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THE 18TH CENTURY SEA FORTRESS OF RUOTSINSALMI, KOTKANSAARI IN FINLAND: ARCHAEOBOTANICAL DATA OF A LOG LATRINE

In archaeobotany, plant remains from latrines have been used to derive information on historical food consumption. In this interdisciplinary paper, we present new archaeological and archaeobotanical data from the 1790s sea fortress of Ruotsinsalmi in Kotkansaari, Finland. Archaeological research revealed the remains of an infantry barracks and a well-preserved log latrine at the sea fortress. The contents of the latrine were excavated, and waterlogged human faeces were found. To reconstruct the food consumption of the soldiers at the sea fortress, we carried out archaeobotanical analyses on the faeces. The waterlogged human faeces consisted purely of plant remains and fish bone fragments. The analysis of the plant remains gave records of 77 different plant taxa, and common millet (*Panicum miliaceum* L.) and sage (*Salvia officinalis* L.) were identified for the first time from archaeological layers in Finland. The remarkable number of cultivated and exotic plants recorded from the faeces shows that imported as well as locally produced food was used.

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Latrines offer evidence of consumed food in the past

Latrines are a type of primitive toilet that collects human faeces, and the word latrine originates from Latin '*latrina*' or 'lavatrina' meaning 'to wash'. Latrines provide excellent preservation conditions, and therefore the content consists of a range of biological materials such as seeds, fruits and plant tissue. Latrines are historically also used as waste pits, where the household rubbish and sometimes even animal dung was thrown. Therefore, archaeological latrines are an excellent source of information on the past diet and waste disposal, and they also provide information about the natural surroundings of the latrine (Märkle 2005, 427; Smith 2013, 526).

Macrofossil, pollen, and zoological analyses of latrines have been conducted e.g. in Turkey (Baeten et al. 2012), England (Moffet 1992; Smith 2013), Germany

Fig. 1. The Island of Kotkansaari lies on the shore of the Gulf of Finland.

(Wiethold 1995; Märkle 2005), and Denmark (Andersen & Moltsen 2007). From Estonia over 30 latrines have been excavated (Bernotas 2008). Latrines have been excavated in Finland as well, from the medieval (AD 13th–16th c.) layers of Turku (Sartes & Lehtonen 2007; Seppänen 2012). However, no botanical analyses of these latrines have been carried out. Therefore, there has been little direct evidence of the diet. What cereals were eaten? Were exotic fruits parts of the diet?

The sea fortress of Ruotsinsalmi (1790–1855) in Kotkansaari was the predecessor of the present town of Kotka (1878−, Fig. 1). During the past ten years, some twenty archaeological studies have been conducted on the Island of Kotkansaari (Kykyri 2013a, 60; 2015, 38 f.). These investigations have shed new light on the history of the island, but so far only limited knowledge has been acquired concerning everyday life at the sea fortress.

New information was gained when the Museum of Kymenlaakso carried out excavations at the sea fortress in the summer of 2013. During the excavations a log latrine containing waterlogged human faeces was discovered (Kykyri 2014a; Kykyri & Lempiäinen-Avci 2014). These faeces were archaeobotanically analysed in order to find evidence of past human diet, and to gain detailed knowledge about the food consumed at the sea fortress.

In this paper, we present new archaeological and archaeobotanical data from the sea fortress of Ruotsinsalmi in Kotkansaari, in addition to discussing the usage and origin of the plants which yielded archaeobotanical remains.

The history of the fortress

The sea fortress of Ruotsinsalmi was built in the 1790s on the Island of Kotkansaari and some smaller surrounding islands, by order of Empress Catherine the Great. The Gustavian war (1788–1790) between Sweden and Russia had shown that Russian defenses in south-eastern Finland were in need of prompt strengthening. In order to ensure the defense of St. Petersburg, a system of

fortifications was built in the border lands, the Ruotsinsalmi sea fortress being the southernmost base in the entity (Airola 1978, 10 ff.; Vangonen 2013, 12 ff.).

The construction of the sea fortress, which consisted of numerous forts, redoubts and artillery batteries, began in 1791. In addition to the military installations (which included a naval harbor), a plan for a town-like community was mapped out on Kotkansaari in the centre of the fortress. The administrative and public buildings, the houses of officers, the military barracks and the storehouses of the garrison were located on the island. The urban area west of the harbour was occupied by civilians (Airola 1978, 19; Vangonen 2013, 13 ff.). At its peak the fortress of Ruotsinsalmi had 10,000 inhabitants, most of whom were military (Harjunpää 1978, 89 f.; see also Kauppi 1998, 128).

The lifespan of the fortress was short. Russia occupied the entire area of modern Finland in 1809 during the Finnish war, and the sea fortress of Ruotsinsalmi lost its military significance. After the Treaty of Hamina (1809) the fleet and the garrison were transferred to Viapori, Helsinki, most of the inhabitants moved away, and the empty buildings began to fall into ruin. In 1855, during the Crimean war, the (British) Royal Navy landed on Kotkansaari and destroyed all that was still left of the former fortress and its town community (Kauppi 1998, 134 f.; Vangonen 2013, 30, 34 f.).

The excavations of summer 2013

Despite the fact that archival sources connected with Ruotsinsalmi are voluminous, the fortress had not become an object of archaeological research before the 21st century. During recent years, a lot of remains already known from historical sources have been revealed in connection with archaeological fieldwork. Worth mentioning are for example the remains of the garrison office, the engineer's office and a large military barracks (Kykyri 2012; 2013a; 2014a–c), and the remains of a naval hospital storehouse (Hakanpää 2006; Koivisto 2007). Furthermore, some remnants of a military training ground and an extensive drainage channel have been found during the excavations (Kykyri 2005; 2010).

In June 2013 drainage works were started in Kirkkokatu 2 and the surrounding street area in the eastern end of Kotkansaari Island. The present urban plot is situated in the former harbour area of the fortress of Ruotsinsalmi, and according to historical sources ten large military barracks had been erected in the area in the 1790s (Vangonen 2013, 17). The drainage work excavation was conducted under archaeological supervision of the Museum of Kymenlaakso (Kykyri 2013b), as it was presumed that old layers and remains of features and constructions from the Ruotsinsalmi era would likely appear.

The archaeological project focused on the oldest (Ruotsinsalmi era) layers, finds and structures at the site. The excavated area was about 200 m². Only a small part of the plot of Kirkkokatu 2 was investigated in 2013, but the field observations suggest there are still multiple archaeological remains to be found at the site.

The archaeological findings

The infantry barracks

Excavated trenches contained cultural layers, finds and remains of structures, which could be connected with the fortress of Ruotsinsalmi. Remnants of four parallel, shallow and about one metre wide ditches were found at the bottom of the trenches. Ditches filled with mortar and piled stone were interpreted as part of a large foundation structure for a wooden infantry barracks, which had been built in the area in the 1790s (Kykyri 2013b, 51 f.).

Using historical maps and drawings, the excavated structure was interpreted as one of six identical barracks, which were situated in two rows with a latrine between each opposing barrack (RGAVMF 1797; Ruotsinsalmen sataman pääsuunnitelma 1801, Fig. 2). The size of each one-storey military barracks

Fig. 2. The infantry barracks (V) and the log latrine (W) excavated in 2013 appear in a map from 1801 (Ruotsinsalmen sataman pääsuunnitelma 1801. The National Archives of Finland).

was 15 × 75 m (RGAVMF 1798), and the latrines were approximately 1.5 × 4 m (Ruotsinsalmen sataman pääsuunnitelma 1801) according to the historical maps and drawings. These barracks and latrines appear in historical maps until the 1810s (VeSa 1806 and VeSa 1812), after which they were demolished as unnecessary.

The log latrine

The most intriguing archaeological find during the excavations was a log frame structure filled with a thick layer of dark brown organic substance. The log frame structure had been damaged during previous street and drainage works in the area but the western wall and the northern corner of the log structure were found intact. The waterlogged remains at the latrine were in excellent condition, and their good preservation status can be due to the fine grain nature, and due to the surrounding layer of isolating clay offering anaerobic conditions (Kykyri 2013b, 52 f.; Kykyri & Lempiäinen-Avci 2014, 22).

The remaining wall of the log frame was eight courses (1.5 m) high. The construction had been made of round, unworked logs and equipped with notched corner joints (Fig. 3). The bottom of the log frame structure was formed by plank flooring with underlying floor joists (Fig. 4). The lower part of the structure was filled with a 60-cm thick dark brown layer, which turned out to be human faeces.

Fig. 3. The wall of the log frame construction revealed. Photo by Marita Kykyri. The Museum of Kymenlaakso.

Fig. 4. The plank flooring of the latrine. Photo by Marita Kykyri. The Museum of Kymenlaakso.

Based on the area stratigraphy, historical sources, as well as the findings revealed from examining the log frame construction that the log frame structure was interpreted to be a container for latrine waste, dug in the ground under the actual latrine building (Kykyri 2013b, 52).

Finds from the trenches

Archaeological finds from the Ruotsinsalmi era excavated from the plot of Kirkkokatu 2 were mainly fragments of household goods and different kinds of construction waste. Among the finds from the yard area were also some flints from firearms, fragments of clay pipes, a few coins and an Orthodox baptism brass cross (Kykyri 2013b, 48; Kykyri & Lempiäinen-Avci 2014, 23 f.).

The composition of the finds dug out from the log frame construction in the present street area differed greatly from the finds from the nearby plot, where the infantry barracks were once located. Besides the remains of plants and seeds even animal bones (Kivikero 2013; Bläuer 2014), leather waste (mainly from boots),

pieces of textile and fragments of glassware and pottery were found in the log frame (Kykyri 2013b, 48; Kykyri & Lempiäinen-Avci 2014, 24). It may well be that part of the domestic waste ended up in the latrine when the building was still in use, and at some point at the beginning of the 1810s when the barracks was demolished as unnecessary (Kykyri & Lempiäinen-Avci 2014, 24).

Archaeobotanical analysis of the latrine

Material and methods

Five samples with a volume of 2 litres each were taken from the latrine contents for archaeobotanical analyses. The samples were full of human excrement, which consisted of seeds and achenes, as well as fish bones and scales. It was evident that conditions for the preservation of uncarbonized material had been excellent in the latrine.

The laboratory work was conducted at the archaeobotanical laboratory of the Herbarium (TUR) at the University of Turku. Samples consisted of coarse sand and faecal lumps. Samples were wet-sieved and washed through a series of sieves with mesh sizes of 2, 1 and 0.25 mm. Identifications were made with the help of reference collections at the Herbarium (TUR) and literature (Cappers et al. 2006). In this study we follow the scientific names of Hämet-Ahti et al. (1998).

Results

The waterlogged faeces were rich in seeds and other plant remains that had passed through the human digestive system. Some plant species found from Ruotsinsalmi are unique in appearing for the first time in archaeological layers in Finland. The archaeobotanical analysis shows a mixed composition of buckwheat and cereals (7.3%), oil and fibre plants (1.4%), spices (0.4%), collected berries and fruits (58.4%), other useful plants (0.4%), weeds (24%), and meadow plants (6.3%) as well as other plant remains (1.8%). Altogether 3036 plant remains were counted belonging to 77 different taxa. The complete results of the five samples from the latrine of Ruotsinsalmi fortress, dated to the 1790s, are listed in Table 1.

In Ruotsinsalmi the most common field crops are the achenes and remnants of the pericarp of buckwheat (*Fagopyrum esculentum*), followed by glumes of common millet (*Panicum miliaceum*) (Fig. 5). However, barley (*Hordeum vulgare*), oat (*Avena sativa*), rye (*Secale cereale*), and wheat (*Triticum aestivum*) are present in the samples as caryopses in very small quantities.

Recorded seeds of oil and fibre plants are flax (*Linum usitatissimum*) and hemp (*Cannabis sativa*), which both were frequently present in the samples, whereas oil plants gold of pleasure (*Camelina sativa*) and black mustard (*Brassica nigra*) were very rare.

Table 1. Ruotsinsalmi, Kotkansaari (Kotka, Finland). Botanical plant remains from the 1790s latrine. Counted remains are seeds, grains or nutlets unless otherwise mentioned. The notation * indicates a moderate amount (5–20 fragments) and ** indicates a large amount (21–100 fragments) of remains in the sample

Sample No.	1	2	3	4	5			
Volume/litre	2	2	2	2	2			
Context in the latrine	West corner, upper layer of the filling	Middle layer of the filling	Middle layer of the filling	Lower layer, on top of the plank flooring	Lower layer, on top of the plank flooring	Total sum	Ecological group % of total sum	English name
Buckwheat and cereals							7.3	
Avena sativa	1	.	.	.	.	1		Oat
Avena sativa, testa	.	.	1	.	.	1		Oat, testa
Cerealia indeterminata	.	.	**	.	.	**		Unidentified cereals
Fagopyrum esculentum	2	48	11	42	36	139		Buckwheat
Fagopyrum esculentum, testa	4	6	4	8	9	31		Buckwheat
Hordeum vulgare, testa	.	.	*	*	.	*		Barley, testa
Hordeum vulgare, rachis fragments	.	.	2	.	.	2		Barley, rachis fragments
Panicum miliaceum	3	.	5	35	5	48		Common millet
Secale cereale, testa	.	.	*	.	.	*		Rye, testa
Triticum aestivum, testa	.	.	.	*	.	*		Bread wheat, testa
Oil and fibre plants							1.4	
Brassica nigra	.	.	.	1	.	1		Black mustard
Camelina sativa	.	1	.	.	.	1		Gold of Pleasure
Cannabis sativa	2	4	6	4	1	17		Hemp
Linum usitatissimum	2	4	6	7	3	22		Flax
Spices and vegetables							0.4	
Juniperus communis	.	.	.	1	.	1		Juniper
Mentha arvensis	.	.	4	3	.	7		Wild mint
Pastinaca sativa	.	.	.	2	.	2		Parsnip
Raphanus sativus var. *sativus*	.	.	.	1	.	1		Radish
Salvia sp.	.	.	1	.	.	1		Sage
Collected berries and fruits							58.4	
Fragaria vesca	14	4	15	12	16	61		Wild strawberry
Rubus fruticosus agg.	1	19	18	3	16	57		Blackberry
Rubus idaeus	50	16	21	25	15	127		Raspberry
Empetrum nigrum	.	1	2	.	1	4		Black crowberry
Prunus cerasus	1	.	5	.	.	6		Sour cherry
Sorbus aucuparia	.	4	2	2	1	9		Rowan
Vaccinium myrtillus	113	1000	105	16	230	1464		Bilberry
Vaccinium myrtillus, berries	1	21	12	1	8	43		Bilberry, berries
Vaccinium sp.	.	.	.	4	.	4		Bilberry/ Cowberry

Continued overleaf

Table 1. *Continued*

Sample No.	1	2	3	4	5			
Volume/litre	2	2	2	2	2			
Context in the latrine	West corner, upper layer of the filling	Middle layer of the filling	Middle layer of the filling	Lower layer, on top of the plank flooring	Lower layer, on top of the plank flooring	Total sum	Ecological group % of total sum	English name
Other useful plants							0.4	
Ficus carica	1	.	2	2	2	7		Fig
Humulus lupulus	2	.	.	2	1	5		Hop
Weeds							24.0	
Agrostemma githago, seeds pieces	**	**	**	**	**	**		Corncockle
Berteroa incana	1	2	3	6	3	15		Hoary alyssum
Bromus secalinus/ hordeaceus	.	.	1	.	.	1		Rye brome
Centaurea cyanus	5	14	15	11	12	57		Cornflower
Chenopodium album	10	.	21	26	13	70		Fat hen
Chenop. glaucum/rubrum	1	.	.	1	.	2		Oak-leaved Goosefoot
Cirsium oleraceum	3	.	1	.	1	5		Cabbage thistle
Conium maculatum	1	.	2	2	1	6		Hemlock
Fallopia convolvulus	8	11	9	20	15	63		Black bindweed
Fumaria officinalis	.	2	.	1	1	4		Common fumitory
Galeopsis ladanum	1	.	9	3	4	17		Red hemp nettle
Galeopsis spec./tetrahit	7	.	2	6	4	19		Large-flowered hemp nettle
Galium spurium	1	.	.	3	1	5		False cleavers
Galium odoratum	.	.	14	11	10	35		Sweetscented bedstraw
Lamium sp.	2	.	.	.	.	2		Deadnettle
Lapsana communis	.	.	5	7	5	17		Nipplewort
Lithospermum arvense	.	1	1	.	1	3		Corn cromwell
Neslia paniculata	5	.	8	4	4	21		Ball mustard
Persicaria lapathifolia	25	27	16	24	19	111		Pale persicaria
Poa annua	.	.	3	.	1	4		Annual poa
Poa pratensis/trivialis	.	1	5	1	2	9		Meadow grass
Poaceae	.	.	6	.	1	7		True grasses
Polygonum aviculare	3	47	3	3	7	63		Knotgrass
Potentilla norvegica	2	.	.	.	.	2		Norwegian cinquefoil
Potentilla recta	7	2	11	.	10	30		Rough-fruited cinquefoil
Raphanus raphanistrum	6	13	15	5	4	43		Wild radish
Rhinanthus sp.	.	.	1	.	.	1		Rattle
Setaria pumila	1	1	6	1	1	10		Yellow bristle grass
Setaria sp.	1	.	.	.	.	1		Bristle grass
Setaria viridis / verticillata -type	.	.	.	5	.	5		Green bristle grass

Table 1. *Continued*

Sample No.	1	2	3	4	5			
Volume/litre	2	2	2	2	2			
Context in the latrine	West corner, upper layer of the filling	Middle layer of the filling	Middle layer of the filling	Lower layer, on top of the plank flooring	Lower layer, on top of the plank flooring	Total sum	Ecological group % of total sum	English name
Sinapis arvensis	.	.	1	.	.	1		Wild mustard
Spergula arvensis	.	10	11	16	9	46		Corn spurrey
Stachys annua	1	.	.	.	.	1		Annual woundwort
Stachys cf. arvensis	3	.	.	2	.	5		Field woundwort
Stachys palustris	1	.	1	3	1	6		Marsh woundwort
Thlaspi arvense	1	1	6	6	5	19		Penny cress
Urtica dioica	3	.	2	.	1	6		Stinging nettle
Urtica urens	2	8	1	1	2	14		Small nettle
Veronica sp.	1	.	1	.	.	2		Speedwell
Meadows and wetlands							6.3	
Andromeda polifolia	.	.	1	.	.	1		Marsh andromeda
Carex acuta – type	3	.	3	1	2	9		Tufted sedge
Carex ovalis	4	.	.	.	.	4		Oval sedge
Eleocharis palustris	.	.	1	.	.	1		Spike rush
Festuca pratensis	.	3	7	45	21	76		Meadow fescue
Ranunculus acris – type	1	.	.	1	.	2		Meadow buttercup
Rumex acetosella	5	1	5	5	2	18		Sheep's sorrel
Silene latifolia	.	.	.	1	.	1		White campion
Silene vulgaris	13	12	21	15	16	77		Bladder campion
Oxalis acetosella	.	.	1	.	.	1		Wood sorrel
Other plant remains							1.8	
Malva cf. *alcea*	1	.	.	.	.	1		Malva
Picea abies, needle	5	4	19	2	2	32		Norway spruce
Unidentified seeds	2	3	12	4	2	23		Unidentified seeds
Straw, grass	.	.	.	**	**	**		Straw, grass
Leaf	.	.	*	.	.	*		Leaf
Sawdust	.	.	*	.	**	.		Sawdust
Mosses	.	.	*	**	*	.		Mosses
Charcoal	.	.	*	.	*	*		Charcoal
Total sum	333	1291	472	413	527	3036	100.0	
	+	+	+	+	+	+		
Other remains								
Unburned bone	.	*	.	.	*	*		Unburned bone
Hair/fur	***	.	**	**	*	.		Hair/fur
Fish bones	*	**	*	**	**	.		Fish bones
Lumbricus terrestris, cocoons	.	.	**	**	*	.		Earthworm cocoons
Insecta	***	**	*	*	**	.		Insects
Rope fragment	.	.	*	.	.	*		Rope

Fig. 5. Glumes of common millet. Photo by Mikael Kukkonen. The University of Turku, Herbarium.

A seed of sage (*Salvia officinalis*) (Fig. 6) and seeds of wild mint (*Mentha arvensis*) were found from the latrine in Ruotsinsalmi. Among the possible spices a single seed of juniper (*Juniperus communis*) found from the latrine can also be mentioned. Seeds of parsnip (*Pastinaca sativa*) and radish (*Raphanus sativus* var. *sativus*) are the only vegetables found in Ruotsinsalmi.

Fig. 6. A seed of sage. Photo by Mikael Kukkonen. The University of Turku, Herbarium.

The archaeobotanical material from Ruotsinsalmi mainly consists of collected wild berries which grow naturally in the local area, such as bilberry (*Vaccinium myrtillus*), wild strawberry (*Fragaria vesca*), raspberry (*Rubus idaeus*), and black crowberry (*Empetrum nigrum*). Blackberries (*Rubus fruticosus*) were also very common, but the species does not grow in Finland. Bilberry was the most abundant berry in the latrine with more than one thousand seeds. Whole berries were also found. Fruits are present in the form of a few stones of sour cherry (*Prunus cerasus*). Other

useful plants were the seeds of figs (*Ficus carica*) and the fruits of hop (*Humulus lupulus*), which were found in very small quantities.

Remains of wild taxa, such as pale persicaria (*Persicaria lapathifolia*), knotgrass (*Polygonum aviculare*), wild radish (*Raphanus raphanistrum*), bladder campion (*Silene vulgaris*), and corn spurrey (*Spergula arvensis*) were the most common weeds in the latrine samples and presumably stem from the surrounding disturbed habitats at the sea fortress. Nitrogenous places are indicated by the presence of stinging nettle (*Urtica dioica*) and small nettle (*Urtica urens*). Identified crop weeds were corncockle (*Agrostemma githago*), cornflower (*Centaurea cyanus*), bromes (*Bromus* sp.) and corn gromwell (*Lithospermum arvense*), as well as ball-mustard (*Neslia paniculata*) (Fig. 7). Among the uncultivated plants are the seeds of hoary alyssum (*Berteroa incana*) and several different species of sedges (*Carex* sp.).

Fig. 7. Seeds of ball-mustard. Photo by Mikael Kukkonen. The University of Turku, Herbarium.

A large amount of small fish bones and scales were also collected from the latrine samples, as well as remains of insects, earthworm cocoons, fragments of hair or fur, fibres, wood chips, twigs, grass, and sawdust.

Discussion

Preservation of the latrine's plant material is excellent, and the data can be connected to the diet of the soldiers at the fortress. New information has been obtained from old occupation layers, underground constructions and structures. This information sheds light on the material culture, cultural contacts and everyday life in the Ruotsinsalmi military base and civilian community (e.g. Hakanpää 2006; Koivisto 2007; Kykyri 2005; 2010; 2013a; 2014a; 2014c; 2016).

Archaeological studies within the 18th century harbour area have been rare (Kykyri 2012; 2013a, 48 ff.), and the discovery of the remains of an infantry barracks and a log latrine with cultural layers and archaeological finds in 2013 was thus an important supplement to the data related to the history of the sea fortress.

Alongside the archaeological research, animal bone analysis (Mannermaa 2007; Kivikero 2012; 2013; Bläuer 2014) and archaeobotanical analysis (Lempiäinen, T. 2006; 2007b; Lempiäinen-Avci 2012; 2014) have also been carried out with

material and samples from a number of excavations. The archaeobotanical results from Ruotsinsalmi had, however, been modest before the latrine container was excavated in 2013. Analysis of the latrine has finally given long awaited information on the diet and food production of the inhabitants of the former sea fortress. Archaeobotanical data and historical sources give valuable information about daily life at the fortress.

According to historical sources, Russian merchants Fjodor Larkin, Jakov and Gavril Vavulin delivered large amounts of food to the sea fortress of Ruotsinsalmi. Their merchandise consisted mainly of Russian products, but also of imported spices and luxuries. The agricultural products were mainly imported from St. Petersburg and the Baltic countries (Kauppi 1993, 55 ff.). The inhabitants of the Ruotsinsalmi sea fortress were mostly Russian soldiers who moved there with their families, so the sea fortress acquired plenty of influences from Russia (Harjunpää 1978, 90).

The botanical species identified from the latrine are mostly weeds which are derived from the local vegetation in Ruotsinsalmi area. Some of the plant species are imported from Russia and from the Mediterranean area. Plant remains found from the latrine are discussed below as relates to their archaeological significance, usage and origin.

Buckwheat and cereals

Achenes of buckwheat (*Fagopyrum esculentum*) has previously been found from two sites in Finland, namely in Turku from 13th century and in Hämeenlinna from 16th century layers (Onnela 2004, 70; Lempiäinen T. 2007a, 105). However, buckwheat pollen grain found in Finland has been dated already to 5300 BC, and the result indicates signs of cultivation (Alenius et al. 2013, 17).

The first archaeobotanical evidence of buckwheat in Estonia has been recorded from 13th–14th century layers in Tallinn (Sillasoo & Hiie 2007, 80). In other parts of Europe, the achenes of buckwheat also regularly appear in medieval culture layers (cf. Alsleben 2007, 23; Latalowa et al. 2007, 51).

Buckwheat has a very high nutritional value, so it keeps hunger away for a long time. It is also easy to cultivate and was a relatively cheap food. It was therefore popular among the poor, seamen (Alsleben 2007, 3; Latalowa et al. 2007, 51) and evidently also soldiers (according to the data from the Ruotsinsalmi sea fortress). Buckwheat was used in everyday cooking, in porridges and as flour. It was most commonly used in the form of groats whereas flours were used less (Elfving 1906, 37).

Buckwheat has never been very commonly cultivated in Finland, and in the 1800s it was cultivated only in the traditional slash and burn area in eastern Finland (Soininen 1974, 174). In Estonia, Poland, Russia and Ukraine the cultivation of buckwheat has been very common and even today it is produced in enormous quantities (Rousi 1997, 113).

The glumes of common millet (*Panicum miliaceum*) were a remarkable find, as it has not been found before in Finland. In Estonia remains of common millet are frequently found from the medieval layers of Tallinn and Tartu (Sillasoo & Hiie 2007, 78 ff.), and common millet is also frequently present in other parts of Europe in layers from medieval up to modern times (Rösch 1998, 117; Latalowa et al. 2007, 51). Millet was used in the form of coarse groats and flour, and it has been a staple food of poor people. Remains of common millet are a sign of import, because millet has never grown in Finland due to cool growing conditions.

Latalowa et al. (2007, 50) mention that in Poland bristle grass seeds (genus Setaria) have been found more frequently than common millet, and this could indicate the cultivation of bristle grasses. Moreover, in Estonia bristle grasses are considered old crops (Sillasoo & Hiie 2007, 82). In Ruotsinsalmi bristle grass seeds are present in very small quantities, and it can be assumed that they represent weeds from the millet fields. Green bristle grass (*Setaria viridis*), yellow bristle grass (*Setaria pumila*), and cockspur (*Echinochloa grus-galli*) do not belong to the original Finnish flora. According to Laine (1988, 92), at least green bristle grass and cockspur are nowadays growing in the Kotka area, but these species most probably originate from the heydays of the sea fortress in the 1790s.

Remains of all four Finnish cereal species – barley (*Hordeum vulgare*), oat (*Avena sativa*), rye (*Secale cereale*), and wheat (*Triticum aestivum*) – were only present in the samples in very small quantities in the form of testa. These may be the remains of grains used in porridge or added to the dough when baking bread. However, the small amount of these cereals does not mean that they were not consumed regularly. The high frequency of buckwheat and common millet compared to Finnish cereals can be explained with the different usage of the plants.

As Alsleben (2007, 20) has noted, only those cereals where whole grains were used to prepare, for example gruel and porridge, or were put into soup, left identifiable remains in samples. Cereals which were used to bake bread had already been processed into flour and therefore there are no identifiable remains left. This is also the case in the material derived from Ruotsinsalmi, where the occurrence of buckwheat, common millet and Finnish cereals largely depends on how the particular plant was used and how the food was prepared. Therefore, it is not possible to estimate which was the most important plant in the everyday diet of the soldiers of Ruotsinsalmi.

Oil and fibre plants

Flax (*Linum usitatissimum*), hemp (*Cannabis sativa*), gold of pleasure (*Camelina sativa*) and black mustard (*Brassica nigra*) were commonly used for pressing oil, but they were also widely used as ingredients in food and medicine, and therefore they are often present in medieval latrine material (Wiethold 1995, 377; Alsleben 2007, 52). Both flax and hemp are also important sources of raw material for fibre production. Flax was cultivated in Finland, but seeds and fibres

were also bought from Tallinn whereas hemp was mainly traded as processed fibres (Lempiäinen, T. 2007a, 106). To note, gold of pleasure also grew as a weed in flax fields and may have ended to the latrine alongside with the flax seeds. Black mustard may also be a weed, because it grows in disturbed places.

Spices and vegetables

Leafy herbs stand no chance of being preserved as they pass through the human digestive system, whereas the seeds of aromatic herbs and spices tend to remain intact and are very common in latrine samples (Wiethold 1995, 379; Alsleben 2007, 27). Sage (*Salvia officinalis*) and wild mint (*Mentha arvensis*) found from Ruotsinsalmi may indicate the usage of these plants for medicinal purposes or tea. Sage is one of the oldest medicines used in the world. It originates from the Mediterranean area and the seeds of sage indicate trade. In the 17th and 18th centuries sage was used to make tea, and it was more popular than normal black tea. Sage has been present in many medieval layers around the Baltic Sea in Sweden, Estonia, Germany and Poland (Häkkinen & Lempiäinen 2011, 115), but has not earlier been found from medieval layers in Finland. Wild mint is very common and grows naturally in damp habitats as well as in disturbed habitat. Therefore, the remains of wild mint could have ended up in the latrine with other weeds and the remains are not necessarily connected to any kind of use of the plant itself. Dried seed cones of juniper could have been used as a spice, as juniper cones are still commonly used in the Nordic countries to flavour meat, also beer and alcohol.

Vegetables are usually poorly present in archaeobotanical material. The vegetative parts of the plants are consumed, and they are often harvested before flowering and the setting of seed, so there is little chance for preservation of the seeds (Latalowa et al. 2007, 53). Diaspores of parsnip (*Pastinaca sativa*) and radish (*Raphanus sativus* var. *sativus*) found from the latrine in Ruotsinsalmi may originate from cultivated plants or from plants growing naturally in meadows and disturbed habitats. Parsnip is a fairly common find in medieval layers, and parsnip seeds were e.g. recovered frequently near Turku, in Kuusisto at the site of the Roman Catholic bishop's castle (Lempiäinen, T. 2007a, 107). Radish is a rather late arrival in vegetable gardens: it is known to be present in Europe from the 16th century onwards and in Finland it is known from the garden of Åbo Akademi in the 17th century (Rousi 1997, 211). Parsnip and radish may have been waste derived from cabbage garden alongside with some other weeds.

Collected berries and fruits

Berries are very often found in archeological layers as they constituted an important resource collected from the wild (Lempiäinen, T. 2007a, 109), and they play a major role in Ruotsinsalmi. The abundance of berries and

fruits in the samples proves that they were a very important part of the diet. They were used to produce juice, jam and compote and were eaten fresh. Bilberry (*Vaccinium myrtillus*) is common throughout Finland in forests, and therefore it is not surprising that it occurs in large quantities in the samples from the latrine.

The earliest findings of sour cherry (*Prunus cerasus*) from Finland are from the medieval layers of Turku (Lempiäinen, M. 2006). Sour cherry has never been very popular in Finland, but in Russia it has a long cultivation history. Due to its acid taste, sour cherry has been used in compotes and to flavour alcohol drinks, but fresh fruits were also eaten. According to Rousi (1997, 271), sour cherry has only been cultivated in Finland from the 17th century onwards. Therefore, the sour cherry stones found from Ruotsinsalmi could have been grown locally and used as fresh fruits, or imported for example from Russia as a cherry preserve, judging by the stones found in the latrine. Russian cherry preserve (Ru. *vishnevoe varenye*) typically includes the stones, and is widely preferred in this form in Russia (http://russianfood-ie.com/russian-sour-cherry-preserve/). Among the collected berries rowan seeds (*Sorbus aucuparia*) found in the latrine in Ruotsinsalmi can also be mentioned.

Other useful plants

Fig (*Ficus carica*) seeds indicate trade as the plant grows in temperate areas. Fig seeds are very common remains found from medieval times onwards in all European countries, and though the fig has always had the status of a luxury food, it also occurs regularly in the contexts of lower class inhabitants of the society (Alsleben 2007, 30). According to Ranta (1984, 45), the consumption of other imported goods such as tobacco, sugar, coffee and tea was substantial in Ruotsinsalmi fortress, so the figs were most probably also a consumed delicacy.

Hops (*Humulus lupulus*) were mainly used in flavouring beer and as a beer preservative. It is well known that soldiers consumed several litres of beer a day in the army, as the food was very salty (Hårdstedt 2007, 112). From early medieval times onwards archaeobotanical remains of hops are very common in Europe (Behre 1998, 41), and since at least the 15th century hop beer has been a daily consumed beverage in the whole of Europe (cf. Alsleben 2007, 21 f.). Beer was produced locally in Ruotsinsalmi sea fortress since at least 1798, when the Russian peasant Pjotr Ivanovits Sinebrjukov founded a canteen and began brewing beer for the workers building a fort, and for the troops stationed there (Bonsdorff 1997, 53). Despite the fact that only a small amount of hops were found from the latrine in Ruotsinsalmi, it can be assumed, that these remains were connected to beer brewing as the waste was spread everywhere in the fortress area. Most likely the majority of beer brewing waste was dumped somewhere else than in the latrine.

Uncultivated plants

It can be assumed that a large number of plant seeds from disturbed habitats, meadows and damp habitats ended up in the latrine with waste and rubbish, or as desiccants to soften the smell.

It should be noted that corncockle (*Agrostemma githago*), cornflower (*Centaurea cyanus*), brome (*Bromus secalinus*/*hordeaceus*), corn gromwell (*Lithospermum arvense*) and ball-mustard (*Neslia paniculata*) are all considered winter-crop weeds (cf. Lempiäinen, T. 2007a, 110). As Wiethold (1995, 381) has noted, they were thrown with kitchen waste into the latrine or chewed with cereals and preserved in faecal remains. Nowadays corncockle is extinct and the others are extremely rare in Finland.

The remains of hoary alyssum (*Berteroa incana*) are very characteristic of the sea fortress. This species spread to Finland during the 18th century with the Russian army, when cereals and fodder were transported from Russia to Finland. Hoary alyssum is considered a Russian origin newcomer to the Finnish flora (Laine1993, 97).

Meadow plants and plants of damp habitats may derive from the surrounding meadows and shores of the sea fortress. Plant species from meadows could have ended up in the latrine along with the remnants of straw or animal fodder or stable dung.

Other remains

The faeces were also mixed with wood chips, twigs, grass and sawdust which could have been used as desiccant in the latrine or they did not relate to the latrine directly. Remains of wood chips and sawdust may be waste also from e.g. woodworking, while grass and twigs, as well as fur and hairs may have ended up in the latrine container from stable dung.

Fish bones most likely originate from the faecal material, as they are from small fishes as herring and perch, which could have been eaten with bones (Bläuer 2014). However, part of the bone material within the latrine can also originate from kitchen waste.

Conclusions

The archaeological excavations and surveys of the last decade on the Island of Kotkansaari have greatly increased our knowledge of the history of the Ruotsinsalmi fortress. One of the most significant archaeological finds within the investigated area was the latrine, where a well-preserved organic fill was revealed. Moreover, the fill turned out to be a real archaeobotanical “treasure box”.

Archaeobotanical analysis from the latrine in Ruotsinsalmi sea fortress gave unique results, including direct evidence of the fortress’s diet and the origins of its food. The results show that local food resources played a minor role, with the

diet mainly influenced by Russian food traditions. For instance, *Panicum miliaceum* played an important role in the diet. However, despite the small appearance in the samples, cereals must have played an important role in the diet as well. Berries and some cultivated crops most probably had a local origin, coming from the forests and fields of the Kotka area. These berries and crops were presumably bought from local peasants and merchants. Several foods, including at least millet, sour cherries, black berries, cereals, buckwheat, spices and figs were traded from Russia or other countries by the Russian merchants at the fortress. Beer was brewed locally, although it is unknown whether the hops were grown locally or traded from abroad to Ruotsinsalmi.

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RUOTSINSALMI 18. SAJANDI MEREKINDLUS KOTKANSAAREL SOOMES: PALKLATRIINI ARHEOLOOGILISED JA ARHEOBOTAANILISED LEIUD

Resümee

Ruotsinsalmi merekindlus ehitati 1790. aastatel Kotkansaarele (Soome) ja mõnele väiksemale naabersaarele keisrinna Katariina Suure käsul. Rootsi-Vene sõda aastail 1788–1790 oli näidanud, et Vene kindlustused Kagu-Soomes vajasid märkimisväärset tugevdamist. Eesmärgiga kindlustada Sankt-Peterburgi kaitset ehitati sellega piirnevatel aladel välja kindlustuste süsteem, milles Ruotsinsalmi merekindlus moodustas kõige lõunapoolsema baasi.

Ruotsinsalmi merekindlusest kujunes praeguse Kotka linna (asustatud 1878. aastal) eelkäija. Viimase kümnendi jooksul on Kotkansaarel läbi viidud ligi kakskümmend arheoloogilist uuringut, mis on heitnud uut valgust saare ajaloole, kuid lisanud seni õige vähe meie teadmistele merekindluse igapäevaelu kohta.

Ruotsinsalmi merekindluse arheoloogilised kaevamised 2013. aasta suvel (Kymenlaakso muuseum) tõid päevavalgele jalaväebarakkide jääned koos hästi

säilinud palkidest latriini ehk käimlaga. Puitraamistiku sein oli säilinud kaheksa kihi (1,5 m) kõrguselt. See oli ehitatud töötlemata ümarpalkidest, mille otstesse olid raiutud tapid, põhjaks olid asetatud taladele toetuvad tahutud palgid. Ehitusjäänuse alumine osa oli täidetud 60 cm paksuselt tumepruuni kihiga, mis koosnes inimese väljaheidetest. Viimaseid uuriti arheobotaaniliselt, et välja selgitada kõnealuste inimeste toitumus ja saada merekindluses kasutatud toiduainetest detailne ülevaade.

Vettinud väljaheited olid rikkad inimese seedekulgla läbinud mitmesuguste seemnete ja taimejäänuste poolest. Kõige tavalisemaks põlluviljaks Ruotsinsalmis osutus tatar, sellele järgnes harilik hirss. Väikestes kogustes on esindatud ka oder, kaer, rukis ja nisu. Latriinis avastati aga ka lina-, kanepi-, tudra- ja musta sinepi seemneid. Leitud marjad on metsamarjad, nagu mustikas, metsmaasikas, vaarikas, must kukemari ja põldmurakas. Kõige sagedasem neist oli mustikas, leiti nii terveid marju kui ka üle tuhande seemne. Väga väikestes kogustes esines veel mitmeid teisigi (kirss, humal, piparmünt, viigimari).

Tulemused näitavad, et kohapealsed taimed polnud toidulaual olulised, samas olid ülekaalus Vene toidutraditsioonid. Olulisel kohal oli näiteks harilik hirss. Kohalikku päritolu olid Kotka metsadest pärit marjad ja mõned ümbruskonna põldudel kasvatatud viljad, mida tõenäoliselt hangiti kohalikelt kaupmeestelt ning talunikelt. Paljud toiduained, nagu hirss, teraviljad, tatar, põldmurakas, viigimarjad, maitseained jt, toodi nähtavasti Venemaalt või vene kaupmeeste poolt teistelt maadelt. Õlut pruuliti küll kohapeal, aga ei ole teada, kas humalat kasvatati Ruotsinsalmis või toodi mujalt sisse.

Kuna latriinides on ideaalsed säilimistingimused, on suur osa bioloogilisest ainesest, nagu seemned ja viljad, säilinud. Sinna on visatud ka majapidamisjäätmeid, loomasõnnikut jms. Kõik see teeb arheoloogilistest latriinidest suurepärased allikad mineviku toitumise ja jäätmekäitluse, mõistagi ka ümbruse looduskeskkonna uurimiseks.