The photo is taken facing west. Photo T. Mökkönen (Finnish Heritage Agency, AKDG5579:1).

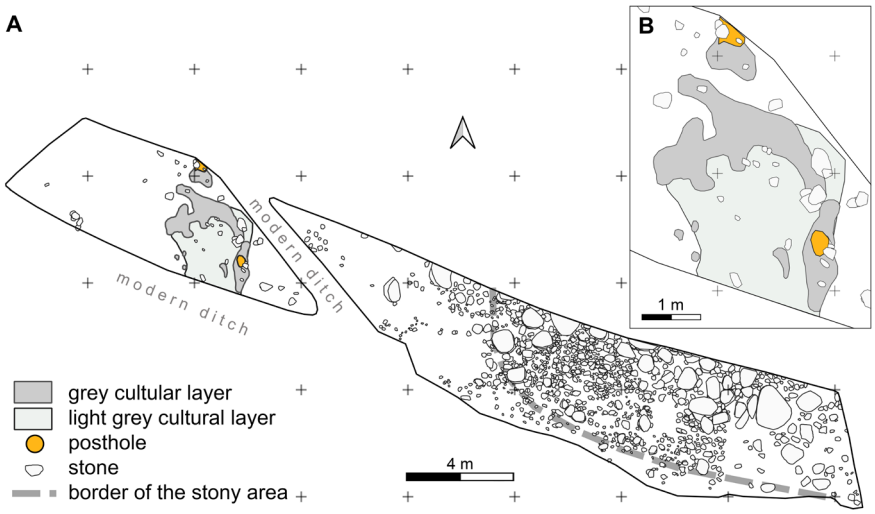

Figure 4. The main features of the excavation area. A – the stoneless western part with the features interpreted as a house and the stony eastern part. B – enlarged map of features interpreted as a house. Maps J. Seppä & T. Mökkönen.

sooty area with some small fire-cracked stones and a concentration of burnt bones, was located in the middle of the cultural layers. Although the stained soils of the cultural layer were weakly coloured, they felt greasy and preserved moisture much longer than natural soils next to them.

These features are interpreted as remains of a house: the cultural layers demonstrate the floor area and the postholes located at the rim of that area are connected to the walls. The house was approximately 3.5 metres in width, and the length exceeded 5 metres, the total dimension remaining unknown. The cultural layers of the floor area were detected at the same level as the lowermost artefacts outside the structure, which indicates that the house is likely to have been erected on the ground surface. On the contrary to the hunter-gatherers' pithouse building tradition, in which the longer sidewall of the house is typically running parallel to ancient shore formations, the longitudinal axis of the Urheilupuisto house was positioned quite the opposite, i.e., its short end was facing the ancient seashore that was located at some distance further away.

Only a small amount of fragmented pottery was found in the western part of the excavation area (Fig. 2; Appx. 1)[3]. The material consists of Corded Ware (pieces of a beaker), probably Pyheensilta Ware (see Vikkula 1987), and some unidentified organic-tempered pottery. The Corded Ware sherds were scattered inside the house and to the west side of it, while the sherds pointing to Pyheensilta Ware were mainly found close to the boulder field to the east of the house (Fig. 5a). The unidentified organic-tempered pottery was distributed in the same areas as the typified sherds, which may suggest coexistence of all the pottery types.

A few identified rim sherds of a Corded Ware beaker are fabricated of dense clay-mass in which organic matter or fine sand are sporadically present. The sherds are undecorated, partly polished, and fibrous imprints are occasionally present on the outer surfaces (Fig. 6a). In the pottery resembling Pyheensilta Ware (Fig. 6d–e), organic tempers (including at least crushed bones) are sometimes supplemented by fine sand. The rare decorative elements consist of oblong depressions and stamps pressed with the tip of a stick. Drawn lines and gently pressed comb stamps (or twisted cord stamps?) are recorded only once. The unidentified organic-tempered pottery is mostly undecorated, and both flat and rounded bottoms are present in the material. There is not much to say for sure, but both organic temper (Meinander 1939; Vikkula 1987; Nordqvist 2016; Kholkina 2017) and completely undecorated or loosely decorated vessels (Edgren 1970: 26; Vikkula 1987: 30–31, 38) are common in both two identified pottery types.

The bulk of the finds consist of knapped quartzes in which only a few retouched artefacts are present (three scrapers, one unidentified, Appx. 1). Quartzes have a three-pole distribution between the house and the western part of the boulder field. In the eastern end of the excavation area, the distribution of artefacts is delimited to a massive boulder, to the east of which no finds were recorded (Fig. 5b). Quartz cores suggest that several reduction methods were applied (20 bipolar cores, two platform cores, nine irregular cores). In addition to knapped quartzes, one light grey flint flake and a porfyrite platform core were recorded (Fig. 6h).

Several whetstones and their fragments found at the site include a large-sized unfinished preform of a whetstone slab (found at the bottom of a ditch next to the stoneless area), one four-sided whetstone (KM 41662:77, 78, fine-grained slate) and one multi-faced whetstone (KM 41662:66, beige sandstone, Fig. 6k).[4] They are all commonly associated with Corded Ware culture (Edgren 1970: 45). Two axes/adzes (Fig. 6f–g) found at the site are closely related to the types associated with Kiukainen culture (see Meinander 1954: 92–94) and a small chisel (Fig. 6j) represent a type that dates roughly to the same periods as the pottery identified at the site (see Meinander 1939; 1954: 94; Vikkula 1987: 13–15).

Based on the current data, the dating of the site remains, to a degree, unsettled. The datings of Pyheensilta Ware (3200/3000–2800/2400 calBC, Asplund 2008: Fig. 10; Pesonen & Leskinen 2009; Pesonen 2021) and Corded Ware (2800–2300/2000 calBC, Nordqvist 2016; Pesonen et al. 2019) suggest that they may have been used during the same time period, at least in theory. The two radiocarbon datings from the Urheilupuisto site do not fully resolve the question either (Table 1). The dating of a piece of birch bark tar mastic (2868–2580

Table 1. Radiocarbon dates of the Urheilupuisto site. Pre-treatment method is acid-base-acid. Radiocarbon dates are calibrated with software program OxCal v4.4 (Bronk Ramsey 2009) using the IntCal20 atmospheric curve (Reimer et al. 2020).

Lab-index	Conventional ^{14}C age BP	calBC, Max (2σ)	calBC, Min (2σ)	calBC, median	Dated material	Context	δ^{13}C (‰; IRMS)	%C	F^{14}C	Collection no. (KM)
GrM-17629	4355 ± 25	3074	2906	2967	charcoal	posthole	-23.22	62.9	0.5815	41662:1590
GrM-17630	4125 ± 25	2868	2580	2718	birch bark tar mastic	find layer	-28.16	75.0	0.5986	41662:1587

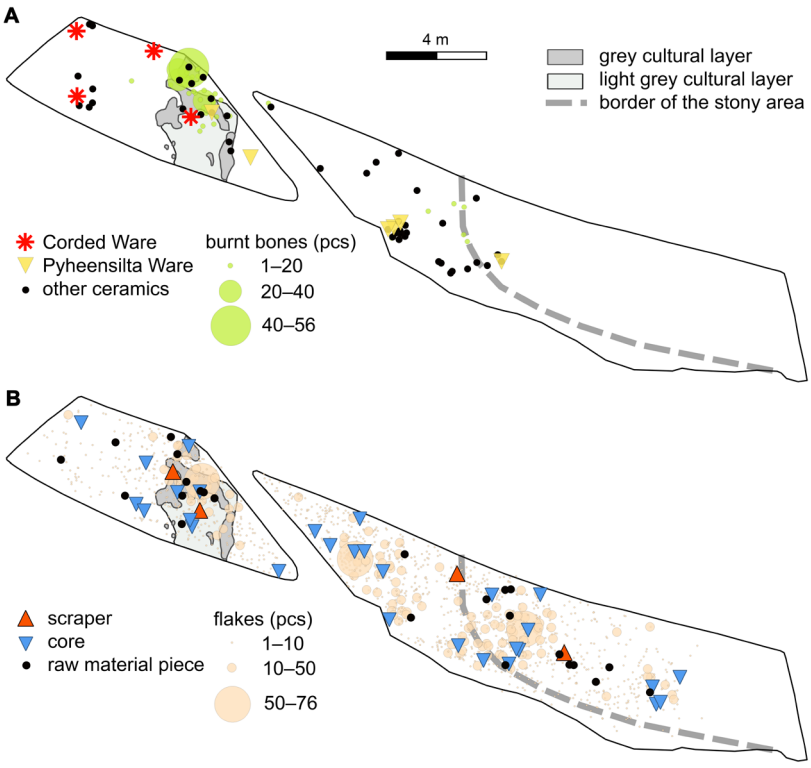

Figure 5. Distribution of materials: A – pottery and burnt bones, B – quartz lithics and artefacts. The dashed line marks the limit of the stony area. Maps T. Mökkönen.

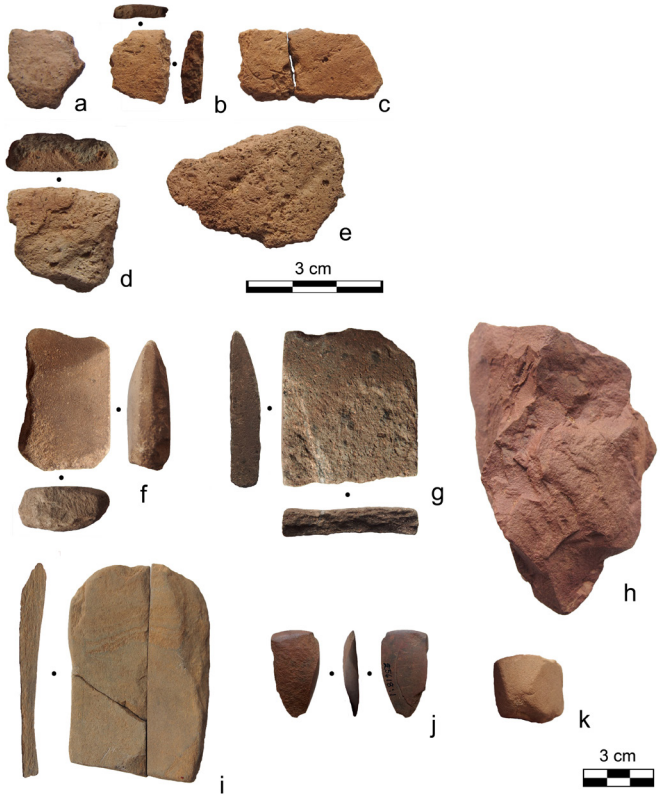

Figure 6. Artefacts from the Urheilupuisto site. Pottery: a–c – Corded Ware (KM 41662: 2; 16; 17), d–e – ceramics resembling Pyheensilta Ware (KM 41662: 13; 47). Stone artefacts: f – axe fragment (KM 41662: 67), g – adze (KM 41662 :68), h – porphyrite platform core (KM 41662:73), i – four-sided whetstone (KM 41662:77–78), j – small chisel (KM 25618:1), and k – piece of a multi-faced whetstone (KM 41662:66). Pottery and stone artefacts are in different scale. Photos T. Mökkönen.

calBC) found at the edge of the boulder field, together with quartzes, points to the Corded Ware period, while a piece of charcoal acquired from the bottom of the posthole at the eastern long wall of the house dates a bit older (3074–2906 calBC). Whether the latter date represents a post of the house, or whether it points to a potential pre-Corded Ware settlement at the site, the date is not in contradiction with dating the house to the Corded Ware period. Based on the current knowledge and the observations made on the materials found at the Urheilupuisto site, there is no compelling reason to suggest several nonsynchronous settlement episodes to have taken place at the site.

OTHER CORDED WARE HOUSES LOCATED NORTH OF THE GULF OF FINLAND

Certain Corded Ware houses

In Finland, the only dwellings previously connected to Corded Ware culture were excavated at the *Malmbacken* site in southern Finland (Cleve 1930; Edgren 1970: 40–41; Fig. 7). The excavation of the site revealed three structures interpreted as dwellings, of which one uncertain example is left out of this discussion[5]. The other two were pithouses ('dwelling pits') associated only with Corded Ware ceramics. They were 1.7 and 1.2 metres in depth. The deeper one was elliptical and 3.5 x 3.5–4 metres in size, while the shape and the exact extent of the other is unknown. Pits were filled with ash and charcoal-mixed soil, and any marks of the wall structures were not observed. Based on the Malmbacken houses, Torsten Edgren (1970: 41) concluded that Corded Ware houses in Finland were built as partly semisubterranean oblong structures without stone foundations. The other pits associated with Corded Ware that have been sometimes referred to as 'dwelling pits' are much smaller in size, and therefore, other explanations are more suitable for them (Edgren 1970: 40).

Another kind of structure is found at the *Lappfjärd-Mössåsen/Kornbäcken* site in western Finland, which is the northernmost pure Corded Ware site of the whole CWC (Fig. 7). The excavation of the site (Area 2, 69 m^2; Laulumaa 2007) produced pieces of 28 Corded Ware vessels (5.3 kg, 2506 pcs), tightly scattered in an area of 4–5 x 7–8 metres in size (Häkälä 2011: 16). Quartz lithics (983 g) were distributed in the same manner as the pottery. A cluster of burnt stones within the area with plenty of pottery is interpreted to be a fireplace (Häkälä 2011: 8). Despite the absence of actual cultural layers (Laulumaa 2007), the tightly packed distribution of artefacts is likely to indicate a house structure (see Laulumaa 2007; Larsson 2008: 122; Häkälä 2011: 14), and therefore, the observed features are considered here a probable Corded Ware house. The site is radiocarbon-dated to 2841–2465 calBC (burnt bones, Hela-1533, 4035±40 BP, median 2550 calBC, Häkälä 2011: 67).[6] Interestingly, 82% of the Corded Ware sherds found at the site have an organic component in the temper (Häkälä 2011: 29), which is a trait commonly attached to the hybrid pottery types that came to exist through the merging of Corded Ware and local pottery traditions (Larsson & Graner 2010; Nordqvist 2016).

The third example is a partly excavated pithouse in the *Rupunkangas 1A* site (ru. *Protochnoe IV*) located on the Karelian Isthmus, Russia (Mökkönen et al. 2007, Fig. 7). The pithouse that was visible on the surface contours included one square room (5 x 6 m in size, c. 35 cm in depth) and separate porch-like entrances (2 x 2 m) in each short end. Weak cultural layers inside the pithouse were associated with hair-tempered pottery (Mökkönen et al. 2007), which is identified as organic-tempered 'Estonian Corded Ware' (Nordqvist 2016). The Corded Ware pithouse was erected on the top of an older pit structure with Mesolithic and Neolithic occupation phases (Mökkönen et al. 2007).

Other houses dated to the Corded Ware period

The temporal and cultural context of some of the pithouses is a bit uncertain because their current archaeological data is incomplete for an unconditional evaluation. These fully or partly excavated pithouses are associated with both Corded Ware and another pottery type (two cases), or they are radiocarbon-dated to the Corded Ware period (two cases). In some cases, the habit to locate the site in the landscape irrespective to larger water bodies

Figure 7. Houses from the eastern part of the Baltic Sea mentioned in text. A – houses with Corded Ware artefacts, B – pithouses with Corded Ware artefacts, C – inland pithouses dating to Corded Ware period (no cultural affiliation based on finds), D – long and narrow hunter-gatherer's pithouses, E – old hunter-gatherer sites resettled as inland sites by non-Corded Ware groups during the Corded Ware period, and F – housepit sites with Corded Ware from southern Finland. The dashed line marks the approximate northern limit of CWC (according to Nordqvist & Heyd 2021). Sites:1 – Urheilupuisto, 2 – Malmbacken, 3 – Lappfjärd-Mössåsen/Kornbäcken, 4 – Rupunkangas 1A (Karelian Isthmus, Russia), 5 – Nähinmaa, 6 – Kauniinmetsänniitty 1, 7 – Isosaari, 8 – Alksnynė 3 (Lithuania), 9 – Narva-Jõesuu IIb (Estonia), 10 – Purkajasuo Vuornos, 11 – Peurasuo, 12 – Kotakangas,13 – Kivineva, 14 – Miekkakaarat, 15 – Meskäärtty, and 16 – Senatsberget 1. Map made with Natural Earth free vector data.

that is characteristic for the settlement of Corded Ware culture, can be used as circumstantial evidence. The presented examples are located both inside as well as slightly outside the established distribution of Corded Ware culture in Finland. The examples in this section, as well as the sites brought up later in the discussion, originate mostly from the coastal Bothnia Bay (Ostrobothnia) where the rapid rate of land uplift has constantly changed the landscape and maintained the constant relocation of coastal settlement sites. Therefore, temporal variation of material culture is very limited at the short-lived Ostrobothnian settlement sites.

The first example is a pithouse at the *Nähinmaa* site, in northern Ostrobothnia, that is located some 140 kilometres beyond the northern limit of Corded Ware distribution (Figs. 7, 8A.). The site includes several pithouses, and a small-scale excavation inside of an oblong and narrow pithouse (pithouse no. 5, floor area 3.5–4 x 12 m in size) produced both Corded Ware (3 pcs) and

asbestos-tempered Pöljä Ware (1 pc, Tranberg 2001). This is the only currently known pithouse context, in which both of these pottery types are present. The site is located in the area of an extremely fast land uplift rate, and according to land uplift chronology it can be dated roughly to 2500–2200 calBC (Okkonen 2003: 227; Pesonen 2016: Kuva 3; Tallavaara & Pesonen 2020: Supplement 1). The dimensions of this pithouse are of great interest, and this topic will be addressed further in the discussion.

The second example, the *Kauniinmetsänniitty 1* pithouse (Pesonen 2013), is located in Northern Ostrobothnia approximately one hundred kilometres north of the traditional northern limit of CWC (Fig. 7). The plan of the house is pretty much similar to the one found at the Rupunkangas 1A site: a rectangular room (4.3 x 6.5 m in size, 40–50 cm in depth) and porch-like entrances (1.5 x 1.5 m) in both short ends (Pesonen 2013). The excavation of the house did not produce any artefacts that allow cultural affiliation (quartzes, a whetstone slab, burnt bones), but it is radiocarbon-dated to the Corded Ware period, to 2566–2298 calBC (birch bark tar mastic, Hela-1711, 3935±35 BP, median 2420 calBC, Pesonen 2013). The pithouse was erected on the remains of a thousand years older pithouse connected to Typical Comb Ware. During the settlement dated to the Corded Ware period, the

Figure 8. Long and narrow pithouses from Northern Ostrobothnia, Finland. A – the Nähinmaa pithouse (no. 5) associated with Corded Ware and Pöljä Ware (Finnish Heritage Agency, AKDG6381:2). B – the Peurasuo pithouse dating to the Final Neolithic or to the beginning of the Bronze Age (Finnish Heritage Agency, AKDG6393:1). The dashed lines are added to the photos to display the location of the pithouses. Photos T. Mökkönen.

site was located approximately one kilometre inland at the level of some 15 metres above the simultaneous sea level (Pesonen 2013; 2016).

The third example, the *Isosaari* pithouse, is located in western Finland, within the northernmost part of the Corded Ware distribution (Fig. 7). The fully excavated rectangular pithouse (3 x 3.5–4 m in size, 0.2–0.4 in depth) was erected on a site first settled by a group who used asbestos- and organic-tempered Pöljä Ware (settlement dated to 3359–3034 calBC), and later occupied by people who used Corded Ware pottery (Kankkunen & Mönkkönen 2010). Inside the pithouse, a rectangular wood-framed fireplace (c. 1.5 x 1.5 m in size) was discovered next to the eastern short wall. Any datable artefacts were not found inside the house, but the wooden structure of the fireplace is dated to Final Neolithic, 2020–1772 calBC (Hela-2210, 3556±33 BP, median 1903 calBC, Kankkunen & Mönkkönen 2009; for the periodisation see Nordqvist & Mökkönen 2017). The dating is a bit young to be securely connected with the Corded Ware culture. However, the end of the Corded Ware period in Finland around 2200 calBC is based on a limited number of datings (n=13, Pesonen et al. 2019), and the production of Corded Ware continued around the eastern part of the Gulf of Finland at least until 2100–1900 calBC (Kriiska & Nordqvist 2021: 373–474, see also Nordqvist 2016: 61). Accordingly, the association between the pithouse and Corded Ware culture is uncertain but not unthinkable.

In addition to the examples presented above, there are few houses where the shared temporal context of a house and the Corded Ware pottery found within is somewhat or highly unlikely. In the *Meskäärtty* pithouse (three rooms, c. 8 x 35–45 m in size) located in coastal southeastern Finland, both local variant of Late Comb Ware as well as Corded Ware were found inside (Mökkönen 2008). In the subsequent research, radiocarbon datings pointed out that the pithouse was erected during the last centuries of the 4th millennia calBC, and the activities of Corded Ware population at the site took place almost one millennium later. The *Senatsberget 1* pithouse (8 x 15 m in size, flat bottom area 4 x 9 m, 0.3 m in depth) located in an archipelago in southwestern Finland is another quite similar example. The small-scale excavation inside the pithouse produced both Corded Ware and Pyheensilta Ware, as well as quartzes, pieces of whetstones and two small axes/adzes (Sipilä 1996). Although the site could have been settled at the earliest during the last centuries on the 4th millennium calBC (based on shoreline displacement) and the author of the excavation considers the common distribution of the pottery types as a sign of contemporaneity, the question of a common temporal context cannot be resolved without more extensive excavations, new stratigraphic data, and radiocarbon-dating of the materials. These two examples from southern Finland, where the rate of land uplift is twice lower compared to the shores of the Bothnian Bay where most of the other examples originate from, underline the need for more extensive excavations and radiocarbon-dated materials.

HOUSES AMONG THE OTHER NORTHERN CORDED WARE GROUPS

Eastern Baltic Corded Ware Complex

Only a few Corded Ware houses have been discovered in the Baltic countries. Further south, by the Vistula Bay in Kaliningrad district, several large oblong houses with sunken floors (built on double posts and wattle-and-daub walls, c. 15 to 35 metres in length) connected to Rzucewo culture (also known as Bay Coast Culture, Haffküstenkultur and Primorskaya culture) have been discovered (Saltsman 2004; Zaltsman 2016). Because the Rzucevo is a hybrid culture with Corded Ware and older Globular Amphora elements, it is often, and also here, excluded from the CWC.

In coastal Lithuania, on the Curonian Spit, a Corded Ware house has been discovered at the *Alksnynė 3* site (Fig. 7; Piličiauskas 2018: 30–33). The remains of the house became visible as a grey coloured area of cultural layer (3 x 3.5 m in size, up to 15 cm in thickness). A posthole (35 cm in diameter, 20 cm in depth) and an oval-shaped small hollow (50 x 64 cm in size, 9 cm in depth, filled with burnt matter) were located at the opposite margins of the house structure. The modest features that are quite similar to the ones found at the Urheilupuisto site are interpreted to be a light constructed

house erected on the ground surface with a stoneless fireplace inside.

In the Alksnynė 3 house, bones were concentrated in the fireplace, and pottery was distributed both inside as well as next to the house. This kind of artefact distribution, also seen in the Urheilupuisto house, seems to be quite typical among Corded Ware houses (Larsson 2008; Müller et al. 2009). Abundant materials found at the site included pottery (2.2 kg), flint and other stones (1 kg), bones (458 g) and amber (85 g, Piličiauskas 2018: 32). Based on radiocarbon dates, the Alksnynė 3 site was settled 2450–2350 calBC (Piličiauskas 2018: 35).

In Estonia, the old interpretation of the two possible long houses, indicated by four hearths at the Valma site (Jaanits et al. 1982: 105–106), is currently regarded unlikely (Kriiska & Nordqvist 2021: 8). Instead, definite house structures have been excavated at the Narva-Jõesuu IIb site in northern Estonia, where two pithouses with Corded Ware artefacts have been discovered (Nordqvist et al. 2014; Kriiska et al. 2015; Kriiska & Nordqvist 2021: 466–467). The larger of the houses was rectangular in shape, and it had walls 3–4 metres in width. The floor was dug into the depth of 0.7–0.8 metres below the surface. The smaller house was 2 x 4 metres in size and dug into the depth of 1.3 metres below the surface. Any clear structural details of the houses were not preserved but they were unlikely constructed on horizontal timber frames (Kriiska & Nordqvist 2021: 467). Based on radiocarbon dates on charred crust on pottery and burnt bones, the dating of the site covers the whole Corded Ware period (2800–2200/2000 calBC, Kriiska et al. 2015; 2016; Kriiska & Nordqvist 2021).

The eastern branch of the wide CWC in Russia, represented by Fatyanovo and Balanovo cultures, is actually distributed quite close to the Baltic Sea in the Leningrad Oblast (Bader & Khalikov 1987, see also Nordqvist 2016: 61; Nordqvist & Heyd 2020), and it is included here shortly. The houses discovered among the Balanovo culture, which is the eastern one of the two cultures, are semi-subterranean pithouses made of horizontal logs and occasionally connected by corridors. The sizes of the houses vary between 4 x 4 and 6 x 8 metres (Bader & Khalikov 1987: 78; Ris. 38). In the context of Fatyanovo culture, which is the western one of the two cultures, any houses have not been found, yet.

Swedish Battle Axe Complex

The Scandinavian CWC is represented by Single Grave culture in Denmark, and Battle Axe culture in Norway and Sweden. In Sweden, an aspect repeatedly attached to the houses of Battle Axe culture is that they are difficult to identify and, therefore, the number of houses is low (Malmer 2003: 144–148; Larsson 2008; Larsson & Brink 2013). The known examples are mostly post-built oblong houses 4 to 7 metres in width and 10 to 15 metres in length (the width increasing in respect to the length, Larsson 2008; Larsson & Brink 2013: 337–338). They are much smaller compared to the Corded Ware houses found in Bornholm, Denmark (over 20 metres in length, Nielsen & Nielsen 1985), or to the Late Neolithic or Bronze Age houses found in southern Scandinavia (Larsson & Brink 2013).

In general, weakly developed cultural layers and the low number of finds inside the structures are considered typical features of houses of the Swedish Battle Axe culture. Cultural layers inside the houses are characteristically thin, for example only 6 cm in thickness as recorded in the Kabusa house in Scania, or the actual cultural layers can be missing altogether (Larsson 2008). This is to say that the recognition of post-built houses is largely based on postholes. In some of the houses, part of the floor is sunken, and typically, cultural layers in this part of the floor are rather well-preserved (Larsson 2008; Larsson & Brink 2013). According to Åsa M. Larsson (2008), the weight of pottery recorded in the houses is mainly between 100–200 g (up to 1.5 kg) and the weight of knapped lithics (flint and quartz) is frequently close to 400 g (up to 2 kg).

In addition to domestic houses, mortuary houses of the Battle Axe culture have been discovered in Sweden. In comparison to regular houses, they are smaller, post-, and plank-built structures (8–4 x 5–3 m in size) outlined by ditches of 0.2 to 0.7 metres in depth (Larsson 2009: 282–293). The ditches are often filled with dark and sooty soils that contain burnt human and animal bones, as well as pottery.

Table 2. The properties of the houses related to Corded Ware culture based on artefacts, or in the absence of datable artefacts, on the combination of radiocarbon dating to Corded Ware period and non-shore bound site location. See the text for references.

Site	Type	Shape	Lenght (m)	Width (m)	Area (m^2)	Lenght to width ratio	Corded Ware artefacts
Isosaari	pithouse	rectangular	3.5–4	3	9–10,5	1.2–1.3	no
Kauniinmetsänniitty 1	pithouse	rectangular	6.5	4.5	29	1.4	no
Malmbacken	pithouse	elliptical	3.5–4	3.5	12–14	1.0–1.1	yes
Malmbacken	pithouse	–	–	> 3	–	–	yes
Mössåssen/Kornbäcken	on the ground	oblong	7–8	3–4	21–32	1.8–2.3	yes
Urheilupuisto	on the ground	–	> 5	3.5	–	>1.4	yes
Rupunkangas 1A	pithouse	rectangular	6	5	30	1.2	yes
Nähinmaa	pithouse	oblong	12	3.5–4	42–48	3–3.4	yes

DISCUSSION

Different types of Corded Ware houses

Despite the early recognition of the Malmbacken pithouses connected to Corded Ware culture (Edgren 1970: 40–41), the concept of a pithouse has usually been attached to the northern Neolithic hunter-gatherers (Pesonen 2002; Norberg 2008; Mökkönen 2011), and the Malmbacken pithouses remained for a long time as an isolated and a bit peculiar example. Now, the current evidence on Corded Ware houses, although still quite limited, suggests that several types of houses have existed in Finland.

Certain Corded Ware houses presented in the article are verified by sufficiently extensive archaeological excavations. In contrast, the other houses dated to the Corded Ware period introduced in the article have been excavated only to a limited extent. This makes it somewhat uncertain whether they belong to the context of CWC. They possess, however, a number of features that jointly support the presumption of Corded Ware context, like the presence of Corded Ware artefacts at site or in a house, radiocarbon or shore displacement dating to Corded Ware period and the location of settlement site irrespective to the concurrent shoreline of larger water bodies – i.e., similar to the habit of the Corded Ware tradition to settle the landscape. In other words, the uncertain houses are considered to potentially belong to the context of CWC based on circumstantial evidence, although current archaeological data is unable to prove it thoroughly.

The well-grounded Corded Ware pithouses found in the northern and the southern side of the Gulf of Finland, at the Malmbacken and the Narva-Jõesuu IIb sites, are quite similar to each other in respect of their dimensions, and they are remarkably deep and small compared to preceding and concurrent pithouses built by hunter-gatherers (see Pesonen 2002; Vaneekhout 2008; Mökkönen 2009; 2011). The Isosaari house from western Finland is similar to these Corded Ware pithouses in size (but not in depth).

The two other Finnish pithouses connected to Corded Ware period, both located close or beyond the northern fringe of the Corded Ware distribution (Fig. 7), the Rupunkangas 1a and the Kauniinmetsänniitty 1, are close matches in many respects: they share similar ground plan and dimensions (Table 2), and they were erected on the older pithouses. The floor areas of the two houses are almost double in size compared to the smaller pithouses presented above. Actually, with respect to their size and ground plan, they are almost identical with the pithouses with one or two separate entrances that are characteristic of the populations using asbestos- and organic-tempered potteries in the northernmost area of the CWC and beyond, dating after 3500 calBC (e.g., Katiskoski 2002; Mökkönen 2009; 2011: 25–26).

Pithouses in the Corded Ware context are not a phenomenon of Northern and Eastern Europe

alone. Corded Ware houses with sunken floors are quite common in Central Europe, too. In the Central European examples, the longer wall of the houses is typically 4–7 metres in length, although much smaller houses exist too, and the length to width ratio of the houses is generally between 1.0 and 1.5 (Hecht 2007: 157). The depth of these houses varies between 0.2 to 0.7 metres below the surface (Hecht 2007: 137, 148, 155). With respect to dimensions, the northern pithouses connected to Corded Ware culture (the length to width ratio between 1.0 and 1.4, Table 2) and the Central European houses with sunken floors seem to be pretty much comparable, and they represent traditions that are clearly different from the houses of Corded Ware/Battle Axe cultures with pots-built structures and elongated ground plans discovered in Scandinavia (see e.g., Larsson 2008).

The Finnish Corded Ware houses that were erected on the ground surface are clearly different from the western post-built house structures of the Swedish Battle Axe culture. Considering the structures, the Urheilupuisto house with modest postholes has its closest parallel in the Alksnynė 3 house in Lithuania. The possible Corded Ware house in the Lappfjärd-Mössåssen/Kornbäcken site in the western Finland, instead, has in respect of dimensions (length to width ratio 1.8–2.3, Table 2) its closest parallels among the houses of Swedish Battle Axe culture that have typically narrow and oblong ground plans (length to width ratio > 2.0; see Larsson 2008).

The data represented in this article suggest that three or four types of Corded Ware houses have existed in Finland. The small pithouses that were present on the shores of the Gulf of Finland exhibit ground plans that are of similar size to the houses with sunken floors in the context of the Central European CWC. The larger pithouses with porch-like entrances discovered close to the northern fringe of the CWC bear a close resemblance to the pithouses built among the concurrent people producing the asbestos- and organic-tempered potteries. Houses that were erected on the ground surface and were built on notably light post construction – compared to Swedish Battle Axe houses – were present in southern Finland, and the narrow and oblong versions of this type of house were possibly present in the southwestern Finland.

Interplay between the cultures

According to various theoretical perspectives in archaeology and anthropology, the types of houses and their spatial arrangement across the landscape are dependent on and interlinked with social, cultural, and ideological aspects of the groups who created them (Knapp & Ashmore 1999; Thomas 2001; Ashmore 2002; Souvatzi 2012; Halperin & Schwartz 2016). Vernacular architecture and the technologies applied in construction are considered to reflect cultural and social identities of the builders (McGuire & Schiffer 1983; Dobres 1999; Halperin & Schwartz 2016: 7–10), and thereby, the changes – e.g., in layout, organization of space, location and building techniques of the houses – imply also some alteration in the way the builders defined themselves.

Recent studies have underlined the regional variability of material culture and burial practices within the CWC (e.g., Furholt 2014; Nordqvist 2016; Ahola & Heyd 2020), which was likely caused by the process in which local societies selectively incorporated and transformed the novelties of Corded Ware culture to fit into the local contexts. This kind of a process took place in northern areas, too, and it affected all the groups involved, and resulted in (1) hybridization of Corded Ware and hunter-gatherers' pottery traditions around the Gulf of Finland (Nordqvist 2016; Kholkina 2017), in southern Ostrobothnia (Edgren 1970: 78; 1997) and along the Swedish east coast (Larsson 2009: 356–368; Larsson & Graner 2010), (2) spread of battle axes and imitations of these battle axes in the area of asbestos- and organic-tempered potteries (Äyräpää 1952; Carpelan 2004; Mökkönen 2011: 53; Nordqvist & Häkälä 2014), and (3) two-way influences in burial customs between CWC and hunter-gatherers (Ahola 2020: 14; Ahola & Heyd 2020: 87).

Just like the regional variation in material culture and customs within CWC, the variation of house types among CWC around the Baltic Sea is likely due to different preceding cultural environments that interacted and locally modified

the housebuilding traditions. In southern Sweden (and in Denmark), this is evidenced by the continuity of the same house type from the earlier Funnel Beaker culture (Middle Neolithic A) to the following CWC (Middle Neolithic B, Larsson 2015). It is likely that the mingling of groups of people and different traditions is present in the whole area of CWC and beyond, and that a wide array of aspects of life were involved in the process of hybridization.

The question of continuation in house building from earlier traditions to CWC in Finland is difficult to resolve due to shortage of data. The overall number of Stone Age houses discovered within the area of Corded Ware distribution in Finland is small (see Pesonen 2002: 23–24, 30–31). They include a few at least partly excavated pithouses, which are associated with Pyheensilta Ware and some asbestos-tempered pottery, or do not have produced any artefacts that allow cultural affiliation.[7] Even if some of the housepits associated with Pyheensilta Ware are of a similar size in width and length with the pithouses associated with Corded Ware in this article (Karjalainen 2006: 26–27), the majority are, however, of larger size. The continuation of house building tradition from earlier traditions to CWC in southern and southwestern Finland is not clearly perceivable in available data. In the areas close to the northern border of CWC, the situation is different, and there the resemblance between the few Corded Ware pithouses and the pithouses built among the groups who produced asbestos- and organic-tempered potteries is quite evident.

The Corded Ware period brought some changes to housing practiced by non-Corded Ware populations along the Bothnia Bay. At that time, more oblong and narrower ground plans appeared in hunter-gatherers' pithouses both in Sweden (Norberg 2008: 159, Fig. 5.17) and in Finland[8] (Fig. 7). In Finland, the Nähinmaa pithouse introduced above in this article and the late Final Neolithic *Peurasuo* pithouse in the Northern Ostrobothnia (floor area, 3,5 x 18 m, Ojanlatva & Alakärppä 2002) are the only examples that have been even partly excavated (Fig. 8). This change in ground plans and building traditions of pithouses around the Bothnian Bay is likely one of the consequences that followed the contacts with CWC, and especially with the Swedish Battle Axe culture, whose presence through direct or indirect contacts is seen in distribution of battle axes in the area (Carpelan 2004; see also Nordqvist & Häkälä 2014).

During the 3rd millennium calBC, hunter-gatherers' traditional mode of habitation at settlement sites that were located close to the shores of larger water bodies altered. This change is evident in the southern part of the Bothnia Bay, western Finland (Fig. 7), an area that is located close to the northern border of CWC. There the population who used asbestos-tempered Pöljä Ware (Miekkakaarat site, Skantsi 2019b) or was not associated with any pottery at all (Kivineva site, Skantsi 2019a), resettled the old settlement sites which had been altered due to land uplift from the coastal sites to inland sites. The resettling is evidenced by recent radiocarbon dates.[9] This kind of inland settlement did not exist during the previous millennia. It seems that the scattered and non-shore-bound settlement pattern practiced by Corded Ware people (see Europaeus-Äyräpää 1930: 190; Edgren 1970: 39, 70; Kriiska 2000: 74; Kylli 2001; Hecht 2007: 244; Larsson 2008; Sikk et al. 2020: Fig. 1) was employed, at least to a degree, among the other groups in close connection to CWC.

The interaction between the groups of different cultural backgrounds and traditions affected several aspects of cultural practices. Therefore, it can be assumed, that the Corded Ware tradition which produced only little archaeological record in volume compared to the preceding hunter-gatherers (Nordqvist 2018: Table 4, Figure 29; Mökkönen 2011: 63–65; 2014), might have affected the practice of producing and discarding material culture among other traditions. As a hypothesis, the observed decreasing number of seashore bound settlement sites and radiocarbon dates in Finland towards the end of the Corded Ware period (see Tallavaara et al. 2014: Fig. 1) might be a consequence of the newly shaped cultural practices that followed the mingling between the CWC and the local cultural traditions.

CONCLUSIONS

The current data available on the Corded Ware houses and on the mingling between the groups representing different cultural traditions is highly incomplete, and therefore, much of the

views presented in this article remain to a degree speculative in character. Despite that, the various house building traditions among the Corded Ware Complex around the Baltic Sea are clearly distinguishable: post-built oblong houses erected on the ground surface mark the westerns shores, whereas smaller houses erected on the ground surface as well as pithouses, both built without substantial (number of) posts, are present on the eastern shores. In Finland, the house types seen in the Baltic Countries are present in southern Finland, while the pithouses that are associated with Corded Ware and that located close to the northernmost area of the CWC are larger in size and some of them well-comparable to the pithouses associated with asbestos- and organic-tempered potteries, as well as to the Balanovo pithouses found in Russia.

In Ostrobothnia, western Finland, the housepits associated with Corded Ware via aftefacts or radiocarbon dates are difficult to interpret because of the mingling between CWC and local hunter-gatherers is clearly present in this area. During the Corded Ware period in Finland, the reshaping of cultural identities likely took place in various aspects of life (for the case of the burial practices, see Ahola & Heyd 2020) including the ways to settle the landscape and build houses. Both the Finnish Corded Ware culture and the Swedish Battle Axe culture were involved in the process, and the influence of the latter was probably more substantial in the northern part of the Bothnia Bay, where narrow and oblong ground plans that are similar in their dimensions with the houses of the Battle Axe culture appeared to pithouses during the Corded Ware period.

The emerging pattern of different house types during the Corded Ware period (Fig. 7) is likely to display both the contacts between the regional variants of Corded Ware cultures as well as the preceding and the concurrent cultural environments which the Corded Ware phenomenon arrived to and acted part in. In the process, the different house types are likely to reflect the variation of social and cultural identities that emerged in different parts of Finland during the Corded Ware period. In addition to the changes in architecture, the Corded Ware period affected how the landscape was settled. The long-lasting tradition to erect settlement sites to a close proximity to larger water bodies was not the norm anymore, and a new kind of inland sites were erected by some of the groups using asbestos- and organic-tempered potteries north of the CWC. Even if the changes are quite distinctive, the process behind it is surely a complex one. In order to evaluate and understand further the mingling between cultures and traditions proposed in the article, more large-scale excavations to produce appropriate data on the temporal contexts of settlement phases at the sites will be needed in future.

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NOTES

[1] The term house is regarded here as a man-made building where human activities have taken place. The term does not refer to any specific kind of structures used in construction.

[2] The northernmost part of the thin cultural layers was cut out in the excavation (that was carried out in artificial layers 5 centimetres in thickness) before the documentation, and therefore, it seems in the maps (see Fig. 3) that the cultural layers of the house did not continue properly to the northern border of the excavation area.

[3] The amount of pottery at the Corded Ware sites varies a lot: 1.2 g/m^2 in the Urheilupuisto site, 0.2 g/m^2 in the *Rävåsen* site (Ruonavaara 2005: 43) and 82 g/m^2 in the Lappfjärd-Mössåsen/ Kornbäcken site (Häkälä 2011: 25) have been reported in Finland. For comparison to other Neolithic periods in Finland, see Nordqvist (2018: 97, Fig. 29), and for comparison to the houses of Battle Axe culture in Sweden, see Larsson (2008).

[4] KM stands for archaeological collections of the National Museum of Finland.

[5] This structure excavated at the Malmbacken site was a paved fireplace (1–1.5 x 4 m in size) with a posthole next to it. It has been interpreted as a possible hut which produced mixed materials of Corded Ware culture and the preceding Neolithic periods (Cleve 1930; Edgren 1970: 40–41).

[6] Another radiocarbon dating (Hela-1534, 4770±40 BP) of a burnt bone obtained from the site dates one thousand years older (mean 3569 calBC). As there is only Corded Ware materials found at the site, no clear explanation for the date exists.

[7] The pithouses at the *Hiittenharju (Laurilan hiekkakuoppa)* site in southwestern Finland are associated with Pyheensilta Ware. They are described as oval depressions between 3 x 6 metres and 5 x 15 metres in size, and 0.3–0.7 metres in depth (Karjalainen 2006). One pithouse is partly excavated (Pellinen 2007). The *Bolarskog 3* pithouse located in southern Finland, excavated in 2002 (Fast 2002), is described as an oval depression c. 6 x 10 metres in size (Jussila 1990). The pithouse is associated with Pyheensilta Ware. Based on the current knowledge on pithouses and the development of cultural layers inside, the structure at the Bolarskog 2 is likely a pithouse although the leader of the excavation questioned it (Fast 2002). The *Härkämäki* pithouse located in southwestern Finland, is roundish, 7 x 7 metres in size, 0.8 m in depth, and it has surrounding embankments 1.5 metres in width. The doorway (2 m in length and 1 metre in width) is facing the ancient shore. Burnt bone found inside the pithouse is dated to 3094–2926 calBC (Hela-4404, 4404±19 BP, median 3017 calBC) (Taivainen 2018). The finds of the Härkämäki pithouse do not allow affiliation to any particular culture.

[8] Two examples of narrow and oblong housepits from Northern Ostrobothinia, that can be dated on the basis of land uplift chronology to Corded Ware period, are *Purkajasuo Vuornos* (housepit 111, floor area c 3.5 x 19 m) and Kotakangas (floor area c 3 x 10 m). For the comparable sizes of hunter-gatherers' pithouses (see Norberg 2008; Vaneeckhout 2008; Mökkönen 2009). While writing the article, almost 200 examples of potential narrow and oblong housepits that are dated based on land uplift chronology to the Late and Final Neolithic have been detected with help of airborne laser-scanning data from the area that is located close to the northernmost distribution of CWC in Finland, in the provinces of Ostrobothnia and Central Ostrobothnia. So far, only some 15 of them have been verified archaeologically as housepits (J. Ikäheimo, University lecturer, Archaeology, University of Oulu, text messages to the author, 27 October 2022, 9 January 2023).

[9] The resettling episodes of the sites that were first occupied as sea-shore settlements by populations using Typical and Late Comb Ware (the 4th millennium calBC) are radiocarbon-dated as following: the Miekkakaarat site 2880–2639 calBC (Skantsi 2019b), and the Kivineva site 2280–1960 calBC (Skantsi 2019a).

APPENDIX

Appendix 1. The materials of the Urheilupuisto site (KM 41662: 1–1591) divided between the western and the eastern parts of the excavation area.

	Western part (**53 m²**)			**Eastern part (69 m²)**			**Total (122 m²)**		
	pcs	g	g/m²	pcs	g	g/m²	∑ (pcs)	∑ (pcs)	MED g/m²
Ceramics	159	130	2.5	10	15	0.2	169	145	1.2
Quartzes	3441	12.281	231.7	2.575	8.020	116.2	6.016	20.301	166.4
Burnt bones	300	36	0.7	4	1	0.0	304	37	0.3
Axes/adzes	1	56	-	1	79	-	2	135	-

Mark Oldham

INTRODUCING CHILDREN TO ARCHAEOLOGY – ON SITE AND IN THE CLASSROOM

Abstract

This paper introduces a case study from Oslo, Norway, where two outreach programmes aimed at local children have been carried out by the Norwegian Institute for Cultural Heritage Research (NIKU) as part of development-led archaeological investigations relating to the construction of the new Medieval Park (Middelalderparken). The first programme involved inviting younger children from four local kindergartens to site, whereas the second programme involved archaeologists visiting fourth graders at school. Both programmes had a clear pedagogical element at their core. The programmes are discussed in relation to both previous work we have done with children, and to the broader literature on archaeology, history and education.

Keywords: children, archaeology, education, Oslo

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INTRODUCTION

In 2021 and 2022, the Norwegian Institute for Cultural Heritage Research (NIKU) carried out development-led archaeological investigations in Oslo in relation to the construction of a new park (Middelalderparken, the Medieval Park) in the area where the medieval city lay. Norwegian regulations provide for that the developer pays for a certain amount of dissemination in connection with archaeological projects and, in this case, we designed and carried out two programmes aimed at giving local children a taste of archaeology. The first programme was aimed at kindergarten children and was conducted on site while the excavation was being undertaken. The second was aimed at fourth graders at school and was undertaken during the post-excavation stage. While different in both content and target audience, the programmes can be considered linked and based on shared pedagogical principles and the overarching goal of bringing children and archaeology together and activating learning about the past through sensory learning – visual, auditory, kinesthetic (Scott 2010) – whereby feelings and emotions are an integral part of historical meaning-making (Stolare et al. 2021: 266).

In this paper, I present the two programmes and place them within the broader context of archaeology and education, before reflecting on the possibilities and opportunities to connect local children with archaeology through development-led archaeology.

The development-led archaeology can be defined as the legally regulated (for example, in Norway, through Lov om kulturminner, https://lovdata.no/dokument/NL/lov/1978-06-09-50) professional archaeology that is most often practiced as part of the planning process. It is the main source of archaeological information

and employment, and arguably the form of archaeology that people encounter most frequently (Beck 2022: 83).

Högberg has reflected on how development-led archaeology, as a 'contemporary activity' (2004: 14), has a responsibility for the past that it creates – and that we need to be conscious of the past that we are telling (2007: 44). MacKenzie and Stone have also remarked on this responsibility that archaeologists have towards the past 'in all its manifestations and in its relations with the present' (1990: 5). This is especially the case when we are telling of pasts in an educational setting, where there is also an emphasis on getting the children to see *how* pasts are created as well as the historical narrative about the past. In designing our programmes, we were conscious that archaeology is a contemporary activity, exists in the present, and is a resource for society.

Archaeology and education

Henson has noted that 'Archaeology as practised seems to have four basic aims: to learn about the past, to learn from the past, to manage the heritage of the past, [and] to enable public engagement with the past' (2017: 45), and education has often been seen to be a key factor in achieving these aims

Archaeology has long tried to find its way into the affections and curriculums of children, and there is a long and growing literature about archaeology and education – especially in formal settings such as schools and museums. However, there has at times been a tension between, on the one side, the need to stress the mutability of interpretations and the multiplicity of histories, and on the other, the urge to teach history as facts.

As Molyneaux (1994: 3) wrote in one of the classic texts on archaeology and education:

> The integration of archaeology and education might seem to be a simple task, but as material evidence takes its meaning from its perception and use, what it represents varies according to the agenda within which it is used. In spite of what may be empirically known about an object, site or prehistoric society, the material past and the ideological past may come into conflict.

This is a task we have grappled with previously, when in a previous phase of the Follo Line excavation project, we arranged a programme of site visits for children in collaboration with Bane NOR, Oslo municipality's Office of Culture and financed by Sparebankstiftelsen DNB (see Oldham 2017). This previous work was used as an inspiration and starting point for these programmes, but the aim was to make something new and different rather than a copy. We thus found that we could make two programmes from the ideas first taken up in this previous project: the site visit could form the core of a programme for kindergarten children, while the close connection to the curriculum and combination of discussions and object-based learning would be the core for the fourth graders.

In the following, I will firstly introduce the programme for kindergarten children and then the programme for school children.

KINDERGARTEN KIDS ON SITE

As Högberg has remarked (2004: 9), the excavation site is a key arena for the production of heritage, and an important meeting place for archaeology and wider society. On development-led projects, it is not always possible to give the wider public access, often due to health and safety concerns and liabilities, time pressures, project priorities and accessibility. However, through good co-operation with the developer, Bane NOR, we were able to facilitate for site visits for kindergartens, school groups and adult visitors.

As noted above, this is not the first time we have invited children to site. This time, however, we decided to aim for even younger children – those in the older groups at kindergarten (3–5 years old). This would be a different challenge, to connect with children without a formal curriculum upon which to base our programme, but instead to focus on the curiosity, excitement and experiential learning of younger children, whose understanding of time is 'embryonic' (Cooper 1995: 16) and very much under development.

Henson has commented that the 'processes

of archaeology are twofold: discovery and interpretation' (2017: 44), and this focus was at the heart of our project; young children are almost constantly in a mode of discovery and interpretation, and we wanted to direct this natural inquisitiveness towards thinking about the past – and its connections with the present. This linkage between the past and the present, that 'archaeology cannot be separated from its audience', as Michael Shanks and Christopher Tilley (1992: 67) put it, is often particularly clear when it comes to children, who tend to want to know more about things that are important to them in the present (Stone 1994: 195). Hence, in our project we wanted to let the conversations, interpretations and discoveries develop in a fluid and natural way – within the structure we had designed for the visit. Through 'enactive representation' (Bruner 1966), children can learn new concepts through experiences, sensation, and language (Cooper 1995: 43), and so providing an experience was to be at the core of our programme.

Upon reflection, the goals of our project echoed what Henson (2017: 45) has written about time, places and people.

> Through our understanding of time, we can learn about the origins of our present-day world and its features, how human society is not static but develops through time, and we can focus on analogies in the past for present situations and issues. Our understanding of places in the past helps us to appreciate the enormous cultural variety and ways of expression of human societies. We also begin to understand the interactive relationship we have with our changing physical environment, landscapes and climate. Our investigations of human behaviour can lead us towards a feeling of common humanity with others and a more empathetic understanding of human experience.

We wanted the children to start to think about development over time, cultural variety and

Figure 1. Children at the timeline (Photo: NIKU).

expression, similarities, and differences, and empathetically consider how life in Oslo was in the past. As Cooper (1995: 9) has written:

> Understanding the relationship between subjective time and measured time develops through understanding other dimensions of the concept of time – chronological sequences, duration, changes over time, similarities and differences between now and past times – and the vocabulary of time.

The site visit involved the children visiting three stations set up next to the excavation area. These three stations had different but complementary themes and learning goals, and each aimed to give the children a specific learning experience. The programme for kindergarten children was developed and carried out by archaeologists Maja Bredal Hauan, Ingeborg Marie Hornkjøl and the author.

Chronology

The first station was a simple timeline, showing five time periods: 'now', 'when one's grandparents were young', 'the Middle Ages', 'the Stone Age', and 'the time of the dinosaurs' (Fig. 1). The learning goal for this station was to give the children an understanding of time and older history; that what they see on site is from quite distant from our own in terms of generational time, but also quite recent in terms of both human history and the earth's history. Although the kindergarten children are young, they have nevertheless started to acquire an understanding of time, as Cooper (1995: 9) has identified:

> … before they start school children are becoming able to sequence events in their own lives, and possibly artefacts and photographs related to their own experience, and to retell stories in chronological sequence, recognising conventions such as 'once upon a time' and 'they all lived happily ever after'.

An idea of chronology and the depth of time is important for historical learning but should not be read as promoting the simplistic idea of a linear historical narrative. Instead, through having an understanding of chronology, one can begin to appreciate that history is more than just events, and that historical interpretations are also contingent on who, when and why they are being made; 'The past is too multiform and reflexive to be wholly conveyed in one-dimensional story lines.' (Lowenthal 2015: 357).

The decision to add in 'when one's grandparents were young' was made to provide the children with a generational hook upon which to attach their understanding of time – and to extend it to the Middle Ages and the Stone Age. As both Owen and Steele (2005: 66) and Lowenthal (2015: 356) have noted, young children struggle to understand the datable past or timeframes that go further than 3–4 generations. Hence, such recognisable and knowable concepts as 'when one's grandparents were young' can help to familiarise and anchor their understanding of time.

To start with, the archaeologists would talk a little about the time periods, starting with the present day:

- Where would you place yourself here? What about your kindergarten?
- Where would you place these (modern) things?
- Discuss the picture of grandma and why she is on the timeline.
    - What sort of things did grandma have when she was young?
    - Discuss the idea of generational time – for example by asking whether anyone has a great-grandma.
    - Move the conception of the past back 2–3 generations.

The next stop on the timeline would often be the time of the dinosaurs. It is almost a Law of Nature that as an archaeologist one will be asked about dinosaurs and whether one has ever found one. For the benefit of future archaeologists, but mainly as a way to both bookend the timeline and to explain that there was a time before people, we decided to include dinosaurs in

the timeline; both familiarity with dinosaurs and the clear divergence between the time of dinosaurs and the time of humans would help in this initial timeline task. As Zarmatti (2015: 185) has noted in an Australian case:

> We have found it especially important to emphasise the chronological context of the site (in its simplest form) with pre-literate children aged 5–7 years who come to the programme with the pre-conceived notion that archaeology is 'all about digging up dinosaurs'. Educators make a special point of emphasising that, although they will be 'digging', the children will not be digging up dinosaurs, but rather finding evidence of what life was like for children who lived on the site a 'long, long time ago', when their great-great-grandparents were children. This supports research that found young children have difficulty understanding concepts of long-span time and are better able to comprehend concepts of time expressed in short time spans that relate to their own experiences.

We would ask questions such as:

- Who likes dinosaurs? What do you know about dinosaurs?
- When did they live? Did they live at the same time as people?

We would then move forward in time to the Stone Age, where we could start to introduce a time with people, but beyond our conception of generational time. This also enabled us to discuss how archaeologists are concerned with humanity and things, and not dinosaurs.

- What do we know about the Stone Age?
- It was so long ago that not even great-grandma's great-great-great grandma was born.
- What sort of things did people have in the Stone Age? What were they made of?
- What did people do in the Stone Age?

The final stop on the timeline would be the Middle Ages, the time that the remains discovered during the excavation were from. We would connect this period with the ongoing excavation and the finds that we would be looking at later. This is a period that is perhaps somewhat beyond the children's conception of generational time, but that is more 'knowable' than for example the Stone Age, as one can easily see remains from the Middle Ages in the landscape (ruins, castles, other buildings), is maybe more visible in popular culture, and even familial connections can sometimes be traced back this far.

- What do the children know about the Middle Ages?
- How long ago was it?
- What was life like then?

Once the initial introduction and discussion was over, the children were given the different pictures relating to the different time periods to place on the timeline. This would then be discussed once all the children had had their turn. Questions such as what was on the picture, and why was it placed there would be asked to stimulate discussion. The role of the archaeologist here was to guide, support and encourage questions and comments about time.

We found that the timeline was a good means of introducing the concept of time and the past, and the comparative element – i.e., that 'before' can be classified into the more recent past and the more distant past, such as 'a while ago', 'a long time ago', 'a very long time ago' and so on. This is something that younger children do not fully grasp, so a timeline with visual help is a useful tool in helping them order and organise time. As Lowenthal has remarked, 'The pearls of history accrue value not merely from being many and lustrous, but from being sequentially strung' (2015: 357). By giving the kindergarten children an introduction to the idea of chronology, or perhaps more pertinently the difference between generational time and the 'long time' of history and archaeology, we had a foundation to build upon at the other stations.

Figure 2. Inside the excavation tent (Photo: NIKU).

Excavation

The second section was inside one of our two excavation tents, and here the children could see the ongoing excavation work (Fig. 2). We would explain what being an archaeologist involves, the tools that are used, and also show them what we had found – streets, buildings, and so on. The learning goal here was to gain an understanding of what an archaeologist does and what archaeology is, and to keep in mind what was discussed at the timeline.

In connection with this station, we filled pallet frames with soil and added artefacts such as shoe soles, pottery and animal bones so that the children could undertake a mock excavation. This was considered to be the best way to facilitate the experience of 'finding', given health and safety concerns in the excavation area – such as polluted soil, the possibility for falls and other injuries, and the need to avoid hazards. The aim here was to allow the children to use the same tools as archaeologists, to discover artefacts, and for them to try to work out what the artefacts are from and what they may be able to tell us about the past.

This excavation was an example of Henson's description of archaeology as 'discovery and interpretation', as mentioned above (2017: 44). The children's responses to finding things in the soil was one of wonder and excitement, with the thrill of the treasure hunt outweighing the loss of authenticity (cf. Toftdal et al. 2018): the controlled situation of digging in the boxes, where there were enough artefacts for everyone to find anything, and where digging was easy, made the experience positive and memorable for the children. As Zarmatti (2015: 185–186) has discussed, this form of active learning is often something that children remember for a long time:

> Memories are shaped by somatic experiences and the environment, and our senses play a key part in memory creation. Motivation and emotion also play a role in determining the strength of a memory. When an experience is novel or unusual, when it is personally

> meaningful or elicits an emotional connection, then it is more likely to be stored in the long-term memory.

Feedback from the kindergartens indicates that this experience on site was a memorable one, which the children took up again spontaneously a while after their visit – both in conversation and in free play, and as such is comparative to other places these children might visit, such as the farm, a museum, or a musical performance.

Artefacts and object-based learning

The third section aimed to allow the children to compare objects from daily life in the Middle Ages with their equivalents today and see changes and similarities over time. For example, we compared modern cooking utensils and equipment with medieval finds, today's ice skates with animal bone skates, and plastic combs from the present day with medieval combs made from antler or bone; often quite similar or knowable, but in different materials. The tangibility of finds is their great strength as disseminators of history. As Lowenthal (2015: 389) has stated, 'The supreme merit of tangible remains is the ready access they afford to the past's ubiquitous traces. Relics and remnants viewable by all offer unmediated impressions free to any passer-by.' Objects are a particularly useful tool for learning, and operate in a completely different way to texts, as Durbin, Morris and Wilkinson (1990: 4-5) note:

> Objects also provide creative and emotional stimulus. They provide material for art, imaginative writing and drama. They provide examples of how ideas can be expressed in ways other than words. Objects are real rather than abstract, and thus they aid the memory: physical sensations, experiences and emotions may remain much longer in the mind than word-gained facts or ideas.

Object-based learning is an important way for children to explore, enquire and reason through a very sensory experience (e.g., Ludvigsson et al. 2022: 684); how artefacts feel, look, sound and smell are key clues for understanding what they might be (see, e.g., Cooper 1995: 23). By asking questions about these objects – either to themselves or to an archaeologist – they find out about the past and also actively and reflexively participate in knowledge creation (Arias-Ferrer & Egea-Vivancos 2017: 92). Object handling is also a form of active learning, like the excavation, and engages children in a way that 'sparks children's interest, then their curiosity or creativity … [and] provide[s] a concrete experience that aids or illuminates abstract thought' (Durbin et al. 1990: 4). Through using objects – and looking at both past objects and modern parallels – children relate to the world around them and gain an appreciation of the role and significance of things in their own lives. Indeed, even for these young children, objects help to develop a number of skills, as identified by Durbin, Morris and Wilkinson (1990: 18):

> learning to look, learning to describe, learning to record, learning to ask questions, learning to classify, learning to relate structure to function, learning to formulate and test hypotheses, learning to use fragments.

At the end of the visit, the visiting children were gathered together at the timeline, and we summed up what had been discussed at the three stations, and encouraged reflections, comments and questions about the archaeology, archaeologists and the past.

Reflections from the kindergartens

Following the site visits, we asked the kindergartens for their feedback and evaluation of the programme. However, only one kindergarten replied. Their reflections, while not possible to generalize of extrapolate from, give us an indication of how the programme was experienced by the children and the pedagogical staff.

This response indicates that this kindergarten had a positive experience on site, and shows the value of objects, a variety of activities and treating the children with respect and as important visitors. The key going forward is maintaining the link and the memory of the site visit, and the suggestion of being able to take something (e.g. finds) back with them is worth keeping in mind for future projects; although one takes an object out of the normal route of excavation ->

conservation -> museum, one arguably increases its effect among the children from kindergarten as lieu de mémoire, which can be used as a spark for memory, activity and further discussion.

TAKING ARCHAEOLOGY INTO THE CLASSROOM

This programme was designed by the author and Vilde Christoffersen Rønning from the University of Oslo, who was on placement at NIKU as part of her master's degree in museology and cultural heritage studies. We were joined in the classroom by archaeologists Stine Urke Brunstad and Therese Marie Edman.

In contrast to the programme for kindergarten children, the programme for schools was directly and explicitly connected to the curriculum. The reasoning for this was so that teachers could easily see that it would be relevant and that it would be a good accompaniment to regular teaching; as such it was tailored to both children's and teachers' needs. Feedback was sought from teachers, and a pilot version was tested out at one school before the programme was finalised.

The session would last for about 2 hours (with a break) and would involve two archaeologists/disseminators in each class of around 20-25 children. Much of the time spent would be related to the learning goal of 'exploring how people lived in the past and comparing with how we live today' (SAF01-04, Utdanningsdirektoratet n.d.). The session also explored concepts such as nature and culture in relation to heritage and parks (and Middelalderparken in particular), sustainability and the sustainable use of resources (NAT01-04, Utdanningsdirektoratet n.d.),

Table 1. Responses from the kindergarten.

Q1	How do you think the children experienced the visit to the excavation?	A1	We were there with two groups, and both had a positive experience. They got to do practical tasks and got a good explanation of what archaeologists work with and what we saw. It was very cold the days we came, but that didn't matter. It seemed like the children really enjoyed themselves.
Q2	Do you think that the programme was appropriate for the age of the children?	A2	The two guides adapted the programme to the two groups. The first group was really interested, knew things from before and had a lot of questions. They received more "advanced" information, which suited them. The other group was also interested, but not to the same extent as the first. They had a similar programme, but one which was more adapted to their needs. It was good that the guides could adapt to the needs of the children that were there.
Q3	To what extent has the visit been built upon or taken up again at kindergarten afterwards?	A3	We have talked a lot about the visit afterwards. One child said immediately that he wanted to be an archaeologist when he was older. We have talked about the visit to site whenever we have visited the open area of the part and hope to keep the experience vivid going forward too.
Q4	Do you think that the children gained an understanding of time and the past?	A4	There was a good illustration on the timeline where the children could place the pictures at the right time period. It was a good task, where the children could together find the right answer. When we got to see the practical work that the archaeologists were doing, the children could see the old things in reality. This gave them an insight in how things could have been in the past.

Q5	Do you think that the children gained an understanding of what an archaeologist does and what archaeology is?	A5	Yes, it was exciting for both the children and the adults to see the archaeologists at work. To see their tools, the precision with which they work, their teamwork and so on. We got answers to lots of spontaneous questions and learnt a lot. It was good that the children could touch bones and other things that they were interested in.
Q6	Do you think that the children gained an understanding of objects and their development over time?	A6	Yes, they understood that it was a long time ago, but it is difficult to say the extent to which they understood. It can be difficult to introduce the time concept to small children, but with the connection to dinosaurs and other things I think they gained a good understanding.
Q7	Have you any other comments (positive or negative)?	A7	I think that the two guides we had were very good at leading the groups of children. They took the time to explain and treated the children with respect. They faced the children and I think that the children really felt like they were seen as competent people. Sometimes they didn't understand everything, but the most important for them was to be treated so well by the guides. They have a good experience together and learnt a lot. It was exciting for them to dig themselves and it was a highlight to find the bones and other finds. A suggestion for next time is that the children can take something with them from the excavation, to maintain the link between the excavation and what we can work further with in the kindergarten.

ideas of conservation, preservation and listing, and why we have archaeological investigations. We also connected these discussions to the overarching part of the curriculum (1.5, Utdanningsdirektoratet n.d.), especially: 'Humans are part of nature and have a responsibility to manage nature in a responsible way. Through education, pupils will gain knowledge about and develop respect for nature' and 'Pupils shall develop an understanding of how humanity's actions affect nature and the climate and thus also our society'.

We had seen with the children from kindergarten that the timeline worked well as an activity, and so we decided to use it again in our sessions with the fourth graders. These children had an understanding of chronology and the various time periods pictured, so it was much more of an icebreaker and starting point for our discussions about the medieval period than was the case for the kindergarten children. We also altered the pictures used to make the assigning of time period more difficult or ambiguous – such as reenactors and medieval buildings that are still standing – to encourage reflection and engagement with the concept of time and with the idea that archaeology exists in the present rather than the past.

In the subsequent discussion, we would talk about the past in general and the medieval period in particular. How long ago was it? What do you think Oslo was like then? What did children do in the medieval period? Here, we encouraged the children to talk between themselves and then discuss in plenum; we allowed them to take time to think, ask questions and talk – they would be active participants rather than passive recipients of information.

Children of this age (9–10 years old) need pauses from thinking and talking, and so one of the ways in which we broke up the session was by using a wordsearch. This involved the children finding words relating to archaeology and the medieval period hidden in a grid – either alone or in teams – for about 10-15 minutes,

before we went through the answers in plenum. We then moved on to the next discussion theme, which would be prompted by one of the words in the wordsearch: *kulturarv* (cultural heritage).

We would ask 'did anyone find kulturarv?' and then follow up by asking what it meant. This was a difficult one, as while heritage is a term that is used frequently, for example, in the media and popular discourse, it is something that the children found hard to pin down. *Kulturarv* in Norwegian is a composite word formed of the word for culture (*kultur*) and the word for inheritance (*arv*). Responses were often focused on the inheritance element, and in particular on inheriting something when someone dies. There was a clear personal and individual aspect to the children's understanding of heritage, which stood in contrast to concepts such as World Heritage or national heritage registers. We attempted to bridge this gap between the personal and the supraindividual by reflecting on the concepts of importance and value and an element of scale. Heritage such as the Viking ships, or medieval ruins in Middelalderparken, are considered heritage because they have value and importance for society in general, rather than people as individuals.

The scale of heritage was something that we explored in the next part of the session, when looking at archaeological artefacts. Medieval artefacts are protected by law, and as such can be connected to the ideas of national registers, significance and so on – yet are often small, everyday objects, the remains of daily life. Different artefacts were distributed among the children, who could then examine them and think about what these fragments might have once been, what they say about life in the medieval period, and how similar or different they are to objects we use today. The starting point for this part of the session was the learning goal in the curriculum (SAF01-04, Utdanningsdirektoratet n.d.): 'Explore how people in the past subsisted, and talk about how significant changes in the basis for life and technology have affected and continue to affect demography, living conditions and settlement patterns'.

After looking at archaeological finds, we looked more closely at the archaeological method and how we use – among other things – ar-

Figure 3. A reconstructed medieval scene (Illustration: Hege Vatnaland).

tefacts to create a narrative and an interpretation of a site. We looked at a picture that showed an imagined scene from a building excavated a few years ago (Fig. 3). In the picture are a number of things found on site – chess pieces, dice and gaming pieces, chicken bones, plates and drinking vessels, musical instruments – and so we asked the children to think about what may have taken place here. Many commented on the fact that the scene looks abandoned, and that it is untidy, and the groups generally came to the conclusion that there had been a party or a feast here, with food and drink and games and music; this is the same conclusion that we have come to as archaeologists (Berge et al. in prep.).

At this point, it was time for the children to take a break from thinking and talking, and so our final activity was more creative – we asked the children to draw either one of the finds they had examined, a scene from Oslo in the medieval period, or what they would like the new Middelalderparken to look like. This part of the session was also linked to a learning goal from the overarching part of the curriculum (1.4, Utdanningsdirektoratet n.d.): 'Pupils are to learn and develop themselves through sensing and thinking, aesthetic expressions and practical activities'. This was a good way to end the session in the classroom, allowing the children to take inspiration from what we had discussed and turn it into a creative result.

As a follow-up to the school visits, we have designed a poster based on some of the drawings from one of the schools and colleagues from Oslo municipality are arranging for others to be displayed in a gallery at Oslo Ladegård. Our poster of the children's drawings is placed prominently on the fence around the Middelalderparken building site, near the ruin of St. Clement's Church where there is a good number of visitors each day – kindergarten classes, dog walkers and neighbours – giving the children's artwork a real audience.

CONCLUSIONS

These two programmes, in connection with one development-led archaeological investigation, brought archaeologists and young children together to discuss and explore archaeology in two different settings – on site and in the classroom. Although there are a number of additional differences regarding the specifics of the programmes and who was involved, there is a shared goal from the archaeologists' perspective of enabling the children to better understand the past and how it is managed in the present day, as well as how archaeologists operate both on a methodological and theoretical plane.

As Cooper has written (1995: 1):

> the past is a dimension of children's social and physical environment and they interact with it from birth. They hear and use the vocabulary of time and change: old, new, yesterday, tomorrow, last year, before you were born, when mummy was little, a long time ago, once upon a time. They ask questions about the sequence and causes of events: when did we move here? Why? What happened in the story next?

Hence, discussing the past with children is something that is familiar and known, even if it not known in the same manner as among adults. Archaeology, with its materiality and tangibility provides an alternative way in to thinking about the past. This was especially the case with the kindergarten children, who have not been schooled in history yet, but was also apparent for the older children, who appreciated the non-textual aspect of our programme.

As mentioned at the start of this article, there is a clear element of social responsibility to the work we do in development-led archaeology, arguably stemming from the legal basis of the investigations and the implicit need to justify our work in terms of public benefit (e.g., Watson 2021). These programmes bringing archaeology and children closer to each other show the benefits that can be provided through development-led archaeology when the social mission of archaeology is given a central role and we allow ourselves to think about the bigger picture and ask, 'What can we learn about ourselves by studying the past?' (Henson 2017: 54). Hence, a goal for archaeologists in their encounters with children ought to be to provide a 'set of themes and concepts for handling the past' (Cooper 1995: 27), that is, the tools by which children can create their own 'map' of the past. Inspiration can

be taken from the Australian case discussed by Zarmatti (2015: 184), who shows how to:

> use archaeology as the means of connecting knowledge, the educator, and the student to produce learning. Archaeology not only provides 'content' and 'knowledge' but its inherent heuristic of inquiry drives the pedagogical process of constructing knowledge and facilitating learning.

Our experience in providing the space and framework for children to interact with archaeology has been a positive one, and it has been important also on a democratic level to discuss themes such as the historical narrative, multivocality and cultural heritage management with young citizens. However, it has been difficult to obtain detailed feedback and evaluation of our programmes from teachers and pedagogical staff at the kindergartens, with the exception of one kindergarten. This is most likely due to a lack of time and a heavy workload on their part; the responses received both immediately on site or at school and in subsequent brief e-mail correspondence have been positive, if lacking in detail – for example:

> Thanks for a great visit! The children said that they thought it was really exciting and informative. It was especially fun to experience real archaeological finds!

This is not by any means unexpected, as we experienced the same when approaching them in advance of the visits – our proposal and the draft programme was accepted without any comments or changes from the teachers and pedagogical staff. This article therefore makes no attempt to be an evaluation of the programmes, but rather presents them as cases that connect archaeology and educational theories in a practical manner, and which show how development-led archaeology can provide interesting learning experiences both on and off site (see, e.g., Stolare et al. 2021 for a case study with more detailed feedback from teachers who took schoolchildren to heritage sites).

There are many considerations that need to be taken into account when creating projects like these, relating to both how we present archaeology, to whom, and in what setting. Each case will need to be tailored to the specifics, but we see that development-led archaeology has both the capability and opportunity to play a role in increasing the links between archaeology, heritage management and children, increasing both awareness about the past and how it is managed and interpreted in the present day.

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HUMAN-BEAVER ENGAGEMENTS SEEN THROUGH MULTIPERIOD SETTLEMENT SITES AT RAUTALAMPI HÄMEENNIEMI AND KITEE HIIDENNIEMI, FINLAND

Abstract

The aim of this article is to investigate the relationship between beavers and humans in the prehistoric times. This is studied through animal bone assemblages excavated from two multi-period settlement sites in Northern Savonia and North Karelia, Finland, and is supplemented with ethnographic and folklore material. The theoretical framework uses perspectives from social zooarchaeology, relational ontology and multispecies archaeology and the research questions are answered with zooarchaeological analysis, age estimates and beaver ethology. This study shows that the hunted beavers were adults who could have established their own colonies, modified the landscape to suit their needs and had their first litter. Beavers had different ways of being, engaging and being present in a world that sometimes led to direct and indirect encounters between humans and beavers. The hunters had knowledge that based on the behaviour of beavers, and they used it to find the animals to engage with them.

Keywords: European beaver, hunting, human-beaver encounters, social zooarchaeology, North Karelia, Northern Savonia

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INTRODUCTION

In what is now Northern Savonia and North Karelia, hunting and fishing have been an important part of people's lives from the Stone Age to modern times. At the end of the Stone Age (3200–1900 BCE), animal husbandry began to spread slowly from the western parts of Finland, but never completely replaced hunting and fishing (Bläuer & Kantanen 2013). During the Early Metal Period (1900 BCE–300 CE), hunting continued to be the main livelihood in Northern Savonia and North Karelia, and this was also the case during the Iron Age (300–1300 CE), although settlement sites and bone material from this period are scarce (Lehtosalo-Hilander 1988; Taavitsainen 1994; Lavento 2015; Raninen & Wessman 2015).

What is evident from the archaeological material and historical sources is that there was one certain species that prevailed as one of the most important game species from the Stone Age until its unfortunate extinction in the 19th century due to overhunting: the European beaver (*Castor fiber*) (Paulaharju 1921; 1922; Lehikoinen 2007; Aalto 2017; Ukkonen & Mannermaa 2017). In Finland, the role of beavers and beaver hunting has mainly been discussed together with other game species (see e.g., Lehikoinen 2007; 2009; Aalto 2017; Ukkonen & Mannermaa

2017). The larger mammals, such as brown bear (*Ursus arctos*), Eurasian elk (*Alces alces*) and wild reindeer (*Rangifer tarandus*), have been studied more extensively through artefact studies, Rock Art studies, burial archaeology and zooarchaeology in order to interpret the importance and meanings of these species for subsistence, cosmologies and human-animal relations (Carpelan 1974; Taavitsainen 1976; Halinen 2005; Lahelma 2007; Kivisalo 2008; Salmi et al. 2015; Kirkinen 2019; Salmi 2022).

The aim of this article is to explore the ways beavers were perceived and engaged in interspecies interaction with humans and other non-human animals during the prehistoric times with the help of social zooarchaeology. Social zooarchaeology is an approach in which non-human animals are seen as active participants in the world and as social beings with the capacity to act and influence other non-human animals and humans. Zooarchaeological analysis is used to examine the context and condition of the bones, anatomical distribution and age of the beavers found at two settlement sites from Northern Savonia and North Karelia (Fig. 1).

The results will be compared with the life history and ethology of the beavers as well as folklore and ethnographic material to examine how beavers behaved, how they were perceived by hunters and what embodied engagements they had with humans. The basis of this research is that the settlement sites and the animals

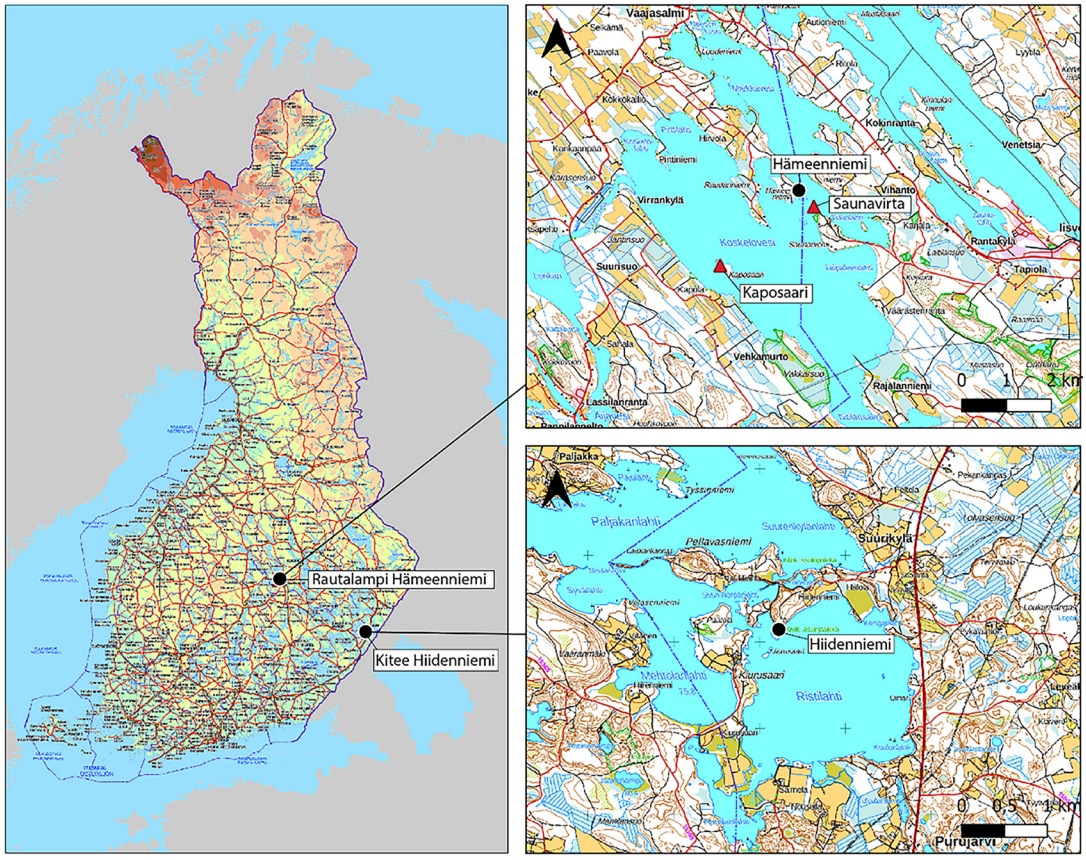

Figure 1. Site locations in Finland and in detail. Top right: Rautalampi Hämeenniemi (686010018) and locations of the nearby stray finds of Kaposaari (KM 5410:2) and Saunavirta (KM 29379) mentioned in the text. Bottom right: Location of Kitee Hiidenniemi (1000003341). Map: E. Jääskeläinen 2023. Data: National Land Survey of Finland 2023, Finnish Heritage Agency 2023.

identified from them can also be used to reflect on the events and engagements outside of the settlement sites as the animals had to be found, encountered, and engaged with before they were hunted and brought to the settlement site.

The settlement sites in the area in question are often defined as multi-period which has been described as difficult to interpret, especially in zooarchaeological research, because they have archaeological material from different time periods and the bone finds rarely have a clear stratigraphic context (Mannermaa 2003; Tourunen 2011a). Here, I use this approach to analyse burnt bone assemblages from two settlement sites at Kitee *Hiidenniemi* and Rautalampi *Hämeenniemi* (Fig. 1), which have been dated to the Stone Age (8850–1900 BCE), the Early Metal Period (1900 BCE–300 CE) and the Late Iron Age (800–1300 CE). As the bones have not been radiocarbon dated, beaver hunting at these multi-period sites is considered within the general framework of prehistory, while recognising that the time frame is broad and that there is likely to have been a lot of variation in human-beaver relationships at different times.

This research will answer the following questions: How old were the hunted beavers based on the age estimates? What do the age estimates tell us about beaver hunting? What do the age estimates tell us about the lives of beavers at the time they were hunted? What do the life history of beavers and their behaviour tell us about hunting, interspecies engagements, and relationships?

European beaver

The focus of this article is the European beaver (*Castor fiber*), an important cohabitant of humans and one of the earliest settlers in Finland, as the oldest radiocarbon-dated beaver from Lieksa, North Karelia, is over 9,000 years old (Ukkonen & Mannermaa 2017: 62). The abundance of beaver bones from the settlement sites and their appearance in historical records, such as tax records and legal disputes concerning hunting rights (Paulaharju 1922; Lehikoinen 2007; Aalto 2017; Ukkonen & Mannermaa 2017), indicate to how important beavers have been throughout the centuries in different parts of Fennoscandia until its extinction during the 19th century. In

Figure 2. Beaver lodge in Hossa national park. The lodge is easy to spot in the landscape once you are familiar with beavers' habits. Picture: E. Jääskeläinen 2022.

Finland, the current beaver population consists of Canadian beavers (*Castor canadensis*) and European beavers. The Canadian beavers were introduced from the United States in the 1930s, as they were thought to be the same species as the local, then extinct, European beaver, which was also reintroduced at that time (Lahti 1972).

Beavers are large rodent-like mammals that live mainly in aquatic environments to which their bodies are adapted (Fandén 2005). Beavers grow to their full body size, reach sexual maturity at 3–5 years of age and usually have their first litter during this time. Adult beaver can grow to a length of 70–105 cm and can weight 12–30 kg. Perhaps the most recognisable features of beavers are their scaly tails and their habit of felling trees and building dams. Although they live mostly on water and are agile swimmers, beavers do not eat fish. Instead, they eat the bark and leaves of deciduous trees, which they gather near the banks of the ponds, rivers, or lakes they

inhabit. For the winter, beavers gather food and store it near their lodges below the water level, so that they do not have to go ashore during the colder months (Lahti 1972; Fandén 2005; Müller-Schwarze 2011).

The lodges that beavers build are sturdy constructions that cannot be easily broken into by predators (Fig. 2), as are the dams they build to control water flow. These activities change the landscape, sometimes drastically, as damming a river, for example, can build up water and can cause flooding in the area. Coles (2006), in their research on the prehistoric beavers of Britain, found that the landscape-altering activities benefited not only humans in many ways, but also other species such as elks and hares. The felling of trees made it easier for hares and elks to find food more easily during the winter months, which could attract people to the area to hunt these species. It has also been suggested that the damming of rivers and the resulting flooding may have increased the size of fish populations and attracted waterfowl (Coles 2006: 48–57).

Theoretical framework

Especially in recent years, the role of animals in societies has been studied from a variety of perspectives and in archaeology, the emergence of social zooarchaeology, relational perspectives, and multispecies archaeology has influenced the way we perceive prehistoric animals (Russell 2012; Lindstrøm 2012; Overton & Hamilakis 2013; Salmi et al. 2015; Overton 2018; Pilaar-Birch 2018; Macāne 2022; Salmi 2022). These interpretations often emphasise the situatedness and relationality of human-non-human relations in pre-modern societies. The categories between humans and non-human animals that relate to each other are porous and change according to the situation. Non-human animals are seen as active participants and social beings in the world and its events, in which they can influence the lives of others. The role of other species and interspecies engagement is an integral part of being a human and being in the world (Hill 2011; Lindstrøm 2012; Overton & Hamilakis 2013; Watts 2013; Overton 2018; Pilaar-Birch 2018).

Thus, the world and everything in it is connected through reciprocal relations. These relationships are situational and are based on internalised knowledge, and hunters know how to use this knowledge in different situations. For example, in modern hunter-gatherer and indigenous ontologies, hunters who moved through the landscape and around of their settlements perceived the landscape as they moved in it (Ingold 2000). They came to know the other species living in the world and knew how to interact with them through knowledge gained from generations of humans and embodied participation in the world (Bird-David 1999; Ingold 2000; Helander-Renvall 2010; Overton & Hamilakis 2013; Bruchac 2014).

This research uses perspectives drawn from the above theoretical viewpoints, focusing on social zooarchaeology. It aims to explore how hunting communities might have perceived the beavers outside of settlement sites based on their known behaviour and recognisable landscape-altering practices, and how they dealt with beavers in the settlement sites after the hunt.

Hiidenniemi and Hämeenniemi settlement sites

The Hiidenniemi settlement site was excavated by Simo Vanhatalo in 2005 and Petro Pesonen in 2006. The excavations revealed several hearths, a waste pit and slag indicating iron smelting. The finds consist of e.g., burned and unburned bones, Sär 2-, Pöljä and Sarsa-Tomitsa Ware, asbestos ware and coarse Iron Age pottery, slag, quartz and metal artefacts, such as knives, a spearhead and a penannular brooch. The dating of Hiidenniemi is based on the radiocarbon dating and typology of ceramics, which indicate a long period of use from the Stone Ages until the Late Iron Age (Pesonen 2006).

All the bones found during the excavations were analysed by Auli Bläuer in 2011 (Tourunen 2011b). The total amount of bones was 825.1 g in 23,189 fragments and 5% of these were identified on the level of species or genus. Identified species were European beaver (*Castor fiber*), mountain hare (*Lepus timidus*), Eurasian elk (*Alces alces*), wood grouse (*Tetrao urogallus*), black grouse (*Lyrurus tetrix*), Eurasian teal (*Anas crecca*), black-throated loon (*Gavia arctica*) or red-throated loon (*Gavia stellata*), northern pike (*Esox Lucius*), European perch (*Perca fluviatilis*) and zander (*Sander*

lucioperca) (Tourunen 2011b; Table 1). Different shares of identified species are presented in Table 1.

The context of the bones from Hiidenniemi varies as some bones were excavated from the fireplaces or from the waste pit, and others were scattered around the area surrounding these. Almost all the bones had been burnt, but 14 of the bones had not been burnt at all or only slightly.

The Hämeenniemi settlement site was excavated in 2001, 2009, 2010 and 2011 (Vanhatalo 2001; 2009; 2010). The report of the 2011 excavation was not available. There were 1,025 burnt bone fragments from the excavation of 2001 (Vanhatalo 2001), 1,380 from 2009 (Vanhatalo 2009) and 87 from 2010 (Vanhatalo 2010) but no osteological analysis has been conducted on them so far . Only a preliminary analysis of bones was carried out by the author on preparing this paper. Other finds from the site included fragments of Comb ceramics, asbestos ware, Pöljä Ware, Luukonsaari Ware and coarse Iron Age pottery, quartz, stone tools, and slag (Vanhatalo 2001; 2009; 2010). The dating of this site is based on the ceramic finds and a radiocarbon-dated charcoal sample, which was taken from the trial trench during the excavations of 2001 and was dated to 1020–1280 calAD (Vanhatalo 2001; 2009; 2010).

It should be noted that there are two stray finds (see Hakamäki 2018: 20–21 for definition) from the Iron Age in the vicinity of Hämeenniemi, which indicate hunting in the area (Fig. 1). The first is a spearhead (KM 29379) from Suonenjoki Saunavirta, which was found on the opposite side of Lake Koskelovesi from Hämeenniemi (Pesonen 2008). The second find is an arrowhead (KuM 6147) from Rautalampi Kaposaari, a small island in the same lake (Nyman 2015).

MATERIAL AND METHODS

In Finland, unburned bones from prehistoric times rarely survive, which leads to an overrepresentation of burnt and highly fragmented bone material (Tourunen 2011a). The burnt bones represent only a fraction of all the bones deposited at a settlement site and only a small percentage of them can be identified. The fragmented nature of the bones also prevents certain analyses, and in this case, it was not

Species	NISP
European beaver (*Castor Fiber*)	90
Mountain hare (*Lepus timidus*)	6
Eurasian elk (*Alces alces*)	1
Wood grouse (*Tetrao urogallus*)	8
Black grouse (*Lyrurus tetrix*)	1
Eurasian teal (*Anas crecca*)	3
Black-throated loon (*Gavia arctica*) / Red-throated loon (*Gavia stellata*)	1
Northern pike (*Esox lucius*)	168
European perch (*Perca fluviatilis*)	12
Zander (*Sander lucioperca*)	1

Table 1. Number of identified species (NISP) in Kitee Hiidenniemi. Table only includes the species that were identified with certainty. Table: E. Jääskeläinen 2023, made after Tourunen 2011b.

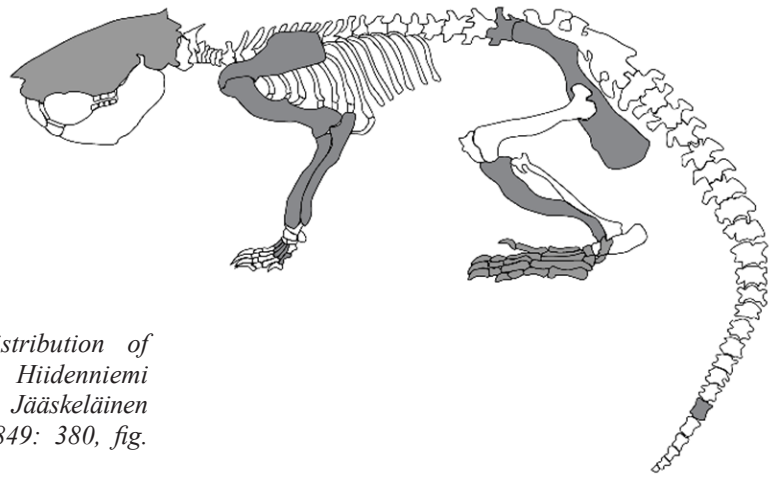

Figure 3. Anatomical distribution of identified bones from the Hiidenniemi assemblage. Drawing: E. Jääskeläinen 2023 (after Jones 1847–1849: 380, fig. 263).

possible to determine the sex of the beavers. This also affects the interpretations that can be made from burnt bone assemblages.

A total of 90 beaver bones were identified from the Hiidenniemi assemblage (Fig. 3). Almost all the bones were from the limbs, especially the pedis. The spatial distribution of the bones in the excavation areas was uneven: 11 bones were found in excavation area 1, 78 bones in excavation area 2 and only on bone in excavation area 3. Thirty-three bones were identified in the soil sample taken from the waste pit.

The minimum number of individuals (MNI) for Hiidenniemi beavers was two, based on ulna's distal open epiphysis (Tourunen 2011b). As all the bones from the Hiidenniemi site had already been analysed by Tourunen in 2011 (2011b), only the identified beaver bones were analysed again to record the epiphyseal fusion for age estimations.

The burnt bones from the Hämeenniemi settlement site were from different excavations. The bones selected for preliminary analysis

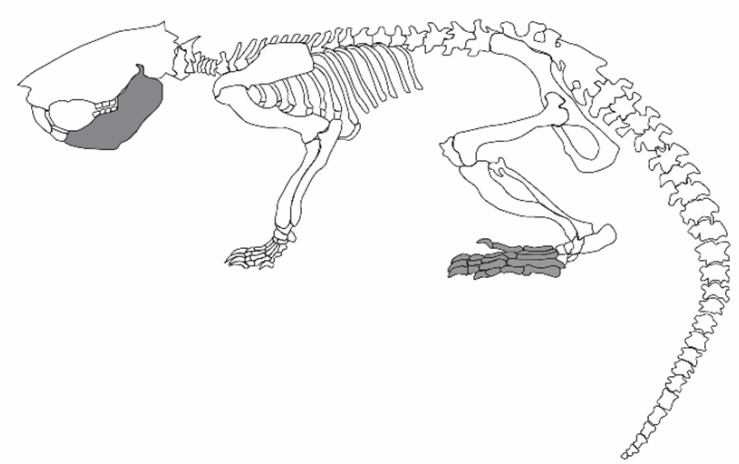

Figure 4. Anatomical distribution of preliminary identified bones from the Hämeenniemi assemblage. Drawing: E. Jääskeläinen 2023 (after Jones 1847–1849: 380, fig. 263).

Element	Hiidenniemi	Hämeenniemi
Clavicula	1	
Cranium	1	
Humerus	6	
Mandibula		1
Metacarpal	1	
Metacarpal 3	1	
Metacarpal 5	1	
Metatarsal	5	
Metatarsal Phalanx 1	9	3
Metatarsal Phalanx 2	9	1
Metatarsal Phalanx 3	3	2
Metatarsal 1	3	
Metatarsal 2	1	1
Metatarsal 3	1	
Metatarsal 4	2	
Metatarsal 5	2	
Naviculare	2	
Os coxae	3	
Os sesamoideum	1	
Pelvis	1	
Phalanx 3	1	
Phalanx 2	1	
Radius	4	
Scapula	5	
Talus	2	
Tarsal 1	1	
Tarsal 3	2	
Tarsal 4	1	
Tibia	3	
Ulna	15	
Vertebra caudalis	1	
Vertebra lumbale	1	
Total	90	8

Table 2. Anatomical element distribution of beaver bones from the Hiidenniemi and Hämeenniemi assemblages. Table: E. Jääskeläinen 2023.

were excavated in 2001 and therefore do not represent the entire settlement site. Burnt bones were found in several test pits and one trial trench (Vanhatalo 2001). The excavation report mentioned that no intact prehistoric fireplaces or structures were found (Vanhatalo 2001: 3), so the burnt bones may have been already scattered around before the archaeologists found the site.

Preliminary identification of the beaver bones from the Hämeenniemi site was carried out using reference images from the ArchéoZoothèque website (2022) and images of beaver skeletons from the Biodiversity Unit of the University of Oulu. All the beaver bones were photographed, and these images were later compared with the beaver skeletons in the Biodiversity Unit's collections in order to be more certain of their identification. Due to the limited time and reference material available, the identifications were only made for those bones that were recognised as mammals and then more specifically as beavers. No other mammals were identified in the preliminary analysis. It was noted that the assemblage also contained fish and bird bones and that the bones from Hämeenniemi would require more in-depth zooarchaeological analysis.

There were eight identified beaver bones, seven being from the pedis and one was a fragment of the processus coronoideus from the mandible (Table 2). One identified phalanx (KM 34058: 271) was a stray find, i.e., a find without a clear find context, but the other identified beaver bones (KM 34058: 107) were from test pit number 4, which had other burnt bone fragments as well. The MNI for the Hämeenniemi beaver's bones was one, based on the proximal end of the first metatarsal (Fig. 4). There were two fragments of it, but on closer analysis it was found that the fragments could have

been from the same individual. It should be noted, however, that Hämeenniemi's sample is very small, so the results in this case are only indicative.

It should also be borne in mind that the MNI at these two sites was very low, even though the number of identified bones at Hiidenniemi was high in relation to other species (Table 1). The fragmented nature of the assemblage and the small number of fragments result in low MNIs which make interpretation of individuals difficult.

Age estimates for the beavers were made using the epiphyseal fusion calendar according to Fandén (2005). He based his estimates on the skeletal development and epiphyseal fusion of the postcranial bones of contemporary European beaver (Castor fiber L) from Southern Sweden and compared them with the life history of the animal (Fandén 2005). The use of epiphyseal fusion is commonly used to estimate the age of domestic and semi-domestic mammals but is less common in wild mammals (Gifford-Gonzalez 2018: 116). In this research, the epiphyseal fusion was recorded as open, fusing or closed as described in Fandén (2005: 202) and then the results were compared to the age estimation table and life history stages (Fandén 2005: Table 10).

RESULTS

The anatomical distribution of the beaver bones found in the settlement sites is concentrated on the limbs, but a few bones from the skull, spine and tail were also found (Figs. 3 & 4; Table 2). In Hiidenniemi the anatomical representation is diverse as almost all the bones from beaver are present. In Hämeenniemi only bones from the lower jaw and hind leg were present, but this may be due to the smaller size of the assemblage.

The total amount of beaver bones that could be aged was 32 from Hiidenniemi and seven from Hämeenniemi, and they were all from the limbs, mainly phalanxes (see Appendix 1). All

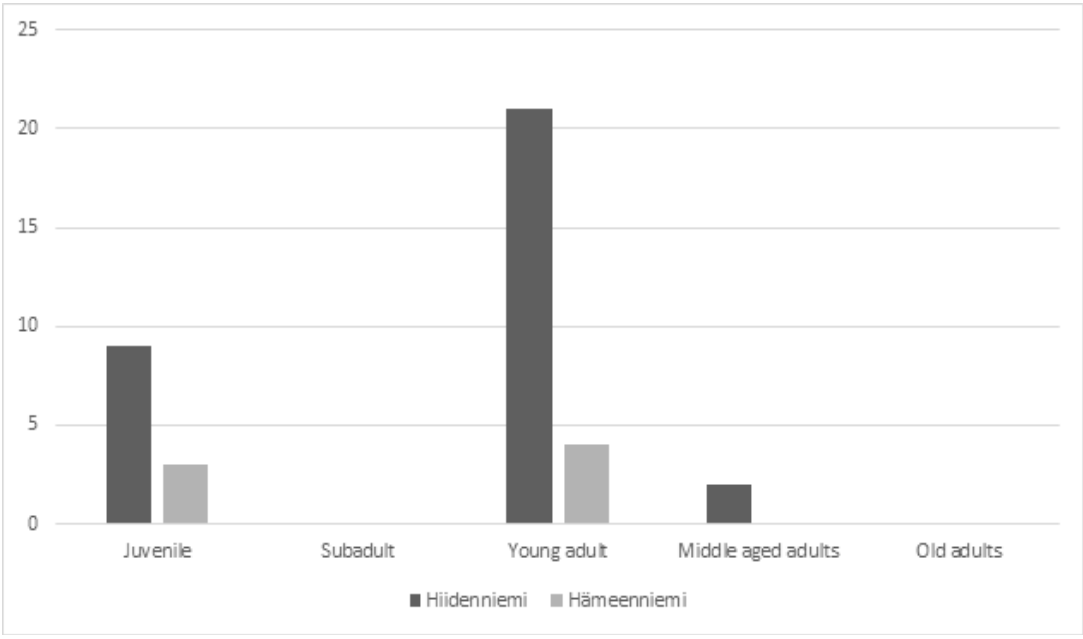

Figure 5. Results sorted into age categories based on Fandén (2005). Juveniles 0–1-year-old, subadults 1-2,5 years old, young adults 3–5 years old, middle-aged adults 6–9 years old and old adults over 10 years old.

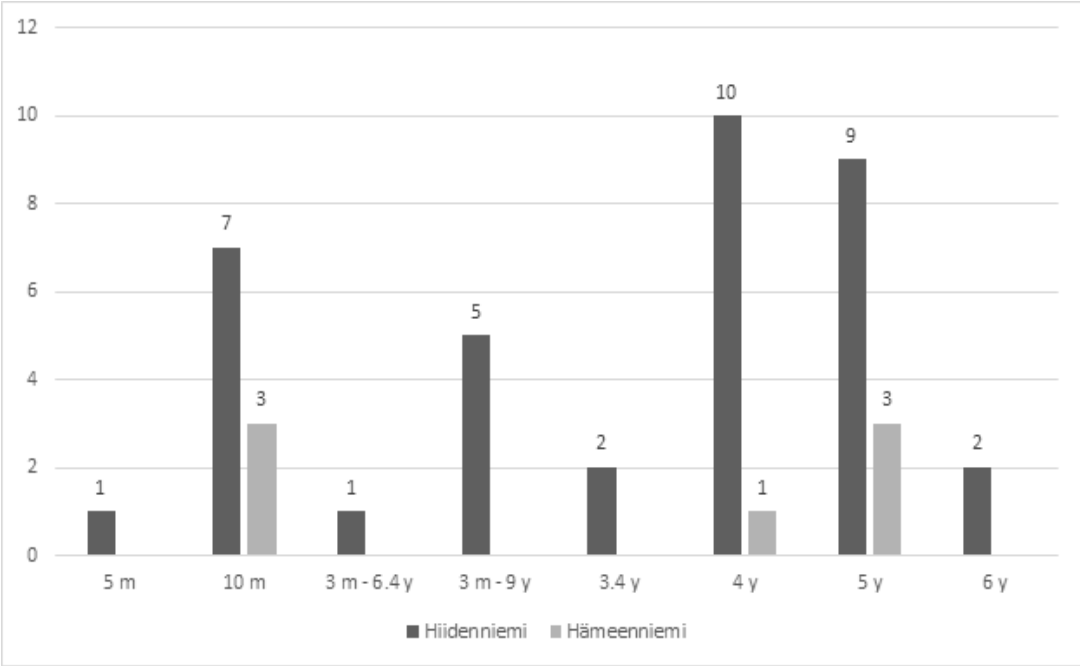

Figure 6. Aged bones from Hämeenniemi and Hiidenniemi presented in graphics. Ages are in months (m) and years (y).

the aged bones are from juveniles, young adults, and middle-aged adults (Fig. 5). Subadults and old adults are missing, but it cannot be completely ruled out that some of the bones are from these age groups. The results are presented in Appendix 1 and in Fig 6.

There are nine bones of juvenile individuals from Hiidenniemi and three from Hämeenniemi (Fig. 5). Juveniles spend their first year in their natal colony even though they can dive and venture into the water very early on in their lives (Fandén 2005: 211; Müller-Schwarze 2011: 90–91). There were no bones aged to the category of subadults. Beavers of this age stay in the natal colony and help their parents to tend the next litter and gather food. At the age of two, beavers usually leave to find mating partners and to establish their own colonies (Lahti 1972: 306–307; Fandén 2005: 211–212).

Beavers reach sexual maturity and have grown to their full body size when they are 3–4 years old, the age category of young adults. Beavers at this age have dispersed from their natal colonies to find their own mating partners and territories. The majority of beavers have their first litter by this age (Lahti 1972: 306–307; Fandén 2005: 212; Müller-Schwarze 2011). From both sites, bones of young adults were common, 21 from Hiidenniemi and four from Hämeenniemi (Figs. 5 & 6).

Middle-aged adults have already made several litters and established a more lasting territory (Fandén 2005: 212), but only two of these were identified in the Hiidenniemi assemblage (Fig. 5). Since old adults are rare in the wild, it is not surprising that they were not found in the assemblages of Hiidenniemi and Hämeenniemi.

DISCUSSION

The results show that the hunted beavers were mostly juveniles and young adults (Fig. 5). The hunting of juveniles could have drastically reduced the beaver population, as European beavers give birth to 2–4 pups once a year and may not reproduce every year (Jormanainen 2005: 170). It is therefore unlikely that juveniles

were targeted, given the importance of beavers to hunters. The age estimates may be misleading because there were no juvenile beaver bones in the reference collections for comparison, and the burning and fragmentation of the material made it impossible to take any measurements for size estimates. Also, the bones that are aged as juveniles, fuse very early in the beaver's life and could be from a much older individual.

The young adults at both sites and the middle-aged adults found at Hiidenniemi suggest that the beavers were hunted when they had reached their full body size. In this way, the catch was optimal as an adult beaver could provide the greatest amount of meat, fat, and fur. The age of beavers also indicates the leaving of the natal colony, and they are fairly easy to spot if you know what to look for as their landscape-altering activities, such as felling trees, and damming rivers, significantly change the environment. These activities can be seen as beneficial or detrimental depending on the point of view. For example, flooding caused by the damming of rivers could be harmful to humans, but it may have had some positive effects on waterfowl and fish (Coles 2006: 48–57; Ukkonen & Mannermaa 2017: 62). Also, felling of trees benefited elk and hare by providing them with food for the winter. In the Hiidenniemi assemblage waterbirds, elk and hare were identified along with beaver (Table 1) which may indicate that these species had benefited from the presence and actions of beavers in the area, which were then exploited by hunters.

The mentioned activities were useful for the beavers themselves, but also for humans, especially hunters, who could find prey more easily in these areas. The knowledge of the beavers' activities would also have led to the beavers being found in different or completely new areas. This may have had been one of the reasons why humans settled in some of these areas, as the beavers would attract other animals. It is possible that the presence of beavers and other game, as well as good fishing waters and opportunities for fowling, was one of the reasons why humans decided to settle in Hiidenniemi and Hämeenniemi over the years.

Another characteristic of beavers is their ability to build sturdy lodges near water using mud, sticks and stones (Fig. 2). Beavers spend most of the day in their lodges and come out onto the land mainly in the evening to gather food and building materials, but also to carry out their construction activities. As beavers are nocturnal animals and mostly active during the darker hours of the day, humans would have noticed their building activities and felled trees during the light of day, and in order to engage with the animal itself, humans may have had to change their habits and movements in relation to beavers (see also Overton 2018).

The nocturnal nature of beavers affected the way they were hunted. Active hunting with handheld weapons, nets or a bow and arrow could have led to night hunting, which can be more demanding than hunting during the day. In summer, the nights in Finland are bright which makes night hunting easier than at other times of the year. It is possible that the hunters hunted beavers during summer nights, but as beavers are at their fattest in late autumn and their fur is at its best in late winter and early in spring (Cole 2006: 54–55; Jormanainen 2005: 170), the beaver hunting season was probably around this time of the year rather than in summer.

Beavers tend to live in the same lodge for several years, and three generations of beavers can live in the same lodge, as young beavers from the previous year's litter take care of the newborn (Jormanainen 2005: 170; Malinen 2014: 201). Beavers give birth in spring, but the juvenile beavers stay in the lodge for several months before they venture to the outside world (Lahti 1972; Jormanainen 2005; Malinen 2014). If in prehistoric times beavers were hunted in the spring to get the best pelt, it is possible to encounter beavers of different ages at this time of the year, as there are several generations of beavers in the colony. Looking at the age estimates, the Hiidenniemi assemblage contained juveniles, young adults, and middle-aged adults. This could suggest that if all the beaver bones were from the same time period, the hunters would have had the opportunity to encounter the whole beaver family, at least in theory. The beavers are at their fattest in the autumn and the juveniles born in the spring would have grown bigger and ventured out of the lodge, so the best time to hunt beavers for food would have been in the autumn.

Active hunting of beavers is a challenging undertaking, as they have good senses of smell

and hearing, although they are almost blind. Beavers are cautious animals and if they sense danger, they will not come ashore. (Jormanainen 2005; Malinen 2014.) The arrowheads and spearheads found in and around the settlement sites could have been used for beaver hunting, but they have their drawbacks. If the pelt of an adult beaver was one of the reasons for hunting these animals, the use of projectiles could damage the skin, making it less usable and valuable (Lehikoinen 2007: 124–125; Overton 2018: 302). Shooting beavers with a bow also requires skill as the lethal point is only the size of a fist (Malinen 2014: 212). Modern hunting practices also suggest that shooting beavers in the water is not advisable as a wounded animal tends to dive and disappear from the hunter (Lahti 1972: 287), or the body of the beaver will sink to the bottom of the lake. Killing the animal directly in the water with projectiles could therefore have been detrimental to the hunters. To catch the beaver on land, the hunters would have had to wait for several hours in a good hiding place for the wary animal to come ashore.

It has been noted that the beavers can be quite dangerous animals when directly approached or agitated (Lahti 1972: 296; Overton 2018: 302), and hunters would have known this. Passive hunting methods such as trapping could be carried out during the day and did not involve direct contact with the animal until the trap was examined making it easier to hunt beavers. In Finland, there is no archaeological material to prove how beavers were hunted in prehistoric times, but in historical times beavers were caught with underwater traps, especially in winter, and with nets at other times of the year (Paulaharju 1921: 69; Nunez 1990; Lehikoinen 2007: 124–125). Trapping as a passive hunting method allowed for more distant engagement during and after the hunt, as there was no direct killing of the animal if it had drowned. The use of underwater traps may explain the presence of juvenile bones in the assemblage, as juveniles can be caught in these traps just like adults.

Beavers are good swimmers and divers, and they use this ability to their advantage. Diving would also have been a way of avoiding or escaping predators and human hunters, which could have been interesting as beavers seemed to disappear into the water when they dived. In northern cosmology and worldview, water has played a significant role with liminal qualities, which have been associated with some of the animals that live mostly or entirely in the water (Kaski 2019; Herva & Lahelma 2020: 110–111). It is known from folklore material from historical times that the beaver's skull and castoreum were used for magical purposes related to water. For example, the skull was used to search the body of a drowned person by looking at the water through the eye sockets, and the castoreum could be used in a spell to calm the sea (Paulaharju 1922: 19; Lehikoinen 2007: 123–127; 2009: 134, 188–191; Pulkkinen & Lindfors 2017: 203). Another example of beavers' liminal qualities can be found in some Sámi drums, where the beavers depicted could be saivo animals, i.e., spirit animals, who helped the shaman on their journey to other worlds (Manker 1950: 22–24).

At both sites, Hiidenniemi and Hämeenniemi, fragments of beaver skulls were found, which of course do not prove the aforementioned beliefs as prehistoric, but they are still intriguing. At other archaeological sites, the mandibles and teeth of beavers have been found to have been used as tools, jewellery, or grave goods. At Yuzhniy Oleniy Ostrov, a Late Mesolithic cemetery in northwestern Russia, pendants made from beaver teeth have been found in several graves (O'Shea & Zvelebil 1984; Mannermaa et al. 2019). A burial with six beaver mandibles was found in the same cemetery, and it was proposed that the grave was a shaman's grave suggesting the importance of beavers in hunter-gatherer cosmology (Gurina 1956; O'Shea & Zvelebil 1984). Mandibula and teeth were also used as tools for different purposes (Zhilin 2020) and for sharpening metal tools such as an axe (Lehikoinen 2009: 190–191). Lehikoinen (2009: 190–191) writes that it was believed that the properties of beaver teeth were transferred to objects sharpened with them.

While there is only limited knowledge on the beliefs of the prehistoric hunter-gatherer communities in Finland, there is evidence that later hunters in the region perceived the animals they hunted as persons with varying powers and abilities. For example, in Finnish-Karelian folklore, the Hunt Master of the Animals would not allow people to hunt if they had not

previously treated the animals with respect and had not performed proper rituals and actions before, during and after the hunt (Tarkka 2005; Siikala 2012). Sámi shared similar beliefs in the Hunt Master of Animals (Pentikäinen 1995: 88–92) and they made offerings at sacred sites to ensure success in subsistence activities such as hunting and fishing (Pentikäinen 1995: 88–92; Äikäs et al. 2009; Salmi et al. 2015). The proper way of acting was crucial for the survival of the people involved, but it was also important for the animals, whose rebirth and new life depended on the hunter's actions. Thus, there were responsibilities that bound both parties, and ignoring these responsibilities could have been dangerous (see Ingold 2000; Hill 2011).

After the hunt, the beavers were brought to the settlement site to be prepared for meals and other purposes, and this is also suggested by the results. At Hiidenniemi and Hämeenniemi, the results and the context, settlement, could indicate hunting for the family unit itself as the total amount of beaver bones is small and the MNI for Hiidenniemi was two and for Hämeenniemi it was one. It is possible that more individuals were brought to the sites than the MNI suggests, as it is difficult to make interpretations from the burnt and highly fragmented material.

At the Hiidenniemi site, there were bones from the whole body, indicating that some of the beavers may have been brought to the settlement as whole carcasses. On the other hand, the Hämeenniemi assemblage may represent a similar situation as beaver mandible, metatarsals and phalanges were found there. The high proportion of limb bones (Figs. 3 & 4; Table 2) could mean that some of the beavers were processed outside of the settlement site and brought back only as skins. Skins were used for clothing because the fur it is waterproof, but they were also valuable for trade, especially for the fur trade during the Late Iron Age. It has been suggested that the objects of foreign origin have arrived here through trading of furs (Talvio 2002; Raninen & Wessman 2015), but this view has been challenged in recent years (e.g., Wuorisalo 2005; Korpela 2008; Kirkinen 2019).

As mentioned above, the proper way of acting was crucial for both parties, so it was important to act accordingly even after the hunt as the animal could retain some of its powers even after death (see e.g., Tarkka 2005; Pentikäinen & Tolley 2007; Hill 2011, Siikala 2012; Kirkinen 2019). When being prepared for consumption, the beaver's body was changed so it would be safe to eat. Overton & Hamilakis (2013: 117) write that humans had an ongoing physical engagement with non-human-animals by eating them and otherwise handling them at the settlement site. Those who did not participate in hunting or handling of the beaver's body would have had shorter physical contact with them than that of the hunters. Engagements with the beaver were regulated through the actions, roles and beliefs of the community, and the hunters had the longest engagement with the beaver itself.

After the beaver had been eaten, the bones from the body were burned, destroyed, and thrown away, as with other species, according to beliefs and habits about how to deal with meal waste. Since unburned bones do not survive in the acidic soils of Finland, there is only partial evidence of how the bones were handled after the animals were eaten. As the hearth enabled the food preparation and survival in a colder climate, the act of burning the bones in it may have had other meanings than getting rid of waste (Westerdahl 2002; Mansrud & Eymundsson 2016; Herva & Lahelma 2020: 166–167). For example, the bones were used as fuel alongside wood (see Vaneeckhout et al. 2010; Ballantyne et al. 2017: 425), which can be seen as a way of feeding the fire (Herva & Lahelma 2020: 166–167).

CONCLUSIONS

The beaver bones in this study came from two multi-period settlement sites. The age estimates suggest that the hunted beavers were mainly adult beavers who had reached their full body size, moved out of their natal colony, and probably had their first litter. The age estimates for juvenile bones could be misleading, and hunting of juveniles could be harmful to both the beaver population and humans, although they may have been caught in underwater traps, if they were used. The anatomical distribution shows that at least some beavers were brought to the site as whole carcasses, especially in Hiidenniemi, but the emphasis on limb bones suggests that some of them were also processed outside of the

settlement. The main species involved in this study were humans and beavers, but it was noted that there were waterfowl, elk, and hare bones from the Hiidenniemi assemblage which may indicate that these species benefited from the presence of beavers. Interspecies relationships between beavers and non-human species would be an interesting topic for future research.

The encounters and engagements outside the settlements were approached by looking at how beavers behaved and acted and what kind of beliefs there were about beavers. In this article, I wanted to illustrate that beavers had different ways of being, engaging and being present in a world, which they shared with humans. The hunters knew how the beavers behaved and where to find them, but the beavers were also active as they could protect themselves or dive away. The hunters would have learned to read the landscape to detect the presence of beavers, and they would have had to adjust their movements and actions in relation to the beavers. The encounters between hunters and beavers would sometimes lead to the act of hunting of adult beavers. Beaver hunting therefore required an intimate knowledge of beaver behaviour and ecology. In many worldviews, such traditional ecological knowledge is associated with beliefs and ideas about animal personhood, agency, and human-animal relationships.

Even in death, the beavers were a part of people's lives and spaces, as the hunted animals were brought to the settlement site to be prepared for meals and then burned on the hearth. This chain of engagement has shaped how the beavers have been perceived and understood in relation to humans and other animals. In the future, the significance of beaver hunting from settlement sites other than multi-period sites should be investigated. It would be very important to study the changing role of hunting and relationships and engagements with wildlife, such as beaver, in the long term as the spread of agriculture may have affected human-animal relationships and interactions.

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Appendix 1. All the aged bones and stages of epiphyseal fusion from Hiidenniemi (Collection number 36423) and Hämeenniemi (Collection number 34058) assemblages with collection numbers.

Collection number	Bone	Epiphysis	Age in years or months
34058: 107	Metatarsal 2	Closed	10 months
34058: 107	Metatarsal Phalanx 1	Closed	5 years
34058: 107	Metatarsal Phalanx 1	Closed	5 years
34058: 107	Metatarsal Phalanx 1	Closed	5 years
34058: 107	Metatarsal Phalanx 3	Closed	10 months
34058: 107	Metatarsal Phalanx 3	Closed	10 months
34058: 271	Metatarsal Phalanx 2	Closed	4 years
36423: 2900	Ulna	Closed	4 years
36423: 2928	Ulna	Open	3 months - 9 years
36423: 2929	Ulna	Open	3 months - 9 years
36423: 4686	Metatarsal Phalanx 2	Closed	4 years
36423: 4786	Metatarsal Phalanx 2	Closed	4 years
36423: 4789	Metatarsal Phalanx 1	Closed	5 years
36423: 4801	Metatarsal Phalanx 1	Closed	5 years
36423: 4809	Metatarsal Phalanx 2	Closed	4 years
36423: 4838	Metatarsal Phalanx 3	Closed	10 months
36423: 4846	Metatarsal Phalanx 2	Closed	4 years
36423: 4848	Metatarsal Phalanx 1	Closed	5 years
36423: 4859	Metatarsal 4	Closed	10 months
36423: 4859	Metatarsal Phalanx 2	Closed	4 years
36423: 4860	Metacarpal 3	Closed	3.4 years
36423: 4860	Metatarsal Phalanx 2	Closed	4 years
36423: 4872	Metatarsal 3	Closed	10 months
36423: 4881	Radius	Closed	3 months - 9 years
36423: 4882	Metatarsal Phalanx 1	Closed	5 years
36423: 4883	Metatarsal Phalanx 3	Closed	10 months
36423: 4919	Metatarsal Phalanx 1	Closed	5 years
36423: 4926	Metatarsal Phalanx 2	Closed	4 years
36423: 4928	Metatarsal Phalanx 1	Closed	5 years
36423: 4945	Tibia	Open	3 months - 6.4 years
36423: 4949	Metatarsal Phalanx 1	Closed	5 years
36423: 4982	Metatarsal Phalanx 2	Closed	4 years
36423: 4986	Metatarsal Phalanx 2	Closed	4 years
36423: 6036	Phalanx 3	Closed	10 months
36423: 6065	Metatarsal 5	Closed	6 years
36423: 6067	Metatarsal 1	Closed	6 years
36423: 6067	Metatarsal 1	Closed	5 months

Collection number	Bone	Epiphysis	Age in years or months
36423: 6082	Metatarsal 2	Closed	10 months
36423: 6086	Ulna	Open	3 months - 9 years
36423: 6090	Ulna	Open	3 months - 9 years
36423: 6099	Metatarsal Phalanx 1	Closed	5 years
36423: 6099	Metatarsal Phalanx 3	Closed	10 months
36423: 6104	Metatarsal Phalanx 1	Closed	5 years
36423: 6128	Metacarpal 5	Closed	3.4 years

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COMBINING RESIDUE AND MACROSCOPIC USE-WEAR ANALYSIS OF QUARTZ OBJECTS IN KRAAKANMÄKI 3 LATE NEOLITHIC SETTLEMENT SITE, WESTERN FINLAND

Abstract

Microscopic remains of plants, hairs, blood, bone, and sinew have been detected on Stone Age implements as evidence of the ways the tools were used. Together with use-wear analysis, microresidues enable us to obtain additional information of artefact biographies. However, the preservation of residues is not a straightforward issue. Although bones, plant matter, and wood have a tendency to decompose rapidly in acidic podzol soils, the acidity favours the preservation of keratinous tissues such as hairs and feathers. Because the analysis of microresidues has not been applied on Finnish quartz artefacts, this paper presents a preliminary testing of the method in a Late Stone Age settlement site in Kraakanmäki 3, western Finland. As a result, we found microscopic remains of hairs, feathers, and plants, which enable us to speak for the careful handling of quartz and stone tools at the excavations for further analyses.

Keywords: Macroscopic use-wear, hairs, plant remains, phytoliths, feathers, Stone Age

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INTRODUCTION

The research on microscopic residues on the surfaces of ancient tools has been recognized as an important means of studying the functions of the implements (e.g., Kealhofer et al. 1999; Pearsall et al. 2004; García-Granero et al. 2015; Frahm et al. 2022). The identification of deposited microparticles such as hairs, feathers, phytoliths, pollen, sinew, and collagen fibres is based on their morphological features studied by light and scanning electron microscopes (SEM)

as well as by SEM-EDS (Hayes & Rots 2019), aDNA analysis (Hardy et al. 1997; Shanks et al. 2005), analysis of lipids (Buonasera 2007; Luong et al. 2017) and proteins (Craig & Collins 2002; Heaton et al. 2009).

The most essential source critical questions rely on the preservation of organic residues and the possible contamination of artefacts with microparticles that are not related to the past use of the artefact. This is because microparticles might have been extracted from the surrounding soil (Pedergnana 2020) or accumulated during the excavation and in the laboratory environment (Frahm et al. 2022). Therefore, contamination needs to be minimised by a careful handling protocol from the field to the lab, and the microparticles should be compared with use-wear analysis (Kealhofer et al. 1999; Dietrich et al. 2019). Furthermore, the distribution of residues on artefact surfaces can give additional information of the origin of the particles (Hayes & Rots 2019; Frahm et al. 2022). A critical moment for the preservation of microparticles on stone artefacts is the handling of finds after the excavation. The recommendation not to clean objects automatically even without considering their further analysis was given already in the 1980s (Loy 1983; Lampert & Sim 1986).

Microparticles have been examined on artefacts excavated in different types of sites and environments (e.g., Cooper & Nugent 2009; Hardy & Svoboda 2009; Lombard & Wadley 2009; Robertson 2009; Juhola et al. 2019). Favourable environmental conditions for the preservation of residues can be found in contexts where organic materials tend to preserve, i.e. in Arctic areas and ice sheets (e.g., the research on Iceman Ötzi's tools by Thomas Loy [1998; see Fullagar 2004; 2009: 5–6]; Wierer et al. 2018), in arid environments, stable rock shelters and caves (Ward et al. 2006; Heydari 2007; Jones 2009) as well as in soils rich in clay particles (Loy 1983). However, microresidues have been reported to have been detected on artefacts in open-air sites in the northern boreal forest zone of Canada (Loy 1983; however, see e.g., Smith & Wilson 1992) in an environment roughly comparable to that of Finland. Moreover, mammalian hairs, bird barbules, and plant fibres were detected in soils samples excavated in a Mesolithic red ochre grave in eastern Finland (Kirkinen et al. 2022).

In Finland, the production and use of quartz artefacts has been studied mostly from the point of view of typological and technological aspects. Earlier studies have focused on tool typology and morphology (e.g., Luho 1948; 1956; Siiriäinen 1968; Matiskainen 1986), but the focus has shifted gradually toward different types of stone technology analyses and studies that touch on stone technology in some context (Rajala 1996; Tallavaara 2001; 2005; Manninen 2003; Jussila et al. 2007: 149–157; 2012: 13–17; Rankama et al. 2011; Manninen & Knutsson 2014). Some useful studies utilising the low magnification analysis method on wear marks on Finnish materials have been conducted by several researchers (Rankama 2002; Pesonen & Tallavaara 2006: 18; Tallavaara 2007: 63–89; Kankaanpää & Rankama 2011: 230–232), following the examples and results of Swedish and international scholars (Broadbent & Knutsson 1975; Broadbent 1979; Knutsson 1978; Knutsson & Linde 1990; Knutsson & Knutsson 2009). Use-wear analysis on quartz, using high-power (microscopic) methods in Finnish materials was largely pioneered by Noora Taipale (2012; 2013), who continued her work by using both low- and high-power methods along with Nordic colleagues (Knutsson et al. 2015; Taipale et al. 2019).

Both low- and high-power microscopy have been found to be useful for use-wear analysis on archaeological quartz material. The combination of both methods has gone a considerable way to approaching quartz use-wear marks, but as with most issues, the research question should determine the method (Taipale 2012: 47). The low-power method can be useful in defining whether the quartz tool was used for soft or hard material. However, reliability of macroscopic analysis depends greatly on wear preservation and angles of the use edges (Taipale et al. 2014). These categories can offer clues as to whether the tool was used on hard materials such as wood or bone, or soft materials such as animal skin or meat. The low-power method is also sufficient in defining wear marks within these two categories; however, high-power microscopy is preferred for more specific definitions of worked materials, accurate directions of use or other subtle use-wear marks (Grace 1990), as well as tool edges with obtuse angles (Knutsson 1988a; Taipale

et al. 2014). The low power method is useful especially as a basis upon which further high-power methods can be applied. As quartz is still a fairly uncommon material in the general field of use-wear analysis, the experimental reference data specifically focusing on low-power imaging remains thin. For this reason, the authors feel that it is unnecessary to make assessments beyond the soft/hard qualification of these quartz artefacts, even as further assessments—based on the low-power method—may be a satisfactory approach for materials like flint or chert.

In this paper, a preliminary study on animal and plant residues on quartz artefacts and flakes is presented. The findings are compared to the morphology of the items as well as to the use-wear marks. Our aim is to widen our understanding of the use of Stone Age quartz implements and especially stress the importance of microresidue research of artefacts and flakes excavated in Fennoscandian open-air sites. We also encourage the excavation leaders to consider a careful handling and packing of stone artefacts at the field without cleaning them, which would enable further microparticle analysis.

KRAAKANMÄKI 3 SETTLEMENT SITE

The site and field work

The study material was collected in 2021 at *Kraakanmäki* 3 settlement site, which is located in the municipality of Harjavalta, Western Finland (Fig. 1). The area was first

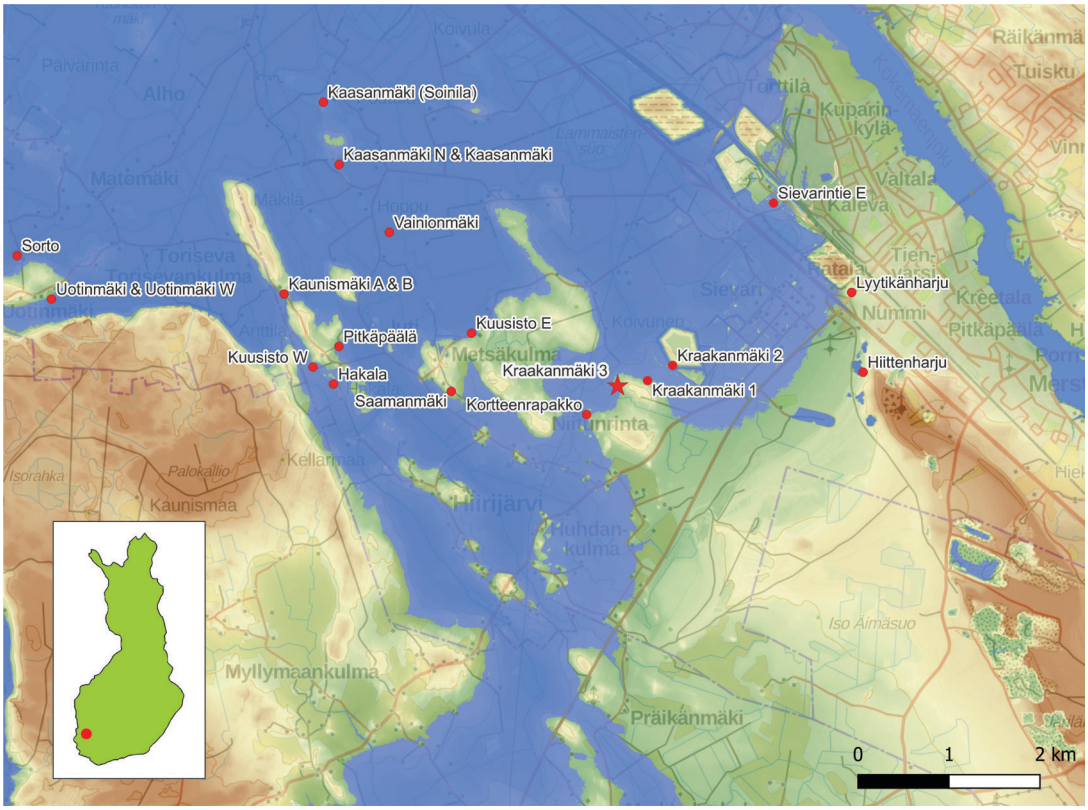

Figure 1. The locations of Kraakanmäki 3 and other known nearby Stone Age sites. The sea is visualised at 33 MASL, illustrating the sea level during the habitation of Kraakanmäki 3 site around 4000 BP. Map: National Land Survey of Finland, modified by T. Väisänen.

Figure 2. An ongoing excavation at Kraakanmäki 3 settlement site. Photo: V. Laulumaa.

surveyed in 2013, when the current slag-spreading area was planned. At the time, two previously unknown Stone Age settlement sites were discovered on the slopes of Kraakanmäki and were named Kraakanmäki 1 and 2 (Bilund 2013). In 2014, rescue excavations were carried out at both sites before the area was released for land use. The material of the excavations was connected to the Late Neolithic Kiukainen Ware Culture and dated with radiocarbon dating to around 2900–1770 CalBC (Pesonen 2014a; 2014b).

As a new slag-spreading area was being planned along the same ancient shoreline (32.5 elevation curve) west of Kraakanmäki 1, the area was surveyed again in 2020, with the discovery of Kraakanmäki 3 and *Kortteenrapakko* settlement (Seppä 2020). In 2021, the Finnish Heritage Agency conducted a rescue excavation at the Kraakanmäki 3 site (Fig. 2). An area of 250 m2 was opened at the settlement and the excavation was carried out in successive spits of 5 cm. The layers were documented by drawing and photographing. The find locations were measured with Sokkia Set 2 total station.

Features and find material

During the excavation, it was observed that the Kraakanmäki 3 settlement site had been well preserved, as there were no indications of contamination by historic or modern land use. The only disturbances visible in the soil were the tracks of a forest machine in the western part of the excavation trench, as well as minor disturbances by roots of trees that had possibly fallen due to heavy wind.

The excavation did not reveal any structures, such as fireplaces. The observations suggest that the area has been under the influence of coastal forces. The phenomenon is explained by the fact that the settlement site has been near the beach and in a low-lying area, where the sea level fluctuations caused by the wind can be very large (Laulumaa & Seppä 2022: 14).

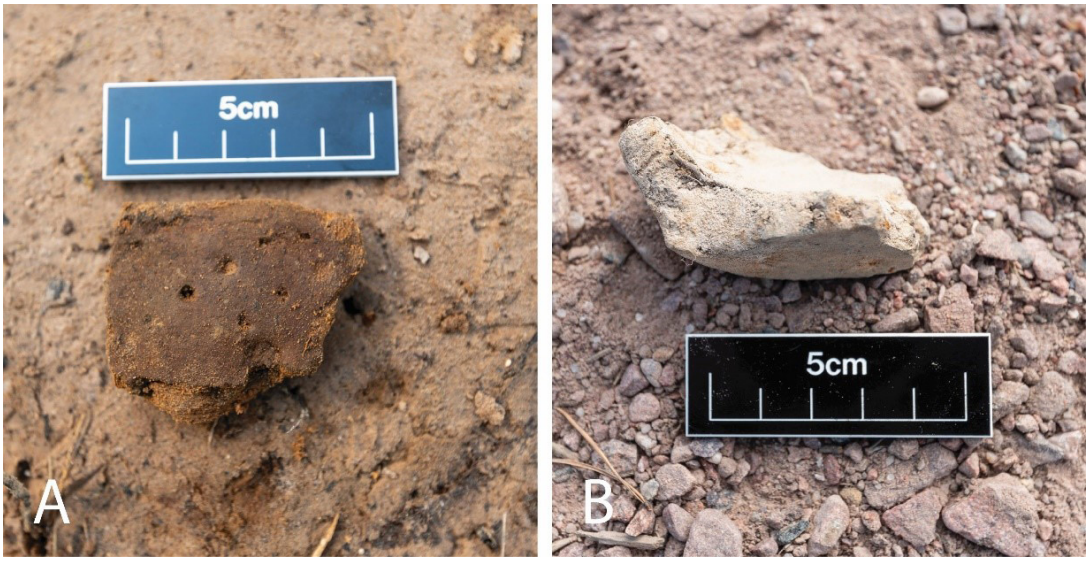

Figure 3. Kiukainen pottery from Kraakanmäki 3. A) decorated rim sherd (KM 43282:177) and B) undecorated sherd from a flat-bottomed vessel (KM 43282:395). Photos: V. Laulumaa.

The research resulted in a total of 4310 finds typical of a Stone Age settlement. The finds comprise predominantly quartz flakes, burnt bone, and pottery. The pottery is mostly fragile and without decoration but based on the few decorated pieces and shape of the vessels (Fig. 3), they belong to the Late Neolithic Kiukainen Ware (2500–1800 calBC; Halinen 2015: 58).

The majority of bone fragments could not be identified within any taxon. However, 48 fragments were identified as seals (Phocidae), two more specifically to harp seal (*Phoca groenlandica*), and one fragment to Eurasian beaver (*Castor fiber*). Fish are represented by perch (*Perca fluviatilis*), pike (*Esox lucius*), common bream (*Abramis brama*), and some cyprinid (Cyprinidae) species. One unidentified bone fragment is probably from a grooved artefact (Nurminen 2022).

The lithic material consists of 2,320 pieces, 2,176 of them being quartz. Most of them were unmodified quartz flakes and fragments detached using the basic bipolar technique. Retouch was found on 136 quartz implements, 66 of them from the edges of broken tools. Different quartz tool types from the site consist of 64 scrapers or scraper fragments, six piercing or chisel tools, seven cutting tools as well as many tool fragments with too little remaining characteristics for an accurate tool-type definition. Many of the quartz implements without retouch or formal tool characteristics could also reveal use-wear, if they would have been studied with microscopy. Non-quartz lithic material consisted of 187 pieces of other stone types such as slate, schist, sandstone and porphyritic stone (Eranti 2022).

Quartz artefacts chosen for this study were collected from the site during the excavation. Implements that were tentatively recognised as tools were picked for the analysis, before they were handled or cleaned. These items were not touched with bare hands but put into zip-lock bags immediately after they were unearthed in the field.

Dating

The site is located 33 metres above sea level, suggesting the phase at the end of the Stone Age, around 4000 calBP. This is also supported by C14-dating from three pieces of burnt seal bones, which were dated to c. 4300–4000 calBP (Ua-74422, 74423, 74424; Laulumaa & Seppä 2022). See Table 1.

Table 1. Radiocarbon dates of the Kraakanmäki 3 site. radiocarbon dates are calibrated with software program IOSACal: v0.4.0 using the IntCal20 atmospheric curve (Reimer et al. 2020).

Lab index	^{14}C age BP	Dated material	Species	calBC	%C	Collection no. (KM)
Ua-74422	3832±32	Burnt bone	Phoca groenlandica	2340–2203	68,2	43282:2639
Ua-74423	3770±32	Burnt bone	Phocidae	2278–2138	68,2	43282:2813
Ua-74424	3733±32	Burnt bone	Phocidae	2198–2043	68,2	43282:2848

MATERIALS AND METHODS

In total 20 artefacts and flakes of quartz (18 pieces), quartzite (1) and porphyritic stone (1) were picked for the analyses at the excavations (listed in Table 2). The selection criterion was that they were classified tentatively as scrapers. However, after cleaning the items, some were reclassified as retouched artefacts and flakes. As such, they cover only about 0.8% of the total number (2176 items) of quartz items detected at the excavation.

Microparticles

At the laboratory, the sand was removed from the items gently by hand with a wooden stick. As the items were still dusty and there was only a limited visibility on the surface, a stereomicroscopic examination was not made before the final cleaning of the objects. Instead, the implements were washed in a small amount of distilled water by using a soft brush. The liquid was divided into 5 ml Eppendorf tubes. The tubes were centrifuged 2500 rpm in 7 minutes, and the material just below the supernatant was pipetted on microscope slides for analysis. The slides were analysed with an Amscope 40X–1600X Advanced Professional Biological Research Kohler Compound Microscope and documented with a 10MP USB 3.0 camera. After that, the washed items were studied under Amscope SM-1TS/BS stereomicroscope with 90x zoom and a ring light for the remaining microresidues.

The hairs were identified after Tóth (2017) and Appleyard (1978) and feathers after Dove and Koch (2010), and further by comparing them to the reference collections of Fennoscandian mammals and birds. The phytoliths were analysed using standard procedures (Piperno 2006; ICPT 2019), and the morphologies were identified with the help of literature and by producing a comparative phytolith collection from modern local plants.

For evaluating the possible soil-derived contamination, three reference samples outside the settlement site and one sample from the cultural layer were analysed for microparticles.

Macroscopic use-wear analysis

The analysis applied in this study is defined as *macroscopic* or *low-power use-wear* analysis, based on the magnification of the microscope. Macroscopic use-wear analysis has been found to be an effective method for sharp-edged tools (Taipale 2012: 47). Round-edged tools in this analysis are simply classified as such, and further suggestions are made based on the residue analysis conducted. Overall features of the artefacts based on a general examination with the microscope and the naked eye were also documented. More accurate functional determinations of use-wear on quartz tools benefit from high-power microscopy (Knutsson 1988a; Sussman 1988), especially on round edged tools.

Moreover, environmental effects such as waterflow and a multitude of other types of phenomena can sometimes affect the edges of quartz tools in a way that is detrimental to use-wear analysis (Knutsson & Linde 1990). However, this natural wear should not be considered edge selective (Rankama & Kankaanpää 2011: 233). Every item in the analysis was inspected, keeping this in mind by scanning the artefacts on every edge and on every surface, to minimise environmental effects from influencing interpretations of the analysis.

All the microparticle and fibre analyses were conducted before the artefacts were again

Table 2. The studied artefacts with the identifications of microresidues, typo-technological tool types and use-wear marks by O. Eranti, T. Juhola and T. Kirkinen.

Catalogue nro [KM 43282:]	Hairs	Barbules	Plants	Tool type	Use-wear
548	Unidentified mammal			Platform core	no
572				Cutting implement	N/A
675				Scraper	N/A
802	Possibly red squirrel (Sciurus vulgaris), unidentified mammal			Cutting implement (includes edge used for scraping)	Hard use
804				Bipolar flake	N/A
941	Unidentified mammal or bird			Scraper	Slight hard use
1286	Two unidentified mammals			Scraper (retouched)	Hard use
1450	Eight hairs, possibly seals?		Plant cell structures	Scraper fragment	Slight hard use
1680				Scraper	N/A
1832		Two unidentified birds	Elongate sinuate	Scraper	Soft use
1881	Unidentified mammal	Unidentified bird		Cutting implement (includes edge used for scraping)	Soft use
1890				Scraper	N/A
1929				Scraper	N/A
1950	Unidentified mammal or bird			Scraper	Hard and soft use
1956				Flake fragment	N/A
2194		Waterfowl (Anseriformes), 4 unidentified birds		Scraper	Soft use
2241	Unidentified mammal			Scraper	Slight hard use
2247	Unidentified mammal		Plant cell structures	Scraper	Hard use
2258				Scraper	N/A
2335				Tool fragment	N/A

available for use-wear analysis. Before the use-wear analysis, all samples were cleaned with the standard tool-cleaning protocol used by the Archaeological Field Services of the Finnish Heritage Agency. This protocol includes brushing the finds with commercial toothbrushes in a bowl of warm water and drying them. After that, the samples were catalogued and stored in the collections of the Finnish Heritage Agency. This was done before the prospect of conducting the use-wear analysis by SEM (scanning electron microscope) or other HPA (high power microscopy) methods. The authors agree that this analysis would normally require HPA or SEM methods, but as the acquisition and transport of the artefacts from the collections to a laboratory with high-power microscopes could take many months to years, it was concluded that the time requirement for this operation would make timely publishing of this article too challenging. Because of this practical obstacle, a smaller low-power microscope was used, and the artefacts were analysed with the LPA (low power) method. It was concluded by the authors that, even as the LPA method is generally not preferable for this type of analysis, it at least marks a beginning.

The finds were analysed with Discovery Artisan 64 digital microscope with 600x zoom. Microscopic photos were taken and edited with Portable Capture Plus software. All artefacts were examined throughout and along all the edges with the microscope. Use-wear was identified from the microscopic view and classified into hard wear or soft wear, based on the experimental data on quartz from the main reference material of this analysis (Broadbent & Knutsson 1975; Knutsson 1988b). The classification method followed some useful Finnish macroscopic use-wear analyses by Rankama and Kankaanpää (2011) and Rankama (2002), that have been based on experimental quartz reference material (Broadbent & Knutsson 1975). The classification to hard and soft wear is based on the edge being sharper when used on a hard material and rounder when used on a softer material, when observed with the microscope.

Macroscopic use-wear analysis was conducted on the following quartz artefacts: KM 43282: 802 (unmodified flake), :1450 (scraper fragment), :1832 (scraper), :1881 (dull-edged tool/scraper), :2194 (cutting tool), :2247 (scraper), :2241 (thin-edged scraper), :1286 (scraper), :1950 (scraper), :941 (informal scraper), and :548 (platform core). The selection was based on the appearance of microresidues.

Reference samples

Three reference soil samples outside the settlement site area and one from the cultural layer in the excavation trench were studied for microparticles. The reference samples taken from the immediate vicinity of the settlement site area were taken from locations, where soil and elevation were similar to that of the settlement site area. The reference samples were taken from shovel test pits, at the same depth as the cultural layer of the excavation trench. The cultural layer sample represented a context that was darker than the surrounding area.

From each bag, a subsample of 50 g was separated. The samples were rinsed in a measuring glass by adding 50 g of distilled water several times. The water was sieved with a 0.125 mm sieve, and the accumulated material was divided in 15 ml conical centrifuge tubes. The tubes were centrifuged for 7 min at 2500 rpm by the TD4A-WS desk centrifuge. The samples were prepared for transmitted light microscope examination by pipetting the extracted material on microscope slides and by covering them with coverslips. The material was studied using Amscope 40X-1600X Advanced Professional Biological Research Kohler Compound Microscope with 100x - 400x magnification. The material was documented with Amscope 10MP USB3.0 camera. The microscopy was conducted in a microscope room. The contamination of samples by modern fibres was prevented by intensive cleaning of the surfaces and by taking control samples with a bowl filled with water.

RESULTS

Microresidues

Hairs and feathers

Mammalian guard and fine hair fragments, 16 in number, were detected on the residues of seven (possibly nine) items (KM 43282: 548,

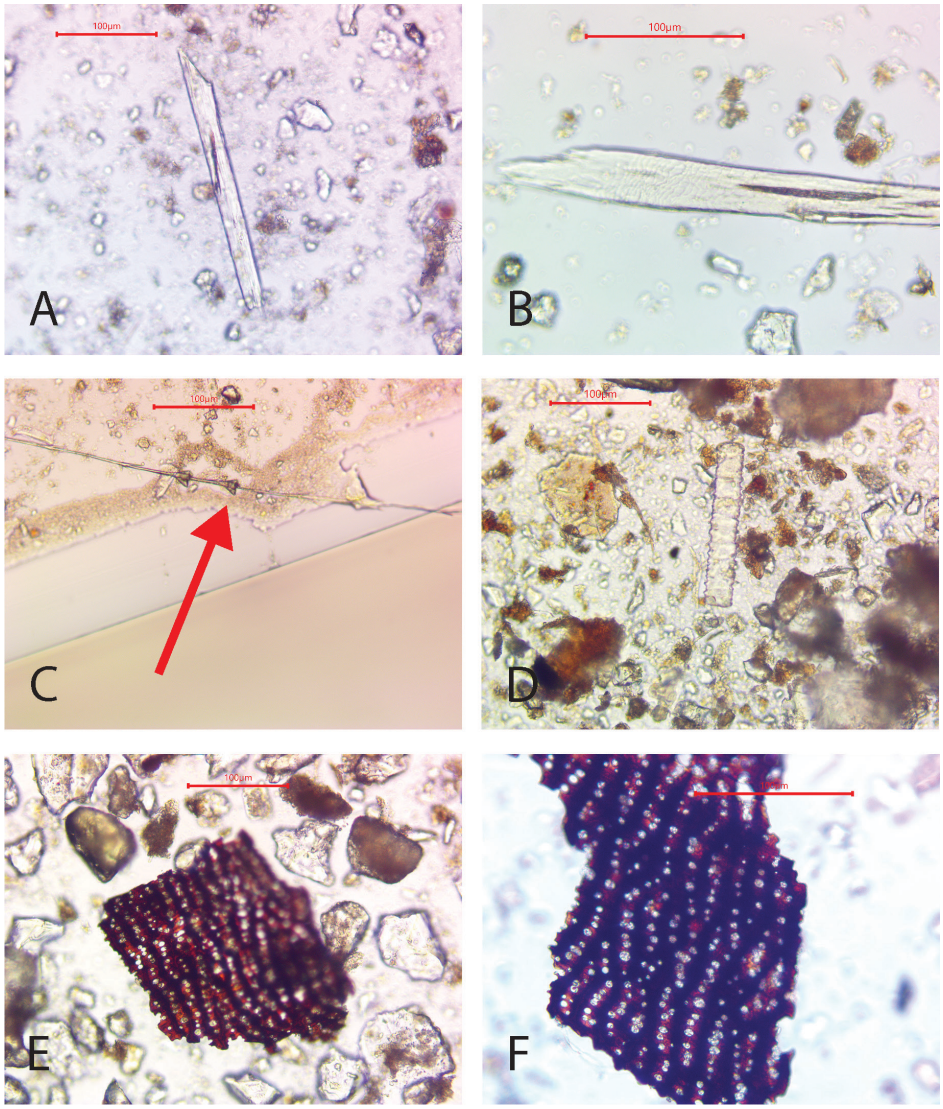

Figure 4. A) Possible seal hair with a diagonal cut (KM 43282:1450); B) unidentified mammal hair (:1286); C) waterfowl barbule (:1842); D) elongate sinuate phytolith (:1832); E) plant cell structure (:1450), a probable cut mark on top; F) plant cell structure (:2247). Photos: T. Kirkinen.

802, 1286, 1450, 1881, 2241, 2247; possibly also :941 and :1950). The hairs were 0.14–3.2 mm in length, and as highly degraded, most of them were impossible to identify. Thus far, one possible red squirrel (*Sciurus vulgaris*) hair was detected on the residues of a bipolar flake (:802), and the fragments detected in contact of a scraper (:1450) originated probably from a seal. Most interestingly, the fragments showed diagonal cut-marks (Figs. 4A, 5A). The cut-marks are comparable with the ones that archaeologist Johanna Seppä produced in her experimental scraping of a cervid skin with a quartz tool (Fig. 5B). For the identifications, see Appendix 1. See also Kirkinen 2022.

In total, eight bird-down fragments, barbules, were detected on the residues of three quartz items, i.e., a bipolar flake (:1832, two barbules),

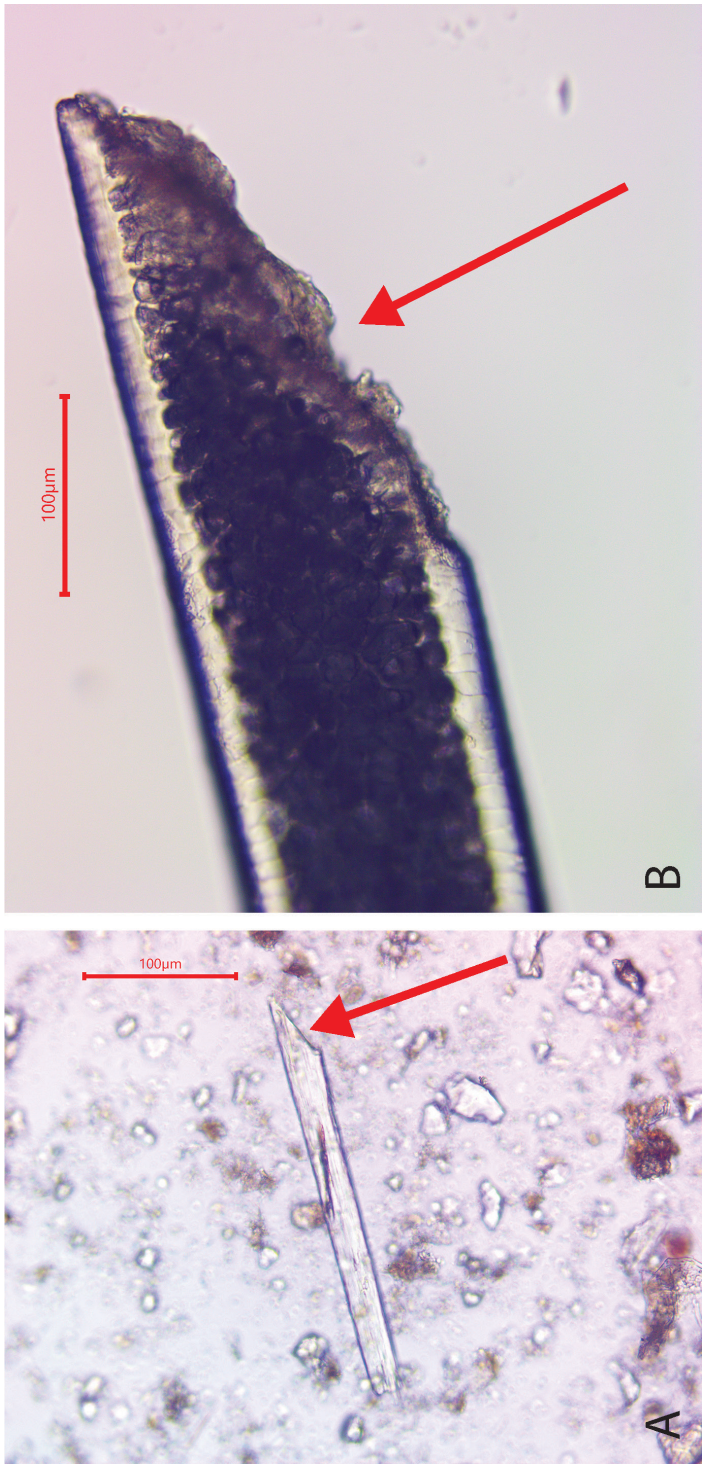

Figure 5. A) diagonal cut mark in a hair B) detected on the surface of a scraper fragment (KM 43282:1450) B) produced by experimental scraping of skin with a quartz scraper by archaeologist Johanna Seppä. Photos: T. Kirkinen.

a dull edged tool/scraper (:1881, one barbule) and a cutting tool (:2194, five barbules). The barbules were 0.51–0.74 mm in length. Only one barbule was identified as a waterfowl (Anseriformes) by its triangular-shaped nodes and prongs at the distal end (Fig. 4C).

Phytoliths

The phytoliths recovered from the quartz tools were common species, such as the Elongate sinuate, indicating leaf epidermis, and identified from the residues of a quartz flake (:1832). This type of phytolith is present in several plant families, for instance Poaceae, Cyperaceae, Pinaceae, or Polypodiopsida.

On a quartz flake (:2247) and a quartz scraper (:1450), there was a thick crust of plant residue, consisting of microscopic pieces of plant cell structures, that had accumulated onto these stone tools. There was a probable cut mark on a cell structure on the latter tool (:1450) (Figs 4D-F).

Use-wear analysis

The use-edges were identified and classified based on different fracture types or rounded, dulled, and smoothed edge surfaces. Some tools showed very little macroscopically visible use-wear, others were considerably worn. Use-wear was found on all artefacts, except one platform core :548 made of porphyritic stone. Tools that did not show evidence of residues were excluded from the use-wear analysis. In the following, the items studied microscopically for use-wear evidence are divided into tools used on a hard or a soft material.

Tools used on a hard material

In the macroscopic use-wear analysis, six items in total were classified as having marks of hard material processing. Sharp-edged tool :802 (Appendix 2 Fig. 1) has step terminations on one side of the edge, and smaller hinge terminations on the other side (App. 2 Figs. A and B), suggesting use against a hard material. Scraper :2247 (App. 2 Fig. 2) has most likely been of limited use on a hard/medium material (App. 2 Fig. C). Scraper fragment :1450 has a small use edge remaining. Only slight wear is visible with the low-power microscope. Most likely it has been used on a hard material, based on small step fractures on the edge. Not enough marks were visible to determine the possible soft material wear. Scraper :2241 was used slightly against some hard material (App. 2 Figs. 3 and D), as was double-edged scraper :941 that also included some plausible soft wear that could not be confirmed at used magnifications (App. 2 Figs. 4 and E). Scraper :1286 includes a retouched edge that has been used against some hard material, resulting in small step and hinge scars along the use edge (App. 2 Figs. 5 and F).

Tools used on a soft material

Based on our analysis, four items were classified as having marks of soft material processing. On the scraper :1832 (App. 2 Figs. 6 and G), the edge is noticeably duller and feels smooth when handled. The edge is also round with no sharp protruding points. This item was most likely used extensively against soft material like animal skin. On the dull-edged tool :1881 (App. 2 Figs. 7 and H), the edge is robust, smooth on the surfaces and rounded. It has most likely been used against at least soft material, for example scraped or cut soft material like animal skin or meat. Also, it might have been used to work against hard material in its previous use-phase. Also, the dull-edged tool :2194 has a rounded and clearly dulled use edge. Most likely it has been used against soft material like animal skin. Scraper :1950 includes both slight hard use-wear and a clearly visible rounded and smoothed edge from soft use (App. 2 Figs. 8 and I).

Reference samples

Neither hairs nor bird feather fragments were found in soil samples. However, it is quite probable that hairs do exist in the settlement site layers but as they can be assumed to have been spread unevenly in different activity areas, it cannot be excluded that single hairs and barbules have been attached to the artefacts from the surrounding soils. A preliminary phytolith analysis was conducted from one of the reference samples and from one sample

from the settlement-site area, and the results indicate open canopy with cold climate grasses (Juhola 2022).

DISCUSSION

The research of microparticles on the surfaces of quartz artefacts and flakes appeared to be successful; on 11 items out of 20 there were remains of organic materials such as hairs, barbules, phytoliths, and fragments of plant tissue. The items on which the organic remains were detected were mostly scrapers or cutting and scraping tools.

The strongest evidence of plant processing was discovered in the surface samples of a quartz flake (:2247) and a quartz scraper (:1450). The thick crust of plant matter and a probable cut mark on a cell structure suggest that plants were cut and scraped with these tools. Based on the use-wear analysis, small step and hinge fractures of the use edges in :2247 and :1450 indicate that the processing of plant matter was most likely done against a hard surface like wood. These wear marks also suggest that the tool edges were not heavily used.

It is worth noting that some quartz items may have been used in a multitude ways, and macroscopic use-wear analysis shows only a few of these. Some older use-wear marks can be obstructed by or completely removed by further use, remodification or retouch. Some plausible indicators of use against soft material were also detected from the use edge of scraper fragment :1450. Interestingly, eight possible hairs of seals with clear cut-marks were detected on this tool. However, SEM-imaging is required to confirm this hypothesis.

Wear marks on scraper :1832 include rounding and dulling of the use edge, resulting in a smooth and shiny finish of the edge. This supports the hypothesis that the tool was used on soft material like meat or skin. This is in line with the bird-feather barbules found on the item. Moreover, its smooth and thoroughly rounded edge would probably require a considerable amount of use to form. In addition, the wear marks on the dull-edged tool (:1881) show evidence of use on soft materials, which is in line with the animal hair and barbule detected on the artefact. Accordingly, the dull-edged tool :2194 also has a rounded and clearly smooth use-edge, which speaks for its use against soft materials. On this item, five barbules were found, including one waterfowl (Anseriformes) barbule.

The possible seal hair identified on the scraper fragment :1450 is in line with the seal bones identified at the settlement site osteological taxa, indicating that the seals were prepared and consumed at the site. Instead, bird-down fragments are interesting as their bones were not detected at the site and they are also generally quite rare in the osteological material of the sites (see Mannermaa 2008: 74). The barbules might be an evidence of the preparation of bird carcasses or skinning them to be used as a raw material for pouches, bags, and garments (e.g., Itkonen 1948: 299; Hatt & Taylor 1969).

The question of possible contamination was controlled by the careful handling of finds in the field as well as in the laboratory. In addition, the study of reference samples taken outside and inside the settlement site supports the hypothesis that at least most of the residues were remnants of actual past artefact use. Accordingly, it is possible that the quartz flake (:1832) had been used for cutting leaves, but it is also possible that there is contamination from the soil, because many elongate phytolith types were frequently present in a preliminary analysis of soil samples on the site (Juhola 2022). Although no hairs or bird-feather fragments were found in the reference sample taken inside the settlement site, it can be assumed that hairs and barbules have spread unevenly in different activity areas and that single hairs and barbules might have been attached to the artefacts from the surrounding soils, too. Especially the unidentified mammal hair on the surface sample of a platform core :548 with no use-wear marks can be interpreted as a contamination.

The interpretation of residues as functional remnants of past artefact use or as sediment-derived remnants would have been supported by an in-situ analysis of the items before washing them. In the in-situ analysis, the residues that are not clearly attached to the artefact can be verified to derive from the surrounding cultural layer in which all kinds of microremains of past activities might have been preserved (see e.g., Cnuts et al. 2022 and references therein). Therefore, we stress

the importance of the in-situ analysis of residues prior to extraction in the future studies. However, our results are valuable both for understanding past human activities and for developing methods that meet the particular challenges posed by podzol soil sites.

CONCLUSIONS

The results of our combined microresidue and use-wear analysis provided evidence that microscopic organic materials can also be found on the surfaces of quartz items in Finnish podzol soil open-air settlement sites. The findings included animal hairs, bird-feather fragments, phytoliths, and plant tissues. Although only some plant remains were documented in this study, this experiment demonstrates the potential for analysis of plant remains on tool surfaces. Finnish archaeology can greatly benefit from the new data this kind of analysis may provide on prehistoric plant gathering and processing, plant foods and medicine.

The keratinous fibres detected on the items gave us detailed information on the use of quartz artefacts. Especially the number of bird barbules indicated the importance of birds as game animals, information of which was not present in the bone material. Also, the cut-marks in plant remains and possible seal hairs gave us minute evidence of skin and plant processing. Moreover, data from the use-wear analysis showed a clear difference of tools used either on hard or soft material. Most probably, this is in line with the different ways that plant- and animal-originated materials were prepared.

Finally, our research showed the importance of combined microresidue and use-wear analysis to gain new information on the preparation and use of plant and animal resources. The next step would be to select items for high magnification optical microscopy analyses to receive more detailed information of the distribution of microresidues. In the future, this kind of research requires careful handling of finds already in the field, i.e., avoiding any touching of finds by hands that might cause contamination. Additionally, the current protocol of cleaning the finds with a toothbrush should be reconsidered. This is because brushing removes residues and destroys valuable evidence. One possible solution is to archive a selection of uncleaned finds for further research.

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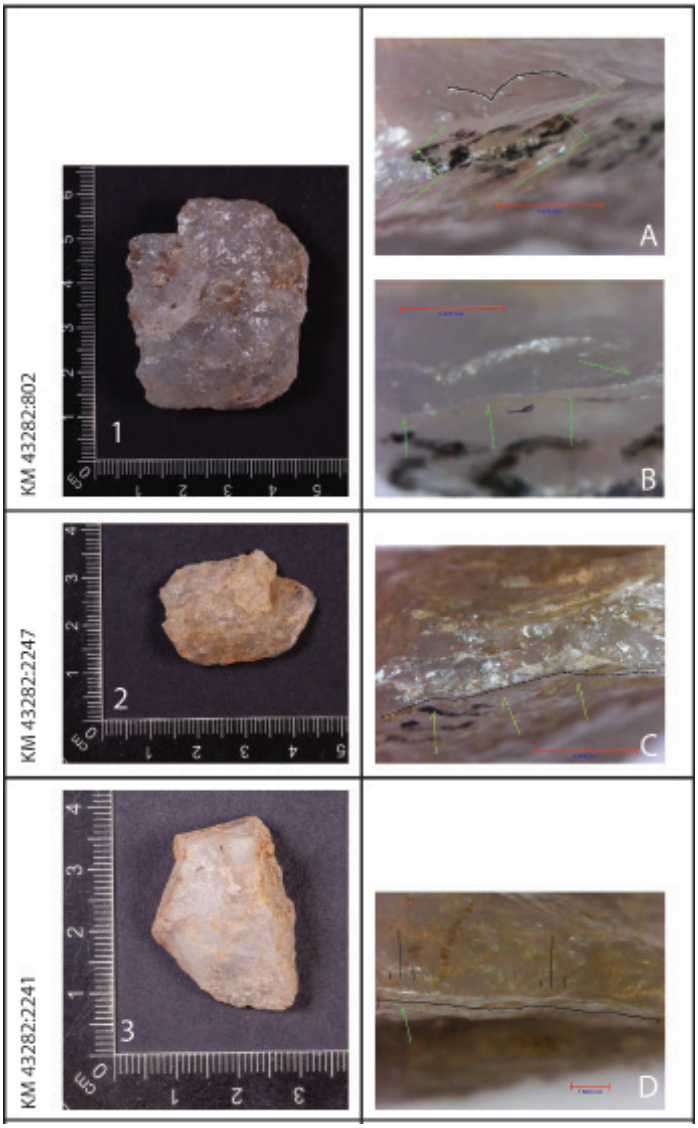
Appendix 1. Animal hair and feather identifications by T. Kirkinen.

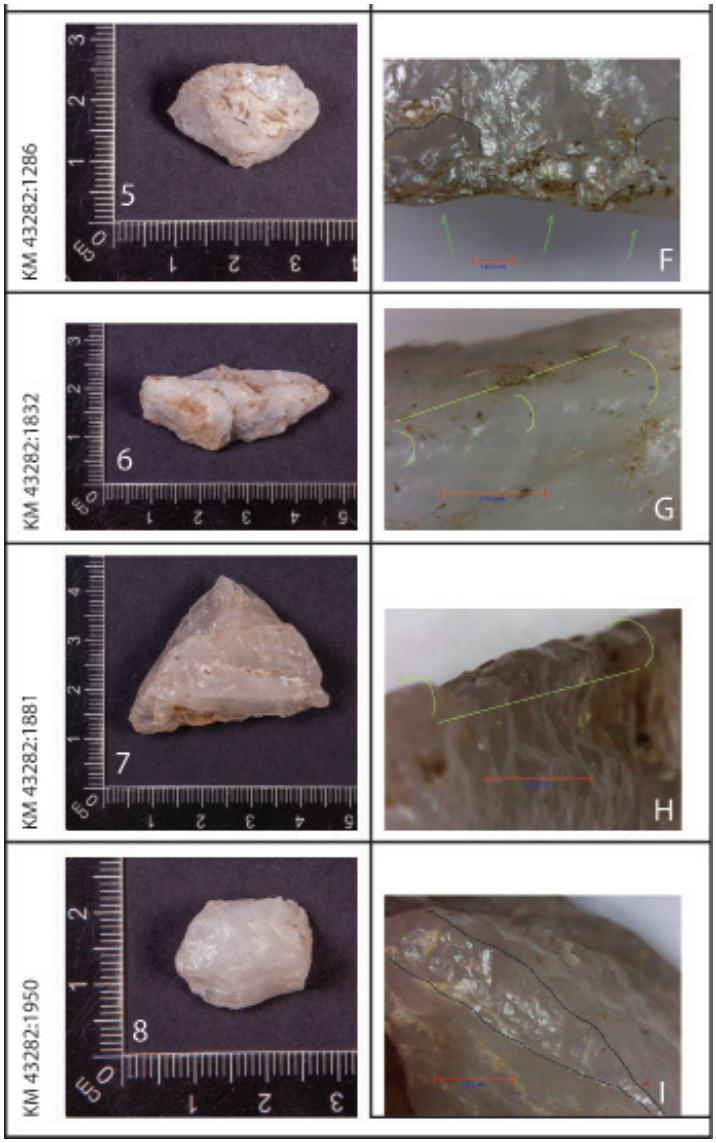
KM 43282 subnumber: Fibre id	Species identification	Diagnostic features	Identification references
548: K1	Unidentified mammal (Mammalian)	Possibly highly degraded, cuticular scales strongly profiled, medulla uniserial/tubular. Width 16.8 µm, length 1.2 mm.	
802: K1	Possibly red squirrel (Sciurus vulgaris)	GH, tip section. Cuticular scales not preserved, medulla multiserial, medullar cells rounded. Width 17.7 µm, length 3.2 mm.	Tóth 2017, 132-133
802: K2	Unidentified mammal (Mammalian)	UH, cuticular scales strongly profiled, medulla empty. Width 10.7 µm, length 0.2 mm.	
941: K1	Possibly fibre	Highly degraded hair or feather fragment. Length 0.14 mm.	
1286: K1	Unidentified mammal (Mammalian)	GH, highly degraded, cuticular scales figureless waved, no medulla. Width 35.5 µm, length 1.2 mm.	
1286: K3	Unidentified mammal (Mammalian)	GH, degraded, cuticular scales irregular mosaic, medulla uniserial regular. Width 34 µm, length 0.8 mm.	
1450: K1	Unidentified mammal (Mammalian)	GH, highly degraded, fragment tip rounded. Cuticular scales not preserved, medullary canal hollowed out by fungi. Width 48.3 µm, length 0.48 mm.	
1450: K2	Possibly seal (Phocidae)	GH, highly degraded. Cuticular scales not preserved, no medulla. Width 130.8 µm, length 2.8 mm.	Reference collection
1450: K3	Unidentified mammal (Mammalian)	GH, highly degraded, fragment tip diagonally cut. Cuticular scales not preserved, no medulla. Width 26.9 µm, length 0.26 mm.	
1450: K4	Unidentified mammal (Mammalian)	GH, highly degraded. Cuticular scales not preserved, no medulla. Width 39.8 µm, length 0.26 mm.	

1450: K5	Unidentified mammal (Mammalian)	Highly degraded, fragment tip diagonally cut. Cuticular scales not preserved, no medulla. Width 16.8 µm, length 0.32 mm.	
1450: K6	Unidentified mammal (Mammalian)	Highly degraded, fragment tip diagonally cut. Cuticular scales not preserved, no medulla. Width 46.8 µm, length 0.63 mm.	
1450: K7	Unidentified mammal (Mammalian)	Highly degraded, fragment tip possibly cut. Cuticular scales not preserved, no medulla. Width 28.8 µm, length 0.32 mm.	
1450: K8	Unidentified mammal (Mammalian)	Highly degraded, fragment tip diagonally cut. Cuticular scales not preserved, no medulla. Width 36.8 µm, length 0.52 mm.	
1832: K1	Unidentified bird (Aves)	Barbule fragment with prongs at the distal end. Length 0.51 mm.	
1832: K2	Unidentified bird (Aves)	Barbule with prongs at the distal end. Length 0.74 mm.	
1881: K1	Unidentified bird (Aves)	Barbule with prongs at the distal end. Length 0.51 mm.	
1881: K2	Unidentified mammal (Mammalian)	Degraded, cuticular scales coronal, medulla uniserial. Width 18.3 µm, length 1.2 mm.	
1950: A1	Possibly fibre	Possibly highly degraded hair or feather fragment. Length 0.32 mm.	
2194: K1	Waterfowl (Anseriformes)	A plumulaceous barbule fragment with triangular-shaped nodes and prongs at the distal end. Length 0.5 mm.	Dove & Koch 2010
2194: K2	Unidentified bird (Aves)	Barbule with prongs at the distal end. Length 0.6 mm.	
2194: K3	Unidentified bird (Aves)	Barbule with prongs at the distal end. Length 0.54 mm.	
2194: K4	Unidentified bird (Aves)	Barbule with prongs at the distal end. Length 0.68 mm.	

2194: K5	Unidentified bird (Aves)	Barbule. Length 0.73 mm.	
2241: K1	Unidentified mammal (Mammalian)	Degraded, root section. Cuticular scales coronal, medulla uniserial/tubular. Width 17.8 µm, length 1.6 mm.	
2247: K1	Unidentified mammal (Mammalian)	Highly degraded, cuticular scales not preserved, no medulla. Width 17.9 µm, length 0.9 mm.	

Appendix 2. Quartz artefacts and the macroscopic use-wear analysis by O. Eranti. Photos: O. Eranti and V. Laulumaa.




KM 43282:1286
5
F
KM 43282:1832
6
G
KM 43282:1881
7
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KM 43282:1950
8
I

Tia Niemelä

TOWARDS A GROWING INTEREST IN THE URBAN ARCHAEOLOGY OF EARLY MODERN TOWNS IN FINLAND

Abstract

Research in historical periods has always had a strong tradition in Finnish archaeology. Past studies and archaeological fieldwork have mostly focused on medieval times; however, in the past 20 years, investigations of early modern towns (1520–1721 AD) have taken place more often in Finland and have changed the tide. Most archaeological excavations in Finland are currently carried out owing to infrastructure and construction projects and can therefore be regarded as contract archaeology. First, this article aims to examine and provide an overview of past research in Finnish urban archaeology focused on early modern towns. Second, current research trends are discussed with an emphasis on the possibilities offered by multidisciplinary approaches. Recent research conducted in Turku serves as a case study to illustrate these developments. The article concludes by touching upon the persistent challenges faced by research, primarily stemming from the contractual nature of most archaeological investigations.

Keywords: early modern period, towns, historical archaeology, urban archaeology

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INTRODUCTION

Most of the archaeological record of towns in Finland is currently obtained by contract archaeology,[1] commonly because of construction projects. In addition, rescue or research excavations are also conducted, the latter usually by universities or funded projects such as community archaeology projects.[2] The Finnish law of the Antiquities Act (295/1963)[3] requires contract archaeological excavations to be conducted before such land use. According to the Antiquities Act, 'Ancient monuments are protected by the law as memories of previous settlements and the history of Finland' (295/1963)[4]. The law does not define the term 'ancient' by providing precise years. In the case of early modern towns, the *Guide for Archaeological Cultural Heritage* (2022) suggests that protected towns were founded mainly before the 18th century. In those towns, cultural layers until the 19th century are protected in areas built up to the end of the Great Northern War (1700–1721 AD) (Guide for Archaeological Cultural Heritage 2022). Therefore, any infrastructure or construction work occurring in such towns must be preceded by archaeological work. The Finnish Heritage Agency (hereafter FHA)[5] is also the authority that gives permits for investigations; thus, it plays a key role in Finnish archaeology.

Following the same quality requirements stated in the *Quality instructions on archaeological fieldwork* prescribed by the FHA

is necessary for all types of excavations (Finnish Heritage Agency 2020a). Contract archaeology is based on competitive tendering, and there is a need to excavate: the site is going to be destroyed, and therefore, it must be investigated. However, a research plan and scientific research questions are necessary for all destructive investigations (Finnish Heritage Agency 2020a: 14). There have been several observations of potential problems in contract archaeology. For example, Liisa Seppänen (2018: 30–31) pointed out that choosing the responsible party based solely on the lowest offer may result in the chosen company not being the one with the most experience with the investigated site. Typically, archaeologists specialize in specific periods or methods during their studies; however, in contract archaeology, they may need to excavate any given period.

Land use and timetable problems are seen in urban archaeology and contract archaeology in general. Marianna Niukkanen (2008: 32) says that one frequent problem in urban archaeology is the rich find material and thick layers in urban contexts. Moreover, according to Marika Hyttinen, Titta Kallio-Seppä, and Teija Oikarinen (2008: 27), carrying out watching briefs is sometimes seen as a burden on timetables and costs at construction sites. In these cases, archaeology has only been perceived as slowing down construction projects, and not as an important part of the process of extending our knowledge of the human past.

Another significant point is the acquisition of as much research data as possible. *The guidelines for Quality instructions on archaeological fieldwork* by the FHA require that reports be submitted after excavations, but no further studies or publishing are necessary (Finnish Heritage Agency 2020a). According to Niukkanen (2004: 33), the aim is to inform people about excavations through newspapers, presentations, and scientific articles. On the other hand, Markus Hiekkanen (1999: 89) and Niukkanen (2008: 34) stated that few studies have been published on urban archaeology for the public.[6] From 2010s onwards, the number of articles has been growing; however, in many cases, excavation reports have been the only sources to familiarize oneself with the investigations. Nevertheless, if publishing results is not part of and funded along with other parts of the excavation, such as preliminary work and post-excavation work, it might not happen, even though it would benefit both academics and wider audiences interested in archaeology.

From the European perspective, the foundations of systematic contract archaeological excavations were established in the 1992 Valletta Convention (Eur. Cult. Conv. 1992). In 2000, the Council of Europe established guidelines for urban archaeology (Council of Europe 2000). The *Code of Good Practice* guidelines have been modified to better suit Finnish circumstances by Niukkanen (2004: 44–45). There is a will to change the lack of research and publications in the field of urban archaeology; however, further actions are still needed.

This article aims to provide an overview of past archaeological research on early modern towns (Fig. 1)[7] and the changes seen in Finnish urban and historical archaeology. Analysis is based on data gathered from publications, doctoral theses, and information about investigations available in the FHA database. The current trends in research are discussed with an emphasis on the possibilities offered by multidisciplinary approaches. Recent urban archaeological excavations and research conducted in Turku serves as a case study to illustrate these developments. The paper concludes by touching upon the persistent challenges faced by current research, primarily stemming from the contractual nature of most archaeological excavations in Finland. It also raises questions about potential mitigation strategies for these challenges.

THE PRACTITIONERS IN THE FIELD OF ARCHAEOLOGICAL RESEARCH IN FINLAND

Practitioners of archaeological work in Finland include for example the FHA, Metsähallitus, private archaeology companies, museums, independent researchers, research groups, and universities (Finnish Heritage Agency 2020a: 11). All these practitioners can conduct archaeological fieldwork. Obtaining research permission from the FHA is conditioned by the presence of a researcher with a degree in archaeology and sufficient fieldwork experience (Finnish Heritage Agency 2020a: 11).

Niukkanen (2004: 27) stated that in Turku, the primary practitioner of archaeological fieldwork in the early 2000s was the Turku

Museum Center. This setting has changed since the beginning of the 2020s, with over 15 active practitioners in the field of commercial archaeology in Finland, and excavations have been increasingly conducted by private companies. Some towns have contracts with certain companies, which means that a specific commercial archaeological practitioner will be responsible for all archaeological investigations in that town. Thus, archaeology is not only a scientific discipline that investigates the past, but also a capitalistic competitive business.[8]

A new Museum Act (314/2019) came into effect in Finland in 2020. According to the modified law, museums with national responsibility and museums with regional responsibility are replacing the old system consisting of regional museums and regional

Figure 1. Finnish towns that were founded between 1150-1721 AD. Towns outside Finland's current borders are excluded from this map

art museums (Finnish Heritage Agency 2020b). Finland now has 32 museums with regional responsibility and 17 museums with national responsibility. The law outlines three tasks for regional museums that are included: promoting regional museum operations, carrying out cultural environment work, and implementing regional art museum tasks (314/2019, 7§). At the national level, the FHA continues to be the main authority. Nevertheless, according to the FHA, with new regional museums arising in the future, expertise will grow due to the new experts, and funding from the government will increase (Finnish Heritage Agency 2020b). The future will show whether this affects the urban archaeology of early modern towns.

All three universities with archaeology majors can organize teaching excavations and survey courses. These are not typically conducted in urban areas, although it is possible. According to Kallio (2005: 13–14), the Department of History and the Archaeological Laboratory of the University of Oulu were the responsible parties for nine different field projects in the urban area of Oulu between 1986 and 2004. There have also been research projects on urban archaeology in the discipline of archaeology at the University of Turku, even though urban excavations were not organized by the university itself (see e.g., Taavitsainen 2003: 16–18).

THE ARCHAEOLOGY OF EARLY MODERN TOWNS IN FINLAND – AN OVERVIEW

Finland has no specific professorship in historical or urban archaeology. Archaeology is only considered as a general subject. The lack of teaching in historical archaeology in Finland was noticed by Knut Drake already in 1993 (1993: 365–366). According to Drake (1993), some researchers had already worked with medieval archaeology in Finland in the early 1990s and had maintained the hope that a chair of medieval archaeology would be created. The number of archaeologists and students studying topics in historical archaeology has been steadily increasing since then, however, a dedicated chair of historical archaeology is still missing. Nonetheless, archaeology professors in Finland no longer specialize solely in prehistoric times, as was the case until the early 1990s (Drake 1993: 365). Even without a professorship, nowadays historical archaeology has an established position in Finnish universities.

To understand the current situation and future of Finnish urban archaeology of early modern towns, this paper will first examine previous research. Because archaeology is a destructive discipline, when it produces new fieldwork data, it is important to understand the current circumstances when information from excavations is gathered. This paper first presents research on medieval towns and then research on towns from the later historical period. In total, six towns were founded in Finland during medieval times, and later, during the period up to the Great Northern War (1700–1721), this number increased. However, the archaeological activity in these towns varies significantly.

Finland was part of Sweden from the Middle Ages until 1809, after which it was part of the Russian Empire as the autonomous Grand Duchy of Finland until it became independent in 1917. The six medieval towns in Finland were: Turku, Viipuri, Porvoo, Ulvila, Rauma, and Naantali. The founding of Turku has been extensively discussed by researchers and recent studies have suggested that the town was founded in the early 14th century (Savolainen et al. 2021; see also Seppänen 2019). Turku is the oldest town in Finland and was the most important town in the eastern part of the Swedish Kingdom in the medieval period.

Two urban archaeology survey projects aimed at researching the medieval and early modern towns of Finland were conducted in the 1980s and early 2000s. The first was the Swedish project ‘The Medieval Town: Implications of early urbanization for modern planning’ (in Swedish *Den tidiga urbanserigsprocessens konskvenser för nutida planering, Medeltidsstaden*), which started in 1976 (Andersson 1976). Four medieval towns (Porvoo, Rauma, Turku, and Naantali) in Finland were included in the archaeological survey and published in the series Keskiajan kaupungit. The project was conducted by the FHA and the Turku Museum Center[9] (Hiekkanen 1981; 1983; Pihlman & Kostet 1986; Hiekkanen 1988). The Town Museum of Helsinki also carried out a survey on the Old Town of Helsinki in the late 1980s (Heikkinen 1989). In addition,

the town of Vaasa in Ostrobothnia was surveyed by the Museum of Ostrobothnia and the results were published in 1987 (Spoof 1987).

Starting in 2000, the FHA conducted surveys of towns founded before 1721 (Mökkönen 2007). In these surveys, the focus was on the parts of the towns that were older than the Great Northern War, and old maps of the towns, together with GIS, were used to identify those parts of each town (Mökkönen 2007: 52–53). Between 2008 and 2009, the FHA supplemented earlier surveys that needed to be updated, and in 2015, the town of Uusikaarlepyy was also surveyed (Kallio-Seppä 2007; Hakanpää 2007a; 2007b; 2008; 2009; Pesonen 2015). In both cases, The Medieval Town Project and later surveys of towns founded between 1617 and 1721, the aim was to clarify future land use, investigate the archaeological potential of the areas, and respond to administrative needs.

Figures 2 and 3, based on the Project Register (*hankereksteri*) database of *Kulttuuriympäristön palveluikkuna* (*Kyppi*) created by the FHA, show investigations of towns in Finland conducted between 1970 and 2022.[10] Investigations of churches, castles, and fortress areas were not included in this study. The database is not entirely accurate because it does not contain all excavations, trial excavations, watching briefs, or surveys that have been conducted in Finland. Already in 2008, Niukkanen noticed that there were problems in using this database. However, no other database is available to access this information, and even though incomplete, it still provides an overview of archaeological activities in Finnish towns.[11]

As shown in Figure 2, Turku stands out in the context of archaeological activity in Finnish towns. Even so, a survey conducted in the 1980s in Turku has not yet been updated. Figure 2 shows that there have been more watching briefs and trial excavations compared to excavations in the cases of Turku, Porvoo, Rauma, and Oulu. In the three last-mentioned towns, the watching briefs clearly outnumber other investigations. According to Niukkanen (2008: 32), between 1980 and 2007, the most investigated towns were Turku, Oulu, Helsinki, Porvoo, Rauma, Kokkola, and Tornio. Figure 2 shows that this is still true, over 15 years later. Of all the early

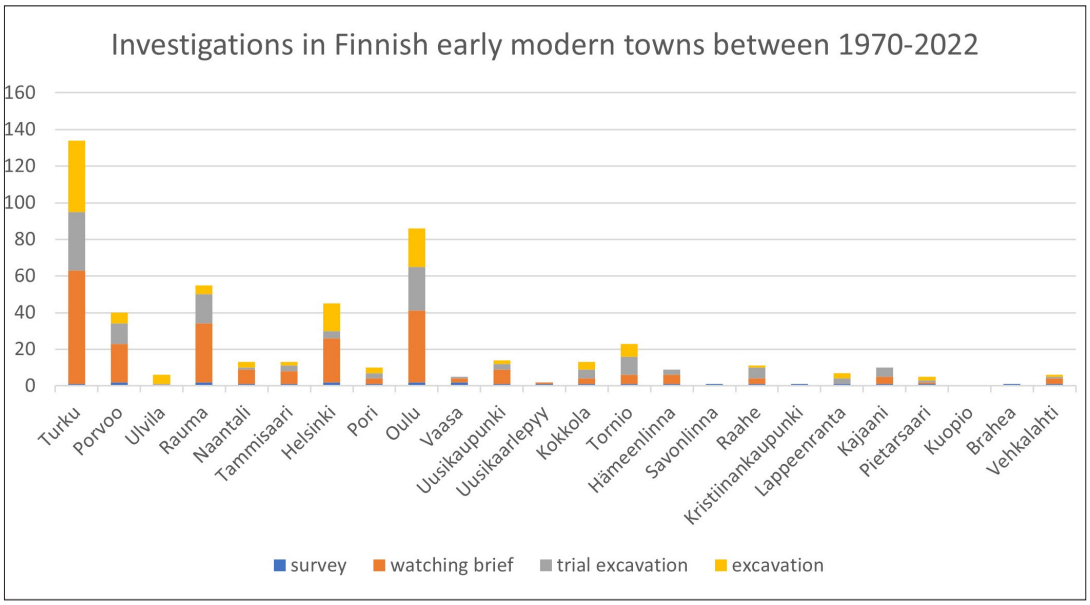

Figure 2. Archaeological activity in early modern towns, based on the FHA project register.

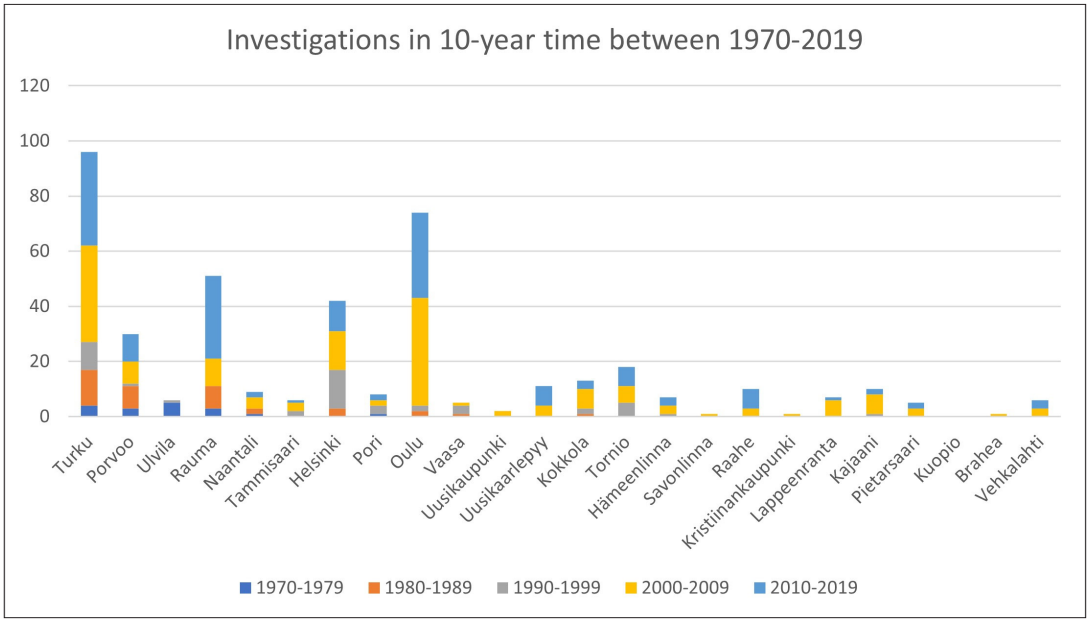

Figure 3. Archaeological activity in early modern towns, based on the FHA project register.

modern towns, Kuopio is the only one in which no archaeological investigations have been conducted. In Savonlinna, Kristiinankaupunki, and Brahea (Lieksa) only surveys have been conducted.

In Figure 3, archaeological investigations, including surveys, watching briefs, trial excavations, and excavations, are counted based on the FHA project register per 10-year period from 1970 to 2019. The number of investigations has been growing since the beginning of the 2000s. However, the graph shows that in Helsinki, more investigations were conducted between 1990 and 1999 than between 2010 and 2019.

The following sections provide a summary of the overall information on excavations and research conducted in early modern towns in Finland.

Turku

In Turku, the earliest observations of urban archaeology and its findings were made already in the 19th century. One notable example from the middle 20th century is Niilo Valonen's interest in the town layers of Turku (Valonen 1958). Subsequently, the number of archaeological investigations increased, but the standards of documentation varied. The *Lake Mätäjärvi* project (in Finnish *Turun Mätäjärvi*) was the first archaeological project to be guided by predefined research questions, although it was conducted because of land use. The first trial excavations took place in 1975, and later continued with larger excavations due to land development in 1982 (Pihlman 1989: 8). The *Lake Mätäjärvi* project was the first multidisciplinary historical archaeology project in Finland, combining archaeology, history, and different analyses such as palaeolimnology, palynology, macrofossils, osteology, and ^{14}C dating (Pihlman 1989: 8–9).

The so-called Julin's plot area in Turku has been investigated on several occasions (see e.g., Gardberg 1966; Laaksonen 1984; Kykyri 1985). In Julin's plot excavations, the remains of the House of the Holy Spirit, the Church of the Holy Spirit, and numerous burials were found (Gardberg 1966; Kykyri 1985). Archaeological activity in the 1980s in Turku included for example excavations in the Old Great Square

(in Finnish *Suurtori*) between 1986 and 1987 and in 1989 (see e.g., Pihlman 2002; for stone buildings see also Uotila 2002; 2003).

The Aboa Vetus & Ars Nova Museum in Turku is located at the so-called Rettig Palace in the Convent Quarter of the medieval town. In 1991, archaeological research in this area became a topic of interest during the construction of a new museum. The museum's area was excavated between 1992 and 1995, and cellars of six different buildings and other building structures were found (see e.g., Sartes 2003; Jokela & Lehto-Vahtera 2012: 35). Some of these structures have been preserved in the museum. Kari Uotila has studied the architectural remains in the area using building archaeology methods and developing modern technology (Uotila 2003; 2007a; 2007b; 2009; 2011). In 2005 the area was excavated again (Uotila & Saari 2006). Moreover, historical sources such as fire insurance policies have been studied in this area (see e.g., Savolainen 2011). The Aboa Vetus Museum is still the only museum in Finland built at an archaeological site.

Another project that led to publications was the Åbo Akademi plot excavation, which took place in 1998. The site is located near the medieval cathedral in Turku. The focus was on the medieval period (see e.g., Pihlman et al. 2004; Seppänen 2012). The excavations caused debates at the time, regarding the methods and resources of urban archaeology in Finland. The project was criticized for unscientific and unethical methods, caused by a lack of funding for archaeological investigations (Haggrén & Lavento 1999; Haggrén et al. 1999a; Haggrén et al. 1999b; Pihlman 1999; Taavitsainen 2003: 16–18; Seppänen 2015b: 4–5). In 2012, Seppänen completed a doctoral thesis based on materials from Åbo Akademi plot excavations and pointed out some of the issues that the employed excavation methods may have caused for further research (Seppänen 2012: 75–82).

In 2000 and 2001, the Rettiginrinne area was excavated due to construction works (Saloranta & Seppänen 2002). Both medieval and early modern layers were investigated (Saloranta & Seppänen 2002). Between 2003 and 2005, the plot of Turku City Main Library was excavated because of a construction project (Tuovinen et al. 2004; Tuovinen et al. 2006).

The first planned urban archaeology project in which there was no pressure from construction or land use in Turku was the 'Early Phases of Turku' project (in Finnish *Varhainen Turku*), conducted between 2005 and 2007. The primary goal of the project was to determine when the town was founded (Talamo-Kemiläinen 2010: 7). In the 'Early Phases of Turku' project, public information and guided tours at the excavation site played a significant role (Majantie 2010). Moreover, schoolchildren and volunteers had the opportunity to participate in fieldwork with archaeologists (Majantie 2010: 147–148).

Part of the area of the Cathedral School (in Swedish *Katedralskolan i Åbo*), which is an upper secondary school in the Old Great Square, was excavated in 2008 (Saloranta & Sipilä 2009). Investigations in the area continued in 2014 with a building survey of the basements (Uotila et al. 2015). Trial excavations were conducted in 2017, and the gymnasium inside the school was excavated in 2018 (Uotila et al. 2018; Uotila & Vidgren 2019). The 2018 excavations followed a public information program, including a temporary pop-up museum inside the gymnasium, where archaeologists held guided tours and the public could see the actual excavated area and remains of the basements, as well as some of the finds (Uotila et al. 2018: 7).

Although most excavations in urban areas are conducted by contract archaeology, the Aboa Vetus Museum organizes small-scale seasonal community archaeological excavations in the museum yard (Aalto 2020). According to Ilari Aalto (2020), people had positive experiences when participating in these excavations between 2017 and 2019. It is more common for community excavations to occur at rural sites, but as Aalto (2020: 147) states, urban areas can offer some benefits, such as accessibility. The same interest was notable in the *Early Phases of Turku* project since volunteers needed to be selected from hundreds who were interested in participating (Majantie 2010: 148). In community archaeological excavations, attendees typically pay participation fees. These types of excavations could be used to fund further research, analysis, and publication of excavated areas.

Not all investigations conducted in Turku have been documented above; only a selection was included based on available information. While

numerous excavations were conducted during the 1980s and 1990s, the absence of written reports poses a notable challenge for research. Along with the excavations mentioned in this paper, several other archaeological fieldwork projects have been conducted.[12] Moreover, as Figure 2 shows, watching briefs has been the most common type of investigation in Turku.

Other towns founded in the medieval period

The other medieval towns of Finland have not been as extensively researched as the town of Turku (Fig 2). Niukkanen (2004: 27) stated that some of the reasons behind this include other towns having a lower level of construction activity and a lack of positions for archaeologists. Viipuri (or Vyborg) and Ulvila were not part of the *Medieval Town* project. Given that Viipuri has been part of Russia since 1944 it has been left out of this paper, because acts established by Finnish law are not recognized there, even though archaeological research in Viipuri has notable reference material when investigating medieval and early modern town life in Finland (about the survey of Viipuri see Suhonen 2005; urban archaeology of Viipuri see Saksa et al. 2002; Belsky et al. 2003; Saksa 2009). Ulvila lost its town status to Pori in the 1550s, but the medieval town area has been located and partly excavated (Pihlman 1984).

The remaining medieval towns, Porvoo, Rauma, and Naantali, were excavated only through contract archaeology. In the early 2000s, along with contract archaeological excavations in Naantali, a larger investigation into the history and archaeology of the town was published in a volume (Uotila et al. 2003). The focus of this study was on the medieval Bridgettines Monastery, but it also included the development of the town (Uotila et al. 2003). In 1966, the market square in Rauma was excavated, and the next larger excavations in Rauma were conducted in Kalatori in 2009 and 2010 (Kärki & Koivunen 1966; Koivisto 2010; 2011). Other archaeological investigations, mainly trial excavations and watching briefs, as well as excavations in 2017, have been conducted in the Old Town of Rauma (see e.g., Uotila & Lehto 2017). In Porvoo, only small parts of the medieval town have been excavated. In 2019, the area next to the town hall in Porvoo was excavated, and layers dating back to at least 1600–1800 were identified based on the find materials (Koskinen 2019).

Helsinki

Finland's current capital, Helsinki, was founded by King Gustav Vasa in 1550 in the Old Town of Helsinki (in Finnish *Vanhakaupunki*). However, in 1640, it was transferred to its current location, closer to the sea, in current Vironniemi. The reason for founding the new town was that, based on its location, it could compete for trade with the town of Tallinn. Already in 1930–1931, Nils Cleve carried out excavations in which Helsinki's first church was discovered (Heikkinen 1994a: 35-51). The district of the Old Town of Helsinki was excavated several times between 1989 and 1993 as part of the Helsinki City Museum project, conducted between 1987 and 1996 (Kallio et al. 1994). This project aimed to study the origin and development of the town of Helsinki (Heikkinen 1994b: 121). In the late 1990s, the Old Town of Helsinki was excavated once again. Investigations in Annala began with a watching brief in 1996 and continued in 1997 (Heikkinen 2002a). In 1999, another excavation was conducted in Kellomäki (Heikkinen 2002b). Although these excavations resulted in few publications, they were the first large multidisciplinary excavations to research a town founded during the Vasa period.

In Vironniemi Helsinki, built in 1640, excavations were first conducted in the Government Palace (in Finnish *Valtioneuvoston linna*) starting in 1993. In 1999, the FHA excavated in Snellmanninkatu 4–6 (Niukkanen 2002: 13). The publication of the Snellmanninkatu excavations contains information about excavated layers, finds, macrofossiles, osteological analysis, and dendrochronological results (Niukkanen 2002). Moreover, written sources were used to identify the residents of the excavated plots (Niukkanen 2002). The excavation was performed for construction purposes, but the publication still included more scientific analyses and information about excavated sites than the mandatory excavation reports.

In the 2010s, several contract archaeological excavations and watching briefs were conducted in Helsinki. Senaatintori square was excavated in 2012 and again in 2020–2021 owing to construction work. The square is located near the Sederholm house, which is currently the oldest stone building in Helsinki, dating back to 1757. (Hämäläinen 2013; Lehto 2021; 2022.) Two smaller excavations conducted recently were the Mariankatu excavation inside the second oldest stone building in Helsinki and investigations at Hallituskatu 11 (Lagerstedt & Roiha 2020; Koskinen 2021).[13]

Oulu and Tornio

Other towns founded in the early modern period and where archaeological research projects have taken place include Oulu and Tornio in Northern Finland. Oulu was founded in 1605 and Tornio 16 years later. Investigations in these towns have been carried out by contract archaeology.

During 1986–1987, the urban excavations in NMKY's plot in Oulu were the largest urban archaeological excavations in Finland at the time (Mäkivuoti 2005: 85). They marked a changing point in the urban archaeology of Oulu, since before them, archaeological data from the town was minor (Mäkivuoti 2005: 86). Another area that has been investigated several times in Oulu is the Oulu Lyseo Upper Secondary School (see e.g., Mikkola 2015; 2017; Helamaa 2016; 2020; 2022a; Helamaa & Tokoi 2020; Paukkonen & Uotila 2022).

Three doctoral theses have been written about the town of Oulu. In the 2010s, Kallio-Seppä's study about the development of public space in early modern Oulu combined archaeological data and contemporary sources, especially cartographic data from the 17th century to the early 19th century (Kallio-Seppä 2013). Tiina Kuokkanen (2016) studied findings from excavations in Oulu together with probate inventories, focusing on small clothing-related items from the early modern period. The latest historical archaeological doctoral thesis on the town was Hyttinen's (2021) research on the Pikisaari pitch mill.

Archaeological research on the town of Tornio has been at the vanguard in Finland. Four doctoral theses have been written on the topics of urban archaeology, the development of town, and archaeological materials, such as animal bones and macrofossils (Ylimaunu 2007; Puputti 2010; Nurmi 2011; Tranberg 2018). In Tornio, urban archaeology is similar to early modern town excavations elsewhere in Finland and consists of small coincidental separately excavated areas (Ylimaunu 2007: 17; for recent excavations in Tornio see e.g., Helamaa 2022b). Timo Ylimaunu's investigation of Tornio is an example of research that takes advantage of material gathered from contract archaeology. This was the first doctoral thesis to research Finland's early modern period.

Moreover, research has focused on material culture (see e.g., Herva & Nurmi 2009) and historical maps (Herva & Ylimaunu 2010). Anthropological archaeology approaches in research on the town of Tornio have also shown multidisciplinary possibilities for historical archaeology (Herva & Ylimaunu 2009; Herva 2010).

From medieval to early modern era

The above chapter presented the main archaeological research on early modern towns in Finland. However, many excavations and watching briefs other than those mentioned here have been conducted (see Fig. 2 and 3). The connection between most of these past archaeological projects is that the focus has been more on the medieval period than on the early modern parts of towns if the towns were founded during medieval times. As previously stated, this has been a common trend in many projects in Finnish urban archaeology. Even if excavated areas may have had layers from the early modern era, these observations were not systematically published along with the analysis of the medieval materials from the site. Niukkanen (2008: 31–32) stated that statistics on urban archaeology in Finland show an increase in excavations in post-medieval towns, however, the activity in medieval towns was still more notable. Georg Haggrén (2023: 81) recently noted that the situation for the early modern period is better in newer towns since the early modern layers are the oldest layers in them.

CURRENT TRENDS IN THE URBAN ARCHAEOLOGY OF FINNISH EARLY MODERN TOWNS

In the 1970s, Finland followed Sweden's model of conducting extensive survey projects in medieval towns. Subsequently, the FHA expanded these surveys. Interest in the archaeology of the early modern period in Finland seems to have been less developed than that of medieval archaeology. Archaeology has been seen only as a prehistoric research field for a long time, and even medieval archaeology has not been taken for granted. In the beginning, historical archaeology mainly focused on structures, buildings, and remains of buildings, especially castles, and churches (see e.g., Hiekkanen 1999; Kykyri 1999: 33; Taavitsainen 1999; Haggrén 2011).[14]

Studies in Oulu and Tornio in Northern Finland have dominated this field, and in the case of Tornio, four doctoral theses were written based on this material. However, based on the FHA project register (Fig 2; Fig 3), Tornio is not even among the top five sites where archaeological projects were conducted, but the data are still used in research. These studies have demonstrated that a wide range of approaches to material culture and consumption (Herva & Ylimaunu 2006; 2012; Herva & Nurmi 2009; Nurmi 2011), buildings (Herva 2010), organic materials (Puputti 2010; Tranberg 2018), and anthropological archaeology, to research for example folk beliefs (Herva & Ylimaunu 2009), can be used in Finnish urban archaeology. In addition, research approaches to the early modern town of Tornio show that with critical research questions, it is possible to accomplish diverse outcomes even with limited resources.

Written sources are rare for the medieval period in Finland and archaeology plays a significant role when investigating medieval times. However, historical sources grew exponentially in the early modern era, and thus, early modern archaeology needs to adopt these sources as part of its research. The multidisciplinary nature of such historical archaeology was noticed years ago (see e.g., Andrén 1997; Haggrén 1998).

Collaboration between disciplines investigating the past, archaeology, and history has been a widely discussed topic in the Finnish research community by both archaeologists and historians (see e.g., Taavitsainen 2005; Haggrén 2011; 2015c; Haggrén & Tuovinen 2011; Savolainen 2011; Seppänen 2015a; Tahkokallio 2016). In 1999, Haggrén (1999: 56, 58) noted that archaeology and history were rarely used in conjunction as sources in doctoral theses in archaeology. Since then, the situation has changed, and in 2010s and early 2020s there are already several doctoral theses and research articles done on the topic of early modern archaeology in Finland (see e.g., Herva 2010; Puputti 2010; Nurmi 2011; Herva et al. 2012; Kallio-Seppä 2013; Kuokkanen 2016; Tranberg 2018; Hyttinen 2021; see also Heinonen 2021 for medieval and early modern villages).

The main difference between history and archaeology is the source materials used. Historians primarily use documents created for administrative or personal purposes, which typically offer precise information. Conversely, in archaeology, the remains left by past human societies, such as ceramics, metal objects, or animal bones, serve as the primary sources. Unlike historical documents, these were not intentionally created to convey information but are discovered by archaeologists. These sources might provide various views of the past, and thus need to be looked at as completing each other's perspective rather than as different answers to the same question. One example is the micro-archaeological approach to studying plot owners and their occupations (see e.g., Pihlman & Savolainen 2019).

In some cases, the research questions may define the sources used.[15] Historians may not consider archaeological materials on their topics. As Haggrén (1998: 102–103) pointed out, they might only use artifacts as pictures in their studies because research can be based only on written sources, and the whole benefit of multidisciplinary studies is not accomplished. Archaeologists must be acquainted with historical maps of their areas already in the preliminary excavation work. In contract archaeology, maps might be the only contemporary source to use, but Finnish urban archaeology offers many examples of how other historical sources are used along with archaeology. Those sources could be, for example, probate inventories, fire insurance policies, and parish registers.[16]

In terms of methods, single-context recording is a matter of course in historical archaeology in the 21st century (see e.g., Kykyri 1999; Saloranta 2003; Lipponen 2005: 18–19). This was not the case before, as past excavation reports and research have shown (see e.g., Kykyri 1985: 21; Mäkivuoti 2005: 86). Stratigraphic methods have been used in Finnish archaeology since the 1980s. For example, excavations of the 'Lake Mätäjärvi' project in the 1980s and the Åbo Akademi plot in the 1990s were accomplished using single-context recording (Pihlman 1989: 66–73; Suhonen 1999). Utilizing the stratigraphic method instead of excavating in 5 or 10 cm layers, as is typical for prehistoric sites, demonstrates a specialization of historical archaeology and a will to improve the methods that are used.

The most common archaeological activity in urban areas is watching briefs or trial excavations (Fig. 2); thus, usually only a small part of the context is simultaneously visible. For example, Kallio-Seppä (2013: 158–159) pointed out the challenges that might arise when variably documented data from urban areas watching briefs are used in research. Kuokkanen (2016: 42) mentions the difficulties in urban archaeological research due to the different documentation methods utilized in the Oulu town area. In the future, materials will most likely be gathered from contract-based watching briefs and excavations like so far.

THE TOWN OF TURKU EXCAVATIONS AS A CASE STUDY TO ILLUSTRATE RESEARCH POSSIBILITIES

The largest urban archaeological excavations in Finland thus far began in 2018 in the Turku Market Square (Uotila et al. 2021) (Fig. 4). The reason behind these excavations was the construction of a parking lot under the market

Figure 4. South quarter of the Turku Market Square excavation area in July 2018. Photo A. Tolvi/ Muuritutkimus Oy.

square area. The total excavated area in the Turku Market Square was approximately 20,000 m2 (Uotila et al. 2021).

In these excavations, it was possible to investigate over 20 town plots that had been sealed under stone paving for over 180 years in a single project, many of which were simultaneously uncovered (Uotila et al. 2021). Town plots dated from the 17th century to the year of the Great Fire of Turku in 1827. Between 2018 and 2021 over 2 800 kg and 44 600 number of finds were collected. (Uotila et al. 2021: 23, 26.)

All documentation was carried out with a total station and in a 3D format based on modern laser scanning technology (Uotila et al. 2021: 10). This made it possible to observe the situation in the field using 3D models, even though the parking lot was in use. Moreover, a single archaeological company worked on this project and oversaw all the documentation during the excavations. Following such unified practices could help solve the problem of documentation accuracies.

Turku Market Square is a relevant example because of its large potential for micro-archaeology in the early modern urban context. Haggrén (1998) already noted this in the 1990s; however, more could be done to try to connect historical written sources from the 18th and 19th centuries with archaeological materials. This excavation provides interesting case study possibilities for further research to valorize materials coming from larger excavated areas. By bringing together archaeological materials and written sources, such as probate inventories, it is possible to create a micro-historical and archaeological overview of inhabitants and their everyday lives in the early modern town area.

Turku was already the most investigated early modern town in Finland, and the excavation of the Market Square area opens new possibilities to compare different town parts. Some of the future research questions could be: Does the Market Square area inhabited in the middle of the 17th century differ from the already inhabited areas of medieval times? Is archaeological evidence about the socioeconomic status of a household from this area showing a similar standard of living as historical written sources?

CONCLUSIONS

Overall, past excavation reports and research on early modern towns in Finland show that before the 1980s, urban archaeology and towns were neither systemically investigated nor the subject of much research. Even when historical archaeology later began to be a growing specialization, the early modern era was less investigated than the medieval period. However, investigations in the early modern era increased in the 2000s. The surveys conducted by the FHA indicated an interest in early modern towns and their development. This helped acknowledge the need to protect the archaeological record of such towns, and excavations conducted due to this law also created archaeological data for further research. The benefits were mainly administrative, but it showed the potential for such research. In the 2000s and the 2010s, several doctoral theses focused on early modern towns were written.

In early modern towns, excavations conducted without the need for construction are rare. Excluding the 1990s and the early 2000s projects in the Old Town of Helsinki, the *Early Phases of Turku* project, and later community archaeology for the Aboa Vetus Museum, there have not been any investigations other than contract-based in town areas. The areas where contract archaeology occurs are not always the most informative. In early modern urban archaeology, the excavated surface seldom covers an entire town plot; therefore, it can be difficult to obtain a clear overall view of an area or the definition of structures. Simultaneously, every excavation destroys the site, and the destructive aspects of archaeology must be considered. Data is gathered from contract archaeological activities. This creates challenges for research, because the quality of the data differs and can be difficult to combine. However, owing to modern documentation methods, it is possible to combine the data from different excavated areas. The modern technology used in documentation can provide further possibilities to analyze data after excavation is completed, but it can also create differences between practitioners because not everyone uses the same methods or equipment.

Tornio stands out regarding the urban archaeology of early modern towns. Although excavations have been conducted by contract archaeology, this is the most studied town. These studies show that research can obtain valuable data from contract archaeology. In the future, similar studies could be conducted in other towns, in which even more investigations have been conducted. Moreover, with critical research questions and different approaches to data from contract archaeological excavations, it is possible to accomplish diverse outcomes, even with these limited resources. Figures 2 and 3 show that in the 2000s, most of the material for research on urban archaeology came mostly from watching briefs; thus, the data for future research is, in many cases, going to be from small separately excavated areas.

In some cases, studies based on contract archaeology excavations of urban sites and surveys have been published. Publications about such excavations not only benefit other researchers, but also all audiences interested in archaeology. Without publications, information about excavations is available only on the FHA websites. Individual reports are not always easy to find and not all are added to the database. Other potential issues could be finishing the available funding in the middle of fieldwork or having several years of delay in post-excavation work, such as cataloguing the finds and writing reports. Unfinished post-excavation work prevents scholars and students from working with the material, even if they have the ambition and funding to do so.

Although some large archaeological survey projects have taken place in towns, generally as part of infrastructure or construction projects, such contract archaeology has not always been followed up with further analysis. The town of Turku is discussed as a recent example of what possibilities there can be, as basic information has already been published (Uotila et al. 2021), and more research is ongoing in the coming years.[17] As Niukkanen (2008: 33) pointed out, this reflects how research and publishing should be conducted immediately after excavations take place - or it might not happen at all. However, this raises more questions than answers. If there is no funding for further research, and practitioners in the field need to excavate site after site, when, and even more importantly, with whose money are these analyses, research, and publishing to be conducted?

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NOTES

[1] In this paper, the term contract archaeology is used for the Finnish term *tilaustutkimus*. Contract archaeology means that archaeologists conduct an archaeological excavation of an archaeological site before construction starts. The term research excavation is used for the Finnish term *tutkimuskaivaus* when archaeological site is excavated only for scientific reasons and not because of land use or construction.

[2] Rescue excavation is used for the Finnish term *pelastuskaivaus*, which means that an archaeological site was found during construction activity and was not known beforehand. Rescue excavations in Finland are rarer than contract archaeological excavations.

[3] The law, which is already 60 years old since it was first decreed in 1963, is now being updated. Information on this process can be found on the website of the Finnish Ministry of Education and Culture.

[4] In Finnish *Kiinteät muinaisjäännökset ovat rauhoitettuja muistoina Suomen aikaisemmasta asutuksesta ja historiasta*.

[5] Previously known in English as the National Board of Antiquities (NBA), but in this article, the current name, the Finnish Heritage Agency (FHA), is used.

[6] For information and archaeology see also Majantie (2010)

[7] In this paper, the term early modern town is used for post-medieval towns founded in the Vasa period (1520–1617) or the Great Power era (1617–1721). The definition of medieval is not discussed in this paper, but it uses the commonly accepted time limit for the medieval period in Finland, from 1150 to 1520. Medieval towns: Turku, Ulvila (deserted), Porvoo, Viipuri (today in Russia), Rauma and Naantali. Vasa period towns: Tammisaari, Helsinki, Pori, Oulu, and Vaasa. The Great Power era towns: Uusikaupunki, Käkisalmi (today in Russia), Taipale (deserted and today in Russia), Kokkola, Uuskaarlepyy, Tornio, Salmi (deserted and today in Russia), Sortavala (today in Russia), Hämeenlinna, Savonlinna, Lappeenranta, Raahe, Kristiinankaupunki, Kajaani, Brahea/Lieksa (deserted), Kuopio, Pietarsaari, Vehkalahti/Hamina and Kurkijoki (deserted and today in Russia). Between the years 1722-1800, three more towns (Loviisa, Tampere, and Kaskinen) were founded.

[8] Commercial archaeology and competitive tendering are topics that have been discussed in Finland since the 2010s (see e.g., Haggrén 2015a; 2015b; Arkeologiayritykset ARKY ry 2015).

[9] Until 2009 known as the Turku Provincial Museum, this article will use the current name of the Turku Museum Center.

[10] The information used in the figure was gathered from Kyppi using the following four criteria: search criteria: theme = towns, type of research = excavation; search criteria: theme = towns, type of research = survey; search criteria: theme = towns, type of research = trial excavation; search criteria: theme = towns, type of research = watching brief.

[11] Some of the reports can be found on the FHA asiat page (https://asiat.museovirasto.fi/home).

[12] All excavations in the town area of Turku before 1984 are listed in the report *Medieval Towns 3: Turku* (Pihlman & Kostet 1986; see also Seppänen 2012: 8–16; Niukkanen 2004: 26–27).

[13] Regarding excavations in Helsinki before 2004, see Niukkanen (2004: 29).

[14] For example, a historian, Reinhold Hausen, oversaw archaeological excavations at Kuusisto bishop's castle in the 1880s (see Hausen 1881; 1883).

[15] For example, historian Panu Savolainen stated in his doctoral thesis about public and private spaces in Turku 1740–1810 that he did not use archaeological material as a reference since he was focusing mainly on later decades than archaeological research (Savolainen 2017: 32).

[16] For Turku, see Tuovinen 2010; Uotila et al. 2021; For Tornio, see Herva & Ylimaunu 2010; 2006; Ylimaunu 2007; Herva et al. 2012; For Oulu, see Kallio-Seppä 2013; Kuokkanen 2016; and especially fire insurance policies used together with archaeology, see Kovalainen 2005; For Lahti, see Poutiainen & Uotila 1999; Seppänen & Takala 2022.

[17] In Uotila et al. 2021, the possibility of following publications on the excavations in the Turku market square is mentioned. A wide range of ongoing research was presented in a seminar about research on excavations (*Uuden Torin kantilla – Kauppatorin arkeologisia tutkimuksia 2018–2022*) held in the castle of Turku on 21 January 2023.

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CEMETERY CONSIDERATIONS – THE CASE OF CAIRN 4 AT NOKIA VIIK, FINLAND

Abstract

Finnish cairn sites are typically defined through the concepts of 'grave' or 'cemetery', their main purpose being associated with burials. However, when one examines cemetery-related contexts in Iron Age Finland, they exhibit a great deal of variation with regard to the existence of interments, how they can be identified, and how they correlate with other finds. The case study, a re-examination of Cairn 4 at Nokia Viik, excavated in 1986–1987, illustrates some of these issues. With a focus on understanding the chronology, osteology, formation, and more detailed spatial character of the cairn, it is revealed that the monument has been accumulated over several centuries and includes elements that cannot easily be explained as individual burials or even cremation remains in a collective grave context. The site's timespan extends from the Late Roman Iron Age and the Migration Period to the Merovingian Period and the Viking Age, where especially the latter periods seem to include deposited materials not related to any actual or distinguishable funerals. One major issue addressed is how to interpret complex structures, where distinct burials are difficult to define, and human remains only occur as one component.

Keywords: burial, cairn, cemetery, cremation, Iron Age, osteology, radiocarbon dating

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INTRODUCTION

It is a widely known issue that Iron Age cemeteries have complex, long-term formation histories. From a practical point of view, a burial is an event, but it also contains aspects that go beyond the actual funerary ceremony. The process of burying is related to both the past and present, as well as a supposed or desired future, making it fairly multifaceted. Mortuary practices involve not only cultural/societal norms but also the intentions of the people left behind who needed to seek out new roles for themselves – their arrangements could have had an impact before, during, and after the actual interment or other final treatment of the body of the deceased.

The formation of a burial ground or cemetery consists of a series of events, which provides each site with a complex history in terms of its chronology, spatial characteristics, and the rituals performed. Embedded in the formation process of cemetery sites is the potential performance of rituals between funerals. Some have discussed the possibility of cemetery sites being used for a variety of rituals – related to not only mortuary practices but also domestic/everyday rituals. In addition, due to different processes and practices, the displacement of cemetery material is another possibility worth considering.

One way of furthering the understanding of various uses for different sites, and the diversity in their types, is to analyse cemeteries and their archaeological material in closer detail. It is important to acknowledge the whole material in its context, in addition to merely placing emphasis on the presence of human bone.

A re-evaluation of the archaeological material from Cairn 4, an earth and stone mixed cairn excavated between 1986 and 1987 at the Nokia Viik site in Finland, presents the opportunity to discuss these themes in further detail. An osteological analysis of the bone material was conducted after the excavations, but, for the purposes of this study, we have further elaborated the identification of the animal bones and analysed a small amount of the bone that was left unanalysed in the original research. We also examined the metal finds and pottery material in closer detail, reassessed the site's find distribution, and created a more detailed chronology that combines object data with new radiocarbon dates of the bone material and pottery. We focused on the chronological formation process of the cairn, as well as on its interpretation as a burial or ritual cairn in terms of its deposition patterns.

BACKGROUND

The concepts of cemetery, cremation burial, and grave

From a contemporary point-of-view, a cemetery is a burial ground, more specifically a graveyard, i.e., a distinct burial space. In Europe, this form of burying has its roots in prehistory (e.g., Snodgrass 2015), but it became more organized during the Middle Ages. The form of the graveyard as we experience it today was established in the late 18th and early 19th centuries (Anthony 2016). In Finnish archaeology, the concept of cemetery (in Finnish *kalmisto*) is commonly used for sites and monuments that contain burials or have been interpreted as probable burial sites. In official ontology, the definition encompasses sites/locations containing multiple (or collective) burials, often dating before the spread of Christianity.[1]

Cremated archaeological human remains, as well as their deposition and interpretation, are topics that have received much discussion (e.g., Appelgren & Renck 2007; Schmidt & Symes 2008; Kaliff & Østigård 2013; Röst 2016; Williams et al. 2017; Therus 2019). Many researchers have also elaborated further on the more specific challenges related to the identification, definition, and interpretation of burials and cemeteries (cf. Asplund et al. 2019: 84, with references). Wessman (2010: 29–30; cf. Wessman & Williams 2017) has previously discussed the definition of the term 'grave' in Finland. It has been pointed out that some deposits have been interpreted as graves without detailed analysis of the quantity or quality of the present bone material. Indeed, sometimes the presence of a single fragment of human bone has been enough to define a grave-like structure as a grave (Taavitsainen 2003: 33), while in other sites, the existence of larger collections of human bone in a structure has not merited the same interpretation (Raike & Seppälä 2005: 65). In addition, some have attempted to identify burial events, and thus individual graves, on the basis of clusters of bone and/or artefacts, even if the burial form in cremation cemeteries under level ground is generally considered collective (Formisto 1996; Heikkurinen-Montell 1996; Hietala 2003). The terms 'cemetery', 'cremation burial' and 'grave' have seemingly been applied to a wide variety of sites and features, the interpretations of which are based on their structures or the presence of human bone (cf. Muhonen 2009: 295).

One definition for 'burying' is placing the dead in a 'burial site' that has been designed to last for a generation or more, as a reminder to

future descendants of their ancestors (Herschend 2009: 37; Lang 2011: 110). If moving from the material content and physical structure of graves towards the process of burying, Thereus (2019: 410) defines the archaeological notion of burial customs as 'all collective practices, often of a rite of passage nature, associated with a deceased person's remains, memorial, or remembrance, which have left material traces.' With regard to the 'burial' concept, instead of seeing it in a functionalist perspective as 'simply a container for the corpse', it is identified as an expression of commemorative practices established in society (Thereus 2019: 412).

Quantities of cremated bone material

In Finland, the small quantity of burnt human bone present in graves or cemeteries has often not been considered problematic (Wessman 2010: 29). Finland's typically acidic soil is poor for the preservation of unburned bone and, perhaps because of this, the presence of small volumes of any type of bone material is usually considered to represent the norm. However, after cremation – be it of the modern or ancient kind –, a considerable amount of human bone should still be present and osteologically identifiable – up to 30–140-mm fragments and with a 99% rate of element identification (McKinley 1994a; 1994b, Plates II-VI; 2013: 163–64). Modern cremations typically result in 1600–3600 g of bone material, with an average of 3000 g (McKinley 1989: 66).

The amount of bone in archaeological deposits is affected by the recovery rate from the pyre site, the deposition and handling of the bones, the destruction in the soil, and archaeological recovery methods (McKinley 1989; 1994a). Jaqueline McKinley (1989) has stated that, in archaeological contexts, the weight of bones from single adult cremations seem to vary between 200 and 2000 g, with an average of 800 g. These figures are in line with Finnish cremation urn or cremation pit burials. In the Early Roman Iron Age cemetery site Kärsämäki in Maaria, the depositions interpreted as single adult cremation burials range from 5 g (KM 12686:89) to 1955 g (KM 8773:895, adult male), most falling within the range of 300–1000 g (Lahtiperä 1973).

Bones, ritual, symbolism

Even if the amount of bone material in Finnish archaeological burial sites is often low, it is evident that there is a lot of variation in the amounts of burnt human bone. This is the case in other areas as well (cf. Thereus 2019: 210–211). Small amounts of burnt human bone should not be considered the default, but rather a phenomenon that ought to be discussed with reference to ritual and taphonomic contexts. In the context of Finnish cremation burials, the possibility that the small amount of bone material could be due to deliberate partial burials ('token burials') has received some discussion (Taavitsainen 2003: 33; Tourunen & Troy 2011; Saipio 2017), but not in depth. A token (memento, symbolic, nominal) burial is a challenging term to define, but it is still a concept that is often used when discussing the deposition of burnt human remains (Andesson 2008; Kaliff & Østigård 2013: 79; McKinley 2013: 154).[2] In our article, we recognize the possibility of deliberate partial burials, i.e. burials where the deposited bone material intentionally contains only part of the whole cremation. We acknowledge that identifying and interpreting the purpose behind past action is challenging. However, repeating patterns of deposition, in this case in mortuary and other ritual practices, offer the possibility of studying these past intentions (cf. Andersson 2008: 112).

In a study of Iron Age (ca. AD 300–700) burnt bone deposits from the Lunda site in Sweden, Gunnar Andersson (2008) discusses the distinguishing factors of grave deposits and grave-like structures used for offerings. According to Andersson's interpretation, part of the burial pattern in the Lunda cremations, dating from the 7th and 8th centuries AD, was to deposit part of the human bone material to some separate place, leaving only part of the total bone material for the main burial. According to Andersson, the modern concept of a grave is perhaps not applicable to prehistoric contexts – instead, we should focus our discussion on more general ritual behavior and depositions.

The questions related to the presence of low amounts of bone are not restricted to the Late Iron Age. In Eastern Sweden, for example, Late Bronze Age graves often contain only small

amounts of bone (Röst 2016). This continued in the Early Iron Age, when the variation of the number of bones is so striking that it cannot be just a coincidence (Appelgren & Renck 2007: 40). With respect to the Bronze Age in Finland, there have a long time been discussions on how the cremated bones in cairns from the period could be interpreted. The related issues include, for example, the small amounts of bone found and whether they should be treated as mere burials or as sites that also involve other meanings related to, for example, the cairn as a manifestation of a place and the symbolic control over its areas and landscapes. The bones of ancestors may have been used to connect a place with a kin group or tribe – thus actually being built primarily for the living and not for the deceased (Asplund 2008: 77–79). Accordingly, Jarkko Saipio (2017: 227) emphasizes the possibility that burnt human bone remains in Finnish Bronze Age inland cairns could derive from a variety of rituals, not all funerary in nature.[3] There is a variation in the amount of human bone material recovered from cairns, ranging from one fragment to several hundreds of grams per individual (Vormisto 1985; Saipio 2017: 227). However, the quantification and comparison of this variation is challenging, due, e.g., to varying taphonomic factors affecting the demise of the bone material.

Osteological analyses of human bones in Early and Middle Iron Age cairns in Finland

While burnt human bones have previously been recovered from several cairns or other stone structures dating to the Roman Iron Age or Migration Period, osteological analyses and radiocarbon dates of the burials or burial-related artefacts are scarce. However, the analyzed cairns exhibit variation in the amount and distribution of finds and bone material. Providing an exhaustive list of all available cairns is not within the scope of this article, but the following sites are examples selected to represent the variation found in cairns dating to the Early and Middle Iron Age.

Only a meagre amount of human bone material has been identified in some Iron Age burial cairns. In the cemetery site of Naarankalmanmäki, located in Lempäälä, ca. 20 km SE of the Viik site, two radiocarbon dates have been made from the charcoal found in Cairn 3. One gave a result to the Bronze Age (1492–902 calBC) and the other to the Late Roman Iron Age (calAD 234–541), of which the latter is considered more indicative of the age of the burial (Raike & Seppälä 2005: 64). Here, 124 g of burnt bones of a child and pottery fragments were recovered from a tight cluster near the central stone (Raike & Seppälä 2005: 49, 77). Two radiocarbon dates are also available from Cairn 5, the first one from a cereal grain (calAD 183–538) and the second one from the organic crust of a potsherd (calAD 260–602). This cairn included ca. 53 g of burnt bone. Most of the bone belonged to a child, but one elk bone was also found. The bones were found scattered in the cairn. Most of the finds consisted of pottery and iron slag, leading to the conclusion that the structure represented a sacrificial cairn instead of a burial (Raike & Seppälä 2005: 65, 77). In the latter case the potential complexity of the monument could be considered, i.e., the possibility of both a burial and other ritual activity. It is possible that cairns have not necessarily been specifically graves or sacrificial cairns but have had different functions during their time of use (cf. Moilanen 2015: 36).

The analysis of bone material from the Päivääniemi cemetery, also in Lempäälä, belonging to a partially excavated burial cairn resulted in the recovery of just ca. 100 g of burnt bone (Formisto 1987; Katiskoski 1987). The bones were found together with bronze jewelry and pottery fragments in a concentration at excavation layers three and four. The bone material consisted of human bone from at least one individual and four bear claws (Formisto 1987). However, most of the pottery was recovered outside of the burial cluster, scattered around the excavation area (Katiskoski 1987: 8). The artefacts found in the cairn date to the Late Roman Iron Age (ca. AD 200–400) and to the Merovingian period (ca. AD 600–800).

A Late Roman Iron Age cairn in Ketohaka 2 site in Salo, Southwest Finland, exhibits a different burial pattern. Here, ca. 19 kg of burnt bone belonging to at least 19 individuals – 18 adults and one infant – was identified (Hirviluoto & Vormisto 1984). The bones, along with various artefacts, such as bronze jewelry, knives, and a spearhead, were concentrated in a sooty layer ca. 40 cm in thickness. No pottery or

animal bones were found in this cairn. Several individuals and a total of ca. 21.7 kg of burnt bone were also recovered from the excavations of a cairn in Sotkalinna site in Nokia, dating to the Merovingian Period and possibly the Viking Age (Hakanpää 1996; 1997). The analyzed bone material (15.9 kg) was comprised of bones from at least five human individuals, as well as bear claws and sheep or goat bones (Fisher 1997). The bone material was found clustered on the western side of the cairn. However, the distribution of the pottery and burnt clay did not follow the distribution of the burnt bone (Hakanpää 1996; 1997).

Complex formation processes

Iron Age cemeteries and cairns in Finland often have complex formation histories that are increasingly emphasized by the growing number of radiocarbon dates from the sites. It has been suggested that remembrance rituals, offerings, using sites as waste heaps or ritual deposition of domestic waste are responsible for the accumulation of finds, and that these may have been contemporary in nature or have occurred later than the initial burials (e.g., Taavitsainen 1992; Muhonen 2009; Mäntylä-Asplund & Storå 2010; Wessman 2010; Asplund et al. 2019).

A study of an earth and stone mixed cairn at Roismala Ristimäki site in Sastamala emphasizes the potential complexity of depositions in a site that has primarily been interpreted as a single formation event (Asplund et al. 2019). In this case, an inhumation burial was radiocarbon dated to the Late Roman Iron Age. However, from the cairn above the inhumation burial, a cluster of unburned human bone was dated to the end of the Pre-Roman Iron Age or to the Early Roman Iron Age, as well as pottery and animal bone to the Migration Period and the Merovingian Period. The latest date was given to a partial sheep skeleton at the bottom of the cairn. The results emphasize the complex formation process and several construction phases of Iron Age cairns, involving secondary deposition of a variety of materials, including – evidently reburied – old human remains.

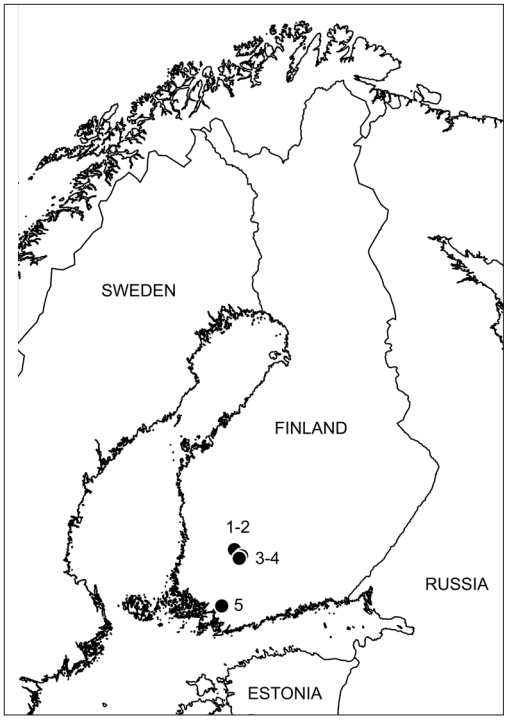

Figure 1. The location of Nokia Viik and the other sites referenced in the text: 1) Nokia, Viik, 2) Nokia, Sotkanlinna, 3) Lempäälä, Naarankalmanmäki, 4) Lempäälä, Päivääniemi and 5) Salo, Ketohaka. Map: H. Asplund.

CAIRN 4 AT NOKIA VIIK – MATERIAL AND RESULTS

The Nokia Viik site and its previous interpretations

Already in the late 19th century, late Iron Age objects were described from the area of Viik Manor (Heikel 1882: 52–54), but the exact locations of the sites of these finds are not clear. The actual Viik site (Fig. 1) was first registered in an archaeological survey of the municipality of Nokia in 1948.[4] Five burial mounds were identified at the time (Erä-Esko 1948: 22). A survey in 1985 described four of them (Renvall & Salo 1986: 35–36). Further investigations in 1999 indicated a somewhat larger number of structures, with a total of eight (Haimila & Taavitsainen 1999: 5–6). The first (1986–1987) excavated structure was Cairn 4, according to the latest numbering

(Haimila & Taavitsainen 1999: 6).[5] Cairn 3 was excavated in 1988 (Pietikäinen & Salo 1989) and cairn 7 in 1999. Furthermore, a test pit was dug in the center of Cairn 8 (Haimila & Taavitsainen 1999). In this study, Cairn 4 was chosen for closer examination to analyze and understand the monument more comprehensively than before.

The total excavated area of Cairn 4 is 160 m^2 in size (Koivisto & Salo 1988: 3; Koivisto 1991: 31). The construction has been described in many ways, such as 'great mound' (in Finnish *suurkumpu*) (e.g., Koivisto & Salo 1988: 3), but already during its excavation, it became apparent that the monument consists of several parts (Fig. 2).[6] The main structure excavated in 1986 (in the northern part of the complex) has been interpreted as a Migration Period burial cairn with a central stone and a surrounding stone circle (Renvall & Salo 1987). An earthen mound (without any stones) was added to it at a later period in time. Furthermore, according to the excavation report, the complex was later extended to the east and south in the form of a construction resembling an underground cremation cemetery.

The conclusion of the 1986 excavation was that the complex represented a rare 'extended burial mound' in which several burials had been made.[7] Two to three separate burials were distinguished, and it was considered likely that the cairn with a stone circle contained the remains of one male burial (even though the finds were distributed all around the area). However, no concentrations of bone were detected, and the amount of burnt bone was low in general (Renvall & Salo 1987). One further burial, now based on the concentration of bone, was identified in excavation squares 102–104/98, though no objects could be linked to the burial (Renvall & Salo 1987). A third burial was recognized as a separate stone setting in the eastern part of the excavated area. Here, a knife, a glass bead, two clay beads, as well as a fragment of a bracelet were found, likely indicating a Viking Age female burial (Renvall & Salo

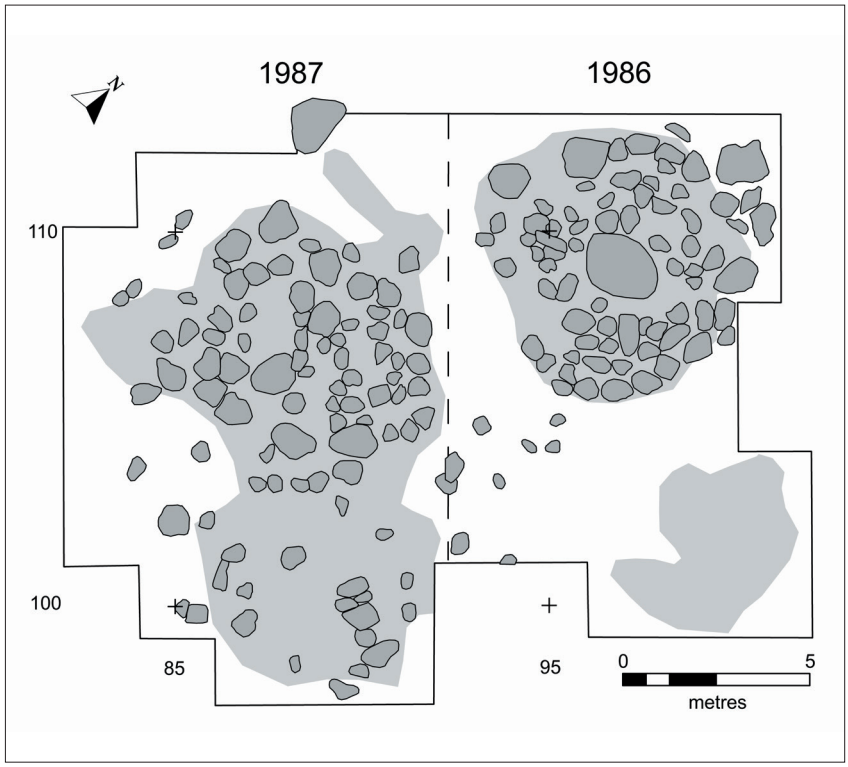

Figure 2. Main stone constructions of Viik Cairn 4 as documented in layer 4 of both excavations, except for the separate stone setting in the eastern part of the 1986 excavation area, best visible in layer 1. Gray shading represents areas with smaller stones. Map: H. Asplund and S. Salomaa.

1987). These examples illustrate the problem of defining a grave – evidently, it can be based on the occurrence of bones and/or supposedly burial-related artefacts.

The main structure, excavated in 1987 in the southwestern part of the complex, was a roundish cairn surrounded by stones partly bigger than in the rest of the cairn, but still did not likely indicate a bordering stone circle (Koivisto & Salo 1988: 18). Looking at some of the excavation maps, one could also interpret this as a rectangular structure. Based on the metal objects found, the construction of this cairn began in the Late Roman Iron Age, but the site was used also in the Migration Period. A couple of secondary stone settings were impossible to date accurately, but there was nothing to suggest that they would be considerably younger (Koivisto & Salo 1988: 19). One secondary stone setting in close connection with the cairn suggested at least one burial, based on some finds (a knife, a fragment of a sickle, three arrowheads, and a ring made of thin bronze thread) (Koivisto & Salo 1988: 18).

According to the interpretations of the excavations made in 1986 and 1987, Cairn 4 (the combination of separate stone and earth mixed constructions) could be dated from the Late Roman Iron Age to the Viking Age (Koivisto & Salo 1988: 19; Koivisto 1991: 33). The archaeological identification of individual burials proved difficult, but the cairn was estimated to contain several interments, which is supported by an osteological analysis where a minimum of three individuals was identified. However, the distribution of the bones suggested, that both main structures could have contained at least three burials (Koivisto 1991: 33). The assumed purpose of the earthen mound between the two cairns was that it serves to unite the two cairns into one big mound. According to field observations, a further

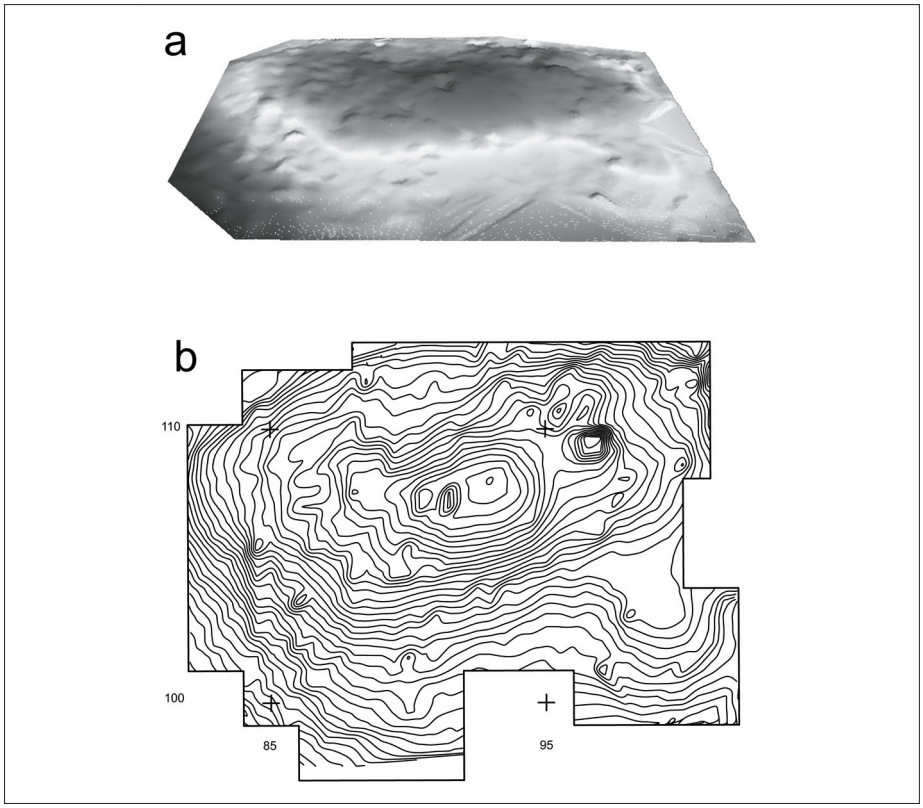

Figure 3. Nokia Viik, Cairn 4, modelled using leveling data, depicted as a) 3D model and b) contour lines. Map: H. Asplund.

one peculiar detail is that nothing pointed to an Iron Age dating of this uniting mound (Koivisto & Salo 1988: 20).[8]

Even though the appearance of the mound might have seemed prominent, the height of the monument could not have been more than one meter, based on the leveling readings from the topsoil and the bottom of the lowermost excavated layer. A 3D model made using levelling data in connection with this study reveals that the mound is not symmetrical and that the topsoil of the excavated areas displays a more complex change in elevations. The mound-like appearance, however, is clearly visible, as is the center stone of the structure excavated in 1986 (Fig.3).

Contrary to Cairn 4, the other excavated cairns at the site contained a more limited number of finds. Cairn 3 does not seem to be related to any Iron Age activities at all.[9] Cairn 7, excavated in 1999, was clearly intentionally built, but the minor amount of bone present puts into question whether it represents an actual burial monument. The cairn has been interpreted as a possible ritual burial or sacrificial cairn, or even some kind of waste heap (Haimila & Taavitsainen 1999). The main parts of the finds consisted of ceramics (67.8%), followed by slag and quarts . Only eight pieces of bone (7.5 g) were found (Haimila & Taavitsainen 1999: 13).

Reanalysis of the metal objects

Several metal objects have been found in Cairn 4. They consist of jewelry, tools, and weapons as well as unidentifiable iron and bronze fragments. Majority of the metal artifacts are from the stone structure excavated in 1987, consisting mostly of jewelry and iron arrowheads.[10] There are also some arrowheads in the stone structure excavated in 1986 and only a few are outside of these structures. The same applies to the jewelry, which was mainly found in or close to the stone constructions (see the section on spatial analysis, below). Other tools and weapons appear also outside of these structures.

In the stone structure excavated in 1986 two objects are of special interest. A socketed axe without eyelet (TYA 426:32) and a spearhead (TYA 426:31) were found together underneath the central stone of the structure, and therefore represent a single assemblage. Similar spearheads in Finland have been dated to the Migration Period (Salmo 1938: 192; Kivikoski 1973: 52). Socketed axes without eyelets were common in the Early Roman Period and remained in use up to the Merovingian Period (Salo 1968: 163–164; Asplund 2008: 246). It is probable that these objects date the structure to the Migration period, since it is unlikely that objects could have been added under the central stone several times.

In the stone structure excavated in 1987 several datable objects were found. They originate from the bottom layers of the structure, dating mostly from the Late Roman Iron Age to the Migration Period.

Several finds of jewellery were found in this stone structure. The crossbow fibula with a tendril foot (TYA 426:6; Fig. 4a) represents a common type of crossbow fibula in Finland (cf. Keskitalo 1979: 151–159). Fibulae of this type are typically found in an area that encompasses large portions of Scandinavia and Central and Eastern Europe. These were in use from the beginning of the Late Roman Iron Age to the early Migration Period (Godłowski 2011: 75–77; Heynowski 2016: 89). The closest parallels (type A161) date from the early to mid-Late Roman Period (Nowakowski: 1998: 52; Heideman Lutz 2010: 156–157).

The crossbow fibula with a straight foot (TYA 426:5; Fig. 4b) is a simple variant of this group. Previous examples from Finland have been discovered in regions of Ostrobothnia, Satakunta and Finland Proper (Keskitalo 1979: 166–167). The closest parallels (type A170) can be found from Gotland, Öland and Bornholm in Sweden and Denmark (Keskitalo 1979: 167). These date from the early to mid-Late Roman Period (Heideman Lutz 2010: 164).

The cross-ribbed fibula (TYA 426:2; Fig. 4c) represents a Finnish variant of a type that has been developed from Estonian and Latvian examples. These are heavily concentrated in the region of Ostrobothnia (cf. Moora 1938: 94–97; Meinander 1950: 74–75; Hauptman 1998: 169–170, Abb. 13). The Finnish finds originate from the early Migration Period (Meinander 1950: 75, 80).

The first crossbow fibula with a triangular foot (TYA 426:4; Fig. 4d) is a simple variant with few parallels from Finland (Keskitalo 1979: 184–185). Similar brooches have been found in Öland and the Baltics, but the form seems to represent a local development (Keskitalo 1979: 185). The Finnish examples date to the transition of the Late Roman and Migration Period (Keskitalo 1979: 185).

The other two crossbow fibulae with triangular foot (TYA 426:1, 3; Fig. 4e-f) also represent local developments, and they are well known from the region of Ostrobothnia. The form was influenced by fibulae designs from Gotland and the Baltics (Meinander 1950: 84). Most of the Finnish fibulae date to the early Migration Period (Meinander 1950: 85).

In addition to these, other pieces and fragments of jewelry have been found in Cairn 4: two copper alloy bracelets (TYA 426:11, 12) that have parallels from the Late Roman Period (cf. Keskitalo 1979: 220, 222–223) and a broken copper alloy neck-ring with thickened ends (TYA 426:14) that has Late Roman Period parallels from Finland (cf. Kivikoski 1973: 48).

There are also several datable weapons and tools from the stone structure excavated in 1987. There were four arrowheads (TYA 426: 21-22, 26, 28; Fig 4) in the construction dating roughly to the Late Roman and Migration Periods (Hiekkanen 1979: 67; Koivisto 1991: 33). One arrowhead is a barbed type (TYA 426:24; Fig. 5), which represents Hiekkanen's group 3GII. This type is rare in Finland, as only a few finds have been discovered in regions of Uusimaa, Satakunta, Häme, and Central Ostrobothnia. The earliest one is from a site dating to the Early to Late Roman Period, while the youngest site dates to the Migration Period (Hiekkanen 1979: 69–71). There is also

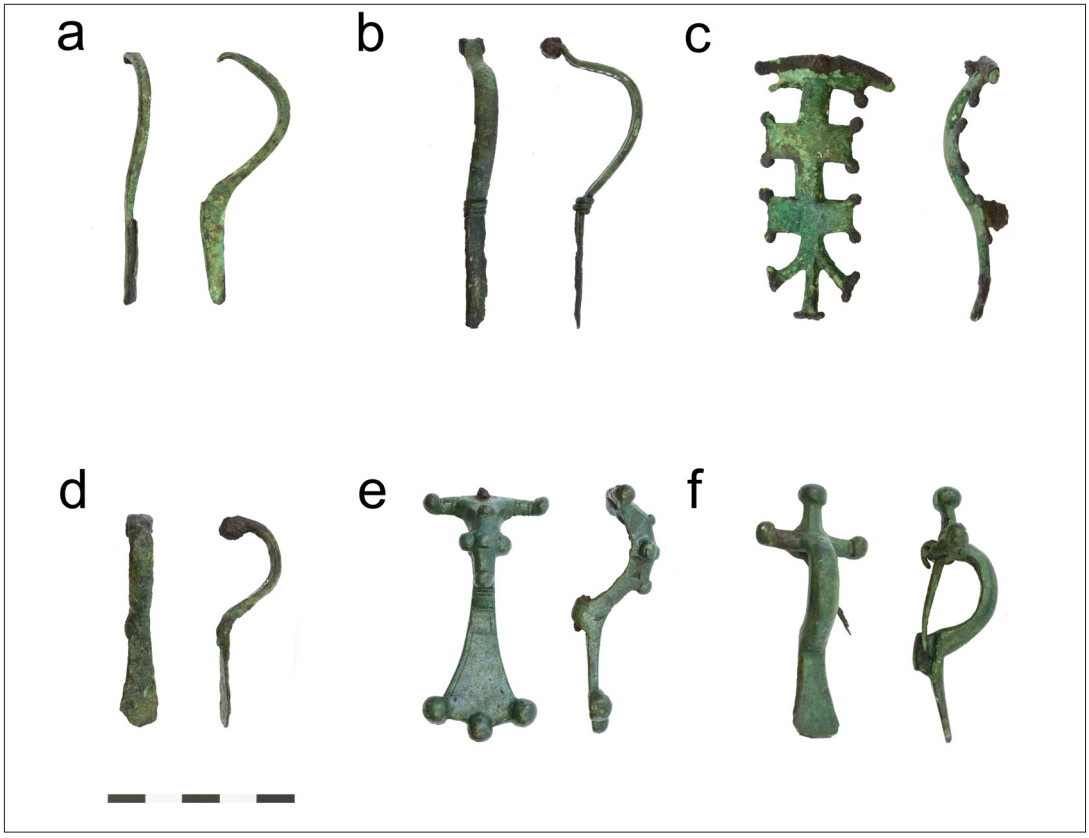

Figure 4. Fibulae form Nokia Viik, Cairn 4. Photo: S.-V. Härmä.

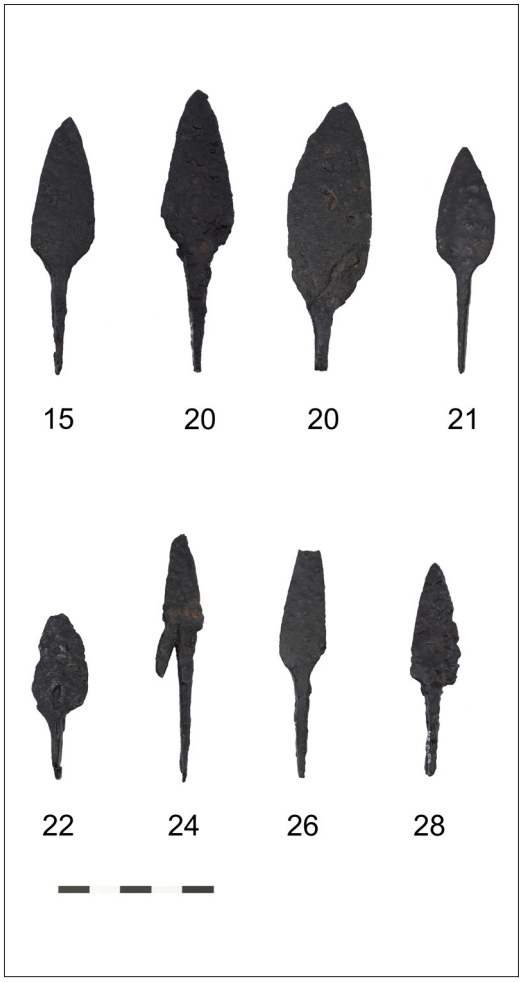

Figure 5. Examples of iron arrowheads from Nokia Viik, Cairn 4. Numbers refer to the find catalogues TYA 337 (the two arrowheads top left) and TYA 426. Photo: S.-V. Härmä.

a socketed axe without eyelet (TYA 426:33) dating from the Early Roman Period up to the Merovingian Period (Salo 1968: 163–164; Asplund 2008: 246).

Outside of the main stone structures only a few datable objects have been found. These include three iron arrowheads (TYA 337:15, 20; TYA 426: 20) dating to the Late Roman and Migration Periods (Hiekkanen 1979: 67; Koivisto 1991: 33), an oval fire striker (TYA 337:6), the earliest examples dating to the late Merovingian Period, and being common in the Late Iron Age (Kivikoski 1973: 88) as well as a blue glass serial bead (TYA 337:5) dated to the Viking Age (Koivisto 1991: 33) from the low stone structure excavated 1986.

In addition to these, Cairn 4 featured a wide assortment of fragmented iron artefacts and finds more difficult to date. The better-preserved examples include three knives and one broken knife blade, two clay beads, four finger-rings, and two copper alloy spirals.[11]

Analysis of the pottery material

According to the rim pieces, the area excavated in 1986 contained fragments from at least 15 different pots (Salomaa 2020). Nine of them are crude tempered, with over 2-mm-sized crushed stone in the paste. Six are fine tempered, with sub-2-mm-sized crushed stone. All the pots are undecorated, and their surfaces have been smoothed. According to the shape of the rim and variation with regard to the temper used, the material consists of small fragments from different pots – none of the pots come close to accounting for an entire vessel. In two different pots (numbers 1.6 and 1.7), a couple of rim pieces fit together, but the rest are connected only in resemblance.[12] Most of the pots are s-profiled (9 pots), but there are also pieces from pots with straight profiles (5 pots), as well as one pot with an inward-turning rim.

In the area excavated in 1987, pieces from at least 17 different pots were found (Salomaa 2020). Of these, ten are crude tempered and eight fine tempered. Most of the pots from this area are undecorated with smoothed surfaces, excluding one pot (number 2.1) belonging to the Morby Ware type of Early Metal Period ceramics (Meinander 1954: 173–179; 1969: 40–47; Edgren 1969; 1999: 313–317; Asplund 2008: 210–213). Again, only a few pieces from each pot were recovered, with none coming even close to accounting for a whole specimen. In addition, the pieces from just two pots (numbers 2.4 and 2.10) actually fit together. Nine of the pots have an s-profiled rim; the rest feature a straight profile (6 pots) or an inward-turning rim (3 pots).

A comparison of the pieces of different pots from both areas reveals that, in seven cases, the pieces could have originated from the same pot. In this case, the minimum number of different

pots in the total excavated area is 24. However, the pieces from different areas do not fit together.

The only typologically identifiable ceramic type is Morby Ware, represented by fragments from at least one vessel. This coarse pot features a striated surface and is decorated with imprints, also on the top of its rim. Crust from one fragment of this particular pot was radiocarbon dated to the Late Bronze Age or (more probably) the Early Iron Age (see the chapter on chronology). These fragments have been interpreted as occurring in a secondary context and may have ended up in the monument during some phase of its construction (Koivisto 1991: 33). One small piece of pottery with pit decorations (TYA 426:243), most likely representing the same type, was found from a test pit dug in the vicinity of the main excavation area (Koivisto & Salo 1988: 16).

Most of the crude-tempered pots could be common Iron Age ceramics, used mainly in everyday contexts (Carpelan 1980: 193; Enqvist 2005: 98–99). This follows the general interpretation made in the excavation report of the 1987 material, according to which the majority represented coarse, undecorated pottery typical for the Iron Age (Koivisto & Salo 1988: 16). The fine-tempered pots, although carefully made, are not decorated or polished and thus cannot be linked to the finer ceramics occurring during the Late Iron Age in Finland (cf. Lehtosalo-Hilander 1982: 76–84). The pieces are so small that no orifices could be measured. However, with regard to the thickness and shape of the rim, some of the pots differ from one another, and it is likely that they have been used for different purposes (Fig. 6).

In the report of the 1987 excavation, it was noted that some large concentrations of pottery were found, but no pots broken in situ (Koivisto & Salo 1988: 16). According to the re-examination, this also applies to the 1986 excavation. The material in total is quite fragmented, with an average sherd weight of 3.8 g. In layers 1–4, pieces of ceramics occur both in the earthen mound and in the stone structure excavated in 1987. In layers 5–6, the pieces occur in the stone structure, whereas in layers 7–9, they only appear in the earthen mound in the middle of the complex. However, the stone structure excavated in 1986 featured markedly less or even hardly any pottery. Although no

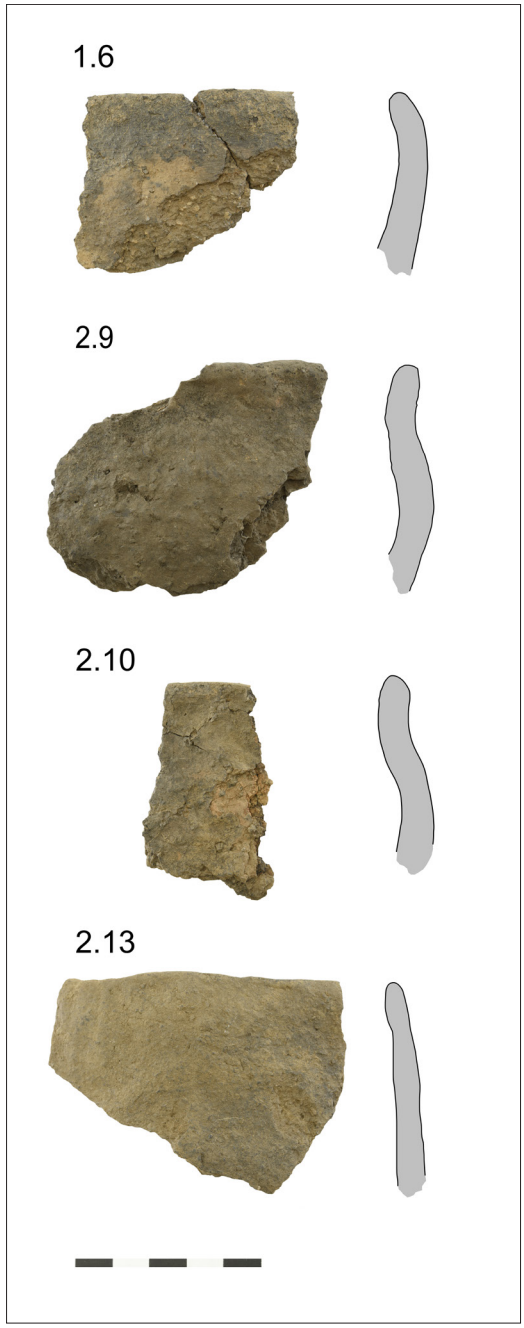

Fig. 6. Examples of pots found in Nokia Viik, Cairn 4. Each identified pot has its own number that was given during the ceramics analysis process. Pictures and descriptions of each identified pot can be found in the ceramics analysis report (Salomaa 2020). Photo: S. Salomaa and S.-V. Härmä.

whole vessels were put into the complex, the spatial distribution suggests that there was some intention or depositional reason behind the distribution of the ceramics.

The two dated potsherds representing the Late Iron Age (TYA 337:147 and TYA 426:155) are from two different parts of the monument – square 104/92 in layer 4 and square 104/84 in layer 4, respectively. While these pieces date to slightly different periods of the Late Iron Age, they were found in the same layer. Furthermore, some of the fitting rim pieces were discovered in very different locations, suggesting that later disturbances affected the material in the complex and caused the ceramics that had been added in different periods to mix.[13] Another possibility is that the material had already been mixed before ending up in the complex.

Osteological results

The osteological material from the site was originally analyzed by Tarja Formisto (1991). A total of six samples (TYA 337:156–161) that were not included in the original analysis for an unknown reason were now analyzed for this article. In addition, the animal bone material was re-examined and clarified further, such as by identifying unidentified fish bones and allocating previously unidentified materials to the correct species. The original analysis did not include a NISP (Number of Identified Fragments) table; this was now counted based on the original and new analysis (Table 1). The fragment number of unidentified bones was not counted, and therefore the distribution analyses are based on weight.

The osteological material consists of both burnt and unburned bone. Formisto (1991) divided the material into human, animal, and unidentified fractions, and this division is also used in this article. All the human bones recovered from the site, 491 fragments in total, are burnt. According to Formisto (1991), the bone material includes a minimum of three individuals identified by the piece of skull above the right eye socket (*margo supraorbitalis* and *arcus superciliaris*) – one adult male and two children (TYA 426:255 and 312 belonging together, 291, 299). An interesting fact regarding the two fitting eye socket bones is that they were found in different excavation squares and layers. The vertical positions of the pieces were quite different, as the one was found in layer 1 and the other in layer 5.[14] This is an interesting detail, and difficult to interpret without considering a mixing of strata or elements in the deposition process. A total of 371.2 g of human bone was recovered from the site, with a total of 540.4 g of human and unidentified burnt bone in all.

The animal bone material consists of 235 g of burnt and 147.2 g of unburnt fragments. The identified animal species include sheep or goat (*Ovis aries/Capra hircus*), pig (*Sus scrofa*), cattle (*Bos taurus*), horse (*Equus caballus*), European elk (*Alces alces*), northern pike (*Esox lucius*), and cyprinids (Cyprinidae).

Spatial analysis

When the excavation of Cairn 4 began in 1986, the excavation area was divided into 2x2-meter squares (Renvall & Salo 1987). The same coordinate system and fixation point for levelling were used during the 1987 season (Koivisto & Salo 1988: 4; Koivisto 1991: 31). The 1986 excavation was conducted in five technical excavation layers, while in 1987, the total amount of documented technical layers was nine. This poses problems as to whether the layers are compatible. While they are certainly not parallel in detail, it seems that the 1987 excavation reached deeper in the monument than before, in which case the top-level layers (which contained the majority of the finds) might be comparable.[15]

The bronze finds generally display an even vertical distribution but with a peak in layer 4 within the 1987 excavation area. This applies to objects and fragments classified as jewellery. Horizontally, most of the bronze ornaments and fragments can be found in connection with the stone structure excavated in 1987 (Fig. 7a). The distribution of iron (mostly related to weaponry and/or tools) is similar, with layers 3–4 standing out in particular. All the iron arrowheads, save for one, are from layer 3 or deeper down. Horizontally, the iron finds have a somewhat wider distribution than bronze, but the 1987 stone structure and its vicinity still remain the standouts (Fig. 7b).

Burnt human bones (ca. 330 g in total)

were found in layers 1–6 (3–5 in the 1986 excavation), with the largest number found in layers 3–4 of the 1987 excavation. Horizontally, the bones were found both within and outside the main structures. However, most of the burnt human bones were located within or close to the structure excavated in 1987, while considerably fewer bones occurred within or close to the 1986 structure (Fig. 7c). In the report of the 1987 excavation, it was noted that burnt bone – unidentified in species at the time – was concentrated in some specific areas within the most solid stone structure; 527.9 g in all, mostly in layers 3 and 4 (Koivisto & Salo 1988: 17).

Burnt animal bones (ca. 235 g in total) were most prevalent in layer 3 of the 1986 excavation area. However, bones occur in all layers – even in small numbers in the lower layers of the 1987 excavation. In addition, unidentified burnt bone (ca. 157 g) occurred most frequently in layers 3 and 4. The most notable single concentration of burnt animal bone is present in one square (x 102-104, y 98-100) in the SE part of the excavation area, in layers 2 and 3. Contrary to burnt bone, unburned animal bones (ca. 150 g in total) occurred mainly within the 1987 excavation area (Fig 7d). The largest numbers were found in layers 3 and 5. In these layers, the horizontal distribution is within the central part of the excavated area, in and around the stone structure excavated in 1987. The distribution is quite different from that of the burnt animal bone.

Pottery (ca. 10.2 kg in total) was distributed throughout the layers, including the lower layers of the 1987 excavation. The majority of the finds were, however, from the upper layers; most of the pottery was found in layers 3–4 of the 1986 excavation and layers 2–3 of the 1987 excavation. With regard to the horizontal distribution, the pottery does not seem to be closely related to the main stone structures (Fig. 7e). Only in layer 6 was there more pottery within the stone structure excavated in 1987 than outside of it. The find material from the 1987 excavation and its distribution have already been elaborated in the excavation report. When the distribution of pottery was viewed as distribution per excavation square, it was noted that the biggest concentrations were found especially at the borders of the most solid stone construction, while considerably less pottery could be found in the central part.

Burnt clay (ca. 5.2 kg in total) exhibited a somewhat similar vertical distribution to the pottery, with most of the finds being made in layers 2 and 4 of the 1986 excavation and layers 2–3 of the 1987 excavation. The burnt clay seems, however, to have a different distribution over the excavated area

Table 1. Bone material from Nokia Viik, Cairn 4. Data are provided as NISP (Number of Identified Specimens).

Nokia Viik TYA 337, 426 NISP			
Species	Unburnt	Burnt	Total
Human		491	491
Sheep/goat	4	4	8
Pig	2	5	7
Cattle	4	2	6
Cattle?		1	1
Horse	2		2
Elk	1		1
Large ungulate	9	5	14
Small ungulate	1	1	2
Pike		3	3
Cyprinid		1	1
Unidentified fish		2	2
Total	23	515	538
Nokia Viik TYA 337, 426 weight (g)			
Human		371,2	371,2
Animal	147,2	235,0	382,2
Unidentified	2,3	169,2	171,5

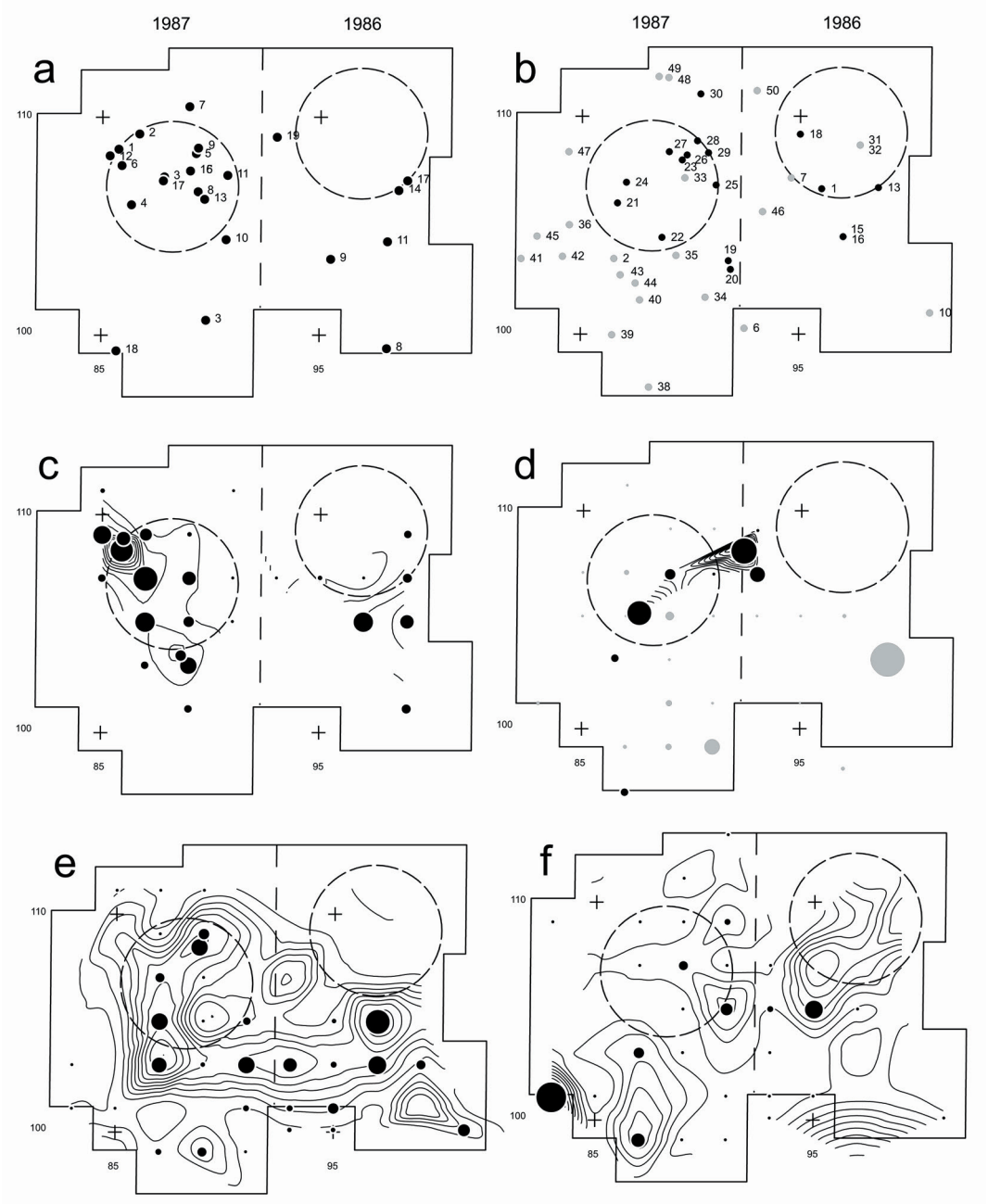

Figure 7. Horizontal distribution of main find categories in Cairn 4. The central stone structures in the excavation areas of 1986 and 1987 depicted as circles. Metal finds include a) bronze objects and fragments, and b) iron objects and fragments, arrowheads in black; the numbering refer to the find catalogues TYA 337 (1986) and TYA 426 (1987). Distribution of bone shown as the total distribution of c) burnt human bone (dots and curves), and d) unburned animal bone (black dots and curves) and burnt animal bone. Pottery and burnt clay compared as e) the total distribution of pottery (curves) and distribution in layer 3 (dots), and f) the total distribution of burnt clay (curves) and distribution in layer 3 (dots); the size of dots (representing weight) is not comparable to those of bone. Map: H. Asplund.

than the other find categories, like that of the pottery (Fig. 7f). A few pieces are daub with triangular cross-sections, and some display imprints of twigs (Koivisto & Salo 1988: 17).

Iron slag (ca. 5.1 kg in total) has a vertical distribution that differs from all the other finds. During the 1986 excavation, most of the slag was found in the upper layers, especially in layer 1, while in the 1987 material, slag was found only in the lower layers, with a large concentration in layer 8. This concentration is in the middle of the total excavated area, located between the main stone structures. In the excavation report, this concentration (square 108/92) was explicitly noted to have occurred within the earthen mound (Koivisto & Salo 1988: 17).

Chronology

The datable bronze ornaments date to the Late Roman Iron Age and the early Migration Period. The same applies to the iron arrowheads as well as the iron spearhead. The previously suggested Viking Age dating seems to be based solely on one serial bead. The dating presented in the report of the 1986 excavation (Renvall & Salo 1987) was later repeated by Koivisto (1991: 33). The dating is not conclusive as blue serial beads could occur even during the Early Iron Age (Tempelmann-Mączyńska 1985: 33, Tafel 2:91). The copper alloy spirals as well as the oval fire striker could, however, be other indicators of Late Iron Age depositions of ornaments and metal objects.

Seven samples were radiocarbon dated – two from human bone, three from pottery crusts, and two from animal bones. The dates give a new insight into the chronology, but the material is still limited. There is no way to exclude the possibility of material from other periods as well, if more samples of, for example, bones were dated. The oldest result is from a potsherd (TYA 426:163), which on typological grounds can be considered to belong to the Early Metal Period or, more specifically, to the Late Bronze Age or the earliest Iron Age. This is confirmed by the outcome, 2419±30 BP (Ua-61157), i.e., calBC 750–680, 670–640 or 570–400, where the highest probability (76.1%) points to the latest period.[16] The occurrence of this type of pottery in the site complex has been interpreted as indicating Early Iron Age (or maybe Late Bronze Age) activities, but not as having a direct link to processes recorded later. All the other dated samples were younger in nature (Fig. 8), with a gap of seven centuries.

The material related to burial includes two dates from burnt human bone (TYA 337:157 and TYA 426:318). The results are 1661±30 BP (Ua-61158), i.e., calAD 250–280, 330–440 (75.3%) 450–480 or 490–540, and 1569±31 BP (Ua-61160), i.e., calAD 420–570, respectively. The results point to the probability of two different burials: one that most likely dates to the end of the Late Roman Iron Age or the very beginning of the Migration Period, and the other with a general dating to the Migration Period. There is, however, a small possibility of overlap. The older date is from the 1986 excavation area, outside or at the edge of the stone structure with a central stone. The latter is from the 1987 excavation area, inside the main stone structure. If the dates were interpreted as directly related to the structures, this would contradict the previous idea of the chronological phases of the monument. These dates are, however, in general accordance with the dating to the Late Roman Iron Age and the early Migration Period, suggested by the typologically datable metal finds.

Regarding the later use of the site, dates from charred organic material (crust) from fragments of two different ceramic vessels (TYA 337:147 and TYA 426:155) indicate that the vessels were in use during the Merovingian Period. The results are 1338±29 BP (Ua-61155), i.e., calAD 640–710 or 730–780 and 1283±29 BP (Ua-61156), i.e., calAD 660–780 (92.5%), 790–800 or 810–820, respectively. It seems evident that the potsherds are of a later date than the burial-indicating bones – at least there is an age difference between the bones and the potsherds now dated.

This complex chronology is underlined furthermore by one burnt pig (*Sus scrofa*) bone (TYA 337:156), which dates to 1207±28 BP (Ua-61159), i.e., calAD 700–740 or 770–890 (88.8%). Regardless of the slight overlap,

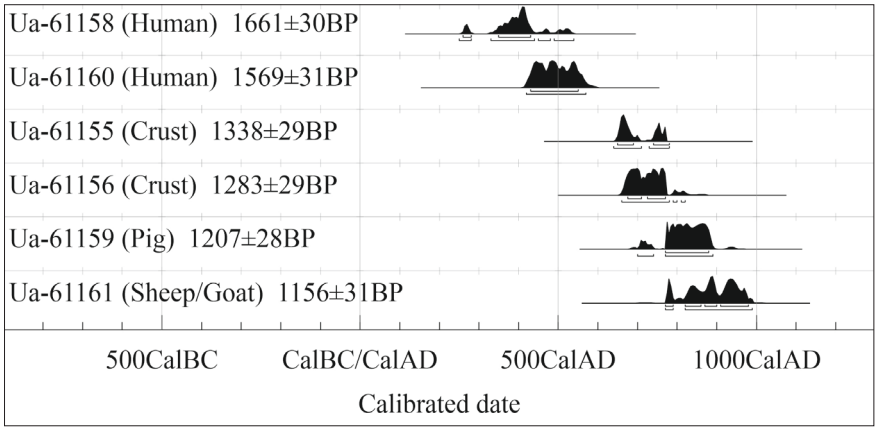

Figure 8. Radiocarbon dates (excluding the Early Metal Period date from pottery).

this suggests a younger date than the pots, most probably the late Merovingian Period or the earlier part of the Viking Age. The latest date of the series was obtained from one unburned sheep or goat (Ovis/Capra) bone (TYA 426:343). This bone might, in principle, be contemporaneous with the former, although exhibiting a somewhat later date of 1156±31 BP (Ua-61161), i.e., calAD 770–790 or 820–990 (86.2%).

DISCUSSION

Deposition of human bone

In the case of Nokia Viik Cairn 4, the main impression – both vertically and horizontally – is that there is no clear occurrence of clusters of bones and objects in combinations that could be directly interpreted as single burial depositions, positioned in a specific spot. The stone construction unearthed in 1987 contains lots of objects and bones, but the distribution is more in the fashion of communal/collective burials encountered in Finland in later cremation cemeteries under level ground. It is interesting that the first excavated (1986) structure does not seem to show any concentrations of human bone and/or artefacts (except for the deposition of an axe and spearhead under the central stone), with very little human bone overall. There must be some reason behind the erection of the stone construction, but it almost seems like the distribution of burned human bone, found mainly outside the structure, is avoiding it.

In the osteological material, the remains of at least three individuals – one adult, one child or adolescent, and one of undetermined age – were deposited in a mixed and scattered state. Due to the distribution of the bones, it has been suggested that the material could involve other individuals with the same osteological characteristics (Koivisto 1991: 33). An equally possible explanation is that the distribution of bones is more random and does not correlate with the structures identified, i.e., the deposition of bones from certain individuals could follow a different pattern. In addition, the bones of the adolescent and adult individuals are mixed in the material and e.g., found in the same square/layer. In this sense, the deposits resemble communal burials, e.g., cremation cemeteries under level ground, contradicting the idea that bones of each individual should be deposited separately.

In such cases, it is likely that the body did not have to be complete or located in a single place (Appelgren & Renck 2007: 40). The low amount of bone – the destruction of the body – could be seen as a way of erasing the individual. However, as Appelgren & Renck (2007) have suggested, this could also be a method for including the individual in something more

comprehensive. When a structure is physically identified as a grave but contains only a small amount of bone or no bones at all, one possibility is that the bones of the deceased have been returned to nature and deposited in one or several of its four elements (Appelgren & Renck 2007: 72–73).

The cremated human bone materials from Nokia Viik, Lempäälä Naarankalmanmäki and Päivääniemi as well as Salo Ketohaka sites (cf. Hirviluoto & Vormisto 1984; Formisto 1987; Katiskoski 1987; Raike & Seppälä 2005) demonstrate the variation of depositions in Iron Age cairns. What is evident is that there are at least as many differences as there are similarities, and this seems to also apply to other materials and not only bones. Variation seems to be one key feature of Finnish Iron Age cairns. In Naarankalmanmäki Cairn 3, Päivääniemi and Ketohaka, a clear cluster of human bones was present, while in Naarankalmanmäki Cairn 5 and in Nokia Viik, the human remains were more scattered. In the case of the former group, the osteological analysis supports the interpretation of the human bone clusters as burials in the traditional sense – all or most of the remains from the cremation pyre were deposited in one location. Even in Naarankalmanmäki Cairn 5, the human remains could derive from one individual, a child.

In the case of Nokia Viik Cairn 4, it is possible that the human bone material represents deliberate token burials with symbolic or ritual purposes. The potential deliberate shifting of burial elements has been discussed regarding the Iron Age in Estonia, especially tarand-graves (e.g., Kalman 2000: 25–29; Arukask 2011: 141; Lang 2011: 121–122). At Viik, the slight correlation between metal finds and human bones in and around the stone construction excavated in 1987 may represent an area dedicated to a ritual that involved scattering elements related to one or several funerals. Without a total excavation of the Viik site, it is challenging to evaluate whether these bones derive from other burials made at the same site or if they were perhaps transported from another location, e.g., for the purposes of maintaining a connection with one's ancestral spirits in a new settlement. However, as the Viik cairn contained evidence of later depositions, we must also consider the possibility that some of the bones may represent disturbed primary burials.

Chronology

Nokia Viik Cairn 4 revealed a complex chronology, where the dated pottery and animal bone samples turned out younger than most of the archaeologically dated artefacts and the radiocarbon dates from human bone. The artefacts point to the Late Roman Iron Age and the early Migration Period. This is supported by the radiocarbon dates from the burned human bone, while the other radiocarbon dates indicate other periods of activity and, evidently, changes in deposition patterns at the site. The bone and metal objects dating from the Late Roman Iron Age to the Migration Period are from the middle layers (mostly layers 4–5) of the stone structure excavated in 1987. Objects have probably been deposited on several occasions, and at least in the Migration Period also human bone material has been added to it. Later abundance of other material, such as pottery, animal bones and burned clay has been brought to the structure as well as outside of it.

Deposition of metal objects under the central stone of the main structure excavated in 1986 suggest that the structure might have been in use at the same time in the Migration Period. However, in this structure only a few metal objects, a minimal amount of human bone and, in the upper layers, some burned clay has been added. Outside the structure there is a deposition of human bones with an older or similar dating as the main stone structures. So here, one stone structure has been a target of several depositions, whereas it seems like the other structure of the same date has almost been avoided.

It is not possible to accurately date the different structures inside the monument since repeated depositions have been made during a long period of time. However, since the radiocarbon dates of the pottery and animal bones are of later periods (from the Merovingian Period to the early Viking Age) and they are found further away from the main stone structures, it is likely that they represent an expansion of the monument and a changed deposition pattern of adding waste-like

material into the complex. The two cases where human bones and pottery pieces fitting together were found in different layers, strengthen the picture of later interferences.

The complex result of several depositions is highlighted by the animal bones. The dated unburned mandibular tooth of a sheep or goat in an animal bone deposit was recovered from the mound connecting the two earlier cairns. In this find context, the presence of material younger than the burial activity is perhaps not surprising (see also Bläuer 2020). However, the dated burnt pig tarsal bone (T4) was found in a concentration of animal bones outside the stone construction excavated in 1986, near burnt human bones of a different age. The find context is such that, without dating, it could have been interpreted as part of actual burial activity at the site. The same applies to the pottery fragments – without closer analysis and dating the deposition of ceramics could be mistaken for a contemporary phenomenon directly related to the human bones.

Once again, it is evident that the extended use or reuse of a former (burial or ritual) site is an important issue that has also been discussed in previous research (e.g., Asplund et al. 2019: 98–100, with references). Burial may have been the starting point – the initiation or manifestation of a special place – which led to other events later on. The dates from the Nokia Viik site share an interesting resemblance with a former series from Roismala Ristimäki in Sastamala (Asplund et al. 2019, Fig. 6), as both series indicate old human bones, followed by the depositions of ceramics, and later pig and sheep bones. However, there are also dissimilarities both in the actual dates, as well as in the occurrence of unburned human bones in the case of Roismala Ristimäki. It is quite probable that the similarity of composition is due to a still-limited number of sites and dates. The general observation of chronological complexity is, however, beginning to appear increasingly typical.

Formation

Extended use is one factor affecting the formation of cemeteries. Estonian examples show that burials in the same grave constructions could take place over multiple centuries (Kalman 2000). Reuse in the form of consciously adding or removing material from a cemetery site is likewise another option. An interesting concept is that of ‘palimpsest monuments’ (Thereus 2019), involving the idea of reuse and remembrance, where depositions connect the place and people, creating and maintaining a collective identity.

Scandinavian examples demonstrate that sometimes the old monuments have been reused for burials after a break, becoming subjects of new meanings and functions for the new users (Thäte 2007: 192–193, 278–279). The remembered or presumed age of the old monuments has affected which monuments have been chosen for reuse: monuments of certain age have been chosen or avoided (Thäte 2007: 192–194, 237–238, 276–280). The place where the secondary burial inside or next to the monument was placed probably carried meaning (Thäte 2007: 234–241). The logic of avoiding or targeting structures, seen also inside Nokia Viik Cairn 4, might be connected to real or mis-remembered properties of the structures and desired effects and meanings of the reuse.

The locations of former burial sites may also have been used in other ritual contexts. The general concept of ‘ritual deposition’ (Berggren 2006: 306; cf. Röst 2016: 322) could be considered in the case of cemeteries as well. There are cases where it becomes difficult to distinguish the concept of ‘grave’ from that of ‘offering’ (Thereus 2019: 240). Concerning Uppland in eastern Sweden Thereus (2019) has highlighted the complexity and diversity of burial customs during the Late Iron Age; only very late in the process the burial practices started to resemble what is today regarded as burials.

The discrepancy between the dates of burials and those of other ritual activities were underlined in a study of animal remains from twelve Iron Age cemeteries from southern and western Finland. Unburned animal bones could have been ritually deposited in former (or then-unused) cemeteries in connection with remembrance rituals or with the intention of securing the health and productivity of livestock (Bläuer 2020). One idea is that these sites may have contained a certain power – ‘kalma’ – due to the human remains (Bläuer 2020: 12). The

cemetery was a platform where the sacred and profane intertwined, which was probably the case in the everyday life of Iron Age people as well (Korkeakoski-Väisänen & Bläuer 2020: 353). The dating results from this study demonstrate that the same could also apply to the burnt animal bone material. Thus, not all burnt bone necessarily belong to a burial phase, as burnt animal bone could also have been used in later ritual depositions within the old structures.

It is probable that 'everyday rituals' or 'secular rituals' have been involved in the formation of sites (Brück 1999; Bradley 2003; 2005; Berggren 2006; Asplund et al. 2019). In principle, any type of object can contain or transmit symbolic meanings; what is important when trying to reach an archaeological interpretation is the contexts of the occurrence, its irregularities, and the recurring combinations of these (Renck 2000: 214–217). Regarding cemetery sites where burial-related rituals have been performed, this could have made them places where other remains of past lives – including material remains from the daily sphere of living – could be properly disposed of (Asplund et al. 2019: 99). At some sites, the simplest explanation for the occurrence of material related to the domestic sphere is that the material was actually brought from a settlement site. This leads to the question of how the ritual treatment of waste may have contributed to the formation of sites that have been archaeologically defined as cemeteries (Asplund et al. 2019: 96–100).

What is now regarded as mere waste may not have been experienced in the same way in the past. When we consider the abundance of pottery fragments, the connection to the domestic sphere is evident. Pottery vessels used by households can function as metaphors for home, food, etc., which makes the pot fragments additionally meaningful in a ritual sense; the destruction of the objects and the remaining sherds could also be seen as being anchored to death as such (Stilborg 2021).[17] The idea of depositing fragments from daily life can also be considered to represent the remnants of a farm or family. Much of the material could, in fact, be household waste from one or several houses. One could think of a relationship between the house/the living and the cemetery/the dead if one sees their house as a 'living entity' (Bailey 1990: 28). Houses could have been thought of in a biographical/life cycle-oriented manner, where crises or the abandonment – or 'death' – of a house would have consequences resulting in rituals of remembrance and the deposition of household waste at a place of ritual importance.

CONCLUSIONS

Sites that fall under the Finnish archaeological concept of a cemetery (*kalmisto*) often seem to involve elements that are not comparable to the current understanding people have of graveyards or other locations solely intended for burials. What is problematic is that we have no knowledge of how prehistoric people experienced sites that archaeologists now classify as cemeteries. It is certain that these locations were sites – places – of importance due to mortuary practices. However, they seem to include other aspects as well, relegating the burial function itself, as we experience it today, to a seemingly secondary role. In many cases, the very concept of a burial – the existence of and variation in the number of bones and/or other materials indicative of funerals – has proven to be difficult to interpret.

The main factor uniting the different ritual elements at these sites are the locations themselves. In addition to actual burials or rituals involving human remains, they have hosted different kinds of activities, resulting in the deposition (and, likely, displacement) of material during different periods. While it may be too early to abandon the Finnish archaeological concept of cemeteries, they should be understood in a more multifaceted manner than as mere burial sites. Categorization also remains a key issue. Attaching the concept of 'cemetery' to sites such as cairns without detailed analysis subsumes sites that may be very different in nature, especially when we acknowledge changes in their use during different times. From the perspective of interpretation, the ways in which the cemetery concept is used is problematic, as it encompasses sites that may include other than funerary functions. A 'cemetery' is often a label used for sites or monuments with common physical characteristics, while identifying actual burial and/or other ritual practices is a matter of interpretation. Through future analyses

concentrating on recognizing nuanced activities in sites such as Nokia Viik, we might be able to understand them in a way that better appreciates the varied activities that were carried out in these locations. While we cannot inhabit the minds of those who were present in these rituals and ascertain whether later depositions were related to any mortuary practices or other rituals, we can still record the material evidence of change.

The functions of different sites, and the ways in which people understood them, could have changed over time – a former burial site may still have been recognized as a special and important place as it was repurposed for other types of rituals. Based on the few samples examined in this article, this seems to apply to earth and stone mixed cairns involving elements from different periods of the Iron Age. These sites seem to indicate patterns of prolonged use and changes in rituals, especially in cases of burial-like constructions and depositions from the Early Iron Age that also include materials of a non-funerary character from later periods.

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NOTES

[1] In Sweden, the definition of a cemetery or burial ground (in Swedish *gravfält*) includes the occurrence of at least five prehistoric grave constructions within a mutual distance of no more than 20 meters.

[2] There have even been discussions on whether it is possible to distinguish graves with no burial remains at all (Appelgren & Nilsson 2007; Appelgren & Renck 2007).

[3] In the case of Late Bronze Age structures it has been stated that the material should be discussed in its own right – not as 'graves', but as 'traces of actions' concerning stones and sometimes human bones (Röst 2016: 320).

[4] The site is registered under the name Viik 1, #536010019, in the Ancient Relics Register maintained by the Finnish Heritage Agency.

[5] There have been some irregularities in the numbering (and locations) of the monuments at the site. This is explained in the 1999 excavation report (Haimila & Taavitsainen 1999: 5–6).

[6] Different concepts have been used to define the monument. At first, the term 'mound' was used, while 'cairn' (in Finnish *röykkiö*) has been used more frequently in subsequent studies. In addition, the Finnish term 'raunio', evidently a synonym for 'cairn', has been used on some occasions (e.g. Koivisto & Salo 1988). In this study, the main structure as well as the combination of structures are referred to as an 'earth and stone mixed cairn' (for a clarification of the concept, see Asplund et al. 2019: 83).

[7] The composition of the monument has evidently been regarded as special at the time of investigation. In general terms, however, reuse and the extension of burial constructions is not uncommon (cf. Thäte 2007; Wickholm 2008; Wessman 2010; Wessman & Williams 2017; Therus 2019: 240–242).

[8] In connection with the excavation in 1987, ten soil samples were taken from the excavation area for macrofossil analysis. Eight of the samples are from the earthen mound and two from the cairn. Several charred cereal grains were found in both sets of samples – ten from the mound and nine from the cairn. Seven were identified as barley (Hordeum vulgare) and one as rye (Secale cereale) (Lempiäinen 1991: 41). As part of the material was discovered in layers that were interpreted to be old, it is likely that the grains are connected to the cairn (Lempiäinen 1991: 43). However, none of the grains have been radiocarbon dated.

[9] Cairn 3, excavated in 1988 (the investigation had begun already in 1986 when the uppermost part of half of the mound had been unearthed) is the smallest (about 4 meters in diameter and 0.6 meters in height) of the mounds at the site, and situated about 20 meters NE of the 'great mound' (Pietikäinen & Salo 1989: 1–2). The finds consisted of one piece of Iron Age pottery and one piece of burnt bone. Other finds were a couple of metal objects (one button and one button-like piece), three clay fragments from a tobacco pipe and two pieces of glazed pottery. Furthermore, the mound contained over 20 kg of brick fragments (Pietikäinen & Salo 1989: 6). Although the mound at first sight was considered as a 'perfect' Iron Age cairn, the content makes unlikely the interpretation that this would be a prehistoric structure (Pietikäinen & Salo 1989: 7).

[10] Seventeen arrowheads were recovered from the monument (Fig. 5). Sixteen of these represent Hiekkanen's group 3BII (Koivisto 1991: 33), which have mostly been found in Häme and Satakunta (Hiekkanen 1979: 68). Group 3BII dates roughly to the Late Roman and Migration Periods (Hiekkanen 1979: 67).

[11] The clay beads (TYA 337:12) are rather irregular and feature skewed holes, which might suggest that they could have been formed naturally. On the other hand, they seem burned, which could suggest that they were deliberately produced.

[12] Invidual pots are referred to with the numberings used in the ceramics analysis report (Salomaa 2020).

[13] In the area excavated in 1986, pieces fitting together from pot number 1.6 were found in

layer 1, square 108/84 and layer 4, square 106/94. In the area excavated in 1987, pieces fitting together from pot 2.4 were found in layer 4, square 100/88 and layer 5, square 100/88.

[14] TYA 426:255 was found in layer 1, square 102/88, while TYA 426:312 was found in layer 5, square 104/88, according to the osteological report (Formisto 1991). In the find catalogue TYA 426:312 is, however, recorded as found in square 204/90, which must be a typing error – probably the correct numbering should be 104/90.

[15] From a current perspective, the excavation and documentation technique was not optional. When mainly focusing on layers and squares, the interpretation of single contexts and their relationships is almost impossible to achieve later. Even creating simple distribution maps in a true metric system (e.g. Fig. 7) from the old data require a lot of work. In this case, the number of catalogued finds or assemblages was 549, the locations of which had been recorded with reference to layers and 2x2 meter squares, in some cases supplemented with measurements (coordinates) within squares. As the current example and the former case of Roismala Ristimäki in Sastamala (Asplund et al. 2019) illustrates, recalculations can (to some extent) be done, which increases the potential for more detailed spatial analyses of old excavation data.

[16] All calibrated dates are given with a 95.4% probability. They were calculated with the OxCal v3.10 program (Bronk Ramsey 1995; 2001) using the IntCal20 calibration dataset (Reimer et al. 2020).

[17] When discussing mortuary practices, the common occurrence of fragments of objects (as well as burned and crushed human bones) in Finnish Iron Age cemeteries has also been explained as linked to conscious breaking and sharing. Fragments could have been distributed within the group of people linked to the ritual site – this would have been a sign of bond between kin group members (Moilanen 2023).

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TWO MICROPARTICLE ANALYSES OF STONE AGE QUARTZ TOOLS IN FINLAND

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INTRODUCTION

Microparticle analysis has in recent years been explored as a potential new avenue for explaining the otherwise hidden resource utilisation in Stone Age sites. For example, in Finnish acidic soils, bone material survives usually only as burnt and even then, as tiny fragments with a low degree of species identification. Discovery of microparticles (hair, fibres, and feathers) has also shown the species that were not recognized in the osteological analyses of the

Figure 1. The location of the two sites, Korsunlahti in Rautalampi and Spångkärret in Loviisa, discussed in text. Illustration P. Pesonen, map data from Natural Earth Data (naturalearthdata.com).

site (e.g., Kirkinen et al. 2023, this volume). Moreover, the microparticle analysis also gives direct knowledge of the actual tool uses. This paper presents two further cases, Korsunlahti in Rautalampi and Spångkärret in Loviisa (Fig. 1), where the microparticle analysis has been carried out on single tools, a quartz scraper and a flake. We especially want to pay attention to the find contexts of these items, and for future best practices, discuss whether the special conditions of these sites may have helped in the survival of the microparticles.

TWO STONE AGE SAMPLE SITES

Rautalampi Korsunlahti – a Mesolithic site with a red ochre grave

Korsunlahti site is located in Rautalampi, North Savo. The site was discovered in 2005 during the basic survey of Rautalampi municipality (Pesonen 2005). Already during the survey, a red ochre patch was discovered in the cut of a small sand road leading to the shore cabins of the

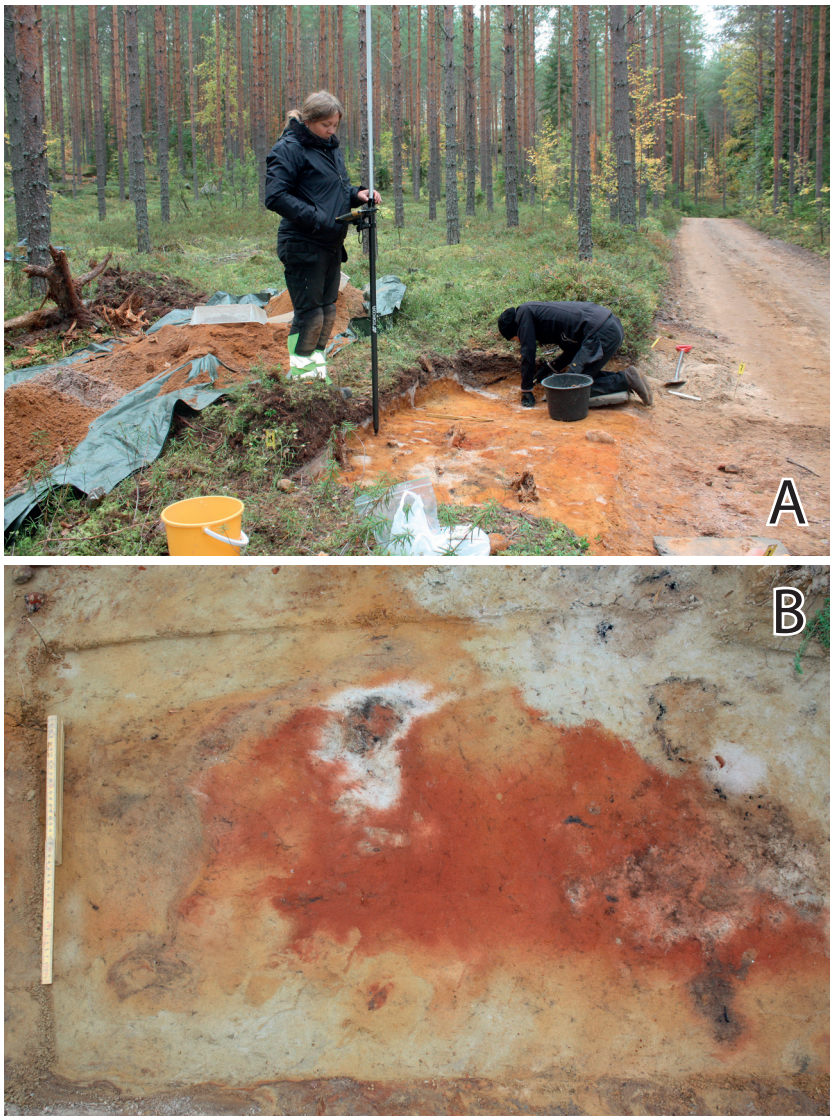

Figure 2. a) The ongoing excavation in the Korsunlahti site, Rautalampi, and b) the red ochre grave in excavation level 5 (c. 20–25 cm below surface). Photos: P. Pesonen, Finnish Heritage Agency.

Figure 3. Test excavation in progress at the Spångkärret site in Loviisa, southeastern Finland. Photo: P. Pesonen, Finnish Heritage Agency.

Korsunlahti bay of the Lake Niinivesi. The red ochre grave was excavated in 2021 as a rescue excavation by the Finnish Heritage Agency's test excavation group in addition to testpitting the site (Fig. 2a; Pesonen 2021a). It appeared that the red ochre grave measured c. 105 x 50 cm, it contained no grave goods, and it contained only c. 5 cm of red ochre in the thickest parts of the feature (Fig. 2b). From the same excavation area, but not in direct contact with the grave, a quartz flake (KM 43336:46) was found and selected as a sample for the microparticle analysis. It was not handled but was immediately packed in aluminium foil and a zip-lock bag. Otherwise, the finds in the area consisted of a few quartz flakes and pieces of burnt bone from beaver (*Castor fiber*), pike (*Esox lucius*), perch (*Perca fluviatilis*), cyprinids (Cyprinidae), and unspecified mammals and fish (Nurminen 2021a). Based on the lake history and the elevation of the site, it is likely that the site derives from the Late Mesolithic or Early Neolithic Stone Age (c. 5000–4000 calBC). Unfortunately, radiocarbon dates are unavailable so far. Considering its size, the red ochre grave may be interpreted as being a child's grave (counterparts, e.g., Pesonen et al. 2014; on the general background of red ochre graves, see Ahola 2019).

Loviisa Spångkärret - a Middle Neolithic site with pithouses

Spångkärret site is located in Loviisa (formerly Pyhtää), Uusimaa region. The first finds from the site were collected by a local amateur archaeologist already in 2014–2015 but the site was not inspected until 2017. In this connection also the 12 pithouses were registered. In 2018, the site was visited again, this time samples for sediment DNA were taken from two of the pithouses (Pesonen 2018; Peltola 2019). Test excavations in 2021 were launched because of the forest management plans concerning the forested mire next to the settlement site (Pesonen 2021b). Three-room pithouse was test-pitted to find out if this feature really was a pithouse and to get datable material for the radiocarbon

analysis (Fig. 3). It turned out that it really is a multi-room pithouse and test pits to all three rooms yielded a number of finds: quartz, organic-tempered pottery and burnt bone. In the middle-room test pit a quartz scraper (KM 43337:11) was selected for the microparticle analysis, wrapped in aluminium foil and left totally unhandled. One big mammalian bone was radiocarbon dated to the Middle Neolithic (Ua-72797; 5124±37 BP; 5850±65 calBP). The dating result is in conflict with the assumed Middle/Late Neolithic Pyheensilta-type affiliation of the organic-tempered pottery (see Pesonen 2021b) and the most probable shoreline dating to the Late Neolithic (c. 5000–4500 BP; according to the shore-line curve of the Loviisa region, see Miettinen et al. 1999). It is still possible that the site was inhabited already during the Middle Neolithic when the water level was some metres higher. Obviously, the chronological settling of the site needs still more data. The osteological analysis (Nurminen 2021b) of the burnt bones revealed mostly seals (Phocidae), several unidentified mammal bones, and in addition, only one bone of perch (*Perca fluviatilis*).

MICROPARTICLE ANALYSIS

In a clean room, the foil wrappings were opened, and the loose sand was shaken off gently. The quartz artefacts were sealed in clean zip-lock bags with a small amount of distilled water. The bags were placed in an ultrasonic cleaner and cleaned for 10 minutes. The resulting liquid from the bags was divided into Eppendorf-tubes and centrifuged at 2500 rpm for seven minutes. The extraction was pipetted on microscope slides and studied by transmitted light microscope with 100x-400x magnification. The findings were documented by photographing, and the fibres were analysed by using identification keys (Tóth 2017; Dove & Koch 2011) and a reference collection that covers Fennoscandian species. The samples were prepared in a room dedicated to microscopic

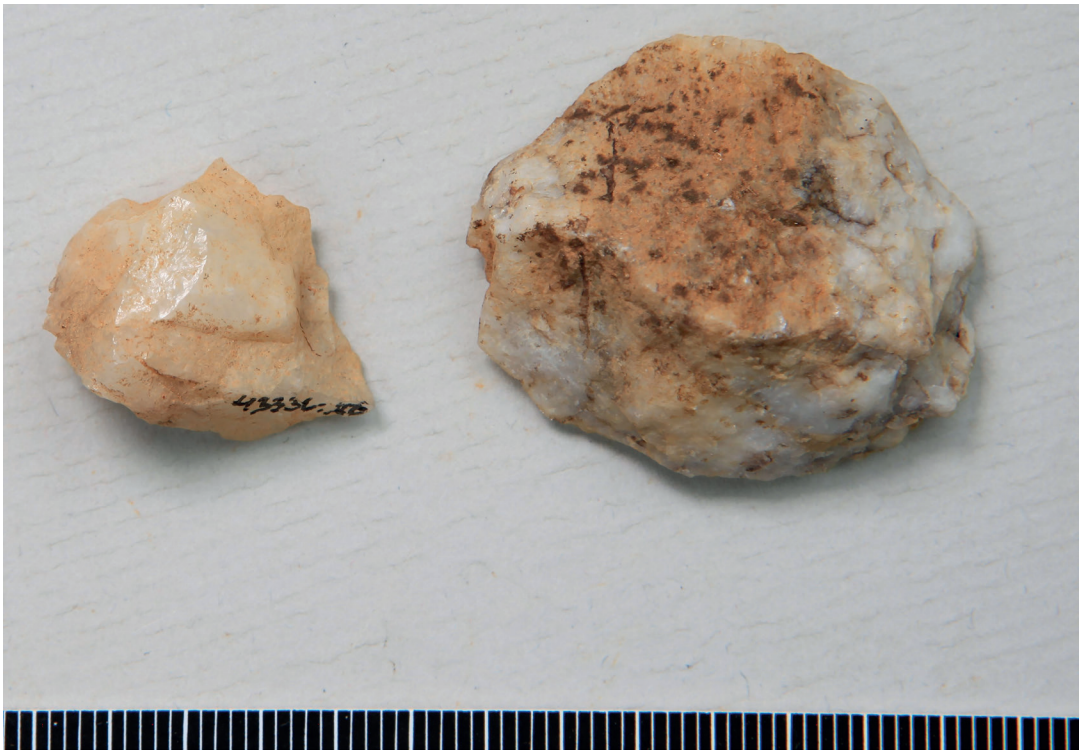

Figure 4. The two quartz items from Korsunlahti site (left) and Spångkärret site (right). Photo: P. Pesonen.

Figure 5. Proximal section of the shaft of a hair K1 at the Korsunlahti site. Note the sharply cut ends. Photo: T. Kirkinen.

examination, and the room was cleaned carefully by wiping it down before every work session.

The results of the microparticle analysis of the Korsunlahti quartz flake were really promising as in total seven hair fragments (K1-K4, K6-K8) were detected. These guard hairs were 0.2–0.8 mm in length and 37–41.8 µm in width. They were brown in colour and scale structure, when identifiable, was waved figureless (see Tóth 2017: 53). The medulla was preserved only in one hair, K1, and it was amorphous and fragmented. Most interestingly, in hairs K1 (Fig. 5), K7 and K8 the ends of the hairs had sharp edges, which might indicate that they have been sectioned by man. The hairs were mostly quite poorly preserved, but the pigmentation, width, and scale structure hint at the possibility that they might be from the same species. Although the hairs could not be identified by species, as they shared no diagnostic features, it is possible to exclude cervids and seals.

At Loviisa Spångkärret, the microparticle analysis resulted in five hair fragments (K1-K3 and K5-K6) and one bird-feather fragment, a barbule (K4). The hairs were all very badly preserved, 0.2–0.4 mm in length and 26.3–39.5 µm in width (Fig. 6). The scale structure was barely visible and there were no remains of the medulla. In K6, possibly a sharp cut mark can be identified. The bird barbule was 0.5 mm in length. It had distal prongs which are not diagnostic to any specific group of birds, however, they are common for waterfowl (Anseriformes) in general.

DISCUSSION AND CONCLUSIONS

The search for microparticles in soil samples (Äyräpää 1931; Ahola et al. 2018; Kirkinen et al. 2022) and on the surfaces of quartz artefacts (Kirkinen et al. 2023, this volume) have provided

Figure 6. A badly preserved hair fragment K5 at Spångkärret site. Photo: T. Kirkinen.

evidence that less than 1-mm-long remains of soft organic materials such as hairs, plant fibres and feathers can be preserved in Stone Age contexts in Finland.

The preservation of fibres varies from site to site from the total lack of microparticles to still identifiable hairs. It is known that keratins of hairs and feathers are favoured by acidity, while in alkaline soils they tend to degrade more rapidly (Janaway 2002: 382; Rowe 2010: 45). There are also different kinds of keratins with different qualities also affecting their preservation. Compared to hairs in which beta-keratin dominates, feathers are composed mostly of alfa-keratin, which is a stronger type of keratin (Janaway 2002: 382). Human scalp hairs, in turn, appear to be more fragile than animal hairs.

In Finland, the preservation of fibres in Stone Age contexts has been discussed along the Majoonsuo red ochre burial case (Kirkinen et al. 2022). In this study, it was proven that the addition of red ochre (iron oxides) to the burial pit changed the chemical properties of the soil by increasing its acidity, changing the dominant charge of the soil particles, and also by increasing the content of the finer particles. Most importantly, a more acidic environment can reduce bacterial attack on organic remains, and small accumulations of silt-clay can concentrate on animal fibres' surfaces covering them and protecting hairs and feathers from bacteria. The latter statement is supported by empirical work, which indicates that the finer the soil, the better is the preservation of fibres.

In this paper, the contexts of the quartz items (close to a red ochre burial and a housepit) indicate the possibility of good preservation conditions in special kinds of find contexts. The flake – which was not covered with the red ochre – was found close to a red ochre burial at the Korsunlahti site. The afore mentioned

acidification of soil next to the grave has not been studied but may still have benefited the preservation of the microparticles in this case. In housepits, the intensity of the habitation and the waste accumulation creates cultural layers that may be much thicker than in normal open-air sites. We do not have good data on the preservation conditions in this kind of strata, but it is possible that also here the conditions favour the survival of microparticles. So far, the study of microparticles has only just begun; we are examining the possibilities and the results are already looking promising. One of the future steps will certainly be to formulate the best practices of microparticle sample collecting, both from the soil and from artefacts and to also assess which contexts are the most favourable for the preservation of microparticles. We also want to point out that in addition to actual tools, there is also a potential for microparticles in items that are not formal tools, e.g., the flake from Korsunlahti site.

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Jonas M. Nordin. *The Scandinavian Early Modern World, a Global Historical Archaeology.* **Routledge, London and New York 2020. ISBN 978-0-367-34807-6. 308 pp.**
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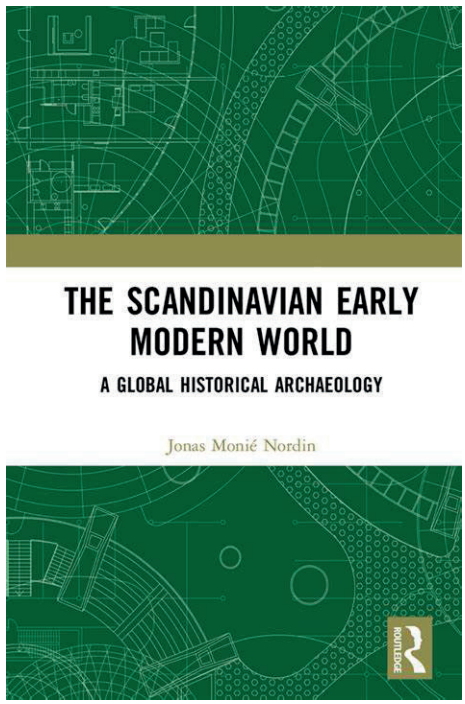
Some years ago, I was focused on studying the earliest phases of Northern Swedish mining history, where the military campaign of Danish-Norwegian troops in 1659 marked the end of the Nasafäll-Silbojokk silver mining complex. Now, after reading Jonas M. Nordin's latest volume, I have a brighter and more comprehensive understanding of why it happened. The seemingly insignificant mining place in the inaccessible middle of nowhere had political, economic, and personal impacts on the global network, which sealed its fate. This is one of the strengths of the book. It aims, and succeeds, in weaving together numerous threads of events and actions of people, places, and things to provide a clear and understandable global view of the role of Scandinavia and Scandinavians in the early modern world.

Nordin's objective in this book is to place Scandinavia into its position in the early modern global world, and I think he nails it well. This is an important contribution, as the author points out in the preface of the book. Scandinavian early modern history has been studied extensively, but the active role of Scandinavians in early modern globalization is a story rarely told. The book is built around about 20 real individuals who lived and influenced the Scandinavian world from the late 16th to the mid-18th century – *the long seventeenth century* – and were, as the book illustrates, intertwined with each other in many ways. Nordin takes the reader on a tour of the Scandinavian 17th century world from Asia to Africa and America to Sweden and back, with cargo full of copper, iron, sugar, weapons, and slaves. But the book is not just about Scandinavians influencing various parts of the world; it is also about people from various parts of the world influencing Scandinavia.



The book consists of a total of nine chapters, including the introduction and conclusions, and five interrelated case studies. The Scandinavians discussed in this book are mostly Danish and Swedish, but Scandinavia itself is a much larger concept than how it is considered today. Nordin includes the eastern provinces of Finland, Karelia, and Ingria, as well as the southern Baltic regions of Pomerania and Bremen-Verden, in seventeenth-century Scandinavia, not forgetting the Danish North-Atlantic realms of Iceland, Greenland, and the Faroe Islands. In other words, Nordin constitutes Scandinavia as a period socio-cultural - political entity, not as a geographical concept. Nordin also brings northern Sápmi, the northern areas of Fennoscandia inhabited by various Sámi populations, into the discussion as a region of its own and not just as the northern peripheries of Norway, Sweden, Finland, and Russia. This perspective is very welcome in the history of northern Europe. In general, Nordin is careful to avoid methodological nationalism in his narrative and emphasizes the multitude and breadth of Scandinavian societies, as well

as any other societies discussed in this book, highlighting the importance of this perspective in obtaining a deeper understanding of the complexity and diversity of history.

Chapter 1 presents the context and theoretical perspectives of the book, untangling the key concepts of the discussion. Nordin, like many other historical archaeologists before him, derives his approaches from the seminal work of Charles Orser and the four haunts of the modern world. However, the author's clear aim is to provide an in-depth criticism of Euro- and particularly Anglo-centricism in the discussion of modernity and modernization by bringing Scandinavia and the meaning and importance of distant and seemingly distant parts of the world into the development process of the modern world.

After an occasionally somewhat burdensome and information-rich but absolutely necessary and clarifying theoretical and contextual setup, the ships are launched, and the Scandinavian voyage is ready to begin. First, Chapter 2 takes us from Copenhagen to Tranquebar, India, via a quick visit to the arctic Kalaallit Nunaat/Greenland. In this chapter, Nordin vividly narrates the early Danish colonial encounters in the North Atlantic arctic region and how it influenced the lives of native populations both at a societal and individual level.

After the European quest and contest for arctic resources, particularly whale oil, the journey heads towards the tropical waters of Southeast Asia and the undertakings of the newly founded Danish East Indian Company. As mentioned, Nordin has built this book around a selection of different people living in the scope of early modern Scandinavia. Here, we are introduced to a young Danish nobleman named Ove Gjedde – one of the main characters of this story – a person who will appear many times in the following pages, illustrating the entanglements of the European world during that period.

The Danish endeavors in the waters of southern India, merely as pawns in the game of local rulers against Portuguese dominance, resulted in a handful of colonies and left behind plenty of material culture accumulated through successful trade. However, in this phase, we leave the South Indian waters with Ove Gjedde and sail back to Scandinavia, passing through Copenhagen to Norway, where Gjedde, along with his newly wedded wife Dorte Urne, began to build a career in the growing northern metal industry. The 17th century was an era of metals, and the Scandinavian countries played a significant role in the period's metal industry. Chapters 3 and 4 introduce us to this theme.

The worn classic expression notes that all roads lead to Rome. In 17th-century Europe, one could say the same about Amsterdam. Amsterdam was definitely the focal hub of all European global trade during this period, and thus, the northern metal industry cannot be discussed without mentioning the Dutch. Hence, Nordin introduces us to a handful of new key players in the book: the de Geer family, the Momma-Reenstierna brothers, and the Walloon charcoal maker Mårten Monier. The first two, although of Dutch origin, were true cosmopolitans of the period, while Mårten Monier, again, was just one of the many members of the early modern mobile labor force who moved to Sweden to work in the growing Scandinavian metal industry. However, with the Monier family, Nordin gives this book a very personal touch and adds another dimension to the entanglement of connections, not just through space but also through time, as the author himself is a direct descendant of the Monier family.

In Chapter 4, the journey after metals continues further north, deep into the arctic Sápmi, and explores the colonial encounters with the northern Sámi peoples. The Sámi people had been settling the northern parts of Scandinavia for centuries and had been in active contact in trade with various directions in northern Europe. The quest for copper and silver brought them in the middle of the European modernization process and colonial forces. As Nordin emphasizes and argues in this volume: "Modernity, in the shape of growing control, colonial ideologies, and the construction of indigenous peoples as the 'Other', was not only a discernible process in the colonial practice of the powerful Western European powers but a praxis played out all over the world in slightly different shapes and forms."

After extracting the precious metals – silver, copper, and iron – from the Scandinavian soils, the products are loaded onto ships that sail out into the global waters. Chapter 5 jumps onboard the Kalmar Nyckel and heads west towards America, exploring the Swedish short and less

successful period as one of the North American colonies in New Sweden, present-day Delaware. In this chapter, Nordin builds an illustrative narrative of the development and network of relations of the Swedish New Sweden colony and its influences on different peoples, including the Native American population. It becomes quite evident that, in the end, the whole New Sweden project was more of a market play by Dutch investors seeking a greater foothold in the promising American trade fueled by the demand for Swedish copper.

Chapter 6 leads the reader to the inevitable gloomy topic of early modern colonialism – West Africa and the transatlantic slave trade. Scandinavian countries have not been the first to be implicated when discussing the main players of the European slave trade. However, Scandinavian powers and people had their part in it, and Nordin does not hesitate to bring it out. Chapter 6 presents the actions of Danish, Swedish, and other European actors in the West African Gold Coast, the establishment of forts and harbor towns as hubs for organized trade of copper, iron, gold, and slaves. The last voyage of the book follows the slave ships back to the American continent over the Atlantic and anchors in the Caribbean Islands – the Danish West Indies and the sugar plantations of St. Croix, St. John, and St. Thomas, where Scandinavian colonial history lasted until the early 20th century. The journey ends back home, in northern Sweden and Sápmi, with a brief discussion of the Europeanizing (a concept that the author is actually critical of) of the North, and a short conclusion on Scandinavia in early modern colonialism and modernity.

The rich narratives and Nordin's writing style make this book pleasant to read. There are moments when one even forgets that one is reading a scientific text. The numerous case studies, personal histories, and the incorporation of multiple levels and perspectives, not to mention the extensive research material employed to construct a holistic perspective on the topic, are impressive. This must have been an enormous task to undertake. The book not only illustrates well the Scandinavian actions and influence in the turmoil of *the long 17th-century* early modern world but also exemplifies the networks and interrelations of different players from the national to individual level in the development process of global modernity. While reading this book, one is inevitably reminded of the classic butterfly effect – just as the flap of a butterfly wing can cause a hurricane on the other side of the world, West African trade contacts can lead to the destruction of a minute distant silver mine in the arctic Sápmi.

The archaeology and history are well balanced in the discussion. Each main chapter begins with the background and introduction of key characters and ends with an archaeological perspective on the material culture. Nordin utilizes a variety of material culture to interpret and connect history, archaeology, anthropology, and geography of the Scandinavian early modern world. This includes not only archaeological artifact finds but also paintings, maps, museum collections, architecture, and landscapes, among others.

Nordin aims to position Scandinavia within its context in the early modern world, and I think he succeeds well in this task. As he notes in the beginning of the book, the discussion of the early modern world and the development of colonialism has unfortunately been too Anglo- or Franco-centered. From this perspective, Nordin's approach is more objective. I feel that he manages to take a more global and versatile view of the process. If I really need to pick something to criticize, there are sometimes tones of modern social criticism observable in the discussion, which brings the author's subjective perspective along. However, this is not in any way disturbing. Nordin's contribution is thus a very welcome addition to this field of research. Although it focuses on Scandinavian endeavors during *the long 17th century*, it manages not to be Scandinavia-centered but highlights the actions and influences of Scandinavia and Scandinavians within the early modern global world. A book definitely worth reading.

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Anna-Elisabeth Jensen. *Freunde und Feinde. Dania Slavica. Südseeland, Lolland-Falster und Møn in der Wikingerzeit und Hochmittelalter.* **Aarhus University Press 2023. ISBN 978-87-7219-320-5. 357 pp.**
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This is an extensive book about the relationship between the Danes and the Slavs (or the Wends) in the Baltic Sea Region during the Viking Age and the Medieval period (AD 800-1200). It is a well-known fact that during the Viking Age there were strong contacts between the Danes and western Slavic peoples, or the Wends, who lived in the coastal areas of present-day Germany and Poland (mainly between the Rivers Elbe and Oder). Several Wendish tribes lived in this area and traded with the Danes, of which several silver hoards tell. This large geographical area, from southern Zeeland, Lolland, Falster, and Møn in Denmark to the western Slavic areas of Holstein and western Pomerania, became a cultural melting pot, which this book is all about.

This in-betweenness and co-existence was not peaceful at all times suggested by the title of the book. The author, archaeologist Anna-Elisabeth Jensen, is deputy director at Museum Lolland-Falster in Denmark. She and her museum have been involved in several research and dissemination projects about these Wendic contacts for a long time. I must admit that I have often wondered who these people were when I have visited archaeological museums in Denmark and Scania. There has not been much background information on who these people were and why this type of pottery (Baltic Ware) is found in these areas, so I was curious to read this publication.

This is a result of a research project established in 1999 called *Freunde und Feinde. Das dänisch-wendischen Verbindungen in der Wikingerzeit und im Hochmittelalter* (roughly translated by the author as "Friends and Enemies. The Danish-Wendish connections in the Viking Age and the High Middle Ages") which was followed up by several other collaborative projects in Denmark and Germany. There is also a Danish language version of this book for those who are not so comfortable with reading German.

The book is divided into eleven chapters and 4 appendixes. It is richly illustrated with both photographs, reconstructions, drawings, and several colorful maps. In the preface, the reader is introduced to the background and to the different aspects that led to the outcome of this book, for example the creation of a database with some 1000 archaeological sites discovered by the year 2000, which is now forming the catalogue in Appendix 4. This extensive work consists of a thorough landscape analysis (GIS) and a close examination of (some) archaeological find categories, place names, and written sources. These analyses form the basis of the book. The main argument is that the sea was a connector rather than a barrier and this led to a Slavic cultural sphere in Lolland-Falster and Møn that the author calls *Dania Slavica*.

The strength of this study lies in the combination of large data sets and in the way this data is introduced to the readers through maps.

But at the same time, grasping these vast and diverse topics is a difficult task. While certain aspects get more thoroughly examined in the book, others are not as meticulously evaluated. Although Baltic Ware is the topic of one chapter, other find categories are not given much attention at all. For example, soapstone vessels, originally quarried and produced in western Norway and (perhaps) southwestern Sweden, were valued trading commodities during the Viking Age. From the 9th century onwards, they were distributed also to Denmark where they are frequent finds (e.g., Baug 2016; Sindbæk 2008). However, they are seldom found on Møn or the Lolland-Falster area, which indeed suggests that this area was culturally different. To involve this artefact type in the argumentation would have brought more breadth to the book. So, although artefacts illustrate the book in a beautiful way, they do not play a major role in this study.

It also becomes clear while reading the book that the author is perhaps more comfortable with handling certain topics than others. The historical and political landscape (Chapter 3) and the coastal resources (Chapter 6) have got most room in the book. Chronologically the book is perhaps also more about the transition period between the Late Viking Age and Medieval period (after 11th century) and not so much about early Viking Age. There is no harm in that, but it leads to a little less comprehensive understanding of this geographical area and its meaning during the Viking Age.

Chapter nine discusses the Baltic Ware also known as Wendic type pottery, a flat-bottomed ceramic type with patterns of wavy horizontal lines. Baltic Ware was the most common type of ceramic in southern Scandinavia, Northern Germany, and Poland during the Early Medieval period. But the pottery type is known in these areas already during the Viking Age. Traditionally it has been suggested that the technology behind Baltic Ware is likely to have been introduced by the Slavs, but further studies have shown that most of the vessels in the Scandinavian area have been locally produced. The chapter gives a comprehensive research history of this pottery type and its typology and serves as such a valuable contribution to the discussion. The chapter is complemented by a ceramic analysis by Torbjörn Brorsson from KKS (*Kontoret för Keramiska Studier in Sweden*) in Appendix 1.

The silver treasures (Chapter 10) show parallel features in Lolland-Falster and on the western Slavic side of the Baltic Sea. Especially during the 11th century, the fragmentation in the hacksilver hoards seem to rise in both areas which supports the author's arguments of a common cultural sphere.

The author concludes that Møn and Lolland-Falster were borderlands that were perhaps not under the control of the Danish king. Instead, they were in the middle of a Slavic influence, *Dania Slavica*. This included dynastic intermarriages, political, cultural, and economic connections but probably also immigration of a Slavic population. She backs this up by the evidence of Slavic place names ending in *-itse* in Lolland and Falster, the Wendic type pottery (Baltic Ware), the combination of the treasure finds and finally the written sources (*Saxo Grammaticus*).

This is an important piece of work and many people have been waiting for the results from these projects for a long time. Now it is finally here and beautifully put together in a book format.

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Gavin Lucas. *Archaeological Situations: Archaeological Theory from the Inside Out.* **Routledge, 2023. ISBN: 978-0-367-56545-9 (hbk), ISBN: 978-0-367-56010-2 (pbk), ISBN: 978-1-003-09829-4 (ebk) 208 pp.**
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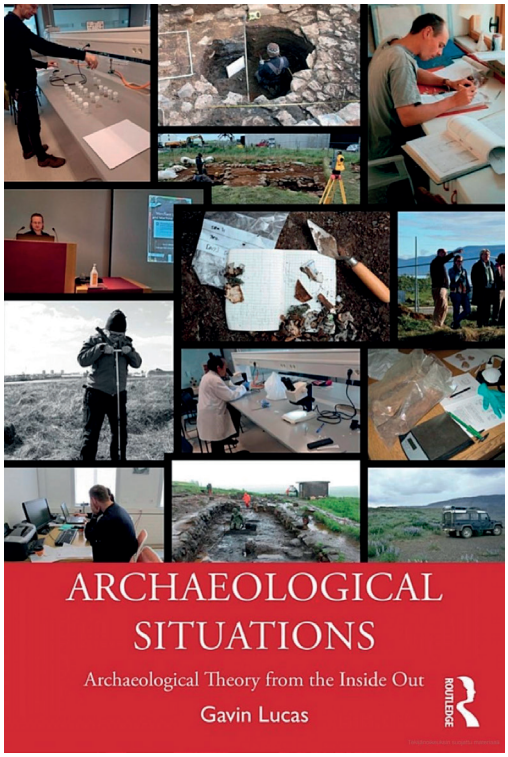

This textbook is aimed for undergraduate students. As I am not a student but a researcher, I have tried to write my comments from the pedagogical perspective. Lucas writes that the aim of the book is 'to introduce archaeological theory […] at a basic level, that is, as a first- or second-year course, but through a very different approach. It merges theory with method and tries to teach theory as part of the normal process of learning archaeology.' As Lucas says as archaeologists do not do theory we should 'teach theory as archeology, not theory in archaeology'. For me the book became a means for self-reflection as a teacher. While reading, I reflected on my own thoughts about archaeology as a discipline and theory in archaeology and how these can be taught to students and how this textbook is suited for that purpose. The book succeeded in helping me elaborate on my own thinking in teaching archaeology.

As Lucas promises, the book does not repeat the history of archaeological theories. In the chapter *Who's Afraid of Theory*, the three paradigms of archaeological theory (culture history, new archaeology, processualism, and postprocessualism) are of course shortly introduced, and so are the ways in which archaeological theories have turned from *-isms* to exploring concepts such as gender or materiality. However, Lucas goes further and concentrates on describing the process of how theory has 'changed its colours and metamorphosized into something more dispersed'. He critically evaluates how archaeologists have defined theory and discusses the relation between theory and data. He further relates the assumptions on facts and data made by archaeologists with the nature of knowledge as well as the nature of archaeological thought and practice. He clearly describes what theory is and how theory is no longer 'a tool used to assist archaeology but is part of the very fabric of archaeology itself'. To make his point he gives clear and relatable examples for an archaeology student. In the chapters he critically describes, defines, and argues how theory is embedded in thinking, decision-making, production of facts and archaeological knowledge while *Doing Fieldwork*, *Making Records*, *Writing up*, *Building a Case*, and *Doing Research* – which all are chapters of the book. He discusses thoroughly every aspect of archaeological research. In the last chapter, *Defining Archaeology*, Lucas critically reviews the major concepts of archaeology: the past, humans, and material culture. He also discusses heterogeneity of archaeology as science working within a trans-disciplinary setting.

The textbook reviews archaeological thinking and archaeology as a discipline and how these

have developed throughout decades and how they appear now for those working within or alongside Anglo-American archaeology. Lucas also brings in discussions – gendered field work, collaborative archaeology, Indigenous ontologies, and caring archaeology, to name a few – that have recently reminded us that the world can be seen differently from the way the most cited researchers portray. For the breadth of discussion, I would recommend the book to all the teachers and students of archaeology.

While reading one can experience Lucas's fascination over theoretic thought that is inherently part of scientific reasoning. Complex matters are clearly explained. The book is worth its title as it discusses archaeological situations and theory from the inside out. Every chapter offers a few useful exercises for the classroom and a thematically sorted list of further reading.

From the reader's perspective, this is not a book that you read in a couple of weeks, at least not if you want to reflect on the thoughts it represents. Personally, I would recommend that students keep the book with them and read it over a longer period. Indeed, for instance, the chapter on fieldwork will open up the discipline and the way of thinking for the first year student whereas chapters on writing and researching archaeology would go along well with the students who are about to start writing their thesis.

In the preface Lucas gives a taste of his own reflections on teaching theory and how difficult it is. Discussing archaeological thought and defining discipline has been and remains to be fundamental for all the archaeology students. The reason Lucas has taken the difficult task of writing the textbook is maybe found from his confession for loving archaeological theory. Further still, in *Coda* he finds troublesome the paradox that theory has been a driving force in archaeological research and yet it is difficult to define what theory is. I love paradoxes because in them lie innovation and discovery. We should not be afraid of them but rather explore deeper. In fact, this paradox was the very reason I chose to review the book. Lucas considers how to solve the paradox and opens a path for discussion on whether archaeology should get rid of theory and start 'theorizing'. This may be the right path but I also acknowledge that many paradoxes never get solved, and that is why they are so exciting.

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