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Elisabeth Holmqvist, Riikka Väisänen and Andreas Koivisto

REDWARES FROM GUBBACKA'S MEDIEVAL VILLAGE: REGIONAL AND INTER-REGIONAL VIEWS ON CERAMIC NETWORKS AND TECHNOLOGY (SEM-EDS)[1]

The medieval village site of Gubbacka is situated in the today's Vantaa, Finland. Archaeological investigations were conducted at the site in 2002–2003 and 2008–2010. The aim of this paper is to explore the social and trade contacts and networks the rural inhabitants of Gubbacka had within the Baltic Sea region. In order to examine how these relationships are reflected in the ceramic materials from the site, redware sherds were sampled for micro-structural and compositional characterization by a scanning electron microscope with an energy dispersive spectrometer (SEM-EDS) to study their provenance and technological properties. In addition, redwares from a nearby site Mankby and Tallinn were included in this study as regional and inter-regional parallels to examine possible shared origins of the pots and technological applications in redware manufacture. Redware is a very common archaeological find material in late medieval contexts, but rather difficult to investigate: the products of the different north European manufacturing centres are practically impossible to distinguish with the naked eye, and even the dating of redware finds is problematic. Hence, this study aims to offer new perspectives for the study of redwares, their technologies and distribution networks in northern Europe.

Elisabeth Holmqvist, Archaeology, Department of Philosophy, History, Culture and Art Studies, University of Helsinki, P.O. Box 59, 00014 University of Helsinki, Finland; elisabeth.holmqvist@helsinki.fi
Riikka Väisänen, Vantaa City Museum, Hertaksentie 1, 01300 Vantaa, Finland; riikka.h.vaisanen@gmail.com
Andreas Koivisto, Vantaa City Museum, Hertaksentie 1, 01300 Vantaa, Finland; andreas.koivisto@wippies.fi

Introduction

This study examines medieval red earthenware pottery and its possible implications for local ceramic technologies and inter-regional contact networks.

[1] This is a slightly revised version of the research paper which was published in the newsletter of Finnish Society for Medieval Archaeology (Holmqvist et al. 2013).

Our particular interest is in the links the inhabitants of the medieval village of Gubbacka, located in the present-day Vantaa, had with the Baltic region and central Europe. Redware pottery sherds were examined by using a scanning electron microscope with an energy dispersive X-ray spectrometer (SEM-EDS). SEM is a powerful analytical technique that can be employed to characterize ceramic microstructure, technologies and glaze and to identify ceramic objects originating from different sources. The particular advantage of this technique is that it can be used for elemental analysis of the ceramic body (matrix), mineral particles and the glaze as separate phases in the ceramic cross-section (see e.g. Maniatis & Tite 1981; Freestone & Middleton 1987; Tite 2008, 218; Martinón-Torres & Rehren 2009; Polvorinos et al. 2011; Cantisani et al. 2012; Montana et al. 2012). As a result, this data can be used to identify ceramic technologies and to interpret contact and trade networks of the communities in question.

The technological attributes of ceramic artefacts hold a key role also from the provenance perspective – given that the potters processed their raw materials, e.g. by levigating the clay and adding tempers, very rarely a correspondence can be found between archaeological ceramics and geological clay sources (Sillar & Tite 2000; Buxeda i Garrigós et al. 2003; Tite 2008, 223 ff.). Hence, our provenance interpretations are primarily based on the categorization of different ceramic technologies and the chemical fingerprint of specific clay recipes used in pottery manufacture. In this respect, the elemental composition of the clay body (matrix), determinable by SEM-EDS, can link more directly than the bulk composition, possibly affected by added temper materials, to the original raw clay source (Buxeda i Garrigós et al. 2003, 14–15).

Our primary focus was to view whether ceramic data can reveal additional information regarding the trade contacts of the inhabitants of the Gubbacka village and in a wider perspective, examine the question of redware manufacture in the regional context of Gubbacka, the southern coast of Finland. Another interesting question is how the ceramic data correlate with the historical sources. We analysed altogether 20 redware ceramic vessels from the late 14th–16th century contexts, including ten ceramic sherds from Gubbacka and comparative materials from two other sites – five sherds from the medieval Hanseatic town of Tallinn and five sherds from another rural medieval village site, Mankby, situated in present-day Espoo in Finland, ca. 35 km to the west of the Gubbacka site (Fig. 1).

Our main research goals were as follows: 1) to distinguish pottery of different clay body/matrix compositions among the analysed samples from Gubbacka, Mankby and Tallinn by performing SEM-EDS analysis, indicating ceramics originating from different sources; 2) to examine whether the analytical data provide any indication of redware manufacture in the regional context of the southern coast of Finland; 3) to examine material links between the Finnish assemblages and the Tallinn samples, i.e. to identify possible imports to Gubbacka and Mankby; 4) to form a focused view on the redwares in the specific regional context by comparative examination of the Gubbacka and Mankby redwares to distinguish whether they can be linked with the same site of production. This

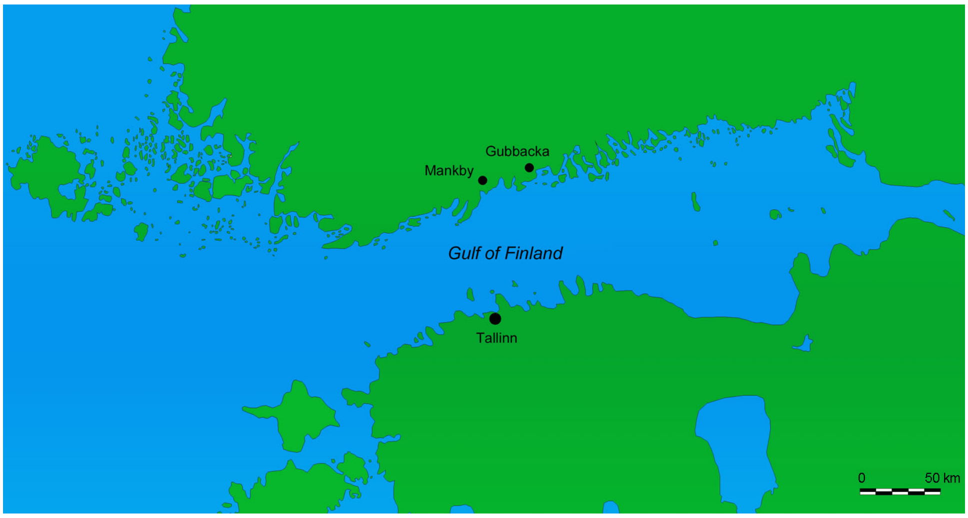

Fig. 1. A map showing the locations of the sites where ceramics were sampled: Gubbacka, Mankby and Tallinn. Drawing by Andreas Koivisto.

paper presents the results of our pilot study, hoped to be expanded in the future by an increased number of samples from relevant sites. The SEM-EDS-analysis was part of a medieval history project of Vantaa, funded by the EU Central Baltic Interreg IV A-Programme and Vantaa City Museum.

The Gubbacka site

The medieval village site of Gubbacka has been archaeologically investigated during the years 2002–2003 and 2008–2010 (Koivisto et al. 2010). The finds from Gubbacka include a large number of redware pottery sherds, which represent the majority of ceramic finds of the site. The finds date mainly to the 15th and 16th century. Gubbacka is situated on a small hill, near the area of today's port of Helsinki in the area of the Vuosaari district. In the medieval times, a strait of the sea was located at the foot of the Gubbacka hill, providing access by boat to the open sea.

Over 20 remains of different structures have been located in Gubbacka so far, all situated south of the main village road. During an earlier period, probably sometime during the 12th century, the village of Gubbacka was inhabited by Swedish settlers. During the medieval times, the village belonged to the Helsinga parish. As Finland was part of Sweden until the early 19th century, contacts to Stockholm, the capital of Sweden, were lively throughout the medieval and early modern times, at least on the official level.

On the local level, the nearest big town from Gubbacka's perspective was Tallinn, situated 90 km south of the village, on the other side of the Gulf of

Finland, in today's Estonia, only a day's journey by boat. According to historical sources, contacts between the inhabitants of the Helsinga parish and Tallinn were very active between the 14th and 16th centuries, and probably also earlier (Salminen 2012). Therefore, it is probable that the first redware pottery arrived to Gubbacka via Tallinn.

Redware pottery

On the whole, our picture of the redware pottery found on the northern shores of the Baltic Sea is fairly vague, and no detailed studies have been carried out on the subject. The production of lead-glazed red earthenware pottery started in north-western (especially in the Low Countries) and central Europe (Germany) sometime during the 12th century[2], and the production further developed and spread to southern Scandinavia and the south-eastern coast of the Baltic Sea during the 13th and 14th centuries.[3] The first redware vessels that reached the Nordic areas were imports from the Low Countries and southern Baltic. During the 15th century the production of redware ceramics slowly spread towards the north. It has been suggested that the first craftsmen to produce redwares in the north were most likely specialists from central (e.g. Germany) and north-western (e.g. the Low Countries) Europe, and they probably combined the production of both vessels and stove-tiles (e.g. Davey & Hodges 1983; Elfwendahl 1999; Gaimster 1999).

According to historical written sources, the first mention of a potter's workshop in Stockholm is from the year 1479 (Johansson 2007, 48), in Tallinn there are mentions of potters from the 14th and 15th century onwards (Russow 2007, 69 f.). In Turku, the first mention of ceramic production is from the middle of the 16th century. Aki Pihlman (1989, 104) states that redware production could have been possible already during the 15th century in Turku, as the amount of redware vessels increases strikingly during that time. However, the first actual archaeological evidence of red earthenware production dates to the end of the 16th century or the beginning of the 17th century (Tulkki 2003). The situation in other parts of Finland is even more poorly known.

Redware pottery was the most common ceramic type in northern Europe from the medieval period onwards, yet its popularity and numerous workshops involved in its manufacture also make it a complex archaeological material. Different production sites appear to have manufactured seemingly very similar products, and compositional analyses are required in order to identify products from different

[2] If not counting the early production of eastern England, particularly Stamford wares. However, this cannot be regarded as impetus for the late medieval redware boom in the Baltic Sea areas (remark of the editor).

[3] For an earlier evidence on the very brief period of production of glazed redwares in southern Scandinavia during the late 10th – early 11th century, see Christersen et al. 1994 (remark of the editor).

workshops with any certainty. Similar vessel shapes and decoration techniques were also used over a long period of time, which makes chronological assignments of the objects challenging (Niukkanen 2000; 2007; Gaimster 2007). Nevertheless, there have been few attempts to date the red earthenware vessels based on the small differences in vessel forms, one of being joint Swedish – Finnish project aiming to date the tripod pipkin handles in the Baltic area from the period of 16th to 20th century (Bergold et al. 2004).

The majority of the sherds (Fig. 2) selected for the analysis represent red earthenware tripod cooking pots or pipkins – it was our primary focus to concentrate on this type and functional category. The two exceptions are one floor tile fragment from Tallinn, and one very coarse sherd from Gubbacka which resembles Iron Age pottery, but has been dated to the 15th century with thermoluminescence (Hel-TLO 4208). Most of the analysed sherds date to the 15th and 16th century – the Tallinn sherds possibly being slightly older, dating to the end of the 14th century or to the first half of the 15th century (Kadakas, personal communication, 12.4.2012).

Fig. 2. Examples of analysed redware sherds. a V1 (Gubbacka, KM 2008043: 49), b V4 (Gubbacka, KM 2009083: 122), c V6 (Gubbacka, KM 2010077: 26), d V7 (Gubbacka, KM 2010077: 181), e V8 (Gubbacka, KM 2010077: 233), f V15 (Mankby, KM 2011014: 187), g V16 (Tallinn, AI7032: 1557), h V17 (Tallinn, AI7032: 1623). Photo by Elisabeth Holmqvist.

Methodology

Regardless of the frequency of redware pottery in archaeological contexts, surprisingly few archaeometric studies have been carried out on the subject. Previous analytical studies of redwares recovered in Finnish contexts employed proton induced X-ray emission (PIXE). PIXE has great advantages in trace elemental concentration determinations compared to SEM, which only enables compositional determination of major and minor elemental concentrations. In addition to great analytical accuracy, PIXE's advantage is that it can be performed non-destructively on an artefact, yet this also has disadvantages particularly in its application to ceramic materials (see Rye & Duerden 1982; Grave et al. 2005; Leon et al. 2012).

PIXE is a bulk method which excludes the possibility to examine the heterogeneity of the ceramic fabric, technological aspects apart from bulk composition and, crucially, elemental analysis of the ceramic body (for a PIXE application to analyse the coating and ceramic fabric separately, see Leon et al. 2012). Surface measurements and inhomogenized samples also bear a risk of surface contamination and burial condition effects (see Rye & Duerden 1982; Schwedt et al. 2004). Hence, ideally, one's analytical approach on ceramics should include both SEM and a bulk chemical method for homogenized samples (e.g. PIXE, XRF, ICP-OES/MS, NAA) for determination of both structural and trace elemental compositions applied on an adequate number of samples (see e.g. Holmqvist-Saukkonen 2010; 2012; Polvorinos del Rio & Castaign 2010; Holmqvist-Saukkonen & Martinón-Torres 2011; Polvorinos et al. 2011; Cantisani et al. 2012).

Wahlberg's (2000) PIXE-analysis of redwares from western Finland (Laukko Manor, Kuusisto Bishop's Castle and Turku) also included three clay samples (from the Laukko and Kuusisto areas and Germany), yet in addition to data compatibility issues derived from the use of another analytical method, his ceramic samples were mainly bricks and roof-tiles and not vessels (apart from one). Regrettably, he does not present the complete set of concentration data in tabulated form, and merely gives the concentrations of few indicative trace elements disconnected from the sample information. This largely prevents any comparative data analysis and evaluation of the results. Wahlberg (2000, 126 ff.) concludes that although the results were 'somewhat contradictory' and there were no adequate matches between the analysed clay and artefact sample compositions (which is unsurprising for the reasons given above), most of the analysed bricks and tiles are, however, likely to be of domestic manufacture. Interestingly, the results of the only analysed redware vessel fragment may indicate an imported status (Wahlberg 2000, 126 ff.).

There is another unpublished PIXE-analysis conducted on redware pottery from Herttoniemi, Helsinki, where there was a redware factory in the 18th century (Rönkkö 2012). These materials are chronologically unrelated to our study, added to the fact that the elemental concentrations were basically undeterminable due to the Pb-matrix deriving from the lead-glaze of the analysed sherds (see

Rönkkö 2012, 61 ff.). These issues underline the importance of a careful selection of the analytical method regarding the nature of the samples in question, and exemplifies the advantages of invasive sampling especially with this kind of ceramic objects that have a layered, glazed structure, added to the complex mineralogical effects in ceramic samples.

For the reasons described above, we chose the SEM-EDS method as the most suitable for our research. In our study, SEM-EDS-analysis was performed on 20 redware pottery samples prepared as cross-sections in polished blocks. The analytical specimens were cut with a Buehler diamond saw perpendicular to the glazed surface, mounted in resin blocks, polished with diamond paste (down to 0.5 µm grain size) and carbon coated to eliminate charging effects. High-resolution field emission scanning electron microscope (Hitachi S-4800 FE-SEM) based at the Laboratory of Inorganic Chemistry, University of Helsinki, was used for backscatter (BSE) and secondary electron (SE) imaging of the ceramic cross-sections in order to observe the ceramic microstructure, grain size, surface treatment and mineral composition. These features were documented by micrographs taken with different magnifications. For elemental analysis, the SEM was equipped with an Oxford Instruments 350 INCA energy-dispersive X-ray microanalysis system (SEM-EDS).

Our compositional groups are based on the ceramic body/matrix elemental composition, determined by SEM-EDS analysis of three areas of 250 × 250 µm size (equivalent to an image of the body area at 500× magnification), selected by avoiding large mineral particles that were probed separately. The semi-quantitative measurements were obtained under the following conditions: working-distance 15 mm; accelerating voltage 20 kV; process time 5, equivalent of detector deadtime of ca. 30%; time of acquisition 180 s. The three measurements were checked for consistency, recalculated by stoichiometry as oxides by the Oxford INCA software and reported as average weight percent values of oxides (Table 1). These data were subjected to statistical analyses, principal component analysis (PCA) and cluster analysis (CA) that are the most commonly used statistical methods for multivariable data in ceramic compositional studies (Baxter 1994; 2001; P_2O_5 was excluded from the statistical analysis due to possible burial contamination, see, e.g. Schwedt et al. 2004). With regard to the glazed surfaces on the sampled ceramics, SEM was employed to measure the thickness of the glaze layer, the size and frequency of bubbles, cracks, and inclusions. Furthermore, SEM-EDS was performed to obtain the chemical composition of the glaze.

Results

The elemental data obtained by SEM-EDS of the clay bodies of the ceramic samples indicate two major compositional groups in the sample set (Table 1), yet both can also be seen as divided into two subgroups (group 1a–b and 2a–b in Fig. 3). One of these groups (1b) is formed by the samples from Tallinn (four out

Table 1. Chemical compositions (SEM-EDS) of the clay bodies (matrices) in oxide wt%. Compiled by Elisabeth Holmqvist

	Sample		Site	Na_2O %	MgO %	Al_2O_3 %	SiO_2 %	P_2O_5 %	K_2O %	CaO %	TiO_2 %	FeO %
Group 1a	V1	KM2008043: 49	Gubbacka	0.71	1.83	16.58	67.23	0.55	3.89	0.78	0.89	7.53
	V5	KM2009083: 138	Gubbacka	1.09	1.84	14.22	69.14	0.43	3.34	1.25	0.93	7.77
	V6	KM2010077: 26	Gubbacka	0.71	2.01	16.12	66.51	0.58	3.97	1.37	0.98	7.75
Group 1b	V16	AI7032: 1557	Tallinn	0.71	1.43	13.84	72.25	0.48	3.31	1.65	0.89	5.44
	V17	AI7032: 1623	Tallinn	0.75	1.77	13.99	69.19	0.44	3.56	2.15	1.19	6.96
	V19	AI7032: 1625	Tallinn	0.78	1.68	14.49	70.58	0.37	3.77	1.71	0.71	5.90
	V20	AI7032: 1175	Tallinn	0.77	1.85	13.83	71.00	0.50	3.57	1.52	0.90	6.05
Group 2a	V2	KM2008043: 86	Gubbacka	0.66	1.74	17.12	62.43	1.23	3.94	1.11	1.21	10.57
	V3	KM2008043: 94	Gubbacka	0.93	2.04	17.70	59.84	3.22	4.24	1.18	1.09	9.76
	V4	KM2009083: 122	Gubbacka	0.77	1.74	17.38	63.57	1.33	4.01	0.83	1.05	9.32
	V7	KM2010077: 181	Gubbacka	1.04	1.79	18.94	62.90	1.53	4.03	1.03	1.18	7.56
	V9	KM2010077: 240	Gubbacka	0.63	1.32	15.35	63.10	4.76	3.58	1.49	0.87	8.90
	V12	KM2008044: 376	Mankby	1.20	2.04	18.80	63.31	0.50	4.30	1.02	1.02	7.82
Group 2b	V11	KM2008044: 277	Mankby	1.60	2.34	17.05	62.87	0.95	4.82	1.96	0.88	7.55
	V13	KM2008044: 401	Mankby	1.38	3.31	17.55	64.30	0.70	3.99	1.27	0.82	6.67
	V14	KM2009032: 35	Mankby	1.41	2.70	16.37	63.79	0.98	4.98	1.26	0.83	7.69
	V15	KM2011014: 187	Mankby	1.49	2.40	15.79	63.34	0.80	5.08	1.30	0.92	8.88
	V8	KM2010077: 233	Gubbacka	0.58	1.20	11.18	75.90	1.07	3.06	0.73	0.73	5.56
	V10	KM2010077: 255	Gubbacka	0.63	1.38	12.82	73.27	0.75	3.49	0.90	0.80	5.97
	V18	AI7032: 1623	Tallinn	1.01	1.87	13.80	71.03	1.08	2.86	3.21	0.69	4.45

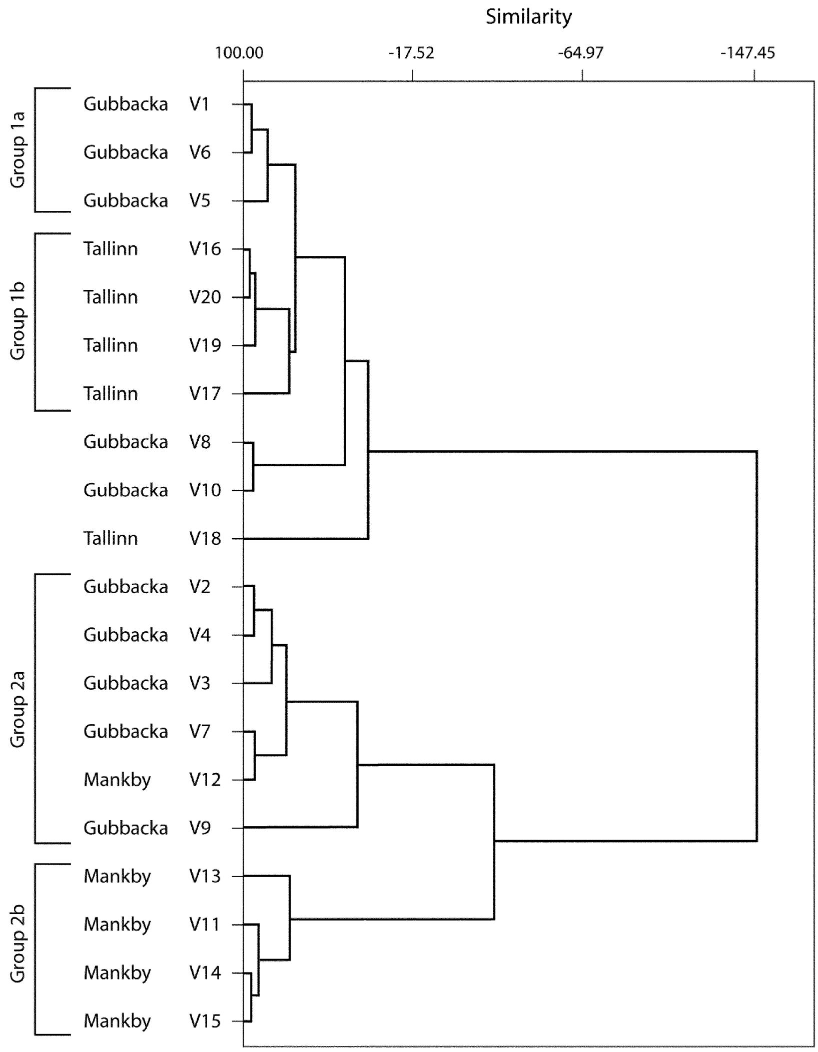

Fig. 3. Cluster analysis dendrogram of the elemental concentrations (SEM-EDS) of the ceramic bodies. Drawing by Elisabeth Holmqvist.

of five Tallinn samples belong to this group, Figs 2–4). The second main group is formed by Finnish samples (2a–b), which appear to form two subgroups that mainly correlate positively with the find locations (Gubbacka and Mankby). The compositional groups are identifiable in the elemental concentration data of the clay bodies and illustrated in the CA dendrogram and the PCA graph (Figs 3–4), however, all in all there is fairly limited variation in the characteristics of the samples. All of the analysed ceramics are of non-calcareous clay (CaO < 3.2 wt%, which may indicate a non-Tallinn source for the so-called Tallinn group), differentiated mainly by the MgO, Al_2O_3, SiO_2 and FeO concentrations.

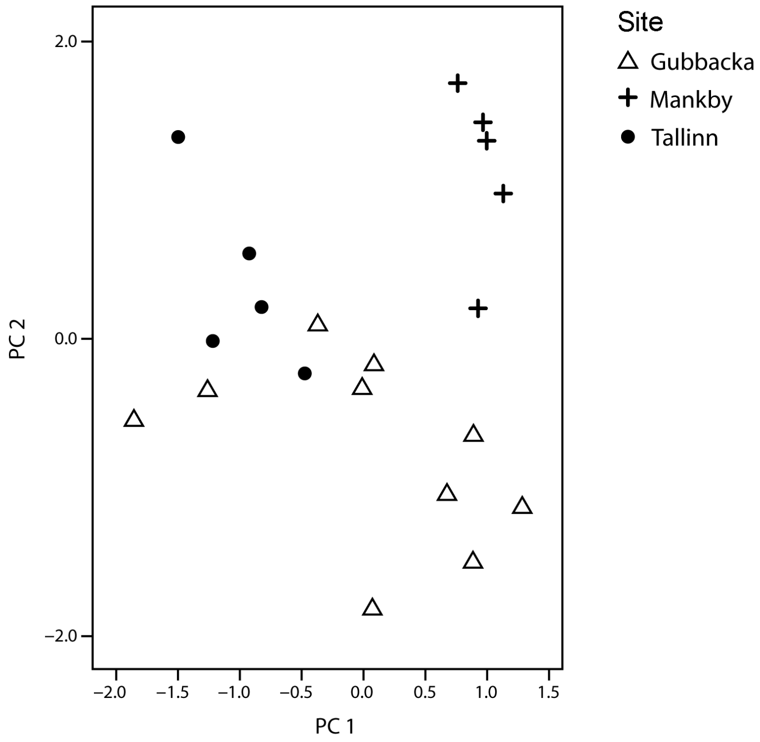

Fig. 4. PCA plot of the elemental concentrations (SEM-EDS) of the ceramic bodies. Drawing by Elisabeth Holmqvist.

Three sherds recovered at Gubbacka (group 1a, samples V1, V5 and V6) show similar clay body concentrations with the Tallinn sample group (1b), suggesting that they may be imports from the same area or workshop. In addition, two other samples analysed from Gubbacka (samples V8 and V10) are similar to each other but do not cluster with any other samples in the data set. The concentrations of these samples differentiate them from the suspected Finnish group, although this does not necessary mean they were not manufactured elsewhere in Finland, e.g. in Turku, given the relative similarity of all of the samples. It is particularly interesting, however, that samples V8 and V10 were suggested as of possible German origin by their appearance (Russow, personal communication, 16.3.2011), although this hypothesis of their source cannot be confirmed at the moment. One of the Tallinn samples (V18) is an outlier in the data set, which can be explained by the fact that it is the only floor tile among the analysed samples, and thus can be expected to vary in composition due to different material sources and processing in tile manufacture.

In general, the ceramic cross-sections showed dominant quartz, plagioclase and K-feldspars that were uniformly distributed throughout the ceramic fabric and often had a bimodal grain-size (typically < 50 μm and 100–300 μm), which together with the occurrence of angularly shaped larger grains suggest excessive tempering. In addition, the clay minerals included common mica (biotite and muscovite), occasional garnet group minerals, apatite, and rare titanite, ilmenite, zircon, rutile and iron oxides.

The glaze layer thicknesses measured by SEM in the cross sections vary between 100–300 µm. All the analysed glazes were transparent, very high-lead glazes, although the Pb-content of the glazes varies greatly between the analysed samples. This suggests that the potters did not have a standardized recipe for the glazes. High-lead glazes are typically applied on coarse wares for their relatively easy application to obtain a water resistant surface and to enhance the outlook of the vessels (Tite 2011, 331). The glaze is applied on a Fe-rich reddish slip layer (Fig. 5), that continues to cover the unglazed exterior and handles of the vessel. The so-called Tallinn group samples (samples 15–17, 19–20) show relatively thinner (80–200 µm) high-lead glaze (PbO 48–51 wt%, apart from sample 17 with glaze PbO of 25 wt%). Similarly, the samples from Gubbacka that are

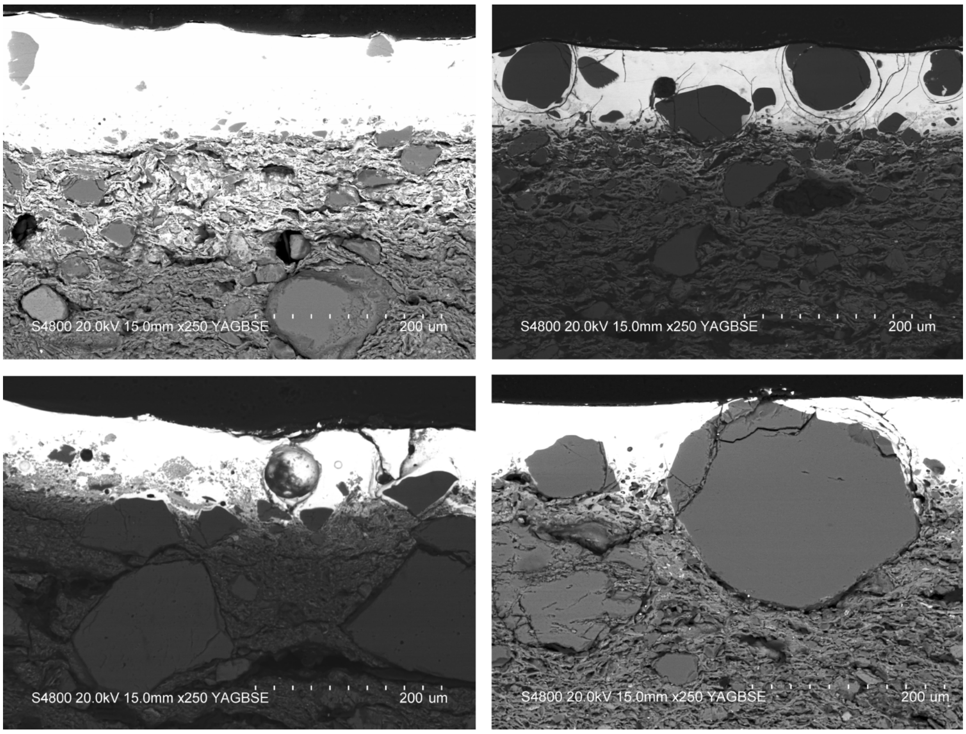

Fig. 5. SEM-BSE micrographs of cross-sections of redware pottery showing high-lead glaze applied on a Fe-rich slip layer on the ceramic fabric. Top left: V4 (Gubbacka, group 2a); top right: V6 (Gubbacka, group 1a); bottom left: V15 (Mankby, group 2b); bottom right: V17 (Tallinn, group 1b). The micrographs on the left (suspected regional group 2) display uneven glazed surfaces, and the ones on the right (possible imports, group 1) extensive quartz tempering in the glaze. Photo by Elisabeth Holmqvist.

treated as tentatively imported (V5–6, V8, V10) based on the clay body composition have similar glaze characteristics (PbO 38–56 wt%, excluding V1 with glaze PbO level at 67 wt%). The glazes of V8 and V10 are notably smooth and thin at ca. 80–150 µm, whereas the glazed samples belonging to the suspected Finnish group (samples V2, V4, V9, V11) show thicker (200–300 µm) and uneven glazes and higher lead content (PbO 52–67 wt%). Cracks and bubbles are also frequent in the glazes, as are relatively large quartz and feldspar grains that in some cases break through the glaze surface (Fig. 5). While bubbles are encountered also in the thinner glazes, the occurrence of large, frequent mineral inclusions, on the other hand, appears to correlate positively with the thickness of the glaze. The variation between the glaze technologies may be indicative of chronological differences.

Conclusions

To conclude, the analytical results indicate ceramics from different workshops in our restricted sample. Based on the clay body elemental concentrations determined by the SEM-EDS-analysis, our sample assemblage appears to divide into three separate groups that primarily seem to correlate positively with their archaeological contexts, added by few outliers. The first group is formed by the Tallinn sherds, added by a group of samples from Gubbacka, which may share a common source. We cannot specify this manufacturing source at this point, although we may speculate – based on the appearance of the sherds, their compositional dissimilarity with the Finnish sherds, and the historical records of the Hansatic trade routes – that they may originate from Germany, elsewhere in central Europe or the southern coast of the Baltic Sea where several production centres existed during the Middle Ages.

The route of the possible imports is another question that remains, whether they arrived in Gubbacka directly or more possibly via Tallinn or even Stockholm. Future comparative analysis with a wider sample may shed more light on the origin of these vessels. Our next aim is to expand our analytical comparisons to include redwares from Turku, and other locations in Finland that may have had redware production.

Our data show that the majority of the Finnish samples fall into the same compositional main group, although this group is fairly heterogeneous in terms of typology. The samples from the two Finnish sites, Gubbacka and Mankby, however, also show some extent of compositional variation. Thus, whether one or more workshops were involved in their manufacture cannot be distinguished based on this data set, but it seems probable that there was redware manufacture somewhere in the regional context of Gubbacka and Mankby, the southern coast of Finland. The typological heterogeneity of the tentative Finnish-origin group, contrasted by the common compositional characteristics within this group, speaks for manufacture on a relatively local level, taking into account the presence of fairly coarse, unglazed, and presumably regionally manufactured artefacts – it seems unlikely that this variety of pottery was imported over considerable distances.

If we accept the so-called Finnish group as regionally manufactured, that would mean that there was redware manufacture somewhere on the southern coast of Finland in the 15th–16th centuries, which would be a parallel finding to that of Wahlberg's (2000) on redware tile manufacture. Taking into account the issues related to the glazing technology particularly evident in this 'regional' group, we might, in fact, be looking at the outcomes of potters practicing on how to apply glazes on their earthenwares. The suspected imports present in the Gubbacka assemblage, may, on the other hand, have acted as advocates of this technological development in this regional context.

SEM-EDS proved a very useful technique for obtaining both technological and elemental concentration data on the analysed ceramics, and the compositional groups indicated by the clay body (matrix) analysis correspond well with the typological assignments of the selected ceramics – sherds identified as exotic in the macroscopic examination proved to be outliers in the data set, whereas the coarsest domestic vessels belong to the presumably relatively local main group. Similarly to the findings of others (e.g. Cruz Zuluaga et al. 2011) our results illustrate the usefulness by SEM-EDS ceramic matrix analysis in provenance studies, particularly in the cases of coarse and heterogeneous ceramic fabrics. The ability of this analytical technique to analyse the clay body composition by carefully avoiding the tempering materials and contamination from surface treatment, such as Pb-absorption from the high-lead glaze coating, proved to be a successful approach with these coarse pots in order to distinguish compositional groups among the analysed sample set.

This paper presented the results of our pilot project, although it should be noted that our interpretations are affected by the fairly limited number of samples analysed in this study. Hopefully, further analysis with a larger sample will allow us to build a more comprehensive and detailed picture of the redware industries and exchange systems in the Baltic Sea region. We are currently continuing the project by analysing additional redware sherds from Turku and Tallinn, which will enlarge out data set and allow further comparative analysis and more in-depth interpretations of the inter-site and inter-regional contacts.

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Elisabeth Holmqvist, Riikka Väisänen ja Andreas Koivisto

PUNASED SAVINÕUD KESKAEGSEST GUBBACKAST: HINNANGUID KOHALIKULE JA MITTEKOHALIKULE KERAAMIKAVÕRGUSTIKULE NING TEHNOLOOGIALE (SEM-EDS-ANALÜÜSI PÕHJAL)

Resümee

Punased savinõud olid kesk- ja uusaegse Lääne- ning Põhja-Euroopa kõige tavalisem keraamikarühm, kuid selle populaarsus ja laialdane tootmine teevad vastavate arheoloogiliste leidude uurimise keerukaks: üksteisest kaugel asuvad

töökojad valmistasid väliselt väga sarnaseid tooteid, mistõttu on nõude võimalikuks eristamiseks vaja kasutada tooraine koostise analüüse. Meie ettekujutus Läänemere põhjarannikult leitud punastest savinõudest on üpris ebamäärane ja seni pole sellel teemal detailseid uuringuid tehtud.

Käesolevas artiklis on uuritud keskaegseid punaseid savinõusid ja võimalusi, kuidas selle keraamika abil tuvastada keskaegse Gubbacka küla (tänapäevase Vantaa piirkonnas) elanike kodu- ning välismaist suhtlusvõrgustikku. Punaste savinõude katkeid elementanalüüsiti skaneeriva elektronmikroskoobi ja energiadispersse röntgenanalüsaatoriga (SEM-EDS). SEM on paljulubav analüüsimeetod, mida saab rakendada keraamika mikrostruktuuri, valmistamisviiside ja glasuuri iseloomustamiseks ning saviesemete päritolu selgitamiseks.

Uurimuse põhieesmärk on vaadelda, kas keraamika analüüs annab lisainfot Gubbacka elanike kaubakontaktide kohta, ja uurida punaste savinõude valmistamist Gubbacka kohalikus kontekstis ehk Soome lõunarannikul. Selle kõrval on huvitav küsimus, kuivõrd hästi korreleerub keraamikaandmestik ajallooliste allikatega. Analüüsisime paarikümmet 14. sajandi lõpu kuni 16. sajandi leiukontekstist pärit punase savinõu katket, nende seas kümme kildu Gubbackast ja võrdlusmaterjalina viis fragmenti Tallinnast ning viis Mankby keskaegsest külakohast (umbes 35 km Gubbackast läänes, tänapäevase Espoo alal).

Selle tagasihoidliku näidisekogu analüüsi tulemused osutavad, et katked pärinevad eri töökodadest. Savimassis leiduvate osakeste SEM-EDS-analüüsi alusel näib meie kogu jagunevat kolmeks rühmaks, mis üldjoontes korreleeruvad leidude arheoloogilise kontekstiga, välja arvatud üksikud erandid. Esimese grupi moodustavad Tallinna leiud ja rühm Gubbacka proove, mis osutavad ühisele lähtekohale. Ülejäänud kaht rühma tõlgendati Soome päritolu toodanguna. Meie andmekogu viitab, et enamik Soome proove kuulub koostise järgi samasse rühma, mille tüpoloogia on üsna heterogeenne.

Kui nõustuda sellega, et nn Soome rühm on kohalikku päritolu, siis valmistati 15.–16. sajandil kusagil Soome lõunarannikul punaseid savinõusid. Arvestades nõude glasuurimistehnikaga seotud probleeme, mis on eriti hästi täheldatavad selle "regionaalse" rühma puhul, võime oletada, et tegemist on pottseppade katsetustega, kuidas savinõusid glasuurida. Oletatavad importnõud Gubbacka leiukogus võivad aga endast kujutada sellise tehnoloogilise lahenduse tutvustajaid siinses regioonis.

Tähtsa küsimusena jääb aga vastuseta oletatavate importnõude teekond sihtkohta: kas need jõudsid Gubbackasse otse või pigem läbi Tallinna või hoopis läbi Stockholmi? Suurema hulga näidiste võrdlev analüüs võimaldaks nõude päritolu ilmselt paremini valgustada. Meie järgmine eesmärk ongi suurendada analüütilist võrdluskogu nii Turu linna kui ka teiste Soome oletatavate punaste savinõude valmistamiskohtade võrra.