

BRICK BUILDINGS, CHIMNEYS, AND WINDOWS WITH GLASS

A chain of changes in medieval housing in Turku

INTRODUCTION

During the last couple of decades, archaeologists in Finland have produced a lot of new information related to medieval material culture and consumption, buildings and constructions, and the living conditions and socioeconomics of the inhabitants. The information has been unearthed in numerous excavations preceding construction activities and different kinds of land use in towns as well as in other areas with human occupation.

The oldest and biggest medieval town in Finland, Turku (Sw. Åbo), is still a major city and has a special role in Finnish medieval studies. The town has been a target of antiquarian research and excavations since the late 19th century. By now, nearly a hundred excavations and antiquarian observations have been carried out there, and they have revealed information on the past history of the town. More than half of these excavations were carried out within the last 30 years, and the documentation of remains and layers was conducted more systematically than in previous decades. Especially since the 1990s there have been many large excavations in the medieval town area, and they have revealed an abundance of find material as well as plenty of well-preserved construction remains.¹ (Fig. 1)

The aim of this article is to discuss the adoption of innovations related to buildings in the Middle Ages in Finland. The study focuses on Turku, which led the way for other towns and sites in many respects and introduced innovations and ideas to Finland. In this article, I present a group of innovations that made up a chain of changes improving the living conditions as well as affecting the building practices and the townscape of medieval Turku.

BRICK AND STONE AND THE INTRODUCTION OF NEW BUILDING TYPES

When Turku was founded in the turn of the 13th and 14th centuries, stone and brick were already known as building materials, in addition to timber. The

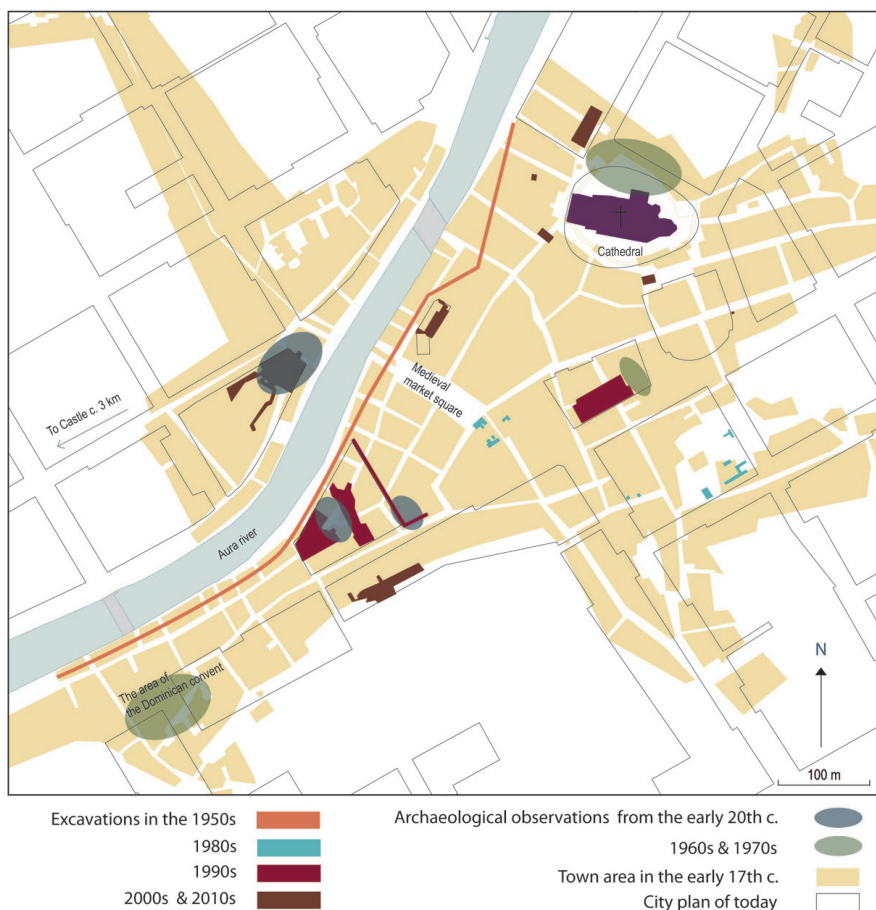


Fig 1. This map of Turku (Sw. Åbo) presents the excavations and archaeological observations, which have revealed information about the buildings and medieval construction of the town.

manufacture of bricks had probably been adopted from Sweden, where bricks were introduced in monumental buildings like churches, castles, and convents already in the 13th century.² On the eastern side of the Gulf of Bothnia, in the area of present-day Finland, bricks had probably been used for the first time in the latter part of the 13th century in the construction of the Bishop's Church in Koroinen, the predecessor of the Turku Cathedral.³

Brick waste and an oven foundation constructed of unburned bricks indicate the local manufacture of bricks in Turku already in the beginning of the 14th century.⁴ (Fig. 2.) It is very likely that stones and bricks were first used in the construction of public and religious buildings, such as the Cathedral and the town hall of Turku, in the beginning of the 14th century.⁵ These materials could have been used in the construction of the Dominican convent, since

in Europe the Dominicans were widely noted for using and promoting brick in their constructions. However, excavations conducted in Turku on the hill of Kaskenmäki have not revealed the time when brick was introduced to the construction of the convent. According to Markus Hiekkanen, these materials would have been used in the rebuilding of the convent after the big fire that consumed Turku in 1429.⁶ New information on the construction of the convent and the use of brick and stone in the early 14th century can be revealed only in excavations and with the help of scientific dating methods.

In any event, it seems that the use of brick and stone was more common in medieval Turku than has been previously thought. Burghers started to use these materials in their buildings already at the end of the 14th century, and the number of masonry buildings increased notably in the first half of the 15th century.⁷ It is very likely that the first masonry buildings for private use were built by German merchants, who were used to building with these materials and living in houses made of stones and bricks. In Lübeck, for example, brick had been the principal building material from the 13th century onwards and timber was used mainly for outbuildings of different kinds.⁸

The choice of building material was influenced by the traditions and building culture represented by the constructor. In Turku, the emergence and increase of masonry buildings is closely related to the immigration of German burghers and close contacts with Hanse towns. The first masonry buildings emerged in Turku 10–20 years after the period, when the majority of all known burghers of the town were Germans. Furthermore, the increase in the number of masonry buildings matches with the increase of German burgers.⁹



Fig. 2. The foundation of an oven, which comprised unburned bricks refers to the local manufacture of bricks in Turku in the early 14th century at the latest. The remains of this construction were found near the cathedral in 2005. Photo: Päivi Repo.

Interestingly, in Sweden, in Linköping and Uppsala, the erection of masonry buildings seems to have followed the same trend as in Turku. According to the present knowledge, the history of these towns can be traced further back than in Turku, which was probably founded in the turn of the 13th and 14th century. Uppsala was established already in the beginning of the 13th century, a hundred years earlier than Turku. The earliest evidence from Linköping can be traced already to the mid 11th century, but the real urbanisation of the town did not probably take place before the beginning of the 14th century.¹⁰

The adoption of new building materials and change in the townscape of these cities can indicate close contacts between these cities at the end of the 14th and in the first half of the 15th century.¹¹ On the other hand, the simultaneous development in construction activities in these towns can reflect a profounder and more extensive change in late medieval urban societies in Europe, which is an ongoing study of the writer of this article. Stone and brick were not, however, the novelties of the late Middle-Ages in the North. In Visby, for example, stone and brick were used in secular buildings already from the mid 12th century onwards.¹² However, the use of brick and stone was not very common in the medieval Sweden, since only c. 14 % of all towns had masonry houses with private use.

In Sweden, masonry buildings have primarily been associated with the wealthiest citizens and members of the highest social class.¹³ This is the general conception also in Finland. The construction of a masonry building required more time and labour and a new kind of expertise compared to the construction of a traditional timber house, and consequently masonry buildings were also valued higher and implied the higher status of the owner.

Building materials were not, however, the only indicators of status and wealth. Socioeconomic position could also be demonstrated with other means, such as the area of residence, as well as the size of the house and the quality of its furnishings and decorations. In addition to wealth and social status, there were other factors that affected the construction activities and the choice of building materials, such as the availability of time and suitable building materials, as well as general circumstances in the society.

New materials and techniques generated a diversity of buildings with differences in size, height, composition, and inner layout. On the basis of archaeological remains, it is impossible to obtain a full picture of the variety of houses that were erected during the late Middle Ages in Turku. According to the archaeological evidence, the shape of the masonry houses was either square or rectangular, longish, and relatively narrow. Some of the buildings housed a cellar with one or more chambers, but there were also buildings without such a subbasement. The buildings with a cellar had a staircase leading to the upper storeys that consisted of one spacious room or several rooms of different sizes. The buildings without cellars had a basement consisting of one to

three rooms, but there were also bigger buildings consisting of 7–10 separate rooms.¹⁴

The size of the masonry buildings in Turku varied mostly between c. 70 m² and 150 m². The smallest building had only 35 m² of roofed space, but some of the houses were as large as 250–380 m². We are inclined to think that big buildings were probably used for some kind of public purpose while smaller ones were in private use. The size of the building does not, however, always reveal its function, which could also have changed with time. Nor can we conclude that the size of the buildings grew towards the end of the Middle Ages, since houses of different sizes seem to have been erected in the same period.

In archaeological excavations in Turku, we can normally find only the remains of the basement of the house or the cellars that have partly reached above the ground. However, it seems that at least some of the buildings had more than one storey.¹⁵ Evidence from different towns in Europe and around Scandinavia also shows that masonry houses had one to three storeys. Masonry houses with more than one storey could actually have been quite common. According to estimates, in Oslo and in Uppsala, for example, every fourth masonry building had two or three storeys.¹⁶ This could have been the situation also in Turku, since the town was similar to medieval Uppsala in many respects.

Although it is highly likely that the owners of masonry houses represented a high social class with plenty of possessions, some people with good income and status could have preferred to live in wooden buildings, which might have been more comfortable. A wooden house was not always modest and simple, and it could have been furnished in many different ways. The introduction of brick and stone into private buildings could have been accompanied by the introduction of new wooden building types of different sizes. According to present knowledge, however, it seems that timber houses with at least two rooms preceded the emergence of private masonry houses. At the beginning of the 14th century, a large wooden building with at least two rooms comprising c. 100 m² was built in the Church quarter, in the vicinity of the Cathedral. Although, the function of the building is unclear, it is very likely that the building of this size was meant for public use.¹⁷ The first private timber house consisting of at least two adjacent rooms and a porch at the other end of the house was built in Turku, in the Mätäjärvi quarter, in the 1360s. This is at least 20 years before the first building of stone and brick was erected in the Convent quarter, which soon became one of the central areas of masonry buildings.¹⁸ Another new house-type, the twin cabin, i.e., a building with two rooms separated by an entrance in between, emerged in Turku after the big fire in 1429, when masonry houses were already being constructed in the town.¹⁹ (Fig. 3.)

Normally, the size of wooden buildings varied between 20 and 65 m², but there is evidence that some houses reached a size of 100 m².²⁰ Although only the lowest parts of wooden buildings have been preserved, the presence of base-



Fig. 3. A twin cabin with two rooms and an entrance in between was a new building type that was introduced to the town area of Turku in 1429 after the big fire. The oldest known remains of this building type were unearthed in 1998 from the medieval Mätäjärvi quarter. Photo: The Museum Centre of Turku / Elina Saloranta.

ments indicates that some of these buildings could have had two storeys. There is evidence of timber houses with two storeys from the early 15th century onwards, which matches the increase of masonry buildings in the town area of Turku. In the 15th century, timber houses were also furnished with better insulation, double foundations, and ceilings, which improved living comfort and also increased the attractiveness of timber houses.²¹

Due to frequent and destructive fires in the Middle Ages, stone and brick became more popular as building materials in many towns, and their use was promoted by statutes and recommendations. For example, already in the 14th century in some towns in the area of the Low Countries, people with limited means and property were subsidized so that they could afford to build a masonry house with a tiled roof against fire. According to written sources, in the early 15th century in Reval, in present-day Tallinn in Estonia, only brick and stone were permitted as building materials. The prevention of fires was not the only reason for promoting the use of stone and brick. The regulations also attempted to improve the sanitation and attractiveness of the town. The regulations were probably not equally strict in medieval Sweden, although there were recommendations for using stone and brick, as well as limitations in the use of timber. The smaller size of the towns, as well as the availability of more suitable building materials and other considerations of practicalities, probably moderated attitudes towards the use of timber in Swedish towns, including Turku.²²

In my study of construction activities in medieval Turku, I noticed that the increase in masonry buildings took place when there was an apparent decline in timber used for building purposes. The emergence of masonry buildings also accompanied population growth, which is reflected in the expansion of the town area and the intensification of the building stock. At the same time, we can detect an evident division in the social and occupational stratification of the townspeople in Turku.²³ The use of brick was not limited to walls, but it was also used for building ovens, fireplaces, ceilings, and floors. Brick ceilings and floors were used exclusively in masonry buildings, but even some of the simple timber buildings in medieval Turku had stone floors. We have archaeological evidence of stone floors in timber buildings already from the early 14th century, from the earliest construction phase of the town. Consequently, the use of stone on floors in timber buildings was not related to the increase in its use as a building material for walls.²⁴

SMOKELESS HEAT WITH CHIMNEYS AND FLUES

At the end of the Middle Ages, Turku welcomed many innovations that are related to heating systems and living conditions. One of these novelties had a remarkable effect on everyday life, namely the introduction of flues and chimneys for heating systems of different kinds. Unfortunately, the remains of fireplaces and ovens unearthed in archaeological excavations do not reveal whether they had chimneys or flues of some kind or not. Consequently, the existence of chimneys needs to be traced with other evidence that might indicate that the building had a fireplace equipped with a flue directing the smoke outside.

Flue dampers can be considered as clear evidence of flues and chimneys, but the problem is that flat iron plates with an extending simple handle could have been used for many decades, reused in different buildings, and even melted for a different type of reuse. The earliest flue dampers could also have been made of wood and may not have survived up to the present. It is not easy to define the original purpose of the remains of thin fragments of wooden sheets found in excavations. However, it bears keeping in mind that some of them could have been used as flue dampers. Consequently, we cannot conclude that the shortage of dampers indicates the absence of chimneys. According to historical evidence, dampers have been in use in Sweden at least at the end of the 15th century. There is also a mention from 1543 of dampers used in Turku Castle, and in the 16th century, dampers are known already from several parsonages. This gives us a reason to assume that dampers were introduced to some buildings in Turku at the latest during the 16th century.²⁵

On the other hand, written information on the number of smoke cabins from the early modern period gives us good reason to believe that only a small

number of houses was privileged enough to have a smoke-free heating system. For example, in 1638, the number of smoke cabins in Turku was 434, but unfortunately there is no record of the total number of houses. According to the population register, in 1637 there would have been 939 households, but the actual number of houses could have been smaller, since one house could comprise more than one household. The number of smoke cabins compared with the number of households allows us to conclude that in the early 17th century, more than half of the houses did not have chimneys and flues.²⁶ According to some researches, however, the majority of the buildings would have been smoke-free at that time.²⁷ The existence of smoke cabins in the 17th century does not refute the idea that the introduction of smoke-free heating systems took place in Turku in the 15th century. There were differences between houses in the 17th century as well as in the 15th century. Furthermore, the adoption of innovations and the development of building practices was not always a straightforward process of continuous progress, but was instead closely related to general social circumstances. Consequently, the general atmosphere and economic situation in 15th-century Turku could have been more favourable for the acceptance of innovations and progress than the situation in the early 17th century.

GLASS WINDOWS AND CEILINGS

The introduction of chimneys and flues has also been connected with the appearance of window glasses and ceilings. Wooden window hatches would have been replaced with sheets and leaded small glass windows when there was no longer a need to use the openings for directing the smoke outside. The oldest pieces of greenish window glass in Turku come from layers that have been dated to the 14th century. (Fig. 4.) Pieces of this glass have been found in all three quarters of medieval Turku on the eastern side of the River Aurajoki (Church Quarter, Convent Quarter and Mätäjärvi Quarter).²⁸ The existence or the spread of single fragments does not, however, reveal the number of the buildings with glass windows or the purpose of these buildings.

It is most likely that the first buildings in Turku with glass windows were the Cathedral and the Dominican Convent and its church. The first Cathedral was erected on Unikankare Hill at the end of the 13th century and the Dominican Convent was built at the other end of the medieval town area, on Kaskenmäki Hill, by the latest in the latter half of the 14th century. The Dominican order was established in Turku already in 1249 with a convent, which was first located in Koroinen, approximately 1.6 km from the site of the Cathedral. It was probably the Dominicans who brought glass windows to Turku. The first mention of a glazier, indicating glass manufacturing in Finland, in Naantali (Sw. Nådendahl), approximately 8 km from Turku, comes from the mid-15th century

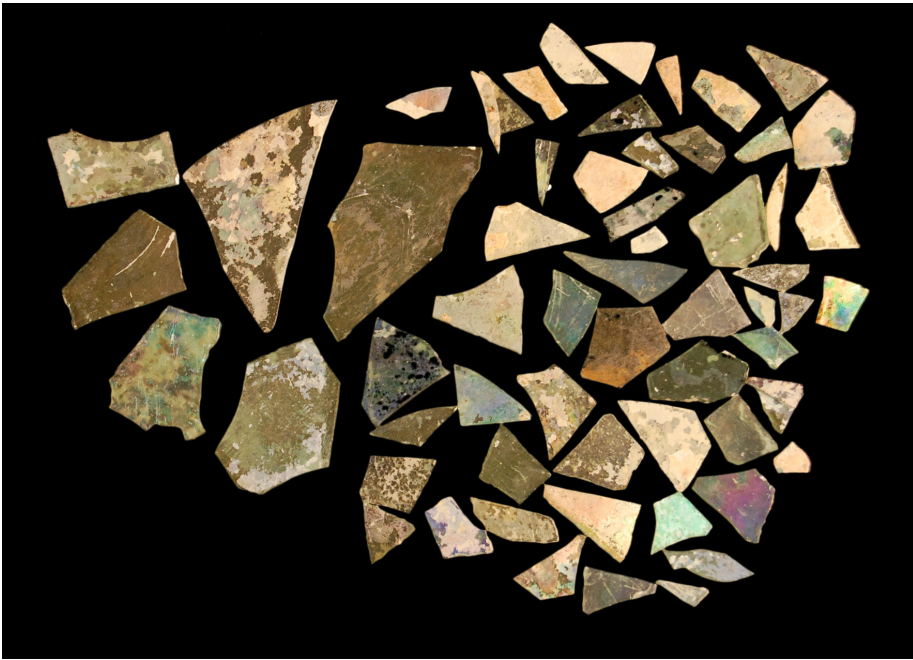


Fig. 4. It is impossible to date the exact time when the first building in Turku was decorated with glass windows. The oldest fragments of the greenish window-glass are found in Turku from the 14th century layers. The number of pieces increases towards the late 15th and early 16th century indicating for the possibility that in the mid 15th century some of the private buildings were furnished with small glass windows. Photo: Liisa Seppänen

(1449). On the basis of survived documents, these professionals were known in Turku from 1509 and 1510 onwards.²⁹ This also corresponds with the archaeological evidence, since the number of window glass pieces and lead frames in the late medieval layers is not limited to isolated fragments.

The quantity as well as the concentration of glass finds in the mid-15th-century layers also provide evidence for the wider use of glass windows in residential buildings. The increase in the frequency of window glass in the late Middle Ages may also signify that there was no longer a need or desire to collect and save broken windows as carefully as earlier, which in turn can be interpreted to mean that in this phase, glass windows were no longer rare.³⁰

Archaeological finds do not, however, reveal the time when glass windows were first introduced in Turku. In the Middle Ages, window glass was a valuable and rare imported article in Turku, and it is very likely that even the smallest pieces were reused in new buildings. Thus the lifespan of individual windowpanes from their first appearance in a building to waste material in the soil could have been very long and included many phases and buildings. The same situation prevails with lead frames, which are easy to reuse and suitable for melting and remanufacturing.

When trying to trace the origin of glass windows and their first appearance, we need to think about the buildings where they might have been used. As stated above, the first window glasses probably decorated churches and religious buildings. Secondly, window glasses can be connected with the appearance of masonry buildings from the end of the 14th century onwards.³¹ Glass windows probably also decorated some of the late medieval wooden buildings in Turku. On the basis of the material, it seems that at least one house, which was a so-called twin cabin built in the 1440s in the Mätäjärvi quarter, would have had glass windows. The first twin cabins in this area were erected in the 1430s, but these layers contained only some sherds of window glass that cannot be connected exclusively with these houses. For now, the connection between a new wooden building type, the twin cabin, and the appearance of window glass remains an open question that can be studied further when the opportunity arises to excavate more houses of this type.³²

The introduction of window glasses was mainly related to living comfort, aesthetic aspects, and the social status of the inhabitants. Imported glass windows were expensive and represented a rarity that only the wealthiest people could afford.

The first glass windows were quite small and consisted of several little pieces of greenish glass connected to each other with lead frames. The lighting capacity of these windows was not of major importance. However, even the faint light they let in made a great difference inside the house, and this change, together with smoke-free indoor air, brought along a good reason to invest also in the furnishing and decoration of interiors.

The appearance of ceilings has also been associated with the question of smoke-free heating systems, since smoke was directed outside through openings in the roof as well. According to the general conception, medieval timber houses would not have had ceilings. This idea has been presented by researchers who have considered the rural smoke cabins of the 18th century as direct descendants of medieval timber houses.³³ Naturally, buildings with more than one storey had ceilings, and consequently, ceilings would have been introduced to timber buildings in Turku already in the beginning of the 15th century. The medieval origin of these ceilings is supported also by the Finnish word for ceiling, “*laipio*”, which has its origins in the old German word “*Laube*” in the Middle Ages.³⁴

The first appearance of ceilings is not necessarily connected with the introduction of chimneys, flues, and smoke-free ovens, since smoke could quite well have been directed outside via the ceiling with the help of wooden pipes made of planks or hollow trunks. (Fig. 5.) The archaeological evidence for ceilings as such is non-existent, but on the basis of multi-storey buildings, I am inclined to think that some timber houses in Turku were furnished with ceilings already in the beginning of the 15th century.



Fig. 5. Appearance of the ceiling did not necessarily succeed the innovation of chimneys and flues, but the progress could have been the opposite. A drawing presents a smoke cabin, where the smoke has directed outside through a wooden pipe. Ceilings reduced the space to be heated and thus saved firewood and time needed for heating. Furthermore, they provided extra insulation and an upper floor for storage. Drawing: Liisa Seppänen

STOVE-TILE OVENS

The appearance of chimneys has also been connected with the introduction of stove-tile ovens. The first archaeological stove-tiles have been found in Germany and Switzerland in 12th-century contexts, but evidently stove-tile ovens were quite rare until the 14th century.³⁵ There are many hypotheses of how stove-tile ovens would have been heated in the Middle Ages. According to one idea, the ovens would have been heated with embers so that there was no need for a chimney. Some have suggested that the opening of the stove-tile oven was on the backside of the oven, with access from the adjacent room. The heating would have taken place in this room, which would also have received the smoke if there was no built-in flue. These two examples demonstrate that the emergence of stove-tile ovens was not necessarily bound together with chimneys and smokeless heating systems.³⁶ However, the development and popularity of stove-tile ovens was closely connected with the development of smokeless heating systems, although stove-tile ovens were probably used in some houses without chimneys, too.

The first stove-tiles from excavations in Turku have been dated to the 15th century. (Fig. 6.) Apparently these tiles were used to decorate the ovens already

at the end of the 14th century or in the early 15th century. On the basis of this evidence, stove-tile ovens would have been introduced to buildings in Turku more than a hundred years earlier than has previously been thought on the basis of written sources.³⁷

At present, we have found a substantial number of stove-tiles from medieval Turku, which proves that several buildings could have been furnished with stove-tile ovens. However, there is still no evidence of an oven with attached stove-tiles, which would demonstrate without a doubt the presence of a stove-tile oven in a certain building. One possible foundation for this kind of oven has been found inside a masonry building in the Mätäjärvi Quarter. The building has been dated to the mid-15th century with the help of dendrochronology, but the stove-tiles found in the vicinity of the building have been dated to the latter part of the 15th century. The dating is based on the pictorial motif of the stove tile representing a pelican and a man with feathered skin, which has been connected with late medieval religion and interpreted as a symbolic depiction of sacrifice and suffering. The stove-tile represents a type that was introduced in the 14th century and replaced in the 16th century.³⁸ (Fig. 7.)

According to archaeological finds, similar stove-tiles were manufactured in Stockholm in the late 15th and early 16th centuries. This tile could originate from Stockholm, but this does not, however, exclude the possibility that tiles of this kind could have been produced even earlier, although there is no evidence of such activity. Another alternative is that the stove-tile was imported from Lübeck instead of Stockholm and represents earlier production. It is also possible that at first the oven was decorated with different stove-tiles, which could have been replaced or supplemented with these tiles of Gothic style in a later phase. Unfortunately the dating

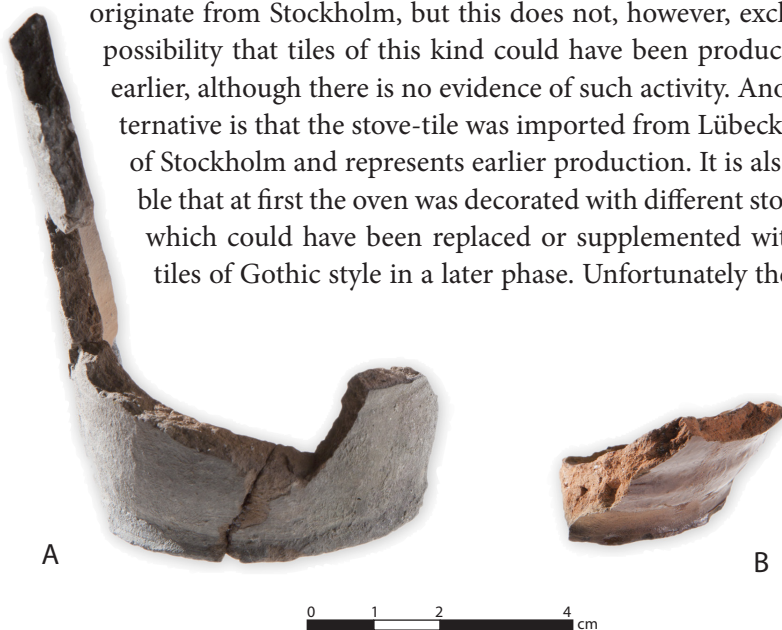


Fig. 6. Vessel tiles represent the oldest type of stove-tiles, but they were manufactured until the 16th century with different modifications. The earliest fragments of vessel tiles found in Turku have been dated to the turn of the 14th and 15th centuries. These fragments (TMM21816: KA102:001 & TMM21816:KA090:001) were found at the Åbo Akademi University's Main Building Site in 1998. Photo: The Museum Centre of Turku / Martti Puhakka (modified by Liisa Seppänen)

of the stove-tile is not at all supported by the find context, which extends from the 15th century until the early 18th century.³⁹

Smokeless stove-tile ovens brought along cleaner air indoors, but there were also other types of ovens and fireplaces that were furnished with chimneys and flues, which are difficult or even impossible to identify in the archaeological record.⁴⁰ Archaeological evidence consists mainly of the remains of foundations that do not reveal the type of the heating system. However, the presence of another type of smoke-free heating system may be traced with the help of remains as well as find material.

Hypocausts were the pioneers of smoke-free heating systems. They were first introduced in Europe during the 2nd century BC. The system was re-introduced in monasteries in central and northern Europe between the 10th and 14th centuries, when the climate started to cool down. Hypocausts were used in big monumental buildings like castles, monasteries, guild halls, and town halls, but they were also built in large houses for private use. Recent studies in Estonia have, however, proved that hypocausts were also built in smaller houses in a more modest style. In northern Germany, hypocausts were also used to heat wooden houses, and thus they cannot be connected exclusively with the wealthiest houses. However, in Sweden, this heating system was apparently relatively rare, and consequently, it has mainly been associated with large masonry buildings and the higher class of society.⁴¹

In Finland, the best remains of hypocaust furnaces have been found in castles. In Turku Castle, there is evidence for four hypocausts, at least one of which has been dated to 1365–1400. In the Bishop's Castle in Kuusisto, this heating



Fig. 7. These pieces belong to a Gothic niche tile, which is presenting a pelican feeding her young with blood plucked from her breast. On the right side there is a human figure reaching his hand towards the bird. The upper piece on the right is a fragment of the canopy depicting a double-headed eagle and it belongs to the same stove-tile. This stove-tile is the only one of its kind found in Finland so far and it has been dated to the mid 15th century. Photo: Liisa Seppänen.

system was in use in the beginning of the 16th century. The remains of the hypocaust furnaces in Hämeenlinna Castle have been dated to the end of the Middle Ages between 1490 and 1520. In addition, remains of hypocausts have been found in the castles of Raasepori and Savonlinna.⁴² Since the remains of hypocausts have been found in castles only, researches have been inclined to think that in Finland this heating system was in use exclusively in castles.⁴³

However, the remains found in the town hall of Turku can be interpreted as evidence for a hypocaust furnace. The construction has been dated to the 1440s when the town hall was reconstructed and the building comprised two storeys.⁴⁴ Archaeological excavations have also revealed a few fragments of ceramic lids that probably covered the air vents of the hypocaust furnace. Although evidence for the use of hypocausts in the town area of Turku is very limited, this heating system could have been used in the town hall and in the Dominican convent in the mid-15th century.⁴⁵

A NOVELTY NEVER COMES ALONE OR WITHOUT REASON

Although the innovations presented above were developed separately, they all represent the progress, which took place in the Middle Ages, and they were inextricably tied together with other changes in living conditions and general circumstances. The introduction of innovations in Turku was closely related to immigration and close contacts with other cities, such as Uppsala, Stockholm, and Lübeck. Evidence shows that Turku grew substantially at the end of the 1360s, in connection with sudden population growth. In this phase, a new building type with twin rooms emerged in the townscape of Turku, but otherwise the construction practices and types of buildings seem to remain quite similar until the end of the 14th century. However, already in the 1370s and 1380s a timber house with two storeys could have been erected in Turku.⁴⁶

It seems that the main catalyst for the emergence of many innovations was the construction of masonry buildings in the late 14th and early 15th centuries, which probably brought along a chain of changes including smoke-free heating systems, stove-tile ovens, glass windows, ceilings, roof tiles, and floor tiles. (Fig. 8.) Some of these innovations were adopted in timber buildings with necessary adjustments quite soon after their first appearance in masonry buildings. However, on the basis of the archaeological material, a chronological sequence of adoption cannot be detected, and in theory some innovations could even have been introduced in timber buildings without predecessors in masonry buildings.

The reasons behind the adoption could have been very practical or related to the demand for development and additional amenities. Practical reasons like fire safety encouraged the use of stone and brick instead of wood or turf. In



Fig. 8. The fragments of roof tiles (a) give us reason to believe that tiled roofs have decorated some of the buildings in the Middle Ages. The first evidence refers to the possibility that the tiles were introduced in the early 15th century. Few fragments of deformed tiles (b) refer to the local production of roof tiles already at the end of the 14th or early 15th century. Photos: The Museum Centre of Turku / Martti Puhakka

addition to fire safety, reasons related to living comfort promoted the introduction of flues and chimneys. The use of stones and bricks in buildings, as well as the introduction of heat-storing, thermal fireplaces, seems to coincide with the decrease in timber and the need to economize on consuming wood. The introduction of chimneys and heat-storing fireplaces increased the interior comfort and at the same time decreased the time needed for heating and supplying firewood, which in turn promoted investments in living space and interiors.

Fires and destructions were always followed by the reconstructions of the town, which often catalyzed the introduction of new techniques and innovations. This is especially noticeable after the fires in the beginning of the 1430s and 1440s with the appearance of a new wooden building type (the twin cabin) and an increase in the number of masonry buildings. However, this can also be connected to the increase in the number of German burghers, which took place at the beginning and middle of the 15th century.⁴⁷

Recent studies and archaeological excavations in Turku have challenged the time of introduction of many innovations. On the basis of present knowledge, it seems that many innovations, such as glass windows, smokeless heating systems and new types of fireplaces, insulations with double basements and ceilings, and new building types with several rooms and storeys, were introduced in Turku in the height of the Middle Ages. The dynamic change in building practices and living culture started in the 15th century, when the town flourished with active connections to neighbouring cities in the west as well as in the south. The practices and main techniques of construction seem to have remained quite similar for many decades and even centuries in Turku, as well as in different parts of Finland.

NOTES

- 1 About the excavations in Turku, see, e.g., Seppänen 2012, 8–15.
- 2 Andersson & Rosenqvist 1980, 48; Tagesson 2002, 124; Venhe 2000, 113.
- 3 Drake 1987.
- 4 Ratilainen 2010, 31–40, 45.
- 5 Drake 2003a, 129–133; 2003b, 137–138; Uotila 2003, 123–124.
- 6 Hiekkänen 2003, 91; 2007, 182.
- 7 Seppänen 2012, 648; Uotila 2003, 121–122; 2009, 44.
- 8 Gläser 2007, 46, 60; Seppänen 2012, 647–648, 671.
- 9 Seppänen 2012, 943.
- 10 Anund 2008, 363–365, Anund et al. 1992, 226–227, Tagesson 2002, 144–162, 225, 229–230.
- 11 Seppänen 2012, 672.
- 12 Westholm 2001, 743.
- 13 Anund 2001, 640, 642; Carelli 2001, 669; Tagesson 2002, 120.
- 14 Brusila 1984, 108; Ratilainen 2007, 17–18; Tuovinen & työryhmä 2004, 11–13; Seppänen 2012, 821.
- 15 Brusila 1984, 108; Brusila & Lepokorpi 1981, 17; Ratilainen 2007, 17–18; Rinne 1952, 207, Tuovinen & työryhmä 2004, 11–17; Seppänen 2012, 821–822; Uotila 1997, 107,109; 2003, 127–128.
- 16 Anund 2001, 643; Gläser 2001, passim; Seppänen 2012, 822.
- 17 Seppänen 2012, 942, 944.
- 18 Seppänen 2012, 577–593, Uotila 2009, 44–45.
- 19 Seppänen 2012, 944, 946, 948.
- 20 Seppänen 2012, 813–816.
- 21 Seppänen 2012, 691, 807–810, 813–818,
- 22 Johansen & von zur Mühlen 1973, 229; Seppänen 2012, 673–675; Spitzers 2001, 207, 209.
- 23 Seppänen 2012, 674.
- 24 Seppänen 2012, 692–703, 719, 807–808.
- 25 Seppänen 2012, 705, 734; Sirelius 1921, 191.
- 26 Ranta 1975, 81, 96.
- 27 Korhonen 1985, 353; Nikula 1987, 113.
- 28 Majantie 2007, 33; Seppänen 2012, 771.
- 29 FMU 5373, 5459; Nordman 1964, 255.
- 30 Seppänen 2012, 778.
- 31 Seppänen 2012, 671; Uotila 2009.
- 32 Seppänen 2012, 778.
- 33 Kykyri 1989, 111; Valonen 1984, 155; Vilkuna 1938, 16–18; Vuorela 1975, 413.
- 34 Seppänen 2012, 807–809; Vuorela 1975, 414.

- ³⁵ Heege 2002, 211; Hoffmann 2005, 321; Majantie 2010, 49–52; Seppänen 2012, 736–737.
- ³⁶ Heege 2001, 14–15; Majantie 2000, 106; 2010, 53–55; Seppänen 2012, 737–738; Russow 2011, 77–78, Joon 2 and 3.
- ³⁷ Nikula 1987, 380; Majantie 2010, 166; Seppänen 742.
- ³⁸ Majantie 2010, 192–196; Seppänen 2012, 186–289.
- ³⁹ Seppänen 2012, 743–744.
- ⁴⁰ Seppänen 2012, 704–736.
- ⁴¹ Seppänen 2012, 727.
- ⁴² Eriksson, Drake & Carelli 2007, 107, 109, Fig. 100; Drake 1994, 50; Gardberg 1959, 68–71, Bild. 25 and 26; 1987, 43–44; Seppänen 2012, 730.
- ⁴³ Heinämies 1989, 77; Majantie 2000, 94; 2010, 49.
- ⁴⁴ Seppänen 2012, 731; Uotila 2003, 125.
- ⁴⁵ Seppänen 2012, 731–732.
- ⁴⁶ Seppänen 2012, 818.
- ⁴⁷ Seppänen 2012, 947–948.

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Abstrakt:

TEGELBYGGNADER, SKORSTENAR OCH GLASFÖNSTER

En serie förändringar i medeltida bostäder i Åbo

De arkeologiska urgrävningar som utförts under de senaste årtiondena har gett forskningen mängder av ny information kring medeltida och tidigmodern materiell kultur, byggande och levnadsförhållanden. Särskilt gäller detta för Åbo, som var Finlands viktigaste och största stad och ett viktigt centrum för innovationsspridning till övriga delar av landet.

En alltmer ökad användning av sten och tegel ledde till förändringar i gatubilden och byggnadsskicket. Murningstekniken spred sig till Finland från Sverige vid 1200-talets slut, och i Åbo har man hittat bevis på tegelframställning från och med 1300-talets början. Inledningsvis användes den nya tekniken i domkyrkan och rådhuset, men redan vid 1300-talets slut förekom sten och tegel i privata byggnader.

Det förefaller som om användandet av sten och tegel aktiverade till innovationer och nya byggnadstyper även inom träbyggandet. De första parstugorna byggdes i Åbo på 1430-1440-talet, då flera murade byggnader redan uppförts i staden. De tidigaste bevisen på träbyggnader med två våningar är från 1400-talets början eller tidigare, vilket väl motsvarar tidpunkten för ett alltmer ökat byggande i tegel och sten.

Fönsterglas var en importvara på medeltiden, som har ansetts ha förekommit främst i religiösa och officiella byggnader samt i välbärgade borgarhem, byggda av sten eller tegel. Vid mitten av 1400-talet ökar mängden fönsterglas markant i fyndmaterialet, vilken kunde betyda att fönsterglas även användes i träbyggnader, eventuellt i de nya parstugorna.

Fönsterglas har ansetts ersätta fönsterluckor och takluckor av trä i det skede då byggnaden var försedd med en skorsten och en eldstad vars rök leddes ut ur byggnaden. I regel har man tänkt sig att kakelugnarna erbjöd en rökfri uppvärmningsmetod, men de första kakelugnarna var inte nödvändigtvis försedda med skorstenar, utan värmdes upp från ett annat rum, och rökte in i det rum

som de värmdes ifrån. De tidigaste kakelugnarna i Åbo har hittats i 1400-talskontexter, men de kan ha blivit uppmurade flera decennier tidigare.

Nya intryck nådde Åbo söder- och västerifrån, genom invandring och kulturella och kommersiella kontakter. Genom arkeologiska undersökningar har man kunnat konstatera att Åbo växte märkbart under 1360-talet. Utvidgningen av stadsbebyggelsen berodde på befolkningen ökade och blev allt mer förmögen, samt på att den professionella och hantverksmässiga specialiseringen successivt ökade vid ingången av 1400-talet. Att nya byggnadsmaterial, tekniker och hustyper togs i bruk, hänger också ihop med de stadsbränder som drabbade Åbo under medeltiden. I Åbo kan tegelbyggnadernas popularitet dessutom bero på att det ständiga byggandet medförde en virkesbrist under 1400-talet. Lagrande eldstäder, mellantak, stenfötter och trossbotten bidrog alla till förbättrad värmehushållning och därmed ett minskat behov av brännved. Då uppvärmningen blev mer arbetsekonomisk bidrog det i sin tur till att rummen blev fler i byggnaderna och att inomhusmiljön förbättrades.

Enligt arkeologiska bevis har många innovationer tagits i bruk i Åbo på 1300–1400-talet, vilket är betydligt tidigare än man kunnat anta utgående från skriftliga källor. Många nya fenomen hänger ihop, men det går inte att avgöra i vilken inbördes ordning de har anlänt utgående från det material vi har till vårt förfogande. Men många av de byggnadstraditioner och innovationer som togs i bruk i Åbo under medeltiden var i bruk ännu långt in i modern tid – på vissa håll i Finland ännu på 1800-talet.

Översättning från finska Ulrika Rosendahl