The Pottery of Pahamäki at

Pahka, Lieto in Southwestern Finland

Samuel Reinikainen
Master's thesis
Department of Archaeology
School of History, Culture and Arts Studies
Faculty of Humanities
University of Turku
December 2019

The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin OriginalityCheck service.

ABSTRACT

In this thesis the pottery assemblage of the multi period settlement site and cremation cemetery under level ground at Pahamäki, Pahka, Lieto in SW Finland has been analyzed through optical microscopy. The oldest potsherds found at the site are most likely Typical Comb Ware, whereas the youngest sherds are of post-medieval date. The majority of the material is from the Merovingian Period–Viking Age.

A typology has been constructed based on primarily fabric, and to a lesser extent surface treatment, while largely omitting the most common typological variable, i.e. decoration. It is evident that the same decorations and vessel shapes have been used for a variety of fabrics. The pottery types have then been quantified based on sherd weight. Frequency seriation has been used to depict and compare the use-histories of the types in the different areas of the site.

The ceramic technology at Pahamäki has seemingly remained quite stable, and in the extreme cases, one can see a continuity from early Neolithic times to early medieval times. However, small modifications have often been made to the general recipes. In the west of the site especially, the fabrics and surfaces had underwent smaller alterations. Some larger trends could also be made out, such as a switch from organic, carbonate tempered fabrics to mineral tempered fabrics in Epineolithic pottery contra Iron Age pottery, which may have been a technological adaptation to an increasingly sedentary life. In some cases, the orientation of the temper hinted at the use of some kind of paddle and anvil to work the wet clay.

It has been argued that there were clear differences in the distribution of pottery between different areas of the cremation cemetery under level ground. The northern area may have been the original cemetery, which was expanded. There were also differences between the settlement contexts and the cemetery contexts. The distributions varied both in terms of represented types and overall quantities.

It appeared as if two coarse bulk wares have been in use during the Iron Age at the site, likely utilized for both cooking, particularly dry roasting based on charring patterns, as well as storage. However, they also played an important part in the funerary customs. Although crude, they may have been loaded with values tied to e.g. certain activities or traditional foods. Another type, perhaps used to boil food, was frequent in the settlement contexts, but almost missing within the cemetery.

Three finer types were overrepresented in the cremation cemetery under level ground in comparison to the settlement contexts. Notably, they were abundant in the first layer of the cemetery. Building on previous research, I have suggested that these finer types had a central function in the commemorative rituals and feasts, which took place on the cemetery. The vessels were likely used to serve food and drink, and perhaps for the brewing of beer. It is unlikely that they were cooking vessels, as no sherds were found with visible charring. Finally, there were some indications of possible re-use of pre-Iron Age pottery in association with the cremation cemetery.

Keywords: *Epineolithic, fabric, inclusions, Iron Age, optical microscopy, pottery, temper*

Contents

1. Introduction

1.1. Research questions, aims and scope

The traditional manner of studying prehistoric pottery in Finland has been to create typologies based on the decorations, surface treatments and shapes of preferably complete vessels. These typologies have then been used mainly to date archaeological contexts. Much work has been successfully carried out on particularly pre-Iron Age pottery, whereas the Iron Age pottery has fallen somewhat to the wayside. Overall, very little has been written about the nature of the temper chosen by ancient potters, and what ceramic fabrics can tell us about not only the functional properties of pottery itself, but prehistoric societies in general.

I have attempted to test what kind of morphological typology one ends up with when analyzing pottery using an optical microscope, and focusing primarily on the fabrics of potsherds, as well as their surface treatments, to a lesser degree. The pottery material is from the multi period settlement site and cremation cemetery under level ground, Pahamäki of Pahka, Lieto, in Southwestern Finland. The assemblage includes pottery from Early Neolithic times (5300 BC–3900 BC) all the way up to recent times, however the brunt of it is from the Merovingian Period–Viking Age (550 CE–1050 CE). The focus of the study has also been on this latter period.

The pottery types found at the site have been quantified based on sherd weight, and the use-histories of the pottery types have been depicted using frequency seriation graphs. The site has then been split into areas to check for spatial differences in the distribution of pottery. In addition to testing the methodology, the central questions for the study have been what the developments in the pottery reveal about the changes in life at the Pahamäki hill from a functional point of view, and secondly, how pottery has been in used in association with the cremation cemetery under level ground contra the settlement areas of the site.

1.3. Background

1.3.1. Pahamäki, Pahka: the site

Pahamäki is a low, craggy hill situated on the border between the Pahka and Sauvala village, in the municipality of Lieto in southwestern Finland (map 1.). Most of the hill is covered by forest, although a few buildings have been constructed on it, and a road connects to its southern end. An offshoot of the Aurajoki River runs west of the hill, and the outskirts of the town of Turku

reside only about 3.5 km downstream to the southwest. The area is characterized by fertile clay fields.

Map 1. The location of the Pahamäki site (National Land Survey of Finland, 2019).

According to Jukka Luoto (1988: 89–91), the hill first emerged as a rocky island roughly around the switch to the second millennium BCE, after having been submerged in water due to weight of the ice masses covering the North of Europe during the last glacial. Luoto interprets the oldest traces of human activity at the hill as hunters being drawn to the island, as it served as a resting place for a healthy stock of birds. Although, he adds, the typologically dated Late Stone Age (2800 BCE–1700 CE) flint sickle found at the site has commonly been considered a tool for collecting fodder for livestock, as opposed to any hunting activity.

Traces of human activity at the hill were first noted by Anna-Liisa Hirviluoto in 1970. In 1974, University of Turku conducted a phosphate analysis of the area, resulting in heightened readings (Luoto, 1976: 1). Slightly later phosphate analyses have however put the nature and age of the phosphate to question, as both the top soil and the natural display increased quantities of phosphate (Luoto, 1977: 6). With that said, it already became quite apparent that the contexts in question were archaeological in nature during the initial sampling stage. Following these indications, and with the initial purpose of the extending University of Turku's excavations at Vanhalinna, the prominent hill fort site located roughly 400 meters southeast across the

Aurajoki River, the university started the first excavations in the area in 1975, led by Luoto. A regrettable construction project had however recently began at the site, and had stripped parts of the cultural layers down to the natural.

Overall, areas of the Pahamäki hill (map 2.) have been excavated in parts over a period of seven years, between 1975 and 1982. The excavated areas are in the north, west, east, and predominately the center of the hill. For the sake of simplicity, I have opted to refer to the various areas of the site using their cardinal directions. Undoubtedly, a more rigorous spatial analysis could lead to some interesting results, but this approach was determined to be sufficient. The reasons for this are the complicated stratigraphy of the site, its large size and the nature of its documentation.

Map 2. Plan of the Pahamäki site (Luoto, 1980).

The north of the Pahamäki site, excavated in stages between 1975 and 1979, has been interpreted as a cremation cemetery under level ground, with an associated Iron Age village, overlying a Stone/Bronze Age settlement. The latter is represented by ceramic material and stone tools, whereas the cemetery is represented by irregular assortments of stones, burned

bone, pottery, and other finds such as jewelry and rivets, mostly from the Merovingian Period (550 CE–800 CE). In addition to this, the cemetery included a megalithic stone, as well as possible indications of inhumation burials, urn burial and later, perhaps Christian depositions of items (Luoto, 1976; 1977; 1981). Unfortunately, the pages in the excavation report detailing the year 1979, by Leena Salmio, are so worn that it was not possible to read them in either physical or electronic format.

South of this, Luoto (1978; 1981) writes that it immediately became apparent that this presumed younger area of the cremation cemetery under level ground was, in fact, several layers of settlement dating to the medieval period (roughly 1200 CE–1600 CE) and the Late Iron Age (800 CE–1300 CE), along with a burial mound. The finds indicated the existence of a building with a fireplace/stove tucked in its corner, along with stoneware and stoneware-esque pottery finds. Older activity was indicated by deep depressions into the natural. These depressions contained Iron Age, possibly Merovingian Period pottery and burned bone, and have been interpreted as clearly cemetery in nature. The oldest activity in the area activity was discovered in the shape of two deep-cutting fireplaces. Bronze Age pottery was recovered within one of these.

The adjacent area further west, Luoto (1982) interprets as showing traces of Stone/Bronze Age settlement, above which a cremation cemetery under level ground presided, especially in the northwest. A stone stove/burial structure was also found. In addition to this, the remains of a building were uncovered, in the shape of stone walls with a related floor layer. This last structure was evidently somewhat younger, as it included ceramic building material.

The westernmost edge of the archaeological features at the site was excavated in the most recent excavations carried out by Kristiina Korkeakoski-Väisänen in 1982. The findings here consisted (Korkeakoski-Väisänen, 1983) of several layers of irregular stone paving of head sized stones, punctuated by occasional fist sized stones, and mixed with in with layers of sooty, dark and organic soil. In general, the brunt of the burned bone was found within the sootiest fills, whereas the objects, i.e. pottery, burned clay, beads, stone artefacts and various scraps of iron and bronze, were mostly found among the stone paving. She interprets this as a cremation cemetery (Finnish *polttokalmisto.* Note: the terminology and burial form have been explained in the following chapter) closed in by larger boulders to the east and west, and by the natural bedrock in the south of the excavated area.

The area south and east, as seen from the middle of the site, contained a low burial cairn, with a possible central stone, in association with fragments of several clay spinners. The cairn was not possible to date due to the mixed stratigraphy, though the fill of the circular ditch surrounding it was dated to the period between the 8th and 10th century CE. In general, the find material from this area of the site was a mix of medieval and older finds, with no clear division between the periods (Luoto, 1979; 1981; Onnela et al., 1996).

Overall, the stratigraphy of the Pahamäki site is explained (Luoto, 1976; 1977; 1978; 1981; 1982; Korkeakoski-Väisänen, 1983) as organic top soil immediately followed by stones within dark, sooty soil, which contained the brunt of the finds. After this, there is a lighter clay with fewer finds. This is followed by another cultural layer, from which the Stone/Bronze Age finds were recovered. After this, there is a clean natural gravel. Finally, small depressions into the natural were found across the site, containing concentrations of finds. These have been interpreted as contexts relating to the cremation cemetery under level ground and possible ritual plough marks.

The pottery found at the site has been studied to a limited degree. An experimental thermoluminescence dating resulted in an age of 90 BCE–410 CE for a scratched vessel with a smoothed and thinned S-shaped upper part, and faint rug marks on its base. Its likely age is interpreted to be around 160 CE. This would place the vessel somewhere between the Pre Roman Iron Age (500 BCE–50 CE) and the Younger Roman Iron Age (200 CE–400 CE), which in turn would make them somewhat older than the finds from the definitive cemetery context. Typologically, scratched and undecorated vessels have been associated with Morby type pottery, though it is not impossible that this vessel is part of a separate type. The fact that some similar sherds were found alongside artefacts dated to the Earlier Roman Age (0–200 CE) is interpreted as mixing of the two contexts (Asplund, et al., 2008: 33–35, 40).

A C14-dating of the charring from within another vessel found at Pahamäki gave a reading of 2110 +- 35 BP. Calibrated, the age is 350–320 BCE or 210–40 cal BCE, i.e. within the Pre-Roman Iron Age (500 BCE –50 CE). The vessel, with its thick wall and coarse temper, though a smooth surface due to the application of a clay slip, is interpreted as a new type (Asplund, 2009: 21).

Overall, Luoto (1988: 113) has interpreted Pahamäki as the development of a single village with associated cemeteries, situated on the hill. The village existed between 700 CE and 1500 CE, from the Middle Iron Age (400 CE–800 CE) well into medieval times in a Finnish context,

during which time the village population buried their dead in the various burial structures at the site. He considers it likely that the hill has been the original location of the old Pahka village, which still exists today in a diminished shape. He links this to Mauno Wanhalinna's observation that a small swelling in the rock on the top of the Pahamäki hill may have given the village its name (the Finnish word *pahka* refers to a gnarl, lump, or wart).

Before this, Luoto (1988: 105, 113) notes, the hill was consistently inhabited from the 4th century CE. He does not see any continuation between these stages in Pahamäki's history and the much earlier settlement and stray finds from Late Stone Age (2800 BCE–1700 CE) and the Bronze Age (1700 CE–500 CE). This is due to there being no such development visible in the material culture, and the fact that no finds have been dated to the Pre-Roman Iron Age (500 BCE–0), creating a sizeable gap in the settlement history of the site.

An alternative interpretation is offered by Esa Hiltunen (1988: 207), who proposes that the settlement linked to the cremation cemetery under level ground may have been the area Skogsgerdböle, which is known from historical sources. It has been documented that the area was sold by Antti Äijönpoika of Vääntelä to the knighted Olavi Tavast in 1418, after becoming abandoned at some point during the 14th century. In time, Hiltunen continues, Skogsgerdböle became absorbed into the surrounding villages.

In recent memory, the Pahamäki hill has been used primarily as a pasture for livestock, though also as a place to light bonfires (Finnish: *kokko*) and to get rid of various waste materials, according to local people (Luoto, 1976: 2). Very regrettably, in the recent VARK (nationally significant archaeological sites)-inspection 11.8.2019 it turned out that large amounts of soil had been dumped onto the hill, and the foundation of a road been placed on it. The damage to the site was evidently serious enough to consider dropping it from the list of nationally significant archaeological sites – VARK.[1] To date, the site has not been excavated anywhere near to completion (Luoto, 1988: 89–91, 112–113).

1.3.2. Cremation cemeteries under level ground

The term cremation cemetery under level ground refers to a cemetery form consisting of a ground level, structure-less assortment of rocks, in between which the commingled cremains of several individuals have been spread. A rich assemblage of often times broken artefacts,

[1] Kyppi.fi, (2019). *Finnish Heritage Agency's web service for the cultural environment*. [online] Available at: https://www.kyppi.fi/palveluikkuna/mjreki/read/asp/r_kohde_det.aspx?KOHDE_ID=423010005. [Accessed 25.11.2019].

such as jewelry, weapons and pottery are usually found within the cemetery, alongside other finds such as non-human bones and slag.

As has been pointed out by a few, cremation cemeteries under level ground are mentioned sparingly in the literature up until the shift to the third millennium, at which point they underwent a slight "boom", resulting in a multitude of new studies. As Anna Wessman (2010: 16) points out, many of these new studies have been conducted by students at University of Turku, and furthermore several of these new studies have been done utilizing methods and theories, which are fresh within the context of Finnish ritual and cognitive archaeology.

Miikka Haimila (2002) has given an extensive history of the research done on cremation cemeteries up until this point in his master's thesis. According to him, the term is never suggested as a new term in the literature, and on the contrary appears to have taken root over time sometime during 1920s and 1930s. Arne Michaël Tallgren wrote about *kenttäpolttokalmistoja*, (i.e. a slightly modified version of the same term), and descriptions of features with the general characteristics of cremation cemeteries under level ground stretch all the way back to the 19th century. The early descriptions, such as Heikel's description in 1894, tend to be very simplistic however, Haimila continues.

It should be noted that opinions regarding the nature formation processes of cremation cemeteries under level ground have diverged much, with some archaeologists questioning their very existence.

Luoto (1982: 3) has speculated that the cemetery form may have its root in the partly earlier though mostly contemporary tradition of constructing *palokuoppahautoja,* or fire pit burials [my translation]. Continuing the discussion of similarities to other burial forms, Rohiola (2003: 25) sees a link to *maansekaisia röykkiöhautauksia*, which are both slightly older than and contemporary to cremation cemeteries under level ground.

Haimila (2002) has interpreted the curious cemetery form in the light of memory, and the landscape of permanent village settlements. According to him, the cemeteries were placed in elevated locations as a visual tool for the collective memory, perhaps boosted by the activity of seizing a difficult terrain. The purpose of the stones may have been to symbolize permanence, whereas their significant size may be the result of a larger number of interments than in related burial traditions.

Anna Wessman (Wickholm, 2005; Wickholm & Raninen, 2006; Wessman, 2008; 2010) suggests that the cremation cemeteries under level ground have intentionally been placed in ritually significant and highly visible places near waters and the old fields. As to the idea that they are a development of tarand graves, she points out that this is a confusion due to cremation cemeteries under level ground sometimes being found on top of tarand graves. According to her, the cemetery form was long considered specific to SW Finland, although now they have been found within an area encompassing Swedish Svealand, Finnish Ostrobothnia, North Latvia and the Lake Ladoga area in Russia. She explains how they have alternatingly been viewed as the cemetery of individual farmsteads and entire villages.

In Wessman's (2010: 25–26, 31–32) understanding, the cremation cemeteries under level ground have served as a center for various activities surrounding commemoration, re-use and construction of the past. Several secondary activities may have taken place in relation with them. The complexity of the cemetery form is illustrated in the way individual weapon graves, which nonetheless may have included commingled bones, have been placed within them during Merovingian times (550 CE–800 CE). Furthermore, the emergence of Christianity during the end of the Viking Age (roughly 1000 CE) led to inhumation burials being dug within the old cremation cemeteries.

More skeptical interpretations have been offered by especially Jussi-Pekka Taavitsainen (1991: 7–10). He problematizes the very concept of cremation cemeteries under level ground, and how they have been interpreted. He raises the point that their commingled nature may simply be the result of looting, in search of e.g. metal for the smithies, a common behavior. Furthermore, he argues that the artefact assemblages found in the cemeteries are very similar to those found in the smithies themselves, as well as settlement sites to some degree. He argues that this could mean that the cemeteries may have had secondary uses either at the same time or in succession. He goes as far as to suggest that the cemeteries under level ground may in fact just be the refuse heaps used by Iron Age settlements.

1.3.3. Pottery in archaeology

The use of pottery in archaeological studies is as old as the discipline itself. Pottery tends to be ubiquitous across archaeological sites, due to the simplicity of the technology, the availability of resources, and its ability to survive over staggeringly long stretches of time. As such, this will necessarily have to a somewhat barebones overview of how pottery has been used in archaeology, though it should be understood that it is one of our most rudimentary materials.

Orton et al. (1993: 3–21) have attempted to link together previous pottery categorization attempts into three general phases: the art historical phase, the typological phase and the contextual phase. The first phase consisted of enthusiasts trying to decipher the development art styles seen in intact vessels.

The following phase, the typological phase, was born out of a need to categorize the increased quantity of recovered potsherds. It resulted in rigorous typologies used to date stratigraphy sequences and group remains of ancient populations into archaeological cultures. Furthermore, the method of seriation made it possible to show the use-history of individual types of pottery.

The final phase, the contextual phase, is a combination of methods and theories from a vast spectrum of natural sciences and humanities, utilizing everything from extremely specific chemical analyses to a multitude of ethnological analogies. The aim is to interpret pottery, and subsequently people, within the larger context of society.

My reading of the history of pottery studies in Finland, is that they have traditionally been conducted within Orton's et al. first phase, the art historical, with strong hints of the second phase, i.e. the typological, with some notable exceptions (e.g. Carpelan, 1979). This has been the situation up until this very day, even if some attempts have been made to diverge from this school (e.g. Holmqvist-Saukkonen, 2012). The heavy hitters of Finnish pottery studies are still very much the established studies of the 20th century.

In general, the aim of the Finnish research tradition has been to be able to identify the decoration of entire clay vessels, which is characteristic to a specific time and place. Utilizing these characteristic decorations, attempts have been made to construct a typology with which it should be possible to date archaeological contexts.

The importance of the dating function of pottery in Finland explains why studies done on pottery are so disproportionately focused on the pre-Iron Age period. As iron was introduced in modern day Finland, so too came several new ways of dating archaeological contexts. The Finnish Iron Age pottery has been considered notoriously difficult to interpret, with the same general styles having been in use across significant stretches of time and space. Finally, the somewhat rustic aesthetics of the aforementioned pottery may have turned many a researcher off the subject (Carpelan, 1963; 1979; 1980).

The earliest notable publication featuring Finnish Iron Age pottery that I have been able to find, is Hackman and Heikel's "Vorgeschichtliche Altertümer aus Finnland: photographische Tafeln

aus dem historischen Museum des Staates in Helsingfors" (1900), which is a collection of photographs and to a lesser degree drawings, showcasing the material culture of prehistoric Finland. For pottery, the focus has clearly been on depicting the decorations and shapes of the vessels. For Iron Age pottery especially, there is a bias toward depicting rim sherds, as this is where the decoration was placed, if present.

Nils Cleve has written about the decorations and shapes, as well as a little about the crafting methods of Iron Age pots in his two books on Iron Age inhumation cemeteries in Köylio: "Skelettgravfälten på Kjuloholm i Kjulo: I. Den yngre folkvandringstiden" (1943) and "Skelettgravfälten på Kjuloholm i Kjulo: II. Vikingatid och Korstågstid, Gravfältet C" (1978).

Kivikoski has written about Iron Age pottery in her monographies "Rautakauden Kuvasto I" (1947) and II, "Rautakauden Kuvasto II" (1951). In these, she covers the decorations and shapes of clay vessels across the Iron Age (500 BCE–1300 CE), with some mentions of the fabric and find context. She has also written about the subject in her doctoral thesis "Die Eisenzeit im Auraflussgebiet" (1939), although I have not familiarized myself with this last work, as I am not a German speaker.

Carpelan (1979; 1980) has categorized pottery from the entire Iron Age based on their decorations, and attempted to date them. Furthermore, he has interpreted the technology and spread of pottery using temper, notably asbestos.

Luoto has constructed a detailed typology of the pottery assemblage found at the Vanhalinna hill fort in Lieto, in his doctoral thesis "Liedon Vanhalinnan Mäkilinna" (1984) He has identified 54 types based on decorations, shapes and surface treatment, stretching from Typical Comb Ware to medieval brick like pottery. He has also given some consideration to their fabrics and made an attempt to quantify the number of vessels in the assemblage based on the aforementioned typology and spatial distribution.

Since the 21st century, a number of articles and master's theses have been written on the subject of Iron Age pottery. Susanna Lehtinen (2003) has attempted to quantify occurrences and co-occurrences of a selection of properties in clay vessels. She has considered decoration, shape, thickness of the wall, surface treatment, and size of the "sand temper" based on eye measurements. She has also made some functionalistic interpretations for why the vessels where crafted the way they were, and for what they may have been used.

Heikki Simola (2000) has experimented with different firing environments and temperatures of clay vessels, proving the beneficial relationship between controlled, high temperature and vessel durability. He argues that the disappearance of pottery from the archeological material during the middle of the Iron Age (500 BCE–1300 CE) might be a simple consequence of the mastering controlled, high temperature. A skill born through working with metals.

Elisabeth Holmqvist-Saukkonen (2012) has studied the origins and technological aspects of pottery at settlement sites in Jordan and Israel using ED-XRF (energy dispersive x-ray fluorescence spectrometry) and SEM-EDS (scanning electron microscopy with energy dispersive spectrometry) to find out the chemical composition of the clay pastes. Utilizing these, she has interpreted the production and trade systems in the area, within its culture-political context. She argues that the same type of research is viable in a Finnish context.

Sisko Jokisalo (2018) has most recently studied Iron Age pottery fragments in her master's thesis, based on their surface treatment, coloration, and coarseness of temper – once again based on eye measurements. She has interpreted the crafting processes and use-wear on the potsherds.

In the newer studies, one can see a gradual shift in focus from the purely decorative-typological themes. New, high-tech methods from the natural sciences have entered the game, making it possible to answer a wide range of new questions. On a theoretical level, the societies that produced and used the clay vessels have come into focus to a larger degree. Added emphasis has been given to considerations such as what kind of technology was required to produce a vessel, and what hypotheses one can make regarding the function of a particular vessel within its societal context. Furthermore, it has been speculated on what the distribution of particular wares can tell us about trade networks, culture, status, attitudes and so on of the Iron Age (500 BCE–1300 CE) populations of Finland.

2. Theory

2.1. Central terms used in the study

Fabric – within this study, fabric has meant the entirety of the material that makes up a clay vessel. In other words, the clay paste and all the additional particles.

Inclusions – used in regards to the particles that are found within the fabric of the vessel, that are not the actual clay paste. The term has been used neutrally, and may refer to either materials occurring naturally within the clay source used by the potter, or inclusions that have been deliberately added to the fabric.

Temper – has referred solely to the inclusions that have been interpreted as intentional additions to the clay fabric. It should be noted that the intentionality behind the potter's work is in no way self-evident, and that the discrimination between deliberate and natural inclusions are based on the interpretation of the author.

2.2 Typology

William Y. and Ernest W. Adams (1991) have written an exhaustive monograph on how we as humans classify the world, with a special focus on archaeological artefacts from a practical standpoint. They define typology and type in the following way:

> A typology is a conceptual system made by partitioning a specified field of entities into a comprehensive set of mutually exclusive types, according to a set of common criteria dictated by the purpose of the typologist. Within any typology, each type is a category created by the typologist, into which he can place discrete entities having specific identifying characteristics, to distinguish them from entities having other characteristics, in a way that is meaningful to the purpose of the typology (Adams and Adams, 1991: 91).

According to Adams and Adams (1991: 8, 41–42), it is a universal human trait to use one's senses to distinguish and classify entities from a myriad of information around us. Even after the sensory stimuli is gone, the imprint of it allows us to recall its image. The typologies we create become scientific when used in science, which leads to one of their main points: typologies are usually created as a tool, and as long as they are useful, their existence is justified.

Typology has, nonetheless, received criticism. Orton et al. (1993), for instance, raise the argument that rigorous typologies are a thing of the past, as they have a tendency to describe the material with pointless detail at the same time as they reveal nothing about the people behind it. Furthermore, countless researchers have created typologies that cannot be used by anyone but that researcher, casting doubt on the entire activity.

Adams and Adams (1991: 8–10, 33–34, 48, 166–167) answer this critique by pointing out that typology not only makes up the foundation for the time-space large picture we as archaeologists rely on for large parts of the prehistoric period, but remains a viable way of classifying and analyzing material for a number of purposes. Subjectivity is necessarily built into typology, as they are most often created for someone's purpose. Furthermore, as we are unable to objectively classify the world around us, the things, ideas and representations we use for those ideas are necessarily incomplete. Each type is made partly as a discovery and partly as an invention, both natural and artificial. A specific typology, they counter, may be the perfect way to describe and

analyze a specific material. The error lies in trying to force an existing typology onto an incompatible material or line of questioning.

To draw these theoretical concepts closer to the matters handled in this thesis, the pottery assemblage of the Pahamäki site has been classified according to the principles of phenetic, or morphological typology, as outlined by Adams and Adams (1991: 217–218), in which artefacts are grouped together based on combinations of their innate properties, without considering outside factors. In this study, intrinsically similar potsherds have been assigned the same type label. Similar sherds with some key difference have been considered part of the same type family. As an imaginary example, the primarily felspar including pottery type 1 may occur tempered with dolomite in another part of the assemblage, meaning we now have the type family 1, consisting of 1A and 1B, one without and one with dolomite.

The purposes of the typology created for this thesis were mainly basic in nature, though they also have an instrumental side, to borrow from the way Adams and Adams have broken down the possible purposes behind typologies. The instrumental purpose was incidental, in the sense that the typology functioned as a memory tool, making it possible to mentally manage a large material. The basic purposes were to make it possible to 1. describe the material in an economic, meaningful way, 2. compare parts of the site to each other, 3. analyze Iron Age pottery to increase our knowledge of it, 4. interpret the people making and using the pottery, and finally 4. illustrate what the pottery tells us about the changes in life at Pahamäki over time.

3. Material

In total, the pottery assemblage at the Pahamäki site amounts to 8258 potsherds. The assemblage, alongside the other finds from the site, is kept within the archaeological collection of the archaeology department at University of Turku. The location of the assemblage, as well as the number of sherds is divided in the following manner:

TYA 82 (1975): 2429 sherds
TYA 87 (1975): 3 sherds
TYA 90 (1976): 1733 sherds
TYA 98 (1977): 162 sherds
TYA 101 (1997): 0 sherds
TYA 104 (1978): 437 sherds
TYA 160 (1979–80): 2140 sherds
TYA 173 (1980): 313 sherds

TYA 187 (1981): 302 sherds
TYA 219 (1982): 739 sherds

The pottery spans a very wide time period, though the majority of the finds are from the Iron Age (500 BCE–1300 CE). Although this is not a study on the art historical typology of the pottery assemblage at Pahamäki, it would be foolish to throw that vast body of knowledge out the window. As such, I have anchored my material to the existing research in general terms, and will spare a few words to present it in the traditional way. The argumentation behind this overview has been fleshed out when discussing the potsherds in question. Unless otherwise mentioned, underlying comparisons have been made based on reference material found on the University of Helsinki archaeology department's online database for prehistoric pottery in Finland[2]. The research literature on Stone Age pottery and their decorations has not been deep dove into for the purpose of this study, as it is mainly focused on Iron Age ceramics.

According to Luoto (1977: 2; 1988: 89–91) the oldest certifiable potsherds are from the Bronze Age (1700 BCE–500 BCE), though some possible Stone Age sherds were reported as well. Activity during the Late Stone Age (2800 BCE–1700 BCE) is also indicated by other finds.

Based on decorations and inclusions, I have argued that the oldest potsherds finds in the Pahamäki assemblage could be as old as Typical Comb Ware, perhaps even in its early form, whereas other sherds could represent Late Comb Ware. The assemblage also includes textile-impressed pottery, which could belong to the Late Stone Age Kiukaisten Ware, though the slightly later Sarsa Ware is perhaps a more plausible interpretation.

Distinctly Bronze Age–Epineolithic pottery is also found in the Pahamäki material. This period in pottery making is indicated by sherds decorated with rows of small pits, which could belong to the Paimio Ware, or its later stage, Morby Ware. Finds of coarse sherds with heavily scratched surfaces could also belong to the latter type (Kivikoski, 1947: 29).

The Iron Age pottery makes up the vast majority of the Pahamäki ceramic assemblage, and consequently the focus of this thesis. It is represented by both the rough, undecorated, commonly assumed to be everyday pottery, and the finer burnished, black smoked, often times decorated pottery. Most of the common Iron Age decorative themes are present in the material. They include incised crisscrosses, oblique lines, horizontal lines, angles, wavy lines, and zigzag

[2] P. Pesonen, (1999). *Suomen esihistoriallinen keramiikka*. [online] The University of Helsinki archaeology department's database on prehistoric pottery in Finland. Available at: www.helsinki.fi/hum/arla/keram/ [accessed 08.10.2019].

lines. The themes are frequently placed within borders of horizontal incisions. An exception to this are broad, shallow grooves, and cord marks, both of which always appear without borders. Single or dual cord marks are also one of the most common decorative elements within the assemblage. As a rule, the decorations have been placed horizontally along the rim and/or the neck of the vessel.

To give an idea of chronology of these Iron Age decorative themes, Cleve (1943: 157) notes that horizontal grooves feature in Migration Period (400 CE–550 CE) pottery, which is however usually not decorated.

Lehtosalo-Hilander (1982b: 79) has found support for what was initially Kivikoski's (cited in Lehtosalo Hilander, 1982b) general dating of zigzag/wavy lines [I disagree with clumping curves and angles together] to roughly the shift between the Merovingian Period (550 CE–800 CE) and the Viking Age (800 CE–1050 CE). Their dating of cord marked vessels also correlate to roughly the Merovingian Period until the 10th and 11th centuries CE. In both cases, Lehtosalo-Hilander notes that the decorations occur slightly later at Luistari than what Kivikoski's more general dating indicates, and are on the side of the Viking Age rather than Merovingian times.

Crisscross decoration, on the other hand, was at its most popular during the end of the Viking Age, around the 11th century, according to Carpelan (1980: 195). Though the pottery was essentially the same, he notes that the new decorative theme came at the expense of the now rarer cord marks, and the zigzag decoration, which vanished completely.

The medieval period (roughly 1200 CE–1600 CE) at the site is illustrated by proto-stoneware and near-stoneware. Many of these sherds have also been covered with colorful glazes. The medieval period also marks the introduction of wheel-thrown wares at Pahamäki. However, as a side note, Kivikoski (1951: 27) has shown that pots where thrown on the wheel already during the Crusade Period (roughly 1050 CE –1300 CE) in Karelia, East-Finland.

The most recent pottery found at Pahamäki includes high-fired red earthenware, faience and a single sherd of stoneware, which outer surface has been decorated with an embossed (raised) floral pattern, which has subsequently been painted and glazed. The last example in particular is clearly from recent times.

4. Methods

4.1. Sampling

The first order of business was to eliminate all the potsherds from the sample that were smaller than 15 millimeters in either dimension. As Orton et al. (1993: 46) point out: sherds smaller than 10 millimeters tend to be redundant for quantification, and are usually not found without sieving. Due to the size of the Pahamäki assemblage of pottery, and its uniformity, I saw fit to increase the minimum sherd size somewhat.

Sherds recovered from unknown contexts were also eliminated, as they cannot be used when studying patterns in the distribution of pottery. There were some instances where the context of finds was unknown due to incomplete documentation, and pottery was also routinely recovered from the spoil heaps. Overall, the amount of pottery without details regarding their depositional context was small enough to be statistically insignificant.

Finally, potsherds that could not safely be categorized as one specific type were not used in the quantification. The reasons for the difficulty in categorizing them stemmed from them lacking diagnostic characteristics or being malformed due to some process. Sherds made porous due to exposure to heat were not used in the quantification regardless of whether it was possible to discern their type. The changes in their fabric makes them lighter, and would thus distort their proportionate weight within the sample (Asplund, 2019).

4.2. Optical microscopy

The remaining sample of potsherds above 15 millimeter in size were analyzed using a stereo microscope of the model Zeiss Stemi 305, with a zoom potential of 5:1, and cold LED-light sources for illumination of the object under the microscope. Photos were taken using the attachable 5-megapixel camera Zeiss Axiocam ERc 5s, and manipulated using the microscope image processing software ZEN (Zeiss Efficient Navigation).

Optical microscopy is, to put it shortly, based on the manipulation of visible light (electromagnetic radiation with a wavelength of roughly 380–450 nanometers) by focusing it through lenses in order to magnify an image. Stereo microscopes fall underneath this umbrella term, and in turn usually work by having two separate eyepieces catch the visible light that bounces of the object under the microscope. The two eyepieces offer a slightly different image respectively, giving the beholder a magnified, three-dimensional view of the object.

As some inclusions look very much alike when viewed through an optical microscope, a steel pick was further used to investigate the hardness and overall texture of inclusions which nature was not evident.

4.3. Typological factors

The pottery was assigned a type based on a number of factors. In order of importance:

1. Fabric
    a. Size of inclusions
    b. Frequency of inclusions
    c. Nature of inclusions
2. Surface treatment

Beyond these factors, qualitative and descriptive observations were made regarding 1. color, 2. thickness, 3. decoration, 4. shape and 5. size. Due to the quantity and nature of the material, it was deemed impractical to e.g. take exact measurements of sherd widths, as they tended to vary significantly within even the same vessel. These factors mainly came to represent the variation within a type, rather than being the basis of forming new types. To put it more plainly, pottery with identical fabrics but e.g. different decorations were seen as being of the same type within this study. The viability of this approach has been evaluated further in the discussion part of the thesis.

It should be noted that this is very much a typology of *sherds* rather than complete vessels. However, for the sake of the flow of the text, the phrase "the type 5C sherds, which make up these vessels" has frequently been written as "the type 5C vessels." The problem with sherd-based typologies is that there may be a considerable degree of variety between sherds of the same vessel. Disregarding exceptions where different pastes have been used for different parts of the vessel, sherds that are quite obviously of the same fabric end up as different types if one does not take the entire vessel into account. In addition to this, it limits the researcher's ability to draw conclusions of the shape, size and use-wear, which requires a large part of the vessel to be intact. I have underlined my reasons and delved deeper into the limitations and possibilities of the sherd-based approach under the following sub header.

4.4. Quantification

It quickly became apparent that the most practical manner of quantifying the sample was in terms of weight. It would have been an unrealistic aim to attempt to reconstruct all of the vessels in the sample. The reasons for this is the large size of the sample, its high level of fragmentation, the time restraints, and (admittedly) the author's initial unfamiliarity with pottery analysis.

To paraphrase Orton et al.'s (1993: 166–167) view of quantification methods of pottery, one should study the composition of different types of pottery within an assemblage, rather than focusing on individual amounts, as we have no way of telling how much of the original assemblage we have access to today. Furthermore, the amounts do not directly reflect how common each type has been, as the lifetimes of different vessels have been likely to differ wildly.

A, for this study, important issue that they (Orton et al., 1993: 168–171) raise, is that the unfortunate consequence of not reconstructing the vessels is that it is not possible to quantify the number of vessels recovered at a site. Another limiting factor when quantifying assemblages using weight is that one inevitably ends up with a statistic that is tilted in favor of the heavier pottery types. This sample bias means that it will not be possible to get the accurate proportions of types within a sample. On a more positive note, they continue, the sample bias will be the same between different assemblages. In other words, quantifying pottery via weight gives you a proportionately accurate count when *comparing* different assemblages to each other, and is as such a viable method of quantification in order to eliminate skewing of the statistics.

4.5. Frequency seriation

Seriation is a way of organizing a material along a single line. In frequency seriation specifically, the variable used is the frequency of occurrence, making it possible to see when a type is introduced, is at its most popular, and finally enters decline. Seriation can be used to establish a relative chronology for different types. Those types that are often times found alongside each other within the same or similar contexts are assumed to have a similar age-range.

Frequency seriation graphs have been created for each pottery type identified in the Pahamäki material. As defined in the previous sub chapter, a type's frequency in this study is based on its weight. This made it possible to compare the frequency seriation of different types between different areas of the Pahamäki site.

A couple of issues concerning the application of the method in the context of the Pahamäki site should be highlighted. Firstly, the site was excavated in technical layers, which unlike stratigraphic layers obviously do not follow a temporal order. This means that the frequency of occurrence of a given pottery type within each layer does not result in a neat chronological graph representing the popularity of that type during each stage of activity at the site. Furthermore, the actual stratigraphy of the site is far from self-evident. The Pahamäki hill has

a history of human activity spanning thousands of years and cremation cemeteries under level ground are notorious for being mixed contexts. As such, it is very likely that cultural layers at the site have been disturbed and become mixed with each other, resulting in finds of very different age being found next to one another.

In an ideal world, the prevalence of later cuts into older layers would have been noted at the time of excavation, and subsequently documented. This can be a daunting task for a field team, especially when excavating contexts that are more demanding. It is important to point out that Pahamäki was excavated during the 70s and early 80s; an era with a wildly different approach to excavation and documentation protocols compared to those of today.

Limitations and problems aside, it was concluded that the chosen methodology was the most practical way to approach the themes and questions that interested the author. The Pahamäki site was deemed an attractive site for the purposes, with its vast amounts of pottery from different periods.

5. The pottery and its distribution

5.1. Earthenware

5.1.1. Types 1A–B

Pottery type 1A represents (figure 1.). one of the "finest" wares at Pahamäki that nonetheless occurs in significant quantities across the assemblage. The type stands out due to, among other things, the frequency and complexity of its decoration.

Figure 1. Profiled and decorated rim sherds and a flat base sherd of Pottery type 1A from the Pahamäki assemblage.

It does not appear as if the ancient potters have strived for any one particular color for the vessels of type 1A, as a wide range of colors is represented in the type. Different shades of gray and brown occur frequently, with varying values of red, all the way to a distinct orange. There

are also instances of completely black sherds. The cores tend to be of a comparatively lighter gray or brown shade.

The coloration of the type 1A sherds appears to be loosely correlated to different parts of the site. In the northern parts of the site, the sherds tended to be shades of brown and gray with varying amount of reddishness. Particularly the gray sherds were sometimes quite dark. The same colors could be seen in the westernmost parts of the site, with the exception of dark gray, whereas the sherds tended to be more orange in color slightly east of this. The completely black sherds of type 1A were found in the middle of the site, and southeast of this. Although there are generally not discernable color differences in the areas between the core and surface of the Pahamäki pottery, i.e. the margins, visible color margins occur in the sherds found in the north of the site. Some of the dark gray sherds have brown inner and outer margins, whereas some of the lighter brownish and grayish sherds have orange margins.

According to Orton et al. (1993: 69), discernable margins within the sherd wall can be the result of alterations of the firing conditions during the firing process. However, they (1993: 133–135) stress that the color of pottery is the result of a complex process, based on not only the raw materials of the paste, but firing techniques and post-depositional processes, capable of both altering the color and reversing the effects. The takeaway from this is that we can merely speculate on matters of color in the context of the pottery of Pahamäki, as we do not know all the variables.

The vast amount of the 1A sherds are smooth, though rougher examples occurred as well. The aim has possibly been that the 1A vessels should be sufficiently smooth to the touch, though we find some instances where the surface treatment has not been as meticulous. More accessible knock-offs are certainly not only a product of the modern day, though there could be any number of reasons for the diversity in surface texture. We also find that a few of 1A vessels have been burnished. These were found within a few isolated layers, and did not correlate with any particular area of the site.

Interestingly, there appeared to be some differences present in the sherds making up the neck and rim of the vessels, and the sherds of the body and base. This is not something that was exclusively observed in type 1A, as differences in thickness are relatively common throughout the assemblage. The differences between parts of the same vessel are, however, especially common and pronounced in type 1A. As already noted, the necks and rims have a tendency to be comparably thinner than the lower parts of the vessel. The thickness range is nonetheless

decidedly on the thinner side across all of the 1A sherds, and varies between roughly 2 centimeters and 0.5 centimeters. Secondly, the neck and rim sherds have often times had their surfaces smoothened to a larger degree. Finally, the fabric sometimes differs between the sherds of the rim and neck, and those of the body and base.

These aforementioned differences coincide with the many types of decorations of type 1A, which are always positioned on the upper parts of the vessel. It seems logical that a fabric with smaller inclusions would have been used for a thinner part of the vessel, to prevent it from becoming significantly more fragile than the rest of the vessel. The rim is already prone to degrading by default, as are the edges of any object. Following this line of thought, maintaining the upper part of the vessel's proportionate durability could have had extra importance, considering the fact that many of the necks of the 1A vessels are both decorated and profiled. It would seem likely that making incisions into the clay wall, and shaping it into a more complex form would compromise its structural integrity. However, experiments might disprove that assumption.

To reiterate, the 1A sherds show some decoration very frequently and it is safe to say that the vast majority of these vessels have indeed been decorated. To give a short account of the decorative themes present on the vessels of type 1A, repeated oblique incisions, and crisscrosses (double or simple incision), running alongside the neck of the vessel, occur frequently within the assemblage. One to two incised horizontal wavy lines are also common. These decorations sometimes occur within borders of horizontal incisions, though simple one to three horizontal incisions are also common as a decoration on their own. Cord marks, though not quite as frequent a theme, also occur on the 1A vessels. A single instance of a raised horizontal collar was noted in the bend between the neck and the body of one vessel.

Finally, a deviating "decoration" visible on a few 1A vessels found in the north of the Pahamäki site consists of an approximately 15 centimeter wide belt of orange color on an otherwise brownish gray vessel, starting just below the rim and covering some distance down the upper part of the body. The regularity of its shape makes it difficult to argue it has developed accidentally, suggesting it has been done deliberately, perhaps for aesthetic reasons. I have been unable to find any mentions of bands of differing colors on Finnish prehistoric pottery, which raises the question of whether this feature is uncommon or merely has not been made note of.

The other decorations have present on the type 1A vessels have been noted and studied by a number of researchers in the field. It is, however, difficult to date the Pahamäki vessels based

on the earlier research to a meaningful level, as many of the decorative themes have been in use for a long time, and the chronologies differ between researchers. According to Kivikoski (1941: 42, 59; 1951: 27), wavy lines and crisscrosses were used as decoration since the Earlier Migration Period (5th century CE), and as late as the Viking Age (800 CE – 1050 CE), whereas horizontal line incisions are known from the Later Migration Period (6th century CE). She (cited in Lehtosalo-Hilander, 1982b: 79) notes that cord marks were used from the Merovingian Period (550 CE–800 CE) to the 11th century.

Cleve (1943: 157–158) echoes Kivikoski in that horizontal incision decoration was seen during the Migration Period (400 CE–550 CE), though he argues that cord marks were a version of this, also occurring during the Migration Period. He sees the Migration Period zigzag/wavy lines as evidence of influence from the pottery of Swedish Gotland.

Carpelan (1963: 16–18; 1980: 195), on the other hand, argues that crisscross decoration was the most popular theme during the Crusade Period (1050 CE–1300 CE), at which point zigzag/wavy line decoration disappeared altogether. He has also dated horizontal line incision to the much later early Viking Age (roughly the 9th century CE), alongside the raised collar decoration, which was however used in a few instances already during the Merovingian period (550 CE–800 CE).

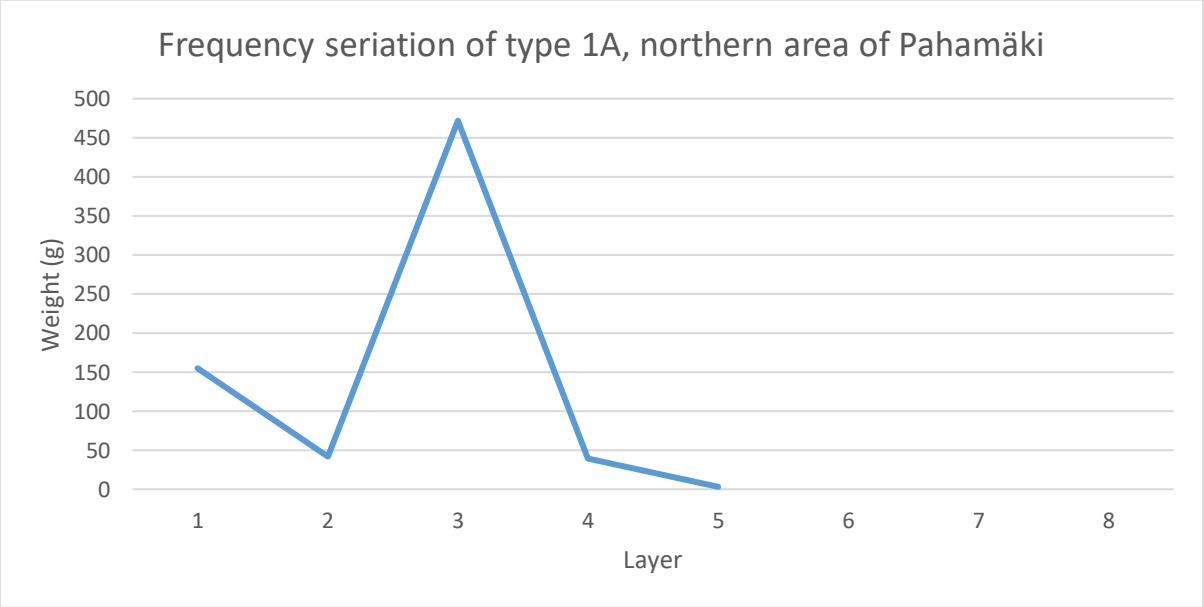
Lehtinen (2003: 75) sees oblique line decoration as a development of crisscross decoration, which strikes me as the most likely interpretation as well. She also notes that combinations of decorative themes where frequent within the pottery assemblage of the Late Iron Age/Early medieval settlement site of Mulli in Ihala, Raisio, in the same part of the country as Pahamäki. This muddies the waters further, making it difficult to draw hard lines between the decorative themes.

Moving from the surface of the potsherd to its inside, the inclusions of the paste used for the type 1A are homogenously sorted and are quite small to their size. There is a moderate frequency of inclusions, though without a microscope the fabric would appear remarkably sparse. In some of the sherds, the inclusions are not visible on the outer surface at all, though they can be made out on the inner side. Perhaps the visible parts of the vessels have been smoothened more thoroughly, to give the vessel a more even finish. The vast majority of the inclusions are made up of grains of quartzite, with smaller occurrences of black and white mica. In some instances, voids in the fabric make it clear that some of the vessels have had organic inclusions, which have combusted during the firing process. It appeared as if the sherds found

in the second layer of 1981's excavation area, west of the site's center, were hole-fired to an especially high degree.

The denseness of especially the 1A fabric, with its small inclusions, would have made the vessels capable of containing liquids, and doubly so for the burnished vessels (Gibson and Woods, 1993: 109). On the other hand, Steponaitis (1984: 108) has shown that vessels of finer fabric can be less durable than coarser vessels when subjected to thermal shock. This suggests the 1A vessels may have been best suited to storing and drinking liquids. As noted previously, these vessels have tended to have thinner necks and rims compared to the rest of the vessel. The higher mass in the lower part of the vessel would have likely made them more bottom-heavy, combined with their flat bases, would have lowered the chance of spilling your drink all over the place.

In general, the distribution of the type 1A sherds was undoubtedly concentrated to the northern parts of the Pahamäki site, where it constituted one of the largest types in terms of weight, despite being one of the thinnest types in the assemblage. In addition to the northern part, type 1A occurred in smaller amounts across almost every other area of the site, seldom more than 10 g in any given layer. Their vertical distribution was mapped on frequency seriation graphs in the northern area and middle to eastern area respectively.



Graph 1. Frequency seriation graph of pottery type 1A in the northern area of Pahamäki.

To begin with the north of Pahamäki: the frequency of type 1A's distribution resulted in a quite sensible looking curve (graph 1.). As was mentioned earlier, this area consisted of a cremation cemetery under level ground, built on top of a Stone Age-Bronze settlement (Luoto, 1976; 1977;

1981). As several other pottery types, notably 3A and 4A, appeared in equally regular graphs, it is safe to say that the stratigraphy in this part of the site has been quite well preserved, making it possible to draw some conclusions from the vertical distribution of pottery.

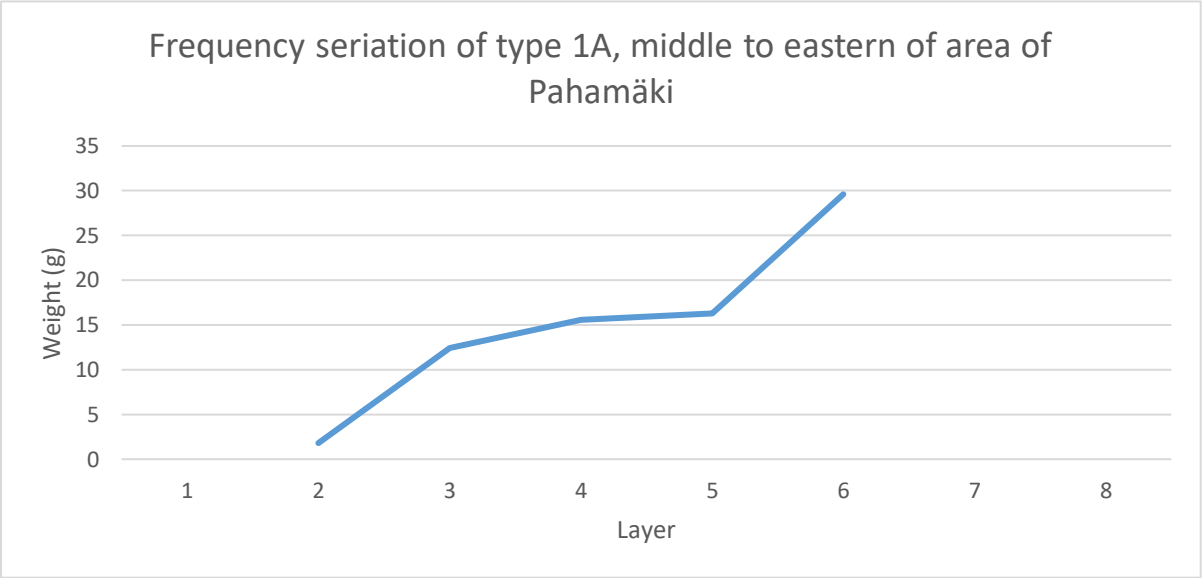
The insignificant quantities of type 1A found in the bottom two layers suggests that the type likely was not in use yet during the pre-Iron Age settlement period at Pahamäki. The type has evidently been one of the most centrally figuring pottery types in the context of the cremation cemetery under level ground, however, which can be seen in the large mass found in layer 3, despite 1A being one of the thinner types in the assemblage. As most of the pottery types in this area, this peak of 1A correlates with the stratigraphic layer the excavator interpreted as the main part of the pyre remains and burial goods (Luoto, 1976: 4–5). The very steep drops of type 1A's frequency in both of the layers adjacent to its peak suggests that the type was used specifically in the context of the pyre remains, as burial goods, feasts or food sacrifices, though as (Wessman, 2010: 56) suggests, perhaps also as a means of transporting the pyre remains to the cemetery.

Interestingly, however, the type 1A saw another small revival in the topmost layer, after having been in steep decline. Several researchers have suggested that the large quantities of pottery found in the top layers of Iron Age cemeteries are the remains of commemorative feasts and sacrifices (e.g. Cleve, 1943: 59; 1978: 88; Erkola, 1973: 45; Mägi, 2002: 113–114, 132; Wessman, 2010: 92). These practices may the very reason why the occurrence of pottery type 1A at Pahamäki spikes in the first layer. The fact that the other pottery types in the found in the north of the site generally decline at the same point, it could mean that the 1A vessels had an especially important role in the feasting. The occurrence is still proportionately too high for the 1A vessels to have been exceedingly rare or special, and it strikes me as likely that there must have been a decent amount of them in circulation. Ultimately, we do not know what the past inhabitants of Pahamäki considered special, and based on which values.

To add to this, Wessman (2010: 92) argues that pottery had more than one function within cemetery contexts, as both crude and finer pottery are routinely found within cremation cemeteries. This is true for Pahamäki as well. It is quite believable that these vastly different types would have also had different functions, though clearly important in their own ways.

An attempt was also made to document the frequency seriation of the type 1A distribution in the middle to eastern part of the Pahamäki hill (graph 2.). The type was found frequently within this area, although in small amounts. The attempt was unsuccessful, as the graph does not show

a logical, gradual introduction of the type. Instead, type 1A appears to have peaked at 29.6 g already at its introduction in layer 6, followed by an initially sharp, then gradual decrease.



Graph 2. Frequency seriation graph of pottery type 1A in the middle to eastern area of Pahamäki.

The explanation for the anomalous graph of type 1A's distribution in the middle–eastern part of the Pahamäki site is likely partly found in the small quantities the type was found in. The smaller the sample, the larger the impact of random outliers obviously is. The reason for why type 1A was found in the middle–east area compared to the north area of the site, in turn, is most likely due to the north constituting a large cremation context, whereas the middle and eastern areas of the site contained mainly settlement layers with occasional burial contexts (Luoto, 1976; 1977; 1978; 1979; 1981).

Notably, the difference in context does not explain why there was so little of type 1A in the west of the site however, as that area included clear indications of a cremation cemetery under level ground, as well (Luoto, 1982; Korkeakoski-Väisänen, 1983). Type 1A is overall distributed in a similar manner as type 4A, which in turn was much more frequent in the west of the site. They share a number of qualitative properties as well, in the sense that both are frequently decorated types with thin walls, and a fabric with small inclusions. Both are what is commonly described as finer types. The regularities between the types and their occurrence throughout the site may mean that the vessels may have had related functions.

Judging by the variety of vessel shapes hinted at in the 1A potsherds, the vessels have likely had a number of different functions. The vessels exist on a spectrum from nearly straight to markedly S-shaped profiles. Most of the rims just outward to some degree, though there are

also examples of inward thickening/jutting rims. All of the identified base sherds are relatively flat, though these are comparably few.

It is tempting to interpret everyday use of Iron Age pottery revolving around a larger set of crude domestic wares, with the fine set brought for special circumstances, perhaps for the consumption of alcohol and good food. The finds from Pahamäki do indeed fit this picture quite well, when looking at how pottery was used in the cemetery context, and then comparing that to the settlement contexts.

Pottery type 1B is one of those borderline cases where it was not certain whether it should constitute its own subtype or not. The 1B sherds stand out from the assemblage in the sense that they, alongside 3B, are the only ones with this particular kind of surface, with their slick, leathery finish. In other aspects, they are very similar to type 1A. They only occurred in a single area, in the north of Pahamäki. Once again, alongside the 3B sherds. The limited nature of their occurrence makes it difficult to make any interpretations based on quantification.

Though limited in quantity, the few recovered rim sherds let us know that at least one 1B vessel has been decorated. The theme depicted is a crisscross pattern with double incisions, within a borders made up of vertical incisions. This is the same kind of decoration visible on the 3B sherds, though this might just be because the decorations were popular during the Viking Age/Crusade Period (800 CE–1300 CE), giving us an approximate date for the age of the vessels (Kivikoski, 1951: 27; Carpelan, 1980: 195).

The possible explanations for their nature has been speculated about further below, but to put it shortly, the 1B and 3B sherds could be explained simply by the sintering of 1A and 3A ceramics. To return to the topic of commemoratory rituals, Mägi (2002) argues that burned, slaglike pottery found in association with cremation contexts are the remains of food and drink, which have been placed on the pyre. The fact that type 1B was only found in layers 2, and particularly 1, implies that the pottery may have been exposed to fire in the context of later sacrificial activity. The other possible explanation is that the deviating look of types 1B and 3B are the result of modification to their original respective crafting technologies.

As Shepard (1956: 191) notes, not only does the application of a slip give a vessel a smoother surface texture and potentially more pleasing color, it reduces the vessel's permeability. The aesthetic factors may be relevant in the sense that the 1A vessels have such a high degree of decorative elaboration. In addition to this, the reduced permeability might have been useful for e.g. boiling food and storing drinks.

5.1.2. Types 2A–B

Both subtypes were primarily found in the northernmost area of the Pahamäki site, where they figured in all four layers. A small amount of 2A was furthermore found on its own in the 5th in the center of the site. 41.8 g of subtype 2B, found in the northernmost area of the site, has unfortunately been documented without layer information in the finds catalogue. A proportionately quite large amount, which cannot be used to make wider interpretations regarding the types within the assemblage, and thus skews the results to a degree.

Across the excavation area at Pahamäki, all potsherds of 2A and B have dark gray surfaces, to the point of almost being black. Their cores are perhaps a shade browner, though overall they have a very homogenous color scheme. The fact that this coloration is a constant between different layers and parts of the site is interesting, and suggests that vessels of these fabrics have been fired using the same technology, or been subjected to the same (post-) depositional processes. Figuring out just what has affected their coloration would require a separate study, however.

Both subtypes have quite smooth surfaces. In the case of 2A, they are occasionally burnished. The edges of the sherds, though uneven, tend to be very rounded. The sherds of 2A in particular give off a characteristically "soft" impression similar to simple burned clay, though this arguably served as a subjective visual aid, and may not be useful for anyone else. In pottery studies, "texture" tends to be used for a jumble of factors pertaining to the fracture and nature of the inclusions, which can be more accurately documented on their own, using standard means (Orton, et al., 1993: 70–71). The very rounded edges of both subtypes could imply old age and a high degree of wear, though the erosion pattern is likely primarily an effect of the small quantity of inclusions.

With the similarities between the subtypes 2A and B out of the way, the types differ from each other not only in their fabric, but also by having distinctly different ranges of width, and finally in their surface treatment. Whereas the 2A vessels have been extremely thin, there has been some thickness to the 2B vessels, which nonetheless also have been quite thin. The exact width ranges have not been measured, for reasons that have been explained under the sub heading 4.3. Typological factors.

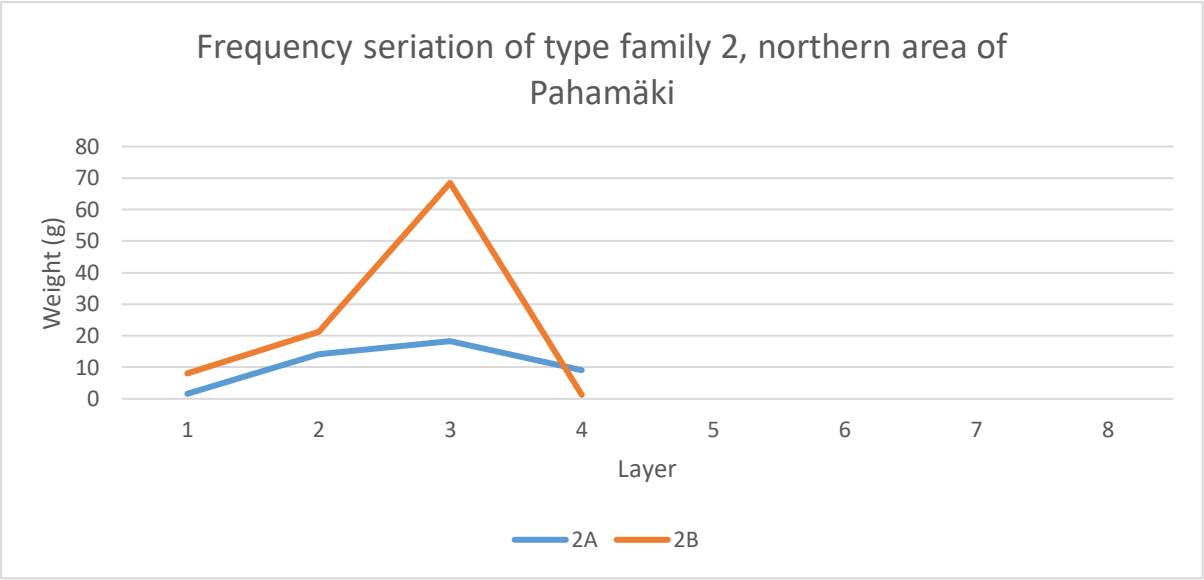
As already mentioned, some of the 2A sherds are burnished, but on top of that, some display decorations of a few different themes. These decorative themes include cord marks and rows of incised oblique lines, either parallel or opposing each other. This is in stark contrast to the

2B sherds, as none of them has been found with any decoration, nor burnishing. A couple of notes on the decorations present on the 2A vessels: Lehtinen (2003: 75) finds it likely that oblique lines may have been a modification of crisscross decoration. Although I suspect she was only referring to parallel lines, and not oppositely aligned lines, it is easy to imagine that the latter may also been a modification of crisscross decoration. Instead of removing every line of the same orientation from the decoration, opposing lines would instead have been removed. At the same time, the oppositely aligned oblique lines are visually quite similar to zigzag decoration as well, but with detached angles. Although this would sever the link to the parallel oblique lines, which they are most alike, making zigzag decoration a less likely relative.

According to Kivikoski (cited in Lehtosalo-Hilander, 1982b: 79; Kivikoski, 1947: 42; 1951: 27) crisscross and zigzag decoration was done from the Early Migration Period (5th century CE), and throughout the Viking Age (800 CE–1050 CE). Cord marks are known from the Aurajoki River valley from the Merovingian Period (550 CE–800 CE) to the 11th century CE, according to her. Carpelan (1980: 195) notes that zigzag decoration disappeared completely during the Crusade Period (1050 CE–1300 CE), during which cord marks became less frequent as well, whereas crisscross decoration instead increased in popularity.

As we can see, the decorative elements present at type 2A can definitely be linked to the Iron Age (500 BCE–1300 CE). Although from quite a wide timespan within the Iron Age, we can roughly pinpoint the decorations to the Middle and Late Iron Ages (400 CE–1300CE). The decorations present on 2A within each layer were not rigorously recorded, due to what was initially a deliberate attempt to move away from the usual decoration focused research tradition. This is slightly regrettable in retrospect, mostly because it might have given additional information concerning the chronology of the layers. With that said, it is clear that cord marks were present in layer two, and oblique as well as wavy lines in layer three.

As types 2A and 2B were found in such isolated instances outside of the north of the site, it was only possible to make a frequency seriation covering the northern area (graph 3.). The graphs show that both types within the family were introduced, peaked, and disappeared in the same layers. They were perhaps manufactured as two contemporaneous versions of the same ware. One slightly coarser than the other. Comparing their occurrences one can note that subtype B has a distinctly sharper curve, though this is to some an extent an effect of its sherds being heavier than those of type 2A. It is nevertheless not impossible that the coarser B subtype, which must have been more economic to manufacture, may have enjoyed slightly more popularity than its 2A countertype.



Graph 3. Frequency seriation graph of pottery type family 2 in the northern area of Pahamäki.

5.1.3. Types 3A–B

Type 3A (figure 2.) constitutes one of the most frequent types found at the Pahamäki site, alongside type 8. The relative frequency of the type is seen in its combined weight, its distribution and the total number of sherds found.

Figure 2. Pottery type 3A from the Pahamäki assemblage.

Type 8 is relevant here for a completely different reason here as well, pertaining to an error made in the analysis and documentation of the assemblage from 1975's (TYA 93) and 1976's (TYA 90) excavations in the northernmost area of the site. The reason for this is that there is some fluctuation within type 8 and type 3A, as there will inevitably be within most types. In the aforementioned areas, type 3A occurred in a particularly coarse state, and type 8 was lumped in underneath it. The author became wise to this nuance slightly afterward, when going through the documented material. The result of the error is that the quantity of type 3A is inflated in the graphs of 1975's and 1976's excavation areas, at the expense of type 8, which appears as if not being present, though it was definitely present in the 3rd layer at the least.

Having clarified this error, let us get into the characteristics of type 3A. Its surface coloration varies from black, to gray and brown with different amounts of red in it, and finally orange. The cores tend to come in shades of gray and brown. Due to the large color variation, and the demanding experimentation required to get any actual information regarding the origin of pottery color, the colors were only qualitatively noted down as variation. With that said, such differences in coloration are likely to be the effect of processes both relating to the crafting methods and post-depositional activity.

The only instances of decoration found on the 3A potsherds, were from the north of Pahamäki, were some sherds were found with wavy lines framed in by horizontal incisions, along the vessel rim. Although the combination of certain decorative themes and horizontal incisions occur on other vessels within the Pahamäki assemblage, this is the only example of wavy lines inside of frames. It is interesting to note that the only case of this decorative composition on this site, with its vast quantities of pottery, coincides with the type 3A, which was not found with any other kind of decoration.

The majority of the 3A vessels have had surfaces with textures varying between harsh and rough. Particularly abrasive specimens were found in the north of the Pahamäki site, as well as in the part of the site between its center and easternmost edge. In contrast to this, there are also instances with large quantities of vessels that have had their surfaces treated.

Sherds with scratching on both sides were found in the third layer in the north of the site, and some of the sherds found slightly east/southeast of the center of the site have also been scratched. Surface treatment occurs to a particularly high degree in the sherds found in the western areas of the site, however. In the fifth and lowest layer of the westernmost area, the single 3A rim sherd had no scratching. In the fourth layer, some of the sherds had very trace scratches, whereas other sherds had scratching so marked and homogenous on both sides, that it bordered on decoration. The scratching has been done in a crisscross fashion in some cases, though for the most part the orientation of the scratches inner and outer surfaces were perpendicular to each other. The rims of the vessels have been scratched in a much lighter fashion. Come the third layer, all of the sherds have now been scratched in the heavier fashion described above. Finally, the surface treatment takes a sharp turn in the shift to the second layer, where the sherds now have one burnished surface and one untreated surface.

Slightly eastward, though still in the western part of Pahamäki, black, burnished sherds were found alongside brown, harsh sherds of type 3A in layer 6. In layer five, and again in layer

three, most of the sherds had a redder hue and have been scratched on either one or both of their surfaces, though with individual black, burnished sherds.

The fabric of type 3A tends to consist of inclusions, which vary between moderate and abundant in frequency depending on the sherd. The size of the inclusions vary between large and small, though the fabric tends to be dominated by quite sizeable chunks. As for the nature of the inclusions, the proportions of the composition within the fabric tends to vary quite a bit between different layers and parts of the site. In the sherds found in the north of the site, there is a proportionately larger amount of dark, dull stone, though some sherds are also quite rich in quartz, and finally some sherds sporting elongated voids with striations, which could very well be what remains of combusted straw or fur. Some variation is seen within the middle layers in the part of the site, which is just east of its center. The sherds found there had fabrics which were now proportionately dominated by large, sometimes considerably so, chunks of quartz and felspar. As the aforementioned inclusions differ somewhat from 3A's fabric in general, they could be regarded temper with some plausibility.

Most of the variation in fabric is seen, again, in the western parts of the site. Once more the question arises whether to split a type into two, or whether to view it as variation within a single type. As this study was done from more of a macro perspective, the choice was made to document the differences as variation within subtype 3A. In any case, in the westernmost part of the site, the inclusions clearly vary in frequency between layer five and the above layers. In layers four and three we can see the same kind of very large quartz and felspar inclusions that were in the sherds from north of the site, though now with some additions; rectangular voids, which may be from combusted calcite, and finally some exceptionally flat, opaque discs. According to the finds catalogue, this last inclusion is a glass temper (figure 3.), which appears very likely.

Figure 3. Glass temper in the fabric of pottery type 3A.

As for the effect of glass inclusions in a ceramic fabric, it was not possible to outright determine how the glass would have affected the vessels' firing process and thermal resistance. According to Searle and Grimshaw (1971: 718–719), the thermal expansion of glass is determined by the proportions of silica, alumina and alkali elements, which we have no way of knowing without chemical analysis.

What we can say, however, is that the glass inclusions would likely have had notably beneficial effects on the fracture resistance of the vessels, based on what Steponaitis (1984: 112) points out, i.e. plate-like inclusions orientated parallel to the sherd wall increases a vessel's resistance to fractures. The inclusions, shell in his case, were orientated in the correct manner within the paste through the paddle-and-anvil-technique. In the case of the glass inclusions of type 3A at Pahamäki, they are indeed orientated parallel with the sherd wall, suggesting they may have been deliberately rotated, perhaps using a similar technique to the paddle and anvil.

Although glass vessels have been found in burials from as early as the Late Roman Iron Age (200 CE–400 CE) (Carpelan (1980: 190–191) it is safe to assume glass must have remained a rare and expensive import material during most of the prehistoric period. This explains why we

only find glass inclusions within the fabric of one type – an exception that is furthermore restricted to a specific area of the site, and a specific few layers. As Viking Age pottery was reported to have been found in the first layer of this area, and pottery from the first half of the Iron Age in the fourth layer (Korkeakoski-Väisänen, 1983: 5), the use of the glass temper can be roughly dated to the Roman Iron Age–Middle Iron Age (0–800 CE). The rarity and short life span of the modification is most likely due to the rarity of glass, especially as the Roman trade declined along with the empire, in relation to more readily available tempers.

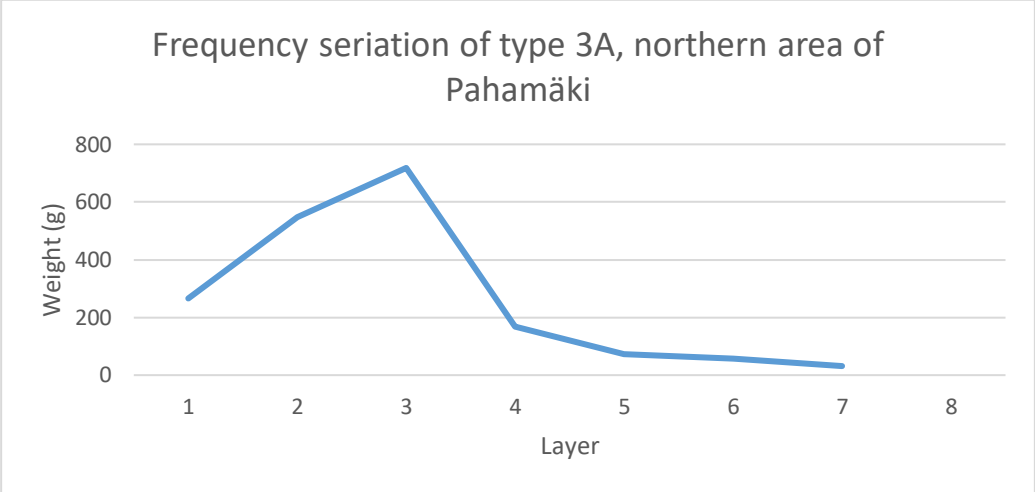
A likely explanation for the temper could be that the Iron Age people at Pahamäki had acquired a few glass vessels through either trade with the Roman world, or more directly through serving in the Roman army (Raninen, 2019). It is less likely that pottery in question have been imported, as it is so similar to the other sherds of the ubiquitous type 3A, with the exception of the glass inclusions. When these glass vessels inevitably shattered, some local potter may have thought to experiment by crushing the glass further into flat shards, and then mixing the shards into their paste, much like grog had traditionally been used. The glass may have been considered too valuable a material to throw away, even though the local craftsmen lacked the tools and expertise to work with it. Who knows, the glass may even have held personal value as a memory from someone's time in the Roman army. The glass subsequently ended up as temper inside a new vessel, and finally inside of a cremation cemetery under level ground.

As no complete vessels have been compiled for the purpose of this study, not a whole lot can be said about the shape of the vessels the 3A sherds have belonged to, other than some vessels having had a straight neck, whereas others have had a slight shoulder. All of the rim sherds appear to have a rim that juts slightly outward.

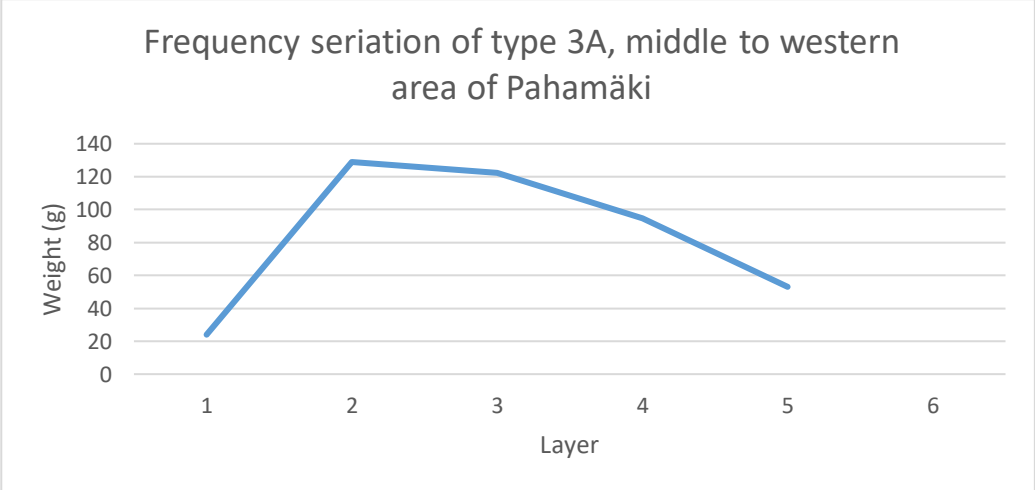
Due to the large quantities of type 3A found across the site, it was possible to make graphs based on frequency seriation for the various parts of the site, and compare their distributions. Firstly, it can be noted that the amount of type 3A was by far the highest in the north of the site. The total weight of the type 3A sherds found in the north of Pahamäki amounted to 1861.3 g. In the area stretching from the middle to the east of the site, there was a 59.7 % decrease of type 3A, to 749.9 g. Conversely, the amount of type 3A found between the middle and the west of the site was 77.3 % less than that found in the north, at 423.1 g. To reiterate, the weight of type 3A is somewhat inflated in the north due to its mixing with that of type 8.

Another thing to note is that the curves look markedly different in each of the three areas (graphs 4., 5. and 6). They do, however, all follow a pattern of introduction, popularity and phasing out.

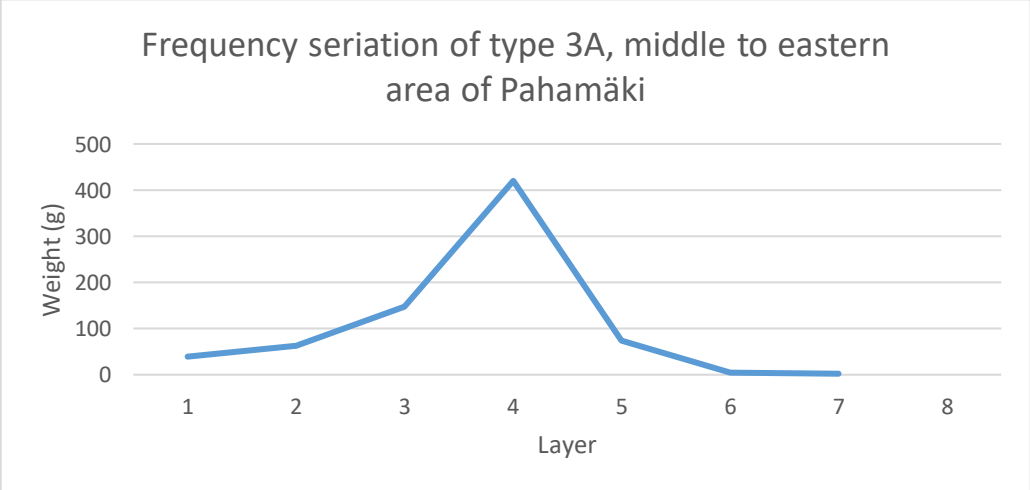
The occurrence of the type deep in the soil of the hill indicates that it was likely introduced during the Stone-Bronze Age settlement period at the Pahamäki hill, during which one would expect to find less pottery than in an Iron Age cemetery context.



Graph 4. Frequency seriation graph of pottery type 3A in the northern area of Pahamäki.



Graph 5. Frequency seriation graph of pottery type 3A in the middle to western area of Pahamäki



Graph 6. Frequency seriation graph of pottery type 3A in the middle to eastern area of Pahamäki.

The introduction of type 3A was quite slow in the north (graph 4.), where it only really picked up speed in layer 4, peaking at a remarkable 718.3 g. This is one layer lower than the brunt of the cremains and burial goods (Luoto 1976), raising the question of whether they were crushed and spread over the area before the pyre remains and burial goods were deposited. A slow introduction can also be seen in the middle–east of the site (graph 5.), though to a lesser degree, as the type picked up speed slightly faster and peaked in layer 4 instead, at 420.1 g. This is a noteworthy quantity, as this area was interpreted as mainly settlement contexts with isolated burials (Luoto, 1978; 1979; 1981; 1998), with generally less pottery finds than in the cremation cemetery under level ground. The type gradually declined in the upper three layers, which contained most of the medieval finds (Luoto, 1978).

In contrast to these areas, type 3A occurred in much sparser amounts in the area encompassing the middle and west of the site (graph 6.). However, it initially appeared at higher quantities, from which point the type had a comparably slower and much less significant increase until layer 2, reaching a weight of 128.9 g. Although type 3A occurred frequently on the western side of the Pahamäki hill, it was instead the even coarser type 8 that was the most ubiquitous in this area.

The occurrence of a wide range of different surface treatments, which change across the layers is characteristic to the western part of the Pahamäki hill, and is similarly seen in the potsherds of type 8. Interestingly, the sherds of both type 3A and 8 found in the other parts of the site have overwhelmingly not had their surfaces treated in any notable way. It is tempting to argue that the vessels, which sherds have been deposited in this area of the site, have undergone a great deal of experimentation. Some of the modifications appear to have been reversed over time, whereas others have become established, and prevailed over the forming of several layers.

Furthermore, the many similarities between types 3A and 8 makes it easy to see connection between the types. They are both among the most plentiful and widely appearing types of pottery at Pahamäki, and appear to have frequently undergone similar kinds of technological modifications, to the point of being easily mistaken for each other in some layers. I have argued that the distribution and properties of both type 3A and 8 point to them having served as domestic bulk wares during the Iron Age at Pahamäki, but were at the same time central in the burial practices of the time. The line of reasoning can be found in the discussion chapter.

The exact nature of subtype 3B escaped certain explanation. Essentially, it is exactly like its A-countertype, with a single, striking difference: its surface. Although the majority of the sherds

of the subtype have quite harsh surfaces, with some exceptions, both due to the sherd walls being penetrated by inclusions, and the general unevenness of the clay surfaces, the subtype's surfaces nonetheless have a slick, leathery quality to them. One of the 3B vessels has evidently been decorated with crisscross-decoration. Based on the decoration the vessel would roughly date to the Viking Age (800 CE–1050 CE) or Crusade Period (1050 CE–1300 CE) (Kivikoski, 1951: 27; Carpelan, 1980: 195).

The question as to the origins of the nature of subtype 3B's differing surface remains. It could be that the vessels, in their leather-hard stage, have been treated with such a light hand, or in such a sloppy fashion, that the result has been a vessel with burnished, though thoroughly uneven surfaces. Its leathery appearance is the same that is found in the sherds of type 1B. Their finish looks quite different to the matte sheen seen in many of the burnished types in the Pahamäki assemblage, however, which could partly be an effect of the uneven surface. Both types occur with crisscross decoration, though that might just signify that they are from the Viking Age/Crusade Period (800 CE–1300 CE).

An alternative surface treatment, which could potentially also have resulted in a shiny surface finish visible in the potsherds, is the application of a clay slip as the vessels were still wet or leather-hard. It is foreseeable that a quick coating of the vessel in liquid clay could result in a glazed, yet uneven surface, if the clay coating was not worked and smoothed out with some tool. As Orton et al. (1993: 82–83) point out, clay is generally one of the most common surface additions used in pottery. Asplund (2009: 31) notes that another vessel has been found at Pahamäki, sporting a coarse fabric but surfaces made smooth using a slip. Although the surfaces are generally not smooth in the case of the 3B sherds, this shows that slips were not only utilized, but also were applied to vessels with coarse fabrics.

Another possibility is that the nature of 1B's and 3B's surfaces is an effect of some secondary process. Perhaps sintering has occurred, if the sherds have been subjected to high temperatures, such as at a funerary pyre, for instance. To reiterate, Mägi (2002) interprets pottery burned to the point of slag found in cemetery contexts as the remains of food and drink sacrifices thrown onto the pyre.

An important factor to note regarding the distribution of 3B sherds is that they were only found within a very limited area, i.e. 1976's excavation area in the north of the site. Within this area, their occurrence forms a very sharp curve within the order of layers. They were found within the upper three layers, starting with a few grams, then reaching a peak of about 200 g and finally

ending with another few grams. The distribution of 3B correlates to a great deal with that of 1B, as both are only found within this area, the only difference being that no 1B sherds were identified in layer 3.

It is not impossible that one to a couple of 3B and 1B vessels within this area have been the target of some event causing them to become sintered, with a few sherds ending up mixed into the surrounding layers. Although, this specific excavation area has unusually even curves in general, suggesting the layers may be less mixed than many other parts of the site.

On the other hand, it could be that we are seeing a small modification to the technologies used to produce vessels of subtypes 3A and 1A respectively, which have been very limited in scope, hence why the sherds were found within such a small radius, and over such a short time span. The goal was perhaps to reduce the permeability of the types, with a minimal amount of effort required. The very sharp drop-off rate of type 3B of the type suggests that the experiment may have been deemed unsuccessful. The fact that type 1B, in contrast, became more bountiful from layer 2 to layer 1, could imply that this experiment yielded more beneficial results, perhaps for the very same function the 3B vessels were intended for.

5.1.4. Types 4A–C

Type 4A (figure 4.) constitutes one of the pottery types in the Pahamäki material that was found over the widest area of the site. As mentioned earlier, the type is very similar to 1A in many ways, and it was not always possible to tell them apart from each other with absolute certainty. Both are thinner wares with small inclusions, which have frequently been decorated with the same themes. Overall, 4A has a fabric with slightly larger and more abundant inclusions than 1A. It is also commonly slightly rougher to its surface, but this trait was far from a reliable way to tell the two types apart.

Figure 4. Decorated rim and body sherd of pottery type 4A from the Pahamäki assemblage.

The surface coloration of type 4A varies between different shades of reddish and grayish browns in the majority of the sherds. Some sherds with black outer surfaces and dark gray inner surfaces, as well as black-brown margins were found in the middle of the site. The cores are generally a medium gray. The surfaces of the sherds, mentioned in the earlier paragraph, vary between rough and smooth. Once again, in the middle of the site and some distance of this, the sherds deviate by having been burnished in some layers.

The decorative themes present on the 4A potsherds include crisscross decoration with double or single incisions and oblique line decoration, both of these themes are sometimes placed within a border of vertical lines. In addition to this, some sherds have been marked with grooves and dual or single cord marks. All of the above decorations have been placed just underneath the rim or further down the neck of the vessels. The previous research on these decorative themes has been elaborated on earlier, but to summarize, they represent a succession of decorations that have been popular during different stage of the Finnish Iron Age (500 BCE–1300 CE), with the upmost layers represented by Viking Age (800 CE–1050 CE) and Crusade Period (1050 CE–1300 CE) ceramics. The one "expected" decoration which is missing, would be wavy line/zigzag decoration.

There is one additional decoration present on type 4A which differ significantly from the distinctly Iron Age decorative themes mentioned above. A few sherds found in the seventh layer of the north of the Pahamäki site had decorations of a most likely much earlier date. As only a small part of this decoration remains, the following description should be read as an interpretive reconstruction to some degree. The visible decoration appears to consist of triangles made up of different elements, which then continues, likely as an element in a larger decorative composition. At least one side of the triangle appears to, in fact, be a multitude of short oblique lines, perhaps made by fingernails. The second side appears to be a simple incision. The third and final side of the triangle is made up by a curving incision, which repeats itself in layers and has likely been part of a larger decoration. These curved lines are possibly a fish bone pattern. The inside of the triangle has been stamped with rows of circles, each subsequent row having one circle more than the last.

The aforementioned decorative theme most resembles those seen on Stone Age Comb Ware. Luoto (1984: 279) has categorized pottery at Vanhamäki with triangular themes as Lausitz Ware, and conversely pottery with circular impressions found at the nearby Vanhalinna hill as Kiukaisten Ware though none of the Vanhalinna sherds evidently had both. Based on the combination of geometric themes in the 4A sherds, and the fact that they are well fired and thin,

I would preliminarily link them to the Early Typical Comb Ware, though Late Comb Ware could be another match. The comparisons were made using the material and notes compiled at University of Helsinki's internet website for prehistoric pottery.[3]

If my interpretation is correct, the existence of these few sherds is somewhat of an anomaly at Pahamäki, as the hill did not rise above the water level before the second millennium BCE. Although, as Typical Comb Ware has been found at the nearby hill of Vanhalinna, it is not that surprising (Luoto, 1984; 1988: 89–91). A group of seal hunters or fishers could have dropped the vessel from their boat whilst combing the archipelago for pray, for instance.

The fabric of type 4A has an abundant frequency of inclusions for the most part though sometimes moderate, depending on the sherd. The exact nature of the inclusions differ somewhat to their composition and proportions depending on from where the sherds were recovered. To give an overview, the inclusions consist of quartzite, lumpy gray stone (particularly in the center of the site), some white but especially black mica. In the west of the site, there were some alterations in the shape of voids formed by combusted material in layer three, likely calcite. In the first layer, there are much larger quantities of quartzite and the addition of quartz sandstone.

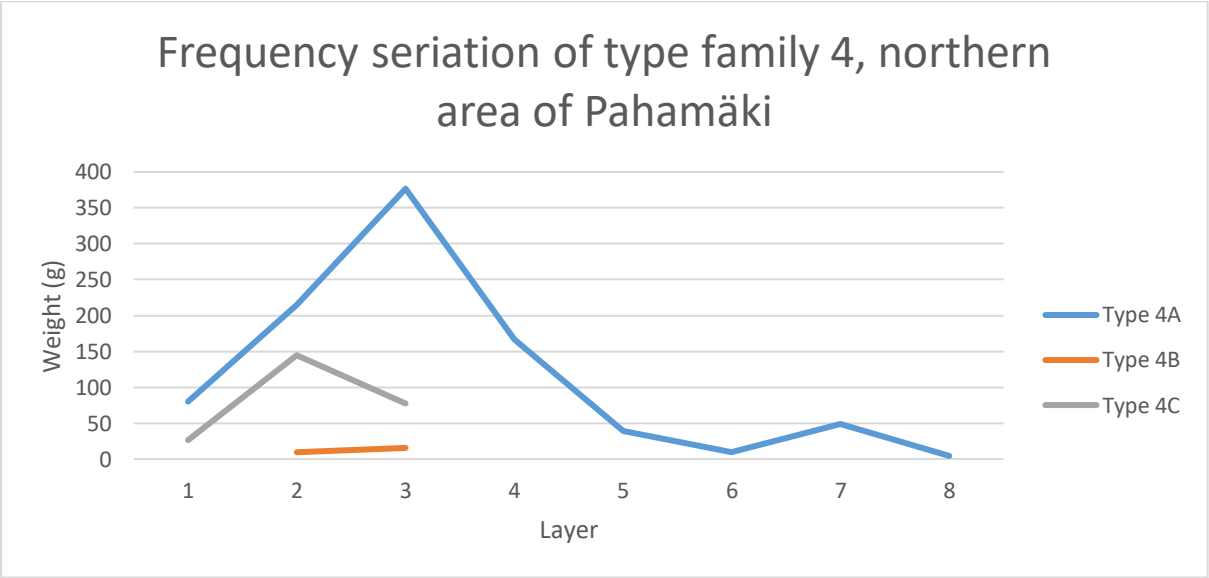
From what was possible to make out regarding the shapes of the vessels of type 4A looking at individual sherds, some vessels have had a markedly S-shaped profile, whereas others have had straight necks. At least one of the S-shaped vessels has seemingly been quite small, based on the curvature of the profile.

The tip of a heavily rounded base of type 4A was found in the 7th layer, in the middle of the site. Further up in the layer order, the bases of the 4A vessels tended to be noticeably flatter. Although these are individual examples, the earliest vessels having angular bases and later ones having flatter bases fits with the general view of prehistoric pottery. According to this, mobile populations, which relied on hunting and gathering, produced clay vessels with angular bases, as these were easier to stick into the sand when making temporary camps. Once people began to settle in place, this property lost its importance, and bases of the vessels were made flat (Korkeakoski-Väisänen, 2014).

[3] P. Pesonen, 1999, Suomen esihistoriallinen keramiikka, [online] the University of Helsinki archaeology department's database on prehistoric pottery in Finland, available at: www.helsinki.fi/hum/arla/keram/ [accessed 08.10.2019].

Overall, the shapes of the type 4A vessels appeared to have varied too much to assign them any one function. Instead, it seems likely that the prehistoric populations that have been active at Pahamäki have crafted this thin, small-tempered and frequently decorated ware across a long time span, over which it has filled different functions.

The 4A sample found in the north has the most potential for interpretations based on frequency analysis (graph 7.), due to the large quantities and frequency of its distribution within this area. We can clearly see that the type was in use during the first phases of life at Pahamäki, although in small amounts. If we interpret these phases as a Stone Age/Bronze Age settlement, based on the Stone Age decorations and Luoto's (1977: 2–3) notes of the area showing such signs, it is perhaps to be expected that the pottery should occur in such small amounts. According to Luoto (1989: 99), the finds at settlement sites tend to be the fragments of whatever has been lost or broken.



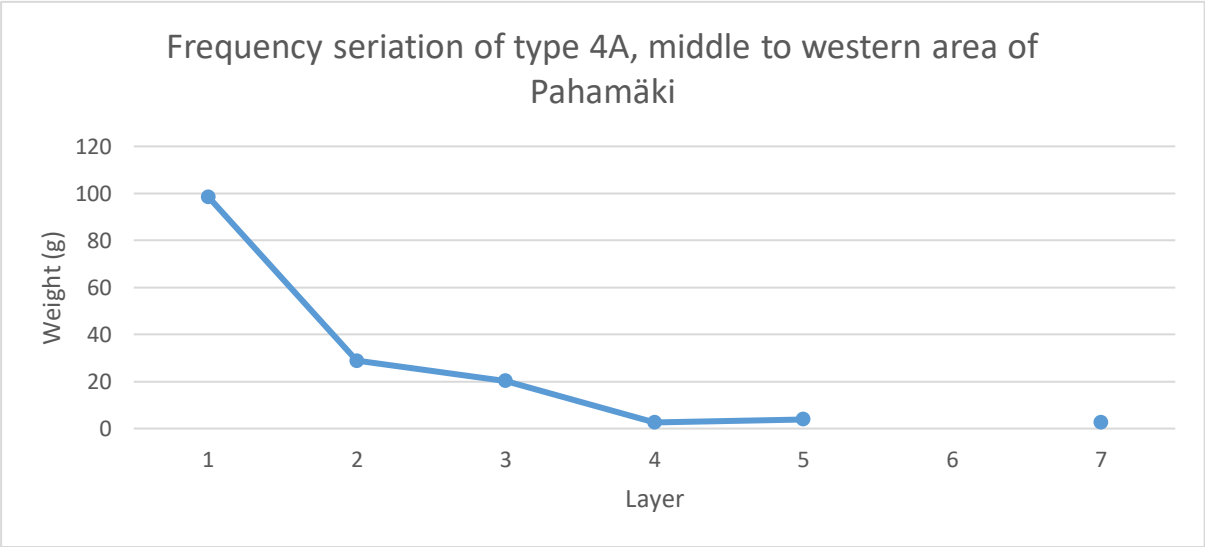
Graph 7. Frequency seriation graph of pottery type family 4 in the northern area of Pahamäki.

After reaching a moderate quantity of 49 g, the frequency of the type took a dip in layer 6, not long after its introduction, which may hint at a cumbersome early history of type 4A. Although when looking at the overall vertical distribution of pottery in this area, it is clear that there was a general decrease in pottery in this layer, with type 3A being the only type of pottery that saw a relative increase. In any case, type 4A saw a gradually accelerating increase, culminating in layer 3 at 376.6 g, alongside the Iron Age cremains and burial goods (Luoto, 1976). After this, the type dropped off in popularity at a steady, moderately steep rate.

Despite the many similarities between type 1A and 4A, it is interesting to note a key difference in the distribution of the types. Whereas there was a definitive decrease in type 4A in the upmost

2 layers, type 1A instead saw a marked upswing within layer 1. This suggests that type 4A did not play a part in the commemorative feasts organized on top of the cremation cemetery under level ground in the north of the site.

Interestingly, however, when we turn our eyes to the area encompassing the middle–west of the site (graph 8.), we see a very different looking curve. Type 4A's weight suddenly spiked in layer 1, after occurring in quite modest quantities prior to this. The context were most of this type was found was interpreted by Luoto (1982: 3) as a cremation cemetery under level ground. In the same manner that we saw in the north of the site, the other present pottery types decreased toward the first level of the cemetery. As such, I would argue that the decorated, fine types 1A and 4A both had an important role in the commemorative sacrificial and feasting activities that took place at the cremation cemeteries under level ground, though it appears as if the two types were used in separate parts of the cemetery.



Graph 8. Frequency seriation graph of pottery type 4A in the middle to western area of Pahamäki.

Type 4B differs from 4A to its fabric, decoration and surface treatment to an extent. Its fabric is slightly sparser, and the shape of the inclusions are more angular. The decoration present on 4B, which does not occur on the 4A sherds, consists of several long, quite shallow, jagged incisions. It could be a modification of the Migration Period (400 CE–550 CE) horizontal line decoration, though this is not clear. The surfaces of the type 4B sherds are black, and have been burnished to a sheen. Though black, burnished 4A sherds occur within the material as well, those properties were far from the norm for the type.

4B was found in too limited a quantity to interpret through seriation frequency. Spatially, however, its occurrence correlated with the northern part of the Pahamäki hill. The type was

perhaps a modification of type 4A, or possibly type 1A, which happened sometime after the Migration Period (400 CE–550 CE).

The angularity of the inclusions, such as those inside of the type 4B fabric, has commonly been seen as an indicator of the inclusions being used as temper. Not only do the edges of materials in naturally occurring clay sources tend to erode over time, but angular inclusions have the added benefit having less of a weakening effect within the clay vessel, by allowing the clay particles to attach to it more effectively (Gibson and Woods, 1990: 28–30). Perhaps it was ultimately decided that the added workload of sorting for inclusions with the appropriate shape was ultimately not worth the cost, especially as the vessels within the type 4 family have evidently been produced to a high degree.

Finally, 4C most notably deviates from its type family by having a much coarser fabric, though partly to their color scheme and surface treatment as well. Whereas the potsherds of subtypes A and B mostly have an abundant, sometimes moderate amount of quite small inclusions within their fabrics, type 4C instead have a much less frequent amount of significantly larger inclusions. The majority of these inclusions are homogenously sized, though there is a smaller amount of particularly large particles. The shape of the inclusions is quite angular. At least the larger particles should rightly be considered selectively added temper, though the general non-eroded angularity of some of the smaller inclusions also hints at intentionality.

The reason for the angularity of the inclusions may have been an important factor in the production of C subtype could have been to make the vessels sufficiently fracture resistant. The large inclusions would have had a weakening effect within the walls of the thin vessels, which may have been counteracted somewhat by ensuring that the clay particles can effectively bind to the edges of the inclusions. This interaction between angular incisions and clay binding potential has been shown by Gibson and Woods (1990: 28–30). Additionally, the large size of the inclusions would have made the firing process of the thin vessels easier in their role as an opening material.

The surfaces of type 4C occur on a spectrum of grays and black. Although the surface have been burnished in many cases, they were nonetheless often times quite harsh due to the inclusions piercing the surfaces of the sherds. This is an effect of the larger particle size of the 4C fabric relative to the low sherd thickness of the type family 4. In most of the cases this features was particularly noticeable on one of the surfaces. It appeared as if the inner surface was especially prone to this, though this could not be verified conclusively. A possible

explanation could be that surface penetrating inclusions were not considered very aesthetically pleasing, and as such greater care in covering them on the visible outside of the vessels.

On the topic of aesthetics, the three decorative themes that occur on the type 4C vessels are 1–2 cord marks, crisscrosses consisting of double incisions separated by rows of three incised borders, and thirdly, wavy lines. As mentioned earlier, wavy lines did not occur in type 4A despite the frequency in which it was decorated.

The occurrence of type 4C was spatially concentrated to the central and especially northern area of Pahamäki. In the north of the site, it was introduced quite late, in layer 3. This is the same time that 4B was introduced, and while 4A was at its peak. After 4C had a short stint of popularity, whereas type 4A decreased in quantity, it once again dropped markedly toward the 1st layer of the area. Viewed in this light, subtypes B and C could perhaps be interpreted as modified versions of type 4A, 4C seeing a minor amount of success, which spawned whilst 4A was in very heavy use.

In the middle of the site, type 4C was found in much lower quantities, and within the limited space of 1977's excavation area. The frequency of its occurrence between layers four and one is a gently undulating, alternating, up-and-down curve, which is not very informative.

5.1.5. Types 5A–C

What initially were 8 different types ended up being compiled into subtypes within types 5 (figure 5.) and 6. Though there were definitive differences, their lines ended up very ephemeral as the number of types increased. Especially when seen from the perspective of the assemblage as a whole, it became very difficult to argue that it was not a question of small modifications to a general pottery making technology. As such, the subtypes within type families 5 and 6 should be understood as groupings of pottery with slight variations, and with some inevitable overlap between their borders.

Figure 5. Rim sherd of pottery type 5A from the Pahamäki assemblage.

Differences in surface treatments were quite helpful when attempting to distinguish the type families of 5 and 6 from each other, which was far from the case for the Pahamäki assemblage as a whole. With types 5 and 6, including their subtypes, the difference in surface treatment was not an ironclad rule, either, though they were consistent in the majority of cases.

The surfaces of 5A are very simple in their surface treatment, being either harsh or rough, with a color scheme varying from grayish brown to reddish brown surfaces, and a gray core. Though the subtype appears to have been undecorated in many cases, it nonetheless displays several decorative themes incised horizontally across the rims of the vessels. These decorative themes are wavy lines, zigzags, cord marks of varying roughness and finally oblique lines as well as crisscrosses, the last two within a border made up of horizontal incisions.

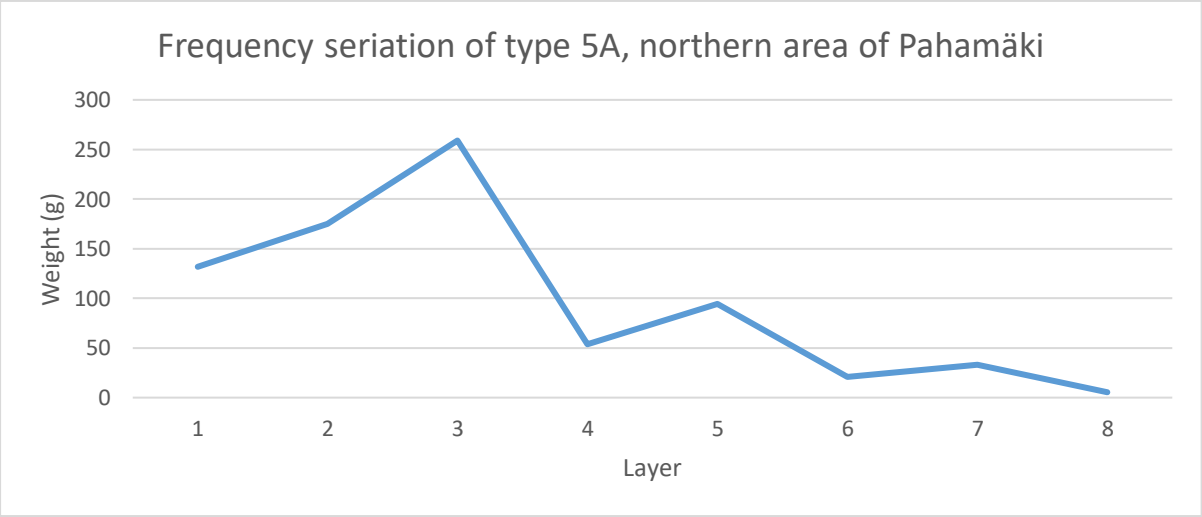
The fabric of pottery type 5A has, in general, a large quantity of inclusions, varying from moderate to small in size. The identities of the inclusions are felspar, quartz, and a dark irregular stone, which was difficult to identify more specifically.

As mentioned, exceptions occur, and it is not always self-evident when one should chalk something up to variance within a (sub)type or when the creation of a new subtype is necessary. Some fragments from 1981's excavation area, slightly to the west of the Pahamäki site's center point, differ on almost all points. From layer 5 up, both surfaces have been burnished, though the fabric is relatively coarse, consisting of dark, irregular lumps of some unidentified stone, and small chunks of quartz. Overall, it was quite difficult to distinguish from some of the finer iterations of type 8, and it is likely that some miscategorizations may have occurred. A completely new decoration to the 5A subtype is also present, which is a single horizontal line along the rim of the vessel.

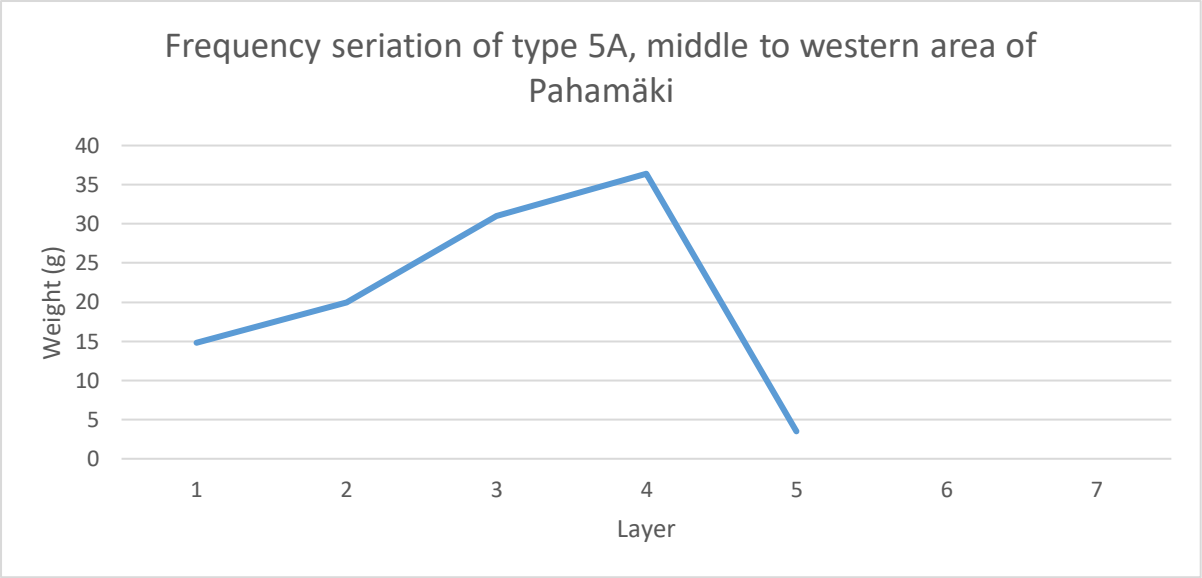
Come layer 2, some gradual changes have occurred. Only the outside surface have been burnished, whereas the inside has been smoothed. Some of the sherds display cord mark decoration. The fabric has also been modified, and the small chunks of quartz are gone. Next up, in layer 1, both surfaces are once again burnished, and quartz is once again present in the fabric. Though similar to the 5A pottery in the lower levels, the fabric is less coarse.

Although the differences may seem drastic when pointed out like this in text form, visual examination, i.e. the foundation of pottery analysis (Orton et al., 1993: 151) confirmed that it was undoubtedly the same "recipe", which underwent gradual changes. In hindsight, some of these stages of experimentation could perhaps have been recorded as different subtypes, though the quantities we are speaking of are so small, that it is doubtful that anything meaningful would have been gained through quantitative analysis. It is arguably just as interesting to note that a large degree of tincturing of this general recipe has occurred within this specific area of the site.

It was possible to make graphs based on frequency seriation for the occurrences of type 5A pottery in the north of Pahamäki (graph 9.), and the area stretching between the center of the site and its westernmost edge (graph 10). The graph for the eastern part of the site has been omitted from the thesis due to the small, irregularly occurring 5A potsherds.



Graph 9. Frequency seriation graph of pottery type 5A in the northern area of Pahamäki.



Graph 10. Frequency seriation graph of pottery type 5A in the middle to western area of Pahamäki.

Comparing the two areas of the site, we can immediately say type 5A was much more abundant in the north of the site than the middle and east of the site, or any other part of the site for that matter. When comparing the total weights of the type 5A pottery, we see an increase from 105.3 g in the middle–east to 773.6 g in the north, or a 631.9 % increase.

The graphs differ in their extent and shape as well, with type 5A potsherds having been found much deeper in the layer order of the north of the site, where it was found from the 1st layer all the way down to the 8th layer, and the Stone/Bronze Age settlement layers. The earlier half of the type's lifespan at the site appears to have been somewhat cumbersome. The relatively small quantities of type 5A in layers 6–8 can mostly be explained by the nature of finds assemblages of settlement contexts versus cemetery contexts, though that does not explain the dips in layers 6 and especially 4. However, after this point, the occurrence of the type rose sharply to a maximum of 259 g, followed by a steady decrease in the following top 2 layers. The peak in 5A's distribution would have mostly coincided with the sooty, mostly Merovingian Period (550 CE–800 CE) cultural layer.

The graph in the north of the site shows a continuation in the technology used to craft the vessels of type 5A, likely stretching from the Stone/Bronze Age settlement to the Viking Age (800 CE–1050 CE) cemetery layers. In the middle and east, however, the type was introduced at a much later date, most likely within the already Iron Age (500 BCE–1300 CE) layers. In the latter parts, type 5A spiked steeply to 36.4 g between layers 5 and 4, shortly after being introduced, after which point it settled into a gentle decline all the way to the 1st layer.

Despite the different look of the curves showing type 5A's frequency seriation, the type was at its most popular in the mainly Merovingian Period (550 CE–800 CE) layers in both the northern area and middle to western area of the Pahamäki site. Nonetheless, it is interesting that the total quantities differ so much, as both parts of the cremation cemetery under level ground were in use roughly during the same periods. In the west, it appears as if types 8 and 4A may have overtaken the functions of many other pottery types seen primarily in the north of the hill, such as type 5A showcased here.

Subtype 5B was only found during the excavations of 1977 and 1978. The combined area consists of the center of the Pahamäki site, as well as somewhat east of this. In the middle of the site, it was found in layers 5 and 4. East of this, it was found primarily in layers 6 and 5, with small quantities found in layers 4 and 2.

The somewhat rough exteriors of type 5B are covered with fine scratch marks. From the remaining sherds, it is possible to say that at least the rim and the shoulder have been horizontally scratched. The surfaces are a very dark gray, bordering on black, and the core is a somewhat lighter gray. It does not appear as if every vessel has been decorated, though wavy incisions are present along one rim.

The fabric of subtype 5B differs from the other subtypes in the sense that although the inclusions vary from moderate to small, which is true for the other subtypes, there is only a moderate amount of them, whereas subtype A and C have abundant inclusions. The inclusions of 5B consists of angular, gray as well as white glassy particles. Based on their hues, the grayer inclusions are likely quartz, whereas the smaller ones could be quartzite, though their diminutive particle size made it difficult to define them. The quartz inclusions in particular, appeared to occur in larger, more angular chunks. As Gibson and Woods (1990: 28–31) point out, materials that vary in size from the other inclusions are often seen as tempers, which have been deliberately added to the clay paste so that the vessel would survive the firing, and especially the initial water smoking stage.

A quite large, well-preserved rim sherd allowed the use of a rim chart to calculate the diameter of the rim of one type 5B vessel. The diameter of this particular vessel has evidently been 22 centimeters. A vessel of this size has perhaps not been large enough to preserve large quantities of foodstuff, though it is within the realm of what one can imagine has been a sufficient size for preparation of meals as well as eating.

One 5B sherd appears to have some black crusting within the sherd wall on what would have been the interior of the vessel's shoulder. This could very well be the charred remains of food. According to Skibo (2015: 190–191) carbonization within the vessel wall, on the inside of the vessel, is the result of fats and food particles sinking into the pores of the fabric. Furthermore, a carbonized ring around the inside of the shoulder suggests that the vessel has been used for boiling purposes. This is due to the fact that charring occurs during temperatures between 300 °C and 400 °C, but the temperature will stay below 100 °C in a vessel filled with water. Above the water surface, however, the temperature will be sufficiently high to form a ring of carbonization. In other words, the 5B vessel found at Pahamäki may have been used for boiling, based on the pattern of charring, as well as the dimensions of the rim. Although, lacking more of the vessel, we cannot say for certain whether the charring on the shoulder is incidental, or if the pattern has truly been ring-shaped.

Subtype 5C was found in largely the same areas of the site as subtype B, within the same family, with the addition of 1981's excavation area westward, as seen from the center point of the Pahamäki site. In other words, 5C was found from an area encompassing the center of the site and large areas to the east and west of this. In general, the C subtype's vertical distribution is somewhat spotty, occurring in relatively larger quantities within a few layers, with no drop-off or increase in the subsequent/previous layers. It occurs shoulder-to-shoulder with subtypes A and B, within the upper and middle layers, though never deeper than A and B.

The surfaces of the 5C are generally harsh, though some sherds have been carefully scratched, resulting in quite smooth surfaces. Scratched sherds were found from the middle of the site, though particularly somewhat west of the site's center, where all the sherds had been scratched on both sides. The scratches were mostly done in the same direction, though with some alternating strokes. The color scheme for all of the sherds of subtype 5C tends to be one orange and one dark gray surface, with a dark gray core. The vessels of this type have evidently not been decorated.

The fabric of the 5C pottery is characterized by its diversity, and includes a colorful assortment of white, gray, opaque, red and black materials (figure 6.). The identity of the white, gray and opaque inclusions are felspar and quartz, though it was not possible to verify the identity of the red and black materials with certainty, using optic microscopy alone. It is, however, likely that they are red and black iron ore. Overall, the inclusions are not just diverse, but also quite abundant. The majority of the inclusions are homogenously moderate in size, though the particle size swings somewhat in both directions. There appears to be the occasional larger

chunk of angular, oblong felspar, in particular. To borrow from Gibson and Woods (1990: 28–31) again: materials, which differ from the mean particle size, as well as angular inclusions in general, are often times interpreted as intentional additions, or temper.

It should be noted that the sherds of 5C found in the western area of Pahamäki differ somewhat in their inclusions. Interestingly enough, this is the same area of the site where a lot of modification had been done to the 5A sherds, as mentioned previously. In the case of the 5C sherds, there is a significantly higher degree of quartz within the fabric. As Gibson and Woods (1990: 34–35) point out, although quartz really is quite the horrible temper to work with, due to the differences in its thermal expansion rates in comparison with clay, it is nonetheless one of the most common inclusions, even as deliberately added.

It is, in other words, not easy to say what the reasons for the sudden quartz inclusions are. Perhaps it was a more widely occurring material than, for example, the black and red iron ores. If it was, for some reason, necessary to produce a large amount of vessels of this fabric type, during some period, it is plausible that one would use whatever tempers were available and worked "well enough." As sherds of subtype 5C were only found in layer 2 within this area of the site, though of moderately high quantities, it is possible that we are witnessing such a period. On the other hand, it seems counter-intuitive that vessels in this part of the site have been meticulously scratched, only for them to fracture during the firing. Overall, the subtype occurs in larger quantities within occasional layers, when compared to the other fabrics within type family 5.

Figure 6. The fabric of pottery type 5C from the Pahamäki assemblage.

5.1.6. Types 6A–B

The sherds of subtype 6A (figure 7.) were, in some cases, quite difficult to distinguish from some of the subtypes of type 5, and as stated earlier, type families 5 and 6 were created in part as umbrella types for several different fabrics. The difference in surface treatment of the sherds turned out to be a helpful tool in distinguishing between the types, however. Whilst the 5A vessels have generally had quite harsh surfaces, with the exception of the burnish present in the sherds found during the excavations of 1981, all of the sherds of type 6A have either had both of their surfaces burnished to a sheen, or meticulously smoothened.

Figure 7. A burnished rim sherd of pottery type 6A from the Pahamäki assemblage.

In general, it appears as if the potters have initially chosen to smoothen the surfaces, and then gradually switched to burnishing. The gradualness of the change is particularly well illustrated in 1975's excavation area, where all of the sherds in layer 3, and 35 g in layer 2 is smoothened. In contrast, 25 g is burnished in layer 2, and all of the sherds are burnished come layer 1. The single sherd found in the first layer of the westernmost area of the site is burnished on both sides, in the same manner.

The 6A vessels have evidently been decorated to some extent, as some of the sherds have been incised with either zigzag, crisscross, or plus sign patterns. The decorative elements are, once again, definitely Iron Age (500 BCE–1300 CE) in nature. The crisscross decoration was found in the first layer of the northernmost excavation area of the Pahamäki site, relatively dating the youngest activity at this part of the site to the Viking Age (800 CE–1050 CE) and Crusade Period (1050 CE–1300 CE), as these periods are associated with crisscross decoration (Kivikoski, 1951: 27; Carpelan, 1980: 195). This lines up with what one would expect from a cremation cemetery under level ground feature.

The fabric of the 6A vessels have generally been slightly more sparse than that of both the 6B vessels, and the vessels within type family 5, though the frequency of 6B's inclusions nonetheless remain within the abundant–moderate range, depending on the sherd. In this case, the fabric of 6A is relatively sparser due to the lower number of particles, even if the particles themselves tend to be slightly larger than those of 6B and type family 5. In the latter two, there is instead a noticeably larger quantity of smaller inclusions, resulting in the fact that their fabrics are more abundant in inclusions overall.

In any case, the fabric of subtype 6A is dominated by quartzite, though it includes a sizeable quantity of white mica as well. The quartzite inclusions are notably flat and angular in shape. It is possible that this angularity became more accentuated toward the later layers in the north of Pahamäki, however this is not certain, as the particle shapes were only noted qualitatively. If the people at Pahamäki indeed favored more angular quartzite inclusions over time, it is possible it became more important to have increasingly fracture resistant vessels. As mentioned earlier, the clay particles have an easier time attaching themselves to flat, angular surfaces.

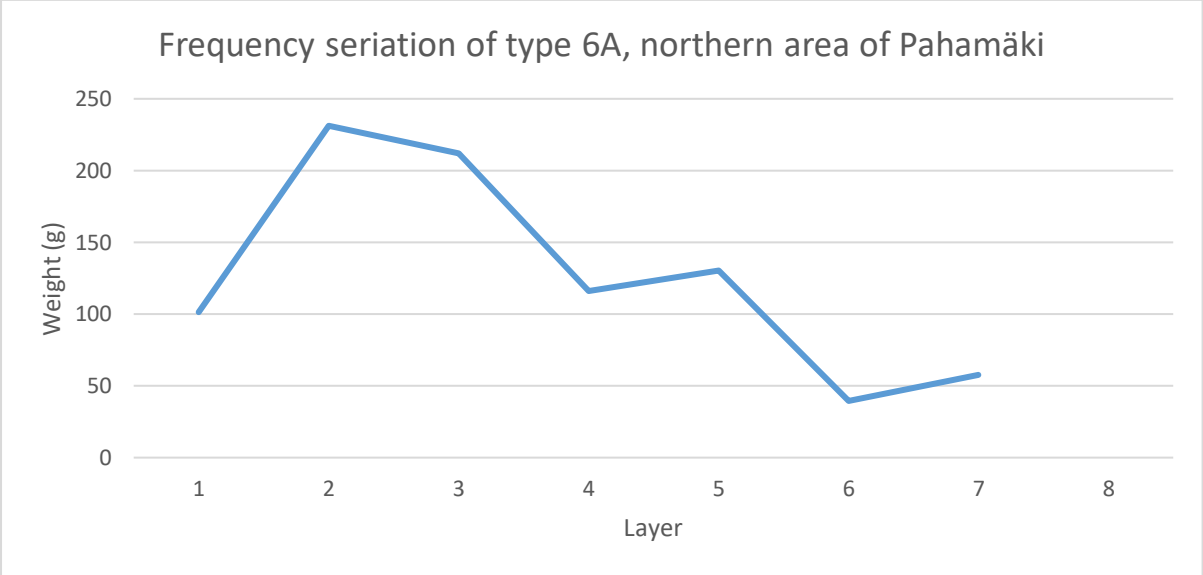
It is possible that the previously mentioned general, and gradual, shift from smoothened to burnished surfaces in the 6A vessels was similarly linked to the changing requirements placed on the vessels. According to Gibson and Woods (1993: 109), burnishing a vessel has a reducing effect on its permeability. This aspect would obviously be of the highest significance if the vessel was designed to contain liquids. Similarly, even a small fracture in the vessel could render it completely useless for the purpose of storing liquids. Perhaps the 6A vessels were modified over time to fulfill a specialized function.

In addition to the quartzite, the type 6A fabric is characterized by an especially high quantity of white mica, which is peppered across the surfaces of the sherds. One cannot help but note that the manner in which they glimmer on the dark, smooth surface in a quite aesthetically pleasing manner. This has surely not been lost on the past inhabitants of Pahamäki, and it is not impossible that the white mica has been selected in part for its aesthetic side effects.

The entire base of one vessel of type 6A had been preserved in the upper layers of northern Pahamäki. The diameter of the flat base is 74 centimeters before it starts curving up toward the body. With a base of that size, it seems likely that the vessel has not been very small, though more cannot be said without reassembling more of the vessel. A recovered rim sherd of one vessel tells us something about the upper part of the vessel as well. It has evidently had a pinched rim with a relatively gently curving neck. It was not possible to verify whether the profile curves inward or outward.

Most of the potsherds of type 6A were found in northern area of Pahamäki, with the exception of the single sherd found in the west, as well as roughly 240 g in trial pit 2 slightly east of the site's center. (Luoto, 1977: 6) mentions that pottery was found in the trial pit, from the bottom of a sooty layer interpreted as a settlement layer. According to the profile drawing, this should be layers 5–6. Later on, this area of the site was interpreted as a ditch circling a possible stone cairn, with a fill likely dating to the period between 700 CE and 900 CE (Onnela et al., 1996).

It was possible to make a graph based on frequency seriation in the north of the site (graph 11.), where the type was found across almost the entire vertical dimension. The curve paints a picture of how the type was introduced in layer 7 and underwent alternating periods of relatively rapid increase and stagnation/slight decrease until layer 2, where it reached its pinnacle at 231.2 g. The graph suggests that type 6A was likely produced already during the Stone/Bronze Age settlement period at the Pahamäki hill, as it was relatively frequent in layer 7, where the sherds were smoothened rather than burnished.



Graph 11. Frequency seriation graph of pottery type 6A in the northern area of Pahamäki.

The type appears to have been at its most popular during the Merovingian Period (550 CE–800 CE), and Viking Age (800 CE–1050 CE). It notably hit its peak higher up in the layer order than any of the other pre-medieval pottery types in the north of the site hit their peaks, with the exception of type 7A, though still within the stratigraphic layer that contained most of the cremains and burial goods (Luoto, 1976). The large quantities of type 6A in the upper two layers nonetheless means that the type likely had a role to play in the post-burial sacrifices and feasts that took place on top of the cemetery, and it even appears as if its role in the context of these was just as central as its role as burial to accompany the dead. Once again, we find indications that a "finer" Iron Age ware, with decoration and an improved surface texture, was used for special commemorative occasions at Pahamäki. Although, in this case it is worth noting that the fabric of the 6A sherds contains some moderately sized inclusions, as opposed to the fabrics of the sherds of type 4A and 1A.

Subtype 6B is somewhat of an outlier in the assemblage. It was only found in one area of the Pahamäki site: in the center and within some distance east of this. The sherds were found

primarily in the first two layers, a miniscule amount in the third, and moderate amounts in layers five and seven. The characteristic that stands out the most, however, is its slick, black outer surface. It has been burnished to the point of having an almost oily sheen, which appears quite different from the other burnished potsherds within the Pahamäki assemblage, which tend to have more of a matte finish. The inner surface has not been preserved in any of the sherds, meaning we cannot say how it has been treated.

One remaining rim sherd of subtype 6B allows us to induce some things about the original shape of the vessel. The rim has had a very gentle convex curvature, followed by a slight outward curving shoulder, after which the profile of the body continues inward, curving moderately. Unless the vessel has had an irregular curvature, or a distinct depression within the profile of its body, i.e. not a feature present in any type pottery within the area, the 6B vessel must have been very small. Unfortunately, not enough remains of the rim sherd to estimate its circumference with any accuracy.

The fabric of the 6B vessels consists mainly of quartz inclusions, which varies slightly in particle size, but is within the moderate size range. The fabric includes smaller particles. The better part of these is a black material, which is likely black iron ore. In addition to this, there is a glassy, white material, which is likely quartzite, as well as earthy, red particles, which are most likely red iron ore.

The dominance of quartz inclusions within the fabric may suggest that the quartz may have been deliberately added to the clay paste used for vessels of type 6B. The fact that the quartz clearly differs in particle size relative to the rest of the inclusions, which again, are much smaller, makes the temper explanation likely. To speculate further: when you combine this with the observation that these vessels have been burnished in such a stand out-fashion, and have evidently been broken, or deposited in small amounts, though over some time, it is possible that these vessels were only used infrequently, and with care. Similarly, if the vessels were intentionally deposited, it was only done in rare cases. If the vessels of subtype 6B have indeed been very small, as suggested by their profile, they were perhaps used to serve beverage or food during special circumstances.

5.1.7. Types 7A–B

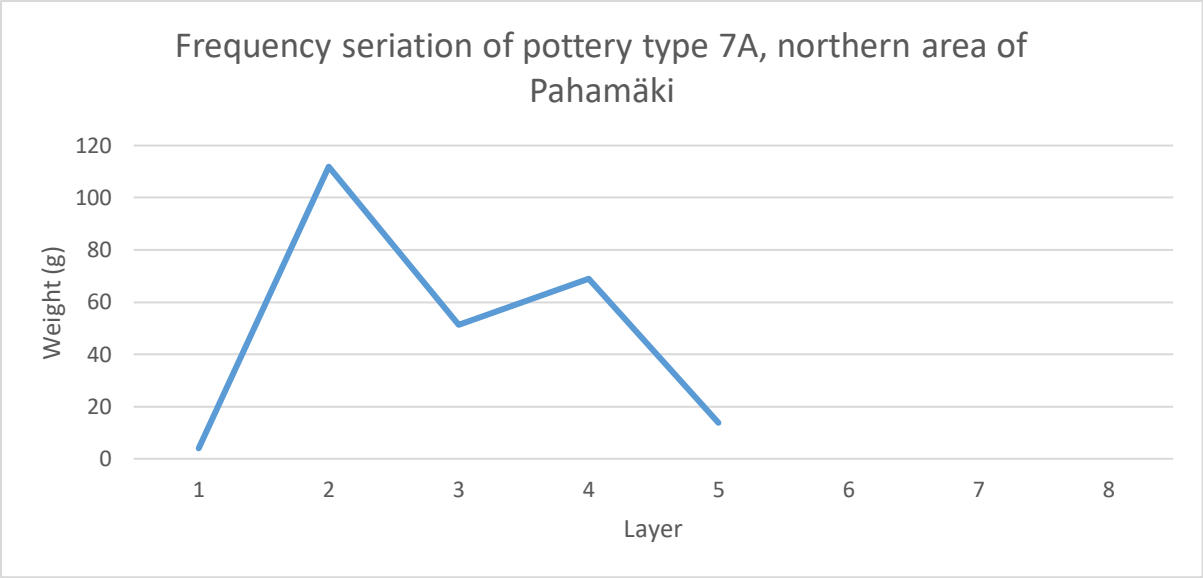
Although type 7A, which ranges from gray and brown to orange in color, seemed to be of a particularly coarse type at first glance, a closer inspection showed this to be not be the case. Although the surfaces of the 7A potsherds vary from harsh to rough without exception, and

large quantities of the sherds have fractured into quite uneven, angular shapes, the fabric itself is relatively sparse, when viewed underneath the microscope.

The visible inclusions of type 7A consists of felspar, which varies quite a bit in particle size, with some grains being of considerable size. The reason for why *visible* inclusions was stressed, is that most of the original inclusions are indeed not present anymore, as they have likely combusted during the firing of the vessels. In other words, type 7A is mostly hole-fired. The hollows left by the burning inclusions vary in size and shape, meaning a range of materials have likely been used in the clay paste. Some of the more rectangular hollows could be the remains of calcite, whereas the more frequent small, round hollows could have been left by combusting limestone or oolite (Peacock, 1977: 30–32).

The rough fracture pattern present in some of the 7A sherds cannot fully be explained by the existence of pre-firing inclusions, as the other hole-fired pottery types within the Pahamäki assemblage have, as a rule, fragmented in quite smooth fragments, despite the hollows present in the sherds. Indeed, some smooth fractures can be seen in type 7A as well. The post-depositional processes or some wholly other quality present in the clay fabric may be the reason for the rough fracture pattern. It has for instance been shown that a lower firing temperature can lead to hackly fractured sherds (Orton et al., 1993: 70).

The vast majority of type 7A pottery was located in the northern area of the site. Its vertical distribution was quite limited (graph 12.), only stretching between layers one through five, and as such we can likely surmise that the type was not in use in the Bronze/Stone Age settlement situated on the hill. Rather, it appears to have been introduced during the Merovingian Period layers (550 CE–800 CE). The type peaked at 111.9 g in layer 2, which is higher up in the layer order than most other pottery types in this area of the Pahamäki site, outside of type 6A.



Graph 12. Frequency seriation graph of pottery type 7A in the northern area of Pahamäki.

The only other part of the site we have to compare the distribution of type 7A with is the middle of the site, where it was only found in the post-Iron Age layer 3, alongside decidedly younger stoneware. As the stratigraphy was reported (Luoto, 1978: 4) as mixed and difficult to read in this area, type 7A may not actually have been in use during medieval times (roughly 1200 CE–1600 CE). Type 7A constitutes a deviation at Pahamäki by not only being an organic tempered pottery type in use as late as the Late Iron Age (800 CE–1300 CE) at the minimum, but not being introduced before the Merovingian Period (550 CE–800 CE). Pottery with organic and carbonate tempers found at Pahamäki have tended to be concentrated to the Stone/Bronze Age settlement layers of the site. In other words, whilst we can see a preference for non-organic temper when moving from the Stone/Bronze Age settlement to the Merovingian Period and beyond, the technology of using organic temper did not become obsolete before medieval times.

Not much could be said about the shapes of the 7A vessels. Based on the rim and base sherds of one vessel, it has had mostly straight sides, with a moderately curved base.

An interesting distinction between the subtypes 7A and 7B is that only the potsherds of the latter have had their surfaces treated and/or decorated. The vast majority of the potsherds belonging to type 7B have surfaces covered with textile impressions, or shallow, slightly angular impressions (figure 8.). Surface scratching also occurs frequently. To a lesser degree, the sherds from some parts of the site have been burnished.

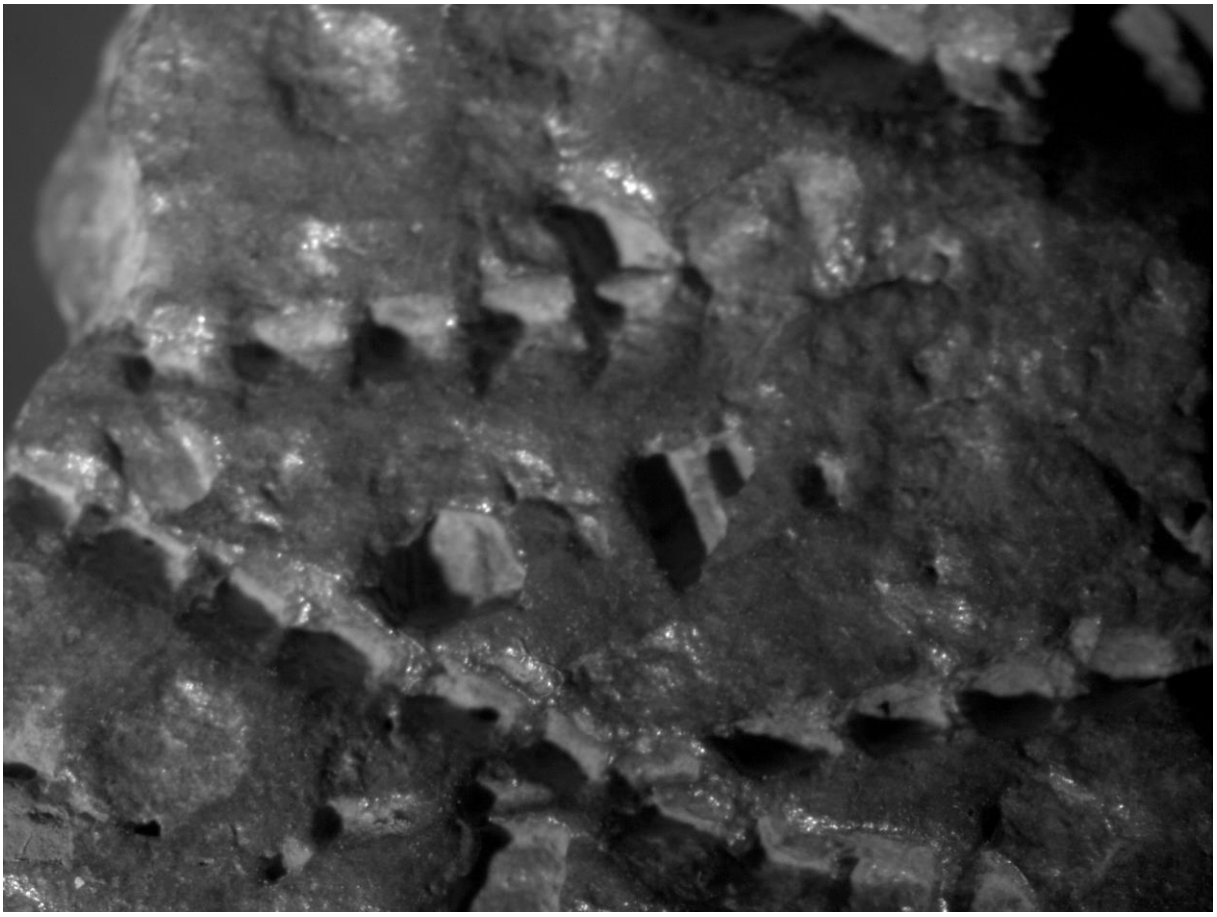


Figure 8. Textile impressions and comb marks on pottery type 7B from the Pahamäki assemblage.

Textile impressions have previously been found in three types of pottery in the prehistory of modern day Finland. These are the Late Stone Age Kiukaisten type pottery, and the Sarsa-Tomitsa type as well as the imitated textile ceramics of the Early Metal Age. The pottery of type 7B of this study, within the Pahamäki assemblage, is most similar to either the Kiukaisten or Sarsa type pottery. The imitated textile ceramics have not been found further south than the middle of the country, and its textile impressions are much more rhomb shaped than in our type 7B. Finally, imitated textile ceramics have been tempered with asbestos, which is not found in the fabric of type 7B.

Between the other two options, it was not possible to conclusively argue which type of pottery type 7B could be linked to, though all things considered, the Epineolithic Sarsa-type appears to be the closest match, based on the fact that both types depict decorations consisting of angles made up of comb marks. The fact that hole-firedness, a trait that characterizes type 7B, occurs in Kiukaisten type pottery as well, muddies the waters a bit, however. According to Carpelan (1979: 16), the Sarsa-Tomitsa wares have their home in Middle Russia, and their introduction

in Finland marked not only a complete overhaul of the prevailing stylistic pottery tradition, but also an innovation in the technology of pottery.

In general, the decorations occurring within the type 7B sample are limited to the 6th layer of 1981's excavation area, somewhat on the eastern side of the site. The exception to this being a pit in a single sherd found the first layer of the same area. In any case, the decorative themes in layer 6 include the aforementioned angles of comb marks and comb marks that zigzag, sometimes crossing each other. A couple of sherds had what appeared to be very shallow cord marks, though they may have been particularly regular textile impressions. One might add that the surfaces in the earlier layers differ in other senses as well. Particularly in layer six, once again, where sintered sherds appeared in hues of black and orange, with some sherds having one scratched and one burnished surface.

From what can be determined by looking at the type 7B rim sherds within the assemblage, the vessels at Pahamäki have had straight profiles. This is typical for pottery characterized as being of the Sarsa type.[4] With that said, types from separate typologies should not be directly equated to each other.

As was already alluded to, the type 7B sherds are hole-fired to large degree (figure 9.). This being the characteristic linking them together with subtype 7A in the typology created for the purpose of this study. The still remaining inclusions are smaller than those of 7A, though a bit more frequent, consisting of unidentified irregular dark lumps, black mica and grog. The last inclusion is what differentiates Sarsa type pottery from the similar Tomitsa type.[5]

[4] P. Pesonen, 1999, Suomen esihistoriallinen keramiikka, [online] the University of Helsinki archaeology department's database on prehistoric pottery in Finland, available at: www.helsinki.fi/hum/arla/keram/ [accessed 02.10.2019].

[5] P. Pesonen, 1999, Suomen esihistoriallinen keramiikka, [online] the University of Helsinki archaeology department's database on prehistoric pottery in Finland, available at: www.helsinki.fi/hum/arla/keram/ [accessed 02.10.2019].

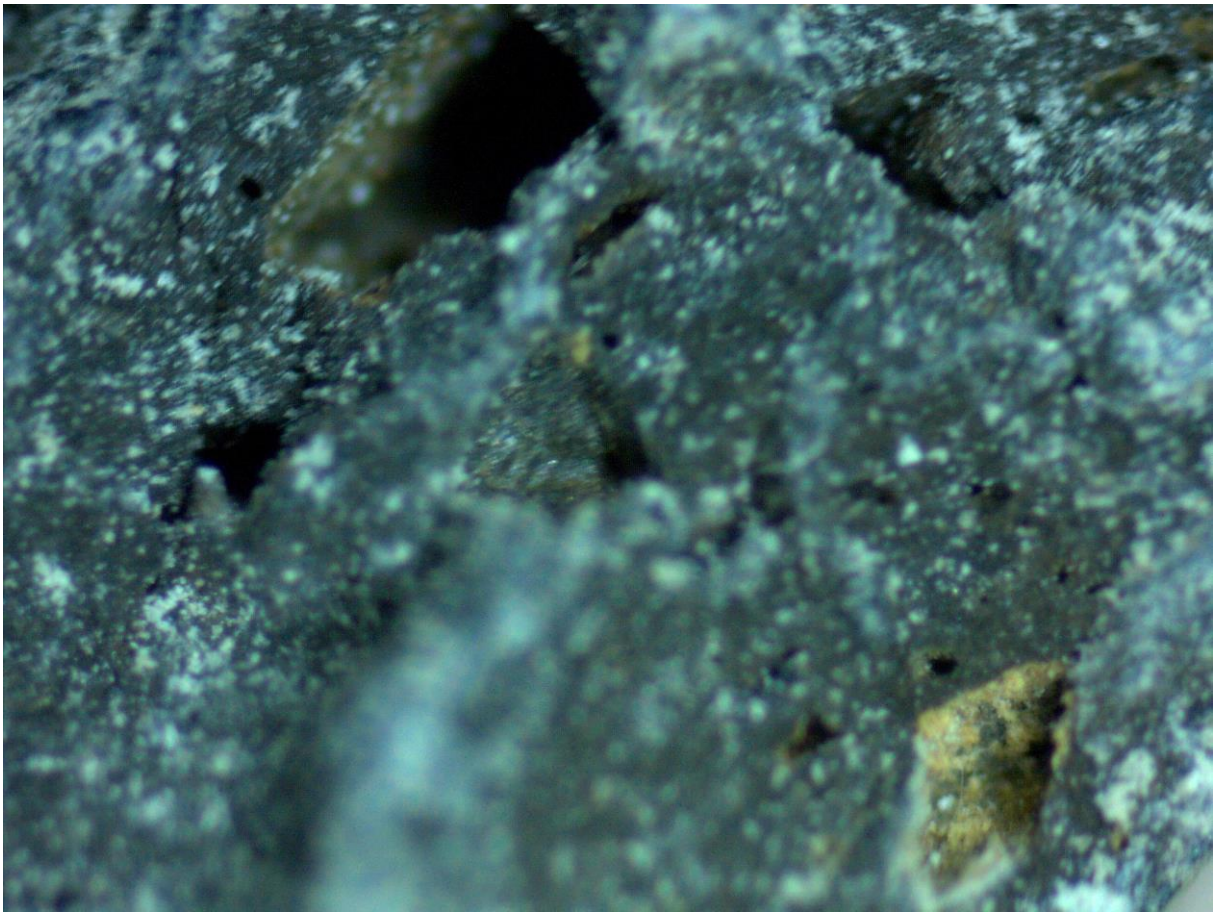
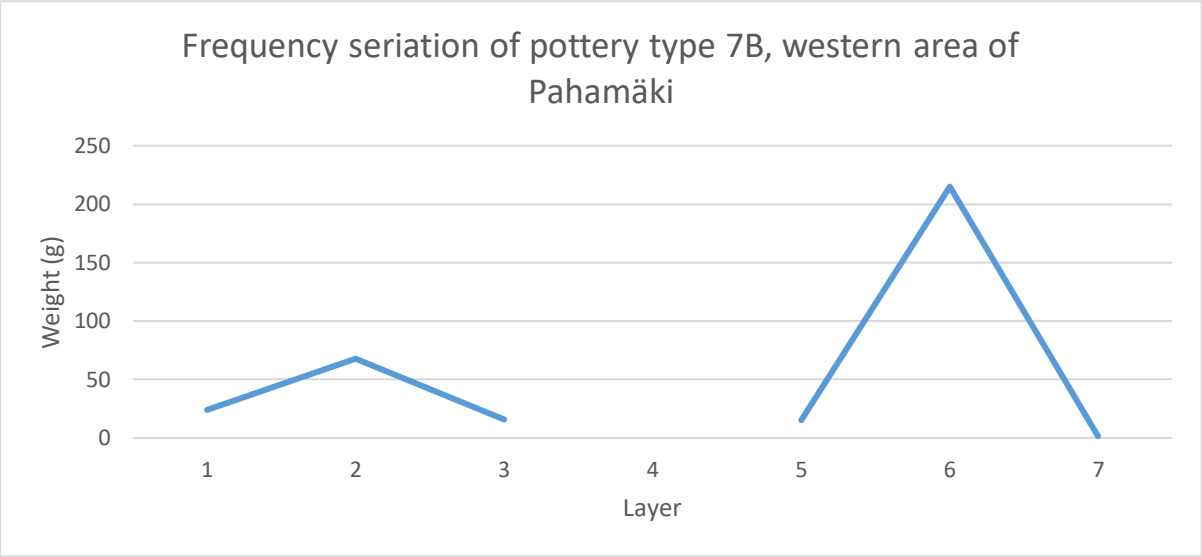


Figure 9. Voids left by combusted inclusions visible in the fabric of pottery type 7B from Pahamäki. The rectangular ones are likely from calcite, whereas the curved, oblong voids suggest shell tempering.

There is a quite large amount of voids visible within the sherd walls of type 7B, suggesting the original clay paste has included a considerable quantity of inclusions, which have combusted during the firing of the vessels. Just as in 7A, there are small, round impressions, which may have contained oolite or limestone, as well as rectangular impressions likely left by calcite. In addition to this, there are more oblong voids present in the fabric, which may suggest that the potters have tempered vessels of this type with shell. The seacoast would have likely been home to a number of species of *bivalvia*. Finally, the striated, elongated voids found within the fabric of the 7B sherds are likely to be the remains of straw or tufts of fur added to the clay paste. The implications of organically contra non-organically tempered in the context of the Pahamäki site have been expanded on in the discussion chapter.

The frequency seriation of type 7B resulted in a quite irregular looking graph (graph 13.). As it was only found in the west, it was not possible to make any further comparisons between parts of the site. Nonetheless, I would argue that the irregular shape of the graph may reveal something regarding type 7B's significance for the past people of Pahamäki. The graph could be interpreted as showing two different curves, each with its own small initial introduction, followed by a peak, and finally ending in a decline.



Graph 14. Frequency seriation graph of pottery type 7B in the western area of Pahamäki.

The earlier, very steep curve between layers seven and five could display the initial and primary use of the type during the Early Metal Period, peaking at a respectable 215 g in layer 6. It made up the most abundant pottery type this deep in the cultural layers of Pahamäki by a wide margin, supporting the interpretation of type 7B overlapping with the Epineolithic Sarsa type pottery.

Surprisingly, we see a smaller resurgence of the type between layers one–three. When comparing the total sherd weight represented in the two curves respectively, we see a 53 % drop from the deeper layers to the upper 3 layers. The question is whether the type 7B pottery was found by Iron Age population, which arrived at Pahamäki. They, too, might have been fascinated by the textile pattern covering the surfaces of the vessels, which stands out so from the surface treatments practiced later, during the Iron Age (500 BCE–1300 CE). Following Wessman (2010), I have argued that smaller quantities of type 7B may have been deposited alongside the cremains to secure the connection to the place and its ancestral inhabitants. The discussion can be found under sub heading 6.1.

5.1.8. Type 8

The error made in the documentation of type 8 should be made clear again. The type was also come across in the northernmost area of the site, where it was found in at least the third layer, which does not show in the graphs. This was, again, due to the similarity between type 8 sherds and the 3A sherds on the coarser side of the spectrum.

With that said, type 8 (figure 10.) is overall one of the most eye-catching and easily recognizable types within the Pahamäki assemblage, as its fabric is by far the coarsest kind found on the site. In many areas of the sites, its surfaces are similarly exceptionally harsh, though in other parts of the sites the type 8 sherd surfaces have been treated in several ways. Additionally, type 8 is noteworthy for being one of the most commonly occurring types at the site, both in the horizontal and the vertical dimension. In several areas of the site, the type makes up the brunt of the recovered pottery, when comparing both the area-specific number of potsherds as well as the weight of the sherds.

Figure 10. Rim sherd of pottery type 8 from the Pahamäki assemblage.

Due to the large quantities of the type that have evidently been in use in the past, and arguably more importantly, the considerable time spans, it is not surprising that we find some variance within the type. There appeared to be some correlation between these variables. The coloration of the type's sherd surfaces varies from brown, to gray, to black and occasionally orange. It is not unusual to see several of these colors on the same sherd. The core tends to be grayish brown and slightly lighter in color.

The redder hues appeared to generally be reserved to the sherds on the thinner side of type 8's thickness spectrum, though thinner gray-black sherds occurred frequently as well. The thicker sherds, however, generally have very little red in them, and instead come in grays, browns and black. Overall, the sherds within the type vary a great deal in their thickness, with some sherds being as thick as two centimeters, whereas others are as thin as a few millimeters. This variation is not solely the effect of different parts of the same vessel varying in thickness, as thick rim sherds of type 8 also occur. Although, it should be noted the rims do tend to be distinctly thinner in several of the types within the Pahamäki assemblage.

Though the type is not decorated in the vast majority of cases, there are some notable exceptions. In the first layer in the north of the site, a rim sherd from a vessel decorated with a single broad, shallow, horizontal groove was found. The groove may have been with finger, dating it to roughly the year 1000 CE (Carpelan, 1963: 19). In the fourth layer of the westernmost excavation area of the site, rim sherds were found with consecutive horizontal grooves done with some tool that caused striations when pressed into the clay paste. Whether these marks should be classified as scratching, i.e. surface, rather than decoration is a matter of interpretation. Heavier scratching was noted in the sherds in the second layer of the same area. Some sherds there have been decorated with oblique lines incised above a single horizontal line.

Moving slightly east, toward the middle of the Pahamäki site, a cord mark-decorated rim sherd was found in layer three. Luoto (1988: 131, 143) points out that cord marked pottery within related cemetery contexts have sometimes been interpreted as being from the Merovingian Period (550 CE–800 CE). He notes that cord marked pottery was clearly found within the earlier layers of Haimionmäki, Loukiainen, another cremation cemetery under level ground local to Lieto. The pottery assemblage at such archaeological features, he continues, is usually too scattered to be able to create a dating sequence, despite the large quantities of decorated pottery. Instead, the finds are clumped into clusters, which clearly stem from different depositional events. However, it should be noted that cord marks have been used throughout extensive time spans during the prehistory of modern Finland.

As for further surface treatments, although the brunt of the type 8 potsherds have strikingly abrasive surface texture, a considerable amount of variation is present in the sherds found from the center part of the Pahamäki site, to the westernmost part of the site. Starting off with the excavation areas in the middle of the site, some sherds have had both of their surfaces burnished. Initially, this property was merely noted qualitatively, but the vertical distribution pattern was

taken into consideration when they started occurring systematically. As such, it became apparent that only the sherds from the 5th layer of 1977's excavation area, one of the central areas of the site, have been burnished, and on both sides. Slightly east of this, scratching of the inside was only observed in layer seven, the bottom layer.

Further westward, part of the sherds in layer four have been scratched, and part have been burnished on both sides. In the following layers, four and five, sherds have also been burnished on both sides. Curiously, the sherds in the first and last layers have no apparent surface treatment.

In the westernmost area of Pahamäki, the same trend is visible to a large degree, though there are also differences. The sherds in layer five are all covered with scratching, as is true for the vast majority of the sherds in layer four, though some have burnished outer surfaces. Come layer three, part of the sherds have been treated by smoothing their surfaces. In layer two, the sherds have been burnished, now on both sides. Only in the uppermost layer, are the type 8 sherds of the very harsh kind again.

It has been mentioned several times, that the fabric used for type 8 vessels is very coarse. To go more in-depth on this, there is some heterogeneousness in the fabrics of the sherds as well, just as has been the case for the previously noted factors. What is shared across the fabrics of the type, however, is an extremely high frequency of inclusions, which display a low level of sorting, i.e. the inclusions vary in size from larger to quite small. When looked at solely by eye, the frequency of inclusions is so high, that the fabric appears to consist more of inclusions than clay.

In general, the inclusions within the type 8 fabrics consists primarily of dull, dark gray and black stone of irregular shape. Once again, there is some variation. To highlight the areas which stand out: in the westernmost area of the site, in the layers four, three and two, there is a large amount of rectangular voids visible in the fabric, which are the impressions left combusted inclusions. According to Peacock (1977: 30–32), the rectangular shape suggests the identity of the combusted inclusions may have been calcite. The sherds in layer three differed further by having large chunks of quartz and similarly large, flat inclusions of felspar within their fabric.

Further east, there was less of the irregular stone material within the sherds in layer 6, which changed further up in the layer order. In the middling fourth, fifth and sixth layers, there was the addition of red flakes within the fabric, which is likely red iron ore. Even further east, in the

excavation area of 1978, there was an unusually high amount of quartz and quartzite inclusions within the fabric, in addition to the characteristic dull, dark, irregular stone.

An interesting detail that sticks out regarding the type 8 vessels is that several sherds were found with a black crusting mostly within the sherd walls, but in a few rare cases, also on the surface of the sherd wall (figure 11.). This crusting could very well be charring from whatever has been inside of the vessels as they have been subjected to heat. Skibo (2015: 190–191) notes that carbonization within the sherd walls is caused by food components seeping into them. As for tangible charring on the surface of the vessel interior, it is often the result of boil-over. Surface-level carbonization of the vessel interior is also caused by cooking methods not involving water, at temperatures higher than 300 °C, e.g. when roasting something.

Figure 11. Surface charring visible on the sherd wall of a type 8 sherd from Pahamäki.

However, it seems logical that charring could have been caused through both secondary activities and post-depositional events involving the vessel, especially in the context of features such as cremation cemeteries under level ground. If the vessel, or parts of it, have been thrown onto the funerary pyre, and come in contact with organic material such as the deceased themselves, one would imagine charring could form just as well as during the primary use of

the vessel. Regardless, it is interesting that the carbonization is so prevalent in the sherds of type 8.

The profile of the rim shapes of type 8 vary slightly between each other, but are quite similar overall. The very edge of the rim is slightly curved in all rim sherds, and at least in one sherd the rim clearly juts out from the interior of the vessel. Further down the rim, all sherds have a very gentle, but perceivable curvature. In a single rim sherd of the type, the profile has a very gentle S-curvature.

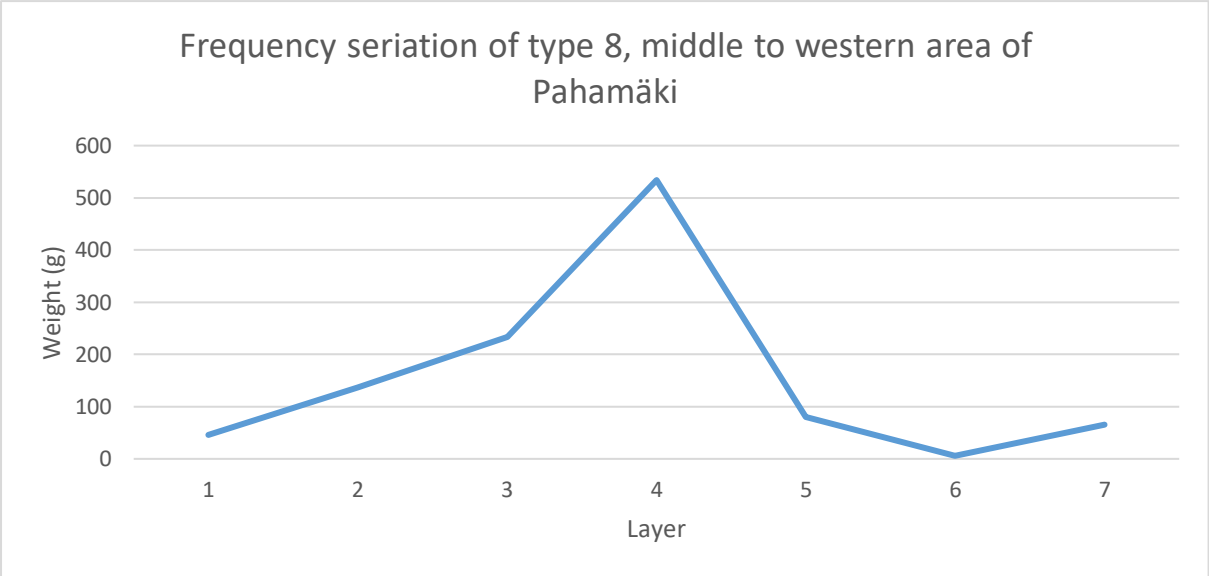
One confidently identifiable base sherd of type 8 was found in layer 4 of the westernmost part of the site. The shape of the base is distinctly angular, with one moderately curving wall, and the other curving steeply. The point at which the walls connect at the base is distinctly rounded. The sherd is rather thick, and its fabric is characteristically filled to a very high degree of dull, dark and irregular rock material.

Unfortunately, none of the rims sherds was wide enough to accurately measure the original diameter of the vessel. As the curvature of the mouth of the vessel was barely noticeable in some rim sherds, it is possible that at least some of the type 8 vessels have been moderately large. It is however quite likely that the vessels have varied in size, as the same fabric has been used across such a wide time span, during which changing factors may have impacted the design of the vessels. The fact that the sherds vary to such a large degree in thickness suggests that this has been the case.

As mentioned earlier, certain qualities and most importantly their distributions, suggest that pottery type 8 has served as the a bulk ware, alongside type 3A, throughout at Iron Age Pahamäki, with minor alterations having been done to the fabric, surface and vessel shape, depending on what was required at the time. It is conceivable that the type was used for a variety of purposes, rather than having one, specific function. For instance, it has seemingly had an important role in the burial customs practiced at Iron Age Pahamäki. I have expanded on this in the discussion chapter.

To move to the vertical distribution of type 8, the frequency seriation for the sherds recovered from the north of the site has not been included in the thesis, as the sherds from the 1975–76 excavations were erroneously weighed alongside the sherds of type 3A. A couple of notes could be made for the distribution in the north, regardless. First of all, type 8 was exceptionally abundant within area. In fact, just the correctly weighed 8 sherds from 1979's excavation area with 1980's excavation area 1 were more than the quantities found in the areas stretching from

the middle to the east and west of the site respectively. Secondly, type 8 was found in smaller amounts as low as layer 5, however it peaked in the decidedly Iron Age (500 BCE–1300 CE) layer 3. Curiously, after a drop in layer two, the type saw another sharp spike in layer one, which must mean that this coarse ware was also utilized in the secondary sacrificial and feasting events that took place on top of the cremation cemetery in the north of the Pahamäki hill.



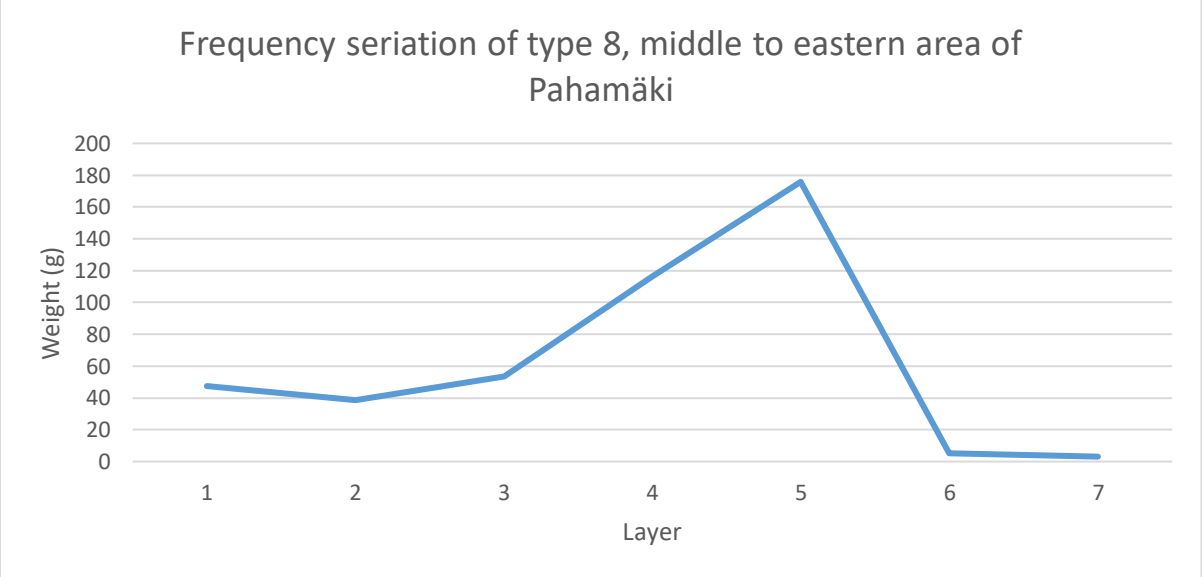
Graph 15. Frequency seriation graph of pottery type 8 in the middle to western area of Pahamäki.

The second highest quantity of type 8 was found in the area between the center and western edge of the site (graph 15.). The majority of the type was found within a cultural layer with soot, burned bone and brittle stone interpreted as a cremation cemetery under level ground (Korkeakoski-Väisänen 1983: 6). Indeed, within this area the type represents the overwhelming majority of the pottery sample. Even if the total number of pottery types represented in any given area of the site was quite stable, roughly varying between 8 and 12 types, type 8 constituted an abnormally high percentage of the total weight of the pottery found in this area. The second most "abundant" type in the area in terms of total weight, type 3A, only weighed 23.3 % of the total weight of the type 8 sherds. Following this, the third and fourth most "abundant" types were a mere 3.1 % of type 8's weight respectively. It almost appeared as if type 8 had taken over the use of other pottery types in the westernmost part of the site for some reason.

As was the case in the north of the site, the distribution of type 8 correlated heavily with the Iron Age (500 BCE–1300 CE) layers. What is noteworthy, however, is that there was no spike in pottery type 8 in the first layer of the cremation cemetery under level ground context in the western area of the Pahamäki site. Neither was there an increase for any other type, with the

exception of the clear spike in type 4A. In other words, the way pottery was used in the western and northern cremation cemetery under level ground contexts differed to a large degree. The question is whether the disproportionate occurrence of this bulk ware in the western part of the cremation cemetery under level ground was linked to whatever social group, perhaps family, that was buried here. Another possibility is that the western area was never intended for collective feasts or sacrifices, and so certain types of pottery with a special link to these activities were not deposited in this part of the cemetery, contra the north of the hill. The latter explanation would require the Merovingian/Viking Age (550 CE–1050 CE) population of Pahamäki to have been aware of these secondary functions at the time of the cemetery's construction, which seems likely, but is not necessarily a given. It should also be stressed that type 8 itself constituted a large part of the burial assemblage.

When comparing the total quantities found in western part of the site to the quantity found in the east (graph 16.), we get a 60.0 % decrease, from 1100.8 g to 439.8 g. It is perhaps to be expected that the eastern part of the site should have had the least amount of any given type of pottery, as this latter part of the site had the highest proportion of settlement contexts to burial contexts, when looking at the entirety of the site.



Graph 16. Frequency seriation graph of pottery type 8 in the middle to eastern area of Pahamäki.

Although, it should be noted that the numbers were reversed in the case of type 3A, of which there was a 56.4 % increase going from the western part of the site to the eastern part. As was mentioned when discussing type 3A, the interpretation of Iron Age pottery one group of crude, everyday pottery versus one group of fine, decorated pottery for special occasions, fit quite well with the distribution of pottery types between the settlement and cemetery contexts at

Pahamäki. However, the relatively smaller quantities of type 8 in the settlement contexts versus its abundance in the cemetery contexts deviates from this picture. Evidently, the crudest pottery type found at the site has played a central role in the burial traditions practiced there. It seems likely that the type 8 pottery carried some values that are not obvious to us. Perhaps it had a connection to some social group, activity or food (Rice, 1984: 245), or perhaps the dead were understood to need some items that we would describe as "every day." This has been further discussed in chapter 6.1.

5.1.9. Types 9A–B

The surfaces of the type 9A (figure 12.) potsherds are all either quite harsh or rough to the touch. Their colors tend to be dark brown or gray, but reddish brown sherds also occur. Their cores tend to be a lighter shade of gray.

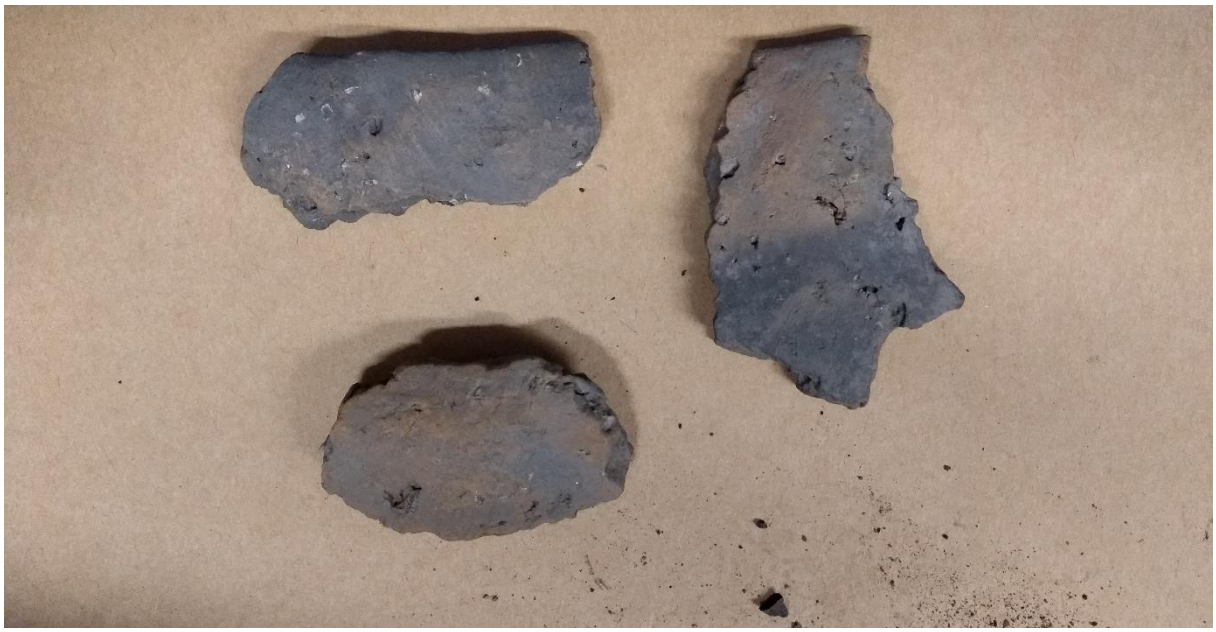


Figure 7. Rim sherds and a body sherd of pottery type 9A from the Pahamäki assemblage.

9A appears to have been a vessel type that was generally not decorated, though there is one exception in the assemblage. In the dead center of the Pahamäki site, a single sherd was found in the seventh layer, with horizontal cord marks going around what would have been the neck of the vessel. This rim sherd differed slightly from the norm of the type, in the sense that it was notably thinner, and contained a larger quantity of homogenously small quartz inclusions. Perhaps an effort to increase the fracture resistance in an already thin walled vessel, by reducing the size of the inclusions. As decoration adds another step to the manufacturing process, it is easy to see how the past potter would have preferred a more labor-intensive product to be less

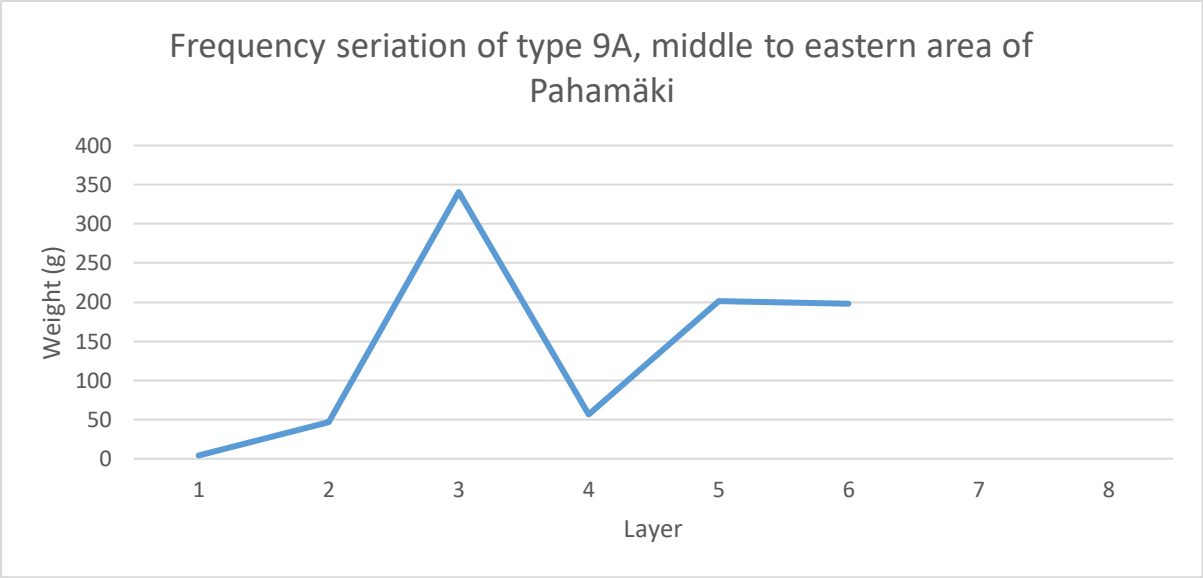
prone to breaking. There are however several instances of decidedly coarse wares with decoration, within the Pahamäki assemblage as a whole.

In general, type 9A tends to be somewhat on the thicker side, though the sherds vary quite a bit, with some sherds approaching the moderately thin. The recovered rim sherds tell us that the vessels have had a very gentle curve to their neck, with a barely recognizable shoulder. The diameter of the rim was measured using a sufficiently large sherd. The rim of that particular vessel has evidently been 25 centimeters.

Pottery type 9A's fabric is notable for containing large quantities of quartz sandstone, though the fabric varies somewhat between different layers and areas of the site. In the type 9A sherds found in the eastern parts of the site, grog had initially been used to temper the vessel, in layers 5 and 6. Other inclusions are felspar and quartzite, which vary between large and small in size. Further up in the order of layers, grog is no longer used as temper, and the inclusions are overall slightly less abundant. In the north of the site, the fabric is largely the same, though there is a larger quantity of large to moderate chunks of quartzite at the expense of the felspar. In the westernmost area of the site, the inclusions are generally smaller than in the previously mentioned two areas, and contain a large amount of smaller pieces of quartz.

The attempts at making frequency seriation graphs for the 9A sherds were mostly unsuccessful. The type occurred haphazardly layers of the different areas of the site and their layer order. The illogical curvature of its distributions may in part have been due to the fact that the technical layers do not accurately align with the time axis in the sense that stratigraphic layers do, as well as the small quantities in which type 9A was often times found.

Somewhat more successful was the attempt to graph the distribution of the type in the middle to the eastern area of the site (graph 17.). Two strange details in the graph for this area should nonetheless be highlighted. The type occurred in proportionately very large quantities already at the point of its introduction at the site. This could mean that the type became popular very shortly after it came into use, though the reason for this is not clear.



Graph 17. Frequency seriation graph of pottery type 9A in the middle to eastern area of Pahamäki.

Secondly, the sudden dip in type 9A's occurrence in layer 4 is quite strange. This could be related to a general trend seen in the development of the fabric of type 9A throughout the site: the sherds in the lower layers contain a higher frequency of inclusions. The drop of type 9A in the eastern part does indeed correlate with a change to a not only sparser, grogless fabric, as detailed earlier, but a relatively smoother surface. Whereas the sherds in layer five and six are quite harsh, some of the sherds found higher up have been polished to a high degree, bordering on burnishing. It is possible that the seriation frequency graph of type 9A depicts a very successful innovation of pottery tempered with quartz sandstone, which, after starting to become obsolete, gained new wind after some changes made to its fabric and surface treatment, leading to it being used as late as medieval times (roughly 1200 CE–1600 CE). Its popularity may even have come at the expense of several other pottery technologies, as we can see a general drop in the other types of pottery at the same point in the technical layers of this area.

What is interesting is that type 9A was one of the few types that were overrepresented in the pottery material from the eastern part of the Pahamäki site, alongside type 3A. The explanation for this may very well be connected to the different combination of contexts we find in the different parts of the hill. Whereas the north of the site, along with much of the western part of the site have been interpreted as a cremation cemetery under level ground, much of the eastern part of the site was interpreted as non-cemetery contexts from the Bronze Age (1700 BCE–500 BCE) to medieval times (roughly 1200 CE–1600 CE). These in turn surrounded smaller, individual burial cairns and mounds of unsure date (Luoto, 1976; 1977; 1978; 1981; Korkeakoski-Väisänen, 1983, Onnela et al., 1996).

Type 9A was perhaps not a kind of pottery used in association with the cremation cemeteries under level ground, either as burial goods or as part of any commemorative activities. The reasons for this are unknown, as the type does not really differ from many other types in any notable way, except for the large amounts of quartz sandstone in its fabric.

It should also be noted that the type 9 sherds were most abundant quite high up in the technical layers at the site, spiking within a layer with plenty of medieval (roughly 1200 CE–1600 CE) finds. As such, it is possible that the type was its most common during a period when the cremation cemeteries under level ground were simply no longer in active use. However, the fact that a few type 9A sherds were found in the bottom three layers of the western area of the cremation cemetery under level ground indicates that the explanation cannot be quite that neat. Although, this may tie in to the interpretation suggested earlier, that an old recipe was recontinued after modifying it, i.e. smoothening the surface, and making a finer, grogless paste.

We are given some possible hints as to the function of the 9A vessels by examining the carbonization present in a couple of sherds. Notably, the inside of the interior sherd wall has visible carbonization along the neck of the vessel. It appears as if the carbonization stops further down the neck, which, according to Skibo (2015: 190–192), suggests that the vessel may have been used for boiling. Although he notes that the residue pattern should be studied on the entire vessel, to rule e.g. carbonization due to exposure to fire. As the outer surface of the same 9A rim sherd has a sharp cut in its coloration, where the rim is brown but the lower part of the neck abruptly turns dark gray, one would expect fire damage to be the explanation to the aforementioned carbonization. However, the same cut in the surface coloration is visible in another sherd, from a different part of the site. This may indicate that some of the 9A vessels have been manufactured stacked inside each other. The part of the vessels inside the exterior vessel receiving a darker color due to being in a reduced atmosphere, and the exposed rim getting a brown color, as its atmosphere would have been oxidized.

9B differs from its counterpart mainly in its fabric, in the sense that it has much sparser, though notably larger inclusions. It was found within the same areas of Pahamäki that the majority of 9A is found, i.e. the east and especially the north of the site, where 9B is found in roughly the same quantities as subtype A. Ultimately, 9B was found in too small amounts to get an accurate idea of the type's lifespan through seriation frequency graphing. It is somewhat doubtful if 9B deserves its own subtype, or if it is sufficient to say that a couple of type 9 vessels were manufactured using a fabric with different proportions. In the north, the recipe for the clay paste

was perhaps set aside for the fabric we see in 9A, and in the east, subtype B popped up as an alteration whilst 9A was at its most popular.

5.1.10. Types 10A–B

What at first appeared to be a single type, due to the fabric having the same general "feel", albeit with some variation in the coloration, turned out to be two distinct subtypes upon closer inspection. The two subtypes were found in separate areas of the Pahamäki site.

Both of the subtypes have surfaces that are very harsh to the touch, but in the case of 10A, they are of a grayish brown color, with a gray core. 10B, on the other hand, has surfaces with a more orange tint, and its cores are a lighter gray. The latter may have been fired in a hotter environment, however it should be pointed out once again that the color of pottery is the result of a multitude of factors and processes, and the causes cannot be determined without rigorous study (Orton, et al., 1993: 133–135; Simola, 2000: 31–32).

In any case, the outer surface of the rim sherds of type 10A are decorated with a vertical line of smaller pits. No such pits were noted in the 10B potsherds, although it should be noted that we are dealing with quantities too small to exclude the possibility of any kind of decoration. Pit decoration features heavily in pottery in prehistoric Finland, and as only a few small fragments of 10A are present in the Pahamäki assemblage, it is difficult to link them to any specific type within the established art historical typology. Although this study is primarily not concerned with decoration, a comparison with the reference material of prehistoric pottery[6], maintained by the archaeology department at University of Helsinki, resulted in a couple of possible matches.

Although pit decoration figures in several art historical types, the fact that no other decorative elements are seen in the vicinity of the pits in 10A means we can likely rule out the types in which pits figure alongside some more prominent decoration. Although, there may have been some additional decoration on the parts of the 10A vessels that have not made their way into the assemblage, but it has evidently not dominated the decorative theme. Both Paimio type, and its later form, Morby type, feature pits of a similar shape along the rim of the vessel. However, they tend to be heavily scratched and coarse tempered, which cannot be said for the type 10A sherds from Pahamäki.

[6] P. Pesonen, 1999, Suomen esihistoriallinen keramiikka, [online] the University of Helsinki archaeology department's database on prehistoric pottery in Finland, available at: www.helsinki.fi/hum/arla/keram/ [accessed 10.07.2019].

Other candidates, which feature pits of the same shape, are the Comb Wares as well as Kiukaisten Ware. The very simple profile of the 10A rim sherds with their barely noticeable curvature, also links better up with these earlier art historical types. One could perhaps make the argument that the predominance of pits within the decorative elements, as well as the relatively fine fabric, points toward Late Comb Ware, although Kiukaisten Ware makes the most sense considering the hill was submerged in water prior to that.

To continue the discussion on fabrics, it was under the lens of the microscope that 10A and 10B primarily differed from each other. In both subtypes, the inclusions vary in size from moderate to small. The inclusions of 10A are dominated by felspar, dispersed unevenly within the fabric, accompanied by quartz and both white and black mica. The fabric in 10B is quite different. Not only is there a larger quantity of inclusions, but the quartz particles are both larger, and notably more oblong, as well as angular to their shape. In addition to the black and white mica as well as felspar, which are also found in subtype A, the sherds of subtype B contain grog.

As was stated earlier, angular inclusions are commonly understood as temper (Gibson and Woods, 1990: 28–30). Furthermore, while any inclusion makes the finished product, i.e. the clay vessel, weaker, due to the inclusions preventing the clay particles from bonding with each other, angular inclusions weaken the vessel to a lesser degree, as the clay particles will stick to the rougher surfaces.

The above does not explain the atypically oblong shape of the quartz inclusions, however. The reason for their distinct shape may have been a technological modification to improve upon the fracture toughness of the finished vessel, to borrow from Steponaitis (1984: 112) line of thinking, as having flat inclusions orientated parallel to the vessel wall will make a pot more resistant to fracturing, than if it has inclusions with equal-length axes. This requires that the inclusions are orientated parallel to the vessel wall, which was accomplished through working the paste with a paddle and anvil. It seems reasonable that this would with quartz just as it did with Steponaitis's crushed shell, though this claim would require testing.

Perhaps what we are witnessing through the difference in fabrics between the types, within their separate excavation areas, is a shift in what was sought out in the vessels. For one reason or another, the people producing the 10B vessels added grog to their paste so that the vessels would be less likely to fracture during the firing stage (Rye, 1976: 115). At the same time, they valued a vessel that would be more durable once done, so they selected oblong, angular chunks of quartz, which would ensure that. As the relationship between the contexts where the two

subtypes were found is unknown, we should however not assume a direct link between the two types. The sample size is also far too limited to offer anything more than tentative speculations.

As both subtypes in the type 10 family were found in small quantities in isolated layers, their distribution was not possible to map through frequency seriation. Suffice to say 4.4 g of 10A was found in the 2nd layer of the northern part of the Pahamäki site, and 9.2 g of 10B in the 7th layer of the area slightly east of the site's center point. These sherds are trace evidence of the earliest Stone/Bronze Age settlement history at the Pahamäki hill. The sherds in layer 2 are anomalous and have likely been mixed into the later cremation cemetery under level ground context, though it is not an impossibility that the sherds have been knowingly deposited into the cemetery, perhaps as powerful objects (Wessman, 2010).

5.2. Stoneware, proto-stoneware and near-stoneware

5.2.1. Types 11A–B

The stoneware and stoneware-esque ceramics in the Pahamäki assemblage are represented by types 11A–B, 12A–B and 13. As this study is primarily focused on the Iron Age pottery, which make up the brunt of the material, the stoneware potsherds have been analyzed at a somewhat rudimentary level, without consulting historical sources or doing a deep-dive into the academic literature on the matter. A suggested division into has been made into stoneware, proto-stoneware and near-stoneware, though it should be noted that this categorization varies between both disciplines and individual researchers (e.g. Crabtree, 2001: 326; Pihlman, 1995: 47–42; 2011: 53; Luoto, 1979: 257).

It is also worth mentioning that the potential for analyzing high-fired wares such as stoneware is quite limited when using a "general-use" stereomicroscope. The reason for this is that the fabric, with its inclusions, has fused to a very high degree, making it difficult to identify its composition.

The amount of stoneware and stoneware-esque pottery found at Pahamäki was too limited to get reliable graphs of the lifetimes of the types. For the sake of efficiency, it was nonetheless opted to depict their seriation frequency within a single graph, underneath its own subheading.

To get into type family 11, it is likely that the 11B is a considerably more recent development of type 11A, and may even have been deposited at the site after it was abandoned as a settlement.

Although the sherds of type family 11 have been high-fired, their fabrics have not fused completely, and as a result, some inclusions were identifiable. As the fabric of 11A had nearly vitrified, yet had a number of small, visible, particles, it could be regarded as a proto-stoneware. 11B on the other hand, appeared to have a degree of porosity, though a closer look at the fabric revealed an almost completely fused fabric. Its categorization is not obvious, but it could be considered a near-stoneware (Crabtree, 2001: 326).

The fabric of the 11B sherds includes white mica, and small grains that vary in color from black to dull tan and red. Based on the dull appearance of the black grains, they are likely to be grog. The red material is most likely red iron ore. The 11A sherds have, in addition to the aforementioned inclusions, also quartzite. In both subtypes, the inclusion particles are homogenously sized, small and sparse.

The same general technique was likely used for both types, but either the quartzite has melted in B due to it being fired in a more extreme temperature, or the quartzite was never included to begin with. In the latter scenario, the reason may be that the mastery of the production methods meant that the quartzite grains were no longer required in order for the vessel to survive the crafting process.

Whereas both the outer and inner surface of the 11B sherd are smooth, the 11A sherds have equally smooth outer surface, but notably rougher inner surfaces. The color of 11A's inner surfaces is brown, while its outer surfaces are covered by a smooth, beige glaze with brown speckles. A smooth, darker beige glaze covers the outside of the 11B sherd, with its decorative elements highlighted in white. Both of type 11B's surfaces are yellowish brown in color. The sherds of both subtypes have light gray cores.

The complicated decoration of the 11B sherd hinted at above, consists of flowers separated by a hash work of overlapping bands. The shapes within these bands could depict leaves. The negative space surrounding the decoration has been carved down so that the decoration is raised from the surface. Pihlman (1995: 41) dates relief stamped pottery with e.g. flower decorations found in Turku to post-medieval times. No decoration is present on the sherds of type 11A.

5.2.2. Types 12A–B

Types 12A and 12B are quite similar, and would likely have been clumped together in most typologies. Their fabrics differ sufficiently, however, for them to be considered different subtypes based on the criteria used in this study. What the types have in similar is a homogenous

gray coloration across the entire sherds. Furthermore, the surfaces are equally rough to the touch.

As for their differences, the type 12A sherds are very heavy, whereas the 12B felt considerably lighter. The weight difference is likely explained by the fact that the fabric of subtype A is much denser and sparser in inclusions. Whereas the type 12A sherds are sparse in inclusions, the 12B sherds sometimes border on a moderate frequency of inclusions. In both types, the inclusion particles are homogenously small. The inclusions of the A subtype consist of streaks of dull gray stone, which exact nature was difficult to determine. The fabric of subtype B is largely the same, but with a number of additions: small, rounded chunks of quartz, felspar and some gray stone. The difference in the fabrics between 12A and B could in part be explained by the fact that the subtype A vessel has been fired in a much hotter environment, meaning the inclusions have melted together with the fabric. This does not explain why A is so much heavier, however, which suggests that the fabrics, not only the firing process, have differed

Another notable difference is the wine red glaze that covers the outside surface of 12B, particularly along the crests of the throw marks, though this may be the result of post-depositional wear. No sherds of subtype A were found with glazing.

Distinct throwing marks let us know that both 12A and 12B are wheel thrown wares. The varied placement of the throwing marks tell us that the clay pastes used for both subtypes respectively, have been thrown using slightly different methods. In some sherds, pronounced throwing marks are visible on the inner surface, whereas some sherds have them on the outer surface. The opposite surface is either completely smooth, or has more trace throwing marks.

Judging by the shapes of the recovered sherds, at least one type 12A vessel has had straight neck. A protrusion in one of the 12B sherds may hint at the vessel having had a pronounced shoulder. No decoration is present on either type.

As for their categorization, seeing as neither 12A nor 12B had seemingly vitrified, and instead include clearly distinguishable inclusions, even though their fabrics are quite dense, they could be categorized as near-stoneware. However, according to Crabtree (2001: 326), a type of stoneware was produced in Siegburg, Germany, with visible quartz temper. Archaeologists have categorized this type as near-stoneware, even though it is scientifically speaking a proper stoneware.

5.2.3. Type 13

Vessels of type 13 represent the finest fabric within the assemblage, i.e. the fabric with inclusions of the smallest particle size, with the exception of the faience of type 16 (figure 13.). The fabric has fused so thoroughly, that the individual inclusions could not be made out using a 5x zoom. The fabric appeared as a speckled background with interlinking gray and lighter streaks, and occasional speckles of yellow, which are likely everything that remains to be seen of the original inclusions. The lighter areas in particular appear to be clusters of some extremely small, rounded particles, which may be almost completely melted quartz or quartz sandstone, though this is an educated guess at the very best. In any case, the completely vitrified state of the fabric of type 13 indicates that they are a proper stoneware.

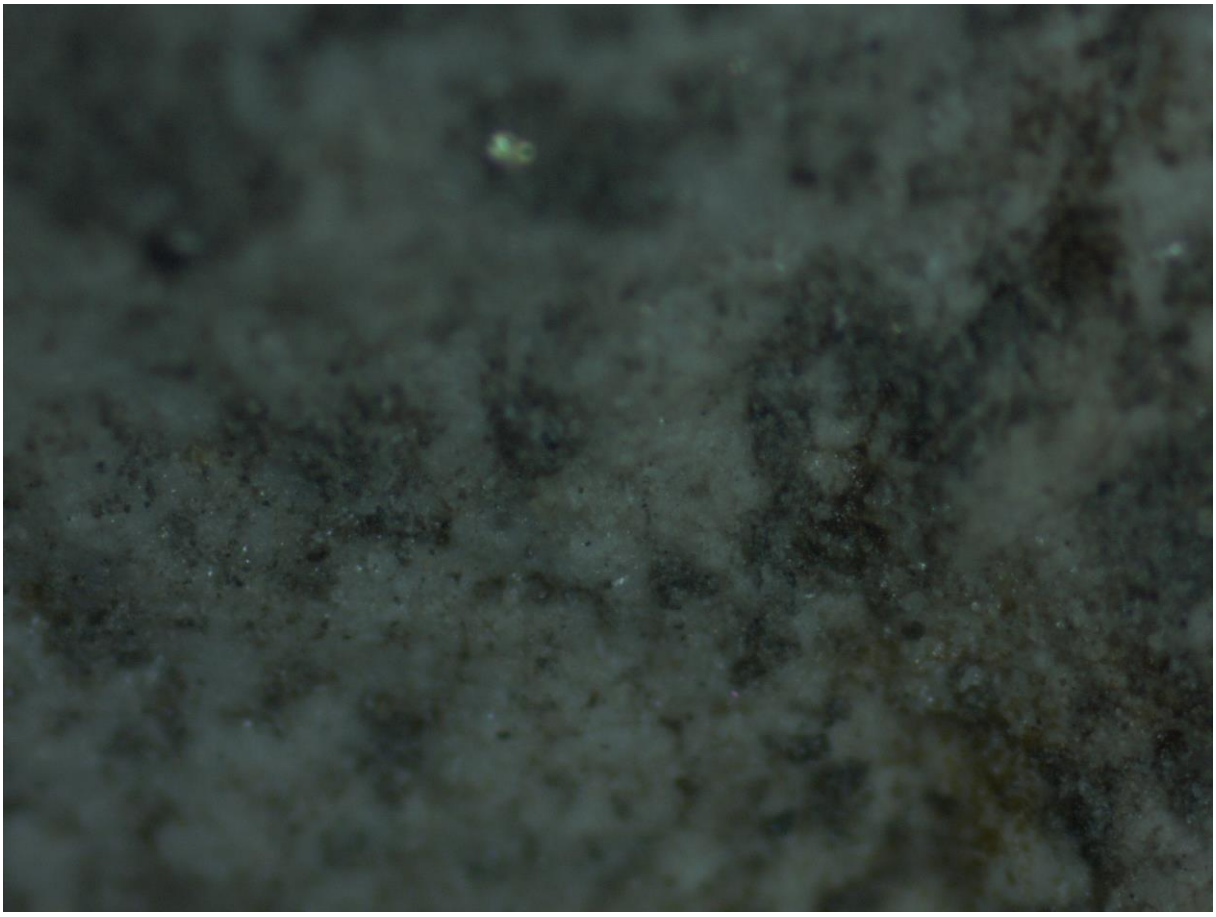


Figure 13. The fabric of pottery type 13 from Pahamäki, as seen with a 5x magnification.

As for the coloration of the type 13 sherds, the outer surfaces are a creamy white whereas the inner surfaces are light gray. They have a beige core and blueish gray margins. The layered coloration of the sherd profile hints at a firing process with several steps, though as has been stated before, the analysis of this process would be a complicated matter. The entirety of the outer surface is covered by a light blue glaze, and a slight light blue tint on the inside suggests

the inside of the vessels may have been glazed as well. The outer surface of type 13 is smooth, whereas the inner surface is a great deal rougher. The latter in particular displays distinct throw marks, telling us vessels of this type have been thrown on a wheel.

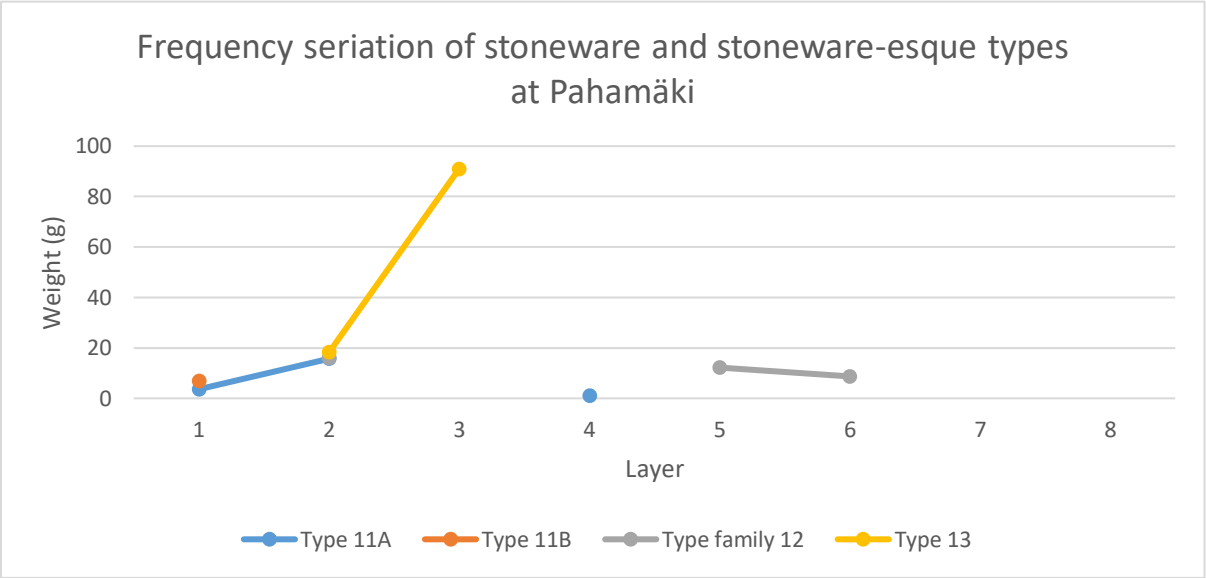
As several larger, diagnostic pieces of the same vessel had already been identified and glued together at an earlier date, it was a simple matter to make notes on the form of the type 13 vessel. The vessel has a distinct base, which is separated from the body by a low stem, i.e. by a depression, which runs around the circumference of the vessel, separating body from base. The base is flat, and turns inward at a right degree to the body. The inside of the base is stepped, meaning it is considerably thinner what it has appeared to be form the outside. The circumference of the base of the vessel has been approximately 18.8 centimeters, based on measurements using a rim chart. What remains of the body has a gentle outward curve beginning from the base, and the dimensions of the body have likely been very similar to those of the base.

Overall, the shape of the type 13 sherds suggest that they almost certainly originate from a selters bottle (figure 14.). These salt glazed stoneware bottles were used for the storage and global shipping of mineral water from the Taunus Mountains in present day Germany during the 17th–19th century CE. Older selters bottles are characterized by having curving bodies in comparison to the straight sides of the later bottles (Pihlman, 1995: 41; Nurminen, 2008: 69, 83). As such, the sherds found in the top layers at the Pahamäki are from a later selters bottle.

Figure 13. The sherds of pottery type 13 from Pahamäki originate from a selters bottle.

5.2.4. Frequency seriation and discussion

In general, the distribution of stoneware, proto-stoneware and near-stoneware types at Pahamäki site (graph 18.) was spread across the middle of the site, with the exception of a single sherd of type 11B found in the north of the site.



Graph 18. Frequency seriation graph of stoneware, proto-stoneware and near-stoneware at the Pahamäki site.

It appears as if none of the types in discussion has been deposited in association with the cemetery under level ground. This is to be expected, as the cemetery was most likely no longer in primary use at the time stoneware(-esque) ceramics were introduced in the area. It has been estimated that people were no longer buried in the aforementioned cemetery by the turn to the historical period (Luoto, 1988). Near-stoneware found in Turku, on the other hand, has been dated to the end of the 13th century CE and the start of the 14th century CE, and stoneware from the beginning of the 14th century CE to post-medieval times (Pihlman, 1995: 203–206). According Crabtree (2001: 326) the first proper stoneware was produced around 1200 CE near Cologne, Germany.

With that said, it is a well-documented fact that many old cemeteries can maintain some significance well after they stop being in primary use (Wessman, 2010: 96). We do not know if the cremation cemetery under level ground has remained in the cultural memory of the medieval settlement at Pahamäki, and how they may have related to it. Based on the distribution of stoneware(-esque) types at the site, the tradition of offering sacrifices and feasting on top the cemetery has not prevailed during medieval times (roughly 1200 CE–1600 CE). Alternatively, the tradition may have continued to some degree through vessels crafted using local, traditional technologies, though that is perhaps less plausible.

On the topic of local pottery, it does not appear as if the introduction of stoneware-esque imports replaced the use of existing types of earthenware at Pahamäki to any noticeable degree. Individual sherds popped up here and there in the medieval settlement layers. The notable 91 g of type 13 found in the third layer of 1977's excavation area in the middle of Pahamäki is all from the same selters bottle, and is as such merely a reflection of the heaviness of the type, rather than the commonness of the type.

The large occurrences of stoneware in early 14th century CE Turku has been shown to be the result of the many German burghers present in the town, and their family- and trade relations. The stoneware was however found spread across the town, rather than limited to a few German-influenced neighborhoods, and showed a positive link to high social standing (Pihlman, 1995: 213, Immonen, 2007: 725–731).

The relative of insignificance of stoneware(-esque) types within the pottery material of Pahamäki may in turn stem from the comparatively lower number of German burghers, and less direct connection to the Hanseatic league, in the smaller village situated upstream from Turku. As such, lesser quantities of stoneware(-esque) pottery likely reached the medieval settlement Pahka/Skogsgerdböle at Pahamäki by way of Turku, through trade or other social connections with the German burghers.

It is also possible that the relatively low occurrences of stoneware(-esque) types means that they were not in everyday use for ordinary activities during which they would have been at the risk of breaking. One would assume a larger quantity of sherds would have been recovered if these vessels were common and tended to break a lot. Furthermore, these vessels may have been more expensive to acquire. Not only did they have to be imported, the level of elaboration hints at labor-intensive production processes.

When comparing pottery found in burial versus settlement contexts we should however keep in mind that settlement material tends to be very fragmented remains of whatever things have been lost or destroyed (Luoto, 1988: 99). Although it would be absurd to describe the finds assemblages of cremation cemeteries under level ground as anywhere near "complete" or "non-fragmented", they would nonetheless not have been the subject of regular reductive activities such as cleaning, in the same manner as settlement contexts. This could partly explain why there is less of some of the more recent types, though I would argue the discrepancy is too large to account for all of it.

To make a note on the seemingly early occurrences of types 12A and B: it is explained by them both having been found in the central areas of the site where more recent finds, notably brick, occurred deep within the technical layers. However, prehistoric finds and structures were seemingly found alongside them, and the stratigraphy was reported as very difficult to perceive (Luoto, 1982: 2–3). 12A could represent a newer development of 12B as subtype B is found significantly lower in the layer order as well, though drawing general conclusions based on individual sherd finds is dubious. Two extremely similar sherds of type 12B were found in layer 5, and later in layer 2. Their profiles do not quite match, however, meaning that they belong to two almost identical vessels, which broke at likely different times.

5.3. Red earthenware

5.3.1. Type 14

The sherds of type 14 have surfaces of dark, almost brown, orange. The core is a lighter orange. The outer surfaces are covered by a bluish green glaze. The inner surfaces are quite harsh and uneven, though this abrasiveness may be due to post-depositional wear. The outer surfaces are smooth. No decoration was found on any of the type 14 sherds.

The inclusions within the fabric of type 14 are homogenously small, and consist of what appears to be white and tan colored felspar.

The sherds were documented in the finds catalogue as likely being tiles, which appears a plausible interpretation. It is however difficult to assign them a certain function, as only a few sherds of undiagnostic shape were found at the Pahamäki site. Pihlman (1995: 36, 39–40) has also identified non-tile red earthenware pottery with a green glaze in the medieval and post-medieval pottery material found in the nearby city of Turku.

5.3.2. Types 15A–B

Types 15A and B are both wheel thrown vessels with red outer surfaces, orange inner surfaces and brown cores. Although, whereas the outer surface of 15A is rough to the touch, its inner surface is smooth. The opposite is true for the surfaces of the B subtype. Although similar in many ways, the types differ in their fabrics. The range of curvatures seen in the rim sherds of both types also differ. As these rim sherds stem from only three vessels, we cannot determine whether this difference in curvature has been systematic.

It appeared as if all of the sherds of both types had been decorated with an engobe decoration. More specifically, clay slips of white, orange and brownish red beneath the cover of a

complicated combination of glazes. In 15A, the rim either has a bubbly red glaze, or a red and green glaze. The necks and bodies either have a bubbly translucent glaze, a white glaze with red stripes or red and green curving shapes, or finally a very dark green, non-bubbly glaze. The 15B sherds were covered with either a brownish red glaze or the same white glaze with red and green curving shapes seen in 15A as well.

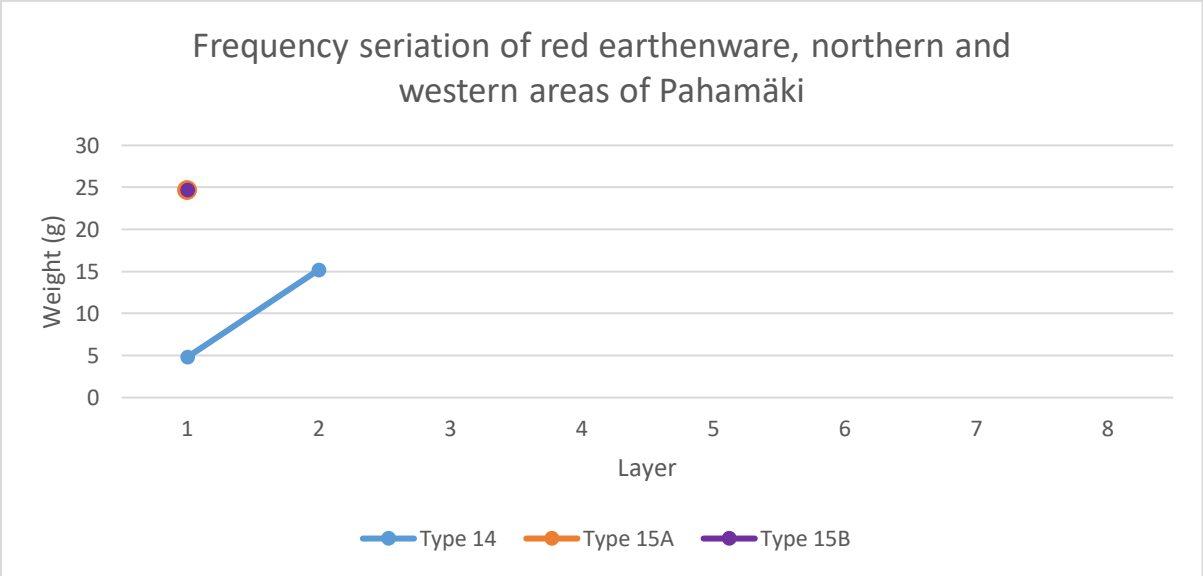
Both 15A and 15B have fabrics that include white mica, as well as black and gray grains, whose exact nature was not possible to verify, though black iron ore is a possibility for the black grains. In addition to this, there are small voids in the fabrics of both types. These voids could have been left by inclusions of organic origin combusting due to high temperatures during firing. Alternatively, the firing process or secondary heat exposure may have caused porosity within the clay itself. As for the differences in fabric, the inclusions in the fabric of the type 15A sherds are small and moderate to sparse in frequency, whereas the 15B sherds included moderately sized inclusions in addition to the smaller ones, and a clearly higher frequency of inclusions.

As mentioned earlier, the collected rim sherds of both types show us that the profiles of the vessels have varied between the types, as well as ever so slightly within at least one type. Within subtype A, there are two rim sherds in the assemblage, which differ slightly from each other. They are clearly of the same general design, and the difference is matter of degrees more than anything. While one sherd has a gently inward curving neck, which ends in a more heavily outward curving rim, the second rim sherd shows a straight neck, and a rim that juts outward at a right angle. Its body (which is not present in the other rim sherd) bulges outward in a bowl-like fashion, after which it turns inward, toward the base. It appears as if the vessel has been a low, profiled bowl. One could argue that the difference between the rim sherds represented in 15A represents random, natural variance, though to my eye the difference in curvature is marked enough to warrant a note. In the end, edge cases like this come down to where the researcher chooses to draw the line.

In contrast to the former instance, the rim sherds of 15B have a single shape, which is thoroughly different to those of 15A. It is quite difficult to determine which end of the sherds constitute the actual rim, as both the thickness of both ends appeared to narrow into a point. The outward curving end could be seen as the rim with some plausibility, as the slight outward curvature to the rim is such a ubiquitous design within pottery. In any case, the presumed rim of the 15B vessels is followed by a body with a very gentle inward curvature, which ends abruptly in an obtuse, inward pointing angle.

5.3.3. Frequency seriation and discussion

The amount of red earthenware in the Pahamäki material was not large enough to plot the use-history of red earthenware types at the site in an accurate manner. Nevertheless, it was decided that a single graph would be the most efficient way to illustrate their occurrences at the site (graph 19).



Graph 19. Frequency seriation graph of red earthenware types in the northern and western areas of Pahamäki.

As we can see, all of the red earthenware was found in the northern- and westernmost parts of the hill. Type 14 was found in the north, whereas 15A and B were found in the west of the site. Their spatial distribution is noteworthy because no medieval or cultural layers or structures were reported in these areas, which on the contrary were interpreted as parts of the cremation cemetery under level ground. Although there is certainly nothing strange about finding scattered pottery in the outskirts of a medieval settlement, one would nonetheless expect to find some pottery within the actual settlement as well.

Although the few red earthenware sherds were found on top of the cremation cemetery under level ground it is not plausible that they were knowingly deposited in relation to it. Rather, the sherds are likely much more recent, stemming from a time when the village had been abandoned around 1500 CE (Hiltunen, 1988: 207; Luoto, 1988: 89–91, 112–113).

During medieval (roughly 1200 CE–1600 CE) times in this area of the country, red earthenware was both imported through the Hanseatic trade and produced locally, such as in Turku. Mainly locally produced red earthenware appears to have replaced stoneware in Turku during the 13th

century CE, though thrown on the wheel as opposed to the earlier local tradition (Immonen, 2007: 726–727; Holmqvist et al., 2014).

Ultimately, the red earthenware at Pahamäki falls somewhat outside of the focus of the study, as they stem from the historical period of Finland. It may also be said that very similar types of red earthenware have been produced in many places and over long stretches of time, meaning compositional analyses are required to tell them apart with certainty (e.g. Holmqvist et al., 2014).

The manner in which the profile of the 15B sherds angle inward at such an early point is quite reminiscent of the bowl shape of the 15A vessel described earlier. It could very well mean that bowl-like vessels have been made of the B-type fabric as well. Now, what does the form tell us about the likely function of the 15A and B vessels? The quite shallow bowl form (figure 15.) would not have been appropriate for the storing of larger quantities of food items or drink, such as cereals and alcoholic beverages. It seems likelier that wide, shallow bowls such as these have been used for serving food or drink, as the vessel would have been quite easy to reach into repeatedly in order to scoop out foodstuff. Although the porosity witnessed in the fabrics of the type family 15 sherds would seem counter intuitive to the serving of liquids, the fact that they were coated in a glaze would have made them impermeable (Searle and Grimshaw, 1971: 413). In addition to this, other engobe-decorated bowls of red earthenware have been interpreted as having been used to serve food (Nurminen, 2008: 83–84).

Figure 15. Bowl-like potsherds of type 15A and 15B from the Pahamäki assemblage.

5.4. Faience

5.4.1. Type 16

Faience only occurred in infinitesimal amounts at the Pahamäki site, and appeared to all be of the same type, i.e. 16, based on the homogeneousness of surface treatment present in the sherds. It should however be noted that a microscope with a 5:1 zoom, as used in this study, is insufficient for studying faience fabrics, due to the extremely small particle sizes present in them. According to Ruohonen (pers. comm., 17.10.2018), types of faience, which are very difficult to discern from each other, have been used since late medieval (15th–16th century CE) times up until recent times.

All of type 16, i.e. all of the faience within the assemblage was found within the 1st and 2nd layers of the excavation area of 1981, between the middle and the western edge of the Pahamäki site. 0.6 g in total was found within the first layer, and 0.5 g within the second layer. In addition to this, another 0.7 g is recorded in the finds catalogue, though without layer information.

To give a short overview of type 16, it has the coloration so characteristic of faience: white surfaces, which are very smooth, along with a beige core. Similarly typical to faience, the fabric of type 16 is very fine. In spite of this, some inclusions within the fabric could be made out using a 5x magnification. The inclusions are homogenously small pieces of grog (figure 16.).

As faience is generally understood to have been fired at high temperatures (e.g. Maggetti, 2012; Bajnóczi et al., 2014) one would imagine that grog makes an exemplary inclusion. As Rye (1976: 115) points out, grog inclusions inside of a vessel expand at the same rate as the clay matrix when exposed to heat during the firing process. This means there will be no stress on the vessel due to uneven expansion of particles within the fabric, offering the potter a lot of flexibility in choosing and preparing their tempers. Furthermore, grog is quite economical to use, as there has likely not been any shortage of potsherds at a settlement where ceramic material was in frequent use.

Figure 16. Grog temper visible in the fabric of the faience from Pahamäki.

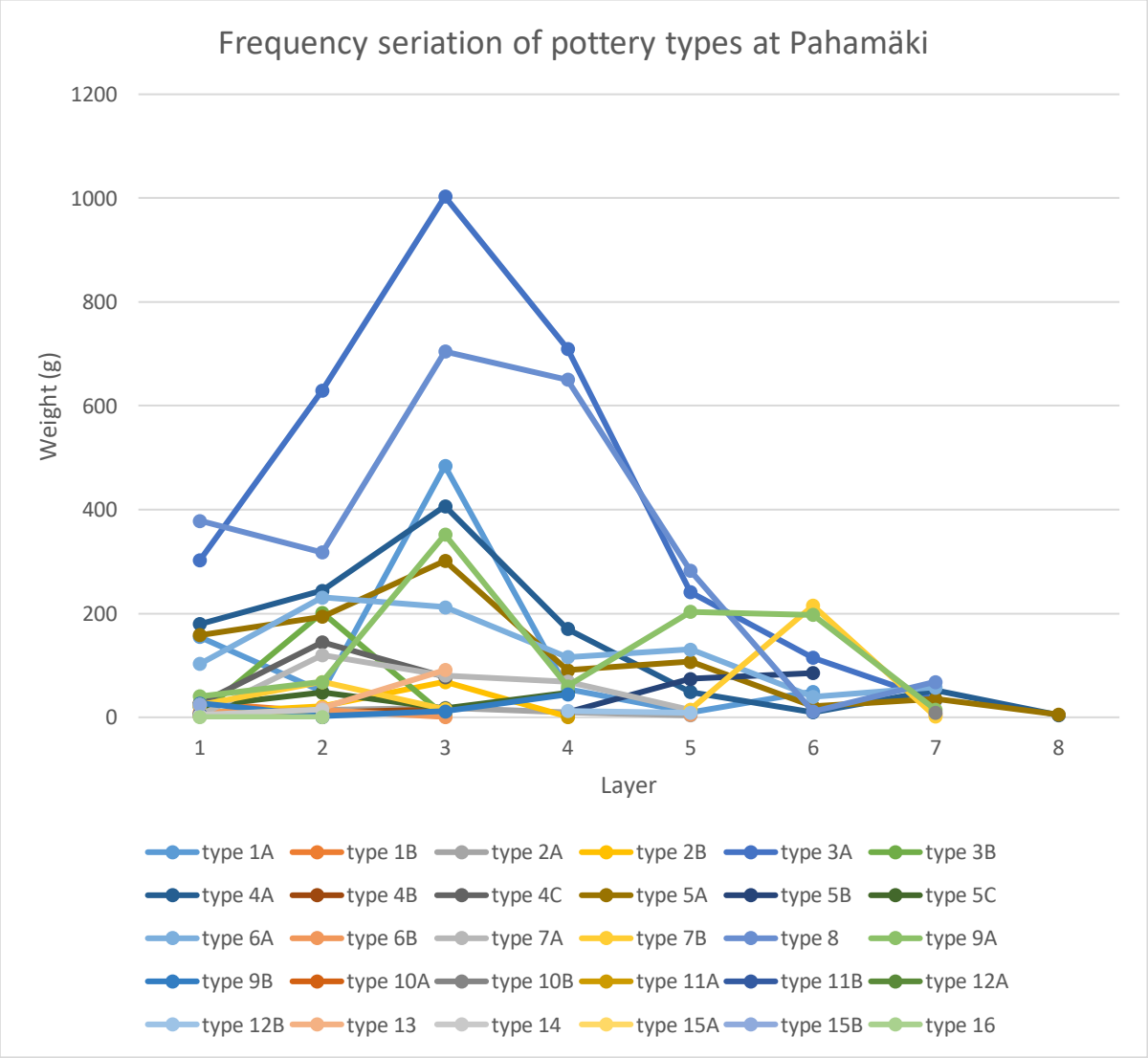
The form(s) of the type 16 vessels is lost to us, due to the miniscule quantity remaining. A heavily curved fragment is likely to have belonged to a handle, though it could also have belonged to e.g. a raised edge on the base of the vessel.

Although the occurrence of faience at Pahamäki could not be plotted through frequency seriation, the vanishingly small amount of faience in the assemblage reveals that activities resulting in ceramics finding its way into the archaeological material have largely seized after the medieval period (roughly1600 CE–).

6. Discussion

6.1. Pottery in life and death at prehistoric Pahamäki

When considering primarily the fabrics of pottery, it is evident that some aspects of the ceramic technology at Pahamäki have prevailed through millennia (graph 20.). Types 6A and 4A were produced during the Stone/Bronze Age settlement period of the hill's history, however they were most abundant in the Merovingian Period (550 CE–800 CE) and Viking Age (800 CE–1050 CE) layers of the cremation cemetery under level ground. The only notable differences we see in the sherds are changes in their decorative themes and surface treatments, indicating that the oldest few sherds of 4A may be as old as Early Typical Comb Ware. A chronology in the Iron Age decorations present on the type can generally be seen mirrored in the layer order.



Graph 20. Frequency seriation graph of all of the pottery types found at the Pahamäki site.

By itself, it is not surprising that a rudimentary form of technology would be sufficiently successful to serve its function for thousands of years. As Rice (1984) points out, it is on the contrary quite usual that the ceramic tradition of prehistoric societies appear to be almost static to the eyes of the archaeologist of today.

However, there are also pottery types at Pahamäki that were clearly used in much lesser numbers during the Iron Age, or not used at all. Both subtypes in type family 10 were evidently discontinued completely. Type 7B, which is covered by textile impressions and would likely be considered Sarsa Ware, or alternatively Kiukaisten Ware, in a more traditional Finnish typology, enjoyed such a large spike in the Bronze/Stone Age layers, that it must have been the dominant type of pottery used during this period. The fact that the type disappeared and then saw a resurgence in the Merovingian Period–Viking Age (550 CE–1050 CE) period layers, where it was found in smaller, yet significant numbers, is to my mind indicative of artefact re-use in association with the Pahamäki cemetery. It seems less likely that the Viking Age population would have started to produce textile impressed pottery.

As Wessman (2010: 96–97) argues, older artefacts were retrieved and deposited alongside the more recently deceased, especially during the Merovingian and Viking Ages (550 CE–1050 CE), in order to re-establish the connection with the ancestral past, either in a direct or mythological sense. If, as Luoto (1988: 113) interprets it, there truly was a break between the Stone-Bronze Age settlement and the Iron Age-medieval village at Pahamäki, it is possible that the Iron Age people came across older artefacts upon arriving at Pahamäki, and used them within their cemetery to establish a connection to the place and its ancestral population.

When comparing the Stone/Bronze Age pottery to that of later times, we can see that the Pre-Iron Age (–500 BCE) inhabitants of Pahamäki favored organic and carbonate tempers in their pottery, whereas the Merovingian period and medieval villagers mainly tempered their clay pastes with minerals and rock. The Stone/Bronze Age type 7B, which ones again makes up the vast majority of the material from these layers, has a fabric that has likely included calcite, limestone/oolite, straw or fur and shell. Organic tempers have by no means become obsolete in the post-Migration Period (550– CE) layers, however, as the impressions left by combusted inclusions were occasionally seen in these as well. A few type 3A sherds had been tempered with straw/fur. Types 8 and 4A likely included combustible calcite as well. Most importantly, all of the type 7A sherds had been tempered with an assortment of organic and combustible materials, of which calcite and limestone/oolite could be identified.

It has been shown that organically tempered pottery has both benefits and drawbacks when compared to mineral tempered pottery. Vessels tempered with organic materials are stronger and outperform their mineral counterparts during manufacture, by being stronger in their wet stage and being quicker to craft. In addition to this, the finished vessels are lighter and are less likely to fracture when dropped. This means they may have been preferable for populations that are more mobile. In contrast to this, vessels tempered with minerals are more resistant to abrasion, and heat up much more effectively (Skibo et al., 1989: 139–141).

It is possible that the Pahamäki vessels of type 7B were similarly manufactured in a way that emphasized characteristics associated with mobility. If we can indeed link type 7B to the Epineolithic Sarsa type, life at that point would still have been quite mobile, even if early agriculture was making life increasingly stationary. Even more so if the type 7B sherds are of the Late Stone Age Kiukaisten type. Perhaps the textile impressions improved the transportability of the vessels by increasing the friction of the surface, and thus making the vessel easier to grip. This would have been doubly as important if the vessels were used to carry e.g. water, which would have made the surface even slicker. The angular bases seen in many of the vessels of the deeper layers at Pahamäki have likely also been beneficial for a mobile life (Korkeakoski-Väisänen, 2014).

It is not inconceivable that the Iron Age type 7A would have been organically tempered in order to fill certain functions that required a degree of mobility, even if life was quite sedentary due to field agriculture by then. Certain activities, such as trade, may have favored light vessels, which did not break as easily when dropped. In general, however, the switch to rock and mineral inclusions in the post-Migration Period (800 CE–) layers is likely to be due to the increasingly sedentary lifestyle when compared to the earlier Stone/Bronze Age settlement period at the site.

The switch from a mobile lifestyle to a sedentary one could also explain why much of Iron Age pottery tends to be so coarse in comparison to the pottery of earlier times. The drawback of a higher frequency of inclusions is generally a lower fracture resistance in the finished vessel (Gibson and Woods, 1990: 30), however one could argue that the aforementioned change in lifestyle brought on a decrease in some of the stress factors affecting clay vessels. Less frequent traveling would have decreased the stressors associated with transporting vessels, not to mention potentially dropping them. As such, to make a generalization:, a vessel that spent most of its lifetime in one place could be of less durable make than a vessel, which had to survive being transported frequently.

As a society becomes proficient in working with metals, one must question to what extent the new technology replaced existing ones. In my view, it seems unlikely that metal vessels replaced traditional clay vessels to a very large degree. A single iron vessel was reported in the finds material at Pahamäki. At the affluent Iron Age inhumation cemetery at Luistari, Eura, only one certain bronze vessel was found, and very few have been found in the country in general (Lehtosalo-Hilander, 1982b: 76). The medieval and post-medieval layers (roughly 1200 CE) also included plenty of pottery, albeit several new types.

As Rice (1984: 245) argues, there is ample ethnographic data that confirms that the methods, resources and tools used for preparing and eating food, not to mention drinking, are among the parts most resilient to change within a culture. This is due to a number of reasons. For instance, people are likely to prefer the unique taste imprinted by the earthenware, as opposed to that of metal. Specific vessels and styles can also be associated with certain rituals, and thus play a role in strengthening the group identity. In addition to this, Rice continues, pottery has traditionally often been viewed as belonging primarily to the sphere of women, who are generally less exposed to new influences, and as such tend to live more conservatively.

The large amounts of clay potsherds found at sites like Pahamäki and Luistari in comparison to metal vessels, points toward the newer metal vessels supplementing the older ones made of clay, rather than replacing them. Even when taking into account that metal vessels were less likely to break, and would have likely been reworked into new objects upon deteriorating. It however strikes me as likely that metal vessels would have replaced clay vessels for certain specific functions, due to the different physical properties of metals in comparison to clay. This may particularly have been the case in regards to iron, which was more widely available than bronze. As Rice (1984: 245) illustrates in the above paragraph, the choice of vessel may not just have been purely utilitarian in nature. The choice may have been aesthetic in nature, or it may have been associated with particular cultural and social beliefs and activities, based on a set of values and attitudes that have been lost to us today. It is also an easily digestible idea, that the Iron Age people were simply fond of a particular earthy aftertaste to their porridge.

Partly following the traditional view on Finnish Iron Age pottery, I have argued that some of the coarsest types at Pahamäki in terms of temper and surface quality, namely type 3A, 8 and 9A, have functioned as domestic wares. The idea is, of course, that the somewhat crude, unadorned vessels have been economical to produce and have thus suited well for the wear and tear of everyday life. In contrast, the thin and elaborate vessels have been more labor intensive and have thus been reserved for special occasions. Although the former is clearly an

oversimplification, a comparison between the distributions of the pottery types in the material of this study suggests that the coarse types 3A, 8 and 9A truly have been used as domestic wares, and types 3A and 8 have furthermore been used as bulk wares at Pahamäki.

In relation to the majority of the Iron Age pottery types at the site, types 3A, 8 and 9A were found in large quantities across the entire site, and while they were most abundant in the cremation cemetery contexts, they were also frequent in the parts of the site that have primarily been interpreted as settlement contexts. One would assume that pottery types that were in frequent use would be found in the areas most actively utilized. Furthermore, these types should have a tendency to deteriorate faster due to being more exposed to wear and tear as well as accidents, and thus end up in the archaeological material of e.g. settlement contexts.

Although the surfaces of the proposed bulk wares 8 and 3A were generally not treated, the periodic scratching and burnishing we sometimes see, likely reflect that these types had a multitude of functions. Vessels made of the same base recipe were occasionally slightly tweaked with to make them more effective for certain purposes. As an example, I am quite skeptical to their ability to contain liquid without burnishing, due to the extremely high frequency of large inclusions in some sherds. As mentioned earlier, many of the type 8 sherds had possible charring inside of their walls, indicating that many of the may have been used for the preparation of food through dry roasting (Skibo, 2015: 190–191). Perhaps burnishing made boiling and brewing possible, as well, by ensuring that the liquid would not escape the vessel.

Another likely function for the vessels of type 8 and 3A is storage. An agricultural society in a part of the world with such a short growing season has obviously has need for storage of food in order to survive winter. Although it was not possible to measure the circumference of any type 3A/8 vessel, we can safely assume that the thickness of the sherds indicates that the vessels have not been too delicately sized, and would thus have been suited to the storage of agricultural surplus. Onnela et al. (1996) have shown that barley dominated the grain material of Viking Age Pahamäki, making up 40 %–70 % in their samples. Gray peas were also found, and a large amount of rye in comparison to other contemporary sites. Oats and wheat occurred in very small amounts. In conclusion, many of the type 8 and 3A sherds may originate from vessels used to store barley, which in turn may have been used to make beer, porridge and bread.

Despite type 3A's and 8's proposed function as bulk wares at Pahamäki, they have evidently also had a central role in the activities surrounding the cremation cemetery under level ground. Not only were they most frequent within the cemetery contexts, and type 3A may in fact have

been crushed and deposited before the cremains, but their high presence in the top layers indicates that they have been used in the post-burial activities at the site. It is possible that the presence of these "crude" types acted as a counter-balance to the valuable, labor-intensive products, which are often found in cremation cemeteries, such as various kinds of jewelry and swords imported from Scandinavia and the Rhineland (Wessman, 2010: 45).

If, as several people have interpreted it, the cemeteries were indeed constructed out of a collective view of society and ancestor worship, the role of the coarse pottery may have been to "ground" the cemetery, using products of a kind that had been in daily use for generations. The pottery type may have been associated with e.g. ritual activities, status or traditions, such as preparing food in a certain manner, which may have had beneficial effects on the social cohesion within the group (Rice 245–247). By depositing the same pottery in the cemetery, the deceased ancestors would have not only been accompanied by valuables, many of them imported, but also with the things used in the everyday life of society.

Type 9A was, as a rule, found in settlement contexts. Judging by the carbonization pattern visible in the sherds, the type may have been used to boil food (Skibo, 2015: 190–191). Porridge stands out as a likely candidate. As it did not notably differ from other Iron Age pottery at the site, except for the frequent quartz sandstone in its fabric, it is not evident why it was not deposited in association with the cemetery. One possible explanation could be that the type was imported to the village, seeing as quartz sandstone was not an overly common inclusion in the other pottery types. Perhaps the nature of its import, say a trade relation with a rival village, made it unsuitable for use in the burial practices. Alternatively, it may be that boiled food was not consumed in the funerary rituals or given as food sacrifices. A provenance analysis may yield interesting information on this.

On the other end of the spectrum, the generally decorated, burnished/smoothened, thin and often fine tempered types 1A, 4A and 6A were disproportionately abundant in the context of the cremation cemetery under level ground, while occurring very sparsely in the settlement contexts. This means that they must have been selectively deposited in association with the cemetery, while likely not being used during the everyday life at Iron Age Pahamäki.

Not only do the large quantities of these finer types found along the cremains indicate that they were given as burial goods, food sacrifices and perhaps used to transport the burned bone, but the spikes in the frequencies of 1A and 4A on top of the cemetery is likely to be the remains of commemorative feasts (Erkola, 1973: 45; Mägi, 2002: 113–114; Svarvar, 2002: 149; Wessman,

2010: 62). Based on the general sherd distribution of *pottery* both within and on top of the Pahamäki cemetery, the clay vessels have most likely been smashed before they have been deposited, as the material was quite mixed and scattered over a large area. A few vessels may have been deposited intact, such as one type 1A vessel in the north of the site, but these possible instances were few.

The idea that the finer Iron Age ceramics were used for special occasions is supported by the distribution of pottery in the top layer of the Pahamäki cremation cemetery under level ground, however these occasions did not exclude the use of type 8, the coarsest type at the site, which also saw a spike in this layer. This could be interpreted as the fine, decorated vessels being used to serve food and drink, whereas storage and especially cooking vessels may have been transported to the area for easy access. It is interesting that no charring was observed on any of the sherds from finer vessels, indicating that they were perhaps not utilized in cooking.

On the topic of beverages, the finer types in the Pahamäki assemblage would have quite possibly been the ones most suited for the purpose of brewing beer. Their smaller and sparser inclusions would have made for denser, less permeable fabrics. The large degree of burnishing within these types would have further added to this effect. In addition to this, the bottom-heaviness noted in some of the 1A vessels may have had made them more spill proof. Beer has likely been a staple of the Iron Age diet, as it not only contains a large degree of vitamins, minerals and proteins, but the brewing process kills potential harmful bacteria present in the water (Hardwick, 1994: 38–43). Furthermore, the by far most common grain at Iron Age Pahamäki was barley, which is both the most widely used and most suitable cereal for making beer (Onnela et al., 1996: 242; Evans, 2011: 236).

In addition to being part of the Iron Age diet, it does not require much imagination to see why alcohol would have filled a function in the feasts and ritual activities practiced by the Iron Age people. As such, the large quantities of certain pottery types in the top layer of cremation cemeteries under level ground may be explained by the generous consumption of alcohol that surely accompanied the feasting.

There are some key differences that spring up when we compare the pottery types found in the northern area of the cremation cemetery under level ground to those found in the western part of the cemetery. The total mass of pottery was considerably lower in the western area of the cemetery. The represented types differed as well. Type 1A, which was strikingly frequent in the north, was all but missing in the western part of the cemetery, as was type 6A. Type 4A was

also much less frequent in the interior of the cemetery, however its function in the commemorative feasts can be seen in the sharp spike of its occurrence in layer 1. Curiously, type 8, the overwhelmingly most abundant pottery type in the west, clearly declined toward the first two layers, and has as such likely not been used in the commemorative activities in this area.

The western part of the cemetery may be younger than the northern area, seeing as oblique incision decoration was the most common decorative theme in this area. If the aforementioned theme really is a variant of crisscross decoration, we can likely date the brunt of the ceramic material in question to roughly the Viking Age–Crusade Period (800 CE–1300 CE) (Lehtinen, 2003: 75), whereas the majority of the material from the northern area has been dated to the Merovingian Period, and the Viking Age to a lesser degree (550 CE–1050 CE) (Luoto, 1976). If this is the case, it is possible that the western area of the cemetery was built as an expansion to the original one in the north. It is interesting to note that the types found in the western area had a much larger degree of modifications done to their surface treatments and fabrics. Perhaps there was a gradually increasing need for specialization in vessel functions.

If the western area was truly built toward the Crusade Period, it stands to reason that it was not utilized as long as the part of the cemetery established during Merovingian times, due to the change to individual inhumations brought on by Christian influence (Wessman, 2010: 27). The briefer use-history of the western area contra the northern area strikes me as the most straightforward explanation for the large discrepancy in overall quantity of pottery.

The practice of organizing commemorative feasts at the original spot may have continued to a degree, however. Perhaps the presence of coarse types, such as 8 and 3A, in the top layer of the northern area of the cemetery reflects that these commemorative activities have been grander, requiring cooking and storage vessels in addition to the serving and drinking vessels. Consider a large-scale communal feast and a smaller memorial with a bite of food. Assuming that ancestor worship was a central element in the beliefs associated with cremation cemeteries under level ground, it seems likely that the earlier ancestors would still have been venerated in some shape. Despite the people living during the end of the Viking Age (800 CE–1050 CE) having no direct memories of their Merovingian Period (550 CE–800 CE) ancestors, myths and oral history may have linked the generations together.

6.2. Evaluation of the viability of the methodology

The methodology utilized in this thesis was in many ways a proces born through trial and error. Although pottery analysis is deep rooted within archaeology, the existing research on Finnish Iron Age is in many ways lacking and each assemblage requires some tailoring of the methods chosen. Many research problems became apparent over the course of the study, relating to the site with its documentation, previous research as well as the approaches chosen by the author. Many of these problems were solvable, and some of those that were not, offered valuable insight into how the methodology can be developed.

To begin from the smallest component, i.e. the pottery fabrics. It is clear that analyzing the inclusions of pottery opens up a myriad of possibilities, which remain unobtainable in art historical analyses. At the same time, a fabric-based study comes with its own assortment of limitations and problems. Finnish pottery is certainly no exception in either regard.

Furthermore, it stands to reason that two typologies based on two different sets of variables will look different to each other. Based on the results of this study, fabric-based typologies may be largely incompatible with art historical typologies, and may furthermore be quite ill suited for the purpose of establishing a general dating for layers and sites. Indeed, at time it seemed counterintuitive to group together sherds of the same fabric displaying Iron Age decorations, with sherds displaying Stone Age decorations. On the other hand, it became obvious that some pottery, which on surface level seemed to be the same, in fact could be separated into several distinct types based on differences in their fabrics. The same decorations and vessel shapes have definitely been used for differing fabrics.

The use of optical microscopy to analyze fabrics worked quite well for the prehistoric material. It was generally less well applied to most of the material from historical times, which was expected. The method was well suited for such a large assemblage, while still offering a depth not obtainable by mere eye. An eye-based assessment is, for instance, not enough to correctly identify a number of common inclusions. In addition to this, there were several types that looked identical before they were placed under the lens.

Optical microscopy is also economical in the sense that it does not require additional costs than the price of the microscope and the time of the analyst (Orton et al., 1993). Perhaps most importantly, it was a suitable method to analyze the material with a quite broad set of questions in mind, offering a welcome degree of flexibility. Rigorous methods from the natural sciences

could now be applied to answer more specific questions, such as e.g. the provenance of various types, which could result in very interesting information.

Although the original sherd profiles revealed the composition of the fabric up to a degree, it would be advisable to cut clean profiles of at least a representable sample of each type. A large part of the inclusions present in the potsherds could nonetheless be confidently made out, although many involved some uncertainty, and a few inclusions could not be identified at all. As such, I would recommend adopting additional tools to aid the visual inspection. The use of a steel pick to test the hardness of inclusions, as suggested by Peacock (1977: 30–32), turned out to be an effective way to differentiate between certain common inclusions. The acid he suggests might have aided with the unidentifiable inclusions. Either a physical ruler or one built into the microscope could also have been used to determine the size of the inclusions more accurately. Lastly, the shape of the inclusions could have been given more attention.

The decorations present on the sherds ended up offering such valuable insight into the age ranges of contexts and sherds alike, that they could not be disregarded completely, but rather noted as secondary qualities. Although the surface treatments were viewed as important typological factors, they could in hindsight have been analyzed and quantified in a more detailed manner, as that data might have been valuable in the interpretation of the technological and functional aspects of the clay vessels of Pahamäki. On the same note, it would be quite interesting to expand the methodology under evaluation from the potsherd to the entire vessel, to get an understanding of the quantity of vessels, their shapes and use-wear.

In retrospect, the viability of the chosen methodology would have been easier to test on a more straightforward site. In several cases, it was difficult to interpret the results of the analysis in light of the ephemeral nature of the contexts and stratigraphy at the Pahamäki site. The perhaps biggest problem was that the technical layers translated poorly to frequency seriation, as the graphs displayed the frequency of types at different depths rather than the frequency at different times. As such, the methods used would be most suitable to a stratigraphically excavated site, or a site at which it is simpler to generally determine the age of the technical layers. In the latter case, a more recently excavated site than Pahamäki may have more potential, due to improvements in documentation protocol.

7. Conclusion

This study has been a primarily fabric- and surface treatment-based examination of the pottery found at Pahamäki in Lieto, SW Finland: a multi period settlement site and Merovingian

period–Viking Age (550 CE–1050 CE) cremation cemetery under level ground. A morphological typology has been constructed based on the analysis, resulting in 16 type families, the majority of them with two subtypes each. The types have then been quantified based on the weight of the potsherds. The use-histories of the pottery types at the site have then been analyzed by arranging them on frequency seriation graphs depicting the weight of each type in each layer. Graphs from different areas of the site were finally compared to each other to check for spatial differences.

The approach differs from the traditional, decoration-focused way pottery has been studied in Finnish archaeology, despite being otherwise commonplace in pottery analysis. Research on Finnish Iron Age pottery is lacking in general, and based on the results of this study the subject is more complicated than the picture painted by much of the previous research on the matter. The commonly referred to fine and coarse Iron Age wares are in fact made up of a number of different fabrics treated in different ways. It is evident that pottery can reveal more about prehistoric sites than just rough ages of contexts. I have interpreted the pottery at Pahamäki from mainly a technological-functional perspective, however explanations have also been given for how the Iron Age population at the hill has used pottery as part of their burial practices.

The use of optical microscopy appears to have much potential in the study of Finnish prehistoric pottery, as it offers an economical and flexible way of analyzing ceramic material. Particularly in the case of temper, the potential depth and precision is much higher than what could be achieved in an eye-based assessment.

The fabrics used during the prehistoric period at the site have evidently been quite stable, which is often the case with prehistoric pottery (Rice, 1984: 266), and certain types at Pahamäki have remained virtually unchanged from Neolithic times (5300 BCE–) up until the medieval period (roughly 1200 CE–1600 CE). In many types, however, we can see minor modifications having been done in either temper or surface treatment. Some of these can be seen as short-lived, perhaps unsuccessful innovations, whereas others have turned into more permanent features, which sometimes correlated with spikes in the popularity of types.

The most common inclusions in the fabrics were quartz, quartzite, felspar, grog, and irregularly shaped gray stone. Black and red iron ore have also been commonly used, as well as white mica. Some types differed markedly in their composition, including grains of quartz sandstone and even glass, suggesting either vessels or tempers may have been imported to the area from as far away as Roman controlled areas (Raninen, 2019). Voids left in the sherd fabrics tell us

about the use of organic and carbonate tempers. The most common of these was calcite, though limestone, oolite, shell, and straw or fur had most likely been used well.

In general, it was mostly not certain which inclusions occurred naturally within the utilized clay sources, and which had been deliberately added as tempers. However, some inclusions could be determined as tempers based on their nature, angularity or deviant particle size. To these belonged several of the organic tempers, commonly felspar and grog, possibly quartz sandstone, glass and notably several cases of quartz, despite being difficult to work with (Steponaitis, 1984: 112; Gibson and Woods, 1990: 28–31, 34–35). Judging by the way some of the disc-shaped tempers were rotated parallel to the sherd wall, it is possible that the wet clay has been worked using some paddle and anvil or related technique (Steponaitis, 1984: 112).

Certain general themes could be made out in the change in the ceramic technology at Pahamäki. The majority of the material in the Stone/Bronze Age settlement layers had largely been tempered with organic and carbonate materials. Most of the Iron Age fabrics included a much larger degree of mineral temper, however, and shell was not present in the Iron Age sherds at all. Furthermore, much of the Epineolithic and Iron Age pottery was also very coarsely tempered. I have suggested that these trends may have had to do with life gradually becoming less mobile, making people favor heavier vessels, which are more resistant to abrasion than light vessels, which, on the other hand, could be crafted quickly and stood a better chance of surviving being dropped (Skibo et al., 1989: 139–141; Gibson and Woods, 1990: 30).

The oldest few sherds at the site have indeed been interpreted as possibly being as old as Early Typical Comb Ware, whereas the newest are clearly of a post-medieval date (1600 CE–). The majority of the material is however from the Merovingian Period and Viking Age (550 CE–1050 CE), and to a lesser degree of Epineolithic character (roughly 1900 BCE–300 CE).

Many of the fabrics used during the Iron Age (500 BCE–1300 CE) at Pahamäki have clearly been used for a variety of vessel shapes and functions. Temporary modifications to these recipes, such as burnishing, perhaps mirror attempts to tailor certain vessels to specific functions. This was particularly prominent in the western area of the site. Despite the evident flexibility in the ceramic technology, there are indications of some types having been used for specific functions. These functions include dry-roasting contra boiling food, serving food, brewing and serving beverages, and finally acting as storage.

Furthermore, I have argued that the Iron Age village at Pahamäki has made use of two particular bulk wares, which are overrepresented in the settlement contexts when compared to other types

of pottery. The bulk wares have nonetheless also been important in the burial practices associated with the cremation cemetery under level ground. They may have been used during the preparation of food sacrifices, however most were found scattered among the cremains and sometimes beneath them. It is possible that the traditional domestic items have acted as a counter-balance to the luxury and imported items given as burial gifts. The deceased may have needed everyday items in the afterlife, and the pottery may have been associated with deep-rooted values, activities and groups (Rice, 1984: 245).

It is unmistakable that certain pottery types have also been overrepresented in the context of the Pahamäki cremation cemetery under level ground. These are mainly the thin, fine-tempered, often decorated and burnished/smoothened types. This supports the traditional view of Finnish Iron Age pottery as a crude domestic type versus a type for special occasions, to a degree. The lack of charring on these finer sherds may mean that they were not used for cooking. The frequency of the finer types clearly spiked in the top layer of the cemetery. Following the previous interpretations of pottery on top of Iron Age cemeteries as the remains of commemorative feasts, rituals and sacrifices (e.g. Cleve, 1943: 59; 1978: 88; Erkola, 1973: 45; Mägi, 2002: 113–114, 132; Wessman, 2010: 92), I have argued that specific types were used in the association of the aforementioned activities, in which the intake of beer may have played a central part.

Ancient ceramics may also have been deposited in the cemetery as a means of tying the Iron Age village to the hill and its past inhabitants (Wessman, 2010). In general, the pottery material in the assemblage was scattered and fragmented, indicating that most of the clay vessels had been smashed in association with their deposition. A few vessels may have been placed intact in the cemetery, however.

The medieval and post medieval sample at the site was represented by stoneware, proto-stoneware, near-stoneware and red earthenware, all of which were wheel-thrown. The early stoneware(-esque) types indicate that the village has had trade contacts with the Rhine area. A large part of these contacts was most likely based around the hanseatic trade and the German burghers living in the nearby town, Turku. The ample amounts of older pottery types in the medieval layers show that the local, traditional ceramic tradition continued for some time at Pahamäki, however. The most recent pottery at the site included a post-medieval stoneware selters bottle as well as red earthenware serving bowls. The relative or absolute lack of post-Iron Age types in association with the cremation cemetery under level ground suggests that the practices of offering food sacrifices and organizing commemorative feasts in honor of the dead

were discontinued as the village switched to Christian burial practices. Furthermore, the pottery producing activities stopped altogether as the village was abandoned in the 14th century.

Overall, I would argue that an increased focus on the fabrics of prehistorical Finnish pottery is vital for our understanding of it. As much merit as the art decorative view of pottery has, there are many questions relating to the function and technology that the perspective cannot answer, some of which I have attempted to tackle in this study.

REFERENCES

Personal communication

Asplund, H. 14.1.2019.

Ruohonen, J. 17.10.2018.

Lectures

Korkeakoski-Väisänen, K. (2014). *Suomen esihistorian erityiskysymyksiä*. Suomen esihistoria. University of Turku. Delivered January 2014.

Raninen, S. (2019). *400-luvun kullankimallus ja 500-luvun kriisi (400–550)*. Sosiaaliset ja taloudelliset järjestelmät Suomessa ja pohjoisen Itämeren alueella keski- ja myöhäisrautakaudella. University of Turku. Delivered November 2019.

Internet sources

Kyppi.fi. (2019). Kyppi.fi, (2019). *Finnish Heritage Agency's web service for the cultural environment*. Available at: https://www.kyppi.fi/palveluikkuna/mjreki/read/asp/r_kohde_det.aspx?KOHDE_ID=423010005. [Accessed 25.11.2019].

Pesonen, P. (1999). *Suomen esihistoriallinen keramiikka*. The University of Helsinki archaeology department's database on prehistoric pottery in Finland. Available at: www.helsinki.fi/hum/arla/keram/ [accessed 22.05.2019].

Maanmittauslaitos.fi (2019). *National Land Survey of Finland's map service*. Available at: https://tiedostopalvelu.maanmittauslaitos.fi/tp/kartta [accessed 18.12.2019].

Excavation reports

Korkeakoski-Väisänen, K. (1983). *Lieto Pahka Pahamäki. Rautakautisen polttokalmiston kaivaus 17.-28.5.1982.* [Excavation report] University of Turku, faculty of archaeology, Turku

Luoto, J. (1976). *Lieto Pahka Pahamäki 1975 Kaivauskertomus. Rautakautinen polttokenttäkalmisto ja asuinpaikka*. [Excavation report] University of Turku, faculty of archaeology, Turku.

Luoto, J. (1977). *Lieto Pahka Pahamäki 1976 Kaivauskertomus. Rautakautinen polttokenttäkalmisto ja asuinpaikka.* [Excavation report] University of Turku, faculty of archaeology, Turku.

Luoto, J. (1978). *Lieto Pahka Pahamäki 1977 Kaivauskertomus. Keskiaikainen ja rautakautinen asuinpaikka.* [Excavation report] University of Turku, faculty of archaeology, Turku.

Luoto, J. (1981). *Lieto Pahka Pahamäki 1978–1980. Kaivauskertomus.* [Excavation report] University of Turku, faculty of archaeology, Turku.

Luoto, J. (1982). *Lieto Pahka Pahamäki 1981. Kaivauskertomus.* [Excavation report] University of Turku, faculty of archaeology, Turku.

Unpublished theses

Carpelan, C. (1963). *Euran, Köyliön ja Yläneen ruumiskalmistojen viikinkiaikainen keramiikka*. [Master's thesis] University of Helsinki, Helsinki.

Haimila, M. (2002). *Polttokenttäkalmisto – erään tilan analyysi. Esimerkkeinä Hämeenlinnan Riihimäki ja Hämeenlinnan Imatran Voima 9.* [Master's thesis] University of Turku, Turku.

Jokisalo, S. (2018). *Astiasi Arvelussa – Kaarinan Ravattulan Ristimäen keramiikkalöydöt 2010–2016.* [Master's thesis] University of Turku, Turku.

Lehtinen, S. (2003). *Saviastiat Raision Ihalan Mullin Myöhäisrautakautisella/varhaisrautakautisella Asuinpaikalla.* [Master's thesis] University of Turku, Turku.

Nurminen, I. (2008). *Turun Kirkkopihan Tontin Keramiikkaa 1400–1700-Luvuilla*. [Master's thesis] University of Turku, Turku.

Pihlman, A. (1995). *Keskiaikaiset Savi- ja Puuastiat Turun Kaupungissa ja Turun Linnassa*. [Licentiate thesis] University of Turku, Turku.

Rohiola, V-M. (2013). *Polttokenttäkalmiston ominaisuudet ja rakenteet: Tutkimuskohteena Laitilan Vainionmäen viikinkiaikainen B-kalmisto.* [Master's thesis] University of Helsinki, Helsinki.

Published literature

Adams, W. Y. and Adams, E. W. (1991). *Archaeological typology and practical reality: a dialectical approach to artifact classification and sorting.* Cambridge: Cambridge University Press.

Asplund, H., Eskola, K. and Oinonen, M. (2008). Luminesenssiajoitus, taustasäteily ja vuosikymmenten takaiset kaivauslöydöt. *Muinaistutkija*, 2008(1), pp. 33–42.

Asplund, H. (2009). Vanhanlinna ennen vanhaa linnaa. In: K. Korkeakoski-Väisänen, J. Pukkila and H. Lehtonen eds. *Muinaisjäännös ja maisemakohde: kaksitoista näkökulmaa arkeologisiin ja kasvitieteellisiin tutkimuksiin Liedon Vanhalinnassa ja sen ympäristössä*.. Turku: Turun ylioppilassäätiö, pp. 16–31.

Bajnóczi, B., Nagy, G., Tóth, M., Ringer, I. and Ridovics, A. (2014). Archaeometric characterization of 17th-century tin-glazed Anabaptist (Hutterite) faience artefacts from North-East-Hungary. *Journal of Archaeological Science*, 45, pp. 1–14.

Carpelan, C. (1979). Om asbestkeramikens historia i Fennoskandien. *Finskt Museum*, 85, pp. 5–25.

Carpelan, C. (1980). Contacts in the Northern Baltic Region as shown by Ceramics. *Fenno-Ugri et Slavi 1978. Papers presented by the participants in the Soviet-Finnish Symposium "The Cultural Relations between the Peoples and Countries of the Baltic Area during the Iron Age and the Early Middle Ages" in Helsinki May 20–23, 1978*, pp. 188–199.

Cleve, N. (1943). Skelettgravfälten på Kjuloholm i Kjulo I. Den yngre folkvandringstiden. *Suomen Muinaismuistoyhdistyksen Aikakauskirja*, 44(1).

Cleve, N. (1978). Skelettgravfälten på Kjuloholm i Kjulo II. Vikingatid och korstågstid. Gravfältet C. *Suomen Muinaismuistoyhdistyksen Aikakauskirja*, 44(2).

Crabtree, P. J. ed. (2001). *Medieval Archaeology an Encyclopedia*. New York: Garland Publishing, Inc..

Erkola, T. (1973). Paimion Esihistoria. *Paimion Historia*. Karisto OY: Hämeenlinna, pp. 9–68.

Evans, E. (2011). Cereals. In: O. Garrett ed. *The Oxford Companion to Beer*. Oxford: Oxford University Press, pp. 236–237.

Gibson, A. and Woods, A. (1990). *Prehistoric Pottery for the Archaeologist*. Leicester: Leicester University Press.

Hackman, A. and Heikel, H. J. (1900). *Vorgeschichtliche Altertümer aus Finnland: photographische Tafeln aus dem historischen Museum des Staates in Helsingfors.* Helsinki: Tilgmann.

Hardwick, W. A. ed. (1994). *Handbook of Brewing*. New York: Marcel Dekker Inc..

Hiltunen, E. (1988). Ruotsin vallan aika. *Liedon historia 1 – Aikojen alusta vuoteen 1809*. Lieto: Lieto municipality and parish, pp. 193–547.

Holmqvist-Saukkonen, E. (2012). Keramiikan koostumus, valmistustekniikat ja verkostot: Materiaalianalyysit arkeologisessa tutkimuksessa. *Muinaistutkija*, 1, pp. 32–45.

Holmqvist, E., Väisänen, R. and Koivisto, A. (2014). Redwares from Gubbacka's Medieval Village: Regional and Inter-Regional Views on Ceramic Networks and Technology (SEM-EDS). *Estonian Journal of Archaeology*, 18(2), pp. 86–101.

Immonen, V. (2007). Defining a culture: the meaning of *Hanseatic* in medieval Turku. *Antiquity*, 81, 313, pp. 720–732.

Kivikoski, E. (1939). Die Eisenzeit im Auraflussgebiet. *Suomen Muinaismuistoyhdistyksen aikakauskirja*, 43.

Kivikoski, E. (1947). *Rautakauden Kuvasto I.* Helsinki: WSOY.

Kivikoski, E. (1951). *Rautakauden Kuvasto II.* Helsinki: WSOY.

Kivikoski, E. (1966). *Suomen kiinteät muinaisjäännökset*. Helsinki: SKS.

Lehtosalo-Hilander, P-L. (1982a). Luistari 1. The Graves. *Suomen Muinaismuistoyhdistyksen aikakauskirja*, 82(1), pp. 1–490.

Lehtosalo-Hilander, P-L. (1982b). Luistari 2. The Artefacts. *Suomen Muinaismuistoyhdistyksen aikakauskirja*, 82(2), pp. 1–197.

Lehtosalo-Hilander, P-L. (1982c). Luistari 3. A Burial-Ground Reflecting The Finnish Viking Age Society. *Suomen Muinaismuistoyhdistyksen aikakauskirja*, 82(3), pp. 1–82.

Luoto, J. (1984). Liedon Vanhalinnan Mäkilinna. *Muinaismuistoyhdistyksen Aikakauskirja*, 87.

Luoto, J. (1988). Esihistoria. *Liedon historia 1 – Aikojen alusta vuoteen 1809*. Lieto: Lieto municipality and parish, pp. 59–192.

Maggetti, M. (2012). Technology and Provenancing of French faience. *Seminarios de la Sociedad Espanola de Mineralogia*, 9, pp. 41-64.

Mägi, M. (2002). *At the Crossroads of Space and Time. Graves, Changing Society and Ideology on Saaremaa (Ösel), 9th–13th Centuries AD*. CCC papers, 6. Tallinn: Department of Archaeology, Institute of History.

Onnela, J., Lempiäinen, T. and Luoto, J. (1996). Viking Age Cereal Cultivation in SW Finland – a study of charred grain from Pahamäki in Pahka, Lieto. *Annales Botanici Fennici*, 33, pp. 237–255.

Orton, C., Tyers, P. and Vince, A. (1993). *Pottery in Archaeology*. Cambridge Manuals in Archaeology. Cambridge: Cambridge University Press.

Peacock, D. P. S. ed. (1977). *Pottery and Early Commerce. Characterization and Trade in Roman and Later Ceramics*. Academic Press LTD.: London.

Pihlman, A. (2011). Aboa Vetus & Ars Nova Museon Tontin VV. 2009–2010 Kaivausten Saviastiat 1200-Luvun Jälkipuoliskolla ja 1300-Luvun Alkupuolella. *Suomen Keskiajan Arkeologian Seura*, 4, pp. 52–58.

Rice, P. M. (1984). Change and conservatism in pottery-producing systems. In: S.E. van der Leeuw and A.C. Pritchard eds. *The Many Dimensions of Pottery: ceramics in archaeology and anthropology*, pp. 231–288.

Riley, J. A. (1984). Pottery Analysis and the Reconstruction of Ancient Exchange Systems. In: S.E. van der Leeuw and A.C. Pritchard eds. *The Many Dimensions of Pottery: ceramics in archaeology and anthropology*. pp. 55–74.

Rye, O. S. (1976). Keeping Your Temper under Control: Materials and the Manufacture of Papuan Pottery. *Archaeology & Physical Anthropology in Oceania*, 11(2), pp. 106–137.

Searle, A. B. and Grimshaw, R. W. (1971). *The Chemistry and Physics of Clays and Other Ceramic Materials*. London: Ernest Benn Limited.

Shepard, A. O. (1954). *Ceramics for the archaeologist.* Reprint. Ann Arbor: Braun-Brumfield, Inc..

Simola, H. (2000). Polttolämpötila ja Keramiikan Kestävyys – Loppuuko Keskisellä Rautakaudella Keramiikan Valmistus vai Sirpaleiden Syntyminen? *Muinaistutkija*, 1. pp. 30–36.

Skibo, J. M. (2015). Pottery Use-Alteration Analysis. In: J.M. Marreiros, J.F. Gibajo Bao and N. Ferreira Bicho eds. *Use-Wear and Residue Analysis in Archaeology*. Manuals in Archaeological Method, Theory and Technique. Berlin: Springer, pp. 189–198.

Skibo, J. M., Schiffer, M. B. and Reid, K. C. (2015). Organic-Tempered Pottery: An Experimental Study. *American Antiquity*, 54(1), pp. 122–146.

Steponaitis, V. P. (1984). Technological Studies of Prehistoric Pottery from Alabama: Physical Properties and Vessel Function. In: S.E. van der Leeuw and A.C. Pritchard eds. *The Many Dimensions of Pottery: Ceramics in archaeology and anthropology*. Amsterdam: Cingvla VII, pp. 79–122.

Svarvar, K. (2002). Brandgravfältet på Pörnullbacken. Tolkningar av gravskick och gravritualer. In: K. Viklund and K. Gullberg eds. *Från romartid till vikingatid: Pörnullbacken – en järnålderstida bosättning i Österbotten*. Studia Archaeologica Universitatis Umensis, 15. Vaasa: Förlagsaktiebolaget Scriptum, pp. 121–157.

Taavitsainen, J.-P. (1991). Cemeteries or refuse heaps? Archaeological formation processes and the interpretation of sites and antiquities. *Suomen Museo*, 98. pp. 4–14.

Wessman, A. (2010). *Death, Destruction and Commemoration – Tracing ritual activities in Finnish Late Iron Age cemeteries (AD 550–1150)*. ISKOS, 18. Ed. Mika Lavento. Helsinki: The Finnish Antiquarian Society.

Wickholm, A. (2005). The cremation cemeteries under flat ground: a representative of what? In: R. Karl and J. Leskovar, eds. *Interpretierte Eisenzeiten: Fallstudien, Methoden, Theorie*. *Tagungsbeiträge der 1. Linzer Gespräche zur interpretativen Eisenzeitarchäologie.*. Linz: Oberösterreichischen Landesmuseum, pp. 31–40.

Wickholm, A. and Raninen, S. (2006). The Broken People: Deconstruction of Personhood in Iron Age Finland. *Estonian Journal of Archaeology*, 10(2), pp. 150–166.

LYHENNELMÄ

Tässä tutkimuksessa olen analysoinut Pahkan Pahamäen polttokenttäkalmiston ja moniperiodisen asuinpaikan keramiikka-aineiston tarkistamalla saviastianvalmistuksessa käytettyjä sekoitteita, sekä vähemmässä määrässä pintakäsittelytapoja. Isoin osa materiaalista on merovingi- ja viikinkiaikaista, jolloin polttokenttäkalmisto oli aktiivisessa käytössä. Rautakautinen aineisto on myös ollut tutkimuksen fokuksena. Aineistoon kuuluu kuitenkin myöskin mahdollisia tyypillisen kampakeramiikan ja kiukaisten keramiikan paloja, epineoliittista keramiikkaa, keskiaikaista keramiikkaa, ja lopulta keskiajan jälkeistä materiaalia.

Savimassan sekoitetta on tutkittu kylmällä LED-valolla varustetulla Zeiss Stemi 305 stereomikroskoopilla viidenkertaisella suurennuspotentiaalilla. Tällä on ollut mahdollista erotella hienosekoitteisiakin tyyppejä ja useassa tapauksessa on myös voitu määritellä sekoitteiden luonne tarkalleen. Terästikulla on tarkemmin testattu sekoiteaineisten kovuuksia. Joissain tapauksessa sekoitteita ei ole ollut mahdollista tunnistaa ilman kemiallisia keinoja. Menetelmällä vaikuttaisi yleisesti olevan paljon potentiaalia verrattuna perinteelliseen silmämääräisen katsaukseen.

Analyysin pohjalta Pahamäen keramiikka-aineistosta on luoto morfologinen typologia. Astianpaloja, joilla on luontaisesti samankaltainen kombinaatio muuttujia ovat siis laskettu samaksi tyypiksi. Muuttujina on toiminut astianpalan sekoitteen koko, määrä ja luonne sekä astianpalan pintakäsittelytapa. Muita piirteitä, kuten väri, paksuus ja koristelu on otettu huomioon kvalitatiivisesti.

Keramiikkatyyppien yleisyyksiä ja käyttöhistorioita kohteella on tutkittu kvantifioimalla tyyppien painoja kerroksissaan ja asettamalla saatuja arvoja niin sanotuille frequency seriation-kaavioille. Nämä kaaviot kertovat milloin tyyppi on ilmestynyt kohteelle, milloin se on ollut yleisimmillään ja lopulta missä vaiheessa se on lakkautettu. Vierekkäin tai samanlaisissa konteksteissa esiintyviä tyyppejä voidaan pitää saman ikäisinä. Eroja keramiikkatyyppien levinneisyydessä on myös tarkistettu vertailemalla kaavoja kohteen eri alueilta. Spatiaalisten erojen tarkistaminen on mahdollista juuri kvantifioimisen astianpalojen painon perusteella, sillä vaikka menettelytapa suosii painavia tyyppejä, tämä kallistus on sama kontekstista riippumatta.

Keskeisiä kysymyksiä tutkimuksen kannalta on ollut selvittää, mitä sekoiteainekset ja pintakäsittelytavat kertovat meille muutoksista elämäntavoissa funktionaalisesta näkökulmasta. Tämän lisäksi olen tulkinnut millä tavalla keramiikkaa on käytetty polttokenttäkalmiston ja

hautauksien yhteydessä. Tutkielma on lopuksi ollut kokeellinen pyrkimys testata, miten kyseinen metodologia soveltuu Suomen olosuhteissa sekä aineiston, että kohteen kannalta.

Suomalaisessa tutkimuskirjallisuudessa rautakauden keramiikka on saanut erittäin vähän huomiota verraten aikaisempaan ja myöhäisempään keramiikkaan. Sitä on pidetty haasteellisena tutkia ja monet muut rautakauden esinemuodot ovat toimineet ajoittajina paremmin. Yleisesti ottaen myös runsaammin tutkitussa kivikauden keramiikassa on perinteellisesti lähinnä luotu typologioita saviastioiden koristeluaiheiden ja muotojen perusteella. Viime aikoina kysymyksenasettelusta on tullut hieman monipuolisempi ja luonnontieteellisiä menetelmiä on käytetty entistä enemmän. Maailmalla sekoitteiden analyysit ovat kuuluneet perustehtäviin jo pitkään, ja keramiikan avulla tutkitaan nykyään menneitä aikoja hyvin laajasti käyttämällä spesifisiä luonnontieteellisiä analyyseja ja kontekstuaalinen, humanistinen viitekehys.

Pahkan Pahamäkeä on kaivettu Turun yliopiston toimena 1970- ja 1980-luvulla. Kaivauksia on johtanut Jukka Luoto, Leena Salmio ja Kristiina Korkeakoski-Väisänen. Ensimmäiset viitteet ihmiselämästä alueella on havaittu olevan myöhäiskivikaudelta, jonka jälkeen siitä vähitellen syntyi asuinpaikka. Tästä luovuttiin kuitenkin pronssikauden lopulla, jonka jälkeen paikalle saapui taas asutusta 300-luvulla CE. Merovingiajan myötä siihen syntyi vakituinen kylä, joka perusti hautarakenteita, joista polttokenttäkalmisto oli isoin. 1400-luvulla CE kylä autioitui lopulta. Historiallisista lähteistä kylä tunnetaan nimellä Pahka tai Skogsgerdböle,

Polttokenttäkalmisto koostuu maantasaisesta, struktuurittomasta ryhmästä kiviä ja nokimaasta. Näiden lovesta löytyy useamman henkilön poltettuja luita ja laaja määrä löytöjä. Löydöt ja luut ovat hajonneita ja siroteltu laajalle. Usein löytöpaikka on melko korkella ja lähellä vesiä, sekä muinaista viljelymaita. Muinaisjäännöstyyppiä tunnetaan Suomen lisäksi monesta lähimaistamme. Niistä on kirjoitettu Suomessa lähinnä 90-luvun jälkeen kollektiivisena hautausmuotona, johon saattoi liittyä esi-isäkultti, pyhiä alueita ja muistelukulttuuri. Muinaisjäännöstyypistä on kuitenkin puhuttu jo 1920-luvulta asti, mutta sitä on pidetty haasteellisena tutkimuskohteena eikä kovin arvostettuna kalmistomuotona.

Kaiken kaikkiaan 16 tyyppiä pystyttiin erottelemaan aineistosta. Useimmilla tyypillä oli vielä kaksi alatyyppiä. Useimmat tyypit olivat koristelunsa perusteella epineoliittisia ja/tai rautakautisia. Yleisiä sekoitteita oli maasälpä, kvartsi, kvartsiitti, kiilteet ja murskattu keramiikka. Harvinaisempiin kuului kvartsikivihiekka ja musta sekä punainen rautamalmi. Yksittäisestä astiasta löytyi lasisekoitetta, joka viittaa roomalaisiin kontaktiin. Suora kontakti

tai jopa Rooman legioonassa työskentely ei ole poissuljettua. Orgaanisia ja karbonaattisia sekoiteaineksia pystyttiin toteamaan niiden jättämien jälkien avulla. Näistä kalsiitti oli yleisin, ja muihin kuului kalkkikivi, dolomiitti, ruoho tai turkis, sekä yhdessä tyypissä simpukankuoria.

Oli usein vaikeata määritellä, mikäli kyseessä oli tahallisesti lisättyjä vai luonnollisesti esiintyviä aineksia. Joidenkuiden tahallisuudesta vihjasi kuitenkin partikkelien poikkeava luonne, koko tai muoto. Näihin kuului muun muassa murskattu keramiikka, maasälpä, monet orgaanisista aineksista ja yllättäen kvartsi, vaikka se onkin ominaisuuksiltaan varsin epäsopiva sekoitteeksi. Sekoitteen orientaation perusteella on mahdollista, että joitain savimassoja on työstetty jonkinlaisella melalla ennen polttoa.

Pintakäsittelytapoihin kuului naarmutus, tasoitus, rappaus, tekstiilipainanteita, kiillotus ja mahdollisesti pari esimerkkiä savilieteen käytöstä. Jälkiviisautena näitä olisi voinut erottaa useampaan ryhmään ja kvantifioida niiden esiintymiä. Koristeluaiheet olivat enimmäkseen keski- ja myöhäisrautakautisia. Näihin kuului vinoviivoja, aaltoviivoja, uurteita, ristikkoja, nuorapainanteita ja horisontaaliviivoja. Monet aiheet olivat nimenomaan horisontaaliviivojen välissä. Kampakeraamisia aiheita, mahdollisesti jopa varhaisia tyypillisiä sellaisia löytyi myöskin, sekä mahdollisesti myöhäiskivikautisia tai epineoliittisia kuoppa-aiheita. Koristelut olivat käteviä ajoittajia, vaikka niitä ei katsottu tärkeinä typologian luodessa. Tämän tutkimuksen mukaan koristeluun perustuvaa ja sekoitteeseen perustuvaa typologiaa ei kuitenkaan voida liittää yhteen, sillä samoja koristeluaiheita ja astianmuotoja on käytetty usealle sekoitteelle ja päinvastoin.

Analyysini perusteella keramiikanvalmistukseen liittyvä teknologia on ollut Pahamäen esihistorian aikana melko stabiili, mikä on esihistorialliselle keramiikalle ominaista. Tyyppi 4A oli ääritapaus, sillä samanlaisia tasattuja, kvartsiittisekoitteisia astianpaloja löytyi niin kampakeraamisilla geometrisilla koristeluaiheilla, kuin viikinkiaikaisesta kerroksesta. Useimmissa tapauksissa oli kuitenkin näkyvissä pieniä muutoksia sekoitteissa ja pintakäsittelyissä. Jotkut muutokset olivat pysyviä, kuin taas toiset lakkautettiin. Esimerkiksi tyyppi 6A:n kohdalla siirryttiin pysyvästi pintojen silotuksesta kiillottamiseen noin rautakauden puolivälissä, kuin taas tyyppi 8:nnen pintakäsittelyssä tapahtui nopeita muutoksia naarmutuksen, tasoituksen, kiillotuksen ja rappauksen välillä.

Taustalla on todennäköisesti onnistuneita ja vähemmän onnistuneita kokeita. Monessa tapauksessa voi tämän lisäksi olla, että ajoittain on valmistettu rajoitettu määrä astioita johonkin spesifiin tarkoitukseen. Olen tulkinnut lähinnä epineoliittisita ja rautakautista

saviastianvalmistusta sarjana yleisiä teknologioita, joita on voitu modifioida monipuolisesti tarpeen mukaan.

Löytyi myös suurimittaisempia muutoksia saviastianvalmistuksessa. Epineoliittisessa keramiikassa oli pääasiassa orgaanista ja karbonaattipitoista sekoitetta. Rautakautisessa keramiikassa oli taas lähinnä mineraali- ja kivisekoitetta. Pohjakerrosten pohjapalat olivat vastaavasti pyöreitä, kuin rautakautisessa materiaalissa esiintyi lähinnä tasaisia pohjia. Olen nähnyt näitä piirteitä teknologisina adaptaatioina elämäntapojen muutoksiin siirtyessä liikkuvasta metsästäjä-keräilijäkansasta yhä pysyvämpään viljelevään ja karjanhoitavaan kyläasutukseen. Liikkuvalle elämälle tarvittiin kevyitä astioita, joita pystyttiin tunkemaan maahan. Nämä eivät haljenneet tippuessa ja oli yksinkertaisia valmistaa. Rautakaudella suosittiin taas tukevia astioita, jotka eivät olleet alttiita hankaukselle seisoessa paikalla.

Keramiikan levinneisyyden ja yleisyyden pohjalla olen argumentoinut, että Pahamäen rautakautisella asutuksella olisi ollut kahta massatavaraa käytössä. Sekoitteiltaan ja pinnoiltaan karkeat tyypit 8 ja 3A löytyivät Pahamäeltä kaikista runsaimmissa määrissä ja laajemmalta alueelta. Verraten useimpiin muihin tyyppeihin nämä olivat myös hyvin lukuisia asuinpaikkakonteksteissa. Lienee todennäköistä, että aktiivisessa käytössä olleet astiat ovat fragmentoituneet isoissa määrissä ja joutuneet nimenomaan asuinalueiden löydöstöön. Harvemmin käytössä, ja ehkä erikoistapahtumissa käytössä olleet astiat pitäisi löytyä tietyistä paikoista ja pienemmissä määrissä. Nämä keraamiset massatavarat ovat joka tapauksessa ilmeisesti ollut hyvin monikäyttöisiä, sillä niitä löytyi eri muotoisia ja pintakäsitettyjä reunapaloja.

Tyypit 8 ja 3A ovat kuitenkin olleet tärkeässä asemassa myös hautaustapojen kannalta, sillä ne löytyivät runsaimmissa määrissä nimenomaan polttokenttäkalmiston sisältä. Niin kuin on esitetty aiemmassa tutkimuksessa, niitä on voitu käyttää hauta-antimina, ruokauhrina tai siirtäessä rovionjätteitä kalmistoon. Tyyppi 3A oli runsain rovionjätteiden ja hauta-aineiston alla, mikä voisi johtua keramiikan murskauksesta ja asettamisesta ennen muun aineiston asettaminen.

Pitäen polttokenttäkalmistojen yleisiä löytökoostumuksia mielessä, eli laaja valikoima kalliita, valmistukseltaan vaativia ja joskus kaukaa tuotuja esineitä niin, kuin korut ja aseet, kuonatuotteiden ja keramiikan ohella – olisiko mahdollista, että vainajia katsottiin tarvitsevan myös perinteellisiä arkiesineitä? Niillä saattoi olla tasapainottava teho kalmistossa tuttuina käyttötavaroina. Esimerkiksi ruuanlaittoon ja perinneruuan makuun on saattanut liittyä arvoja

keramiikan karkeudesta huolimatta. Etenkin tyyppi 8:nnen astianpaloissa on usein ollut karstaantumista niin seinän sisällä, kuin pinnassa. Karstaantumiskuvion perusteella astioita on voitu käyttää kuivan ruuan paistamisessa.

9A oli niitä harvoja tyyppejä, joita ei juuri löytynyt kalmistosta, vaikka olivatkin runsaita asuinpaikkakontekstissa. Joissain reunapaloissa näkyi karstarengas, joka olisi voinut syntyä ruuan keiton yhteydessä. Astianpaloista löytyi runsaasti muissa tyypeissä melko harvinaista kvartsihiekkakiveä. Olisiko kyseessä tuontitavara, joka ei sopinut oman sosiaalisen ryhmän kalmistoon? Vai eikö keitetty ruoka sopinut ruokauhriksi tai hautarituaalien yhteydessä? Tätä on vaikeata selvittää ilman provenienssitutkimusta, sillä tyyppi ei juuri muuten erottunut esimerkiksi 3A:sta.

Yleisesti ottaen keramiikka-aineisto vaikutti Pahamäellä löytölevinneisyyden perusteella murskaantuneelta ja levitettynä, vaikka parissa tapauksessa oli mahdollista, että kokonainen astia oli asetettu kalmistoon. Eräs tyyppi 1A:n astia oli näistä todennäköisin.

Aineistosta löytyi myös polttokenttäkalmistossa yliedustettuja tyyppejä verraten asuinpaikkakonteksteihin. Tyypit 1A, 4A ja 6A olivat aivan selkeitä esimerkkejä tästä. Tyypit olivat usein koristeltuja ja pinnaltaan työstettyjä, sekä sääntömäisesti ohuita ja hienosekoitteisia. Keveytensä huolimatta tyypit olivat hautauskonteksteissa runsaimpia. Nämä eivät ainoastaan löytyneet hauta-antimien ja roviojätteiden seasta, vaan poikkeuksellisesti niiden esiintymisissä näkyi kärkiä kalmiston ensimmäisissä kerroksissa. Keramiikkalöytöjä kalmistojen päältä on aiemmin selitetty jälkinä muistelujuhlista ja –rituaaleista sekä ruokauhreista. Olen argumentoinut, että juuri nämä tyypit olisivat näissä tapahtumissa käytetyt saviastiat.

Tyyppien 6A:n, 4A:n ja 6A:n astianpaloista ei löytynyt karstaantumista ollenkaan, joten niissä ei ehkä lämmitetty ruokaa. Näitä hienoja astioita on ehkä lähinnä käytetty ruuan ja juomien tarjoiluastioina. Ne ovat luultavimmin ollut juuri juoma-astioina sopivia, sillä hienon sekoitteen takia ne ovat olleet nesteenpitävimpiä, kuin useimmat muut kohteen tyypit. Etenkin kiillotetut astiat niin, kuin valtaosa 6A:sta on olleet varsin soveliaita tähän tehtävään. Ei ole kovin kaukaa haettua, että rautakauden ihmiset olisivat juoneet muistijuhlissaan esimerkiksi olutta. Ohra oli aiemman tutkimukseen mukaan kohteen ylivoimaisesti yleisin jyvälöytö ja siitä saa kaikista helpoiten nimenomaan olutta. Näissä astioissa on mahdollisesti myös valmistettu alkoholijuomia.

Eri osista polttokenttäkalmistosta löytyi erilaisuuksia keramiikkatyyppien esiintymisissä. Isoin ero oli löytömäärä, joka kalmiston pohjoisessa oli huomattavasti isompi, kuin lännessä. Yksityiskohtaisemmin esimerkiksi 1A oli varsin runsasmääräinen pohjoisessa osassa kalmistoa, ja 4A:n yleisempi kalmiston lännessä. Koristeluaiheet olivat osittain samat, mutta pohjoisesta löytyi myös verraten vanhempia aiheita. Polttokenttäkalmiston pohjoinen osa on siis todennäköisesti vanhempi, merovingiajalla rakennettu osa ja läntinen kalmistonalue viikinkiaikainen laajennus. Tämän jälkeisen osan olleensa käytössä lyhyemmän ajan ennen hautaustapojen muuttuminen kristillisyyden vaikutteen takia, siihen kertyi luonnollisesti myös vähemmän keramiikkaa, kuin alkuperäiseen osaan. Nämä saattoivat kuitenkin olla joissain määrin käytössä samaan aikaan. Pohjoisen kalmistonalueesta ensimmäisessä kerroksessa näkyi karkean tyypin 8:nnen kärki, jota ei havaittu läntisestä osasta. Ehkä vanhemmalla, myyttisellä kalmistoalueella pidettiin isoimpia muistelujuhlia, joihin tarvittiin ruoka- ja säilöntäastioita hienompien astioiden ohella?

Mahdollisesta kalmistoon liittyvästä muistelukäytäntöistä kertoo myös tekstiilipainoitteisen 7A:n löytäminen merovingi- ja viikinkiaikaisista kalmistokerroksista. Kyseessä saattaa olla pelkkä kerroksien sekoittuminen, mutta vanhojen esineiden uudelleenkäyttö kalmistokonteksteissa on todettu useammassa tapauksessa. Seuraten edellisempiä tutkijoita: voi olla, että Pahamäen rautakautinen väestö löysi ja pohdiskeli oudon näköistä keramiikkaa, jota he sen jälkeen veivät kalmistoonsa luodakseen yhteys tärkeän paikan ja muinaisten esi-isien kanssa.

Tämän tutkimuksen tulokset tukevat siis joissain määrin vakiintunutta tulkintaa rautakauden keramiikasta kahtena ryhmänä. Toisessa hienoa, erikoista keramiikkaa ja toisessa karkeata jokapäiväistä keramiikkaa. Tämä näkemys on kuitenkin yksinkertaistettu, sillä hienosta ryhmästä löytyy eri kombinaatioita koristelemattomia, keskikarkeasekoitteisia ja pinnoiltaan eri laatuisia astioita. Karkeasta ryhmästä löytyy myös kiillotettuja ja parissa tapauksissa koristeltuja astioita. Tämän lisäksi löytökokonaisuudet viittaavat karkeiden tärkeästä asemasta myös kalmistokontekstissa.

Kohteelta löytyi myös keskiaikaista ja keskiajan jälkeistä keramiikkaa, johon optinen mikroskopia ei soveltunut yhtä hyvin savimassan hienoisuuden takia. Tämä oli kuitenkin odotettu tulos, eikä tämä aineisto ollut tutkimuksessa painopisteenä. Lähes-kivisavikeraamiset ja protokivisavikeraamiset löydöt antoivat viitteitä kontakteista Reinin alueeseen ja Hansaverkostoon. Uusia esinemuotoja saapui Pahamäelle todennäköisesti Turussa asuvien saksalaisten porvariston kanssa. Uudet tuontitavarat eivät kuitenkaan näennäisesti korvanneet

vanhoja esinemuotoja hyvin laajassa mielessä, eikä niitä käytetty polttokenttäkalmiston yhteydessä.

Oikeata kivisavikeramiikkaa löytyi myös yhden myöhäisen seltteripullon pohja- ja seinäpaloina. Näissä on tuotu mineraalivettä Taunusvuorilta. Luultavimmin keskiajan jälkeistä punasavikeramiikkaakin esiintyi muutaman tarjoiluvadin muodossa. Tämän ajan vähäiset löydöt johtuvat kylän autioitumisesta 1400-luvulla.

Lopuksi näyttäisi siis siltä, että stereomikroskopialla voi olla paljon potentiaalia keramiikantutkimuksessa. Menetelmällä pystyy tunnistamaan monia yleisesti käytettyjä saviastioiden sekoiteaineksia, eikä sen soveltaminen aineistoon ole turhan kallis tai hidas. Suomen rautakauden keramiikka on huomattavasti monipuolisempi, kuin lyhyen tutkimuskirjallisuuden ja koristeluaiheiden typologian antamasta kuvasta voisi päätellä. Saviastioiden sekoitteisiin ja teknologisiin ominaisuuksiin perustuvat analyysit saattaisivat tuoda esille uutta tietoa vanhasta haasteellisesta tutkimusaiheesta.