# Dirt, dung and sanitation in the medieval Turku

## - (Mis)Conceptions of medieval sanitation

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Quite often the popularizations about medieval towns are characterised by dirt and disorder. The prevailing general conceptions are based rather on ideas and interpretations about the medieval way of life than studies and analysed evidence related to the time period in question. Therefore, more studies and discussion about the topic are needed to change the conceptions unless they are based on limited and one-sided evidence. The focus of this paper is on the sanitary conditions of the medieval Turku. I am presenting the findings and measures, which aimed at improving the sanitation not only in the town of Turku but in other towns in the North as well. These findings demonstrate that people in Turku had both will and ability to take care of their living environment and to increase the comfort of their living quarters in many ways. Furthermore, I am discussing the concept of waste and call for more comprehensive and detailed studies about environmental conditions in medieval towns to create the reliable basis for conceptual change beyond academic circles, too.

*"People threw their rubbish out of the windows at 10 o'clock at night, shouting the warning 'Gardyloo' (from the French 'prenez garde a l'eau' – watch out for the water). Passers-by shouted 'Haud yir haunde! to protect themselves from the unpleasant shower!"*

This is how Edward Topham, an English journalist and playwright described the people's life in Edinburgh in 1775. Today, the text can be found in the People's Story Museum, which presents the lives of ordinary people in Edinburgh from the late 18th century until modern times[1]. Although Topham described the prevailing situ-



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ation in Edinburgh in the late 18th century, the same kind of behaviour has been considered quite usual in the Middle Ages already and in the Nordic countries, too.

At least one history textbook used in Finnish schools today give the students the following information about the medieval sanitation:

> *There were no toilets in medieval cities and people peed and pooped on streets and into the river. There were no sewers and therefore the streets were covered with waste. Because of leavings and waste, the smell was terrible and diseases spread fast. There were bathhouses and saunas, but they were not visited and people did not wash themselves. Actually, bathing was considered unhealthy and knights who washed themselves were mocked. Because of poor hygiene, people and their clothes smelled bad.*
>
> *(Selected sentences from Päivärinta, Solastie & Turtiainen 2012, translations Seppänen).*[2]

According to the publisher, the textbook provides the students with unforgettable stories enabling them to enter the events of the past and to act as researchers solving the mysteries of the history. As an historian and archaeologist having studied medieval cites, I can be nothing but amazed about the knowledge of the authors of these textbooks. Where do they get their information from and what their interpretations about the past are based on?

Perceptions of poor sanitation in medieval cities have been based partly on preserved town laws including instructions and regulations about the sanitation of the town. Quite often, these laws and instructions have been interpreted as attempts to improve the sanitary conditions of a dirty town (Beronius Jörpeland & Beck 2001, p. 323). However, we need to ask whether there were laws and rules before the actions they were made to control or were the laws drawn when they were considered necessary for keeping the order and favourable conditions. Although, the laws and statutes probably aimed at improving sanitary conditions and reflect the ideas of the time, they do not reveal the real level of sanitation or the lack of it in the medieval cities.

Furthermore, it seems, that in the shortage of contemporary descriptions of the time, the written sources from later periods have been used in a quite straightforward manner to describe the life in the Middle Ages, too. Conceptions about the continuous progression and development of mankind support the ideas that the farther we go back in time, the less people paid attention to the sanitation, environment and personal hygiene. The interpretations related to poor / non-existent sanitation in the Middle Ages have been supported by ideas, according to which it was not until at the end of the 19th and early 20th century when



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the relation between the health and hygienic conditions of the environment was universally understood (Beronius Jörpeland & Beck 2001, p. 323).

Although there is plenty of evidence about medieval waste management, the prevailing conceptions about the medieval and early modern towns (especially concerning the ones that located on the fringes of the European civilisation) are characterised by dirt and disorder. These images are supported by many popularisations including films, books, exhibitions and medieval events of different kinds. However, one would expect that the education would be based on research and knowledge instead of general conceptions – no matter how established they are. It seems that what and how teachers teach is linked to what it is they believe (See e.g. Liljedahl 2011). Teachers' beliefs can be difficult to change and it is not my aim even to try to do that with this paper. By analysing the existent evidence related to the sanitation in the medieval Turku, I rather try to create a basis for further studies and to raise discussion about the possibilities to challenge the prevailing (mis)conceptions about urban environment and medieval sanitation.

## Waste disposal, latrines and rubbish pits

The mid 14th century seems to have meant a general turning point in waste management in northern Europe. Probably, this was caused by the Black Death and understanding about the connection between rats and spreading of the plague. Controlling the amount of waste affected the population of rats in urban areas and as the result diseases were prevented and the wellbeing of inhabitants was promoted in many ways. The growth of urban population and increased density of habitation could have catalysed the more organized waste management already prior to the Black Death. In Scandinavia and in Northern Europe, there is evidence of more systematic waste management already from the 13th century (Beronius Jörpeland & Bäck 2001, p. 329; Gläser 2004b, p. 190; Jørgensen 2008, p. 563; Seppänen 2012b, p. 944–947; Skov 2004, p. 560; Westholm 2001).

According to the present knowledge, Turku was not established before the turn of the 13th and 14th century. The evidence related to the first decades of Turku is very limited. It is quite possible, that simple unfurnished cesspits and latrines were used at this phase but they have not been identified in excavations. The town started to grow in the 1360s when the town expanded in all directions (Seppänen 2009; 2016). Possibly, the growth of population caused the need to think about waste management in urban environment in Turku, too, since the earliest latrines were from the period when the town experienced a rapid growth. All latrines were



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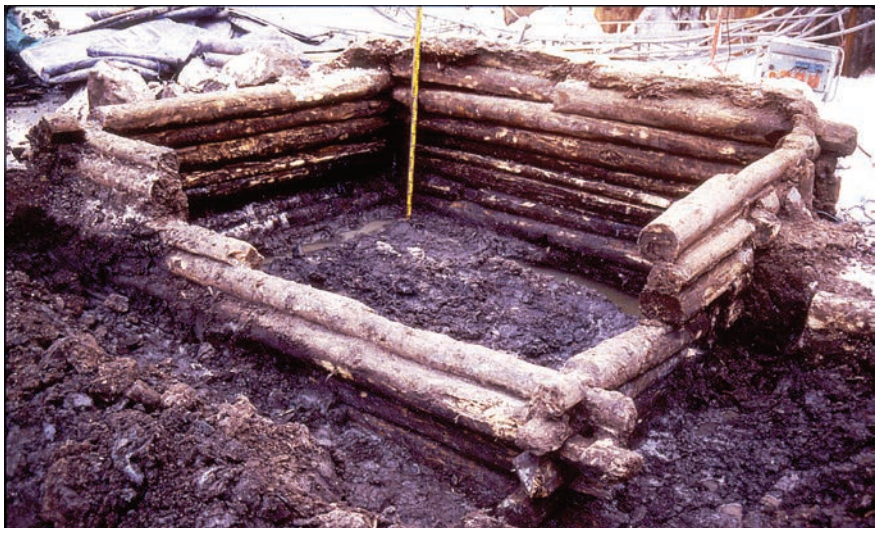


*Figure 1. This construction was used as a latrine at the end of the 14th century before it became a foundation for a privy built partly on top of it (see Fig.3). The missing logs in front of the frame indicate the place of the younger privy (Seppänen 2012b, p. 476, original photo: The Museum Centre of Turku.).*

made of wood with the maximum size of 10 m2. The height of latrines is more difficult to estimate, since only the foundations have been preserved. Normally, the latrines have located either near the buildings, on the backyard or inside the houses. Some of the latrines have been placed so that they could have been served for two adjacent plots. Comparative material and written sources from other countries indicate that the biggest latrines were in public use (Gläser 2004a).

There were many different kinds of latrines: A latrine could have been a simple pit, which may have been lined with timber, stones or bricks. Quite often, privies, old abandoned wells, barrels and also foundations of ruined buildings have been used as latrines, too (Fig. 1). Therefore, latrines cannot be defined by their constructional features but with artefactual and ecofactual contents of the filling layers. Generally, latrines contain material like broken glass and construction waste, which could not be reused, but considered unwanted and even dangerous in everyday environment. Sometimes latrines may contain single finds, which were not waste but have ended up in these containers unintentionally and by accident like toys, rings, belts and purses.

Until present, less than ten latrines have been found in excavations in Turku. The number is quite low, if we compare the figure with the number of latrines found in the neighbouring countries. For example, at least 35 medieval latrines have been found in Tartu (Bernotas 2008, p. 16; Tvauri & Utt, 2007, p. 143). In Bergen, the number of



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medieval latrines is nearly 50 (Øye 2004, p. 524–525). From Visby, there is evidence from 70–80 latrine chambers inside the masonry houses some of which can be dated to the 13th century (Westholm 2001, p. 254–255).

The low frequency and limited number of latrines found in Turku can be explained by the coverage of archaeological excavations. It is quite possible, that the latrines have been situated mainly in areas which have not yet been excavated extensively. Until today, there have been only four large scale excavations in the medieval town area of Turku covering about 1000 m2 each. However, sometimes not even big excavations do reveal any latrines. For example, in Vadstena in Sweden, the excavations in Sanden area covered approximately 4000 m2 and not a single latrine was found in this area. However, the minimal amount of waste in this area gave a good reason to believe that waste was collected somewhere else, possibly outside the city centre (Tagesson 2000, p. 170).

It is quite possible that latrines have been concentrated in certain areas. For example, in the old centre of Tartu, in Estonia, six latrines from the 14th, 15th and 16th centuries were found in an area covering only 115 m2. This kind of frequency of latrines in such a limited area refers to systematic waste collection in specifically selected areas that were reserved for this purpose in order to avoid polluting larger areas of the town. Sometimes a new latrine was build inside the older one, which refers to the concentration and continuation of waste management in the same areas (Mäesalu 2004, p. 399).

One possibility is that the majority of latrines, especially the ones meant for public use, were placed outside the city centre. Unfortunately, there have been no archaeological excavations or archaeological surveys in connection with construction and development projects outside the medieval and early modern town borders in Turku. Therefore, it is quite likely that some information related to the use of the surrounding environment has already been lost.

Although, the number of discovered latrines is low in Turku, the small fragmentation of non-organic material and concentration of waste to certain layers refer to systematic sanitation and waste management. Generally, the shards of ceramics, glass, stove tiles etc. are found in abandoned constructions like cellars, foundations and wells where they did not cause any harm for people and animals. On the other hand, organic waste material (like broken wooden dishes, stave vessels, textiles and leather waste) are found on squares, streets and yards as well as in foundations of the buildings where they have been utilized as adsorbent material. Furthermore, the contents of some latrines found in Turku indicate that rubbish and waste was separated from human



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*Figure 2. The location of Mätäjärvi has been marked with a circle and texture on the oldest map of Turku from the 1630s. On this map, there is no visible evidence of the lake and the only reference to the lake is the name of the hill (Mätäjärvi hill) on the south side of the marked area. The map does not provide any information about the medieval brooks either. Map: National archives of Finland (modifications made by the author).*

and animal excreta, which could have been used as manure in fields (Seppänen 2012b, p. 867, 872). When waste is used intentionally for fertilisation and as fill, insulation and absorbent material, it meets the criteria for recyclable waste and useful material and cannot be considered just waste any longer.

The dampness of the soil must have been a real problem in Turku in the Middle Ages. The town was founded on the clayey banks of Aura River, surrounded by many hills on both sides of the river. Furthermore, there was a small lake (Mätäjärvi) in the northeastern part of the town, on the outskirts of Mätäjärvi quarter (Fig. 2). The lake is mentioned in medieval written sources only twice, in 1423 and in 1465, as a landmark defining plots, but otherwise there is no information of its size, use or condition (REA 407, 604). The lake was connected to the Aura River by two small brooks that ran through the central parts of the city. There are several mentions about the brooks in the medieval sources and in older archaeologi-



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cal excavations some observations of the brooks have been made but without proper documentation and soil analysis. Due to the limited information, the excact course of the brooks is still unknown. The lake did not exist at the end of the 17th century when this area was described as marshy and damp and efforts were taken to harden and solidify the soil with stones and gravel (Juslenius 2005, p. 14–15; Kostet 1989, p. 22).

Unlike Turku, the town of Vyborg in the eastern part of the realm was built on uneven bedrock. In excavations, archaeologists have made a discovery that the biggest pits in the bedrock, which have collected dampness, meltwater and rainwater, have been lined with timber frames and used as cesspits for manure and waste in the Middle Ages. Possibly, in Turku too waste was used to absorb the excessive water and moisture from the soil. In a couple of documents from 1538 and 1540, the people in Vyborg appealed to King Gustavus Vasa and asked him for help in improving the sanitary conditions of the town. In 1555, the king visited Vyborg and ordered that all dung should be removed from the town area and wet pits on the rock surface must be filled with sand and stones instead of waste (Saksa et al. 2002, p. 48).

Possibly the latrines were emptied from dung and waste in Turku, too, since the latrines found in excavations did not actually contain much find material or other kind of waste, but they were filled with construction waste like mortar, broken bricks, sand and soil. Otherwise, there is no clear evidence from Turku that latrines have been emptied in the Middle Ages. In Scandinavia, however, there is evidence of systematic emptying of latrines from the Early Modern Period. Since some of the latrines have been found empty they could have been emptied in the Middle Ages too. In Visby, the medieval latrine chambers were provided with hatches, which indicates that emptying of latrines was considered already when they were made (Tagesson 2000, p. 170; Westholm 2001, p. 255, 257). In Tartu, there is both archaeological and written evidence about the emptying of the latrines from the 14th century onwards. Generally, the owner of the latrine was responsible for its maintaining and emptying. Consequently, the authorities of the town shared the responsibility for maintaining public latrines (Bernotas 2008, p. 25; Westholm 2001, p. 260–261). There is written evidence related to some towns demonstrating that the contents of the latrines were transported and spread outside the urban area (Anund 2004, p. 440; Beronius Jörpeland & Bäck 2001, p. 329; Westholm 2001, p. 260). Therefore, it would be very useful to extend archaeological observations and excavations beyond medieval town borders in Turku, too.

One explanation for the low number of latrines in Turku might be the availability of running water



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inside the urban area. It is quite possible that Aura River was used as the biggest latrine in the medieval Turku. Even today, despite all awareness and actions related to sanitation, the river seems to be a dumping area and refuse pit for some people. In the Middle Ages, the abovementioned Mätäjärvi Lake on the fringes of the town area could have provided a suitable dumping area for waste too. Even the name of the lake, Mätäjärvi ("Putrid lake"), refers to this use. There were small excavations in the area of the lake in 1975 and 1982 and according to paleolimnological analysis conducted in the early 1980s, the lake was polluted already in the mid 13th century, prior to the establishment of the town of Turku. By the 16th century the lake had turned into a damp wasteland probably used as rubbish dump by the citizens of Turku (Salonen, Räsänen & Terho 1989, p. 172–173, see also Fig 2).

## Privies providing tell-tale evidence

Besides latrines, medieval sanitation and especially personal hygiene are often combined with the availability of privies in urban environment. In many studies, latrines are equalled with privies, since quite often they were used for the same purpose and it might be difficult to distinguish any difference between these constructions. If conclusions about the sanitation in the medieval Turku were made exclusively on the basis of the frequency of privies, we would have to admit that the sanitation



*Figure 3. This timber framed privy found in Turku was built at the end of the 14th or early 15th century. The size of the privy was c. 5 m2 and it contained a seat meant at least for two people. The privy was probably emptied prior to its abandonment at the end of the Middle Ages since the soil inside did not contain manure (Seppänen 2012b, p. 432, original photo: The Museum Centre of Turku).*



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level with only a couple of privies was really low. However, we cannot make conclusions about the whole town on the basis of a few excavated areas alone. Although there have been a couple of larger excavations, the excavated areas reaching the medieval layers have usually been small in size revealing only parts of constructions, that are not easy to identify. Furthermore, it is not easy to distinguish privies from latrines and from other small constructions unless there is clear evidence about their use (Fig. 3). We also need to remember that wooden privies were light constructions, which were easy to demolish without leaving visible remains when new constructions were built in the same area.

By now, the oldest privies in Turku are dated to the end of the 14th century or early 15th century (Seppänen 2012b, p. 874). However, this does not mean that there were no privies earlier. In Turku, the archaeological evidence from the 14th century is still very limited and the situation may change if excavations will be carried out in the urban area that was inhabited at that time. It is quite likely that latrines, cesspits and manure pits have been used as privies, too when covered with simple seats or provided with a spar. In the medieval Oslo, for example, the majority of the privies were simple cesspits of these kinds without specific constructions (Beronius Jörpeland & Bäck 2001, p. 328).

Privies found in Turku have been situated quite close to the buildings. In some cases, they could have served two different households and plots (Seppänen 2012b, p. 874–876). According to the medieval town law by King Magnus Erikson in the mid 14th century, the minimum distant between a privy and neighbouring house and adjacent street should have been three feet at the minimum. On the other hand, the town law in Visby defined that the distance between a privy and a stone building needed to be at least five feet (Beronius Jörpeland & Bäck 2001, p. 327; Holmbäck & Wessen 1966, p. 87). Despite the differences related to distances, both these two laws suggest that medieval privies could have been placed quite close to the buildings.

In masonry buildings, privies were probably attached to the buildings as overhanging extensions or built-in closets. In Turku, only the cellars and basements of masonry buildings have been preserved and therefore we cannot make conclusions about the possible privies located on the upper floors. There is evidence of privies in Turku Castle, but we don't have any reliable information about the construction time of the first privies inside the castle.

## Single sewers or evidence of sewage systems?

It is very common that the towns, which have provided evidence about privies and sanitation also have been equipped with a sewage



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network of some kind (Kuokkanen et al. 2010; Valonen & Korhonen 2006, p. 138–139). According to written sources, at least some cities in northern Europe have been provided with a sewage network by the late Middle Ages (Sowina 2011). Furthermore, there is evidence from London, Trondheim, Visby and Tallinn that privies were furnished with quite advanced sewers and ventilation channels. In some cases, there is even evidence that privies were connected to running water utilized for waste transportation (Beronius Jörpeland & Bäck 2001, p. 327–329; Pärn 2004, p. 414–415; Westholm 2001, p. 255, 260).

There is no written evidence about medieval sewers in Turku, but archaeological excavations have revealed some evidence about sewers in medieval contexts. The oldest sewers of Turku were probably connected to the two aforementioned brooks running in the central town area. There are no exact datings available, but constructions have been roughly dated to the period when the town was founded in the turn of the 13th and 14th century and they have been connected with a need to control the dampness of the area. There is more evidence about sewers from the contexts of the 14th and 15th century although the constructions themselves have not been dated. It is quite likely, that sewers have been used for many decades, even for the whole medieval period from the 14th century until the early 16th century. Some of the med-



*Figure 4. Wastewater management and placement of sewers was considered in the planning and construction of buildings, too. A masonry building from the 15th century was provided with a timber sewer leading the waters to the gutter of the adjacent street (Seppänen 2012b, p. 882, original photo: The Aboa Vetus & Ars Nova Museum, Turku).*



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ieval sewers could have been used until the early modern period with proper maintenance (Seppänen 2012b, p. 878–882). In Lübeck for example, the same sewers have been used for 180–390 years (Grabowski 1994, p. 42).

In Turku, the sewers have been found in connection with the buildings (under and on the floors as well as underneath the walls), next to the buildings and plot borders as well as on the streets and yards (Fig. 4) The majority of the sewers were lined with planks or timber, but some sewers were lined with birch barks, branches, sticks, stones and even bricks. Some of the sewers were clearly related to handicrafts and activities, which needed lots of water like tanning, shoemaking and dying. Consequently, the sewers can be considered not only as the evidence of sanitation but also as an indicator of occupational distribution in the town area (Seppänen 2012b, p. 879–881).

## Maintenance of streets, squares and yards

When making conclusions about the medieval urban environment and sanitation of the society, we cannot ignore the condition and maintenance of streets, squares and yards. According to the present knowledge, the streets of Turku were unpaved in the early 14th century. This information is based on the observations of the medieval main street of Turku, Church Street, which is the only street unearthed from this period by now. In the earliest phase, the street was grounded with sand and gravel and surfaced with organic material consisting of wooden chips and waste of different kind, most of which may be originated from the construction of the first wooden houses. This kind of surface absorbed the excessive moisture from the damp soil and created a solid surface. In the 1340s, the street was surfaced with gravel, which indicates that the unpaved streets have been maintained and their surfaces have been repaired and renewed (Seppänen 2012b, p. 927).

The first streets with wooden pavements were made in Turku in the 1370s and 1380s when the town expanded into new areas (Fig. 5). Interestingly, it seems that in this phase, only the new streets were paved with timber while the older ones remained unpaved until the early 15th century. In the next phase, the streets were paved with stones. This seems to have taken place after a big fire in 1429 and when large parts of the town were reconstructed. Again, the oldest evidence of stone paved streets comes from the outskirts of the town and not in the centre. However, the lack of evidence can be explained by the possible reuse of stones when making a new surface. The removal of stones could only be detected when the surfaces are exposed with care and by documentation and analysis in detail. By the early 16th century, all streets in



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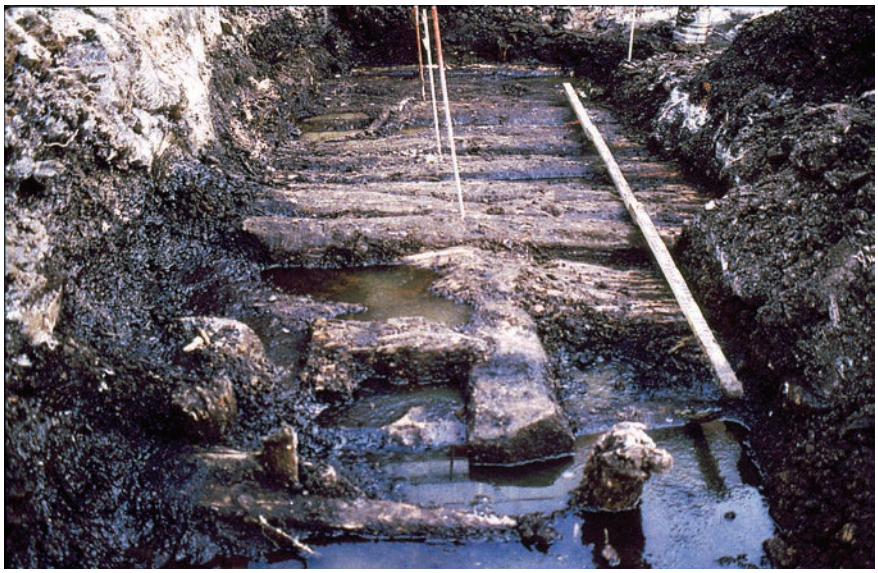


*Figure 5. According to the present knowledge, the first streets with timber pavement were made in the 1370s in Mätäjärvi quarter (Seppänen 2012b, p. 461, original photo: The Museum Centre of Turku.).*

central Turku were probably paved with stones (Seppänen 2012b, p. 927–929).

It seems that as soon as Turku was inhabited some of the passages and yards were covered with planks and timber to facilitate walking and transportation. The more systematic paving of yards took place at the end of the 14th century following the paving of the streets (Seppänen 2012b, p. 882–883). In Novgorod, which is famous for its well-preserved yard pavements, the first pavements were made more carefully and with more laborious techniques (Khoroshev & Sorokin 1992, p. 55). In Turku we have not been able to make this kind of conclusion. In the early 15th century, however, the wooden pavements were made with utmost care and with a good quality of timber. This matches well with the time when the town started to flourish and develop in many different ways (Fig. 6).

According to our present knowledge, stone was not used for paving the yards and squares in Turku before the mid-16th century. This is more than a century after the emergence of stone streets. Stone did not become the dominant material in paving the yards, and the wooden pavements were used until the 17th and 18th centuries when some of the yards were still uncovered.

The archaeological information about paving the squares in Turku is limited to investigations on the medieval School Square in 2005–2006 in the vicinity of the cathedral. The square was made in the mid 15th century and at this



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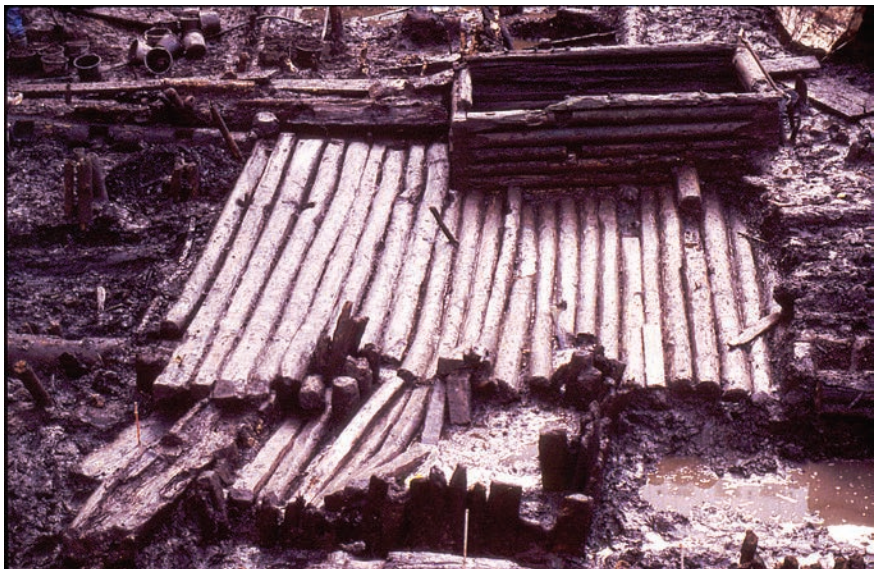


*Figure 6. In Mätäjärvi quarter, a yard between two buildings was carefully paved with logs in the 1400s. The pavement covered an area of 43 m2 (Seppänen 2012b, p. 359–365, original photo: The Museum Centre of Turku.).*

phase the square was unpaved. However, the square was provided with a stone paved lane lined with thick logs on both sides. The lane was 2.5 m wide equalling the width of smaller streets in the medieval Turku. In the late 15th century, the stone lane was replaced by a narrower brick lane framed with thick logs likewise its predecessor. Some of the bricks used for paving were profiled and originated possibly from the cathedral nearby (Fig. 7). The new passage was probably made after the fire in 1464, which caused severe damage to the cathedral and launched larger reconstruction activities in this area. The unpaved part of the square surface was covered with the remains of wooden dishes and other wooden material as well as with leather waste and broken artefacts (Saloranta 2007, p. 27; Seppänen 2012a, p. 484–485; 2012b, p. 926–927, 937). Organic waste absorbed the excessive moisture and made the surface harder and more compact. Leather and wood were used on the streets and yards for the same purpose. Thus, they were not waste but material with a new function.

Unfortunately, there have been no proper excavations on the medieval main market square (Old Great Market Square) of Turku. Therefore, the earliest surfaces of the square are still unknown. According to historical sources, the square was paved with stones in 1737 and repaved in 1771. The sources reveal that in the mid-18th century, the governor of Turku demanded that Academy Square (the medieval School Square) had to be paved with stones (Nikula 1981, p.



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*Fig. 7. The photo presents the stratigraphy of different pavements and phases of the School Square. In the oldest phase (on right), the square was provided with a stone paved lane framed with logs. In the next phase (middle), the lane was paved with bricks while the square remained unpaved. The square was paved with stones in the late 15th century or in the early 16th century (left). Photo: Päivi Repo.*

102). This information has led to the conception that the squares of Turku were not paved prior to the 18th century. However, the archaeological excavations on School Square in 2005–2006 revealed that the square was paved with stones already during the late 15th or early 16th century when the paving of streets had become more common in Turku (Fig. 7). It is possible, that also the Market Square was paved in the late 15th or early 16th century, since this was the time when the streets in the central town area leading to Market Square were paved with stones. However, evidence about the surfaces and maintenance of squares of Turku can be achieved only with new archaeological excavations.

Streets and squares were not only maintained by paving and repairing but also by cleaning. According to Magnus Erikssons town law from the mid 14th century people who did not clean the streets as requested were imposed a fine (Holmbäck & Wessen 1966, p. 89). Furthermore, written documents related to England and Stockholm suggest that the streets were maintained and cleaned by professionals providing services of this kind. The oldest preserved written sources referring to professional cleaners in Turku come from the end of the 16th century (Jørgensen 2008, p. 556–557, 561, 564–567; Nikula 1987, p. 89–90; Seppänen 2012b, p. 935). However, there is archaeological evidence



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referring to cleaning activities in the Middle Ages already. Remains of broken broomsticks on the surface of School Square may demonstrate that even the unpaved surface of the square was cleaned every now and then. On the other hand, the absence of rubbish layers and the limited amount of waste (broken artefacts) and short stratification of the material provides negative archaeological evidence about the cleaning of the streets from the early 14th century onwards (Seppänen 2012a, p. 934–938).

Thick rubbish layers with long stratification do not, however, mean that the rubbish would have been cumulated while the street was in active use since the waste was used for levelling old surfaces and for priming the new ones. For example, in Nottingham, the costs of paving the streets were recorded in detail and according to one entry, people were paid for "carying of ramel to the same lane to highten it with". "Ramel" refers to rubbish or rubble, which was placed on the streets as a levelling layer prior to making a new surface on top of it (Jørgensen 2008, p. 560). In Finland, we have records of similar kinds from the city of Lahti as late as in the early 20th century (Repo 2016, p. 116–123). However, in Turku there is no evidence that waste as such was used in the filling layers of the streets in the Middle Ages, but the foundations consisted mainly of clean sand or construction refuse (chips, cuts, mortar and bricks). Furthermore, the foundation layers included organic material like staves and leather (waste), which absorbed the excessive dampness in the area.

There were many reasons for paving the streets. Probably the main catalyst was the change in sanitary conceptions and efforts to improve the urban environment. Paving was also regulated by legislation, instructions and recommendations. Furthermore, social ambition of the peope possibly made them improve their living environment and increase the value of their property. This is a factor which is difficult to prove but cannot be underestimated (Seppänen 2012b, p. 931–932).

## Concluding words

In this paper, I have discussed waste management in the medieval town of Turku on basis of constructions (privies, latrines, cesspits, sewers, streets and squares) and historical sources. To get a more comprehensive and reliable understanding of the medieval sanitation and urban environment we would have to analyse the thickness and quality of the cultural layers as well as the quantity, quality, fragmentation and concentration of finds in different parts of the town in more detail and more extensively. Furthermore, analyses related to ecofactual remains and the geochemistry of the soil would reveal further information about urban environment and sanitation in different parts of the town in different times.



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*Figure 8. Conceptions of waste are time and culture bound. If one arrived in Turku on the first of May, (s)he would get a completely different image about the manners of the people and sanitation of the town than in other times. Every year, despite organised waste management and instructions, the traces of celebration can be seen everywhere until they are cleaned with extra effort and costs. Photo: Liisa Seppänen.*

However, based on available material and studies, it seems that there were actions and practises related to organized and systematic waste management from the late 14th and early 15th centuries onwards in Turku. The organized sanitation was probably catalysed by new ideas, legislation, population growth and intensified activities in the urban sphere. New ideas about sanitation were not, however, necessarily connected to population growth everywhere. James Deetz, who studied three cities from the 18th century, discovered that all cities adopted new ideas related to sanitation simultaneously regardless of the size, situation or social status of the cities (Deetz 1996, p. 171–174). Deetz´s study demonstrates that changes in sanitation can be connected with mental and attitudinal changes rather than with the growth of the town and decrease in the urban space. However, increase in the amount of waste and the need for improved sanitation are generally connected to bigger cities which have dense habitation and areas characterized with poverty, industrial funtions and low social status of the inhabitants.

On the basis of the evidence at our disposal today, it seems that people in Turku did not live in the midst of dirt and dung in the Middle Ages. When excavating the organic layers, archaeologists need to remember that the organic material dominates the characteristics of the soil; if the soil consists of as little as 2 % of organic material it gives an impression that the soil is predominantly organic. The soil appears to be even more organic, if it is moist with an open surface accessible for animals and different kind



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of use (Heimdahl 2003, p. 10–11). Therefore, many excavated layers are interpreted to be more organic than they actually were when they were deposited and made.

It seems that people in Turku were aware of sanitation and knew how different actions affected the environment. Efforts to improve the sanitary conditions, prove that they had both will and ability to take care of their living environment and to increase the comfort of their living quarters in many ways. They sorted their waste and used it for different purposes, manure for fertilisation and organic material for insulation and as absorbent material. The waste was not always rubbish, but recyclable and usable material. Debris that could not be reused was collected in latrines or disposed of in foundations and abandoned wells or drowned in waters. The authorities controlled the maintenance of the environment, sanitation and hygiene with statutes and orders.

Finally, I want to point out that the conceptions and ideas related to waste and sanitation are always time and culture bound, on macro as well as on micro level. In different cultures and societies, the concept of waste varies and the ways, how waste is produced, disposed of and used, are different. Consequently, the studies concerning waste, waste disposal and sanitation call for a wider and deeper understanding of the prevailing ideas, norms and practices in different contexts (Fig. 8).

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Notes

1 The author of this paper visited the museum in September 2015.

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