

Rivo Bernotas

**New aspects of the genesis of the medieval
town walls in the Northern Baltic Sea region**

Academic dissertation

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Tämän tutkimuksen tarkoituksena on analysoida Vanhan-Liivinmaan kaupunginmuurien alkuperää keskittyen erityisesti nykyisen Viron alueelle. Tärkeimmät tutkimuskysymykset ovat: 1) minkälaisia muutoksia muurien rakentaminen luo kaupunkikuvassa, 2) milloin kaupunginmuurien rakentaminen aloitettiin ja kuinka kauan niiden valmistuminen kesti ja 3) erosiko keskiaikaisten kaupunginmuurien rakentaminen Virossa naapurimaissa tapahtuneesta rakentamisesta ja jos, miten. Kaupunginmuurien rakentaminen edellytti uudenlaisten rakennusmateriaalien kehittämistä, ja materiaalien valinta riippui suuresti kunkin paikan luonnonvaroista. Tiilenvalmistuksen aloittaminen Virossa korreloi selvästi 1300-luvun rakentamisen noususuhdanteen kanssa, jolloin kaupunkialueet suunniteltiin uudelleen sekä aloitettiin kaupunkien linnoitusten, kivikirkkojen ja kivitalojen rakentaminen. 1300-luvun alkupuolella erottuu tässä yhteydessä selvästi myös jätekuoppien ilmestyminen kaupunkikuvaan. Muurin rakentamisen jälkeen kaupunkien laeissa todennäköisesti säädettiin jätteiden hävittämisestä jätekuoppiin.

Kehitys ensimmäisistä kaupunkiasutuksen jäljistä muurein ympäröityihin keskiaikaisiin kaupunkeihin nykyisellä Viron alueella kesti keskimäärin 50–100 vuotta, ja muurit rakennettiin todennäköisesti 1300-luvulla.

Pohjoisen Itämeren alueen ympäristössä keskiaikaisia muurein ympäröityjä kaupunkeja ei ole Liettuassa eikä Venäjällä ja Skandinaviassakin vain muutamia. Siitä johtuen esitän, ettei kaupunkilinnoitusten rakentaminen ollut aina sidoksissa sotilaallisiin tarpeisiin, vaan syynä oli myös saksalaisten uudisasukkaiden tuoman kulttuurisen tilan erityispiirteet. Saksalainen vaikutus on selvästi säilynyt myös Ruotsin keskiaikaisten kaupunkien muureissa. Latviassa kehitys ensimmäisistä kaupunkiasutuksen jäljistä muurein ympäröityihin kaupunkeihin kesti Viron tapaan 50–100 vuotta, mistä poikkeuksena on Riika. Ruotsin keskiaikaisten kaupunginmuurien rakentaminen valmiiksi vaikuttaa noudattavan samaa ajallista mallia kuin Vanhalla-Liivinmaalla. Joissakin tapauksissa samanlaisia jälkiä on nähtävissä myös tuolloisessa kaupunkisuunnittelussa. Keskiaikaisten kaupunginmuurien rakentamisen alku Vanhalla-Liivinmaalla vaikuttaa selvästi noudattavan tavanomaista asuttamisen toimintatapaa, mikä ei ole ainutlaatuista Euroopassa.

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The purpose of this research is to analyse the origins of the town walls of Old Livonia, specifically the medieval town walls in the present-day territory of Estonia. The main research questions are 1) which changes on the urban townscape can be associated with the building of town walls; 2) when did the construction of the town walls start and how long did it take to complete them; 3) did the walling of medieval towns in the Estonian area differ from the similar processes in the neighbouring countries, and if so, how.

The town walls construction required the development of new types of building materials, which depended largely on natural resources in the respective locations. The beginning of brick-making in Estonia clearly correlates with the beginning of the construction boom in the 14th century, when town areas were re-planned, and the construction of the town fortifications, stone churches, and stone houses had started. Also in the current context the appearance of cesspits in the first half of 14th century clearly distinguish. After building the wall, the disposal of waste to cesspits was probably regulated by the town laws.

The average development from the first traces of urban settlement to walled medieval town in the present-day Estonian territory took a timeframe of approximately 50–100 years and the walls were probably erected in the 14th century.

Around the northern Baltic Sea region there are no medieval walled towns in the territory of present-day Russia nor Lithuania and there are very few of them in Scandinavia. Therefore I have suggested that the building of urban fortifications was not always directly related to military necessity, but was also due to the specificity of the cultural space, which came to Old Livonia with the German settlers. German influence is also clearly perceivable in the walled towns of the territory of medieval Sweden.

Similarly to Estonian area, the average development from the first traces of urban settlement to walled medieval town in the Latvian territory took a timeframe of around 50–100 years, with the exception of Riga. The timeframe for the completion of the medieval Sweden's town walls seems to fall in the same pattern as we already witnessed in Old Livonia. In some cases one can perceive similar events in the town planning.

The genesis of the medieval town walls in Old Livonia seems to clearly indicate an ordinary colonisation policy, which is not something unique in Europe.

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Introduction

The purpose of the current paper is to analyse the origins of the town walls of Old Livonia, specifically the medieval town walls in the present-day territory of Estonia. As the author has conducted research and published articles on this topic in 2008–2013, this research is summarised and brought to bear on the wider analysis. For the purposes of this volume, I largely confine my scope to Estonia as traditionally defined, although at times it will be necessary to look beyond its borders in order to completely understand the aspects of Livonian history and culture.

The foundation of this research is based on eight different articles¹ published in peer-reviewed journals. The papers cover a variety of issues related to the investigation of medieval towns. The central point of the research concentrates on the material from Tartu (in German: *Dorpat*), Uus-Pärnu (*Neu-Pernau*), Viljandi (*Fellin*), Narva, and Haapsalu (*Hapsal*). I have used the material from Tallinn for comparative purposes only, as a number of different approaches covering the city's fortifications have already appeared in various publications (eg, Zobel 1980; in English see Zobel 1994; 2014; Mäll 2004 etc), written both by archaeologists and architectural historians. Therefore, one of the aims of this publication is filling a gap between the research of the town fortifications of Tallinn and that of the rest of the Estonian territory.

As every archaeologist's duty is to bring the results of their research to a wider audience, much data from my own relevant excavations and surveys have been used here. I have also used numerous different reports, the results of which are published for the first time herein; therefore, this text serves the additional purpose of being a source publication. Since I was born and raised in Tartu and spent all my childhood summers in Pärnu, naturally those two towns are somewhat more in focus in my research, as the readers might notice from the articles.

The main research questions in the current publication are based on the volume of the articles following:

¹ Six of those are written by the author himself (Bernotas 2013a; 2013b; 2013c; 2012; 2011 and 2008) and two as co-author (Bernotas *et al* 2009; Kriiska *et al* 2011).

1. Which changes on the urban townscape can be associated with the building of town walls?
2. When did the construction of the town walls start and how long did it take to complete them?
3. Did the walling of medieval towns in the Estonian area differ from the similar processes in the neighbouring countries, and if so, how?

Based on these questions, this text is divided into three chapters. The first two chapters examine the changes in the medieval townscape that can be related to the construction of the town walls. I start with the investigation by examining the building materials used in Estonia and their role in the specific features of town buildings in general and town fortifications in particular. By applying comparative examples I will analyse how brick making was connected to the so-called construction boom in the area of Estonia in the Middle Ages.

In the second chapter I will examine the details of medieval waste management and how the presented dates match the changes in the townscape. Also, the archaeological research of stone buildings in Tartu will be touched upon. Based on the dates presented in the chapter, the dating of the medieval town walls and the timeframes for the erection of the urban fortifications will be analysed.

In the third chapter I will compare the situations in the townscapes in the Estonian area as well as that of its neighbours (other parts of Livonia, medieval Sweden). I will give an overview of the walled towns of these areas and analyse which parallels or differences can be pointed out between these regions.

Due to the space limitations, not all important issues can be included in this survey. However, those issues serve as background to the analysis herein. The hope is that this text raises further questions that encourage scholars to focus on them in the near future.

Overview of the publications

As mentioned above, the base of this study is a total of eight different articles, all of which examine the different aspects of town walls and town planning, the results of which point to answers to the three research questions presented in the introduction. As the base of any construction activity is its building material, the first article of the series is focused on brick-

making (Bernotas 2013a). That article summarised the published research about brick-making in medieval Old Livonia, specifically in the territory of present-day Estonia. Using the historical-comparative method, comparing the dates of other brick sites in Europe, I discuss the possible correlation between the emergence of brick-making in Estonia and the so-called construction boom in the 14th century in the same area. Also, various examples of the brick application in buildings will be discussed.

The second publication associates some of the changes to the Tartu townscape with the re-planning of its town area and the establishment of its town fortifications (Bernotas, 2012). The focus of this research is on establishing dates for the waste management system, the town wall, and the stone buildings. An important object of study in this publication are the medieval cesspits – some of which I have been able to date by using the dendrochronological method; their dates clearly correlate with the dates of the construction of the town wall. The third and fourth publications in the series examine that dendrochronological research more in depth (Bernotas 2008; Kriiska *et al* 2011).

In the fifth publication, dedicated to the research of the town wall of Tartu, I analyse the construction of the wall and propose a new hypothesis of its date and its effect on the re-planning of the town area (Bernotas 2011).

The sixth and seventh articles have Pärnu's medieval town wall as their focus. The sixth paper examines the composition of the wall, and based on results of dendrochronological research, establishes a new date for the wall's construction (Bernotas 2013b). The seventh paper discusses thoroughly the results of the author's own fieldwork carried out on the medieval and modern town fortifications of Pärnu from 2007–2009 (Bernotas *et al* 2009).

The eighth and final publication in the series covers the investigation of the town walls of three Estonian medieval small towns – Viljandi, Haapsalu, and Narva (Bernotas 2013c). The results of current archaeological research are summarised, and based on the historical-comparative analysis, I propose new dates for the completion of the town walls as well as for the timeframes of the urban developments. Using comparable material from Scandinavian and Lithuanian towns as examples, I also analyse the wall fortifications of Estonian small-towns in the wider context of Old Livonian and Baltic town fortifications.

While this collection of publications might at first glance seem to cover somewhat different topics, they actually all reflect different aspects of how fortifications affect how the town is

organised, built, and settled. Therefore, they should be reviewed in the context of the same background system. The current research clearly demonstrates that the dates of planning the stone buildings, town walls, and streets are in sync with the construction of cesspits. This in turn indicates that they are clearly linked to urban development phases and represent a certain stage in urban organisation and development. The towns, however, did not have ambitions to reach the described stages until they had walls around them.

Theoretical background

Every nation's building traditions are works of art that contribute to the architectural artistry of all mankind. Therefore even the smallest nation's building monuments merit research and documentation to form part of the history of building of the world. Placing the Estonian building history in a world context also helps clarify some of issues presented by the unconventionalities of Estonian construction, which is one of the most difficult core issues in the research of Estonian building monuments (Aluve 1993, 83). As the data about the medieval town walls from the area known today as Estonia is irregular and sporadic, grasping all the small bits and analysing them in a larger context helps put all the individual pieces of the puzzle into perspective.

The working foundation of medieval archaeology is archaeological evidence, which as a rule is stratigraphically arranged, embedded in the ground in successive layers. These material remains of humankind, recovered and studied with the appropriate archaeological methods, allows various historical inferences and assertions to be made. These methods have been developed by archaeologists studying prehistoric and early historical periods. Medieval archaeology overlaps with them chronologically. Yet the position of archaeology in studying the Medieval Period is different from that of prehistoric and early historical periods. Researchers of those periods almost exclusively depend on archaeological evidence for the reconstruction of their periods of interest, and accordingly they are almost autonomous in their interpretations. Medieval archaeology, on the other hand, appears alongside numerous other medieval disciplines with their various sources, including textual ones, all reflecting different aspects of the same historical past. From this context springs unexpected new possibilities for researching the archaeological sources, and exploiting these possibilities

demands working closely with neighbouring disciplines² (Fehring 1991, 2). My research has been interdisciplinary in this manner in several cases (Bernotas 2008; 2013b; Kriiska *et al* 2011).

Masonry foundations and walls are one of the more obvious features in an excavation. The study of masonry structures can provide valuable information on subjects such as topography, architecture, construction techniques and, by analysing the materials and methods employed in construction, economics. All excavation necessarily involves the destruction of archaeological features. This is true even of masonry, except in rare cases where the structure is to be preserved *in situ* or dismantled for subsequent reconstruction. As is the case for archaeology in general, the only surviving record in buildings archaeology is normally the field record, which becomes the primary source of information for the study of the structural design and construction techniques after the excavation is complete (Spence 1990).

Archaeologists typically engage new periods by first examining evidence of warfare and conflict, taking note of military artefacts and architecture, before moving onto other themes and options. Perhaps this is because there is something captivating and compelling about warfare and why people fight. Perhaps it is war and conflict leave the most obvious and the most monumental material culture in some periods. Perhaps it is because research questions relating to war and conflict are among the most interesting, challenging, or controversial to face (Schofield 2005, 13). Buildings archaeology is concerned with questions of warfare because town walls can serve a defensive purpose. However, towns and cities themselves have further implications for potential conflict. They typically acquire a larger population than other forms of settlement and store larger amounts of wealth and commodities in proportion to their populations and area.³ They also acquire different social and cultural imperatives, status, and levels of meaning. Towns become more than just centres for the land around them – they transform into spatial and social entities with significant differences from their hinterlands (Hill & Wileman 2002, 52).

² For example, buildings archaeology can be seen as a catalyst when the restoration architect or the conservationist has to mediate between various relationships and values – those of construction, function, aesthetics, and history – at the point where answers are needed to the questions of what to preserve and how. In Denmark, buildings archaeology is regarded as a scientific approach to the historical traces, time layers, and the historical and aesthetic values of a building (Hædersdal 2012, 105).

³ It is not the size of the city that determines its importance to the exploration of urban culture and urban space in the premodern world, but rather how the city dominated the social, economic, and political life of the area (Classen 2009, 5).

Town walls have long attracted the attention and interest of scholars. This was often because of their imposing presence, especially before stratigraphical excavations developed. As they are clearly defensive structures, they well symbolise times of war– as the Middle Ages have always been considered (Gonella 2008, 16). However, in many cases, the construction of medieval walls was driven rather more by the desire to display civic wealth and status than for the real defence (Hill & Wileman 2002, 68).

It has been suggested that medieval urban spaces did not fill with people and buildings organically, but rather as a result of a controlled realisation of a planned spatial model (Urbańczyk 1994, 124).⁴ Walls, as well as being extremely expensive to build and maintain, unduly restricted urban growth. In the developing suburbs, dwellers attracted by the availability of land were vulnerable to attack and to “scorched earth” demolition by the defenders of the walled town intent on securing a clear field of fire (Steane 2001, 195).

City walls did not establish a clear line between “the city” and “the countryside”. The foregoing detailed investigations from Germany have shown that the “urban growth rings” visible in medieval towns are not just the sequence of reinforcement lines. Especially in the early period of cities, substantial populations lived outside of the city walls (Porsche 2000, 175). Therefore, town walls did not demarcate a simple division between the “citizen” and “peasant” populations.

The numerous preserved town walls of the cities founded in the 13th⁵ and 14th centuries make it clear the high priority given to wall construction. Wherever it was possible, earlier wood and earth fortifications were quickly replaced by stone walls. In older towns the

⁴ See also Classen 2009, 121: Urban space in the Middle Ages was not simply limited by the city walls; instead the city’s authority regularly extended far beyond, sometimes even to other cities or whole regions.

⁵ For example, around 1200 many German cities built new town walls (Porsche 2000, 83).

importance of fortifications changes and the responsibility for the repair, maintenance⁶, and security service is entirely borne by the citizens (Porsche 2000, 233).⁷

The military significance of the medieval town walls has sometimes been questioned and their symbolic function has been given prominence instead. The town's fortifications have been seen as a manifestation by the burghers, a symbol of the town's status and a visual demarcation in relation to the surrounding area (Söderlund 2010, 760). However, the sporadic and incoherent way of building the late medieval walls – often taking place in troubled times – does not give the impression that their erection was guided by the aim of representing the city's status (Söderlund 2010, 760–761). Across Europe, periods of crisis, when defences were most urgently needed, were also times when the organisation of labour and supplies was most likely to suffer disruption. By contrast, stable conditions were more likely to produce a wealth surplus which might be channelled into prestige projects (Bond 1987, 92), such as stone walls.⁸

Buildings can speak to us about their history in different ways. It can express itself through its physically visible material, through spatiality enclosed by the material, or through the uses that have been made of the different spaces in the building⁹ (Hædersdal 2012, 117 and the references therein). The study of each case is definitely a good starting point in terms of understanding both the function and functioning of fortifications over the centuries. Nevertheless, material structures should then be considered within a wider scope, so that the

⁶ More on the topic see Porsche 2000, 34: New ways of financing the construction of the town walls are in place since the 12th century. In the documents of the town rights and privileges of many cities, passages can be found that state that the city or the townspeople should facilitate the provision of necessary funds. Sometimes inheritance laws were used in this sense. For example, in the case of an heirless estate, the law stipulated that one-third should be expended on the city's fortifications. Only in the following century was an attempt made to pass the costs of construction to be covered by the citizens, for example by surveys on food and beverage or consumer goods, through the collection of wall duties or, by assigning fines for violent acts in public.

⁷ As example, see Cologne, which, with its vast city walls following the example of Rome, is a fine example of what high standard just the townspeople had to form and the symbolism of their city walls as well (Porsche 2000, 233).

⁸ Among the reasons for questioning the ubiquity of defence functions in England is the fact that the country experience long periods of internal peace after a bout of anarchy in Stephen's reign (1135–54). There were brief episodes of baronial rebellion and peasant unrest (as in 1264–6, 1320–7, 1381, 1450) but in general and in contrast to neighbouring France, Flanders, and north-west Germany, England's towns were not often threatened by external foes (Steane 2001, 204).

⁹ For example, a monk would have a particular understanding of the different buildings of a monastery, an external visitor another. The archaeologist must place himself in both their positions to understand the use of the buildings (Hædersdal 2012, 117–118).

field data can be analysed in the light of socio-political changes and historical events. Such changes might have brought about, on a local or interregional scale, different solutions and developments with relation, in particular, to the diverse relationships between town and countryside (Gonella 2008, 16).

Social organisation of Old Livonia

Between 1136 (when building started on the new choir for the church of Saint Denis, north of Paris, presumably the first Gothic project) and the middle of the 14th century, medieval Europe was in the grip of what amounted to a building boom. The products of this boom still amaze observers today (Prak 2008, 2). It has been estimated that from 1240 to 1300, about 300 new towns were founded every year in Europe.¹⁰ In the 14th century the process slowed and came to a halt around 1400 (Schubert 1992, 381). The great wall-building period in western Europe lasted from the 12th through to the end of the 14th centuries, as construction strategies from foreign lands gleaned from crusading were incorporated into European fortifications (Steane 2001, 195).¹¹

The birth of the medieval towns of Livonia as the result of the German and Danish conquest in the 13th century represented a clear and visible change from the previous period. It can be generally said that urbanisation began in Livonia in the 13th century (Selart 2012, 123; see also Šnē 2002, 263; Ose 1999, 213). In 1202, with the support of episcopal power, the order of the Livonian Brothers of the Sword¹² was founded (Ose 1999, 216).

¹⁰ See also Classen 2009, 9: In central Europe by ca. 1150 the number of major cities had grown to ca. 200 and by ca. 1250 the medieval landscape was dotted by ca. 1500 cities.

¹¹ For older medieval examples see Porsche 2000, 171: In two places in the city of Lübeck, in the west at the shore of Traveufer and on the east near the river Wakenitz, both the stratigraphic context and absolute dating the town wall sections to the 12th century. This could speak for an older city wall. See also Porsche 2000, 55–56: In Regensburg, the continuity between the Roman camp walls and medieval urban development has been noted. Since in the latter 13th century Regensburg received a uniform, large city wall, the city considerably expanded eastward at that time.

The continuity between the Roman-age camp walls and medieval fortifications in Europe deserves a publication of its own, however.

¹² In 1237, this was renamed the Livonian branch of the Teutonic Order (Ose 1999, 216).

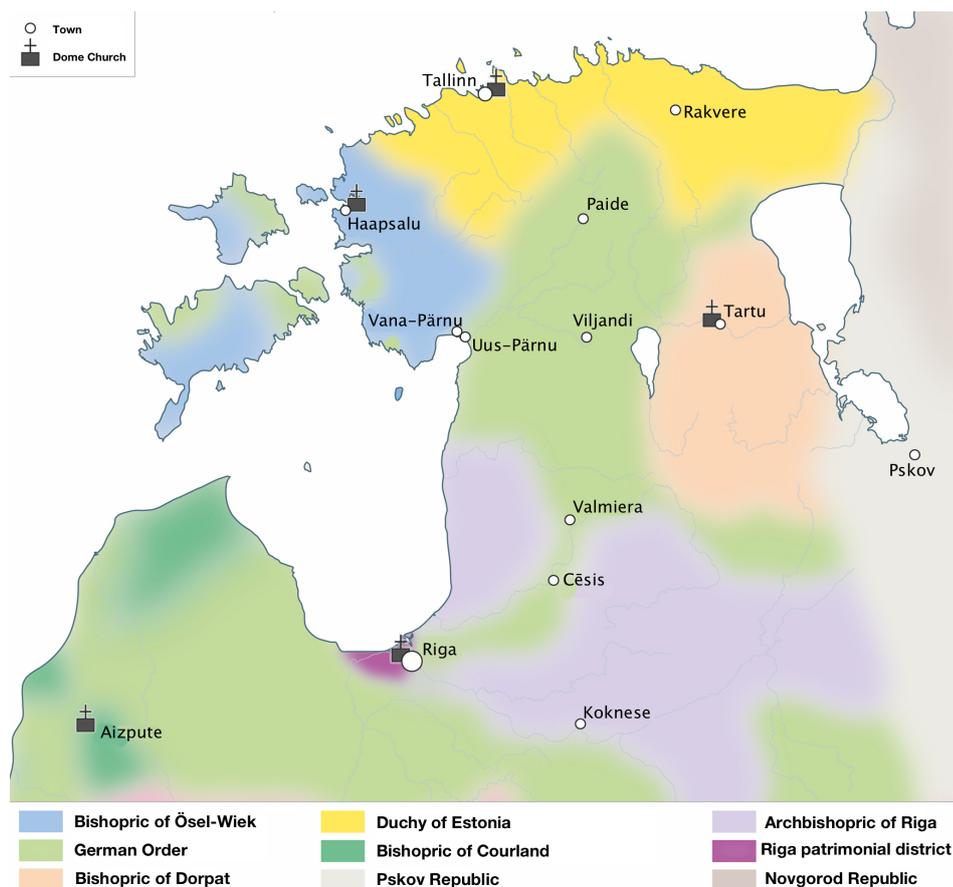


Figure 1. The map of Old Livonia ca. 1300. Circles mark the towns (map from Selart 2012; modified by Rivo Bernotas).

The conquered lands of the Liv, Lettgallian, Selonian, Estonian, Curonian and Semigallians tribes were carved into four bishoprics: Riga¹³, Dorpat, Ösel-Wiek, and Courland (see Figure 1). These ecclesiastical territories were interspersed with the possessions of the Livonian branch of the Teutonic Order, the largest landholder (Kasekamp 2010, 31).¹⁴ Along with the gradual colonisation of the area, stone castles were built (Ose 1999, 213) as administrative centres of their surroundings (Caune 2012, 61). They emerged on the main trade routes as bases of the Livonian Order and bishops. Many German castles formed artisan and commercial centres for the surrounding area. Already in the 13th–14th centuries, some of these developed into towns (Ose 1999, 213).

¹³ Riga was elevated to an archbishopric in 1255.

¹⁴ It has been noted that the colonists were frequently in conflict with one another, especially the bishops and the towns with the Order (Kasekamp 2010, 34; see also Bernotas 2013c, 289–290 and the references therein; Sne 2002, 264).

Together with the newly founded towns, this conglomerate of territories, covering the approximate territory of present-day Latvia and the southern half of Estonia, was known as Livonia.¹⁵ In the north, the territory conquered by Denmark became the Duchy of Estonia (Kasekamp 2010, 31).¹⁶

The map of the medieval towns of Livonia took shape by the mid-14th century and did not change much afterwards (Selart 2012, 123). Feudal relations¹⁷ were introduced in the lands of the Estonian and Latvian tribes under German and Danish colonial rule during the Middle Ages. The conquerors established a network of castles and towns across Livonia.¹⁸

The towns enjoyed flourishing international trade and prosperity during the heyday of the Hanseatic League in the 14th and 15th centuries (Kasekamp 2010, 20). Distance between the two towns in this area was mostly between a hundred and a few hundred kilometres, which was very large distance in comparison to central Europe (Selart 2012, 123). No new towns emerged after the 14th century in Livonia. Why this was the case is difficult to say, but without a doubt one reason was the decrease of the demographic and economic pressure for urbanisation. On the other hand, however, the regent's eagerness to establish new towns dropped as well. The noticeable slowdown in the establishment of new towns in the 14th century was however a European trend, not a phenomenon peculiar to Livonia (Selart 2012, 128; see also Schubert 1992, 381). There is little to no doubt that it was also closely related to the pandemic plague, also known as the Black Death or Great Pestilence¹⁹, which reached Crimea from India in 1347 and was then imported into Venice, Genoa, and Sicily. The disease spread slowly and inevitably from village to village by infected rats and humans, or more

¹⁵ Livonia's nominal head was the archbishop, who received his authority from the Pope in Rome and enjoyed the status of a prince of the Holy Roman Empire of the German Nation as of 1207. The next to be enfeoffed by the emperor was the Bishop of Dorpat, Hermann von Buxhoevden, in 1225, followed a few years later by the Bishops of Ösel-Wiek and Courland. Nevertheless their connection with the Holy Roman Empire remained tenuous (Kasekamp 2010, 31).

¹⁶ Denmark sold its territory to the Order in 1346.

¹⁷ The crusaders formed the new ruling classes. Feudal relations were established, with the new rulers granting land to foreign nobles who, in return, pledged to provide military service whenever required by the bishops and the Order (Kasekamp 2010, 31).

¹⁸ It has been also noted that in Livonia outside of the towns and the network of castles, the presence of the colonists was very sparse (Kasekamp 2010, 31–32).

¹⁹ It had appeared already in 1334 in China, spread westward along the great trade routes in Tauris on the Black Sea, and eventually to made it to Constantinople (Riedel 2005, 117).

quickly from country to country by ships, and eventually killed 20 to 30 million people in Europe: more than one-third of the European population (Riedel 2005, 117).

The plague reached Lübeck in 1350. Whether some vessels from the plague-ridden Lübeck reached Livonia, we have no evidence (Raudkivi 2010, 18). The first message about the plague in Livonia derives from Hermann von Wartberge, who mentions a high mortality rate in 1351 (Raudkivi 2010, 19 and the references therein). The plague had shaped the history of Livonia certainly in the second half of the 14th century. Two disasters caused by nature – the Great famine (1315–1317) and the Black Death – had an impact on Livonia that one in no way can deny (Raudkivi 2010, 20). However, it has been also stated that no data has been found to show that the plague got to the Estonian area (Jögiste *et al* 2004, 463). It is quite evident that with one-third of the European population killed, the plague would have obviously dried up the flow of settlers from German areas to Old Livonia.

Human losses in Germany, either by great famine, or certainly much more by the Black Death, created a new situation where the need for emigration fell off. This influenced the application and execution of the settlement patterns imported to Livonia, mostly the urban society (Raudkivi 2010, 20–21). Several studies have highlighted that in the middle of the 14th century, the phenomenon which commonly is referred as the Germans expansion to the east (*Ostsiedlung*) stopped (Bulst 1979, 56).

The combination of geographical features and its suitability for human settlement was important in the urbanisation process in Livonia. An important role in the beginning of Livonian towns was played by German merchants who remained in the conquered land and demanded privileges. The locations and spatial distributions of urban areas speak of the importance of far trade. Favourable locations were points of junction such as a river mouth (Pärnu)²⁰, water- and roadway intersections (Tartu, Narva)²¹, or ports (Tallinn, Riga, Narva). The location's suitability for constructing fortifications, or its proximity to a standing castle played an important part in the settlement patterns of most of the towns of Livonia (Selart 2012, 123), which again emphasises the cooperation between the lords and merchants. There are both similarities and differences between the networks of pre-German conquest hillforts and medieval towns in Livonia. In some cases these emerged where the castle was located,

²⁰ On the history of Pärnu see also Laakmann 1930; Kivimäe *et al* 1998, 55; Bernotas 2013b, 185–186.

²¹ More on the history of Narva see for example Alftoa 1996, 14; Küng 2005, 52 ff.

such as Tallinn²², Tartu, and Viljandi. In other cases, towns emerged on a more or less empty area, such as in Pärnu, Haapsalu, or Paide (Selart 2012, 124).

As the Livonian towns grew in size and gained wealth, they increasingly sought and obtained greater independence from their feudal lords. They were part of an extended community of towns along the shores of the Baltic Sea and northern Europe, which shared the same values and legal systems, and which enshrined a common language – Low German – in their charters. There was considerable interaction and mobility among the merchants and artisans of these towns (Kasekamp 2010, 36–37). The establishment of trading centres in Livonia was initially led by the German merchants from Visby, but they were soon overtaken by Lübeck, the leading Hanseatic city (Kasekamp 2010, 37).

Medieval towns of Old Livonia

There were six stone-walled towns located in the Middle Ages in the area of present-day Estonia – Tallinn, Tartu, Pärnu, Viljandi, Haapsalu, and Narva (Figure 2; see Chapter 3.1.). Now the above-ground parts of the walls are preserved only in sporadic fragments. The exception here is Tallinn (German: *Reval*), the only town with almost completely-preserved medieval fortifications, which understandably has attracted the attention of the most researchers so far.

Besides those, there were also three medieval non-fortified towns. Vana-Pärnu (originally: *Perona*; in German: *Alt-Pernau*) was granted town rights in 1251 (Selart 2012, 125). The walls of its castle, built of fieldstone and bricks 2–2.5 m thick, are nowadays still preserved in the ground. The castle has been noted to share similarities with Haapsalu Castle (Aluve 1993, 10). The exact location and the existence of the castle is to this day still debatable though.

Paide (German: *Weißenstein*) in central Estonia was granted town rights in 1291 (op. cit. 127). The ruins of the castle of the Livonian Order are still visible today.

Despite the granted town rights, no substantial medieval cultural layers nor remnants of buildings have been found at Paide. Therefore, there is reason to believe that urban settlements were not established there in the Middle Ages (Tvauri 2015).

²² The existence of the pre-conquest castle and settlement is still uncertain though (see Lang 1996).

Rakvere (German: *Wesenberg*) which in 1302 was granted town rights by Danish King Erik VI Menved (Selart 2012, 125). The building of the castle of the Livonian Order had started earlier, in the 13th century (Aluve 1993, 25).²³

There were 11 towns in the Middle Ages in the present-day Latvian part of Livonia (Šnē 2002, 264; see Chapter 3.2.). The medieval walled towns comprise Riga, Cēsis (in German: *Wenden*), Valmiera (*Wolmar*), and Koknese (*Kokenhusen*). By contrast, Limbazi (*Lemsal*)²⁴, Rauna (*Ronneburg*), Alūksne (*Marienburg*), Rūjiena (*Rujen*), Kuldīga (*Goldingen*), Ventspils (*Windau*)²⁵, Bauska (*Bauske*), Aizpute (*Hasenpoth*) and Straupe were designated as open little towns (i.e. not provided with walls) (Caune 2012, 61).

Since the layout of the towns were mainly determined by natural conditions, there is variety in how different towns and castles are laid out. Some towns were spread in a semi-circle around the castle (Riga, Cēsis, Kuldīga), while others were located on a peninsula in front of the castle (Koknese, Valmiera) (Ose 1999, 231). In Riga, the castles were built in the already inhabited place. All other towns in Latvia arose later than the castles (Ose 1999, 216).

There is little material on the medieval topography of other walled towns of Latvia besides Riga. On the basis of the 17th–19th century maps, and some evidence from written sources, we can characterise the main features of the layouts of several towns and their relationships with the castles. In Latvia, some medieval towns were built in such a way to form a joint fortification with the castle (Ose 1999, 218). This feature, called “on the shield” in German

²³ The exact dating is still debated though (Aluve 1993, 25).

²⁴ Of Limbazi, see more Caune 2012, 82–83: Although not mentioned among the fortified cities in the 1555 compiled list of Livonian castles, Limbazi’s town wall is already documented in 1385. There is no direct evidence of the construction of the castle of archbishop of Riga in Limbazi. The first time it is mentioned was in a 1318 document. In the Middle Ages, one of the main roads in Vidzeme, which led from Riga to Rujiena and Viljandi, went through Limbazi. In the 14th century a settlement was built southeast of the castle. A *civis* in Limbazi is mentioned in 1362. Even on the oldest town map from 1663 is the wall located. Limbazi was repeatedly vandalised and burned in the wars of the 16th and 17th centuries. From the medieval building nothing has preserved above the earth. In the city there have been no major excavations, but since 2002, the construction of underground communications has been archaeological supervised. It has been found that the cultural layer is 1 m to 3 m thick. The deepest layer was found in the filled-in moat. In the area between the streets Dailes, Cesu, and Gildes was found the base of the medieval town wall, about 30 meters long. The 2 m thick wall of fieldstone bound in lime mortar has been preserved under the earth at a height of 1.5 m. Its foundations were barely in the original floor – deepened – yellowish clay. As various earthworks have been carried out in the 19th and 20th centuries, the older cultural layer mostly destroyed under the streets of Old Limbazi. Only scarce finds from the 17th to 18th centuries have been found.

²⁵ There has been suggested that Ventspils was also surrounded by a wall, which is also mentioned in written sources; however, archaeological research has not confirmed the presence of the wall. It is possible that the town and a castle were protected by a palisade wall (Ritums 2004, 296).

research (*auf dem Schilde*), features an extension of the castle's side walls along a line, taking advantage of defences provided by a hill or waterway, and is separated from the castle by trenches and walls. This territory, which is basically a bailey, is designated for settlement (Altoa 1978, 51).

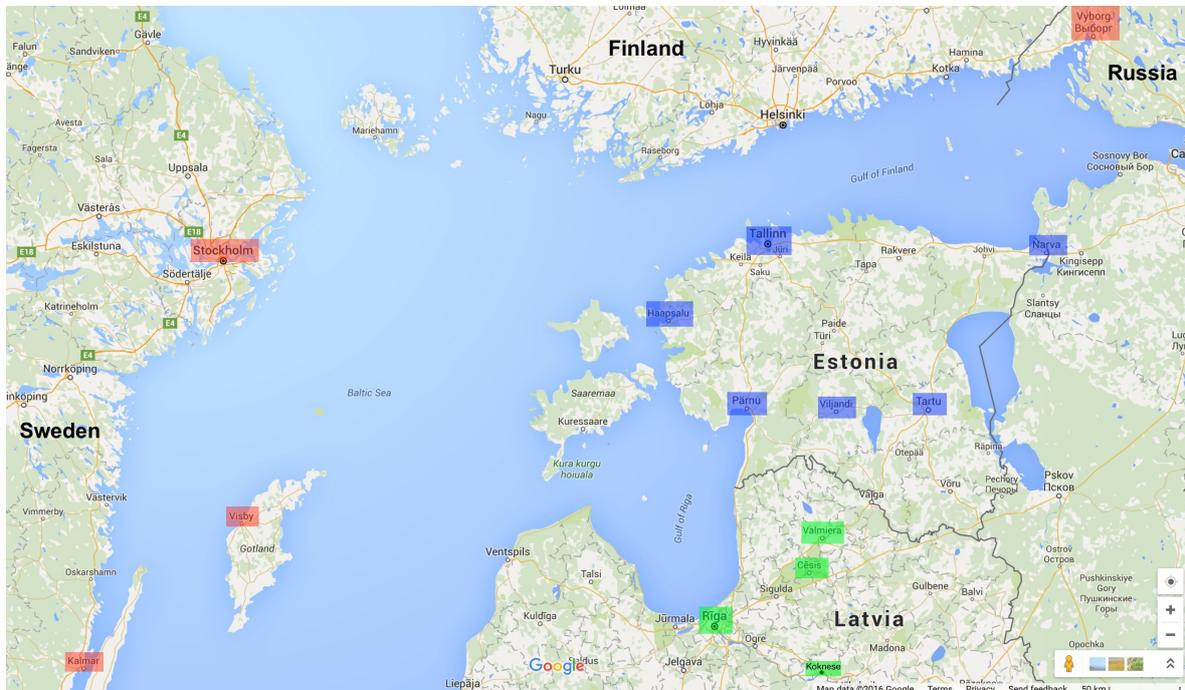


Figure 2. Northern Baltic Sea region and the walled towns discussed in the current research. Estonian towns marked with blue; Latvian towns with green, and medieval Swedish towns with red. Map from Google Maps, modified by Rivo Bernotas.

Cēsis, Valmiera, Koknese, Limbaži, Straupe, Rauna, and Rujiena were completely destroyed during the Livonian and in the Great Northern War. Above the surface only the outer walls of some churches have been preserved from the Middle Ages (Caune 2012, 62–63).

Chapter 1. Building materials

In this chapter I summarise my article that covers the medieval brick making issues in the Estonian area (Bernotas 2013a) and provide an overview of the main building materials used in the medieval stone masonry constructions in Estonian area: limestone, glacial erratic, and bricks.

The materials used for building town walls and stone masonry structures in the Estonian area depended largely on the natural resources available in the respective locations. Limestone is used extensively in the construction of town walls of Tallinn, Narva, and Haapsalu. On the other hand, the town walls of Tartu, Viljandi, and Pärnu are mostly made of fieldstone. Similarly, as there are no abundant clay layers in the northern and western part of Estonia, brick is seldom used in the construction of the town walls of Tallinn, Haapsalu and Narva, but it is extensively used in the constructions of town walls of Tartu, Viljandi and Pärnu.

The archaeological research conducted in Latvian small-towns have resulted in the first direct finds of the town walls there. Similarly to Estonian area, it was found that the builders used locally obtained building materials: dolomite stones in Cesis and fieldstones in Valmiera and Limbazi (Caune 2012, 91).

1.1. Limestone and lime mortar

There is almost nothing known about the history of lime production in the Estonian area before the 19th century. So far, there is little to no archaeological overview, as to where and what kind of antiquities related to the production of lime are preserved and what their value is as a source of history and as cultural monuments (Saimre & Tvauri 2010, 4).

Limestone can be considered as the most important building material because it was used to bind together masonry units. The type of stone masonry used (brick, fieldstone, or limestone), and the volume and size of the project, depended on the availability of lime in the region. Lime mortar was probably introduced in Estonia during the 13th century by German and Danish crusaders (Tvauri & Saimre 2009, 193; see also Kruus 1933).

In Medieval Period and the modern era the main building materials used in Estonian towns, and in numerous castles and churches were stone and brick, which were tied with mortar. As

northern, western, and central Estonia have abundant supply of limestone – raw material for making mortar – then building lime was probably prepared for construction purposes on-site in those regions. Considering the volume of the medieval construction, lime production was likely a very large-scale industry that left behind recognisable traces on the landscape still visible today, such as limestone quarries and lime kiln locations (Saimre & Tvauri 2010, 4–5).

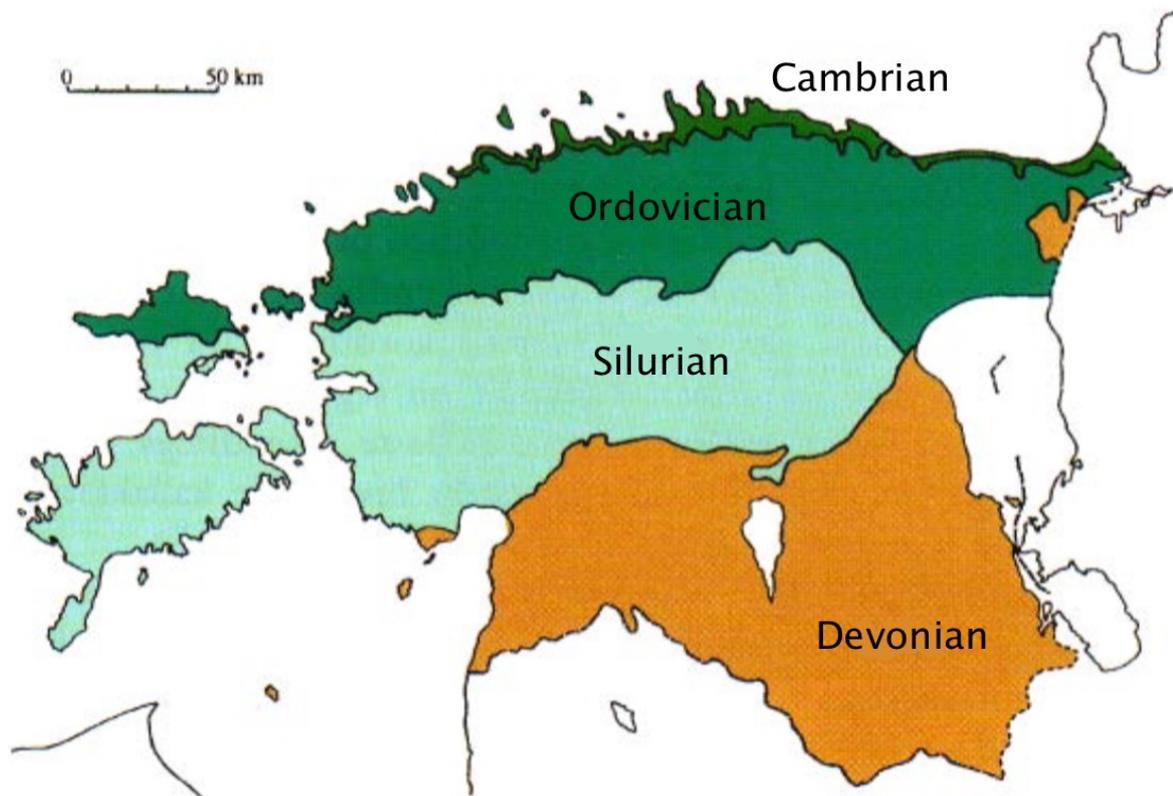


Figure 3. The geological map of the bedrock of the Estonian area. Limestone can be found in the Ordovician and Silurian systems (Puura & Veski 2004, 51).

There are also a few hints about limestone use in the historic data. Limestone was used both for building and for making lime mortar, and in plasters, lime wash, paints, and agricultural soil additives (Tvauri & Saimre 2009, 193; see also Leetmaa 2000, 149; Kruus 1933). Estonia is considered to be relatively rich in limestone, as the surface of bedrock in northern, western, and central Estonia is mostly of limestone (see Figure 3). To a certain extent there are limestone layers also in the south-easternmost part of the country (Leetmaa 2000, 149). Kursi parish is the southernmost area where abundant limestone can be found (see Figure 4). Therefore it was an important source of lime for all of southern Estonia (Tvauri & Saimre 2009, 193; see also Kruus 1933). South of the Pärnu-Navesti-Puurmani-Mustvee line,

limestone is rare. Limestone fragments used in lime burning were carried to this area during the Ice Age from northern Estonia. Usually enough limestone was found in the fields during ploughing or by stone gathering to satisfy the needs of local lime production (Leetmaa 2000, 149).



Figure 4. Lime production facilities in Kursi parish identified by the end of 2009. Red triangles – preserved limekilns or remains; Blue triangles – limekilns mentioned in written sources but indistinguishable on the landscape; Yellow circles – limestone quarries (Tvauri & Saimre 2010, fig. 1.)

The buildings of Tallinn, especially the city walls, towers, and other defence systems required a massive amount of building material in the form of timber, limestone, lime, bricks, roof-tiles, and firewood (Alamaa & Kivi 1966, 123). The entries of an invoice book from medieval Tallinn reveal that construction work was halted during cold season (Kaplinski 1975, 334).²⁶ The city council organised the cutting of building timber and firewood as well as transporting these to the city by rafting. Additionally, the council organised limestone hewing for

²⁶ More on the building expenses see Kaplinski 1975. 338–341.

construction use, and limestone cutting and transportation from its source deposit in areas outlying the town to the town's lime kilns. The town council also organised the lime burning and mortar production. The city's involvement is also evidenced by the fact that brick and roof tile production was organised in a brickyard owned by the city (Alamaa & Kivi 1966, 123; see more Alamaa & Kivi 1966).

During the Medieval Period,²⁷ lime-burning from limestone was carried out in the Tallinn's lime kilns, located at Kõismägi in front of the gate Suur Rannavärv (Kivi 1966, 137). Entries in the city's oldest account books suggest that the town council of Tallinn had two lime kilns in the second half of 14th century, one of which at 1372 was referred as the "new lime kiln". The latter dates also confirm substantial changes in the town building and planning in the 14th century.

The limestone needed for burning lime was transported from the lime quarry, located at the town area Lasnamäe (in German: Laaksberg), and the firewood delivered from the islands of Naissaar (in German: Nargen) and Aegna (in German: Wulf) (see Bernotas 2013a, 143; Figure 3). The amount of limestone known to be transported to the lime kilns gives information about of the production of lime, which appeared to be high. It was also used for sale locally and even beyond Tallinn, but sometimes there was an acute shortage of lime (Kivi 1966, 138). During periods of lime shortage, lime was bought from outside the area and imported in (Kivi 1966, 139).

The sand required for the manufacture of mortar was transported from the sand mountains near Lake Ülemiste and also from the area next to the road to Pärnu. Sand for mortar was transported also in boats from the island of Naissaar (Kivi 1966, 142).

In addition to the lime production information from Tallinn, some historical data originating from the late Middle Ages or the beginning of the Modern era is known from the Pedja River area near the river Emajõgi. As noted, the limestone deposits of central Estonia are relatively poor in usable limestone. High-quality limestone is found to a greater extent around the branch of the river Emajõgi in the Pedja River area (Kruus 1933, 177–178). Lime burning in the Pedja River area district originated in the relatively distant past. The oldest historical sources, which also apply to the Pedja district, especially to the Kursi area, do not provide any

²⁷ More is known about lime production from the modern era. For example, lime was brought to Tallinn from the lime kilns of Saaremaa and Hiiumaa, and from Stockholm in 1671 for the renovation of the St. Nicholas Church (Kivi 1966, 140). For more on the lime production in the modern era, see also Leetmaa 2000.

data about lime burning or the existence of lime kilns in this area. A Swedish cadastre from the modern era (1599–1601) notes that the Kursi area had two lime kilns. Although the location of those lime kilns is not mentioned, it is likely that they were already then in Tõrve, at the most southern part of the district bordering the Pedja River, as close as possible to Tartu, the main user of the lime produced in Estonia (Kruus 1933, 178; see also Perens 2005).²⁸

Despite of the lack of archival data, it is known that in the second third of the 17th century the main problems associated with construction were related to transporting the lime to Tartu, namely, the shortage of transporting animals and their constant fatigue, and the never-ending problems with poor roads. Therefore it is understandable that for transporting lime, waterways were used as much as possible. Lime was transported with horses or boats down from Puurmani manor, around 15 km from the lime kiln, and then sent on barges along the river to Tartu. Inevitably, the lime transportation was also carried out by using horses, obviously, primarily in the winter (Kruus 1933, 185).

1.2. Glacial erratic

The main building material in southern Estonia was glacial erratic (fieldstone), but the archaeological material says little of how fieldstone was worked. As the town walls and towers of Tartu, Viljandi, and Pärnu consisted primarily of large granite boulders, it is definitely a subject worth investigating more in detail.

Fieldstones were carried to Estonia by the continental glacier.²⁹ In general, it can be said that fieldstone is a hard and strong stone suitable for use as a building material, which can be used in underground and other supporting structures due to its density and low porosity. These properties also mean that fieldstone's thermal conductivity is high, which is why it is not suitable for building dwellings. It has most commonly been used to build stables, cellars, barns and, to a lesser extent, taverns and other public buildings (Peebo & Rennu 2013, 74).

²⁸ In the areas at higher altitudes, in Härjanurme and Saduküla, good-quality limestone belonging to the Silurian strata in the middle part of Jõgeva layers was burned. In the lower areas, in Tõrve, however, the clean limestone was only few metres in thickness. Limestone constructions are few in this area, and also the lime kilns built were predominantly made of granite. This suggests that there was little limestone available that was suitable for building (Perens 2005, 48). More on the geology of the area, see Einasto 2007, 12.

²⁹ For further reading see Pirrus 2009.

Even though there is very little known about the usage of glacial erratic in the archaeological material, what is known raises several questions. Firstly, how far away was the origin site of the boulders used in southern Estonian buildings – castles, town buildings, stables, and so on? It is quite safe to assume that the glacial erratic came from the neighbouring and nearby parishes. I would also suggest that it is likely that the neighbouring peasants brought stones to the town for sale as well as for some kind of tax.

Since the rocks have been used in incredibly huge amounts, it might be assumed that these were not gathered together at once, but rather over an extended period of time. It is likely that transportation took place in the winter, as it was convenient to use the sleds. Considering the average weight to volume ratio of glacial erratic (2.7 tonnes per m³ (Peebo & Renno 2013, 75), it can be said that even the building of the walls of the small towns required tens of thousands of tonnes of stone.

It has been noted that in Europe the transportation costs led stone quarried on the site of the building project to be preferred. In the early fourteenth century, land transport of stone across five or six miles cost the equivalent of the stone itself. It was obviously cheaper to carry it across water (Prak 2008, 8) and therefore local materials were preferred.

1.3. Bricks

1.3.1. Brick making origins in Old Livonia

Out of building materials used in the Estonian area, the most is known about brick making. In the Baltic area brick appeared in the twelfth century, and it was not before the second half of the thirteenth that builders first created Gothic brick churches in the region, over one hundred years after the creation of the Gothic style in France (Prak 2008, 23 and references therein).

Lübeck, as one of the oldest German cities founded in the formerly Slavic Baltic Sea area, had become the largest German trading town in the Middle Ages on the Baltic Sea.

The town was founded in 1143 and the first traces of using bricks as a new building material in secular architecture derive from the end of the 12th to the first decades of the 13th

century.³⁰ The oldest buildings made of brick were clerical and official ones (Rieger 2014, 39).³¹

Between the 1180–90s and the first part of the 13th century, the first brick buildings were established in Pomerania, Pomerania, and Lower Silesia, initially parallel to fieldstone or ashlar masonry. The earliest examples of brick use come from the ecclesiastical-monastic context. It seems that in the middle and third quarter of the 12th century, in the early times of monastery founding, brick buildings were not yet common in Pomerania. The important role of the monasteries for the proliferation of brick technology is evident also from the fact that most archaeologically documented brick kilns – albeit not before the 13th century – belong to the monastic context. Brick technology spread apparently to Pomerania from Denmark, where brick was already used in the 1160–70s. The monasteries played a leading role in the innovation, dissemination, and economic development of brick production and use (Biermann & Herrmann 2014, 52 ff.). The brick used in buildings in Lübeck also bear evidence of trade relations, the analysis of limestone found from house remains at Braunstrasse, demonstrate the very specific composition of corals that are common only to Gotland. In addition, written sources mention the trade relations between Gotland and Lübeck in 1161, so it is conceivable that the bricks came as a kind of ship-ballast to Lübeck (Rieger 2014, 46). In the Middle Ages, when the economic ties with Germany and other Hanseatic areas (which also included Tallinn and Tartu), were very close, this type of brick trade might have been quite lively. Moreover, as practice shows, other ceramic products were imported en masse. These imports, however, could not have been in particularly large scale because of the small ship carrying capacities of the time. Since the transport costs would have driven the brick price very high, the builders would have preferentially choose other materials (Tamm 1974, 53).

³⁰ Dominating the early history of Lübeck is the castle on the north side of town, erected on the only land access to the peninsula. This dominated the later city hill already in Slavic times and was built after the German conquest of 1143. Economic and demographic growth led to the flourishing of this settlement which soon expanded. By the end of the 1170s it is likely that the settlement had progressed to the east to the shores of the Wakenitz. In the early 13th century, in Lübeck, like in many other cities in this period, large city walls were erected that included all the parts of the settlement. Perhaps this has been the town wall, the building of which actually started in 1217 under the Danish King Waldemar, that chroniclers reported from the late Middle Ages (Porsche 2000, 174).

³¹ The oldest dated bricks are from the cathedral's choir, dating around 1176 and 1181. This date roughly converges with the earliest phase of Lübeck's city walls, having thermoluminescence dates around 1181 (Rieger 2014, 39).

1.3.2. Medieval brick making in Estonia

As mentioned earlier, the emergence of towns in the 13th century was extremely important to the development of architecture in the territory of Estonia.³² In southern Estonia, where there was a shortage of limestone, they were forced to use other building materials. The natural materials used in the south were boulders; however, in tandem with boulders, the building material used most extensively was used brick (Tamm 1974, 6–7). Brick was easy to produce in standardised shapes and sizes, which allowed for regular, structurally coherent masonry and less massive walls than boulders allow, thus reducing the amount of material needed. Additionally, brickyards were rented out or leased for clay exploitation and brick production in Europe (Debonne 2014, 17–18), as the prohibitive upfront investment of production facilities for brick making meant that most brick makers merely used the ones the city provided when they were needed.

As with any problems relating to the history of building materials, questions concerning building bricks are virtually unexplored or covered only slightly. Also the history of brick production has been studied briefly, where the issue has been addressed in relation to either the economic or architectural history; however, due to the small amount of data in the archives,³³ the research is essentially limited to the more recent period (Tamm 1974, 3 and the references therein).³⁴ Although there are some archaeological finds related to brick making, still even on a brief examination it is clear that a large majority of brick making sites must have been destroyed (Haak & Heinloo 2007, 35). In Estonia there has been also an attempt at

³² The ancient architecture of Estonia did not have lime mortar technology until the 13th century.

³³ In the territory of Estonia data concerning the brick manufacturing technology and installations of the brickyards dates no earlier than the 19th century (Tamm 1974, 25).

³⁴ In addition to written sources from the 14th century from Tallinn (Bernotas 2013a, 142–143), a note from Narva dates to the 1430s (Süvalep 1936, 63; see also Tamm 1974, 7; Bernotas 2013a, 151), which, however, does not explain whether the brickyard was built at that time. It is known that in the 16th century it was in operation (Süvalep 1936, 292). The more in-detail notes about brickyards come, however, from the late 16th century. Brickyard from the neighbouring areas of Tartu, Raadi, and Tähtvere are mentioned. In 1590 the brickworks at Kursi was given to the town of Tartu. Near Viljandi, a brickyard is known from Parika village, where the Master of the Order donated the plot for this in 1533. This brickyard operated until the Livonian War. Brickyards from the 16th century are known from Põltsamaa and Tarvastu. All the rest of the notes from brick making in Estonia derive from the later centuries (Tamm 1974, 8–12 and the references therein).

dating historic walls by the measurements of the bricks³⁵ but without a result (Tamm 1974). This method should be used only with extreme caution in comparison between structures over a wider area (Pela 2014, 68).

The beginning of brick making in Tartu has been suggested to date to the 13th century, as supposedly the building of town wall and churches needed building material (Haak & Heinloo 2007, 31). Based on my research I have suggested that the beginning of brick-making clearly correlates with the beginning of the construction boom in Estonia in the 14th century. In the course of the construction boom, the town areas were re-planned and the construction of the town fortifications, stone churches, and stone houses had started (Bernotas 2013a, 151–152). Similarly for example in Europe, the appearance of brick in Brussels is linked with the establishment of large urban projects, particularly the construction of the second town wall.³⁶ These testimonies assume local production, but today we cannot yet define the extent and quality nor the status of the contractors who were responsible for it. We can cautiously say that it concerns a relatively upper social group. Brick production requires indeed specialised trades for its manufacturing, infrastructure, tools, and fuel (Sosnowska 2014, 36).

Multiple similarities are clear in the location choice of the different brickyards. As we can see, the brick manufacturing complex in Tartu was located right outside of the town wall and around 200–250 m from the river Emajõgi (see Figure 5). Similarly, the brickyard on the Kopli peninsula in Tallinn was near the coast, to which the wooden rafts were transported. Most important for the location of the brickyard was the existence of the clay layers on the spot and the proximity to the consumer. Evidence shows that the waterway provided transportation for firewood (Bernotas 2013a).

³⁵ This method has also had a wide application in architectural and archaeological studies conducted in Poland. In addition to their value in dating sites, brick measurements have also been used to identify and distinguish the production of construction workshops operating in central Poland (Pela 2014, 68).

³⁶ The appearance of brick in Brussels is later than in the county of Flanders and in the northern Low Countries, as the first archaeological evidence does not go back beyond the 14th century, except perhaps in one case of the second half of the 13th century (Sosnowska 2014, 36).

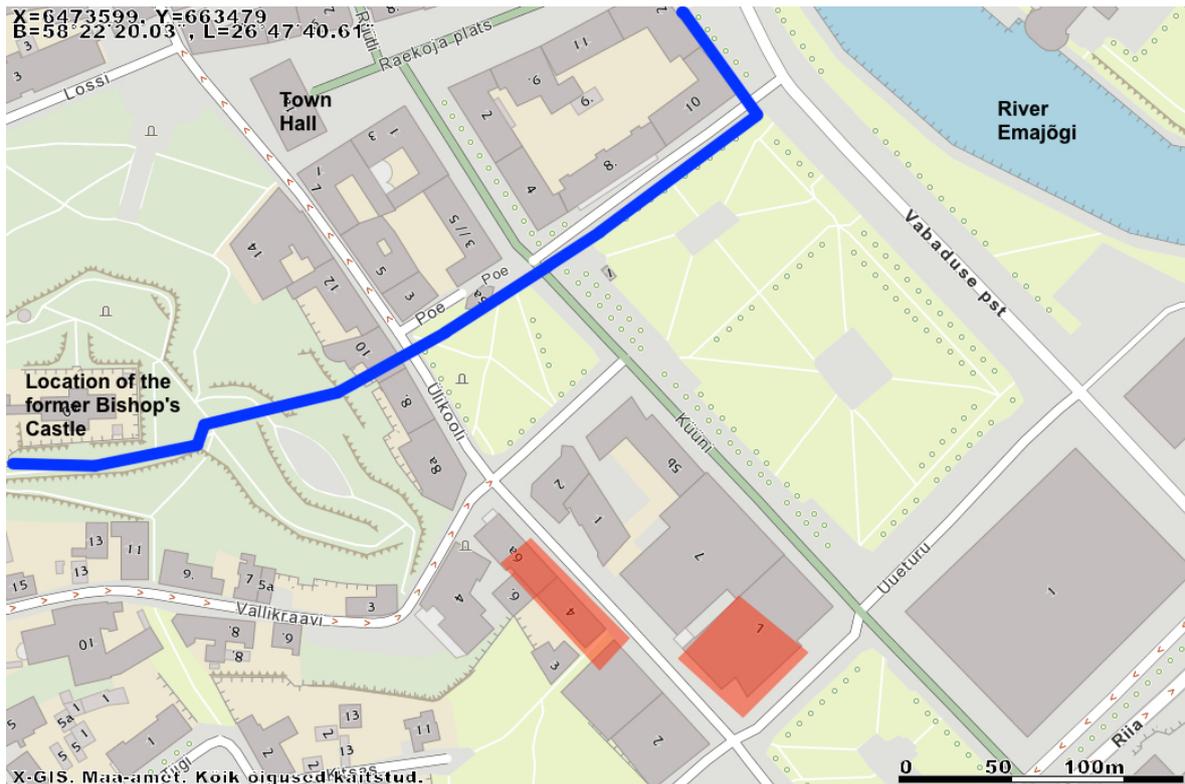


Figure 5. Location of the medieval brickyard on the contemporary map of Tartu. The areas where brick-making facilities have been found are marked with red. The location of the town wall is marked with blue. Map from the Estonian Land Board website www.maaamet.ee; modified by Rivo Bernotas.

In Flanders in the 14th century, the brickyards were located either close to the building sites or a navigable waterway³⁷ (Debonne 2014, 21). In Brussels also the *intra muros* locations have been mentioned,³⁸ said to have been located on very sparsely built land (Sosnowska 2014, 29). It appears that the explosive rise in the popularity of brick from the 13th century onwards

³⁷ For a comparative example see also Rentzel 2002, 184: Building materials like limestone and sandstone were mostly exploited in deposits close to the riverside in the Upper Rhine Valley between Basel and Rheinfelden, which emphasises the significance of the rivers Rheine and Wiese as transport routes. The mortar analyses proved that quicklime was produced in the Triassic limestone quarries situated above Basel. After burning, the quicklime was transported to the building site, probably by boat, like the limestone. See also Prak 2008, 8: The first implication was that stone was preferably prepared at the quarry, rather than at the building site, whenever the two were situated far apart. Otherwise, transport costs would be wasted on hauling excess material.

³⁸ Brick factories in Brussels, dated to the late 14th century (Sosnowska 2014, 29).

in medieval Flanders may have been related to innovations in other branches of the building industry there (Debonne 2014, 23).³⁹

In the case of Estonia, the area around Viljandi has been said to lack suitable clay for the production of bricks, and the bricks for the construction of the castle were transported from afar (Tamm 1974, 7–8). However, we might be sceptical about this theory. First, drilling results have shown the substantial natural clay layers in the area of the town wall's moat (Tvauri & Valk 1997, Figure 7; Valk 1996, 10); recent fieldwork conducted outside of the medieval town revealed a large supply of natural clay layers in the northeast part of town as well (Bernotas 2016a). Second, traces of brick-making have been found in the immediate vicinity of the medieval town wall in Viljandi: two trenches filled with mortar crumble and fragments, brick residue, and roof tiles and their pieces. It is remarkable that there were no traces of mortar on the bricks and tiles. Some of these had been distorted to the point of being unusable or re-burnt. The production waste of bricks and roof tiles points to the existence of a medieval brick-firing place in the vicinity (Tvauri 2010, 159). Based on the stratigraphy it was concluded that the trenches were dug soon after the construction of the town wall (Bernotas 2013a, 146 and the references therein). The beginning of the construction of the town wall of Viljandi is suggested to date to the 14th century⁴⁰ (Bernotas 2013c, 18).

The introduction of brick buildings in Tartu has been previously dated from the end of 14th century to the 15th century. Based on the information discussed in my article, the introduction of brick buildings in Tartu can be traced to the early 14th century (Bernotas 2012, 164). Presented dates about Tartu also support the hypothesis that the construction of the town wall

³⁹ The seemingly sudden introduction of brick in Flanders in the early 13th century probably the result of a technical adaptation of existing tile production techniques, in order to respond to new demands from the building industry in a society undergoing intense economic and demographic growth. In this environment, monastic communities were no longer the main patrons of architecture; construction progress was now also driven by the flourishing cities of the county. As Bruges developed into an international trading centre in the course of the 13th century, the surrounding area experienced formidable economic growth. As in Bruges, the second half of the 13th century marks the breakthrough of brick, coinciding with the prosperity of the trading towns along the Zwin, the natural channel connecting Bruges to the North Sea. Excavations in Ypres, once the third largest city in medieval Flanders, suggest a popularisation of brick in the second half of the 13th century. By 1300, brick was a well-established building material in most of Flanders, although some regions lagged behind (Debonne 2014, 13 ff).

⁴⁰ It has been noted that whatever the situation was before ca. 1250 in Viljandi, the town formation has been rather intense since then. If habitation had started in the area of the market square even before 1250, it clearly saw an increase during the period 1250-1350. It seems likely that the inhabited areas were originally rather small and these were few and far between. However, it still seems that the whole area surrounded by town wall had not been inhabited even by 1300 (Haak & Russow 2013, 73 ff).

began in the first half of the 14th century. Brick-making was essential for the development of the medieval urban townscape, as the old-fashioned wooden buildings presented a constant fire hazard. Only a limited amount of archaeological evidence of medieval brick making has been found in Estonian towns besides Tartu. This suggests that brick was a rather expensive building material in Estonia, limited only to castles and buildings in the townscape such as fortifications, ecclesiastical buildings, and private houses (Bernotas 2013, 152).⁴¹ During the Middle Ages bricks were also used in the building of different stoves and furnaces (Haak & Heinloo 2007, 37).

1.3.3. Workers

Even though there is little information preserved about brickmakers, it seems probable that like the case of the stone-carvers⁴² of Tallinn, the master⁴³ brickmakers were locals (Kangroopool 1992) as well as foreigners who worked outside their hometown and country boundaries⁴⁴ (Bernotas 2013a, 152). Although the percentage contribution of the building industry to the economy as a whole cannot be established with any precision in the European context, it must have been substantial. It has been suggested, that around five percent of the urban workforce were builders, and perhaps as much as 10–15 percent of the industrial workforce was employed in the building industry. Obviously, not all of this was spent on churches (Prak 2008, 5 and the references therein).

⁴¹ On the other hand it has also been assumed that brick may have been a second-rate choice in terms of prestige, but from an engineering point of view it provided builders with a quality material (Prak 2008, 23).

⁴² For the organization of the masons in Sweden see Hædersdal 2012, 114–115: Model A shows how a workshop may have provided stonemasons who travelled to different parts of Östergötland. Model B shows how a quarry may have functioned as a centre for the distribution of dressed stones. Model C shows how stonemasons may have travelled from one building site to another.

⁴³ A comparative example from Flanders suggests that technical exchange between stonecutters and brickmakers was very likely (Debonne 2014, 19).

⁴⁴ For the local example see Kaplinski 1981, 26: Of the building masters in Pärnu in 1554 civil rights were given to five German joiners and carpenters, to 12 non-German joiners, carpenters, and wood sawers, and to 23 workers from the countryside. The above figures speak for intensive construction activities in town, and as confirmed by a significant number of entries in the town book, the town council took the fortifying of the town quite seriously in those years. For comparative examples see also Malm 2014, 74: Most probably Sweden gradually developed brick-working forces of its own. But it should be remembered that members of brickworking forces belonged to an ambulating profession. A brickmaker could move from a job in Sweden to Denmark or Germany.

In medieval Sweden,⁴⁵ those who initiated building in brick always came from the social elite.⁴⁶ The king, members of the royal family, or members of the church were the first to use brick as a building material. Gradually, changes in the society and its socio-political life led to the emergence of builders from different social classes (Malm 2014, 74). For example, from the first part of 15th century onwards in Tallinn, it is known that almost all of the stonemasons were locals (Kangroopool 1980, 97).

Moreover, any large-scale building activity was not carried out as some isolated phenomenon, but rather was executed on the basis of the capacity of the town as a whole to facilitate construction. The main factors that regulated the construction queues of the city were the access to skilled labour and building materials (Kangroopool & Lumiste 1977, 272).

1.4. Summary

The materials used for building town walls and stone masonry structures in the Estonian area depended largely on the natural resources in the respective locations. In the construction of town walls of Tallinn, Narva, and Haapsalu, limestone is used extensively. On the other hand, the town walls of Tartu, Viljandi, and Pärnu are mostly made of fieldstone. Similarly, as there are no abundant clay layers in the northern and western parts of Estonia, there is little brick used in the construction of the town walls of Tallinn, Haapsalu, and Narva, but it is extensively used in the constructions of town walls of Tartu, Viljandi, and Pärnu. Similarly to the Estonian area, the builders in the Latvian area used locally obtained building materials.

There is almost nothing known about the history of lime production in the Estonian area before the 19th century. So far, there is little to no archaeological overview as to where and what kind of antiquities related to the production of lime are preserved and what value they may hold as a source of history and as cultural monuments. In the Middle Ages the main building materials used in Estonian towns and in numerous castles and churches were stone

⁴⁵ The oldest brick buildings in Sweden are dated to the first half of the 13th century. Once brick began to be used as a building material in Sweden, the material quickly gained popularity. During the second half of 13th century several brick cathedrals were built (Malm 2014, 71–72).

⁴⁶ From the study it appears that masons in Sweden, during the first half of the 12th century, were contracted by the social elite to build the first stone churches in the region and therefore used to travel between the building projects. During the period 1140-1250, the building of stone churches increased immensely, which meant that several quarries could have provided the building sites with stone. It is not impossible that the stone was worked in the quarry (Hædersdal 2012, 114 and the references therein).

and brick, which were joined with mortar. As the northern, western, and central areas of Estonia have an abundant supply of limestone – raw material for making mortar – then building lime was probably prepared for construction purposes on-site. The southernmost area of Estonia where abundant limestone can be found was Kursi parish. Therefore it was an important source of lime for all of southern Estonia.

In medieval Tallinn the lime-burning of limestone was carried out in the town's lime kilns. From written sources appears that the town council of Tallinn had two lime kilns in the second half of the 14th century, which also confirm the substantial changes in the town building and planning in the 14th century in Old Livonia evidenced in the archaeological record.

The town council organised the cutting and transportation of limestone, as well as the cutting of building timber and firewood and rafting them to the town. They also organised the burning of lime and producing mortar. During periods of lime shortage, lime was bought and imported from outside the town. Also some historical data about lime production is known from the Pedja River area near the river Emajõgi.

The main building material in southern Estonia was glacial erratic (fieldstone), but the archaeological material shows nothing of how fieldstone was worked. In general, it can be said that fieldstone is a hard and strong stone suitable for use as a building material, which due to its density and low porosity can be used in underground and other supporting structures. These properties mean that fieldstone's thermal conductivity is high, which is why it is not suitable for building dwellings. It has most commonly been used to building stables, cellars, barns and, to a lesser extent, taverns and other public buildings. It is likely that peasants in areas neighbouring the towns brought stones to the town for sale as well as for some kind of tax. The rocks have been used in such incredibly huge amounts that these were not likely to have been gathered together at once, but rather over an extended period of time. It is likely that transportation took place primarily in the winter as it was convenient to use the sleds. Considering the average weight to volume ratio of glacial erratic, it can be said that even the building of the walls of the small-towns required tens of thousands tonnes of stone.

As with other aspects of the history of building materials, questions concerning building bricks are virtually unexplored or covered only slightly. According to the current research the beginning of brick-making in Estonia clearly correlates with the beginning of the construction

boom in the 14th century. During the course of the construction boom, the town areas were re-planned, and the construction of the town fortifications, stone churches, and stone houses had started. From Estonia it has so far been suggested that the area around Viljandi lacked suitable clay for the production of bricks, and the bricks used there were transported from a distance. However, this suggestion is questionable given that drilling results have shown the substantial natural clay layers in the area of the town wall's moat, and the recent fieldwork conducted outside of medieval Viljandi revealed a large supply of natural clay layers in the northeast part of town as well.

The production waste of bricks and roof tiles points to the existence of a medieval brick-firing place in the vicinity of Viljandi, thereby demonstrating medieval brick-making. From the stratigraphy it was concluded that the trenches were dug soon after the construction of the town wall. The beginning of the construction of the town wall of Viljandi is tentatively dated to the 14th century.

Even though there is little information preserved about brickmakers, it seems probable that like the case of the stone-carvers of Tallinn, the master brickmakers were locals as well as foreigners who worked outside their hometown and country boundaries.

Chapter 2. Changes in the townscape

It is quite obvious that projects as enormous as surrounding the towns with walls could not just happen without any related events on the townscape. Therefore it would be safe to assume that this undertaking would be connected with different changes in the medieval townscape. In the current context, two events are clearly distinguished as correlated to changes in medieval town planning: the building of cesspits and stone houses.

In the current chapter I will first examine the waste management problems that were related with the re-planning of town areas in medieval Old Livonia and, as said, concentrate on the cesspits. Secondly stone housing in Tartu will be discussed.

2.1. Waste management

2.1.1. Cesspits

According to excavation reports, over 40 medieval cesspits⁴⁷ have been found in Tartu. Several medieval cesspits have also been documented during the archaeological surveillance of the cultural layers, but these have not been studied in detail.⁴⁸

Cesspits are amongst the most interesting objects of study from medieval Tartu as they are rich in finds and possess enormous scientific value. Although single medieval and modern-age wooden and stone cesspits have been excavated in other places in Estonia⁴⁹, they have been found nowhere in such large numbers as in Tartu.⁵⁰ The finds recovered from cesspits in

⁴⁷ In different sources the terms “latrines”, “waste-box”, “waste-pits” etc. have also been used.

⁴⁸ One of the source categories that provides very detailed and far-reaching insights into the everyday life of the Middle Ages are sewers and wells; however, the information content of these sources is too often not adequately explored (Schütte 1986, 237).

⁴⁹ For references see Bernotas 2012, 155.

⁵⁰ It has been found that especially the large and medium cities with increasing population growth struggled in the Middle Age with waste and wastewater problems that demanded new solutions. In the smaller towns these problems could probably be handled with relative ease, as a rule, especially in the vicinity of natural waters (Feldhaus-Stephan 1995, 310). Perhaps that might be one of the reasons why cesspits were so uncommon elsewhere, as most of the rest of the Old Livonian towns were definitely small-towns by medieval standards (see Bernotas 2013b, 196).

Tartu, and the cesspits themselves, have survived remarkably well.⁵¹ The use of cesspits spread to the Estonian area from German towns⁵², where the first mention of large wooden boxes in Lübeck date to the 13th century.⁵³ Simultaneously with paving the streets, the tradition of building wooden cesspits in the courtyards of houses began there. The cesspits looked similar to wells. They were used to throw away junk, as well as for latrines. Earlier cesspits were of wooden construction, but from 14th century onwards the cesspools were often also lined with bricks (Bernotas 2012, 155 and the references therein).

Wooden cesspits from Germany have been noted to be more often square-shaped than round (Schütte 1986, 241–242). In Greifswald, mostly oak and less frequently beech, alder, and ash were used as building timber for the cesspits. Pine is first used to an increased extent at the beginning of the 14th century (Heußner & Schäfer 1999, 255; 274; 281–282). Most of the investigated cesspits of Tartu have so far been found made out of pine.

The diameter of the large German cesspits exceeds 3–4 m⁵⁴ and the depth is rarely little more than 6–8 m. The average cesspit is often less than 2 m in diameter and less than 4 m deep (Schütte 1986, 241–242), quite similar to most of the cesspits found in Tartu. The latrines were rarely located directly along parcel boundaries and usually were a small distance from the neighbouring properties (Heußner & Schäfer 1999, 276).⁵⁵ There has been some suggestion that several households may have used a cesspit together (Schütte 1986, 248; see also Feldhaus Stephan 1995, 310).

⁵¹ The reason for this is that in the medieval location of the town, on the floodplain of the river Emajõgi, the soil is wet all year round due to ground water coming from Quaternary deposits. Moisture is a perfect preservative for organics, especially in the lower levels of the cultural layers (Bernotas 2012, 155 and the references therein).

⁵² Hundreds of such disposal facilities have been discovered in the medieval town centers and subsequently archaeologically investigated (Feldhaus-Stephan 1995, 279).

⁵³ For additional material from Hörter, Germany, see Feldhaus-Stephan 1995, 309. See also Feldhaus-Stephan 1995, 311: The start of use of many cesspits is around 1200 and can thus still date back to 12th century, perhaps dating back even to 1150. Overall, it should be noted that elaborate stone disposal facilities from 1150-1200 are still very rare.

⁵⁴ The measurements of German cesspits ranged up to 6 metres in diameter (Bernotas 2012, 155 and the references therein).

⁵⁵ See also Schütte 1986, 247: No general location references within a parcel can be given for cesspits, as they have been found both within buildings, as well as in backyards.

It has been estimated that the biggest German cesspits – up to 8 metres deep – were filled within 30 to 50 years⁵⁶, after which they would be emptied. As the cesspits in Tartu were considerably smaller⁵⁷, it has been estimated that they were used at least for 40 years and during this time they were regularly emptied⁵⁸ (Bernotas 2012, 155 and the references therein); however it has been noted that the period of usage of some of the pits on the basis of some of the included finds possibly cover a period up to 200 years (Haak & Russow 2012, 167).⁵⁹

2.1.2. Dendrochronological dating of the Tartu cesspits

So far five cesspits found from Tartu have been dated by using the dendrochronological method: two cesspits from the courtyard of Ülikooli St 15, one from the courtyard of Ülikooli St 14 (Bernotas 2008), one from the courtyard of Lutsu St 2 (Kriiska *et al* 2011), and one from the courtyard of Küüni St 3/5 (Nöps 2015).

From latrine 1b in Ülikooli St 15, 41 different wood discs were sawn for dating. Proofs could be taken from the logs of all four sides, but they could not be taken from the lowest layers due to the active inflow of water. From all the samples, 23 were averaged to a 79 year long

⁵⁶ It has been calculated that a large latrine (25 m³) is filled only in 50-70 years. If one includes other waste materials into the calculation, such as moss for wiping, the result is still a period of about a generation for replenishment (Schütte 1986, 241).

⁵⁷ E.g. the side length, measured from the inside, was 1.8 m at the Ülikooli St 15 cesspit (Bernotas 2008, 18); the length of the box at Ülikooli St 14 was 3 m and the width ca. 1.5 m (op. cit. 20).

⁵⁸ On the contrary, the latrines from Greifswald, Germany were allegedly not often emptied. The feces remained largely in the bottom of the respective parcels. From this tradition, the time of about 1350 to 1500 clearly stands out. From this phase, only three new buildings were detected. Apparently, there was probably a more regular emptying of underground and above-ground latrines (Heußner & Schäfer 1999, 276–277).

⁵⁹ It has been also suggested that as sherd links occur between different strata identified within a cesspit, the continuous clearing of their contents cannot be supported on a stratification basis and it is almost impossible to distinguish different find complexes within one pit by current standards of research (Haak & Russow 2012, 155). However, this problem could be indicative of the inadequate documentation of some of the earlier excavations in Tartu (e.g. from the VII Quarter there is still no report after 25 years and due to poor documentation, where the finds were collected together from every pit, it is not possible to distinguish different layers). Cases which have been adequately documented (e.g. excavations at Ülikooli St 15) show clearly that the older finds were in the lower layer and newer ones in the layer on top of this. It seems more likely that as the contents of the cesspit sink over time, the cavity occurred in the courtyard area was filled with thrown-in debris.

average ring-width series *Iepy1501*⁶⁰ and the average was compared with chronologies (or series) from Stockholm and Uppland and with the 12 samples from Vene St in Tallinn. In addition, four sample series resulted in a 123 year long average *Iepy1511* and compared first of all with Ülikooli St 15 sample series, then with the Ülikooli St 14 latrine sample series and the series from Kuldjala tower in Tallinn. All comparisons unambiguously date last year circle to the year 1335.

From latrine 5, samples were taken from all of the four widest cover logs. As there were only four samples, the expectations for dating success were low. Still, the series of two samples resulted in a 86 year long average *Iepy15k1*. When comparing the average with chronologies from Novgorod, the Tallinn town hall, and the Three Sisters building complex from Pikk St 71 in Tallinn, the result dated the last ring to 1309.

From latrine 14G-14F at Ülikooli St 14, 13 sample discs were sawed. Nine of them could be averaged to a 176 year long average *Iepy1406*. Comparing it with pine chronologies from Gotland, Novgorod, the Tallinn town hall, and Riga, the dendrochronological date was 1362 (Bernotas 2008, 22).

From the beams of the southwestern wall of the cesspit at Lutsu St 2, six cross-sections were removed and the width of their tree-rings measured. Two series of them appeared similar to each other and they were averaged into a mean series *IepLu2a1*, with a length of 133 ring-widths. Matching this mean series with dated reference chronologies produced a dendrochronological dating of the mean series of Lutsu St 2 to AD 1328. The reference chronologies included the Estonian pine chronology *3epalaja*, a latrine bin of Ülikooli St 14 in Tartu *3epy1401*, and the Novgorod pine chronology *3rpnov05*. As the waney edge was not preserved in both averaged samples of Lutsu St 2, it can be assumed from the extremely fine outer rings that no more than ten rings had disappeared from the trunk surface. So the probable felling date of the trees for construction beams of the latrine bin would be between 1328 and 1338. As a simple construction like a cesspit was probably built from raw timber (i.e. within a year of felling), the likely building year falls into period AD 1329–39 (Kriiska *et al* 2011, 23–24).

⁶⁰ The codes are divided into the series number, species, location of the sample, and the number of measurements. In here: “1” marks the first synchronised series, “ep” stands for the species: “Estonian pine” (rp would be “Russian pine”, “sp” Swedish pine” and so forth, “y15” stands for Ülikooli St. 15 and “01” marks the first measurement.

In 2015 another dendrochronological study was conducted in Tartu. In the result of this, cesspit No 3 from the courtyard of Küüni St 3/5 in Tartu was dated. The date supports the dates of the aforementioned cesspits to the 14th century and is 1316 (Nöps 2015, 23, 28).

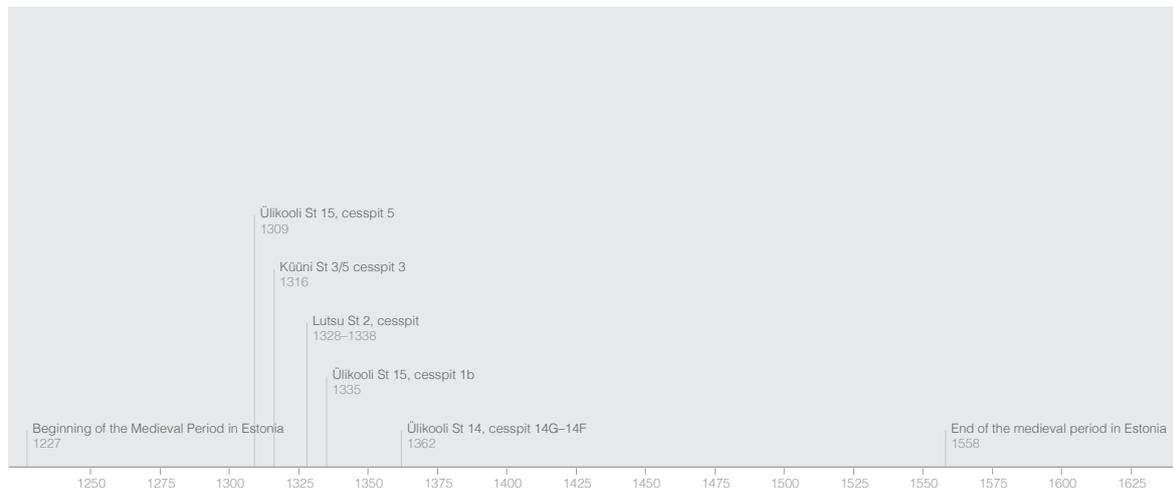


Figure 6. Timeline of the dendrochronological datings of the cesspits from Tartu. Rivo Bernotas.

2.1.3. Cesspits as the indicators of town planning

The dates of the find-complexes of the vast majority of cesspits and dendrochronologically dated⁶¹ cesspits (see Figure 6) reveal that they appear on the townscape of Tartu clearly in the first half of the 14th century. Therefore this date seems also to support the hypothesis that the erection of the town wall and the re-planning of the town area began in the first half of the 14th century (Bernotas 2012, 158). On the basis of my research I have concluded that the townscape of Tartu underwent several changes in the 14th century. It might be suggested (Bernotas 2012) that the disposal of waste to cesspits was regulated by the town laws, which were valid only within the limits of the area enclosed by wall and therefore did not apply to the surrounding area.

As no cesspits have been found outside of any town walls in Old Livonia, we might assume waste management in the areas surrounding towns was accomplished by simpler earth pits.⁶²

⁶¹ It has been noted that wooden shafts made of planks and boards are not without problems in their dendrochronological dating. The use of secondary wood and inferior quality timber is thus understandable (Heußner & Schäfer 1999, 253). The wood used for building the cesspits of Tartu has so far been found to be primary though.

⁶² On the German examples, see also Feldhaus-Stephan 1995, 310.

Possibly the sewage and rubbish might have been further utilised instead of simply stored in cesspits, as it was similarly used in Germany as well (Feldhaus-Stephan 1995, 310–311; see also Heußner & Schäfer 1999, 281–282).⁶³ In addition, manure is known to have been shipped a trade good (Feldhaus-Stephan 1995, 310–311).

The latter claim about regulations in waste management has also indirectly found support from written sources, as for example in 1554, the Tartu town council informed the representatives of the citizens that it was the citizens who must clean the streets, the gutters, waste-boxes, and the town ditch.⁶⁴ The mud from the town ditch had to be carried to the gardens along the town wall. Despite the high level of the fine, however, the pavings were so holey and streets so dirty that filth and dung, which was flushed off in times of torrential rain, clogged the waste-boxes and town ditches. It was a major concern of Tartu town council in 1553, as it was noted to the representatives of the town citizens (Kaplinski 1981, 28–29).

2.1.4. Original function of the cesspits

It is quite evident cesspits were ultimately used as waste-boxes and latrines.⁶⁵ However, a problematic issue is what their original function was. Were they initially already built for latrines as suggested by Ain Mäesalu (1990, 452) and Vilma Trummal (1992, 14–15) or for another purpose, such as treating leather as suggested by Romeo Metsallik (1995, 31)? Based on the demolished cross-beam wooden construction on top of two of the cesspits at the crossroad of Lossi St and Ülikooli St, and the remnants of a clay-plastered chimney also found there, it has been assumed that the boxes were used for the purpose of tanning leather. The claim is also confirmed by a significant amount of animal hair found from the cesspit. A similar technology was used in many western European cities (Metsallik 1995, 31 and the

⁶³ Animal faeces were first temporarily stored (manure pit, manure pile). For the agricultural fields and gardens in and around the city animal manure and sewer content found use as fertiliser use (Feldhaus-Stephan 1995, 310–311).

⁶⁴ For comparative examples, see Feldhaus-Stephan 1995, 310: Emphasised is that the construction and maintenance of waste facilities were usually a private matter in and thus the capacity depended of the individual urban residents. In addition to simple disposal methods such as faecal disposal in watercourses, burying carcasses outside the city walls, or seeping wastewater on the farm, important disposal facilities include sewers, cesspits, septic tanks and gutters, ditches and so on.

⁶⁵ Interestingly, for example in Greifswald (most of the investigated pits were built 1258–1345) after the major plague in the year 1350, almost no more wooden pits were built. The faeces were then regularly disposed of away from the properties (Heußner & Schäfer 1999, 255; 274; 281–282). The similar possibilities for the end of use of the cesspits from Tartu needs further investigation though.

references therein). Therefore the original function of the excavated cesspits was certainly more diverse than previously speculated, mostly technological in nature. It is known that in many parts of Europe, manure from chickens, pigeons, dogs, and other animals was used in the primary treatment of leather. Some scholars suggest that wells and built-in facilities that had lost their original purpose found later use in waste management (Metsallik 1995, 31 and the references therein).⁶⁶ Furthermore, quadrangular boxes used for tanning leather have been found from England as well (Heard 2000, 141–143), providing further evidence that cesspits may have first been built for leather making.

Additional evidence in favour of their original function of treating leather could be the relatively small sizes of the cesspits⁶⁷, the skin and hair remnants found from them, their tight grouping together in certain areas, their construction into the ground,⁶⁸ and their frequent contemporaneity with one another. Also, the question does arise as to so many cesspits are found from Tartu and so few from other medieval towns in Estonia.⁶⁹ Considering that all of Old Livonia belonged to the German cultural space and assuming that the cesspits were initially built for latrines, they should have been found in large numbers from elsewhere as well.

It should be noted that Russian export to the West was of great importance to Hanseatic trade. Furs and wax were two of the most important exports from the Russian territory (Sepp, 1937, 133 ff.). In the Medieval Period, Hanseatic-Russian trade from Novgorod gave foreign merchants raw materials or, in extreme cases, half-prepared products, because there is no question of industrial development in Russia at that time (Sepp, 1937, 130). Through Livonia passed a wide range of leathers from all kinds of wild animals as fur was a highly valued product from Russia in western European markets. In good times Livonia was able to move hundreds of thousands of leathers through to the west. In the 16th century trade declined,

⁶⁶ Especially for 13th century Germany, the question arises in some cases as to whether all are cesspools or only secondarily used wells (Schütte 1986, 239). In the case of some of the cesspits from Greifswald, it is possible that these could have functioned primarily as a fountain due to the inevitably short period of using these latrines of a maximum of one, two, or six years, especially since the lowest layer also consisted only of faeces (Heußner & Schäfer 1999, 271). Further, mines of any kind, wells, cisterns, cellars and moats have been noted to be sometimes secondarily used as a sewers or garbage dumps as well (Feldhaus-Stephan 1995, 310).

⁶⁷ See footnote 57.

⁶⁸ Tanning was a long-term process, therefore the tanning barrels had a permanent location and were partly dug into ground (Harjula 2008, 136).

⁶⁹ For further reading see Bernotas 2012, 155.

probably partly because of the relocation of the trade routes (Selart 2012, 214). However, it has also been noted that Tartu did not specialise in any particular type of trade during the Medieval Period, as being in the middle of transit routes required putting equal importance to all the required goods (Freymuth 1927, 27, see also Tarvel 1980, 46).

Recent research has shown that tanning processes were held both inside and outside of town. It is not impossible that the process had been divided into phases, for example one part of the work done outside of the city walls at the tannery courtyard, the second part at the workshop connected to the residential quarters (Samorokov 2012, 70). The current research suggests that the location of a tannery depended largely on the town's layout and access to suitable resources such as water sources. The widely accepted opinion that tanning was conducted outside of towns in general should be treated with caution, and not to be taken as a rule (Samorokov 2012, 16–17).

Therefore, based on the discussed information, we cannot exclude the possibility that some of the cesspits were originally built for treating the leather and later – after the town wall was built – the old tanning boxes were used as latrines and waste boxes. The leather tanning in the town area stopped with the construction of the town wall. The cesspit found at Poe St, next to the town wall, shows clearly that it was originally a courtyard before the town wall and the new street network emerged.⁷⁰ The mentioned cesspit was found beneath the street (Tvauri & Bernotas 2007). In any case this process happened in the 14th century, so this further confirms the presented date of the construction of the town wall and the re-planning of the town area in Tartu.

2.2. Stone buildings

The medieval secular buildings of Tartu have not been extensively researched. On several occasions the remains of the medieval buildings have been found in excavations, but often these remnants have been very fragmentary and have not led to any substantial conclusions about the buildings themselves, let alone contributed to the wider picture. Archaeological investigations at Lutsu St 2 indicate that in the first half of the 14th century one stone building was erected there and in the mid-14th century another stone building was built on the same

⁷⁰ For similar examples from Germany, see footnote 71.

plot. The oldest examples of stone buildings are a one-room brick building found at Kompanii St from the 13th–14th century and house remains at Lossi St. The walls of that house were stacked on top of the fieldstone foundation. This building has been dated to the 14th–16th century.

Another brick building has been found in the Botanical Gardens, Lai St 38 as well. The remnants of a stove and hypocaust plates were found in the building, suggesting the time of use to be have been sometime between the 14th–16th centuries. The remnants of the stone buildings from the northern side of Lossi St have also been noted to be medieval (Bernotas 2012, 159–160 and the references therein). In excavations conducting in 2012–2013, several medieval remnants of stone buildings were found from the plot of Lossi St 15, the oldest of which might derive from the 13th–14th century (Kriiska *et al* 2013, 1; J. Štšogoleva, pers. comm.). In the course of the excavations in 2015, several fieldstone foundations of the medieval brick houses were found at Ülikooli St, Tartu (Bernotas 2016b).

The oldest firmly dated stone masonry in Tartu, St. John's Church, was built after the year 1321, when a log foundation layer underneath the church walls was laid. Similarities with St. John's Church have been discovered in St. Mary's Church of Tartu. Although the exact construction time of St. Mary's Church is not known, churches with similar room layouts were particularly common in the Baltic Sea region during the 14th century and in Schleswig, Denmark until the second half of the 15th century. In earlier research, the introduction of brick buildings in Tartu had been dated to the end of the 14th century – 15th century. Based on the discussed information, the introduction of brick buildings can be traced to the early 14th century (Bernotas 2012, 160 and the references therein).

One aspect to take into consideration for the bigger building projects is the supply-consumption ratio of the labour in the medieval towns. For example, in the first half to the middle of the 15th century the number of stonemasons working at the same time in Tallinn has been estimated to be around 30. We know that St Olaf's Church rebuilding was linked to at least 14 of them, in the short-term even up to 25 masters, so almost all of the skilled labour of the town was in use. Such a high supply-consumption ratio of labour automatically rules out two simultaneous large-scale construction projects. For the same reason it is clear that the rest of the large-scale projects were put on hold during the construction or modernising of the town defences (Kangroopool & Lumiste 1977, 272).

2.3. Summary

It is quite obvious that a project as enormous as surrounding a town with walls could not just happen without any related changes to the townscape. Therefore it would be safe to assume that this undertaking would be correlated to different changes in the medieval townscape. In the current context, two events clearly stand out in the medieval townscape in relation to town planning: the building of cesspits and the construction of stone houses.

According to excavation reports, over 40 medieval cesspits have been found in Tartu. Several medieval cesspits have also been documented during archaeological exploration of the cultural layers, but these have not been studied in detail.

Cesspits are amongst the most interesting objects of study from medieval Tartu as they are rich in finds and possess enormous scientific value. Although single medieval and modern-age wooden and stone cesspits have been excavated in other places in Estonia, they have been found nowhere in such large numbers as in Tartu. The cesspits in Tartu and material recovered from them have survived remarkably well.

The use of cesspits spread to the Estonian area from German towns, where the first mention of large wooden boxes in Lübeck date to the 13th century. Simultaneously with paving the streets, the tradition of building wooden cesspits in the courtyards of houses began there. The cesspits looked similar to wells. They were used for throwing away junk, as well as for latrines.

So far five cesspits found from Tartu have been dated by using the dendrochronological method: two cesspits from the courtyard of Ülikooli St 15, one from the courtyard of Ülikooli St 14, one from the courtyard of Lutsu St 2 and one from the courtyard of Küüni St 3/5. The dates were: Ülikooli St 15, cesspit 1b: 1335; Ülikooli St 15, cesspit 5: 1309; Ülikooli St 14, cesspit 14G–14F: 1362; Lutsu St 2: 1328–1338; Küüni St 3/5, cesspit 3: 1316.

The dates of the find-complexes of the vast majority of cesspits and dendrochronologically dated cesspits reveal that they appear on the townscape of Tartu clearly in the first half of the 14th century. Therefore this date seems also to support the hypothesis that the erection of the town wall and the re-planning of the town area began in the first half of the 14th century. On the basis of my research I have concluded that the townscape of Tartu underwent several changes in the 14th century. It might be suggested that the disposal of waste to cesspits was

regulated by the town laws which were valid only within the limits of the area enclosed by town walls and therefore did not apply to the outlying areas. We might assume that as no cesspits have been found outside of the town walls in Old Livonia, the waste management in the outlying areas used simpler earth pits.

It is quite evident that at the end of their respective use, cesspits were used as waste-boxes and latrines. However, the question remains as to what their original function was. Were they initially already built for latrines or for another purpose, such as treating leather? Based on several factors, we cannot exclude the possibility that some of the cesspits were originally built for treating leather and later – after the town wall was built – the old tanning boxes were used as latrines and cesspits. Traces of leather tanning in the town area stopped with at the border of the town wall. The cesspit found at Poe St, next to the town wall, shows clearly that it was originally a courtyard before the town wall and the new street network emerged. In any case this process happened in 14th century, so this further confirms the presented date of the construction of the town wall and the re-planning of the town area in Tartu.

The medieval secular buildings of Tartu have not been extensively researched. On several occasions the remains of the medieval buildings have been found in excavations, but often these remnants have been very fragmentary and have not led to any substantial conclusions about the buildings themselves, let alone contributed to the wider picture. The dates of the medieval buildings remnants found from Tartu range from 14th to 16th century.

The oldest firmly dated stone masonry in Tartu, St. John's Church, was built after the year 1321, when a log foundation layer underneath the church walls was laid. Similarities with St. John's Church have been discovered in St. Mary's Church of Tartu. Although the exact construction time of St. Mary's Church is not known, the churches with similar room layout were particularly common in the Baltic Sea region during the 14th century.

In earlier research, the introduction of brick buildings in Tartu had been dated to the end of the 14th century – 15th century. Based on the discussed information in the current chapter, the introduction of brick buildings can be traced to the early 14th century.

Chapter 3. Medieval town walls in the northern Baltic Sea area

3.1. Old Livonia – in the present-day territory of Estonia

3.1.1. Tallinn (*Reval*)

Tallinn received Lübeck law in 1248, followed by the other Estonian towns (Kasekamp 2010, 36; see table 1). Merchants from Visby (see Chapter 3.3.3.) had a significant role in the development of Tallinn as a town (Zobel 2014, 61). Around 1250, Tallinn entered the German trading cities union and circa 1280 the Hanseatic League. The settlement nucleus of Tallinn became divided into castle and downtown. In 1265 Queen Margrete I ordered the centre of the downtown to be encircled by walls (Zobel 1994). However, it has been noted that the document states that the town must be protected by earthworks and other fortifications (*vallari valeat et muniri*). As we can see from the section drawings of Tallinn's town wall, the first stage of the town's fortifications indeed probably consisted of earthworks – there could be no other explanation for the couple of metres high earth wall running exactly under the later stone wall (Mäll 2004, 259; 266).

The signs of the major rearrangements of Tallinn's settlement environment are linked to the construction of the town's defences somewhere after 1265. In the area of today's Old Town of Tallinn, the remains of the early colonial (1219–1265) and possible pre-conquest settlement (ante 1219) are almost completely destroyed by later activities connected to the building of the first stage of the town's fortifications and the resulting restructuring of the settlement, probably in the second half of the 1260s (Mäll 2004, 266–267).⁷¹

In 1310, Viceregent J. Kanne gave the same order as the queen in 1265, which was actually fulfilled. In 1310–1320 the oldest town wall was built. Around 1340 construction of the new

⁷¹ For further reading on the similar examples from Europe, see Porsche 2000, 232: During the 11th century the new city walls in Germany were drawn often on pragmatic reasons (as for example, in Basel), but from the early 12th century, the idea that a city outline should be "nice" – round, elliptical, semi-circular, later rectangular, obviously as far as the topography allowed - came into circulation. The new city walls of Munster, Paderborn, Soest, Cologne, and Gelnhausen had an almost ideal geometric form. For example in Freiburg such a wall was even built recklessly through existing previous settlement. Everywhere these great city wall rings were often far from being filled by urban developments, but rather were partially undeveloped areas until the Modern Era. The focus does not appear to stand on the pragmatic need to surround existing settlement areas, but more towards a future-oriented, creative, urban planning act.

town wall started on the northern and southern part of the town. The encircling wall was completed in 1355. The wall was extensively modified over the following centuries (Zobel 2014, 64 ff; 1994).

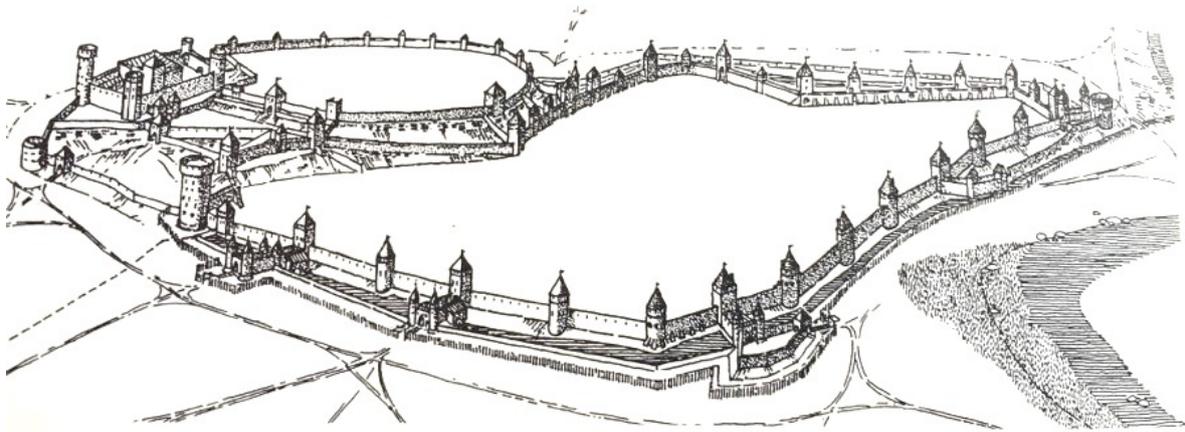


Figure 7. The fortifications of Tallinn in the 1530s. A view from the south-east. Reconstruction. (Zobel 1994).

At the end of the Middle Ages, Tallinn's downtown area was encircled by a 2.35 km long and up to 15.9 m high wall (see Figure 7), which had 8 gates, 11 outer defence towers, and 27 wall towers; the height of the towers amounted to 18–37 m. The wall was bordered by a moat filled with water, 3 water mills together with artificial lakes and 6 bridges. The Ordensburg and the castle on Toompea completed the defence. Together with the towers in the harbour, there were at least 66 defence towers in the town at the end of Middle Ages (Zobel 1994).

3.1.2. Tartu (*Dorpat*)

Of the extent of the town wall of Tartu during the late Middle Ages, only ruins survive today (see Figure 8). So far, as a result of archaeological research, it can be said that the wall is partly founded as a dry stone and either irregularly poured lime mortar or soil was used to bind the stones. Fieldstone, limestone, intact bricks, and brick fragments were used to construct the wall. The improvement and modification of the fortifications continued probably throughout the whole Medieval Period. The town wall consisted of altogether 27 towers (9 of them with gates) and measured 2.145 km in length (Bernotas 2011, 57; 68).

Although the date of construction of the medieval town wall of Tartu is largely based on written sources dated to the second half of the 13th century, the existing research results show

that it seems more likely that the wall was actually built in the first half of the 14th century, when the former town was completely re-planned.⁷²



Figure 8. The renovated section of the town wall of Tartu in the riverside part of the town and the excavation pit in 2009. Photo by Rivo Bernotas.

The brick making complex dated to the same period allow us to consider that in addition to the town wall, the construction of stone houses and stone churches also probably began after the re-planning of the town. The different constructions and the cultural layer from the 13th–14th century at Town Hall Square suggest that the medieval Town Hall Square as a market square derives from the first half of 14th century. This hypothesis is also supported by the fact that at the same time a new street network, the Town Hall Square, and the location of defence fortifications were planned in Tallinn. Similarly with Tallinn, somewhere during the turn of the 13th–14th centuries dramatic changes in the infrastructure of Tartu took place, when old wooden buildings were demolished and an entirely new network of streets was established (Bernotas 2011, 68).

⁷² See footnote 71.

To further analyse the dating of the construction of the town wall of Tartu to the 14th century, in my earlier research I have suggested on the example of Tartu that the town was ready for extensive planning and erection of walls only after the urban community was populous enough to carry these works out, as these activities required a large number of local workers (Bernotas 2012, 163). The latter has also indirectly found confirmation in recent research that in the ancient county of Ugandi (where Tartu was located) by the end of 1224, the local secular government had been almost completely destroyed, as well as the structures of society altogether weakened, due to incessant raiding. It seems that Bishop Hermann began to build his diocese into a power vacuumed, and only barely populated area (Oad 2014, 78).

The town wall different in thickness in different areas: 1.7 to 2 m on the north side, up to 2–2.4 m on the east side, and up to 2–2.9 m on the southern side. The thickness of the excavated walls of towers ranges from 1.9–3.5 m at the White Tower to 2.17 m at Jacob's Gate tower, 2 m at Blunt Tower, up to 4.5 m at the front gate of the Russian Gate, and approximately 2.3 m of the tower *Pasatorn*. The varying thickness of the different sides of the wall are too small for making far-reaching conclusions of the exhaustive fortification of one or the other side (Bernotas 2011, 64).

It should probably be presumed that the town wall, which was built after the German conquest of Tartu, was not only a military building, but also symbolised the current way of life and demonstrated the power of the new rulers to the indigenous people, as well as to the governors of the neighbouring countries. Although this issue has never been examined in the literature, looking at the Tartu town wall from the perspective of a defensive function raises the question as to why and against whom it was built. After the Russian raid in 1262, the next act of war under the walls of Tartu was in 1558 during the Livonian War. Thus it seems safe to say that the town wall of Tartu, having the deterrent effect against attacks by foreign enemies, in addition to the above-mentioned symbolic sense, was more than just protection-based military building (Bernotas 2011, 67–68).

3.1.3. Viljandi (*Fellin*)

The town wall of Viljandi surrounded the 10.2 ha of town which, together with 4.6 ha of the Order's castle, covered 14.8 hectares of protected area. The total length of the town wall was

about 1.2 km. The wall was built of fieldstones and joined with lime mortar, while the lowermost stones were bound with clayish sand (see Figure 9). For plastering the wall also bricks were used. The wall surrounded the town on three sides, while the south side was defended by the castle (Bernotas 2013c, 267–268; 276–279). It might be assumed that the town wall, towers, and gates evolved during the whole Medieval Period in accordance with the development of weaponry.



Figure 9. Excavated part of the town wall of Viljandi in the north/north-east part of the town. Photo by Peeter Piirits.

I have suggested that it seems more probable that the construction of the town wall of Viljandi started in the 14th century (Bernotas 2013c, 286). This has also been confirmed in recent research by fellow scholars Arvi Haak and Erki Russow, who noted that if we date the construction of the town walls to the same time as the construction of the castle, it should be remembered that the convent house was constructed most likely at the beginning of the 14th century. The existence of large-scale fortifications in the outer baileys during the 13th century can also be doubtful. The dating of the town wall is not much earlier. However, the fact that there has been only one spot near the medieval town where 13th century settlement traces

have been found leads to the conclusion that the habitable territory strictly defined. Whether it was natural causes, land ownership, or any other reason, we cannot determine, but all the existing signs lead to that conclusion. However the planning of a town and castle complex in the middle of the 13th century, just after the conquest, would seem a bit too optimistic (Haak & Russow 2013, 78).⁷³

3.1.4. Uus-Pärnu (*Neu-Pernau*)

The first traces of urban settlement and its mentioning in Uus-Pärnu (originally: *Embecke*) date to the second half of the 13th century. At the end of the Middle Ages, the town wall of Uus-Pärnu was 0.91 km long, enclosing the town on three outer sides, with the addition of the 0.14 km long wall of the bailey on the western side. The whole defensive perimeter was surrounded by a moat. During the Late Middle Ages the town wall had six towers and eight gates. The wall and earthen fortifications from modern times have been almost completely destroyed (Bernotas 2013b, 185–186).

The archaeologically investigated sections of the town wall of Uus-Pärnu reveal that it was relatively homogeneous in terms of building technology. It was made of fieldstones bound with lime mortar and fragments of bricks. Also roof tiles and pieces of limestone were used in the seams. The thickness of the wall facing the riverside part of the town varied from 1.35 m to 1.84 m. At least in some cases, a log foundation layer was located underneath the wall. Also in some places clay was used for plastering to prevent leaking through the wall during the increase of water in the moat. The thickness of the wall on the east side is up to 1.5 m. On the south side, the thickness of the town wall varies from 1.35 m to 1.7 m. Limestone was sometimes used in its construction, as well as brick and limestone fragments.

⁷³ A small comparison to other medieval centres of Estonia would reveal a strikingly similar situation. A few written notices have been used as evidence of the quick formation of medieval centres, but this cannot be actually supported by the collected archaeological material. It seems that such a possibility has so far been a priori excluded, either by dating some not so precisely datable finds or strata to the ‘intermediate’ period or assigning the earliest settlement core to the areas not investigated archaeologically. Although neither of these possibilities can be denied without a good argument, the possibility that the formation of centres of the medieval type took somewhat longer also needs consideration. So far, Estonian finds of a ‘medieval’ type which can definitely be dated to the first half of the 13th century have been obtained only from Toompea in Tallinn, Lihula, and Tartu (Haak & Russow 2013, 77–78).

The thickness of the walls of the investigated towers varies from 2.5 m in the Red Tower to 3 m in the White Tower, and up to 4.66 m in the Artillery Tower in the northwest corner of the bailey. The towers are similarly built to the walls of fieldstones. In places, limestone, bricks, and dolomite stones were used.

Based on finds of ceramics and the carbon-14 analysis of a plank found in the layer of debris of a wooden building near the town wall at a plot situated at Aida St 5/Hommiku St in the northern part of Uus-Pärnu, the origins of settlement in this area can be dated most likely to the second half of the 13th century. According to the radiocarbon data, the log raft discovered under the town wall at Munga Street 2 dates with 68.2 % probability from the period between 1310 and 1405 AD (590 ± 30 carbon-14 years). The above information and the date obtained for the wooden sample from Õhtu St next to the bailey wall (last growth year 1347), might quite possibly date the construction of the town wall of Uus-Pärnu to the second half of the 14th century (Bernotas 2013b, 192 ff.).

Considering the town wall of Uus-Pärnu solely from the perspective of defence, analogous to the town wall of Tartu, the question arises of the possible real defensive purposes for which it was built. After almost three hundred years of peace, the next act of war involving the walls of Uus-Pärnu was during the Livonian War in the 16th century. Therefore it might be considered that in addition to external military threats from enemies, one reason for the construction of the town wall of Pärnu was its symbolic significance to the town residents as well as to the governors of the countries around (Bernotas 2013b, 195).

3.1.5. Haapsalu (*Hapsal*)

The town of Haapsalu is located on the south coast of Haapsalu Bay. The town and the castle were located on favourable terrain and separated from the countryside by water obstacles. Thus the medieval defence system of Haapsalu is mentioned as strong in written records (Bernotas 2013c, 288).

The geological characteristics of western Estonia have had significant impacts on the development of the town. The rise of the ground of 2–3 mm per year has resulted in a substantial increase of the town area over the centuries. It has been noted that the wall encircled the town on the seaward side and was 0.85–1.2 km long. The wall had five gates for

protection on the sides most likely to be attacked (Bernotas 2013c, 270–271). The wall was built of fieldstone and limestone (op. cit. 282).

In 2015, a 1.6 m thick fragment of town wall, built of fieldstone and limestone, was found in the course of the archaeological monitoring (Treuman 2015, 5).

The close connection to the city of Riga had a decisive importance in the construction history of the Bishopric of Ösel-Wiek, as master builders from Riga brought their building traditions with them. The latter might indicate to the connection in similarities of the town plans of Cēsis and Haapsalu. The castle at Cēsis was one of the earliest strongholds built by the Livonian Order in its process of conquering the country. Haapsalu seems to spread out in the same ways as the town around the castle at Cēsis (Bernotas 2013c, 290 and the references therein).

The first traces of the urban settlement in Haapsalu derive from the second half of the 13th century (see Table 1), and it has been suggested that the town wall was erected at the end of 14th century (Bernotas 2013c, 271 and the references therein).⁷⁴ Therefore the timeframe from the first traces of urban settlement to a complete medieval town in Haapsalu was approximately 100 years.

3.1.6. Narva

Narva is situated in the northern part of Estonia, i.e. in the area that belonged to Denmark. There were three major fortified administrative footholds in this territory: Tallinn, Rakvere, and Narva. For centuries the position of Narva was the boundary between the two cultural worlds, or at least between the Western and Eastern Churches, separated by the Narva River. From the end of the thirteenth century, merchants began to travel to Novgorod via Narva. The first reliable written evidence of the existence of an urban settlement next to the castle at Narva comes from 1342, but it might be suggested that the settlement was already in place somewhat earlier. The birth of the town of Narva can be dated to 1345 based on written sources.

⁷⁴ Villem Raam has suggested the reign of Bishop Winrich von Kniprode (1385–1419) (Bernotas 2013c, 271). Also different dates around the turn of 14th and 15th century have been suggested (Bernotas 2011, 67 and references therein).

Previous research suggests that around the downtown area, the establishment of limestone walls had already begun during the 1370s. The builders were the townspeople, supported by the Order and Tallinn. The wall was completed probably by the end of 14th century. The total length of the fortification perimeter was 1.58 km. The length of the town wall was 1 km. The wall had at least seven towers, three of them with gates.

Narva's almost constant complaints of poverty and insecurity have been well documented. These were particularly high in times of threats of war, trade embargoes, or the plagues when the citizens left the town (Bernotas 2013c, 273–274 and the references therein).

3.2. Old Livonia – in the present-day territory of Latvia

3.2.1. Riga

The oldest town in Livonia was Riga, the castle was established there already in 1201 close to two settlements of the Livs (Šnē 2002, 263–264; see also Ose 1999, 216). German traders began visiting Riga and its environs with increasing frequency toward the second half of the 12th century, via Gotland (Dollinger 1970). Already in the 1220s, Riga enjoyed the same rights as Visby (Kasekamp 2010, 36). Nearby, the oldest German city was founded the first half of the 13th century, covering about 16 hectares was surrounded with a 1.6 km long wall (Ose 1999, 216). It has been mentioned by Henry of Livonia that Riga was 1207 and 1208 for the first time surrounded by walls (Ose 2010, 667).

During the 13th century, these settlements flowed together in terms of both the local inhabitants and the German city, thereby forming medieval Riga. The city took up 28 hectares and around 1272 it was surrounded by a new city wall with a total length of 2.2 km (Ose 1999, 216; Ose 2010, 667–668; see figure 10), around the same length as in Tartu (Bernotas 2011, 57). The latter was both a geographical and symbolic border of the town and its hegemony. This city wall has been in the same place until the mid-19th century⁷⁵ (Ose 1999, 216; see

⁷⁵ Already in the 16th century, the first earthworks were built around the city and throughout the 17th century the old walls are increasingly used in building houses or partially removed to make room for new large earthworks built with ramparts and bastions of Swedish engineers. With the construction of large ramparts and bastions in the second half of the 17th century the town wall lost its significance (Ose 2010, 667).

also Šnē 2002, 264). The maps from the 17th century allow to pursue the former route of the medieval wall (Ose 2010, 667–668; see Figure 10).

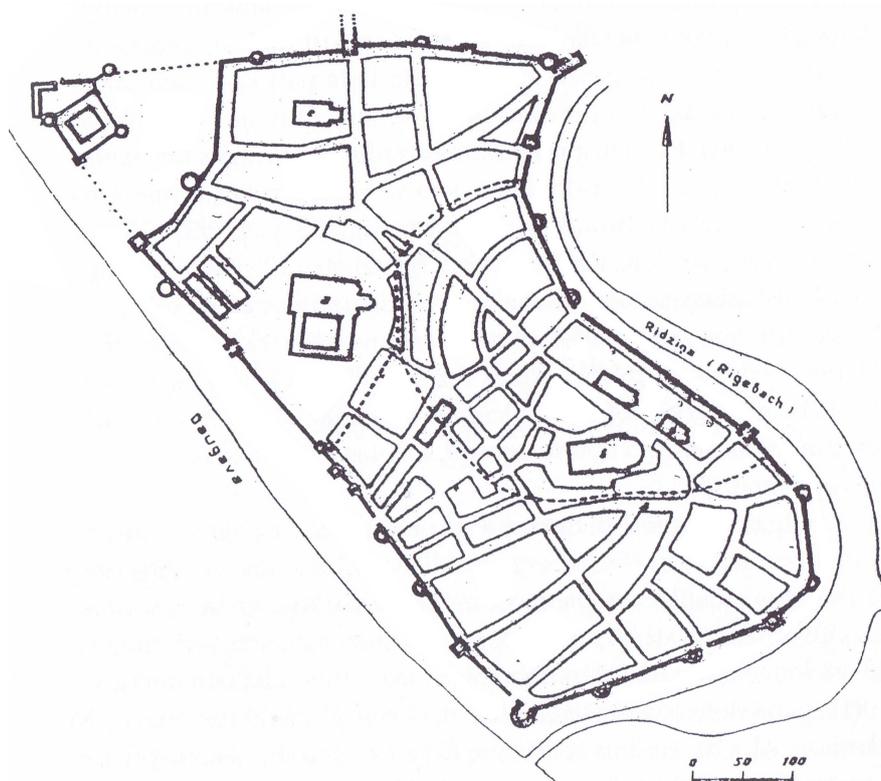


Figure 10. The medieval town plan of Riga in the 13th century (Caune 2007, 167, Figure 7).

Along the banks of the Daugava, Bishop's Castle had a building with two side towers, which were simultaneously also the towers of the city wall (Ose 1999, 217). The Teutonic castle and the city of Riga have since the 14th century formed two co-existing but separate attachments – each of them was surrounded with their own enclosure and separated from each other by moats (Ose 1999, 218).

Riga takes a special place among the cities of Latvia as it was already in the 13th century an important administrative and commercial centre due to its position on the crossroads of the major trade routes and sea port. Riga is the first German fortified town in the Baltic, and from there the colonisation of the country was conducted (Ose 1999, 214). Until the second half of the 13th century there were almost only wooden buildings in Riga, whereas the town's building regulations 1293 allowed only the building of stone houses (Šnē 2002, 264).

Much richer evidence on Riga's fortifications has been obtained in the course of archaeological excavation. Since 1938 fragments of the wall have been found at 24 sites (Ose

2010, 679). Based on the research it has been noted a wall with a thickness of 1.8 – 2.7 m was built of dolomite boulders in the early 13th century. The wall had a height of 5 m above ground level, with a parapet walk at the top. Along the bank of the river Riga, a 1 m deep foundation trench was dug for the wall, but in the middle of the peninsula the wall was built on a stable layer of sand, after which a layer of earth was added along the wall. In about 1300, by which time the cultural layer in the inner town had increased in thickness by several metres, the wall was heightened by 3-4 m, and the thickness was increased by the addition of an arcade. Red brick was used for this alteration work. The wall was reinforced in the following centuries (Ose 2010, 679).

3.2.2. Koknese (*Kokenhusen*)

The oldest of the aforementioned “on the shield” towns in the territory of present-day Latvia is Koknese (Ose 1999, 218), which was one of the three major strongholds of the Archbishop of Riga. The castle was built in 1209 on a narrow peninsula between the Daugava River and its tributary the River Perse on a former Lettgallian hillfort (Caune 2012, 64; see also Alttoa & Tamm 1992). In the 13th century a settlement arose in front of the castle (Caune 2012, 64). In front of the castle was also the bailey. Supposedly already in the 13th century the town was surrounded by a wall.⁷⁶ As Koknese was protected on two sides by the steep banks, only an artificial moat on the land side was needed. From there also led the only access to the castle (Alttoa & Tamm 1992).

As drawn in the 17th century plans, Koknese was surrounded on three sides by walls (Caune 2012, 65–66; see Figure 11). The castle and town were a common defence system in which the town functioned as a bailey. The town plan of Koknese is a medieval castle-town, similarly to Valmiera in Latvia and Viljandi in Estonia (Alttoa & Tamm, 1992).

In 1961–1966, archaeological excavations were carried out on the territory of the Koknese castle ruins and its medieval town. The largest research area of 300 m² was in the area of the former bailey. Among the brick buildings of the outer bailey came the undestroyed horizon of a cultural layer to the fore, which was rich in organic matter and contained remains of wooden

⁷⁶ The Archbishop had given town rights to Koknese already in 1277. It has mentioned that the town already existed for some time before that (Caune 2012, 64, see also Alttoa & Tamm 1992).

buildings. It turned out that preceding the wooden castle, already in the pre-conquest period in the 12th and early 13th century, an approximately 0.4-hectare area dense was populated with wooden buildings – residential and commercial buildings, including barns (Caune 2012, 64–65; 2014, 6).⁷⁷ The latter suggests a timeframe similar to the Estonian area, where development from the first traces of urban settlement to the stone walled medieval town took 50–100 years.

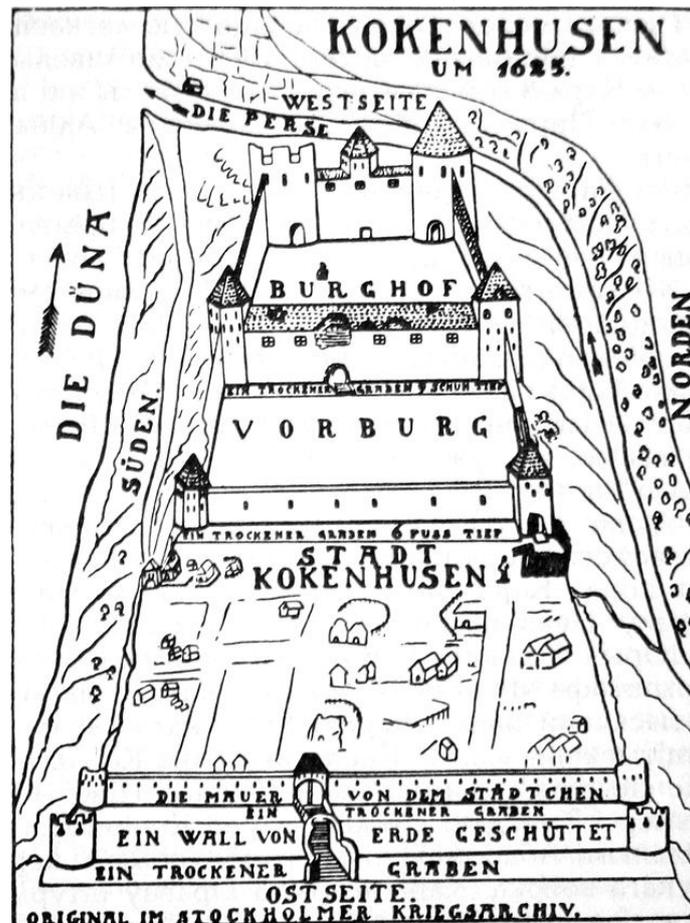


Figure 11. Koknese town plan from 1625, drawn by Georg von Schwengeln.

On the territory of the 3.6 hectare town of Koknese of the 13th to the 17th century, which was outside the flood zone of the hydroelectric plant, just a dig space of 150 m² area has been explored (Caune 2012, 65–66; 2014, 6–7).

⁷⁷ Unfortunately, this interesting and historically important material over the medieval town Koknese remained unedited and unpublished. The director of the excavations has published his findings only a few brief preliminary reports without images in the annual research reports of archaeologists of Latvia (Caune 2012, 65–66).

3.2.3. Valmiera (Wolmar)

Unlike Koknese, Valmiera was a town and castle of the Livonian Order. The castle was created on a high and steep promontory before the year 1283 (Ose 1999, 220), but there is no written evidence of when the castle Valmiera was built nor when the adjacent settlement received town status. It is believed that the castle emerged soon after 1224, when the Order received after Talava, a division of the country lying around the Valmiera area (Caune 2012, 66–67).

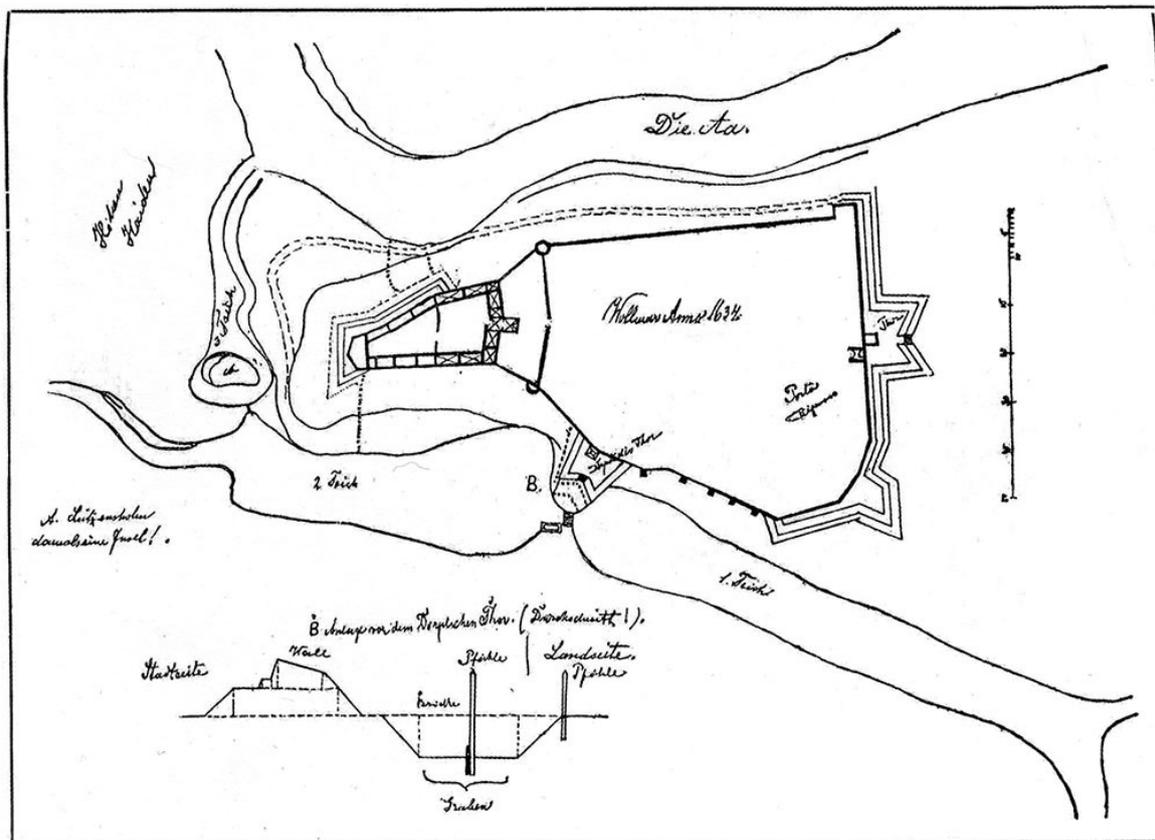


Figure 12. Fortification project of Valmiera from 1634, depicting the medieval town wall and projected bastions (Berga 2003).

Valmiera as a town is first documented in 1323, when the town also got town rights (Ose 1999, 220), but its monumental Gothic St. Simon church has been noted to be built as early as the 1280s. In Riga's debt register (*Schuldbuch*) several merchants from Valmiera are mentioned in the 1290s. These prove indirect evidence that the town existed in the second half of 13th century (Caune 2012, 67). The town developed rapidly in the 14th-15th century

(Berga 2010, 112). In 1365, Valmiera became a member of the Hanseatic League (Caune 2012, 67; 2014, 7).

The town was in front of the castle. An approximate idea about the castle and the town is given in some 17th century plans. The town plan indicates that the town was built with a central square and regular road network (Ose 1999, 220; see Figure 12). The 4.5 hectare town was surrounded by a 0.5 km long wall, which formed a common defence system together with the castle (Caune 2012, 67; 2014, 7).

The construction of the wall has been dated approximately to the late 14th or early 15th century (Berga 2010, 113, 124). It has also been assumed that the town was already in the 13th century surrounded with a wall (Caune 2012, 71); however, there has been no evidence to back up this claim. Based on the standard timeframe for development from first urban settlement to a walled medieval town in Old Livonia, it might be suggested that the wall could have not been constructed any earlier than the first half of 14th century.

The west side of the town was protected by a dry moat, and along the north side the small Bishop's ditch with its artificial ponds made a significant water barrier. The town wall that once had two gates and in the west joined with the bailey wall has not survived anymore.⁷⁸ To the present day the walls have remained only as scant ruins (Ose 1999, 220; Berga 2010, 113). Town wall sections were found in the excavations of 2000, 2005, 2006–2007, and 2008. First, foundations of the former wall were found in the southern part of Old Town in a trench. The wall was built at a distance of 6 m from the steep bank of the river Gauja; it consisted of fieldstone and brick fragments in lime mortar, and was 1.3 m and 1.6 m thick. Since the river Gauja protected the town from the south side, this wall was weaker than the other, mainland facing wall (Caune 2012, 71; Berga 2010, 122). Similarly, for example, the town wall of Tartu on the side of the river Emajõgi was somewhat less thick and did not have any protecting towers besides the gates (Bernotas 2011, 58; 64).

But in the western part of the town, foundations have been uncovered under part of town walls 160 m length. The wall was preserved partly to a height of 1 to 2 metres under the ground, but mostly it was damaged and only individual stones of the lower layer were still

⁷⁸ In the Livonian War (1558–1583) Valmiera was devastated in 1577 by the Muscovian troops. But the town plan from 1654 shows that some of the small brick medieval houses then still existed though (Caune 2012, 67). In the town plan from 1644, written by Johan Rodenburg, the Tartu Gate and the Riga Gate ran out to roads to Tartu and Riga. In 1681 began construction of the new earthworks and the city walls were demolished partially. The part of city walls after surviving above ground was destroyed in the 18th century (op. cit. 71).

found. This part of the town wall had been 2.0 to 2.2 m thick and was built as a shell wall where outside of both sides large stones were laid and in the middle were smaller stones and fragments of bricks bound in lime mortar. Also the foundations of the former Riga gate have been uncovered. On both sides of the gate tower, 10.5 m long and 2 m strong foundations of walls were discovered that formed a zwinger, which and was built simultaneously with the gate tower. (Caune 2012, 72; Berga 2010, 124).

Along the northern side of the town were two sections of the city wall – 35 m and 28 m long— exposed. In contrast to the west and south sides of the city, here the walls were built along the low bank. Therefore, the old wall had not been removed in the 17th century, but filled in with earth in order to increase in this way the banks of Dzirnavu Lake (in German: Mühlenteich) by several metres. In a sample dig, it was found that the old walled city reached almost 5 metres high at this location. This section consisted of ramparts, as well as the above-described fragments of boulders, but the stones of the foundations were much larger, up to 80 cm x 80 cm (Caune 2012, 72–73; Berga 2010, 118–119).

3.2.4. Cēsis (*Wenden*)

In Livonia, there is also a type of town where the castle is located on a side of the city. These fortifications did not have natural water features for protection. Cēsis was one of them – one of the most important medieval castles of the Livonian Order and the Hanseatic towns in Livonia. Cēsis was also the main residence of the Master of the Order. The Teutonic castle is mentioned in Cēsis already in 1209 (Ose 1999, 222).

The castle at Cēsis was one of the earliest strongholds built by the Livonian Order in its process of conquering the country, and until the collapse of the Livonian conglomerate, it shared with Viljandi the reputation of being the strongest fortress in Livonia (Leighly 1939, 264).

It has been noted that representatives of the Livonian Order settled already in 1207 at Cēsis; at 1214 the construction of the new Order castle began. It is believed that in addition to the already established castle, a settlement existed next to the castle hill. In the Middle Ages the town spanned an area of 10 hectares, and with its town wall, Cēsis was the second largest city (after Riga) on the territory of present-day Latvia (Caune 2012, 74).



Figure 13. Town plan of Cēsis from 1693, modified to the 1988 plan (<http://www.cesis.lv/lv/pasvaldiba/buvvalde/regeneracijas-projekts/>).

South of the castle, a town⁷⁹ was established, and in its centre were a church and marketplace, from which several roads lead to the town wall gates. Cēsis got town rights in 1224 (Ose 1999, 222). In the Riga debt register a merchant is mentioned in 1296 who lived in Cēsis near the Russian gate. This implies that Cēsis had been walled city in the 13th century (Caune 2012, 75). In the 14th century the town wall had 3 towers and 4 gates (Ose 1999, 222–223; see Figure 13). The length of the town wall was around 1 km (Caune 2012, 75). Although the castle and town of Cēsis formed a common defence system⁸⁰, the castle was clearly separated with their enclosing walls from the city. The castle has remained on one side of the town, and with its large baileys, it takes up almost a third of the town's territory. The plans of the 17th

⁷⁹ Cēsis received town rights in 1224 (Ose 1999, 222).

⁸⁰ See also Caune 2012, 75.

century show that the north-western and north-eastern side of the castle and the town was protected by man-made moats and several ponds. In the second half of the 16th century, the castle and the town were demolished during the Livonian War, but during the Great Northern War in the early 18th century the destruction was so great that its walls were not renewed (Ose 1999, 223–224).

The town of Cēsis occupied a position with respect to the castle that is repeated elsewhere in the small towns that grew under the protection of the castles, a position not greatly different from that occupied by the baileys of the castle. But even a small town needs more room than a spacious bailey required, and thus could not be laid out simply as an enclosure one side of which was the contours of the castle, the pattern followed by most of the baileys. Several solutions of the problem of articulating town and castle can be found: it was one of the essential form-problems of the smaller Livonian towns. At Cēsis the solution was arrived at by enclosing a sector of an irregular ring about the castle on the gentle slope southward from the eminence on which the castle stands (Leighly 1939, 266).

Fragments of the town wall have been archaeologically excavated on two sides of the town. In the northeastern part of Rīga St the wall was 1.6 m to 1.85 m thick; it was built in this area of dolomite stones. Larger stones were used outside, while the centre consisted of smaller dolomite fragments and fieldstones on each side. In the excavations of the southeastern part of the city to Līvū Square, the remains of the wall that were exposed were made from the same material, but their thickness was here 2.0 m to 2.1 m. The foundations of the city wall had been dug into the natural soil. Fragments of the town walls have been preserved in the cultural layer to a height of 1.5 m (Caune 2012, 76–77).

In spring of 1989, massive medieval walls were discovered which were identified as the foundations of gate leading to a road to Rauna and a 17-metre section of the town wall. The first gate was only in alignment with the 1.7 m thick wall; the tower in front of the town outside was built later. This was revealed by the joints of the building structures. The tower had a square ground plan with 8.80 m, 10.80 m, 7.20 m, and 9.8 m long sides. The thickness of the walls was 1.6 m to 2.0 m, which had 3 m wide door opening. Both the tower and the town wall were made of dolomite rocks; only a corner of the tower was later supplemented with fieldstones. Probably during the same remodelling, the foundations of the northern and eastern walls of the tower were reinforced and added an approximately 1 m thick masonry in

fieldstone. On both sides of the tower, strong walls built of dolomite were uncovered. Perhaps a zwinger had been here. In the town went a 3 m wide street at the gate that was paved with small fieldstone and dolomite rocks (Caune 2012, 77).

3.3. Sweden

Like much of central and eastern Europe, Scandinavia had no urban centres before the Middle Ages (Line 2007, 328–329). The territory of medieval Sweden was rather different than modern Sweden. The medieval state consisted also the territory of present-day Finland, the Scania province was under Denmark, and Gotland existed some of the time on its own or under the power on Danish king. Unlike Old Livonia, Sweden had a monarchy, but similarly to Old Livonia, Sweden was culturally also a part of the German cultural space.

In the middle of the 13th century the political and economic situation in Sweden allowed for the first time the significant intensification of military building activities. These developments became possible as the consequence of three new phenomena: the consolidation of royal power, the regulation of the taxation system, and the reorganisation of the military forces (Lovén 1996a, 40, 56). Most Swedish medieval towns, Stockholm included, were formed in the 13th century. In the east, in the present-day territory of Finland, urbanisation processes reached to the Karelian Isthmus, namely Viipuri in the 14th century (Suhonen 2005, 185). The defence structure of the town wall of Viipuri is one of a kind in Finland. The other towns in medieval Sweden fortified with stone walls were Stockholm, Kalmar, and Visby (Taavitsainen 2007, 217; see also Hiekkanen 2010, 717).

It has often been argued that the widespread construction of defensive structures in given region reflects a high level of violent disorder, or the threat of it, which frequently coincides with periods when central power is weak. This happened in medieval Sweden during the reign of Birger Magnusson (1290–1318) and again in the period c. 1363–95. Both were periods of internal war in which rival claimants for the throne battled for power, but they were also periods when royal power was incapable of preventing the building of fortifications by local landowners.

For most of the 12th and 13th centuries neither peaceful conditions nor strong centralised government existed in Sweden, and it therefore might be expected that local nobles would

have had the same free rein that they did in later periods of weak government. Yet in this period there is a comparative lack of fortifications, which has been explained in terms of the nature of warfare in early medieval Scandinavia, where it was the custom to conduct raids or determine the issue in the open field (Line 2007, 309).

It has been also noted that the time period around 1300 seems to have been a decisive moment in the history of Finland and its infrastructure. Not only were Turku Castle and the town of Turku⁸¹ were founded contemporaneously, but at the same time two other main castles in Finland were founded, namely Häme Castle and Viipuri Castle (Hiekkänen 2010, 716). As we can see, this date clearly correlates with similar processes on the southern coast of the Gulf of Finland in Livonia.

3.3.1. Stockholm

The town and royal castle of Stockholm appear in written sources from the middle of the 13th century (Lovén 1996b, 100). The date of the castle has provoked much argument during the last hundred years, but recent research suggests that it was built early in the 13th century (Line 2007, 314 and the references therein).

It has been also suggested that the town of Stockholm was probably established in the middle of the 13th century and did not exist prior to the castle (Lovén 1996b, 100). In the Middle Ages, Stockholm was the main castle of the kings. The building of the castle has been also suggested to have started soon after 1250 (Drake 1996, 31), but also periods before 1250 have been suggested. The castle of Stockholm is in 1288 for the first time mentioned in written sources (Drake 2002, 154–155). It consisted of a main castle and a vast bailey. It has been

⁸¹ Interestingly Turku was not a walled town. By the early 16th century, Turku was more than two hundred years old (i.e., same age as Tampere today), and there lived maybe 2,000–3,000 inhabitants. The city was among the mid-sized cities of the Baltic Sea region, and it was the economic, social, religious, and political centre of Finland (Uotila 2007, 233). It has been assumed that one possible reason for not building a town wall in Turku is the topography of the town and its surroundings. The medieval town was surrounded by hills in the northeast, southeast, and southwest. They all rose high above the urban area and would have made the position of the defenders on the walls difficult and dangerous. If the walls would have been built to incorporate the hills or at least their highest elevation, the area to be protected as well as the length of the wall would have become too costly and presumably impossible to defend with the manpower of a small town. Additionally, building a wall is traditionally seen as a measure against the threat emanating from Novgorod and later Moscow. Turku for its part was never threatened from any of these political powers after 1318: the town was located too far to the west (Hiekkänen 2010, 717).

noted, that the bailey was planned as a settlement area of a castle town. Its construction, however, persisted well into the 14th century and in the meantime, the settlement had spread far beyond the castle island, becoming the town of Stockholm (Drake 1996, 31). The earliest town wall of Stockholm ran along the edge of the raised plateau and is mentioned for the first time also in 1288 (Söderlund 2010, 752), but no information survives as to when it was built, by whom, or how it was constructed.⁸² Although various walls have been proposed as remnants of the earliest town wall, no indisputable remains have ever been found. In the mid-14th century the town wall was replaced by a wider circuit of defences closer to the water (Bergman & Söderlund 2015, 8; 11).

The earliest town seal from 1296 shows a crenellated wall and two towers protected by water. The image is assumed to be based on the actual appearance of the defences. The earliest description of the origin of the wall comes from the early 16th century. At present it is not clear how the wall was built, but given that no indisputable remains have ever been found, it is unlikely to have taken the form of a mortared masonry construction, several metres thick (Bergman & Söderlund 2015, 14).

It can be assumed that the wall formed one of the earliest works of Stockholm and may have been completed when the first urban settlement began to develop. In this case the initiative to build the wall cannot have originated from the burghers, unlike in Visby. Those who worked on the Stockholm walls ought to have come from the “outside” – a factor that speaks for the initiator having been involved in trade. It is probable that the power of the state accounted for the construction (Söderlund 2010, 757–758; for further reading see also Söderlund 2002, 46), similarly to Livonian examples Viljandi and Koknese.

The builders of the earliest town wall almost certainly exploited the topography and followed edge of the plateau. Here archaeologists have recorded undisturbed natural gravel many times, usually 1.5–2 m below the present-day ground surface. Archaeological work has been limited to section analysis in old pipe trenches. The only piece of (uncertain) dating evidence from a deposit overlying the gravel is a single medieval pot sherd. The original topography of the gravel suggests that any remnants of the earliest town wall would be situated one storey,

⁸² In the northern part of Västernorrland St, cultural layers dated to the latter part of 1100s or the early decades of the 1200 have been found. If the interpretation of the deposited gravel layer is correct, it might mean that the wall had been built during this period, coinciding with the construction of the oldest remains of the castle's courtyard (Bergman & Söderlund 2015, 8).

perhaps two, below present-day ground level. Downhill from the plateau, earlier excavations have recorded redeposited gravel overlying the original ground surface. This gravel has been interpreted as spoil dug from the ridge when the town wall was built. Recently, a similar gravel layer has been found from the same area. Overlying deposits were dated to the late 12th or first decades of the 13th century, which suggests the earliest town wall was built at this time, if our interpretation of the redeposited gravel is correct. This period coincides with the date of the earliest deposits at the present-day palace courtyard (Bergman & Söderlund 2015, 11).

Due to the steeper and longer ridge slope on the east side of the city than the west, the wall may have had a different design on each side. It has been estimated that the wall height in the west was up to seven metres because this was a normal height of German town walls from the 1200s (Bergman & Söderlund 2015, 102 and references therein).

It has also been suggested that the earliest town wall of Stockholm could have been built before 1220 (Bergman & Söderlund 2015, 102).

During the second half of the 14th century a new wall was erected on reclaimed land along the western banks of the Old Town of Stockholm. It was built of brick on a foundation of granite and had flanking towers (Söderlund 2010, 759–760). Flanking towers indicate that these were probably built during the era of firearms. The walls built against the gravel ridge are usually various types of granite construction. The lower part of the wall one storey below Präst St is built of granite; the upper part is built of brick. Brick, which is sensitive to damp, is not generally used in structures that have direct contact with the ground. Therefore the granite/brick interface may represent the original ground level when the wall was built (Bergman & Söderlund 2015, 12).

Along Präst St, Baggens St, and Bollhus Alley are neighbourhoods where the plots stretch down to Västerlång St and Österlång St (see Figure 14). The houses are likely to have been built just outside the town walls since it had been discontinued and replaced by new fortification walls closer to the water. Based on dendrochronological dating, it is known that new walls were under construction on the west side in the second half of the 1300s (Söderlund 2002, 53). The hitherto oldest dated house outside the wall is from the mid-1300s (see page 44). (Bergman & Söderlund 2015, 96). The discontinuation of the old type of

settlement buildings and the erection of new ones indicates a somewhat similar situation in town planning as is found in Tallinn and Tartu (see chapter 3.1.).

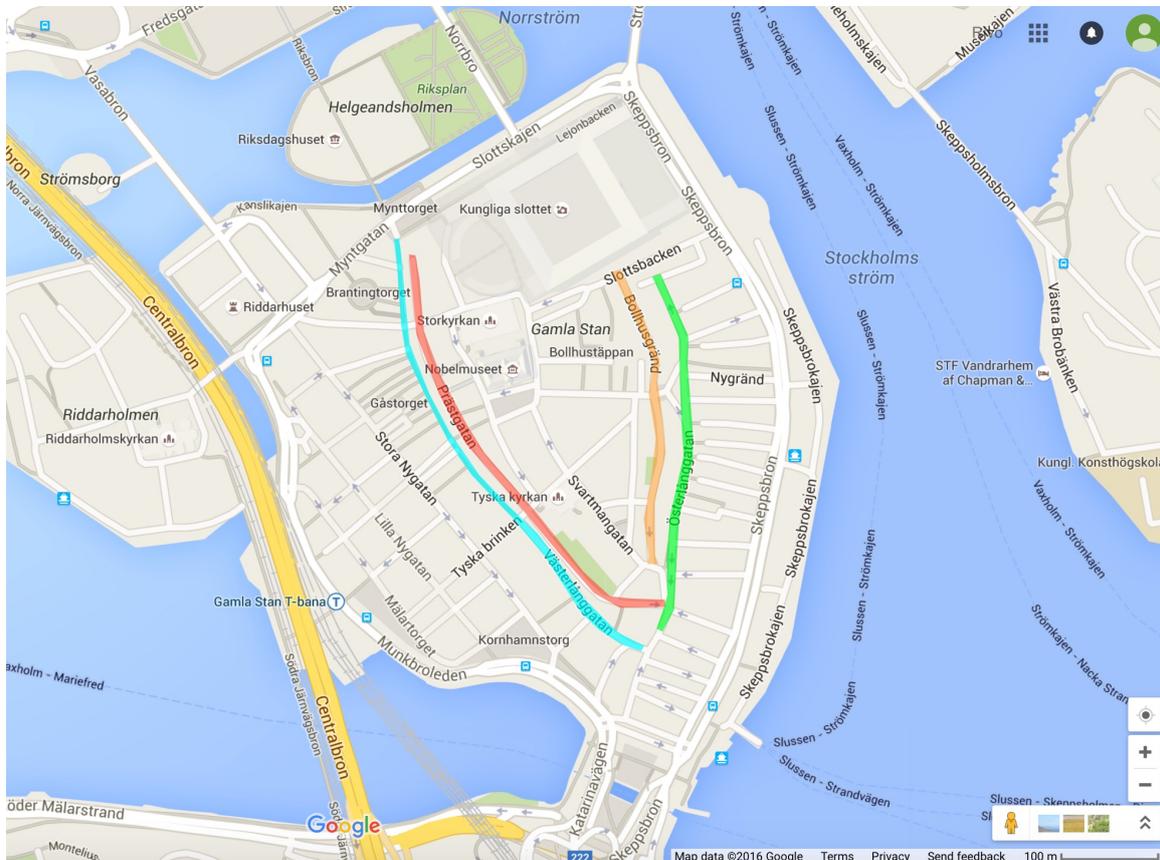


Figure 14. Old Town of Stockholm. Präst St marked with red, Baggens St and Bollhus Alley with orange; Västerlång St with cyan, and Österlång St with green. Map from Google Maps, modified by Rivo Bernotas.

The building of defensive walls of Stockholm swallowed up extensive financial resources and this factor may have hampered the rate of development as well as the fact that a wall along the shoreline made access to the harbours and the water more difficult (Söderlund 2010, 761).

3.3.2. Viipuri (*Viborg*)

Viipuri (in Swedish: *Viborg*) Castle was founded in 1293⁸³ (Saksa & Taavitsainen 2008, 393; see also Drake 2002, 156) for the protection of the church, the kingdom, and trade (Taavitsainen 2007, 212).⁸⁴

⁸³ The main castle is noted to date to the 14th century though. Viipuri is the only early Swedish castle, of which several sources mention the founding year (Drake 2002, 156 ff.).

⁸⁴ For further reading about Viipuri, see also Hiekkänen 2001; 2003; 2005; 2007.

Viipuri has been mentioned in written documents several times before 1403 (Suhonen 2005, 186 and the references in there), when King Erik of Pomerania granted Viipuri its first known town privileges (Saksa & Taavitsainen 2008, 394; see also Drake 1996, 32). During the 14th century, Viipuri grew from a village-like settlement at the foot of a wooden fortification into a medieval town, protected and controlled by a stone castle (Suhonen 2005, 185). Although the Viipuri of that era would not have been a large town by medieval standards, it was not a small town. By mid-1500s the estimates of the population were ranging from 1,200 to 2,000⁸⁵ (Taavitsainen 2007, 212–213), therefore being around the same size as Viljandi in Old Livonia (Bernotas 2013c, 267 and the references therein).

The construction of stone walls for the defence of the town that had emerged on the mainland cape began presumably at the beginning of the 1470s. The first mention of the town wall of Viipuri is dated to 1475⁸⁶ (Saksa 2012, 162 and the references therein; see Figure 15). The aims of the construction programme was to reinforce the kingdom's eastern border, which included not only the construction of the town wall of Viipuri but also Olavinlinna Castle (Taavitsainen 2007, 217), as well as to separate the bourgeois of the town from the countryside dwellers (Suhonen 2005, 190). The building of the large-scale fortifications in Viipuri was necessitated by the need to defend the frontier town against the more powerful Moscow State during the intensification of the struggle for domination in the Baltic Sea and the dramatic development of siege artillery (Saksa 2012, 162 and the references in there). The wall was constructed quickly and therefore without following the strict technical requirements (Saksa 2012, 169).

The length of the wall was about two kilometres, and it is known to have at least 11 towers and a gate tower (Taavitsainen 2007, 217), although the exact number of the original towers is not precisely known (Saksa 2012, 162). Of these only a small square tower⁸⁷ has preserved

⁸⁵ Within Baltic Sea region a population of Viipuri was therefore not a minor town, even if big cities like Lübeck, Danzig, and Novgorod could have had more than 20,000 inhabitants. The population of Stockholm and Tallinn was around 5,000–6,500. Of the central European towns and cities, however, only 15 per cent belonged to the same size range as Viipuri (Taavitsainen 2007, 213).

⁸⁶ It is assumed that by that time its main inland part had already been completed since construction of Savonlinna Castle began simultaneously in the neighbouring province of Savo and there would not have been enough master-builders or building material for two such projects at the same time (Saksa 2012, 162 and the references therein).

⁸⁷ Called the Town Hall Tower (Taavitsainen 2007, 217).

(Taavitsainen 2007, 217). Near the town hall tower, the width of the wall was about 2 m and the height reached 5.2 m (Saksa 2012, 168).

The oldest known map of Viipuri depicting the walls and towers encircling the town (Saksa 2012, 162) dates back to 1638.⁸⁸ A few other known maps are from the 1640s that provide a picture of the town plan of Viipuri in the Late Middle Ages and some information about its buildings (Taavitsainen 2007, 214).



Figure 15. Town fortifications of Viipuri in 1710. Map from <http://art.alvin-portal.org/alvin/view.jsf?file=6131>, modified by Rivo Bernotas.

Viipuri was a trading town where innovations spread quickly. It was in a relationship with Riga, Danzig, and Lübeck. With cosmopolitan Tallinn, however, Viipuri had a special relationship throughout the Middle Ages, which is further confirmed between the Hanseatic cities' bourgeoisie family ties. Relations in the west's with own national capital, Stockholm, as with Turku, were superficial (Taavitsainen 2007, 213).

Archaeological research has revealed that the two lowermost excavation layers in Viipuri can be dated to the late 13th and early 14th century, i.e. pre-dating the town privileges. In other

⁸⁸ The time gap between the medieval period and the year 1638, however, causes methodological difficulties (Suhonen 2005, 191, and references therein).

respects, cultural layers of typical urban character date from the first half of the 15th century (Saksa & Taavitsainen 2008, 399). Therefore this situation seems to indicate a timeframe similar to that of Old Livonia, where the development from the first traces of an urban settlement to a fully complete medieval town has been noted to take approximately 50–100 years (Bernotas 2012, 164; see also Bernotas 2013c, 287).

Southern Wall St is situated closer to the castle, which traditionally has been regarded as the oldest part of the town community. Here, wooden structures were found that were dated to the beginning of the 15th century. In the lowermost cultural layer reaching the bedrock or intact sand, fishing tackle was found as well as wooden chips, animal bones, and manure containing the seeds of grasses typical of cattle pastures of the period. A radiocarbon dating of lambsquarters seeds was obtained, with the most probable date being AD 1310 (Saksa & Taavitsainen 2008, 396).

It was necessary in addition to prove the assumptions that the stone town wall during its construction may have ‘cut off’ a part of the city’s suburb that had already existed by that time. In studies of the medieval urban fortifications of Viipuri one must remember the possible presence of older defences here. It is also likely that the wall of the 1470s was built ‘liberally’ to leave room for future construction (Saksa 2012, 168–169).⁸⁹ Similarly it is known that the inhabitants of Viljandi still had land within the walls to use for gardening even at the beginning of the 16th century (Haak & Russow 2013, 76). Several empty areas have also been noted in medieval Narva (Süvalep 1936, 239; see also Kivimäe 2004, 21).

Most of the town’s defensive walls from the 16th–19th centuries were torn down in the 1860s, after having lost their military importance (Saksa 2012, 163–164).

3.3.3. Visby

The German merchants from Lübeck expanded their activities to the northeast, establishing their most important trading centre at Visby in the 1160s on the Baltic Sea island of Gotland. From there, they were able to develop and expand their contacts on the eastern coast of the Baltic and rapidly came to dominate the old Scandinavian trade routes in the Baltic Sea region (Kasekamp 2010, 11). In the course of the 13th century, Visby experienced great expansion,

⁸⁹ For examples see footnote 71.

and consequently a building boom. The town expanded in area and buildings were packed closer together in the older parts. The former wooden buildings had been replaced by stone buildings. In the mid-13th century, Visby experienced its greatest boom ever. In the 1270s, however, Gotland encountered increasing competition from the Germans in trade between Novgorod and western Europe. Contemporaneously the Hanseatic League expanded and gradually transformed into a federation of mercantile towns, rather than individual merchants. This development was a blow to the traders of the Gotlandic peasantry, who had taken an active part in international trade. Their names were mentioned all the less in the written sources of the 1260s–1270s (Westholm 2010, 770).



Figure 16. Northern part of the town wall of Visby. Photo by Andres Tvauri.

The town wall of Visby (see Figure 16) is relatively well-preserved, but records of its building are very scarce. The wall has been noted to be built in the second quarter of the 13th century (Zobel 2014, 62)⁹⁰; also building in stages between 1250 and the early 1300s has been suggested (Harrison 2002, 600).⁹¹

⁹⁰ This means earlier than some researchers have been suggesting (Zobel 2014, 62).

⁹¹ For further reading about the town wall of Visby, see also Eckhof & Janse 1936.

In the period from 1280–1288 a new land wall was built outside the existing centre of the town. The wall was approximately 8 m high, higher in some places. The land wall that was built on top of the bank and followed it along its eastern run did not originally have any towers. It had some gates and incorporated some previously existing stone buildings (Zobel 2014, 63).

The wall was 3.4 km in circumference of which 1.4 km were erected alongside the seaside and harbour. The height of the town wall varied between 5.5 m and 6 m (Westholm 2010, 770–771).

In Visby, the town wall was originally erected to define the boundaries of the city and as a toll wall, primarily targeted at excluding the countryside from trade.⁹² It would thus seem as if the town wall of Visby was erected against the interests of the island's own inhabitants and not in the first place as protection against external enemies. The wall was reinforced very shortly after the civil war (Westholm 2010, 771). Similarly, one cannot exclude these same reasons behind the building of town walls in Livonia, where for example Tallinn was sieged during the uprising in 1343.

Visby has been noted to be an opposite example of the castle town while, for example Viljandi from Old Livonia is a classic example of the castle town. The castle attracted artisans and merchants, who are sedentary, and so in the custody of the castle formed the city; whereas in Visby in the 12th century an urban settlement emerged in there (Drake, 1996, 30).

It has been also noted that in Germany, especially in the “common wall” cities, began the formation of the citizenry, which in addition to opposing the lord of the city also competed with him for political power. The first conflicts occurred in Worms, Cologne, and Wurzburg already in the late 11th century. These early civil emancipation efforts were apparently confined to cities where urban citizens and city government were enclosed by a common wall⁹³ (Porsche 2000, 233), similarly to Visby.

⁹² In 1286 representatives of the Hanseatic League convened in Visby, where they decreed that only Visby would be granted the right to sign trade agreements in international trade, thus excluding the rural population outside of Visby or peasant-traders in other places within the interest sphere of the Hanseatic League. The former conception of “the Gotlandic coast”, which meant free trading along the coast of Gotland, was now invalidated. This decision led to civil war on Gotland. In 1288, the year following the meeting, the farmers on the island attacked the town in alliance with soldiers from their ancient trading area in the Baltic Rim (Westholm 2010, 771).

⁹³ In the “two part” towns the settlement had received their own fortifications (Duisburg, Halberstadt) but this did not become a real autonomy (Porsche 2000, 233).

3.3.4. Kalmar

Kalmar, on the east coast of the Swedish mainland, opposite Öland, was a typical colonial town of its period with a church on the market square, a couple of other ecclesiastical institutions, and a large castle (see Figure 17). The castle was located on an island, off from the town. German traders may have founded Kalmar at the end of the 12th century, as a joint venture with the Swedish monarchy (Blomkvist 1997, 69; see also Drake 2002, 153). Kalmar Castle has been also said to initially have served to check the activities of Swedish pirates (Kaufmann & Kaufmann 2001, 245).

The region's trade was conducted in the city, which at the time was located on the mainland directly next to Kalmar Castle. This allowed the central power to collect duty on the goods that were in circulation in the country (Jonsson *et al* 2013, 10).



Figure 17. Reconstruction of the late medieval town plan of Kalmar (Frank *et al* 2010, figure 12).

Kalmar had already become an urban centre before its substantial castle was built, during the early 13th century. Evidence from the early 1250 links Kalmar with the ports of northern Germany, when an agreement was made with Lübeck, but they probably began before this (Lovén 1996b, 98; Line 2007, 332–333; see also Drake 1996, 31).

The dating of the oldest castles in Kalmar is still an open question. The building of the first castle has been suggested to date from the 1170s and the later castle to the 1280 and 1290s. The older castle has been suggested to derive from the first half of the 13th century and the later castle from the 1330s. Christian Lovén follows a mediating line and moved both periods of construction to the second half of the 13th century. Knut Drake's suggestion was to distribute the construction period to the years before and after the 1250th (2002, 154).

Around 1300, crenellated town walls with semi-circular towers were built between 50 and 60 metres apart. The wall was demolished in the 1600s but is archaeologically researched. It was on average two metres thick and more than eight metres high. The wall had four main gates: Västerport (most important), Norreport, and Söderport led into the town, and Stadsbroporten down to the harbour. The wall was constructed of granite with limestone in use. The total length of the outer side has been estimated to be 1080 metres and it forms an irregular semicircle around the city (Harrison 2002, 642; see also Frank *et al* 2010, 28 and the references therein; see also <http://kalmarlexikon.se/s/1849-stadsmuren-gamla-stan>). The timeframe between the first traces of urban settlement (ca. 1200–1250 the earliest) and the medieval walled town (around 1300) seems to be very similar to the towns in Old Livonia.

From 1610 derives the oldest known map of the town of Kalmar (Jonsson *et al* 2013, 70). The oldest topographical view is a pen drawing by Erik Dahlberg from 1645 (Olsson 1968, 31). From the Middle Ages until the mid-1600s, Kalmar was one of Sweden's most important port cities, partly through trade and partly because of the proximity to the Danish border. The exposed location meant, however, that the city of Kalmar until the early 1600s was repeatedly besieged, looted, and burned, which affected its inhabitants very hard (Jonsson *et al* 2013, 12).

3.4. Summary

Based on the discussed material it might be concluded that the average development from the first traces of urban settlement to the walled medieval town in the present-day Estonian territory took approximately 50–100 years (see table 1). The town walls were erected in the Estonian territory probably in the 14th century.

Town	Town rights	Feudal lord	First finds/ mention of urban settlement	Completely developed medieval town
Tallinn	1248	Before 1346 Danish King, afterwards the Teutonic Order	First half of 13th century	First half of 14th century
Tartu	1262	Bishop of Dorpat (Tartu)	First half of 13th century	First half of 14th century
Viljandi	1283	Teutonic Order	Second half of the 13th century	First half of 14th century
Uus-Pärnu	1318	Teutonic Order	Second half of the 13th century	Second half of the 14th century
Haapsalu	1294	Bishop of Ösel-Wiek (Saare-Lääne)	Second half of the 13th century	End of 14th century
Narva	1345	Before 1346 Danish King, afterwards the Teutonic Order	First half of 14th century	End of 14th century

Table 1. Comparing the development timespan from urban settlement to medieval town within the Estonian territory.

To understand whether and how the walling of medieval towns in the Estonian area differed from the similar processes in the neighbouring countries, I comparing the Old Livonian towns with their counterparts around the northern Baltic Sea region. In this, an interesting aspect arises – there are no medieval walled towns neither in the present-day Russian⁹⁴ territory or Lithuania⁹⁵ and there are very few of them in Scandinavia. As there was no German conquest or sufficient community in these areas, I have suggested that the building of urban fortifications was not always directly related to military necessity, but was also due to the specificity of cultural space, namely, with the German culture that arrived with the German settlers to Old Livonia and was henceforth represented by them. The influence of the German traders is also clearly perceivable in all of the four medieval walled towns in the Sweden territory – Stockholm, Viipuri, Kalmar, and Visby.

⁹⁴ For further reading see Petrov & Troianovsky 2001, 140.

⁹⁵ The oldest city wall in Lithuania, the city wall of Vilnius was built between 1503 and 1522 (Ragauskienė 2006).

The town plans indicate that Tartu, Haapsalu, Tallinn, and also Riga were fortress-towns with a combined defence system type of layout. Viljandi, Narva, and Uus-Pärnu on the other hand were based on a quadrangular plan, similarly to Koknese and Valmiera in Latvia. In this layout, the town wall functions as the outer bailey of the castle. The system of baileys, where the large areas protected by stone walls were established directly in front of the castle, has by fellow scholars been stated to be the typical feature of the fortification sites of the Order. However, this is not completely accurate, as Valmiera was a town of the Teutonic Order, and Koknese on the contrary was one of the strongholds of the Archbishop of Riga. Thus, even though it seems tempting to divide the town plans into groups according to the feudal lord (Bishop/Order) we cannot make any far-reaching conclusions on this subject; therefore, the tendency to divide the towns into typologies on the basis of the landlord does not seem to find much support.

We also do see similarities of the town plans of Cēsis and Haapsalu, as Haapsalu seems to spread out in the same ways as the town around the castle at Cēsis. Also, the close connection to the city of Riga had a decisive importance in the construction history of Läänemaa, as master builders from Riga brought their building traditions with them.

Town	Town rights	Feudal lord	First finds/ mention of urban settlement	Completely developed medieval town
Riga	1201	Archbishop of Riga	End of the 12th century	Second half of 13th century
Cēsis	1224	Teutonic Order	First half of the 13th century	End of the 13th century
Valmiera	1323	Teutonic Order	Second half of 13th century	End of 13th century
Koknese	1277	Archbishop of Riga	First half of the 13th century	End of the 14th century

Table 2. Comparing the development timespan from urban settlement to medieval town within the present-day Latvian territory.

There were four walled towns in the Middle Ages in the present day Latvian part of Livonia. As we examined in Chapter 3.2., similarly to the Estonian area, the average development from

the first traces of urban settlement to the walled medieval town in the Latvian territory took approximately 50–100 years (see Table 2), with the exception of Riga. Also as the strongest fortress of the Order in the Estonian area, Viljandi developed into a walled town somewhat faster than the rest of the Estonian area, interestingly similarly was the situation in Cēsis, the strongpoint of the Order in the Latvian area.

Riga is the first German fortified town in the Baltic from which the colonisation of the country was conducted. It takes a special place among the towns of Latvia as it was already in the 13th century an important administrative and commercial centre due to its location at the crossroads of the major trade routes and sea port. But even then it seems to share the similar timeframe of urban development as the rest of the area.

The territory under the rule of medieval Sweden was rather different than that of modern Sweden. The medieval state consisted also the territory of present-day Finland, the Scania province was under Denmark, and Gotland existed some of the time on its own or under the power on Danish king. Unlike Old Livonia, Sweden had a monarchy, but similarly to Old Livonia, Sweden was culturally also a part of the German cultural space.

Sweden had, considering its vast territory, only four medieval walled towns. As we examined in Chapter 3.3., the timeframe for their completion seems to fall in the same pattern as we already witnessed in Old Livonia – first the traces of urban settlement appear, then the town develops and is completed with a stone wall around a half to full century later (see Table 3). In some cases one can perceive similar events in the town planning, where at some point during the building of the town wall the pre-existing settlement areas were re-planned or cut off, such as the cases of Tartu, Tallinn, Stockholm, and Viipuri, according to the research material. Also, the transition from wooden to stone houses in connection with the building of the wall is clearly traceable in Tartu and Visby.

It has been also suggested that the Viipuri town wall of the 1470s was built ‘liberally’ to leave room for future construction, being therefore similar to Viljandi and Narva.

The initiative to build the Stockholm wall cannot have originated from the burghers, unlike in Visby. Those who worked on the Stockholm walls ought to have come from ‘outside’ – a factor that speaks for the initiator having been involved in trade. It is probable that the power of the state accounted for the construction, similarly as for example in Livonia in Viljandi and

Koknese. It has been also noted that some Swedish cities, for example Kalmar, may have been founded by German traders as a joint venture with the Swedish central power.

Town	Feudal lord	First finds/mention of urban settlement	Completely developed medieval town
Stockholm	Swedish King	Middle of the 13th century	Second half of 13th century
Visby	Independent area, 1361 conquered by Danish King	Second half of the 12th century	Second half of the 13th century
Kalmar	Swedish King	First half of 13th century	First half of 14th century
Viipuri	Swedish King	Second half of the 14th century	Second half of the 15th century

Table 3. Comparing the development timespan from urban settlement to medieval town within the present-day Latvian territory.

In comparison with Viljandi, Visby has been noted to be an opposite example of the typical castle town. The castle attracted artisans and merchants, who are sedentary, and so in the custody of the castle formed the city; whereas in Visby in the 12th century an urban settlement emerged in there.

On the basis of research material from town walls in Tartu and Uus-Pärnu I have also suggested, that the town walls were not only military buildings, but symbolised the current way of life and demonstrated the power of the new rulers to indigenous people, as well as to the governors of the neighbouring countries. Therefore, one also cannot exclude the symbolical value of the medieval town walls in the research.

It has been noted that in Visby the town wall was originally erected to define the boundaries of the city and as a toll wall, primarily targeted at the countryside. It would thus seem as if the town wall of Visby was erected against the interests of the island's own inhabitants and not in the first place as protection against external enemies. The wall was reinforced very shortly after the civil war. Similarly one cannot exclude the same reasons for building town walls in Livonia, where for example Tallinn was sieged during the uprising in 1343.

In summary, the genesis of the medieval town walls in Old Livonia compared with their counterparts around the northern Baltic seems to clearly indicate an ordinary colonisation

policy, which is not something unique in Europe.⁹⁶ As has been noted, the locations of towns in border areas were due to the fact that boundaries between the various lordly territories were often not clearly determined, as it was in the 13th century Old Livonia or, with the only walled Finnish town, Viipuri⁹⁷. A newly created settlement in an area where lordly rights were not yet clearly fixed could serve as an anchor point for dominion. In this way, territories were enlarged by colonisation and the creation of new legal structures such as town rights, rather than by military conquest. It is also relevant that frontier regions were relatively uncultivated and underpopulated due to less favourable geographical conditions, as is usually the case with border areas. Because of the growing population pressure and the increasing knowledge of agrarian technology, it became profitable to cultivate these marginal lands (Bernotas 2013c, 293–295 and the references therein).

⁹⁶ For references see Bernotas 2013c, 293 and the references therein.

⁹⁷ As already mentioned, for example Turku was never threatened from any of political powers after 1318: the town was located too far in the west (Hiekkanen 2010, 717), therefore one reason for not having a stone wall.

Conclusions

The research of the medieval town walls in Estonia has so far been scarce at best. To fill this gap, in the current paper I have sketched some of the historical sequences of transformations of the medieval townscapes that archaeology has begun to reveal and pointed out a few of the fundamental contexts and processes that have influenced such changes.

In answer to the first questions of the research – which changes on the urban townscape can be associated with the building of town walls – we might conclude that town walls construction required the development of new types of building materials. As examined, these depended largely on natural resources in the respective locations. Similarly to Estonia, the builders in Latvian area used locally obtained building materials.

The main building materials used in Estonian towns and in numerous castles and churches were stone and brick, which were joined with mortar. North, west, and central Estonia are considered to be relatively rich in limestone. From written sources it is known that lime-burning was carried out in the Tallinn's lime kilns already in the 14th century. This date also confirms the substantial changes in the town building and planning around the same time in Old Livonia.

The main building material in southern Estonia was glacial erratic, a hard and strong stone suitable for use as a building material, which can be used in underground and other supporting structures. The rocks have been used in an incredibly huge amounts; therefore it might be assumed that these were not gathered together at once, but rather over an extended period of time. It is also likely that the town's neighbouring peasants brought the stones to the town for sale as well as for some kind of tax. Considering the average weight to volume ratio of glacial erratic, it can be said that even the building of the walls of small-towns required tens of thousands tonnes of stone and therefore was an enormous project.

The beginning of brick-making in Estonia clearly correlates with the beginning of the construction boom in the 14th century. In the course of the latter, the town areas were re-planned, and the construction of the town fortifications, stone churches, and stone houses had started.

Secondly it is quite obvious that projects as enormous as surrounding the towns with walls could not just happen without any related events on the townscape. In the current context, two

events clearly distinguish in the medieval townscape in relation with the town planning: the appearance of cesspits and stone houses.

Over 40 medieval cesspits have been found in Tartu, five of which have been dated by using the dendrochronological method. The dates of the find-complexes of the vast majority of cesspits and dendrochronologically dated cesspits reveal that they appear on the townscape of Tartu clearly in the first half of the 14th century. Therefore this date seems also to support the hypothesis that the erection of the town wall and the re-planning of the town area began at the same time. It might be concluded that the townscape of Tartu underwent several changes in the 14th century. After building the wall, the disposal of waste to cesspits was probably regulated by the town laws, which were valid only within the limits of the area enclosed by wall and therefore did not apply to outlying areas.

On a side note, it is quite evident that after they could not long serve their original purposes, cesspits were used as waste-boxes and latrines. Based on the several factors it might be suggested that we cannot exclude the possibility that some of the cesspits were originally built for treating the leather and later, after the town wall was built, the old tanning boxes were used as latrines and cesspits. The leather tanning in the town area stopped with the construction of the town wall.

On several occasions the remains of medieval buildings have been found in excavations from Tartu, the dates of which range from the 14th to 16th century. The oldest firmly dated stone masonry in Tartu, St. John's Church, was built after the year 1321.

In earlier research, the introduction of brick buildings in Tartu had been dated to the end of the 14th century–15th century. Based on the discussed information the introduction of brick buildings can be traced to the early 14th century.

In answer to the second question – when the construction of the town walls started and how long did it take to complete them – the discussed material suggests that the average development from the first traces of urban settlement to walled medieval town in the present-day Estonian territory took a timeframe of approximately 50–100 years. The examined material indicates that the town walls were probably erected in the area of present-day Estonia in the 14th century.

To answer the third question – whether and how the walling of medieval towns in the Estonian area differed from similar processes in the neighbouring countries – we first

compared the Old Livonian towns with their counterparts around the northern Baltic Sea region. In doing so, an interesting fact becomes apparent – there are no medieval walled towns in the territory of present-day Russia nor Lithuania and there are very few of them in Scandinavia. As there was no German conquest or sufficient Germanic community in these areas, I have suggested that the building of urban fortifications was not always directly related to military necessity, but was also due to the specificity of the cultural space, which came to Old Livonia with the German settlers and was henceforth represented by them. The influence of the German traders is also clearly perceivable in all of the four medieval walled towns in the territory of medieval Sweden: Stockholm, Viipuri, Kalmar, and Visby.

The town plans of Estonia range from fortress-towns with a combined defence system type of layout to the quadrangular plan-layout, similarly to Latvia. In the latter layout, the town wall functions as the outer bailey of the castle.

The system of baileys, where the large areas protected by stone walls were established directly in front of the castle, has by fellow scholars been stated to be the typical feature of the fortification sites of the Livonian Order. However, as we examined in the current research, this is not completely accurate, as Valmiera was a town of the Teutonic Order, and Koknese on the contrary was one of the strongholds of the Archbishop of Riga. Thus, even though it seems tempting to divide the town plans into groups according to its feudal lord, we cannot make any far-reaching conclusions on this subject. Therefore, the tendency to dispense the towns into typologies on the basis of the landlord does not seem to find much support.

We also do see similarities of the town plans of Cēsis and Haapsalu, which is understandable, as it is known that the close connection to the city of Riga had a decisive importance in the construction history of Läänemaa, as master builders from Riga brought their building traditions with them.

There were four walled towns in the Middle Ages in the present day Latvian part of Livonia. As we examined, similarly to Estonian area, the average development from the first traces of urban settlement to walled medieval town in the Latvian territory took a timeframe of around 50–100 years, with the exception of Riga. Also as the strongest fortress of the Livonian Order in what is now Estonia, Viljandi developed to a walled town somewhat faster than the rest of the Estonian area, interestingly similarly was the situation in Cēsis, the strongpoint of the Order in the Latvian area.

Riga is the first German fortified town in the Baltic, and from there the colonisation of the country was conducted. It takes a special place among the towns of Latvia as it was already in the 13th century an important administrative and commercial centre due to its location at the crossroads of the major trade routes and sea port. But even then it seems to share a similar timeframe of urban development as the rest of the area.

The territory under the medieval Sweden was rather different than that of present-day Sweden. The medieval state consisted also the territory of present-day Finland, the Skane province was under Denmark, and Gotland existed some of the time on its own or under the power of a Danish king. Unlike Old Livonia, Sweden had a monarchy, but similarly to Old Livonia, Sweden was culturally also a part of German cultural space.

Medieval Sweden had, considering its vast territory, only four medieval walled towns. The timeframe for their completion seems to fall in the same pattern as we already witnessed in Old Livonia – first the traces of the urban settlement appear, then town develops and is completed with a stone wall around a half to full century later. In some cases one can perceive similar events in the town planning, where at some point during the building of the town wall the pre-existing settlement areas were re-planned or cut off.

It has been also suggested that the Viipuri town wall of the 1470s was built “liberally” leaving room for future construction, therefore, being similar for example in Old Livonia in Viljandi and Narva.

The initiative to build the Stockholm wall cannot have originated from the burghers, unlike in Visby. Those who worked on the Stockholm walls ought to have come from “outside” – a factor that speaks for the initiator having been involved in organisation and trade. It is probable that the power of state accounted for the construction, similarly as for example in Livonia in Viljandi and Koknese. It has been also noted that for example Kalmar may be founded by German traders as a joint venture with the Swedish central power.

On the basis of research material from town walls in Tartu and Uus-Pärnu I have also suggested that one can exclude the symbolical value, as not being only military buildings, but symbolising the current way of life and demonstrated the power of the new rulers to indigenous people, as well as to the governors of the neighbouring countries.

It seems that the town wall of Visby was erected against the interests of the island’s own inhabitants and not in the first place as protection against external enemies. Similar reasons

have surfaced in Old Livonia as well. In comparison with Viljandi, Visby has been noted to be an opposite example of the castle town.

In summary, the genesis of the medieval town walls in Old Livonia compared with the counterparts around the northern Baltic seems to clearly indicate an ordinary colonisation policy, which is not something unique in Europe.

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References

- Alamaa, E. & Kivi, A. 1966.** Tallinn. Linna asustus- ja ehitusajaloolisi materjale seitsmes köites. Köide VI. Eesti NSV Riiklik Ehituskomitee, Tallinn.
- Alttoa, K. 1978.** Viljandi linna kujunemisest. – *Ehitus ja arhitektuur*, 2, 48–54.
- Alttoa, K., Aus, T., Tamm, J. 1996.** Narva Castle: an outpost of the Occident. – *Castella Maris Baltici II. Lund Studies in Medieval Archaeology* 18. Eds. M. Josephson, M. Mogren. Södermanlands Museums Förlag, Nyköping, 13–18.
- Alttoa, K., Tamm, J. 1992.** A glimpse at research into historic towns in Estonia: Current Results and Perspectives. – *Estonia: Nature, Man and Cultural Heritage. PACT*, 37, 63–76.
- Aluve, K. 1993.** Eesti keskaegsed linnused. Valgus, Tallinn.
- Berga, T. 2010.** Viduslaiku Valmieras aizsargmūris. – *Arheoloģija un etnogrāfija XXIV*. – Zinātne, Rīga, 112–124.
- Berga, T. 2003.** Valmieras pils: arheologa stāsts. Valmieras Novadpētniecības muzejs, Valmiera.
- Bergman, A. & Söderlund, K. 2015.** Den svårfunna äldsta stadsmuren, Gamla Stan, Stockholm. – *Arkeologisk och Byggnadsarkeologisk Rapport. Stadsmuseet Rapporterar* 77. Stadsmuseet, Stockholm.
- Bernotas, R. 2016a.** Aruanne arheoloogilisest järelvalvest Viljandis, Hariduse, Vaksali, Kaalu, Tallinna, Turu, Tartu ja Liiva tänavatel 2014–2015. In press.
- Bernotas, R. 2016b.** Aruanne arheoloogilisest järelevalvest Tartus, Ülikooli tänaval 2015. aastal. In press.
- Bernotas, R. 2013a.** Brick making in the medieval Baltic – the Estonian example. – *Estonian Journal of Archaeology*. 17:2, 139–156.
- Bernotas, R. 2013b.** Medieval fortifications of Pärnu. An archaeological approach. – *Zeitschrift für Archäologie des Mittelalters, Jahrgang* 40, 2012. Verlag Dr. Rudolf Habelt GmbH, Bonn, 185–199.
- Bernotas, R. 2013c.** Medieval small towns of Estonia – archaeology and the history of urban defense. – *The Estonian Historical Journal / Ajalooline Ajakiri* 2013, 3:145, 265–298.
- Bernotas, R. 2012.** New insights on the changes of townscape in 14th-century Tartu. – *Estonian Journal of Archaeology*, 16:2, 153–168.

- Bernotas, R. 2011.** Medieval town wall of Tartu in the light of recent research. – *Estonian Journal of Archaeology*, 15, 56–72.
- Bernotas, R. 2008.** Dendrodates of three medieval latrines of Tartu. – *Estonian Journal of Archaeology*, 12, 16–29.
- Bernotas, R., Vunk, A., Kriiska, A. 2009.** Archaeological fieldwork at Pärnu Medieval and early Modern fortifications from 2007 to 2009. Arheoloogilised välitööd Pärnu kesk- ja varauusaegsetel kaitsehitistel 2007.–2009. aastal. – *Archaeological Fieldwork in Estonia 2009*. Muinsuskaitseamet, Tallinn, 155–165.
- Biermann, F. & Herrmann, C. 2014.** The origin and rise of brick technology and use in medieval Pomerania, Pomerelia and Lower Silesia. – *Fresh Approaches to Brick Production and Use in the Middle Ages. Proceedings of the session “Utilization of Brick in the Medieval Period – Production, Construction, Destruction”* held at the European Association of Archaeologists (EAA) Meeting, 29 August to 1 September 2012 in Helsinki, Finland. Eds. T. Ratilainen, R. Bernotas, C. Herrmann. *British Archaeological Reports International Series* 2611, 51–60.
- Blomkvist, N. 1997.** När hanseaterna kom: En stadshistorisk jämförelse mellan Visby och Kalmar. – *Gotländskt Arkiv: Meddelanden från Föreningen Gotlands Fornvänner*, 69, Visby, 47–70.
- Bond, C.J. 1987.** Anglo-Saxon and medieval urban defences – *Urban Archaeology in Britain*. Eds. J. Schofield & R. Leech. Council for British Archaeology, London, 92–116.
- Bulst, N. 1979.** Der Schwarze Tod: demographische, wirtschafts- und kulturgeschichtliche Aspekte der Pestkatastrophe von 1347–1352: Bilanz der neueren Forschung. – *Saeculum* 30:1, 45–67.
- Caune, A. 2014.** Arheoloģiskā pētniecība Latvijas 13.–16. gs. Mazpilsētās līdz 2008. Gadam. – *Latvijas Zinātņu Akadēmijas Vēstis*, 68:5/6, 4–22.
- Caune, A. 2012.** Stadtkernforschungen in den Kleinstädten des 13. bis 16. Jahrhunderts in Lettland. – *Vana Tallinn XXIII (XXVII)*. Ed. R. Pullat. Estopol Publishing, Tallinn. 61–95.
- Caune, A. 2007.** Pētījumi Rīgas arheoloģijā. Latvijas vēstures institūta apgāds, Rīga.
- Classen, A. 2009.** Urban space in the Middle Ages and the Early Modern Age: Historical, mental, cultural, and social-economic investigations. – *Fundamentals of Medieval and Early*

Modern Culture: Urban Space in the Middle Ages and the Early Modern Age. Eds. A. Classen, M. Sandidge. Walter de Gruyter, Berlin, New York, 1–145.

Debonne, V. 2014. Brick production and brick building in medieval Flanders. – Fresh Approaches to Brick Production and Use in the Middle Ages. Proceedings of the session “Utilization of Brick in the Medieval Period – Production, Construction, Destruction” held at the European Association of Archaeologists (EAA) Meeting, 29 August to 1 September 2012 in Helsinki, Finland. Eds. T. Ratilainen, R. Bernotas, C. Herrmann. British Archaeological Reports International Series 2611, 11–26.

Dollinger, P. 1970. German Hansa. – The Emergence of International Business 1200– 1800, Vol. 1, Macmillan , London.

Drake, K. 1996. Burg und Stadt in Schweden in der Zeit von 1250 bis 1320. – Castella Maris Baltici II. Lund Studies in Medieval Archaeology 18. Eds. M. Josephson, M. Mogren. Södermanlands Museums Förlag, Nyköping, Sweden. 29–34.

Drake, K. 2002. Burgenbau des 13. Jahrhunderts in Schweden. – Forschungen zu Burgen und Schlössern. Band 7: Burgenbau im 13. Jahrhundert. Deutscher Kunstverlag, Munich-Berlin. 149–159.

Eckhof, E. & Janse, O. 1936. Visby stadsmur. Wahlström & Widstrand, Stockholm.

Einasto, R. 2007. Paealuspõhjast Põltsamaa ümbruses. – Põltsamaa Muuseumi Toimetised, Põltsamaa, 7–42.

Fehring, G. 1991. The Archaeology of Medieval Germany: An Introduction. Translated by Ross Samson. Routledge, London.

Feldhaus-S., R. 1995. Untersuchungen zum Wandel von Gebrauchsgeschirr der Zeit um 1200 und zur frühen städtischen Entsorgungspraxis, dargestellt am Beispiel von zwei archäologischen Fundkomplexen aus Höxter. – Ausgrabungen und Funde in Westfalen-Lippe 9B, Zabern Verlag, 201–317.

Frank, A., Englund, P., Sabel, M., Ljungdahl, J., Arvidsson, S., Lewan, T., Nilsson, U. 2010. Planprogram för Område Kring Kv Valnötsträdet. Kalmar kommun, Kalmar.

Freytmuth, O. 1927. Tartu linn orduajal. Tartu. 12–43.

Gonella, G. 2008. The history of early medieval towns of north and central Italy: The contribution of archaeological evidence. – BAR International Series 1780. Archaeopress, Oxford.

- Haak, A. & Heinloo, E. 2007.** Pudemaid keskaegsest käsitööst Tartus. – History in Town. Tartu Linnamuuseum, Tartu, 31–42.
- Haak, A. & Russow, E. 2013.** On the development of the town of Viljandi in the light of earliest archaeological find complexes. – Estonian Journal of Archaeology, 17:1, 57–86.
- Haak, A. & Russow, E. 2012.** Interpreting find complexes from the medieval cesspits of Tartu. – Medieval Urban Textiles in Northern Europe. Muinasaja Teadus 22. Tartu Linnamuuseum, Tartu, 147–172.
- Hædersdal, Ebbe. 2012.** On buildings archaeology in Denmark. – Across the North Sea: Later Historical Archaeology in Britain and Denmark, c. 1500–2000 AD. Studies in History and Social Sciences Book 444. University Press of Southern Denmark, Odense, 105–118.
- Harjula, J. 2008.** Before the Heels: Footwear and Shoemaking in Turku in the Middle Ages and at the Beginning of the Early Modern Period. Suomen Keskiajan Arkeologian Seura, Turku.
- Harrison, D. 2002.** Jarlens Sekel: En Berättelse om 1200-talets Sverige. Ordfront Förlag, Stockholm.
- Heard, K. 2000.** A post-medieval tawyer's yard in Berrymore. – London Archaeologist, 9:5, 137–143.
- Heußner, K.-U. & Schäfer, H. 1999.** Mittelalterliche Holzschächte vom östlichen Marktquartier in Greifswald, Mecklenburg-Vorpommern. – Germania: Anzeiger der Römischen-Germanischen Kommission des Deutschen Archäologischen Instituts, 77:1, 247–282.
- Hiekkanen, M. 2001.** Die mittelalterlichen Stadtkirchen in Finnland. Die Stadt im europäischen Nordosten. Kulturbeziehungen von der Ausbreitung des lübischen Rechts bis zur Aufklärung. *Aue-Säätiön julkaisuja, Skrifter utgivna av Aue-Stiftelsen, Veröffentlichungen der Aue Stiftung* 12. Lübeck, 453–469.
- Hiekkanen, M. 2003.** Viipurin lääni – rautakaudesta keskiaikaan. Karjalan synty. *Viipurin läänin historia* I. Ed. Matti Saarnisto. Jyväskylä, 475–504, 528–532, 551–554.
- Hiekkanen, M. 2005.** Uusia kaivaustutkimuksia, uusia tutkimustuloksia: Viipurin keskiajan kuva muuttuu. *Viipurin Suomalaisen Kirjallisuusseuran toimitteita* 15. Helsinki, 86–94.
- Hiekkanen, M. 2007.** Suomen keskiajan kivikirkot. Suomalaisen Kirjallisuuden Seuran Toimituksia 1117, Helsinki.

- Hiekkanen, M. 2010.** City fortifications in Turku during the Middle Ages and the early modern era? – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen. Verlag Schmidt Römhöld, Lübeck, 715–719.
- Hill, P. & Wileman, J. 2002.** Landscapes of War: The Archaeology of Aggression and Defence. Tempus Publishing, Charleston.
- Høst-Madsen, L; Simonsen, R.; Wozniak, S. 2010.** The fortification of Copenhagen. – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen. Verlag Schmidt Römhöld, Lübeck, 845–865.
- Jonsson, M., Reuterswärd, A., Nilsson, N. 2013** Kalmar hamn: Kulturhistorisk utredning 2013. Ölandshamnen 2013. Kalmar Läns Museum, Kalmar.
- Jõgiste, A., Varjas, J., Rjabinina, J. 2004.** Katku ja koolera levikust Eestis. – Eesti Arst, 83:7, 463–467.
- Kalmar Lexikon.** Stadsmuren, Gamla stan. <http://kalmarlexikon.se/s/1849-stadsmuren-gamla-stan>
- Kangroopool, R. 1992.** Tallinna kiviraidurid ja mürseppmeistrid ca 1290–1800. TLA.R-242.1.224.
- Kangroopool, R. 1980.** Hans Kotke, Tallinna mürseppmeister ja kiviraidur 15. sajandi keskpaigas. – Tõid kunstiteaduse ja -kriitika alalt 3. Kunst, Tallinn, 97–109.
- Kangroopool, R. & Lumiste, M. 1977.** Tallinna 15. sajandi arhitektuuri dateerimise küsimustest. – Tõid kunstiteaduse ja -kriitika alalt 2. Kunst, Tallinn, 264–283.
- Kaplinski, K. 1975.** Uusi andmeid Tallinna linnamüüri Tõnismäe-poolse osa kindlustamisest 15. sajandi viimasel veerandil ja 16. sajandi esimesel poolel. – Eesti NSV Teaduste Akadeemia Toimetised, 24: 4, 332–343.
- Kaplinski, K. 1981.** Eesti keskaegsed ehitusmeistrid. Manuscript in the archive of National Heritage Board.
- Kasekamp, A. 2010.** A History of the Baltic States. Palgrave Macmillan, Houndsmills, UK.
- Kaufmann, J.E. & Kaufmann, H.W. 2001.** The Medieval Fortress: Castles, Forts, and Walled Cities of the Middle Ages. Da Capo Press, Cambridge.
- Kivi, A. 1966.** Tallinna manufaktuuride ja tööstuste ajaloost. – Tallinn. Linna asustus- ja ehitus- ajaloolisi materjale seitsmes köites. Eds E. Alamaa & A. Kivi. Eesti NSV Riiklik Ehituskomitee, Tallinn, 120–329.

- Kivimäe, J. 2004.** Medieval Narva: Featuring a Small Town Between East and West. – Narva und die Ostseeregion. Tartu Ülikooli Narva Kolledž, Narva, 17–29.
- Kivimäe, J. & Kriiska, A. & Põltsam, I. & Vunk, A. 1998.** Merelinn Pärnu. Pärnu Linnavalitsus, Pärnu.
- Kriiska, A. & Štšogoleva, J. & Kimber, A. & Alttoa, K. 2013.** Kesk- ja uusaegsete ehitusjäänuste uuringud Tartus Lossi tn 15. – Tutulus. Eesti Arheoloogia Aastakiri, 26.
- Kriiska, A. & Roog, R. & Alttoa, K. & Allik, A. & Läänelaid, A. & Bernotas, R. & Malve, M. 2011.** The medieval and modern period building complex at 2 Lutsu Street in Tartu. Results of archaeological, architectural historical, dendrochronological and osteoarchaeological research. – The Estonian Historical Journal, 1:135, 3–40.
- Kruus, H. 1933.** Lubjapõletamine Pedja jõe raionis. – Ajalooline Ajakiri, 4, 177–195.
- Küng, E. 2005.** Narva kesk- ja varauusaegne linnaõigis ja seda mõjutanud tegurid. Linna asutamine, esmamainimine, inimtegevuse jäljed. Ed. by Merike Ivask, Narva Muuseumi Toimetised, 5. Narva Muuseum, Narva, 51–64.
- Laakmann, H. 1930.** Ajalugu. – Pärnumaa. Maateaduslik, tulunduslik ja ajalooline kirjeldus. Eesti. Eds. A. Tammekann, J. Köpp & E. Kant. Maateaduslik, tulunduslik ja ajalooline kirjeldus, IV. Eesti Kirjanduse Selts, Tartu, 718–741.
- Lang, V. 1996.** Muistne Rävala: Muistised, kronoloogia ja maaviljelusliku asustuse kujunemine Loode-Eestis, eriti Pirita jõe alamjooksu piirkonnas, 1–2. – Muinasaja Teadus, 4. Ajaloo Instituut, Tallinn.
- Leetmaa, M. 2000.** Lubja- ja tõrvaahjud. – Suitsutare 2: valitud artikleid 1975–1999. Tallinn 2000, 147–210.
- Leighly, J. 1939.** The towns of Medieval Livonia. – University of California Publications in Geography, 6: 7. University of California Press, Berkeley, 235–314.
- Line, P. 2007.** Kingship and State Formation in Sweden 1130–1290. – The Northern World. Brill, Leiden–Boston.
- Lovén, C. 1996a.** The Round Towers of Sweden's Eastern Coast. – Castella Maris Baltici II. Lund Studies in Medieval Archaeology 18. Eds. M. Josephson, M. Mogren. Nyköping, Sweden, 97–102.
- Lovén, C. 1996b.** Borgar och Befästningar i det Medeltida Sverige, 1st edition. Antikvariska Serien 40. Kungl. Vitterhets Historie och Antikvitets Akademien, Stockholm.

- Metsallik, R. 1995.** Tartu arheoloogilisest uurimisest. – Tartu arheoloogiast ja vanemast ehitusloost. Tartu Ülikooli Arheoloogia Kabineti Toimetised 8, 15–36.
- Mäesalu, A. 1990.** Sechs Holzkonstruktionen in Tartu (Lossi-Strasse). – Eesti Teaduste Akadeemia Toimetised. Ühiskonnateadused, 39 (4). Teaduste Akadeemia Kirjastus, Tallinn, 446–452.
- Mäll, J. 2004.** Arheoloogilise kultuurikihi spetsiifikast. Tallinna vanalinna territooriumil. – Linnusest ja linnast. Uurimusi Vilma Trummali auks. Muinasaja Teadus 14. Eds. A. Haak, E. Russow, A. Tvauri. Tallinn, Tartu, 249–268.
- Nöps, M. 2015.** Tartust Küüni 3/5 hoovist 2002. aastal leitud keskaegsete puitehitiste dendrokronoloogilised dateeringud. Bachelor's thesis. Manuscript in the library of the Department of Archaeology of the University of Tartu.
- Oad, K. 2014.** Ristisõda kui kanoonilise õiguse instituut ja selle kohaldamine Eesti- ja Liivimaal 13. sajandi I veerandil. Master's thesis. Manuscript in the library of the Department of Justice of the University of Tartu.
- Olsson, M. 1968.** Erik Dahlbergs bilder av Kalmar gamla stad och deras värde som historisk källa. – Fornvännen: Journal of Swedish Antiquarian Research, 31–48.
- Ose, I. 1999.** Burg und Stadt im mittelalterlichen Lettland während des 13.–15. Jahrhunderts. – Castrum Bene 6. Burg und Stadt, Prague, 213–231.
- Ose, I. 2010.** Die Stadtbefestigungen Rigas im 13. bis 16. Jahrhundert. – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen. Verlag Schmidt Römhöld, Lübeck, 667–680.
- Peebo, A. & Rennu, M. 2013.** Maakivi ehitusmaterjalina: töötlemine ja kasutus. – Lugusid materjalidest/Stories about materials. Studia Vernacula. Tartu Ülikooli Viljandi Kultuuriakadeemia rahvusliku käsitöö osakond, 73–86.
- Pela, W. 2014.** Brick in historic architecture: The research experience of Warsaw. – Fresh Approaches to Brick Production and Use in the Middle Ages. Proceedings of the session “Utilization of Brick in the Medieval Period – Production, Construction, Destruction” held at the European Association of Archaeologists (EAA) Meeting, 29 August to 1 September 2012 in Helsinki, Finland. Eds. T. Ratilainen, R. Bernotas, C. Herrmann. British Archaeological Reports International Series 2611, 61–69.

- Perens, H. 2005.** Jõgevamaa on üleminekuala paekasutuselt maakivi ja tellise kasutamiseks. – Keskkonnatehnika 1/2005, 47–52.
- Petrov, M.I., & Troianovsky, S.V. 2001.** Man and the fortress: Ways for co-existence in mediaeval Russia. – Castella Maris Baltici V. Archaeologia Medii Aevii Finlandiae VI. Eds. J. Skaarup, N. Engberg, K. Borch Vesth. Rudkøbing, 137–142.
- Pirrus, E. 2009.** Eestimaa suured kivid. Suurte rändrahnude lugu. Teaduste Akadeemia Kirjastus, Tallinn.
- Porsche, M. 2000.** Stadtmauer und Stadtentstehung. Untersuchungen zur frühen Stadtbefestigung im mittelalterlichen Deutschen Reich. *Folio*-Verlag Dr. G. Wesselkamp, Hertingen.
- Prak, M. 2008.** Megastructures of the Middle Ages: The Construction of Religious Buildings in Europe and Asia, c.1000-1500. S.R. Epstein Memorial Conference: “Technology and Human Capital Formation in the East and West”. LSE, 19th–21st June 2008.
- Puura, V. & Vaher, R. 2004.** Praguline Eestimaa. – Maa Universumis. Eds. H. Nestor, A. Raukas, R. Veskimäe. Reves Grupp, Tallinn, 49–57.
- Ragauskienė, R., Antanavičius, D., Burba, D. 2006.** Vilniaus žemutinė pilis XIV a. – XIX a. pradžioje: 2002–2004 m. istorinių šaltinių paieškos. Lietuvos Pilys, Vilnius.
- Raudkivi, P. 2010.** Maa – meie ema, ilm – meie isa. Märkmeid looduse rollist Liivimaa 14. sajandi ajaloos. – Acta Historica Tallinnensia, 2010, 15, 3–23.
- Rentzel, P. 2002.** Bausteine und Mörtel der Basler Stadtmauern. – Medieval Europe Basel 2002: Centre, region, periphery. Volume 3: Sections 6–8. Eds. Helmig, G, Scholkmann, B, Untermann, M. 3rd International Conference of Medieval and Later Archaeology. Hertingen, 186-192.
- Riedel, S. 2005.** Plague: from natural disease to bioterrorism. – Baylor University Medical Center Proceedings, 18: 2, 116–124.
- Rieger, D. 2014.** The use of early bricks in secular architecture of the 12th and early 13th century in Lübeck. – Fresh Approaches to Brick Production and Use in the Middle Ages. Proceedings of the session “Utilization of Brick in the Medieval Period – Production, Construction, Destruction” held at the European Association of Archaeologists (EAA) Meeting, 29 August to 1 September 2012 in Helsinki, Finland. Eds. T. Ratilainen, R. Bernotas, C. Herrmann. British Archaeological Reports International Series 2611, 39–50.

- Ritums, R. 2004.** The rise of the medieval town of Ventspils – archaeological investigation and hypotheses. – Linnusest ja linnast. Uurimusi Vilma Trummali auks. Muinasaja Teadus 14. Eds. A. Haak, E. Russow, A. Tvauri. Tallinn, Tartu, 291–314.
- Saimre, T. & Tvauri, A. 2010.** Aruanne lubjaahjude ja paemurdude uurimisest Eesti Teadusfondi grandiprojekti nr 6690 raames Kursi kihelkonna alal aastatel 2006–2009. Manuscript in the archives of the National Heritage Board.
- Saksa, A. 2012.** Vyborg: New evidence of the fortifications of the city. – Castella Maris Baltici X. Archaeologia Medii Aevi Finlandiae XVIII. Eds. K. Uotila, T. Mikkola, A.-M. Vilkuna. Saarijärvi, 161–172.
- Saksa, A., Belsky, S., Kurbatov, A., Polyakova, N., Suhonen, M. 2002.** New archaeological excavations in Viipuri. Results of field investigations of the 1999–2001 seasons and current research problems of urban history. – Fennoscandia Archaeologica XIX. Eds. J. Okkonen, J.-P. Taavitsainen. Archaeological Society of Finland, Helsinki, 37–64.
- Saksa, A. & Taavitsainen, J.-P. 2008.** Viipuri (Sw. Wiborg, Ru. Vyborg). – De förste 200 årene – nytt blick på 27 skandinaviske middelalderbyer. Eds. H. Andersson/G. Hansen/I. Öye. Arkeologiske Skrifter Nordisk 5. Universitetet i Bergen, Bergen, 393–400.
- Samorokov, M. 2012.** Naha töötlemine keskaegses Uus-Pärnus läbi kirjaliku ja arheoloogilise materjali. Master's thesis. Manuscript on the webpage of Department of Archaeology of University of Tartu http://www.arheo.ut.ee/docs/MA12_Samorokov.pdf
- Schofield, J. 2005.** Combat archaeology: Material Culture and Modern Conflict. Duckworth, London.
- Schubert, E. 1992.** Städte im Aufbruch und Wandel. – Stadtluft, Hirsebrei und Bettelmönch. Die Stadt um 1300. Konrad Theiss Verlag, Stuttgart, 381–392.
- Schütte, S. 1986.** Brunnen und Kloaken auf innerstädtischen Grundstücken im Ausgehenden Hoch- und Spätmittelalter. – ZAM Zeitschrift für Archäologie des Mittelalters, 4, 237–255.
- Selart, A. (ed.). 2012.** Eesti ajalugu II. Tartu Ülikooli ajaloo ja arheoloogia instituut, Tartu.
- Sepp, H. 1937.** Kaubandus ja linnad keskajal. – Eesti Majandusajalugu. Akadeemiline Kooperatiiv, Tartu, 109–150.
- Šnē, A. 2002.** Castles, towns and villages – different landscapes of power in territory of Latvia from the 11th to 16th century. – Medieval Europe Basel 2002: Centre, Region, Periphery. Volume 2: Sections 4 and 5. Eds. Helmig, G, Scholkmann, B, Untermann, M. 3rd

International Conference of Medieval and Later Archaeology. Folio-Verlag Dr. G. Wesselkamp, Hertingen, 261–265.

Spence, C. (ed.). 1990. Archaeological Site Manual. Department of Urban Archaeology, Museum of London. BAS Printers Limited, Over Wallop, Hampshire.

Sosnowska, P. 2014. Approach on brick and its use in Brussels from the 14th to the 18th century. – Fresh Approaches to Brick Production and Use in the Middle Ages. Proceedings of the session “Utilization of Brick in the Medieval Period – Production, Construction, Destruction” held at the European Association of Archaeologists (EAA) Meeting, 29 August to 1 September 2012 in Helsinki, Finland. Eds. T. Ratilainen, R. Bernotas, C. Herrmann. British Archaeological Reports International Series 2611, 27–38.

Steane, J.M. 2001. The Archaeology of Power. Tempus Publishing, Charleston.

Suhonen, M. 2006. Medieval urban Vyborg. – Estonian Journal of Archaeology 9:2, 179–206.

Süvalep, A. 1936. Narva ajalugu I – Taani- ja orduaeg. Narva Ajaloo Seltsi Toimetised, Narva.

Söderlund, K. 2010. Stockholm’s fortifications in medieval and early modern times. – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen. Verlag Schmidt Römhöld, Lübeck, 751–763.

Söderlund, K. 2002. Stockholms borg och murar. – *S:t Eriks årsbok*. Stockholms stadsbibliotek, Stockholm.

Taavitsainen, J.-P. 2007. Mikael Agricolan Viipuri – Viipurin Mikael Agricola? – Agricolan aika. Eds. K. Häkkinen, T. Vaittinen. BTJ Finland, Helsinki, 212–233.

Tamm, J. 1974. Eestis esineva ehitustellise tüpoloogia ja dateeringu väljaselgitamine. Muinsuskaitseameti arhiiv, Tallinn. P-2004.

Tarvel, E. 1980. Majandus. – Tartu Ajalugu. Eesti Raamat, Tallinn, 45–50.

Treuman, K. 2015. Aruanne arheoloogiliste uuringute teostamise kohta Läänemaal Haapsalu linnas F. J. Wiedemanni tänav 12 kinnistul (Lasteaed “Tõruke” kanalisatsiooni rekonstrueerimistööd). Manuscript in the archives of the National Heritage Board.

Trummal, V. 1992. Arheoloogiuuringutest Tartus Lossi tänaval. – *Stilus*, 2. Eesti Arheoloogiaseltsi Teated, 2, 5–28.

- Tvauri, A. 2015.** Aruanne arheoloogilisest järelvalvest Paides seoses tänavavalgustuse renoveerimisega 2015. aastal. Manuscript in the archives of the National Heritage Board.
- Tvauri, A. 2010.** Archaeological excavations at Lossi 21, Viljandi. – Archaeological fieldwork in Estonia, 2009. Eds. E. Oras, E. Russow. Muinsuskaitseamet, Tallinn, 157–163.
- Tvauri, A. & Saimre, T. 2009.** Archaeological investigations of lime and tar production facilities in Kursi and Rannu parishes. – Archaeological fieldwork in Estonia 2008. Eds. E. Oras, E. Russow. Muinsuskaitseamet, Tallinn, 193–202.
- Tvauri, A. & Valk, H. 1997.** Arheoloogilised uuringud Viljandi vanalinnas kvartalis nr 161 linnamüüri piirkonnas 1997. a. Manuscript in the archive of the Department of Archaeology, University of Tartu.
- Uotila, K. 2007.** Mikael Agricolan Turku 1500-luvun alkupuoella. – Agricolan aika. Eds. K. Häkkinen, T. Vaitinen. BTJ Finland, Helsinki, 233–263.
- Urbańczyk, P. 1994.** The origins of towns on the outskirts of Medieval Europe – Poland, Norway and Ireland. – *Archaeologia Polona*, 32, 109–127.
- Valk, H. 1996.** Viljandi linna 1996. a. radardusfailid ja nendega seotud puuraukude kirjeldused. – 1996. a. radardamis- ja puurimistöõde aruande lisa. Manuscript in the archive of the Department of Archaeology, University of Tartu.
- Westholm, Gun. 2010.** Visby's fortifications between 1100 and 1700. – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII: Die Befestigungen. Verlag Schmidt Römhöld, Lübeck, 765–780.
- Zobel, R. 2014.** Tallinn (Reval). Fortifications in the Middle Ages. Tallinn: Eesti Kunstiakadeemia. Tallinna Raamatutrükikoda, Tallinn.
- Zobel, R. 1994.** Kindluslinn Tallinn. The Fortifications of Tallinn. Kunst, Tallinn.
- Zobel, R. 1980.** Tallinna Keskaegsed Kindlustused. Valgus, Tallinn.

Publications

Rivo Bernotas

BRICK-MAKING IN MEDIEVAL LIVONIA – THE ESTONIAN EXAMPLE

In the area that makes up modern-day Estonia, medieval brick buildings have been found in several different towns. Despite this fact, medieval brick-making has still not yet been specifically studied. As the production of bricks as a field of research on its own has been somewhat neglected, even less attention has been given to its different aspects, which bear witness to brick-making. In this article, I am summarizing the material considering brick-making in the medieval Estonian area. Using the historical-comparative method and a comparison of the dates of other brick sites in Europe, whether and how the existing data about brick-making in what is today Estonia correlates with the so-called construction boom in the 14th century in the same area will be analysed. Based on the research in the current article, it might be suggested that the beginning of brick-making clearly correlates with the beginning of the construction boom in the Estonian area in the 14th century. The presented dates support the hypothesis that the construction of the town wall of Tartu began in the first half of the 14th century. Brick-making was essential for the development of the medieval urban townscape. There have been found only a limited number of archaeological evidence of medieval brick-making from Estonian towns besides Tartu. It might be suggested that brick was a rather expensive building material in Estonia, limited only to castles and buildings in the townscape such as fortifications, ecclesiastical buildings and private houses. Even though there is little information preserved about brick-making workers, it seems probable that the brick-masters were often foreigners who worked outside their hometown and country boundaries.

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Introduction

In the area that makes up modern-day Estonia, medieval brick buildings have been found in several different towns. Despite this fact, medieval brick-making has still not yet been specifically studied. As the production of bricks as a field of research on its own has been somewhat neglected, even less attention has been given to its different aspects, which bear witness to brick-making, such as for example the waste-bricks.

Through archaeology, we can detect a revival of brick production in Lombardy, northern Italy, shortly before the middle of the 12th century. In the middle of the 12th century the use of this technique spread to northern Europe, to both Germany and Denmark (Kristensen 2007, 230). During the late 12th and the first half of 13th century the use of brick technology spread quickly over the territories of Poland, Pomerania and Prussia (Herrmann 2012, 266), and to many other parts of Europe, particularly to places which lacked good building stone (Kristensen 2007, 230). The brick building has been noted to arrive in the present day Swedish and Baltic region in the 13th century (Ratilainen 2012a, 15 f., and references therein). In the northern Baltic, masonry skills along with brick building supposedly arrived in Finland in the late 13th century (Drake 2007, 115; see also Harjula & Immonen 2012, 184). From the 13th century, brick became prevalent in ambitious architecture in Pomerania (Biermann 2012, 266). The most important creators of early brick architecture in these regions were monastic orders and orders of knights (Herrmann 2012, 266). The oldest brickyards in Prussia, which belonged to the Dominican Order, emerged in Kulm and in Elbing. Whether they provided the material only for the construction of the respective monasteries or also for the other urban construction companies is uncertain (Torbus 1998, 316). It is worth mentioning that many of the earliest examples of brick buildings represent the highest quality of brick production and building techniques (Herrmann 2012, 266).

Brick-making (Fig. 1) was one of the prerequisites for the implementation of various construction projects which were run by noblemen. Aristocracy was



Fig. 1. Brick-making in the Netherlands (Binding 2004, 83).

responsible for remodelling the landscape in addition to creating designed landscapes. Noblemen were involved in planning and re-planning villages and open fields, markets and boroughs, in founding and remodelling churches and monasteries, and so on (Hansson 2006, 20). The creation of monuments was thus a way for local communities to gain prestige, but also a way of showing a new attitude towards nature. Castles, churches, monasteries, towns and manors all gave the places where they were situated a special meaning in the local society, often of different kinds of power (op. cit., 39).

Brick-making strongly depends on the availability of clay. Once appropriate clay is located to make brick, there are six basic steps in brick-making: (1) mining, or “winning”; (2) preparation; (3) moulding, or “forming”; (4) drying; (5) firing, or “burning”; and (6) grading, or sorting of finished products for sale (Peres & Connaster 2008, 106; see also Smith 2004, 259 f.; 1985). The bricks were produced by pressing well-kneaded clay, sand and water into a form and thus, with the removal of surplus clay, a regular block was produced. Afterwards a raw brick was knocked out of the form and transported to a drying ground, where they hardened ready for firing (Kristensen 2007, 231).

In the cities of Prussia several brickyards usually existed, which satisfied the demand of different builders. These brickyards were probably operated by different organizations. There were municipal, private, as well as specific church building-oriented brickyards. The urban brickyards were usually under the control of the town councils, which could operate it themselves or lease it to different people. In smaller towns, the number of brickyards was much lower (Herrmann 2007, 136 f.).

The building work itself was seasonal – in the winter the walls were capped with straw or rush thatching to keep out the rain and frost while lime mortar slowly cured (Binding 2004, 7). Studies have shown that brick involved a new way of building. A brick is a modular unit which is easy to combine and vary, and it is easy to handle. Building became rational and presumably efficient, yet production had to be planned and organized. The production of brick required extensive organization which can, to some extent, be compared to the manufacture of ashlar (Sundnér 1997, 81 f.).

According to my research (e.g. Bernotas 2011; 2012; 2013a; 2013b), it appears that in the 14th century radical changes took place in the townscapes in the Estonian area and active construction began, including the start of building stone defensive walls and stone houses. In this article, I am summarizing the material about brick-making in medieval Estonia. Using the historical-comparative method and a comparison of the dates of other brick sites in Europe, whether and how the existing data about brick-making in Estonia correlates with the so-called construction boom in the 14th century in the same area will be analysed. Also various examples of the brick application in buildings will be discussed. Since several results of the archaeological research presented in this article are still unpublished, the current paper also serves the purpose of a source publication.

Traces of brick-making in Estonia

Written sources

The first written record of the brick-making site in Tallinn derives from 1365, from a note about the town mint. There it was noted that in the 4th years of the reign of the mintmaster¹ Peeter Stockelstorp, the revenue of the mint was 885 Rigan marks, of which 75 marks were allocated to brickworks. The mentioned brickyard was located in the Telliskopli Peninsula, in the area of the current Tallinn ceramics factory, on the corner of contemporary Kopli and Maleva streets (Figs 2, 3). There are several maps known of this area, but none of those have so far been published.² The exact time of the establishment of the brickyard is not known, but the oldest town council account books give some information about its founding. The brickyard was established as a joint venture at the expense of the town and the three members of the town council. The town council transferred the co-partners rights gradually to the town by paying them a certain

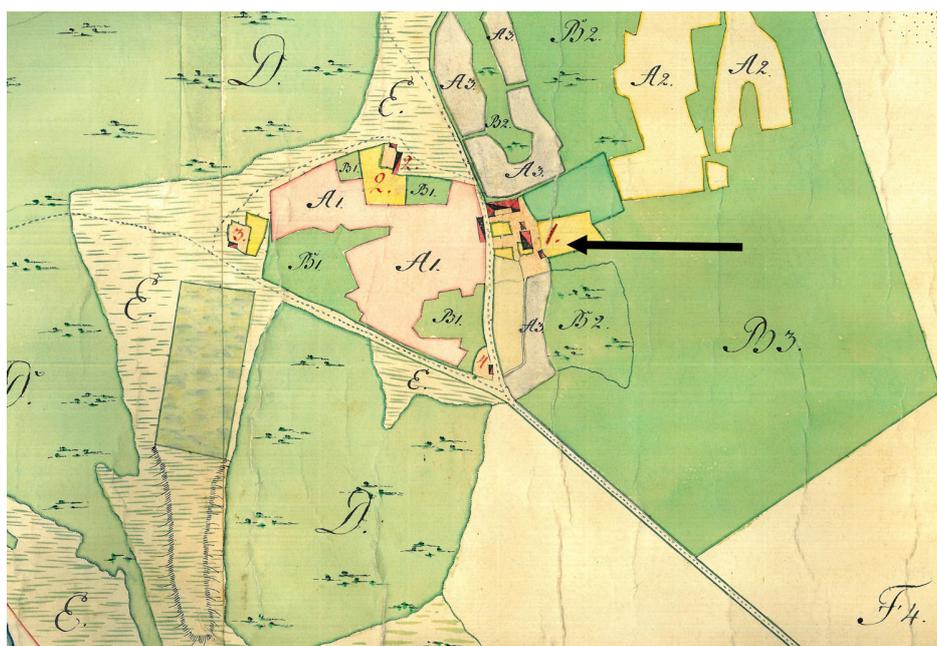


Fig. 2. The alleged location of the Kopli brickyard on the map of 1820 (Geometrische Charte von Ziegelkoppel und den dazu gehörigen Inseln Gross- und Klein Carls, 1820. M. J. Stroch, TLA 149-4-246). Part of the map. Modified by Rivo Bernotas.

¹ The member of a town council who was responsible for the management of the mint.

² The oldest preserved map is "Geometrische Karte von Ziegelskoppel gemessen im Jahr 1819. M. J. Stroch" (TLA 149-5-2187) and it has been reproduced in a manuscript (Kivi 1966).

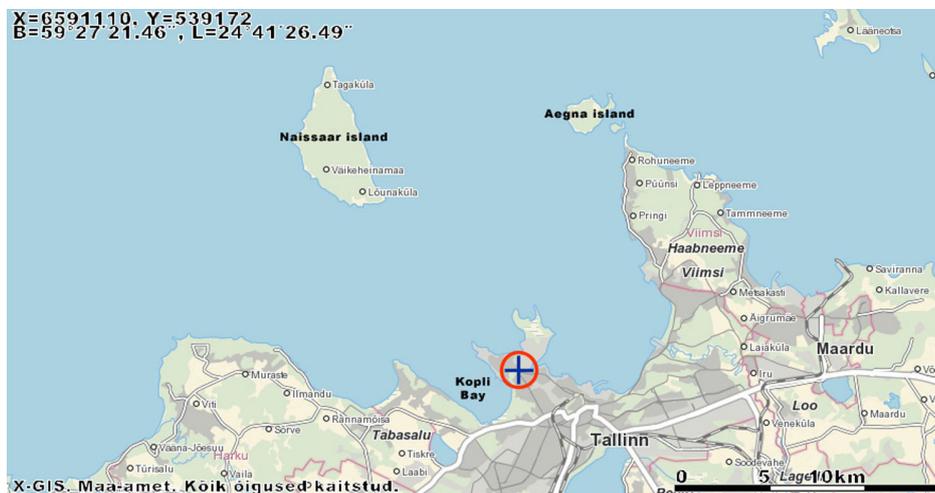


Fig. 3. Location of the brickyard and surroundings on the contemporary map of Tallinn. Map from the Estonian Land Board website www.maaamet.ee. Map modified by Rivo Bernotas.

amount from the town's funds each year until the contribution was expunged. It seems that the rights to the brickyard had been redeemed by the town by 1370 as there are no bills of payments in the town account books for the following years (Kivi 1966, 143 f.).

In the established brickyard, bricks and roof tiles were fired. The brick-making process was overseen by the brickmaster (*tegelmaster*), who was paid by the town. The management of the brickworks was the responsibility of two members of the town council. Brickmasters were imported from Germany and they received a salary from the town in money and downs (Kivi 1966, 144).

The firewood necessary for burning bricks was brought from Naissaar and Aegna islands (Kivi 1966, 145; see Fig. 3). The cutting of the logs and the firewood was organized by the town council of Tallinn (Kivi 1966, 123). The firewood was brought by waterway, by rafts, fishing boats, and the vessels belonging to the town and the boatmen (Kivi 1966, 145). Logging was usually done in winter and in spring, after the icebreaking logs and firewood were transported to the beach (Kivi 1966, 126). The wood was unloaded at the beach of Kopli Bay, from where it was transported by horse and oxen to the brickyard. The brickyard was financed on the account of the town's chest for a long period (Kivi 1966, 145).

Archaeological research

In the course of rescue excavations, the brick-making complex from the southern suburban area of Tartu was found. This complex consisted of several different elements (Fig. 5). The brick kiln found from 1 Kitsas St. (Figs 4, 5: a) had a stove which was partly sunk into the original sand layer that stood on the slope.



Fig. 4. Brick kiln from 1 Kitsas St. View from north. Photo by Rünno Vissak.

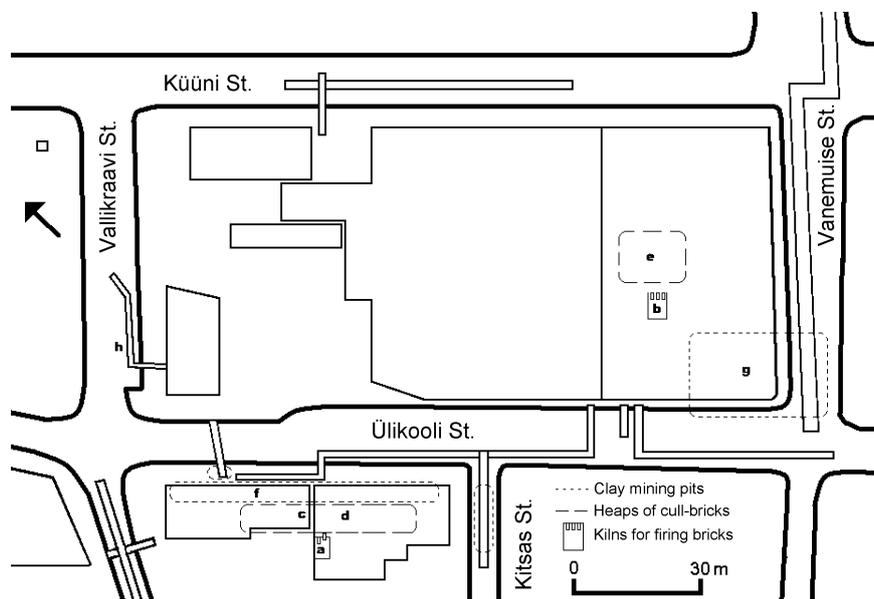


Fig. 5. The brick-making complex in the southern suburban area of Tartu (Heinloo 2006, 87; Fig. 3).

The brick base was laid upon the smoothed but undisturbed natural clay layer. The longitudinal axis of the stove was, like the slope, east–west oriented. In the eastern wall there were two burning chambers and beside them an opening which was probably used for filling and cleaning the stove. During the period of use, the walls of the burning chambers and the vault covering them had been repaired at least once. While the front of the kiln, with the burning chambers and the opening, was laid of burnt bricks, the other two excavated walls were mostly laid of unburned bricks. The measurements of the kiln, taken at the outer sides of the walls, were the following: the length of the burning chamber, 2.5 m; the width, narrowing towards the kiln, 1–0.5 m; the range of the brick burning chamber, 6.2 m; the width observed in the excavation was up to 4 m. The walls were sporadically preserved up to a height of 1.5 m. The kiln is dated to the end of the 13th – beginning of the 14th century (Vissak 2000, 118 ff.).

A second brick kiln with a similar construction came to light in the excavation at the plot of 7 Vanemuise St. (Fig. 5: b), nearly 100 m south-east of the previously mentioned kiln on Kitsas Street. In this area, some timber structures have been excavated with the clay deposits near them indicating that they belonged to a complex of brickyards (Vissak 2000, 118 f.). As a layer was found where there were both clay mining pits and thick waste-bricks, in addition to the structural similarity with the kiln from the plot of 1 Kitsas St., it has been assumed that these remains belong to the same period and were used for the same purposes. The descriptions of the kiln are absent, but the excavation plan and published photographs reveal that the kiln consisted of a large brick-burning chamber (size approximately 5 × 6 m) and multiple chambers in the frontal part (approximately 0.5 × 2 m) (Heinloo 2006, 36). In the same plot, the remains of a wooden building measuring approximately 8 x 4 m were discovered in the south-western side of the excavation area (Aun 1995, fig. 1). No datable finds were found from the building. It has been associated with the kiln, located ten metres north-east, which by its very nature and the specificities of the region, is dated to the end of the 13th or to the 14th century (Heinloo 2006, 45). On the basis of the measurements of the building we cannot eliminate the possibility that it might even have been used as a residential house.

A massive, 1.2 m thick layer (Fig. 5: c) containing bricks and their fragments, covering an area of 80 sq m was discovered at the plot of 6a Ülikooli St. Some of the bricks, measuring 9 × 14.5 × 32 to 10 × 15 × 22 cm were heavily burnt, while others were obviously less severely burnt. On one side, the bricks had longitudinal parallel grooves, evidently made by hand. The earliest presumable date for the layer of waste-bricks and brick manufacturing refuse would be the turn of the 13th and the 14th centuries (Vissak 2000, 116). Also in the northern part of the plot on 1 Kitsas St. (Fig. 5: d), a layer of brick fragments was found. In this excavation the cultural layer was up to 80 cm thick (Vissak 2000, 118). In addition, at the 7 Vanemuise St. plot, north-east from the alleged brick kiln, a 0.3 to 0.9 m thick cultural layer (Fig. 5: e) which consisted of bricks and clay was found immediately on top of the prehistoric strata (Aun 1995, 92).

The pits formed as a result of clay mining were concentrated on the south-west side of Ülikooli Street (Fig. 5: f) on the north-west–south-east directional section and to a lesser extent, immediately north and north-east of the intersection of Ülikooli and Vanemuise streets (Heinloo 2006, 34 and the excavations referred to therein; Fig. 5: g). The clay mining pits are steep-walled digs, reaching into the natural blue-and red clay layers. The depths of the pits range from 35 to 120 cm. At the plot of 6a Ülikooli St. the pits were clearly distinguishable from each other due to a narrow clay partition. Based on the stratigraphic position and comparing the dates of other parts of the brick-making complex (clay conservation pits, brick kilns, heaps of waste-bricks), the date of the clay mining pits is placed from the end of 13th to the beginning of 14th century (Heinloo 2006, 34 f.).

At 2 Vallikraavi St. a natural basin was used for depositing pure red clay. Prior to the placement of the clay layer, this clay-conservation pit was artificially deepened in the south-eastern part (Heinloo 2006, 35; see also Fig. 5: h). Remarkably in the western part of the excavations at 2 Vallikraavi St., a clear red clay layer, up to 90 cm thick, covering an area of 45 sq m was found (Vissak 2000, 115). Fragments of round pot, or '*kugeltopf*' type of ceramic vessel, were found which were dated to the turn of the 13th and 14th centuries in this context by Rünno Vissak (Heinloo 2006; see also Vissak 2000, 116).

The rescue excavations at Kүүni Street revealed a dark thick cultural layer, which consisted of fragments of bricks and was deposited on top of a natural layer of lime. The fragments of local-type ceramic vessels found from this layer were dated from the end of the 13th century to the 14th century. This date is also supported by the wooden drainage systems found in the same trench, which based on the finds, are dated to the end of the 13th century to the 14th century (Heinloo 2012, 13 f.).

Traces of brick-making have been found in Viljandi as well. In the course of the excavations in 21 Lossi St., two trenches were found in the immediate vicinity of the medieval town wall. These trenches were filled with mortar crumble, fragments and residue of bricks, roof tiles and their pieces. This fill, consisting of construction residue, was efficient in canalizing the groundwater. It is remarkable that there were no traces of mortar on the bricks and tiles that filled the trenches and some of these had been distorted to the point of being unusable or re-burnt. The production waste of bricks and roof tiles points to the existence of a medieval brick-firing place in the neighbourhood (Tvauri 2010, 159). From the stratigraphy it can be concluded that the trenches were dug soon after the construction of the town wall (Tvauri 2009, 6). The beginning of the construction of the town wall of Viljandi is suggested to be dated to the 14th century (Bernotas 2013a, 18).

The output of bricks

Bricks in the Middle Ages were used in several different types of constructions, notably in town fortifications, ecclesiastical buildings, castles and private houses. In the construction of the town wall of Tartu, bricks were used

extensively (Bernotas 2011, 63 f.). This has found further confirmation in several excavations in the last years. The town wall in the Town Hall Square consisted of mostly 30–60 cm fieldstones, reddish mortar with white lime fragments and fragments of bricks between the stones as a filling. The eastern side of the wall consisted of 8–9 cm thick bricks (Bernotas & Roog 2012, 3). North-east from the crossroad of K uuni and Poe streets the town wall was 1.15 to 1.25 m wide. The wall was made of fieldstones stacked in layers, but for levelling the rows bricks were used (Heinloo 2012, 18 f.; Fig. 6).

South-west from the crossroad of K uuni and Poe streets, the width of the wall was 2 metres. A remarkable discovery was the edge made of bricks, perpendicular to the town wall, which may mark a passageway or aperture in the town wall. The dimensions of the bricks used in the masonry were 8 × 15 × 31 cm (Heinloo 2012, 19).

At K uuni Street a part of medieval town wall's (semi-)circular tower was found. In the construction of its west side a regular fieldstone wall, bound with lime mortar was documented, bricks were also documented to a lesser extent (Heinloo & Vissak 2010, 8 f.).

One of the earliest and most spectacular specimens of Gothic brick architecture in the Baltic countries is the Dome Cathedral of Tartu, dedicated to Apostles Peter and Paul. It has been suggested, that the construction of the cathedral probably started in the second third of the 13th century (Valk 1995, 59; see also Alttoa 1992). The walls of St. John's Church in Tartu were laid of layers of fieldstone and brick bound with lime mortar alternated in the foundation laid upon fieldstones which were packed with sand (Alttoa 2011, 15 f.).

The foundation of the Dominican monastery was of fieldstones, the upper part of brick (Tamm 2002, 56). The alleged buttress of the same building, found in the excavations in 2005, was made of brick and granite stones (Tvauri & Bernotas 2006, 105). The alleged walls of St. Catherine's nunnery in Tartu were also made of brick (Tvauri & Bernotas 2007, 174).

The oldest examples of stone houses in Tartu are a one-room brick building in Kompanii Street from the 13th–14th century and house remains from Lossi



Fig. 6. Town wall on the north-east side of the crossroad of K uuni and Poe streets. View from south. Photo by Eero Heinloo.

Street. There is no detailed information about the first building, but the walls of the last-mentioned brick house stood on top of the fieldstone foundation. This building has been dated to the 14th–16th century. Another brick building from the 14th–16th century has been found in the Tartu Botanical Gardens at Lai Street (Bernotas 2012, 160, and references therein).

Several buildings where brick has been applied in construction have been found in the vicinity of Tartu. It's been noted, that brick was a common building material in the castles of southern Estonia (Andres Tvauri, pers. comm.). For example, in the course of the excavations it became evident that the castle of Varbek had been erected in at least two stages. At first, a building with the shape of an irregular rectangle was erected, using granite stones and bricks (dimensions $30\text{--}31 \times 15\text{--}15.5 \times 10$ cm) (Tvauri 2002, 154). The walls of the medieval bishop's castle of Varbek near Tartu were laid of bricks with dimensions of $30 \times 14 \times 9$ cm and quarry stones, and was remarkably thick – the westward wall was 3 m and the southward wall 2.5 m thick (Tvauri 2005, 127 f.). At Laiuse Castle, the excavations of the inside of the eastern wall of the building revealed two window recesses, widened on the inside and lined with bricks. The brick walls were rather heavily demolished (Vissak 2003, 124). In the excavations at the Kärkna Monastery, a brick floor was found which had a brick lining laid to the inner side of the castellum wall (Tvauri 2000, 59).

As areas adjacent to Tallinn have abundant supplies of limestone, this was the main building material in masonry and there have been no traces found of medieval brick buildings in Tallinn. Therefore it might be suggested that the main focus of the brickyard was to produce roof tiles and building details for a number of different buildings. For example, the roof of the chapel of St. Anthony in Niguliste Church in Tallinn was always covered with stone roof tiles. This roof made of monk-nun type tiles was repaired in 1672 and 1679, and in the 1680s even the roof tiles burnt and replacements were purchased in Lübeck for repairs (Lumiste & Kangropool 1990, 50). The fragment of roof tile made in the Lübeck St. Petri brickworks found at Haapsalu (Russow & Pärn 2008, 131, 138) also indicates that the material was brought from elsewhere. St. Petri brickyard exported roof tiles to many countries around the Baltic Sea (Kristensen 2007, 231).

Discussion

So far it is evident that the traces of medieval brick-making found from Estonia date to the 14th century. Thus it can be stated that the beginning of brick-making clearly correlates with the beginning of the construction boom in the Estonian area in the 14th century, during the course of which the town areas were re-planned, and the construction of town fortifications, stone churches and stone houses began. From the discussed material, it might be concluded that the brick-making complex from the southern suburban area of Tartu derives from the turn of the 13th and 14th centuries at the earliest. Since there were bricks used for

the levelling of stone layers in the town wall of Tartu, it might be suggested that the beginning of the construction of the town wall cannot be dated earlier, and therefore a suitable date would be the first half of the 14th century. This hypothesis is supported by the fact that as the suburban areas of Tartu have been extensively covered by archaeological fieldwork and no other traces of brick-making have been found elsewhere besides the material examined in the current research (Andres Tvauri, pers. comm.). It has been noted that also in Europe, most towns throughout medieval and early modern period strove to keep brick-making outside the towns, not just because of the fire risk but also because of the unpleasant fumes given off during firing. On the other hand, possessing widespread raw material for making bricks made it possible to manufacture them close to where they were to be used. This had a great economical advantage (Smith 2004, 258).

Brick-making might be considered essential in medieval urban design as due to the timber structures, the danger of fire was constant. For example, the town council of Tallinn fought constantly against wooden buildings by prohibiting their construction, requiring the demolition of the existing ones and their rebuilding into stone houses, and covering the roofs with roof tiles. The town council of Tallinn tried to create order in construction, and even made the new owners to rebuild the wooden houses in stone in a period of around 3–4 years; threatening that otherwise the house would fall to the ownership of the city (Kivi 1966, 21 f.). Despite the orders, the number of wooden buildings decreased very slowly and the constant danger of conflagration remained (Kivi 1966, 24).

In my previous publications, I have suggested that in the present-day Estonian area the development from the first traces of an urban settlement to a walled medieval town took approximately 50–100 years (Bernotas 2013a). What was the comparable situation in some of the better known towns around the Baltic? For example, there is still no written reference to the true medieval city of Rostock at the end of the 12th century. However, historians accept that the first German settlers and merchants arrived there between 1108 and 1190. At present we know as little about the exact time of the founding as we do of the appearance of the first urban settlement (Muslow 2001, 290). The building of the brick and field-stone wall with guard towers in the second half of the 13th century then marked the final medieval city borders (Baier 1976, 106; see also Muslow 2001, 291). This date gives an impression that the time from the rudimentary urban settlement to the walled medieval town in some German areas around the Baltic might even in bigger cities have taken around century, similarly to the Estonian area (Bernotas 2013a).

In some areas around the Baltic, brick-making was a forced choice. For example, on the lowland of Great Poland throughout the 13th century, the basic building material was wood. Timber was used in military and even ducal architecture. The situation changed when the Dominican and Franciscan monks, two urban orders, came to Poland. The first was the establishment of the Franciscan order in 1239. They brought the art of brick architecture and brick production to the towns of Great Poland and Kujawy. A stronger and more resistant building material was

needed, and brick was the answer. Moreover, it was a very convenient material, as clay was easily available in this region. There were also rich deposits of limestone, used for making mortar (Poklewski-Kozielł 2001, 146 and references therein). It has been assumed that King Casimir the Great (1333–1370) made use of the building workshops developing in towns from the middle of the 13th century onwards (Poklewski-Kozielł 2001, 147). During his reign in the Duchy of Mazovia, the important town of Warsaw was surrounded by a defensive wall and had a brick castle erected by the duke. From there the Vistula River ran towards the royal town of Plock, where the King built a brick castle and surrounded the town with a brick defensive wall (Poklewski-Kozielł 2004, 150). Prior to 1250, the regularly planned area of the city of Wrocław was encircled with a system of brick ramparts, complete with towers and a moat. Around the middle of the fourteenth century, districts added to the city on its south and west side were fortified in a similar manner (Piekalski 2011, 378).

According to the traditional view, brick was an expensive and rare medieval building material in some parts of Europe, as for example in Finland (Ratilainen 2012a, 17 and references therein; see also Ratilainen 2012b, 198). Similarly in western Europe, in the Netherlands, in the town of s'Hertogenbosch, as a rule the use of stone and bricks during this early period was limited only to public, ecclesiastical and military buildings, such as the early 13th century town wall with its gate houses (Janssen 2002, 142). In Alkmaar, Netherlands, the use of quite expensive brick was also meant to impress the town's visitors (Bitter 2010, 152). In Sweden, stone as a building material was mainly used in buildings which symbolized both divine and secular power: churches and castles. Dwelling houses of stone and brick were reserved for the nobility, the clergy, and the rich burghers (Sundnér 1997, 79). Brick remained expensive throughout the medieval period. The burghers of Antwerp, following the attack on their city in 1542, spent over 10 000 000 guilders on updating the defences with stone-faced and bastioned walls in the Italian style. Even with brick substituted for stone, Italianate defences were expensive and were thus largely concentrated in the main zones of conflict (Courtney 2006, 168). In England, brick had a theoretically huge potential market, but in practice it was in competition with stone in most districts and its cost of production was too great even though the clay itself was cheap. Wage costs were high, both for skilled moulders and layers, for large numbers of unskilled labourers, and additionally the kilns voraciously consumed fuel. Coal had to be transported and so was not cheap, probably even if carried as ballast in boats that had taken grain to the north-east. In the same way, bricks were too heavy for easy transport and with a lot of expenses production at a single centre for distribution over a wide area was not sensible, which is the typically restrictive pattern of a medieval bulk industry (Hinton 1990, 168).

It might be assumed that direct contact between Estonian area and England was rather unlikely and there was instead probably a mediator. The English influence has, after all, been the subject of a strong influence on the Hanseatic towns of

the 14th century – for example Torún's Church or Jacob's Church in Rostock (Alttoa 2011, 50). Comparing the brick-making data from England, it appears that a municipal brickyard in Hull was recorded as early as in 1303 and continued in production until the middle of the 15th century. Brick had made occasional appearances before in England, but Hull marks its first significant bulk use; Hull's town walls were built of brick. Some other east coast towns made similar use of it (Hinton 1990, 168). Large sections of the town wall of London were rebuilt in brick in the second half of the 15th century. The parapet was built in brick and brick arches were built behind the wall in at least three sections, perhaps as a defence against cannons. This is probably the earliest large-scale use of brick in London and might be seen as the beginning of the rise in the fashion of brick buildings, which were to predominate in the 16th century and later (Thomas 2002, 127; about brick usage in London Wall in Saint Alphage Garden see also Smith 2004).

Considering the workforce, not a lot of information has survived. From the available material it appears that the master of the Livonian Order asked in 1436 to deploy the German-originated brickmaster to Narva, with a purpose of choosing a place for the brickworks and to search for suitable clay for firing bricks. The master of the order announced that he gave an order to the Commander of Tallinn to give horses and a man who would transport the brickmaster to Narva and back (Kivi 1966, 144). The limestone products and the stone-carvers of Tallinn were widely known in the Middle Ages and later. These masters often worked outside their home town and country boundaries, and their products were exported overseas (Kivi 1966, 152). They³ were highly skilled and were often asked to go to supervise construction works in other cities and abroad (Kivi 1966, 165). For example, it has been suggested that stonemasons in Sweden generally belonged to the mason's lodges attached to major construction projects and therefore moved from one project to another (Sundnér 1997, 88 and the references therein). It has been noted that the masons who built the city wall of Visby, Gotland, ended the construction works at the end of the 13th century and moved to new jobs in Tallinn, Kalmar, Turku and Åland (Kivi 1966, 154). Therefore it seems probable that the brickmasters working in Estonia were often itinerant, similarly to stonemasons. For example, in England the archaeological evidence has also been used to suggest itinerancy amongst tilers (Stopford 1993, 96).

Conclusions

Based on the research in the current article, it might be suggested that the beginning of brick-making clearly correlates with the beginning of the construction boom in Estonia in the 14th century. In the course of the latter, the town areas

³ Most of the workers' ethnicity was Estonian, however among the masters there were few Estonians. Most of the foreign workers and masters descended mainly from the Rhineland, Westphalia and Gotland (Kivi 1966, 154).

were re-planned, the construction of the town fortifications, stone churches and stone houses had started. The presented dates support the hypothesis that the construction of the town wall of Tartu began in the first half of the 14th century. Brick-making was essential for the development of the medieval urban townscape, as the old-fashioned wooden buildings presented a constant danger of fire. The previous research shows that the development from the first traces of an urban settlement to a complete medieval walled town in the present-day Estonian area took approximately 50–100 years. According to the discussed information, it might be suggested that it was the same in some of the German areas around the Baltic. The art of brick architecture and brick-making spread from German areas to the towns of Great Poland and Kujawy through the Dominican and Franciscan orders. There have been found only a limited number of archaeological evidence of medieval brick making from Estonian towns besides Tartu. It might be suggested that brick was a rather expensive building material in Estonia, limited only to castles and buildings in the townscape such as fortifications, ecclesiastical buildings and private houses. Even though there is little information preserved about brick-making workers, it seems probable that similarly to stone-carvers of Tallinn the brick-masters were often foreigners who worked outside their hometown and country boundaries.

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References

- Alttoa, K.** 1992. Eesti tellisgootika uurimisseisust. – Eesti Teadusliku Seltsi Rootsis aastaraamat, XI, 1988–1990. Stockholm, 9–26.
- Alttoa, K.** 2011. Tartu Jaani kirik. (Eesti kirikud, III.) Muinsuskaitseamet, Tallinn.
- Aun, M.** 1995. Tartu keskaegse eeslinna kultuurikihist Küüni tänava arheoloogilise materjali põhjal. – Tartu arheoloogias ja vanemast ehitusloost. Ed. H. Valk. (Tartu Ülikooli Arheoloogia Kabineti toimetised, 8.) Tartu, 91–97.
- Baier, G.** 1976. Das Stadtbild als Spiegel der Geschichte. Die großen Küstenstädte und ihre Baudenkmale. – Denkmale in Mecklenburg. Ihre Erhaltung und Pflege in den Bezirken Rostock, Schwerin und Neubrandenburg. Weimar, 53–136.
- Bernotas, R.** 2011. Medieval town wall of Tartu in the light of recent research. – EJA, 15: 1, 56–72.
- Bernotas, R.** 2012. New insights on the changes of townscape in 14th-century Tartu. – EJA, 16: 2, 153–168.
- Bernotas, R.** 2013a. Estonian small towns in Middle Ages – archaeology and history of urban defense. – Estonian Historical Journal. In print.

- Bernotas, R.** 2013b. Medieval fortifications of Pärnu. An archaeological approach. – *Zeitschrift für Archäologie des Mittelalters*. In print.
- Bernotas, R. & Roog, R.** 2012. Aruane arheoloogilise järevalvest Tartus, Magistri tänaval ja Raekoja platsil toimunud elektriabitrassi rajamisel 2012. aasta augustis. Manuscript in the National Heritage Board.
- Biermann, F.** 2012. Brick technology and use in Medieval Pomerania – the monastic example. – 18th Annual Meeting of European Association of Archaeologists. 29. August – 1. September 2012, Helsinki, Finland. Abstracts. Ed. E.-M. Viitanen. Helsinki, 266.
- Binding, G.** 2004. *Medieval Building Techniques*. Tempus, Stroud.
- Bitter, P.** 2010. 'In de vesten, tot Alcmair' – inside the moats, at Alkmaar. – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum, VII: Die Befestigungen. Verlag Schmidt Römhöld, Lübeck, 147–162.
- Courtney, P.** 2006. Armies, militias and urban landscapes: England, France and the Low Countries 1500–1900. – *Cities in the World, 1500–2000. Papers Given at the Conference of the Society for Post-Medieval Archaeology*, April 2002. Eds A. Green & R. Leech. Maney Publishing, London, 167–193.
- Drake, K.** 2007. Gotische Backsteinbaukunst in Finnland. – *Backstein Baukunst. Zur Denkmalkultur des Ostseeraums. Dokumentation der Tagung zum 75. Geburtstag von Gottfried Kiesow in der Wismarer St. Georgen-Kirche*, 31.8.–1.9.2006. Deutsche Stiftung Denkmalschutz, Bonn.
- Hansson, M.** 2006. Aristocratic landscape. The spatial ideology of the medieval aristocracy. (*Lund Studies of Historical Archaeology*, 2.) Almqvist & Wiksell International.
- Harjula, J. & Immonen, V.** 2012. Reviving old archaeological material. A project analysing finds from the early medieval fortified site of Koroinen in Turku. – *Castella Maris Baltici*, X. Eds K. Uotila, T. Mikkola & A.-M. Vilkkuna. Society for Medieval Archaeology in Finland, Saarijärvi, 183–190.
- Heinloo, E.** 2006. Tartu lõunapoolne eeslinn kesk- ja varauusajal arheoloogia andmetel. Peaseminaritöö. Tartu. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Heinloo, E.** 2012. Küüni tänava rekonstrueerimise II etapi käigus teostatud arheoloogilised uuringud 2010. aastal. Manuscript in the Town Museum of Tartu.
- Heinloo, E. & Vissak, R.** 2010. Küüni tänava rekonstrueerimise käigus toimunud arheoloogiline järevalvest 2009. aastal. Manuscript in the Town Museum of Tartu.
- Herrmann, C.** 2007. *Mittelalterliche Architektur im Preussenland*. Michael Imhof Verlag, Petersberg.
- Herrmann, C.** 2012. Monastic orders as pioneers of brick architecture in medieval Poland, Pomerania and Prussia. – 18th Annual Meeting of European Association of Archaeologists. 29. August – 1. September 2012, Helsinki, Finland. Abstracts. Ed. E.-M. Viitanen. Helsinki, 266.
- Hinton, D. A.** 1990. *Archaeology, Economy and Society: England from the Fifth to the Fifteenth Century*. Seaby, London.
- Janssen, H. L.** 2002. Patrician and aristocratic town residences in s'Hertogenbosch c. 1250–c. 1550 – the archaeological evidence. – *Medieval Europe Basel 2002: Centre, Region, Periphery*. Vol. 2: sections 4 and 5. Eds G. Helmig, B. Scholkmann & M. Untermann. Folio Verlag Dr. G. Wesselkamp, Hertingen, Basel, 140–148.
- Kivi, A.** 1966. Tallinna manufaktuuri ja tööstuste ajaloost. – Tallinn. Linna asustus- ja ehitusajaloolisi materjale seitsmes köites. Eds E. Alamaa & A. Kivi. Eesti NSV Riiklik Ehituskomitee, Tallinn, 120–329.
- Kristensen, H. K.** 2007. The production and use of bricks. – *The Archaeology of Medieval Europe*. Vol. 1. Eds J. Graham-Campbell & M. Valor. Aarhus University Press, 230–232.
- Lumiste, M. & Kangrool, R.** 1990. *Niguliste kirik*. Kirjastus Kunst, Tallinn.
- Muslow, R.** 2001. *Rostock – Medieval Archaeology: An Encyclopedia*. Garland Publishing, New York, London, 289–292.
- Peres, T. M. & Connaster, J. B.** 2008. Brick making as a local industry in Antebellum Kentucky and Tennessee. – *Tennessee Archaeology*, Vol. 3, issue 2. Eds M. C. Moore & K. E. Smith. Tennessee Council for Professional Archaeology, 105–122.

- Piekalski, J.** 2011. Wrocław in the twelfth–sixteenth century. – *The Archaeology of Medieval Europe*. Vol. 2: Twelfth to Sixteenth Centuries. Eds M. Carver & J. Klápště. Aarhus University Press, 376–378.
- Poklewski-Koziell, T.** 2001. The castle in the defensive system of royal towns in Great Poland in the 14th century. – *Castella Maris Baltici*, 3–4. Eds K. Alftoa, K. Drake, K. Pospieszny & K. Uotila. Society for Medieval Archaeology in Finland, Turku, Tartu, Malbork, 145–149.
- Poklewski-Koziell, T.** 2004. The royal castles and defensive towns on trading routes through Poland to the Baltic Sea in the 14th–15th century. A contribution to the history of country defence system planning. – *Castella Maris Baltici*, 6. Ed. A. Kuncevičius. Savastis, Vilnius, 147–152.
- Ratilainen, T.** 2012a. Tiiliä tulkitsemassa. Hattulan Pyhän Ristin kirkon muuraaminen keskiajalla. Licentiate thesis. Turun yliopisto. Historian, kulttuurin ja taiteiden tutkimuksen laitos. Turku.
- Ratilainen, T.** 2012b. To study medieval brick building technique by applying digital surveying methods cases: Holy Cross Church of Hattula and Häme Castle. – *Castella Maris Baltici*, X. Eds K. Uotila, T. Mikkola & A.-M. Vilkkuna. Society for Medieval Archaeology in Finland, Saarijärvi, 197–208.
- Rusow, E. & Pärn, A.** 2008. Archäologische Untersuchungen in Haapsalu: Bischofsburg, Marktplatz und Vorstadt. – *AVE*, 2007, 127–138.
- Smith, T. P.** 1985. *The Medieval Brickmaking Industry in England 1400–1450*. (British Archaeological Reports. British Series, 138.) B.A.R., Oxford.
- Smith, T. P.** 2004. The late medieval bricks and brickwork of London Wall in Saint Alphage Garden, EC2. (London Archaeologist, 10, Autumn 2004.) London Archaeologist Association, 255–263.
- Stopford, J.** 1993. Modes of production among medieval tilers. – *Medieval Archaeology*, 37, 93–108.
- Sundnér, B.** 1997. Building stone as archaeological source material. – *Visions of the Past. Trends and Traditions in Swedish Medieval Archaeology*. Eds H. Andersson, P. Carelli & L. Ersgård. (Lund Studies in Medieval Archaeology, 19.) Central Board of National Antiquities, Institute of Archaeology, Lund University, 73–90.
- Tamm, J.** 2002. Eesti keskaegsed kloostrid. Eesti Entsüklopeediakirjastus, Tallinn.
- Thomas, C.** 2002. *The Archaeology of Medieval London*. Sutton Publishing, Stroud Gloucestershire.
- Torbis, T.** 1998. *Die Konventsburgen im Deutschordensland Preussen*. R. Oldenbourg Verlag, München.
- Tvauri, A.** 2000. The archaeological investigations in Viljandi, Tartu and Kärkna. – *AVE*, 1999, 54–62.
- Tvauri, A.** 2002. Archaeological investigations at the Bishop's Castle of Varbek (Kastre). – *AVE*, 2001, 152–159.
- Tvauri, A.** 2005. Archaeological investigations at the medieval bishops's castle of Varbek (Uue-Kastre) in 2002–2004. – *AVE*, 2004, 127–132.
- Tvauri, A.** 2009. Aruane arheoloogilistest kaevamistest Viljandis Lossi 21 hoone (endine kino "Rubiin") idaküljel 2009. aastal. Manuscript in the National Heritage Board.
- Tvauri, A.** 2010. Archaeological excavations at Lossi 21, Viljandi. – *AVE*, 2009, 157–163.
- Tvauri, A. & Bernotas, R.** 2006. Archaeological investigations carried out by the University of Tartu in 2005. – *AVE*, 2005, 101–110.
- Tvauri, A. & Bernotas, R.** 2007. Archaeological investigations in Tartu and Vorbuse settlementsite. – *AVE*, 2006, 167–181.
- Valk, H.** 1995. Tartu Toomkiriku kalmistust ja ümbruskonna varasemast asustusest. – *Tartu arheoloogiast ja vanemast ehitusloost*. Ed. H. Valk. (Tartu Ülikooli Arheoloogia Kabineti toimetised, 8.) Tartu, 1995, 59–80.
- Vissak, R.** 2000. Results of the archaeological investigations at the SE foot of Toomemägi, Tartu. – *AVE*, 1999, 113–120.
- Vissak, R.** 2003. Archaeological investigations of the Laiuse castle. – *AVE*, 2002, 118–126.

Rivo Bernotas

TELLISETOOTMINE KESKAEGSEL LIIVIMAAL – EESTI NÄITEL

Resümee

Tänapäeva Eesti alal on keskaegseid tellishooneid leitud mitmest linnast. Telliseid on kasutatud nii linnakindlustuste, vaimulike kui ka ilmalike hoonete ehitusel. Sellest hoolimata pole keskaegset tellisevalmistamist siiani veel eraldi uuritud. Kui tellisetootmine kui uurimisvaldkond tervikuna on unarusse jäänud, siis isegi vähem on tähelepanu pööratud selle erinevatele aspektidele, mis annavad tunnistust telliste valmistamisest, näiteks praaktellistele. Käesolevas artiklis vaatlen keskaegsele tellisetootmisele viitavat arheoloogilist materjali Eesti alalt ja analüüsin ajaloolis-võrdlevale meetodile ning Euroopa materjali dateeringutele tuginedes, kas ja kuidas teadaolevad andmed tellisevalmistamisest Eesti alal seonduvad nn ehitusbuumiga siinses piirkonnas. Esimene kirjalik teade Tallinna linna telliselöövi kohta pärineb ühest linnamüntla kohta käivast märkusest 1365. aastast. Selles on märgitud, et müntlahärra (raeliige, kellele allus müntla majandamine) Peeter Stockelstorpi ajal olla müntla nelja aasta jooksul andnud tulu 885 Riia marka, millest 75 kulutatud telliselöövi tarbeks. Tähenatud telliselööv asus Telliskopli poolsaarel, praeguse Tallinna Keraamikatehase kohal Kopli ja Maleva tänava nurgal. Millal see telliselööv asutati, ei ole teada, kuid linnarae vanimad arve- raamatud annavad selle rajamisviisi kohta mõningaid andmeid. Tähenatud telliselööv rajati Tallinna linna ja kolme linnarae liikme kulul ühisettevõtetena. Linnaraad lunastas osanike osaõigused linnale järk-järgult, tasudes neile igal aastal linna- laekast teatud summa kuni osamaksu kustutamiseni. Näib, et telliselöövi osaõigused lunastati linnale juba 1370. aastal. Telliselöövis põletati telliseid ja katusekive, mille valmistamise protsessi jälgis tellisemeister. Keskaegse Tartu lõunapoolse eeslinna alalt avastatud telliste valmistamise kompleks, mille hulka kuulusid nii tellisepõletusahjud, praaktellisekuhjatised, savikaevanduslohud kui ka savisäilitus- lohud, on dateeritud 13. sajandi lõpu kuni 14. sajandi algusega. Mainitud piir- konna lähedusest leitud loodusliku pinnase peal paiknenud tellisetükke sisaldanud kultuurkiht on dateeritud sama perioodiga. Jälgi tellisetootmisest on avastatud ka Viljandist, kus linnamüüri läheduses toimunud päästekaevamiste käigus paljan- dusid kaks kraavi, mis olid täidetud praaktelliste ja -katusekivide ning nende katketega. Avastatud tootmisjäägid viitavad keskaegse tellisepõletusahju lähe- dusele. Kultuurkihi stratigraafiast tulenevalt võib järeldada, et mainitud kraavid rajati vahetult peale linnamüüri ehitust. Viljandi linnamüüri rajamise olen oma varasemas publikatsioonis dateerinud 14. sajandiga. Käesolevas artiklis esitatud uurimistulemustele tuginedes võib öelda, et tellisetootmise algus korreleerub 14. sajandil Eesti alal aset leidnud aktiivse ehitustegevusega, mille käigus toimu- sid muudatused linnaplaneeringutes ja alustati linnakindlustuste, kivist kirikute ning kivimajade ehitust. Tartu materjali vaadeldes võib öelda, et esitatud dateeringud

toetavad hüpoteesi, mille kohaselt algas Tartu linnamüüri ehitus 14. sajandi esimesel poolel. Tellisetootmine oli keskaegse linnamaastiku arengus olulisel kohal, kuna vanamoodsad puitehitised olid tuleohtlikud. Keskajal levis tellisevalmistamine Saksa aladelt ida suunas eelkõige dominiiklaste ja frantsisklaste mungaordude tegevuse tulemusel. Peale Tartu on Eesti linnadest keskaegsest tellisetootmisest napilt jälgi leitud. Võib oletada, et analoogselt mõningate piirkondadega Euroopas oli ka siinsetel aladel tellis pigem kallis ehitusmaterjal, mida kasutati vaid linnustes ja erinevates ehitistes linnades (kindlustused, vaimulikud ning ilmalikud hooned). Kuigi tellisetootmisega tegelnud töolistest on vähe teada, tuleb tõenäoliseks pidada, et analoogselt Tallinnast teadaolevatele kiviraiduritele olid ka tellisemeistrid tihti välismaalased, kes töötasid väljaspool oma kodulinna ja riigi piire.

Rivo Bernotas

NEW INSIGHTS ON THE CHANGES OF TOWNSCAPE IN 14TH-CENTURY TARTU

In this article I will discuss some of the changes in the townscape of Tartu in the 14th century and analyze how these changes could have been related to the re-planning of the town area. The topics examined in this article cover the medieval waste management, the erection of stone buildings, the existence and purpose of the defences in the riverside part of the town, and the workers behind all the construction activities in Tartu. The present research suggests that the disposal of waste was regulated by the town laws which were valid only within the limits of the town area, enclosed by town wall, and therefore did not apply to the suburbs. In earlier studies, the introduction of brick buildings to Tartu has been dated from the end of the 14th century to the 15th century. Based on new information, the introduction of brick buildings can be traced to the early 14th century. It can be suggested that the town was ready for extensive planning and erection of walls only after the urban community was populous enough to carry these works out as these activities needed a large number of local workers. The recent research shows that in the area of present-day Estonia the development from the first traces of an urban settlement to a fully complete medieval town took approximately 50–100 years. According to the information discussed in the present article this seems to be the case in Tartu as well. The dates presented in this publication support the hypothesis that the erection of the town wall and the re-planning of the town area began in the first half of the 14th century.

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Introduction

Researchers studying the medieval period of Estonia have rarely had an option to rely solely on written sources and therefore concepts involving the relics and events earlier than the modern historical era must still rely on archaeology. Tartu (*Dorpat*) is not an exception, as the medieval archives have disappeared in the whirlpool of wars and preserved written sources give only sporadic fragments of information from the 15th century onward (Raid 1995, 33). In the current article, I am looking at some of the changes which took place on the townscape of Tartu during the 14th century, and analyzing whether and how these could have been related to the re-planning of the town area.

Tartu is the most excavated town in Estonia (Tvauri 2001, 11) and it has attracted the attention of researchers for over a hundred years. Although over the years several different theories have been published about the settlement history of Tartu, these have been focused primarily on the investigation of the end of the prehistoric era (e.g. Metsallik 1985; 1995; Trummal 1996; Tvauri 2001). In the discussions concerning the period after the German conquest, Tartu is commonly described as an already fully completed medieval town (e.g. Mäesalu 1997; 2004; Vissak 1999; Mäesalu & Vissak 2002). The gathered results of the excavations in the last 20 years of the 20th century have been broadly discussed and the adoption of 3D models and geological radar has been suggested by archaeologist Rünno Vissak (Vissak 1999).

After the German conquest in 1224, Tartu was first mentioned with the name *Castrum de Tarbate* in 1234 and this date is accepted to be the first completion of the bishop's castle. Archaeological excavations revealed that the bishop's stone castle was built on top of the ruins of an ancient fortress (Trummal 1980, 23). It had been assumed that after the conquest of Estonia by the crusaders in 1224, Tartu gradually became a European town, located nearly in the same territory as the old urban settlement. The beginning of the construction of the town wall allegedly began sometime after the Russian raid against Tartu in 1262. It had been assumed that the marketplace (the later town hall square) stayed in its old location, which explains its somewhat unusual place at a distance from the city centre. It has been suggested that in the 13th–14th century, Tartu was still largely a town of wooden buildings with streets of wooden pavement. It had been assumed that in the second half of the 14th – at the beginning of the 15th century people slowly began erecting stone buildings and the wooden pavement was gradually replaced by cobblestone pavement (Mäesalu 1997, 347).

The re-planning of the town area has also been suggested to date to the period after the Russian raid in 1262. As the town had been burnt, it has been assumed that the re-planning process potentially started shortly afterwards. With reference to previous research, the re-planning did not include the several basic elements of Tartu (stronghold, market-place, river harbour, etc.) because these have supposedly been located in exactly the same places through many centuries (Mäesalu & Vissak 2002, 155 ff.).

Previous excavations in the town area indicate that after the German conquest in the 13th century, Tartu was an urban settlement without any stone buildings (e.g. Metsallik 1995, 30 and the excavations referred there). Substantial changes in the townscape followed in the 14th century, after the establishment of the brick manufacturing complex in the southern suburban area of town (Bernotas 2011, 66), the introduction of cesspits, and the construction of buildings made of bricks and stone. In the travelogues from the first half of 15th century, Tartu is already being described as a well fortified town, with beautiful stone buildings (Vahtre 1983). Therefore it might be suggested that the answers to the re-planning of town and its subsequent enclosing with the wall should be searched for in the 14th century in particular.

The waste management

I start the discussion about the waste management of the medieval town and concentrate on the cesspits. The use of cesspits probably spread to the Estonian area from German towns, where the first mention of large wooden boxes in Lübeck date to the 13th century. Simultaneously with paving the streets, the tradition of building wooden cesspits in the courtyards of houses began there. The cesspits looked similar to wells. They were used for thrown-away junk, as well as for latrines (Mührenberg 2002, 19).¹ Earlier cesspits were of wooden construction, from 14th century onwards lining with bricks was also used. The measurements of German cesspits ranged up to 6 metres in diameter, and were occasionally up to 8 metres deep. It has been estimated that such enormous boxes were filled within 30 to 50 years, after which it would be emptied (Gläser 1999, 32). As the cesspits in Tartu were considerably smaller, it has been estimated that they were used at least for 40 years and during this time they were regularly emptied (Bernotas 2008, 26).

According to excavation reports over 40 medieval cesspits have been found in Tartu (Tvauri 2008, 140). Several medieval cesspits have also been documented during archaeological surveillance of the cultural layers, but these have not been studied in detail. Cesspits are amongst the most interesting objects of study from medieval Tartu as they are rich in finds, they possess an enormous scientific value. Although single medieval and modern-age wooden and stone cesspits have been excavated in other places in Estonia², they have been found nowhere in such large numbers as in Tartu (Bernotas 2007, 54). Cesspits in Tartu and material recovered from them have survived remarkably well. The reason for this is that in the medieval location of the town, on the floodplain of River Emajõgi, the soil is wet all year round due to ground water coming from Quaternary deposits. Moisture is a perfect preservative for organics, especially in the lower levels of the cultural layers (Metsallik 1985, 47 ff.).

The large number of different samples of wood has made cesspits attractive for dendrochronological dating. From the Tartu material, four different cesspits have already been dendrochronologically dated (Table 1). From the logs of cesspit

¹ It has also been suggested that the cesspits were used for tanning leather (Metsallik 1995, 31). In the town centre this seems unlikely though, against this theory the fact can be considered that due to the offensive odors coming from tanning, for example the tanners in Lübeck were displaced away from the city to the river Wakenitz (Mührenberg 2002, 19).

² For example, in Tallinn, a limestone cesspit was found in the courtyard of Estonian state puppet and youth theatre at Lai St. 1/Nunne St. 4/Nunne St. 8 (Nurk et al. 2010, 173). A wooden crossbeam cesspit was found at Sulevimägi Street 4/6. According to find material, this cesspit was dated to the 17th century (Kadakas & Nilov 2004, 170). From Pärnu, at Uus Street 9A, a cross-beam cesspit, with a plinth of rubble-stones bound with lime mortar, partly under the staircase was found (Saluäär et al. 2004, 179). The majority of finds from the cesspit date from the second half of the 18th century to the beginning of 19th century. Usage of the cesspit ceased sometime in the middle of the 19th century (Saluäär et al. 2004, 182). A cesspit from 16th century was found near St. John's Church of Viljandi (Valk 2004, 423).

Table 1. Dendrochronologically dated cesspits from Tartu

Cesspit	Location	Dendrochronological date	Find complex date
Cesspit No. 1b	Ülikooli St. 15	1335	Last quarter of the 14th century or beginning of the 15th century
Cesspit No. 5	Ülikooli St. 15	1309	No finds
Cesspit 14G–14F	Ülikooli St. 14	1362	Beginning of the 15th century
Cesspit 1	Lutsu St. 2	1328–1338	Medieval

1b at Ülikooli Street 15, several samples were sawn for dating and all comparisons unambiguously date the last annual ring to the year 1335 (Bernotas 2008, 22, fig. 6). From cesspit No. 5 at the same plot samples were taken from all the four widest cover logs and the result of dating showed that the youngest annual ring was formed in 1309 (Bernotas 2008, 22, fig. 7). The dendrochronological date from cesspit 14G–14F at Ülikooli Street 14 is 1362 (Bernotas 2008, fig. 9). The cesspit from the courtyard of Lutsu Street 2 dates to the period 1328–1338 according to dendrochronology (Kriiska et al. 2011, 24).

Most of the cesspits found in Tartu are dated based on the find material to the period from 14th to 16th centuries, and in a single case, also to the 17th century (Table 2). According to find complex dates, so far only one, cesspit No. 1, found in the excavations at Lossi Street in 1985–1990, has been dated to the end of 13th century (Mäesalu 1990, 452) or to the beginning of the 14th century (Tamm 1988, 97). Based on the fragment of stoneware pottery from Langerwehe (TÜ A 362) (Russow 2006, 55) and the potsherds from the Russian wheel-thrown vessel type 3.3 (TÜ A 371) it can be suggested that although the end of 13th century cannot be completely eliminated, the more likely date seems to be the 14th century. For example in VII quarter the Russian wheel-thrown pottery type 3.3 was found in the cesspits dated to the 14th–15th century (Tvauri 2000, 104 f., fig. 8; Andres Tvauri, pers. comm.). All the other known cesspits in Tartu derive from later periods (Bernotas 2006, 56; see figure 3). Recently, in the excavations in 2010, three cesspits were found in the courtyard of Jakobi Street 2/Lossi Street 3 and these date to the 14th century (Tvauri 2011, 185). Cesspit No. 3 from Ülikooli Street 15 dates to the second half of the 16th or to the 17th century (Tvauri 2008, 139). Cesspit No. 6 from the same plot was dated to the beginning of the 16th century (Tvauri 2008, 147). The youngest known cesspit is from the courtyard of Munga Street 12 and it originates from 17th century (Vissak 2000b).

The distribution area of the cesspits discovered in Tartu (Fig. 1) clearly shows that their usual location is inside the town quarters, in the territory enclosed by the town wall.³ Therefore, it can be assumed that they were located in the

³ Even though there have been only sporadic cesspits found in other towns of Estonia, so far they have all been inside of the town walls, e.g. in Tallinn, Pärnu and Viljandi (see reference 1, page 3).

Table 2. Dates of the find complexes of the cesspits of Tartu. The cesspits in Table 1 are excluded here

Cesspit	Location	Find complex date
Cesspit No. 16	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Turn of the 13th–14th century (Vissak 1994, 77)
Cesspit No. 7	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Beginning of 14th century (Vissak 1994, 76)
Cesspit No. 1	Lossi St. 3	14th century ⁴
Cesspit No. 3	Lossi St. 3	14th century (Mäesalu 1990, 452)
Cesspit No. 6	Lossi St. 3	14th century (Mäesalu 1990, 452)
Cesspit No. 4	Lossi St. 3	14th century (Mäesalu 1990, 452)
Lower and middle building phase of cesspit No. 19	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	14th century (Aun 1998, 132)
Cesspit No. 18	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	14th century (Aun 1998, 132)
Cesspits Nos 1–3	Jakobi St. 2 / Lossi St. 3	14th century (Tvauri 2011, 185)
Cesspit No. 5	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Second half of 14th century (Vissak 1994, 77)
Cesspit 8B–8C	Courtyard of Munga St. 12	Second half of 14th century (Vissak 2000b)
Cesspit No. 2	Lossi St. 3	End of 14th century (Mäesalu 1990, 452)
Cesspit No. 4	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	End of 14th century (Vissak 1994, 77)
Cesspit No. 8	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Turn of the 14th–15th century (Vissak 1994, 76)
Cesspit 9D–10D	Courtyard of Munga St. 12	End of 14th century – second half of 15th century (Vissak 2000b)
Cesspit No. 20	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	14th–15th century (Aun 1998, 132)
Upper building phase of cesspit No. 19	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	14th–15th century (Aun 1998, 132)
Cesspit No. 1	Plot of Küütri St. 5	First quarter of 15th century (Aus 1993, 25 ff.; Piirits 1994, 20)
Cesspit No. 14	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	First half of 15th century (Vissak 1994, 77)
Cesspits Nos 9, 10, 15	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Mid-15th century (Vissak 1994, 76 f.)
Cesspit No. 1	Courtyard of Munga St. 12	15th century (Piirits 1998, 8)
Cesspit No. 5	Lossi St. 3	15th century (Mäesalu 1990, 452)
Cesspit 5C-5D	Courtyard of Munga St. 12	15th century – first half of 16th century (Vissak 2000b)
Cesspit No. 6	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Second half of 15th century (Vissak 1994, 76 f.)
Cesspit No. 1	Raekoja plats 2 / Ülikooli St. 11 (VII quarter)	Second half of 15th century – beginning of 16th century (Vissak 1994, 77)

⁴ In earlier research the cesspit dates to the end of 13th century or to the beginning of 14th century (Tammet 1988, 97; Mäesalu 1990, 452).

Table 2. *Continued*

Cesspit	Location	Find complex date
Cesspit of the IV building	Plot of K��utri St. 5	Second half of 15th century – beginning of 16th century (Piiirits 1994, 20)
Cesspit 4D–4E	Courtyard of Munga St. 12	Second half of 15th century – 16th century (Vissak 2000b)
Cesspit 4B–4C	Courtyard of Munga St. 12	Second half of 15th century – second half of 16th century (Vissak 2000b)
Cesspits	Lai St. 38/40	15th or 16th century (M��esalu 2001, 584; Bernotas 2006, 12) ⁵
Cesspits	Lossi St. 24	15th or 16th century (Trummal 1992, 15)
Cesspit No. 6.	��likooli St. 15	Beginning of 16th century (Tvauri 2008, 147)
Cesspit No. 1	K��utri St. 1	Beginning of 16th century (Tvauri & Bernotas 2007, 168)
Cesspit No. 17	Raekoja plats 2 / ��likooli St. 11 (VII quarter)	16th century (Aun 1998, 132)
Cesspit No. 21	Raekoja plats 2 / ��likooli St. 11 (VII quarter)	16th century (Aun 1998, 132)
Cesspit 5D–5E	Courtyard of Munga St. 12	Second half of 16th century (Vissak 2000b)
Cesspit No. 3	��likooli St. 15	Second half of 16th – first half of 17th century (Tvauri 2008, 139)
Cesspit	Jaani St. 8	16th–17th century (Tvauri 2004, 140)
Cesspit 6B–7B	Courtyard of Munga St. 12	17th century (Vissak 2000b)

courtyards of medieval residential houses. Although several large-scale excavations have been conducted in the suburban area south from the town wall of Tartu (e.g. Aun 1995; Vissak 2000a; Vissak & Heinloo 2003; Heinloo 2006; 2007), cesspits have never been discovered in this territory yet. Thus it can be suggested that the disposal of waste was regulated by town laws which were valid only within the limits of the area enclosed by the town wall. Therefore it can also be assumed that these laws did not apply to suburbs. It seems quite evident that the urban re-planning and enclosing of the town area by a wall meant that each household had to set up a specific collection site for excrements and waste. For this purpose, the German settlers built wooden boxes, already known from their own cultural townscape. The obvious question is, when did this process take place in Tartu? Based on the dates of the find-complexes of the vast majority of the cesspits and the dendrochronologically dated cesspits, they appear on the townscape of Tartu clearly in the first half of the 14th century. Thus this date seems to support the hypothesis presented earlier (Bernotas 2011) that the erection of the town wall and the re-planning of the urban area began in the first half of the 14th century.

⁵ One of the cesspits is noted to date to the 14th century (M  esalu 2004, 399, fig. 3).

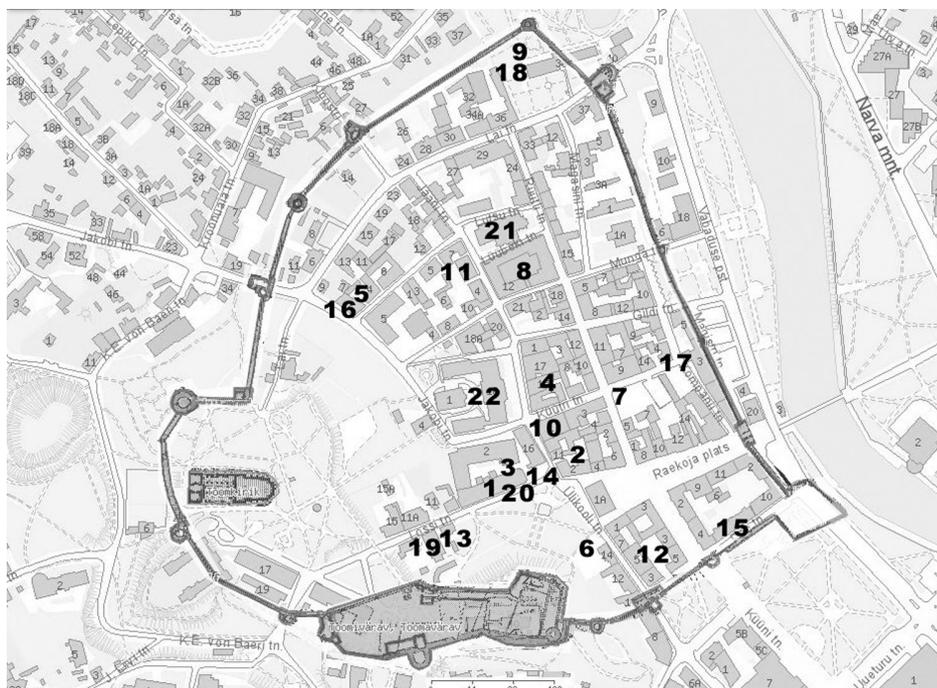


Fig. 1. Map from the Town Government of Tartu. The location of the objects mentioned in the article. Cesspits: 1 Lossi Street 3 (Mäesalu 1990), 2 Raekoja plats 2 / Ülikooli St. 11 (VII Quarter) (Vissak 1994; Aun 1998), 3 Courtyard of Lossi 3 / Jakobi 2 (Tvauri 2011), 4 Ülikooli Street 15 (Bernotas 2008), 5 Lutsu Street 2 (Kriiska et al. 2011), 6 Ülikooli Street 14 (Bernotas 2008), 7 Küütri St. 5 (Aus 1993; Piirits 1994), 8 Courtyard of Munga St. 12 (Piirits 1998; 2000; Vissak 2000b), 9 Lai St. 38/40 (Mäesalu 2004; Bernotas 2006), 10 Küütri Street 1 (Tvauri & Bernotas 2007), 11 Jaani Street 8 (Tvauri 2004), 12 Küüni Street 3/5 (Tvauri 2003), 13 Lossi Street 24 (Trummal 1992), 14 Corner of Lossi-Ülikooli Streets (Metsallik 1995), 15 Poe Street (Tvauri & Bernotas 2007). Medieval stone houses: 16 Lutsu Street 2 (Kriiska et al. 2011), 17 Kompanii Street (Lange 1994), 18 Botanical Gardens (Trummal 1992; Russow et al. 2006), 19 Lossi Street 24 (Trummal 1992), 20 northern side of Lossi Street (Metsallik 1987). Churches: 21 St. John's Church (Läänelaid 2002), 22 St. Mary's Church (Altoa 2009).

Stone buildings

The medieval secular buildings of Tartu have not been extensively researched (Kriiska et al. 2011, 35). On several occasions the remains of the medieval buildings have been found in excavations (Metsallik 1995, 32), but often these remnants have been very fragmentary and have not led to any substantial conclusions about the buildings themselves, let alone contributed to the wider picture. Archaeological investigations at Lutsu Street 2 indicate that in the first half of the 14th century one stone building (number 1 in the excavations) was erected there and in the mid-14th century another stone building (number 2) was built on the same plot (Kriiska et al. 2011, 35; see also Kriiska et al. 2010). The

oldest examples of stone buildings are a one-room brick building in Kompanii Street from the 13th–14th century (Lange 1994) and house remains from Lossi Street. The walls of the last-mentioned brick house were stacked on top of the fieldstone foundation. This building has been dated to the 14th–16th century (Trummal 1992, 8).

Another brick building has been found in the Botanical Gardens as well (Russow et al. 2006, 171). The remnants of a stove and hypocaust⁶ plates were found in the building, suggesting the time of use to be the 14th–16th century (Trummal 1992, 14). The remnants of the stone buildings from the northern side of Lossi Street have also been noted to be medieval (Fig. 2) (Metsallik 1987, figs 1–24; Romeo Metsallik, pers. comm.). The oldest firmly dated stone masonry in Tartu, St. John's Church, was built after the year 1321, when a log foundation layer underneath the church walls was laid (Läänelaid 2002). Similarities with St. John's Church have been discovered in St. Mary's Church of Tartu. Although the exact construction time of St. Mary's Church is not known, the *Stuzbasilika*'s with similar room layout were particularly common in the Baltic Sea region during the 14th century and in Schleswig, Denmark, until the second half of the 15th century (Alttoa 2009, 30). The brick manufacturing complex found in the southern suburban area of Tartu has been dated to the end of 13th – beginning of 14th century (Bernotas 2011, 66). In earlier research, the introduction of brick buildings in Tartu had been dated to the end of the 14th century – 15th century (Metsallik 1995, 31). Based on the discussed information, the introduction of brick buildings can be traced to the early 14th century.



Fig. 2. Interior wall of the medieval stone building in Lossi Street (Metsallik 1987, fig. 2). Photo by Romeo Metsallik.

⁶ Hot-air heater.

Around the same time, similar tendencies in stone architecture took place elsewhere in Europe as well (Fig. 3). For example, in the town of s'Hertogenbosch, the Netherlands, in the early phase of building the use of stone and bricks was, as a rule, limited to public ecclesiastical and military buildings, such as the early 13th century town wall with its gate houses. In accordance with the economic prosperity, the archaeological evidence shows an enormous increase of brick-built housebuilding both inside and outside the first town wall during the period of ca 1275–1350. Together with this phenomenon, the building of the second town wall was started at the end of the 13th century. The second town wall was completed about a century later, enlarging the area within the town walls of s'Hertogenbosch from ca 10 to 115 ha (Janssen 2002, 142).

Town defences

There have been several suggestions about the town wall on the riverside part of Tartu that need to be examined here. The theories such as the missing wall (Altoa 1995, 142) and the filling of the marshy meadow ground are examined first. For comparisons, I have used various towns from Europe which had trade connections with Old Livonia and where similar problems occurred. At the Gildi Street area in Tartu, 4–5 inch thick pinewood logs were laid under the wall as a foundation layer (Stange 1933, 25). From the comparative material, a similar example comes from Conwy, England, where the excavation of Lucy Tower



Fig. 3. Discussed towns on the map of Europe.

revealed that initially the area was covered by fibrous vegetable “matting” which included sticks and reeds; this may have been laid down to provide a reasonably dry surface on which to work. The tower itself was supported on foundations which consisted of both horizontal and vertical timbers as well as large stone slabs and the town wall was built in a similar manner. The town defences of Conwy were built in the 1280s (Kenyon 1990, 197).

The defensibility of the river areas of the walls has been a concern elsewhere as well. For example, the Thames in London needed constant vigilance because crossing the river and entrance into an unprotected city would have been too easy. The gates, if closed, offered their own protection for the citizens and only required the attention of two somnolent guards, but the river required the active patrol of a sergeant and four men. In other words, the only openings within the walls of the city, the gates, required only the most cursory of administration in order to fulfil their protecting role. The river required a far more active guarding, gathering all boats to ensure that there were no late crossings and forcefully blocking trespassers (Rothausser 2009, 261). There are other examples from Europe, for instance similar problems appeared at Cologne. The construction of the new wall on the river side of the Rhine probably started almost in the same way, as was the case with the wall on the land side.⁷ In any case, the river side wall was the lower and the less costly one; even the attached towers were not as high and strong as on the land side. At least initially, Cologne did not have any violent attacks and no persistent worry about safety, so initially strong fortifications were not necessary (Militzer 2005, 90). The situation in Tartu is comparable, where the towers on the river side part of the wall were still the old-fashioned quadrangular type at the end of the Middle Ages and not equally strong if compared with the ones on the southern and northern side. This has provided a basis for the suggestion that the upgrading of the towers was not necessary because of the naturally preventive water barriers on the east side of the town (Prints 1967, 43).

For example in Deventer, the Netherlands, large-scale works to change the topography of the riverside area took place in the 13th century. The low riverbank areas were raised to build a new town wall. A new brick wall was added as a shell to a long stretch of the old royal earth wall. Where the new brick wall was laid around a new town area next to the new harbour, a large market square was built on the place of the old wall (Spitzers 2002, 404). Also for example, in Kiel, Germany, the area between the later city wall and the wooden fortifications were still at lowland in the 13th century, thus not suitable for any settlement or building. In the urban expansion at the beginning of the 14th century, the moats of the wooden fortifications were filled (Albrecht & Feiler 1996, 23; for similar examples, see also Teuber 2002, 276). In some cases, the gradual raising of the ground level in the town interior was caused by the steady accumulation of rubbish and building materials within the town walls (Huml 1990, 276).

⁷ However, one can not say exactly what the wall, the towers and gates looked like at that time, as well-documented plant modifications were the later following centuries (Militzer 2005, 90).

What kind of purpose could such modification works of the described territories fulfil? Quite a few, most likely. In Tallinn, it has been suggested that these modifications were used firstly to “delete” traces of previous ownership; secondly, to remove the unsanitary and contaminated soil; and thirdly, to improve the flow regime of the soil (Mäll 2004, 261). According to the discussed examples, it might be assumed that comparable objectives were the priority in Tartu as well.

The workers

It is quite evident that the urban renewal plan and the construction of the town wall, as extremely labour intensive and expensive projects, could not have taken place only through the activity of the small numbers of immigrants in the period immediately after the conquest. The demographic aspects are also indirectly supported by archaeology. For example, the burials from 13th–14th century at St. John’s Church cemetery indicate that the population was of western (German) origin, but from the first half or from the middle of the 14th century onwards the local-origin anthropological type dominates. This suggests that the local group was the most populous one in the urban population (Kalling 1995, 55 f.). Based on this, it might be suggested that the town was ready for extensive planning and erection of walls only after the urban community was populous enough to carry these works out, because these activities needed a large number of local workers.

The recent research shows (Bernotas 2012) that in the present-day Estonian area, the development from the first traces of an urban settlement to a fully complete medieval town took approximately 50–100 years. According to the information discussed in the present article, this seems to be the case in Tartu as well. This tendency is not common only in Estonia though. For example, as the Hanseatic influence grew in Gotland, this strengthened Visby’s role at the expense of the rest of the island. During the 13th century the city underwent a radical change. A huge renovation project started around the year 1200, when old wooden buildings were replaced with high and lavish buildings of stone. The construction probably lasted without interruption for a period of 75–100 years. Between 1250 and 1288, most likely towards the end of this period, the city walls were also built around the buildings and therefore a serious barrier to trade for farmers was created. In this century, a large number of architectural designers and builders must have been employed in Visby (Westholm 1997, 88).

Conclusions

Based on the discussed information, it might be concluded that the townscape of Tartu underwent several changes in the 14th century. It might be suggested that the disposal of waste was regulated by the town laws which were valid only within the limits of the town area, enclosed by town wall and therefore did not apply to the suburbs. The dates of the find-complexes of the vast majority of

cesspits and dendrochronologically dated cesspits reveal that they appear on the townscape of Tartu clearly in the first half of the 14th century. Thus this date seems to support the hypothesis that the erection of the town wall and the re-planning of the town area began in the first half of the 14th century. The introduction of brick buildings in Tartu has been previously dated from the end of 14th century to the 15th century. Based on the information discussed in the current article, the introduction of brick buildings in Tartu can be traced to the early 14th century. It might be suggested that the town was ready for extensive planning and erection of walls only after the urban community was populous enough to carry these works out, as these activities required a large number of local workers. The recent research shows that in the Estonian area, the development from the first traces of an urban settlement to a fully complete medieval town took approximately 50–100 years. According to the material discussed in the current article this seems to be the case in Tartu as well.

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References

- Albrecht, U. & Feiler, A.** 1996. Stadtarchäologie in Kiel: Ausgrabungen nach 1945 in Wort und Bild. Wachholtz Verlag.
- Alttoa, K.** 1995. Tartu keskaegsetest kaitsemüüridest ja peamisest muinasteest. – Tartu arheoloogiast ja vanemast ehitusloost. Ed. H. Valk. (Tartu Ülikooli Arheoloogia Kabineti toimetised, 8.) Tartu, 141–150.
- Alttoa, K.** 2009. Die Tartuer Marienkirche und die Frage der Bauschule in Tartu im 14. Jahrhundert. – *Baltic Journal of Art History*, Autumn 2009, 7–30.
- Aun, M.** 1995. Tartu keskaegse eeslinna kultuurkihist Küüni tänava arheoloogilise materjali põhjal. – Tartu arheoloogiast ja vanemast ehitusloost. Ed. H. Valk. (Tartu Ülikooli Arheoloogia Kabineti toimetised, 8.) Tartu, 91–97.
- Aun, M.** 1998. Tartu vanalinna arheoloogilise uurimise tulemusi (VII kvartali IV kaevandi kesk- ja idaosa põhjal). – *EAA*, 2, 94–141.
- Aus, T.** 1993. Tartu Rüütli ja Küttri tn. nurgakrunt. 1992. a. linnaarheoloogiliste kaevamiste aruanne. Kõide I. Tartu. Manuscript in the National Heritage Board.
- Bernotas, R.** 2006. Tartu Ülikooli tn 15 krundi jäätmekasti nr 1 suletud leiukompleksi analüüs. Peaseminaritöö. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Bernotas, R.** 2007. 14. sajandi teise poole jäätmekast Tartu Ülikooli 15 õuel. (Tartu Linnamuseumi aastaraamat, XIII.) Tartu, 54–64.
- Bernotas, R.** 2008. Dendrodates of three medieval latrines of Tartu. – *EJA*, 12, 16–29.
- Bernotas, R.** 2011. Medieval town wall of Tartu in the light of recent research. – *EJA*, 15, 56–72.
- Bernotas, R.** 2012. Medieval small towns of Estonia – archaeology and history of urban defense. In print.

- Gläser, M.** 1999. Der Alltag in einer mittelalterlichen Hansestadt. Archäologische Ergebnisse in Lübeck. – The Medieval Town in the Baltic: Hanseatic History and Archaeology. Eds R. Vissak & A. Mäesalu. Linnamuseum, Tartu, 19–32.
- Heinloo, E.** 2006. Tartu lõunapoolne eeslinn kesk- ja varauusajal arheoloogia andmetel. Peaseminaritöö. Tartu. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Heinloo, E.** 2007. Keskaegne Tartu Riia-eeslinn ehitusjäänuste põhjal. (Tartu Linnamuseumi aasta- raamat.) Tartu, 65–76.
- Huml, V.** 1990. Research in Prague – an historical and archaeological view of the development of Prague from the 9th century to the middle of the 14th century. – From the Baltic to the Black Sea. Studies in Medieval Archaeology. Eds D. Austin & L. Alcock. (One World Archaeology, 18.) Academic Division of Unwin Hyman Ltd., 267–284.
- Janssen, H. L.** 2002. Patrician and aristocratic town residences in s'Hertogenbosch c. 1250–c.1550 – the archaeological evidence. – Medieval Europe Basel 2002: Centre, Region, Periphery. Volume 2: Sections 4 and 5. Eds G. Helmig, B. Scholkmann & M. Untermann. 3rd International Conference of Medieval and Later Archaeology. Hertingen, 140–148.
- Kadakas, V. & Nilov, H.** 2004. Various investigations in Tallinn and Harjumaa. – AVE, 2003. Ed. Ü. Tamla. Muinsuskaitseamet, Tallinn, 160–175.
- Kalling, K.** 1995. Paleoantropoloogilisi andmeid Tartu Jaani kiriku kalmistu 13.–14. sajandi matuste kohta. – Tartu arheoloogiast ja vanemast ehitusloost. Ed. H. Valk. (Tartu Ülikooli Arheoloogia Kabineti toimetised, 8.) Tartu, 47–58.
- Kenyon, J. R.** 1990. Medieval fortifications. – The Archaeology of Medieval Britain. Series ed. H. Clarke. Leicester University Press, Leicester, London.
- Kriiska, A., Roog, R. & Altoa, K.** 2010. Mittelalterliche Überreste in der Lutsu-Strasse 2, Tartu. Vorläufige Forschungsergebnisse. – Baltic Journal of Art History, Spring 2010, 171–200.
- Kriiska, A., Roog, R., Altoa, K., Allik, A., Läänelaid, A., Bernotas, R. & Malve, M.** 2011. The medieval and modern period building complex at 2 Lutsu Street in Tartu. Results of archaeological, architectural, historical, dendrochronological and osteoarchaeological research. – The Estonian Historical Journal, 1 (135), 3–40.
- Läänelaid, A.** 2002. Jaani kiriku algus ja aastarõngad. – Horisont, 1, 30–34.
- Lange, K.** 1994. Über die mittelalterlichen Steinbauten an der Kompaniestraße in Tartu. – TATÜ, 43: 4, 409–411.
- Mäesalu, A.** 1990. Sechs Holzkonstruktionen in Tartu (Lossi-Strasse). – TATÜ, 39: 4, 446–452.
- Mäesalu, A.** 1997. Über den Stand der archäologischen Forschungsarbeit in Dorpat (Tartu). – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum, I. Stand, Aufgaben und Perspektiven. Ed. M. Gläser. Schmidt/Römhild, Lübeck, 343–350.
- Mäesalu, A.** 2001. Die Haustypen im hansezeitlichen Tartu (Dorpat). – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum III: Der Hausbau. Ed. M. Gläser. Schmidt/Römhild, Lübeck, 581–594.
- Mäesalu, A.** 2004. Über die Infrastruktur der Hansestadt Tartu (Dorpat) vom 13. bis 16. Jh. – Lübecker Kolloquium zur Stadtarchäologie im Hanseraum, IV: Die Infrastruktur. Ed. M. Gläser. Schmidt-Römhild, Lübeck, 397–403.
- Mäesalu, A. & Vissak, R.** 2002. On the older topography of Tartu. – The Medieval Town in the Baltic: Hanseatic History and Archaeology, II. Eds R. Vissak & A. Mäesalu. Tartu Linnamuseum, Tartu, 145–165.
- Mäll, J.** 2004. Arheoloogilise kultuurkihi spetsiifikast Tallinna vanalinna territooriumil. – Linnu- sest ja linnast. Uurimusi Vilma Trummali auks. Eds A. Haak, E. Russow & A. Tvauri. (MT, 14.) Tallinn, Tartu, 249–268.
- Metsallik, R.** 1985. Tartu vanalinna kultuurkihi stratigraafiast. – Tartu – minevik, tänapäev. Ed. J. Linnus. Tallinn, 47–63.
- Metsallik, R.** 1987. Arheoloogilised uuringud A. Lätte tänava põhjaküljel 1986. a. kaevandi lääne- osas. III kaust. Manuscript in the Town Government of Tartu.
- Metsallik, R.** 1995. Tartu arheoloogilisest uurimisest. – Tartu arheoloogiast ja vanemast ehitus- loost. Ed. H. Valk. (TÜ Arheoloogia Kabineti toimetised, 8.) Tartu, 15–35.

- Militzer, K.** 2005. Die Stadtmauer im Laufe der Zeiten. Das Kölner Beispiel. – Fasciculi Archaeologiae Historicae: Architecture et guerre. Fasciculus XVI–XVII. Ed. T. Poklewski-Koziell. Instytut Archeologii i Etnologii, Łódź, 87–92.
- Mührenberg, D.** 2002. Zum Verhältnis Mensch und Umwelt im mittelalterlichen Lübeck. – The Medieval Town in the Baltic: Hanseatic History and Archaeology, II. Eds R. Vissak & A. Mäesalu. Tartu Linnamuseum, Tartu, 7–20.
- Nurk, R., Kadakas, V. & Toos, G.** 2010. Investigations in the courtyard of Estonian state puppet and youth theatre. – 2009. AVE, 171–175.
- Piirits, P.** 1994. Tartu Karuplats. 1994. a. arheoloogiliste kaevamiste aruanne. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Piirits, P.** 1998. Arheoloogilised kaevamised Tartus Hugo Treffneri Gümnaasiumi keldris (veebruari-aprill 1998. a). Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Piirits, P.** 2000. Arheoloogilised kaevamised Tartus H. Treffneri Gümnaasiumi hoovi O-osas. Aruanne arheoloogilistest kaevamistest Tartus H. Treffneri Gümnaasiumi O-osas. Manuscript in the Tartu Town Museum.
- Prints, O.** 1967. Tartu kui kindlus. Manuscript in the National Heritage Board.
- Raid, N.** 1995. Tartu vanimad linnamüüri-sisesed tänavad. – Tartu arheoloogias ja vanemast ehitusloost. Ed. H. Valk. (TÜ Arheoloogia Kabineti toimetised, 8.) Tartu, 129–140.
- Rothausser, B. C. L.** 2009. “A reuer...brighter ben boþe the sunne and mone”: the use of water in the medieval consideration of urban space. – Fundamentals of Medieval and Early Modern Culture: Urban Space in the Middle Ages and the Early Modern Age. Eds A. Classen & M. Sandidge. Walter de Gruyter, Berlin, 245–272.
- Rusow, E.** 2006. Importkeraamika Lääne-Eesti linnades 13.–17. sajandil. Tallinna Ülikooli Ajaloo Instituut, Tallinn, 2006.
- Rusow, E., Valk, H., Haak, A., Pärn, A. & Mäesalu, A.** 2006. Medieval archaeology of the European context: towns, churches, monasteries and castles. – Archaeological Research in Estonia 1865–2005. Eds V. Lang & M. Laneman. (Estonian Archaeology, 1.) Tartu University Press, 159–192.
- Saluäär, U., Rusow, E., Sarv, K. & Kadakas, V.** 2004. Minor investigations in New-Pärnu. – AVE, 2003, 176–191.
- Spitzers, T.** 2002. The transition from early trade-centre to medieval town in Deventer in the light of socio-economic changes 900–1200. – Medieval Europe Basel 2002: Centre, Region, Periphery. Volume 2: Sections 4 and 5. Eds G. Helmig, B. Scholkmann & M. Untermann. 3rd International Conference of Medieval and Later Archaeology. Hertingen, 400–405.
- Stange, N.** 1933. Archäologisch-Topographisches aus Alt-Dorpat. Dorpat.
- Tammet, M.** 1988. Tartu keskaegsete jäätmeaukude karpoloogilise analüüsi tulemusi. – Loodus-teaduslikke meetodeid Eesti arheoloogias. Eds A.-M. Rõuk & J. Selirand. Eesti NSV Teaduste Akadeemia Ajaloo Instituut, Tallinn, 97–102.
- Teuber, S. W.** 2002. Einbeck-Petersilienwasser – Die Bebauungsstrukturen des 13. bis 16. Jahrhunderts. – Medieval Europe Basel 2002: Centre, Region, Periphery. Volume 2: Sections 4 and 5. Eds G. Helmig, B. Scholkmann & M. Untermann. 3rd International Conference of Medieval and Later Archaeology. Hertingen, 276–281.
- Trummal, V.** 1980. Vanimast ajaloo. – Tartu ajalugu. Tartu, 18–26.
- Trummal, V.** 1992. Arheoloogiauringutest Tartus Lossi tänaval. – Stilus, 2. Eds L. Jaanits & V. Lang. Eesti Arheoloogiaselts, Tallinn, 5–28.
- Trummal, V.** 1996. Über die Entstehung und Herausbildung der Stadt Tartu auf der Grundlage archäologischer Untersuchungen. Congressus Primus Historiae Fenno-Ugricae. Ed. K. Julku. (Historia Fenno-Ugrica, I: 2.) Oulu, 531–539.
- Tvauri, A.** 2000. Loode-Vene päritolu slaavi keraamika Eestis 11.–16. sajandil. – EAA, 4: 2, 91–119.
- Tvauri, A.** 2001. Muinas-Tartu. Uurimusi Tartu muinaslinnuse ja asula asustusloost. (MT, 10.) Tartu.
- Tvauri, A.** 2003. Arheoloogilised uuringud Tartus Küüni 3/5. – AVE, 2002, 176–178.

- Tvauri, A.** 2004. Archaeological investigations at the former building of Academia Gustaviana (Jaani Street 8) in Tartu. – AVE, 2003, 137–143.
- Tvauri, A.** 2008. Archaeological investigations in Tartu, Ülikooli Street. – AVE, 2007, 139–152.
- Tvauri, A.** 2011. Archaeological investigations at the courtyard of Jakobi Street 2 / Lossi Street 3, Tartu. – AVE, 2010, 179–186.
- Tvauri, A. & Bernotas, R.** 2007. Archaeological investigations in Tartu and Vorbuse settlement site. – AVE, 2006, 167–181.
- Vahre, S.** 1983. Tartu 15. sajandi reisikirjeldustes. – Tartu ja ülikool. Ed. J. Linnus. Tallinn, 14–26.
- Valk, H.** 2004. Viljandi Jaani kiriku kalmistu. – Linnusest ja linnast. Uurimusi Vilma Trummali auks. Eds A. Haak, E. Russow & A. Tvauri. (MT, 14.) Tallinn, Tartu, 421–450.
- Vissak, R.** 1994. Der Fundstoff Aus Den Holzkästen Des VII. Quarters In Tartu. (TATÜ, 43: 1.) 71–77.
- Vissak, R.** 1999. The condition of archaeological research in Tartu after 20 years of rescue excavations. – The Medieval Town in the Baltic: Hanseatic History and Archaeology. Eds R. Vissak & A. Mäesalu. Tartu Linnamuseum, Tartu, 33–41.
- Vissak, R.** 2000a. Results of the archaeological investigations at the SE foot of Toomemägi, Tartu. – AVE, 1999, 113–120.
- Vissak, R.** 2000b. Jäätmekastide leiukomplekside kirjeldused ja analüüs. Aruanne arheoloogilistest kaevamistest Tartus H. Treffneri Gümnaasiumi O-osas. Manuscript in the Tartu Town Museum.
- Vissak, R. & Heinloo, E.** 2003. Archaeological investigation of the southern part of the Riia suburb of Tartu in 2001–2002. – AVE, 2002, 153–163.
- Westholm, G.** 1997. Gotland, hansan och de bevarade spåren av en epok. – Gotländskt Arkiv. Meddelanden från Föreningen Gotlands fornvänner. Ed. B. Radhe. Visby, 71–94.

Rivo Bernotas

UUSI TEADMISI TARTU LINNARUUMI ARENGUST 14. SAJANDIL

Resümee

Käesolevas artiklis on vaadeldud mõningaid 14. sajandi Tartu linnaplaanis toimunud muutusi ja analüüsitud, kas ning kuidas võisid need linnaala ümberplaneerimisega seotud olla. Vaatluse all on keskaegne jäätmemajandus, kivihoonete rajamine, küsimus linna jõepoolses osas olnud kaitserajatistest ja kogu ehitustegevuse taga seisnud töölisel. Tartust avastatud keskaegsete jäätmekastide leviku-ala puhul torkab selgelt silma nende paiknemine kvartalisestel aladel linnamüüri piiratud territooriumil. Seega võib tõenäoliselt pidada, et jäätmekäitlus oli linnamüüri ümbritsetud alal reguleeritud vastavate seadustega, mis ei kehtinud eeslinnade territooriumi kohta. Tuginedes Tartust avastatud jäätmekastide leiukomplekside dateeringutele ja dendrokronoloogilise meetodi abil dateeritud jäätmekastidele, ilmneb, et need ilmusid Tartu linnapilti 14. sajandi I poolel. Tartust on mitmetel kaevamistel avastatud keskaegsete kivihoonete jäänuseid, kuid need on enamasti olnud väga kehvast seisukorras ja seetõttu pole võimaldanud teha põhjalikumaid järeldusi hoonete kohta. Senine vanim täppisteaduslikult dateeritud hoone, Jaani kirik, rajati pärast 1321. aastat. Varasemates uurimustes on kivihoonete rajamise algusaeg Tartus dateeritud 14. sajandi lõpu – 15. sajandiga. Tuginedes

käesolevas artiklis esitatud uurimistulemustele, võib kivihoonete rajamise alguse Tartus dateerida 14. sajandi I poolega. Artiklis on vaadeldud erinevate Euroopast pärit võrdlevate näidete varal Tartu jõepoolse ala müüri kindlustamise küsimust. Võib oletada, et pinnasetöödel jõeäärsel alal oli mitu eesmärki. Näiteks Tallinna materjalile tuginedes on seal toimunud analoogsete protsesside kohta oletatud, et “kustutati” jäljed varasematest omandisuhetest, kaevati ära nn must pinnas ja parandati pinnase niiskusrežiimi. Analüüsitud näidetele tuginedes tuleb tõenäoliseks pidada sarnaseid eesmärke ka Tartus. On ilmne, et linna ümberplaneerimine ja müüri ümbritsemine kui töömahukad ning kallid projektid ei saanud toimuda vaid väikesearvulise kolonistide ettevõtmisena vahetult peale Saksa vallutust. Seega tuleb tõenäoliseks pidada, et Tartu oli mahukateks planeerimistöodeks ja ka linnamüüri püstitamiseks valmis alles siis, kui linna kogukond oli nende tööde teostamiseks piisavalt arvukas. Viimased uurimused Eesti ala kohta näitavad, et linnade areng esmastest linnalistest asustustest kuni täielikult väljaarenenud kesk-aegse linnani kestis ligikaudu 50–100 aastat. Näib tõenäoline, et vastavalt käesolevas artiklis arutatud andmetele toimus see sarnaselt ka Tartus. Artiklis esitatud dateeringud toetavad hüpoteesi, mille kohaselt linnamüüri rajamine ja linna ümberplaneerimine algas 14. sajandi I poolel.

Rivo Bernotas

DENDRODATES OF THREE MEDIEVAL LATRINES OF TARTU

In the article dendrodates of three latrines in Tartu (15 Ülikooli Street, latrines 1b and 5, and 14 Ülikooli Street, latrine 14G-14F) are viewed and they are compared with other archaeological findings. Latrine 1b dates back to the year 1335, latrine 5 to the year 1309 and latrine 14G-14F to the year 1362. The research is unique in northern Europe, because the specifics of medieval waste management are viewed using exact dating. As a result of the research, it was found out that the latrines were used at least 40 years and that the theories of emptying latrines starting not before early modern times are not true.

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Introduction

According to December 2007 data on at least 35 latrines dating to 13th–16th centuries have been found in Tartu (Tvauri & Utt 2007, 143). In addition it has been possible to document several medieval latrines in cultural layer during archaeological supervisions, but at the moment they have not been researched more specifically.

Latrines are one of the most interesting and rich in finds objects in Tartu from the Middle Ages, which possess an enormous scientific value. Although single medieval and newer wood and stone latrines have been researched in other places in Estonia, they have nowhere been found in such large quantity as in Tartu (Bernotas 2007, 54). Latrines of Tartu and material discovered from them have survived remarkably well. The reason is, that in the medieval position of the town on Emajõgi flood plain the soil is wet all year round because of ground water coming from Quaternary deposits. Moisture is in turn a perfect preservative for organics, especially in lower levels of the cultural layer (Metsallik 1985, 47 ff.).

In Estonia the dendrochronological dating of wood structures has been researched by Tartu University lecturer Alar Läänelaid (Läänelaid & Eckstein 2003; Läänelaid 2004; 2005; 2006; Läänelaid et al. 2005), who has also dated

the wooden floats below St. John's Church walls (Länelaid 2002). The objective of the current article is to publish dendrodates of three different Tartu latrines and compare their suitability with archaeological findings. It is the first research in northern Europe where medieval latrines have been examined with exact science method.

For dating, the latrines from which the author could take wood proofs himself in 2007 were used. Besides three latrines dated here, more have been discovered on the plots of 14 and 15 Ülikooli Street, but they have not survived well enough – they were made of either too thin or trimmed logs or it was not possible to dig them out to a full extent.

Dated latrines

15 Ülikooli Street courtyard, latrine 1b

The plot in 15 Ülikooli Street was situated right in the centre of Tartu surrounded by town wall, on the east side of Mary Church, which was the largest sanctuary in Tartu (Fig. 1). Latrine 1b is one of six latrines examined in courtyard



Fig. 1. Location of investigated latrines on the map of medieval Tartu. 1 Courtyard of 15 Ülikooli St., 2 Plot of 14 Ülikooli St. Drawing by Andres Tvauri.

of 15 Ülikooli Street in 2005 and 2007. The content of only two of those latrines (Nos 1b and 6) was completely excavated. Other latrines had been destroyed before the archaeological research (latrine No 3) or they were below the appointed digging depth and only their upper part could be examined (Tvauri 2007).

The side length of the quadratic corner-jointed log box (Fig. 2) measured from inside was 1.8 m. The box has been at least 15 log-levels high (1.9 m). Logs had been connected with dog-neck type connection, whereas the hollow of the corner tenon was hewed on the upper side of a log. As on some parts the bark is visible, it can be concluded that they were pine logs. The logs were 10 cm in diameter on an average. The box was surrounded by medieval cultural layer composed of loafs, branches, leather and other organic waste. Below the box the layer of decomposed peat emerged, into which the lowest log layer had sunk. Box 1b had been built inside a former and larger latrine (1a) (Tvauri 2007, 12).

Inside the box, 1–2 log layers from above, there was a thin wood line, which seemed to originate from north–south directed boards. Below that line the box was filled in with thick and soggy, green-brown or dark-red organic layer, which contained branches, chips, cherry stones, parts of wooden tableware, ceramics and other findings. In addition there were many large bricks in the latrine (size 30.5–31.5 × 14.5–15.5 × 8–10 cm) and their parts. Bricks were in most cases with grout traces. There was a pile of land stones on the bottom of the box (Tvauri 2007, 12).



Fig. 2. 15 Ülikooli St. latrine 1b. Photo by Andres Tvauri.

The substance in the latrine was mainly dated from the period starting from the mid-14th century until the end of the 14th century (Tvauri & Utt 2007, 144 f.).

15 Ülikooli Street courtyard, latrine 5

Latrine No 5 (Fig. 3) was situated on the east side of latrine 1b. From that only the logs covering the box could be cleaned and also the box of four highest log layers. Up to that height the box was filled in with later material. It was not possible to observe the initial content of the box – it was below the digging depth and will be conserved below the concrete floor of the cellar. From the stratigraphical location the box clearly dated from the Middle Ages, being on the same level and in the same direction with box 1b and surrounded with medieval cultural layer (Tvauri 2007, 14 f.).

The box was built of an average 15-cm-thick round pine logs. Logs were attached to each other with dog-neck tenon. The internal measures of the box were 1.4 m from east to west and at least 1.3 m from north to south. The latter measure could not be determined more precisely, as the upper part was probably destroyed with installing a wooden drain well in the 18th century (Tvauri 2007, 14 f.).



Fig. 3. 15 Ülikooli St. latrine 5. Photo by Andres Tvauri.

On the box, seven from east to west directed round logs with a diameter of around 24 cm were laid. In the middle of the box there was a two-log wide opening in the log layer. Probably the log layer was the cover of latrine (Tvauri 2007, 14 f.). From those log layers the samples for dendrodating were taken – the upper layers of the box were too rotten to use them for dating.

14 Ülikooli Street courtyard, latrine 14G-14F

The plot on 14 Ülikooli Street was situated in the southern part of medieval Tartu, surrounded with the town wall, just on the foothill of medieval bishop's castle (Fig. 1). The latrine that was situated in squares 14G-14F (Fig. 4) in the grid formed in pit was excavated by archaeologist Peeter Piirits in 2007. The length of the box was 3 m and the width ca. 1.5 m. It was made of 20 cm thick pine logs and was limed from inside. The box had survived at the eight of nine log layers (2 m).

The interior of the latrine was filled in with dark and thick organics-rich manure layer, which included pieces of wooden tableware and ceramics, fragments of textile, pieces of glass, metal parts, etc. (Piirits 2008). The findings date back to the 15th century. For instance, there was an oval so-called Jacoba jug (Fig. 5), which had been manufactured in Waldenburg, western Saxonia (Russow 2006, 101, fig. 28: 1).



Fig. 4. 14 Ülikooli St. latrine 14G-14F. Photo by Rivo Bernotas.



Fig. 5. Jacoba jug, found from latrine 14G-14F of 14 Ülikooli St. (TM A 133: 4264: 1, 2). Photo by Rivo Bernotas.

In addition, two stoneware jars of Siegburg origin were found as well (see Russow 2006, fig. 12: 8) and a jar from Waldenburg (TM A 133: 4244), which all date back to the 15th century (written note from Erki Russow, February 2008).

Dendrodating methodology

According to the methodology currently in practice in Europe, wooden structures are dated using the width of rows of average annual tree rings, taken preferably from at least ten different log samples. In order to achieve sufficient reliability, the logs must be long enough, about 100 years old, but in some cases 50–60 years. To assess the similarity and reliability of the rows, the *Student t*-value is used as parametric methods, and a so-called sign-test as non-parametric methods. *Student t*-value is calculated from the correlation coefficient and the overlap length of compared the rows. The larger the *t* value is, the more reliably similar the rows are. When comparing hundreds of pairs of numbers, the similarity is considered 95% reliable when *t* is higher than 4. When comparing identical rows the value is $t = 100$. In practice the value of *t* is calculated using different formulas in computer programs and that is why its value is a bit vary (Sander & Levanic 1996, 269 ff.).

Sign test (*Gleichläufigkeit*) gives the percent of same direction changes (increase or decrease) in the width of the neighbouring tree rings in two compared rows (Kaennel & Schweingruber 1995, 162). When the growth (width of annual ring) decreases in both ring-widths' series put beside each other, then it is considered to be one similarity point. When in both rows the growth is higher next year, then this also gives one similarity point. When one of the year ring widths remains unchanged, then this gives half a point. When counting the points for the same direction changes and dividing the sum with the sum of total changes (length of compared rows' overlap) ratio W is obtained (*Gleichläufigkeit*). Depending on the length of the rows the program also gives confidence level, on which the calculated W is reliable (0.95; 0.99 or 0.999). Sign test is used beside *Student t-value* (Läänelaid 1999, 142).

In order to measure and date samples, well-known dendrochronology programs in Europe, such as TSAP (Time Series Analysis) (Rinntech) and CATRAS (Computer Aided Tree Ring Analysis System), were used (Aniol 1983, 46).

Dating Tartu latrines

From the logs of all the latrines in question, we sawed test discs with Andres Tvauri. From latrine 1b 41 different wood discs were sawn for dating. Proofs could be taken from the logs of all four sides, but they could not be taken from the lowest layers due to the active inflow of water. From the samples, 23 ring width series were averaged to a 79 year long average *lepy1501* and the average was compared with chronologies (or series) from Stockholm (3spsto09, $t = 4.07$, $W = 66.7$), Uppland (3spupp01, $t = 3.83$, $W = 61.5$) and 12 samples from Vene Street in Tallinn (3epv1201, $t = 3.8$, $W = 61.5$). In addition, four sample series were averaged to a 123 year long average *lepy1511* and compared first of all with 15 Ülikooli Street sample series *lepy1501* ($t = 5.89$, $W = 71.2$) and then with 14 Ülikooli Street latrine sample series *lepy1406* ($t = 4.26$, $W = 63.9$) and series from Kuldjala tower (3epyklj02, $t = 4.36$, $W = 54.5$). All comparisons unambiguously date last year circle to year 1335 (Fig. 6).

From latrine No 5 samples were taken from all four widest cover logs. As there were only four samples, the expectations for dating success were low. Still series of two samples could be averaged to 86 year long average *lepy15k1*. When comparing the average with chronologies from Novgorod (3rpnov05, $t = 6.28$, $W = 67.6$), Tallinn town hall (3tlr04, $t = 5.47$, $W = 71.2$) and Kolm Õde building complex in Tallinn (3ep3od14, $t = 4.65$, $W = 62.4$), the result of dating the last ring was 1309 (Fig. 7).

From latrine 14G-14F 13 sample discs were sawed (Fig. 8). Nine of them could be averaged to a 176 year long average *lepy1406*. Comparing it with pine chronologies from Gotland (3spgot01, $t = 4.11$, $W = 58.6$), Novgorod (3rpnov05, $t = 5.44$, $W = 62.9$), Tallinn town hall (3eptlr04, $t = 6.51$, $W = 66.3$) and Riga (3lptro01, $t = 5.31$, $W = 68.4$), the dendrochronological date was 1362 (Fig. 9).

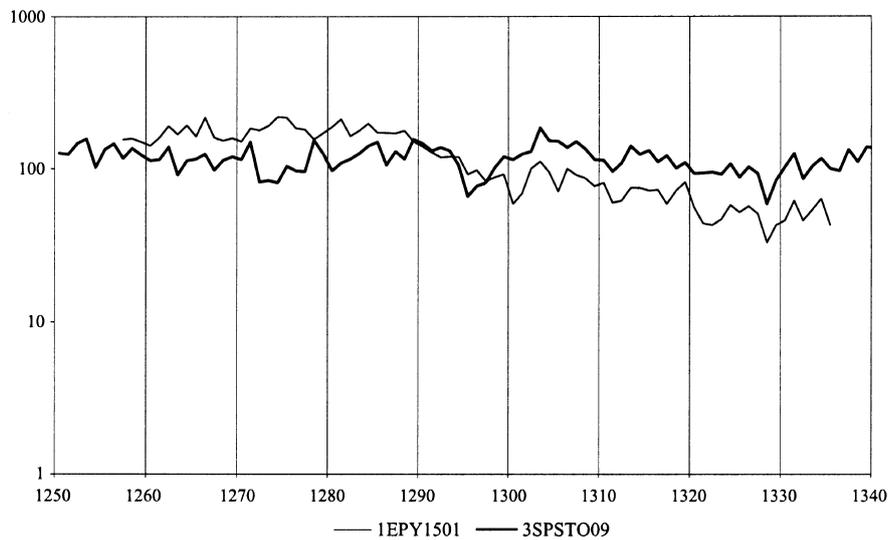


Fig. 6. Average of 23 samples of latrine 1b from 15 Ülikooli Street (1epy1501) in comparison with Stockholm pine chronology (3spsto09). Y-axis marks the width of annual ring and x-axis marks the years.

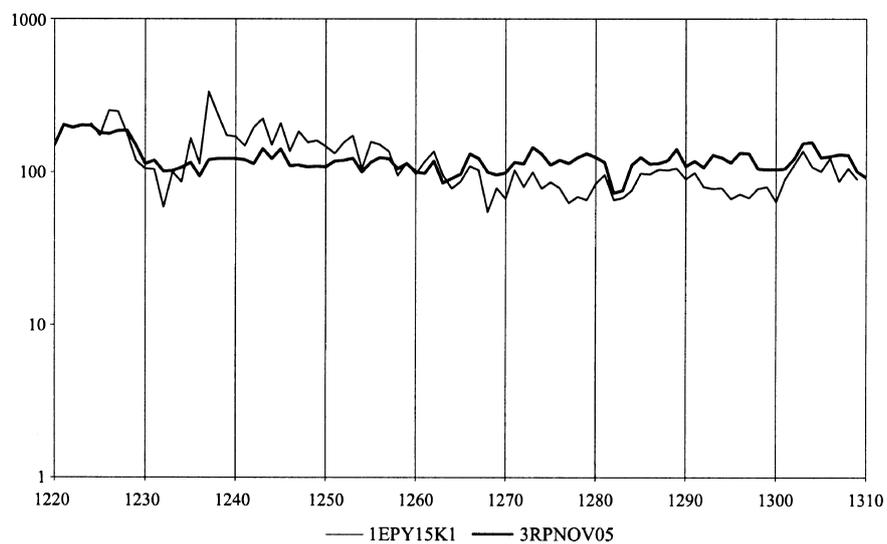


Fig. 7. The average of two samples (1epy15k1) from latrine No 5 at 15 Ülikooli Street in comparison with Novgorod pine chronology (3rpnov05). Y-axis marks the width of annual ring and x-axis marks the years.



Fig. 8. Test discs for dendrochronological dating from latrine 14G-14F of 14 Ülikooli St. Photo by Rivo Bernotas.

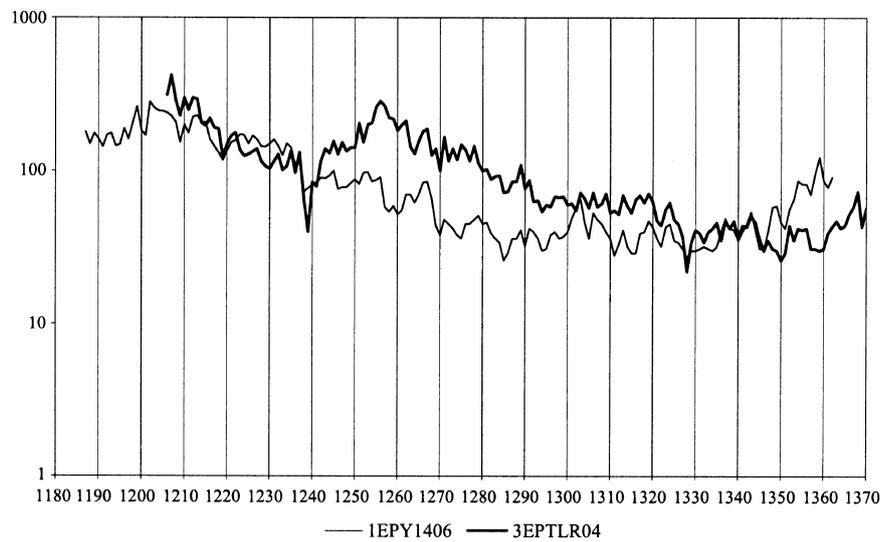


Fig. 9. The average tree ring row of nine samples from latrine 14G-14F at 14 Ülikooli Street (1epy1406) in comparison with average tree ring row of two samples from Tallinn town hall (3eptlr04). Y-axis marks the width of annual rings and x-axis marks the years.

Discussion and results

Dendrochronological dating of wood means determining the growing year of the last measured tree ring. As mentioned, the dates were established using reference chronologies, whereas the correctness of dates was checked using both statistical similarity indicators and visual comparison of figures. As in the case of latrines we are dealing with the dating of round logs, which have bark pieces, then dates show the year of last ring below the bark. The preservation of the last ring below the bark is shown by the same date of different logs in the latrine. After the growth of last annual ring the tree was cut down and used for building the waste pit. The wood was probably not dried before the building of latrines, as they were not quality buildings. New latrines should have got wet from inside and outside. Using raw wood means that the building took place in the year after the year of wood growth at the latest. Derived from the fact that all dates ended with a full tree ring, those trees could be cut from the dendrochronological dating year autumn until spring next year and the building time of latrines evidently falls into the same period.

So far the research of latrines of Tartu has been concentrated on dating and examining their content as separate research complexes (e.g. Mäesalu 1990; Vissak 1994); quite often only most interesting finds from the latrines have been analyzed (Mäesalu 1999; Mäesalu et al. 2008; Tvauri & Utt 2007). The boxes have not been dated with natural science methods. That is why three dendrodates achieved in the current research provide interesting material for further discussion.

One previously unanswered question is: how long were the latrines used before abandoning them, and were they emptied? Using archaeological finds from Tartu latrines it has been thought so far that the boxes most rich in finds are the oldest. For instance Ain Mäesalu, using material from Tartu, has noted that some of the latrines were not emptied during the whole medieval period, and when a box became full then a new one was built beside it. Such activity made the dating of finds from the latrines relatively simple (Mäesalu 2004, 399). It has been assumed that during the building of earlier boxes (those of the 13th–14th centuries), when there was no town wall, there was also no space problem in Tartu. When the box became full, then a new one was built beside it. In the next centuries there was lack of land in the territory surrounded by the town wall due to population growth and the new latrines were regularly emptied and no garbage was thrown into the box that would make it more difficult to empty (Bernotas 2006, 36).

When comparing the dendrochronological dates acquired in the current research with findings, it can be said that already from the beginning of the 14th century the latrines have been built in order to use them repeatedly and theories of emptying the latrines not before the beginning of the modern times are not correct. When looking at latrine 1b dating from 1335 and comparing it with the

chronology of finds (the latest are from the beginning of the 15th century) it can be assumed that the box was in use at least for three quarters of a century.

When comparing the dendrochronological dates of latrine 1b and that of 14G-14F and other finds an interesting connective aspect emerges: in both latrines the first datable finds appear approximately 40 years after the building of the box (latrine 1b was built in 1335 and finds are from the last quarter of the 14th century or from the beginning of the 15th century; latrine 14G-14F was built in 1362 and the earliest findings date to the beginning of the 15th century). That is why it can be suggested that this coincidence is not accidental and that it indicates some kind of (not determined) system in medieval waste management.

The German researcher Manfred Gläser has written about the latrines 6 metres in diameter and 8 metres in depth discovered in Lübeck, which in his opinion without emptying became full in 30–50 years (Gläser 1999, 32). Taking into account the several times smaller size of Tartu dendrodated latrines it can be assumed that they were used at least for 40 years in which time they were constantly emptied. The question why they were no longer emptied and why the dates of the last components found in the boxes were as described, demands further research.

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References

- Aniol, R. W.** 1983. Tree-ring analysis using CATRAS. – *Dendrochronologia*, 1, 45–53.
- Bernotas, R.** 2006. Tartu Ülikooli tn 15 krundi jäätmekasti nr 1 suletud leiukompleksi analüüs. Peaseminaritöö. Tartu. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Bernotas, R.** 2007. 14. sajandi teise poole jäätmekast Tartu Ülikooli 15 õuel. (Tartu Linnamuuseumi aastaraamat, XIII.) Tartu, 54–64.
- Gläser, M.** 1999. Der Alltag in einer mittelalterlichen Hansestadt. Archäologische Ergebnisse in Lübeck. – *The Medieval Town in the Baltic: Hanseatic History and Archaeology*, I. Proceedings of the First & Second Seminar, Tartu, Estonia 6th–7th June 1997 and 26th–27th June 1998. Eds R. Vissak & A. Mäesalu. Tartu, 19–32.
- Kaennel, M. & Schweingruber, F. H.** (eds). 1995. *Multilingual Glossary of Dendrochronology. Terms and Definitions in English, German, French, Spanish, Italian, Portuguese and Russian.* Swiss Federal Institute for Forest, Snow and Landscape Research, Birmensdorf.
- Läänelaid, A.** 1999. Dendrokronoloogia uurimisseis Eestis. – *Ajalooline Ajakiri*, 3/4 (106/107), 141–152.
- Läänelaid, A.** 2002. Jaani kiriku algus ja aastarõngad. – *Horisont*, 1, 30–34.

- Läänelaid, A.** 2004. Puude aastarõngalaiuste võrgustik Eestis. – *Publicationes Instituti Geographici Universitatis Tartuensis*, 89, 298–312.
- Läänelaid, A.** 2005. Kuidas ruhnlased kirikus käisid. – *Horisont*, 3, 10–15.
- Läänelaid, A.** 2006. Lossi legendist, tamme teekonnast ja maali mõistatusest. – *Horisont*, 5, 40–44.
- Läänelaid, A. & Eckstein, D.** 2003. Development of a tree-ring chronology of Scots Pine (*Pinus sylvestris* L.) for Estonia as a dating tool and climatic proxy. – *Baltic Forestry*, 9, 2, 76–82.
- Läänelaid, A., Raal, A. & Valk, H.** 2005. Setomaa tsässonate vanusest: esialgseid andmeid. – XXVIII Eesti looduseuurijate päev. Setomaa loodus. 2.–3. juulini 2005, Obinitsa. Eesti Looduseuurijate Selts, Tartu, 37–46.
- Mäesalu, A.** 1990. Sechs Holzkonstruktionen in Tartu (Lossi-Strasse). – *TATÜ*, 39: 4, 446–452.
- Mäesalu, A.** 1999. Emailbemale Glasbecher aus Tartu. – *The Medieval Town in the Baltic: Hanseatic History and Archaeology, I. Proceedings of the First & Second Seminar, Tartu, Estonia 6th–7th June 1997 and 26th–27th June 1998*. Eds R. Vissak & A. Mäesalu. Tartu, 75–84.
- Mäesalu, A.** 2004. Über die Infrastruktur der Hansestadt Tartu (Dorpat) vom 13. bis 16. Jahrhundert. Lübecker Kolloquium zur Stadtarchäologie im Hanseraum, IV: Die Infrastruktur. Lübeck, 397–403.
- Mäesalu, A., Peets, J. & Haiba, E.** 2008. Nahast küünarvarrekaitsmed keskaegsest Tartust. – *Loodus, inimene ja tehnoloogia, 2. Interdistsiplinaarseid uurimusi arheoloogias*. Eds L. Jaanits, V. Lang & J. Peets. (Muinasaja teadus, 17.) Tallinn, 27–36.
- Metsallik, R.** 1985. Tartu vanalinna kultuurikihi stratigraafiast. *Tartu – minevik, tänapäev*. Tallinn, 47–63.
- Piirits, P.** 2008. Aruanne arheoloogilistest kaevamistest Tartus Ülikooli 14 krundil. Manuscript in the National Heritage Board.
- Russow, E.** 2006. Importkeraamika Lääne-Eesti linnades 13.–17. sajandil. Tallinna Ülikooli Ajaloo Instituut, Tallinn.
- Sander, C. & Levanic, T.** 1996. Comparison of t-values calculated in different dendrochronological programmes. – *Dendrochronologia*, 14, 269–272.
- Tvauri, A.** 2007. Aruanne arheoloogilistest päästekaevamistest Tartus, Ülikooli 15 hoovis 2007. aastal. Manuscript in the National Heritage Board.
- Tvauri, A. & Utt, T.-M.** 2007. Medieval recorder from Tartu, Estonia. – *EJA*, 11: 2, 141–154.
- Vissak, R.** 1994. Der Fundstoff aus den Holzkästen des VII. Quartals in Tartu. – *TATÜ*, 43: 1, 71–77.

Rivo Bernotas

TARTU KOLME KESKAEGSE JÄÄTMEKASTI DENDRODATEERINGUD

Resüme

Tartust on 2007. aasta detsembri seisuga leitud vähemalt 35 13.–16. sajandisse kuuluvat jäätmekasti ehk latrini. Lisaks on dokumenteeritud mitmeid keskaegseid jäätmekaste, kuid esialgu on need veel läbi uurimata. Jäätmekastide näol on tegemist ühtede kõige leiurikkamate ja huvitavamate keskaegsest Tartust säilinud objektidega, mille teaduslik väärtus on hindamatu. Ehkki üksikuid kesk- ja uus-aegseid puidust ning kivist jäätmekaste on uuritud ka mujal Eestis, pole neid kusagilt leitud nii arvukalt kui Tartust. Tartu jäätmekastid ja neist avastatud leiu-materjal on tänu Emajõe niiskusrežiimile erakordselt hästi säilinud.

Eestis on puitrajatiste dendrokronoloogilise dateerimisega seni tegelnud Tartu Ülikooli geograafia instituudi lektor Alar Läänelaid. Käesoleva artikli eesmärgiks on publitseerida kolme erineva Tartu jäätmekasti dendrodateering ja võrrelda nende sobivust arheoloogilise leiumaterjaliga. Tegemist on esimese uurimusega Põhja-Euroopas, kus keskaegseid jäätmekaste on uuritud täppisteadusliku meetodi abil.

Dateeritud jäätmekastideks on Ülikooli 15 jäätmekastid 1b ja 5 ning Ülikooli 14 jäätmekast 14G-14F. Ülikooli 15 jäätmekastist 1b saadud leiuaines pärineb peamiselt perioodist 14. sajandi keskpaigast kuni 14.–15. sajandi vahetuseni; Ülikooli 15 jäätmekastist 5 leiumaterjali ei saadud ja Ülikooli 14 jäätmekasti 14G-14F leiumaterjal kuulub 15. sajandisse.

Praeguse Euroopas praktiseeritava meetodika kohaselt dateeritakse puitrajatise mitme, soovitatavalt kümnekonnast eri palgist võetud puiduproovi keskmiste aastarõnga laiuste ridade abil. Võrreldavate ridade sarnasuse küllaldase usaldatavuse saavutamiseks peavad read olema piisavalt pikad, soovitatavalt sadakonna, mõnel juhul siiski ka 50–60 aasta pikkused. Ridade sarnasuse ja usaldatavuse hindamiseks on parameetristest meetoditest kasutusel *Student t*-väärtnus ning mitteparameetristest meetoditest nn märgitest. Proovide mõõtmiseks ja dateerimiseks on dendrokronoloogias kasutatud Euroopas laialdaselt levinud arvutiprogramme TSAP (Time Series Analysis) (Rinntech) ja CATRAS (*Computer Aided Tree Ring Analysis System*). Ülikooli 15 jäätmekast 1b õnnestus dateerida 1335., Ülikooli 15 jäätmekast 5 1309. ja Ülikooli 14 jäätmekast 14G-14F 1362. aastaga.

Puidu dendrokronoloogiline dateering tähendab sellest puiduproovist mõõdetud kõige viimase aastarõnga kasvamise kalendriaastat. Nagu eelnevast nähtub, tehti dateeringud kindlaks võrdluscronoloogiate abil, kusjuures dateeringute õigsust kontrolliti nii statistiliste sarnasusnäitajate kui ka graafikute abil. Kuna uuritud jäätmekastide puhul oli tegemist ümarpalkide dateerimisega, millel oli säilinud ka kooretükke, siis näitavad dateeringud viimase koorealuse aastarõnga kalendriaastat. Viimase koorealuse aastarõnga säilimist osutab ka sama jäätmekasti eri palkide sama dateering. Viimaseks jäänud aastarõnga kasvamise järel puud langetati ja kasutati jäätmekastide ehitamiseks. Võib oletada, et jäätmekastide ehitamiseks puitu eelnevalt ei kuivatatud, kuna tegemist ei olnud kvaliteetehitistega. Vastsed jäätmekastid pidid nii väljast- kui seestpoolt niikuinii taas märjaks saama. Toore puidu kasutamise eeldamine tähendab ehitusaega hiljemalt järgmisel kalendriaastal pärast viimase aastarõnga kasvamist. Tulenevalt asjaolust, et kõik dateeritud proovid lõppesid täisaastarõngaga, võidi need puud langetada ajavahemikus dendrokronoloogilise dateeringu aasta sügisest kuni järgmise aasta kevadeni ja samasse perioodi jääb tõenäoliselt ka jäätmekastide ehitamisaeg.

Tartu keskaegsete jäätmekastide uurimine on seni keskendunud nende sisu kui suletud leiukomplekside uurimisele ja dateerimisele või siis on käsitletud kastidest leitud uhkemaid leide. Kaste endid pole seni loodusteaduslike meetoditega dateerida õnnestunud. Seega pakuvad käesoleva uurimistöö raames jäätmekastidest saadud kolm dendrodateeringut põnevat mõtteainest.

Üks seni vastuseta olnud küsimus on: kui kaua kaste enne nende hülgamist kasutati ja kas neid ka tühjendati? Tartu jäätmekastide puhul on siiani arheoloogilisele leiumaterjalile tuginedes arvatud, et kõige leiurikkamad kastid on ühtlasi ka dateeringutelt kõige varasemad. Näiteks Ain Mäesalu on Tartu materjali uurides täheldanud, et osa kastidest ei tühjendatud kogu keskaja jooksul, vaid kui jäätmekast täitus, ehitati selle lähedusse uus. Selline teguviis muutis vastavatest jäätmekastidest saadavate leiu komplekside dateerimise võrdlemisi lihtsaks. On oletatud, et varasemate kastide ehitamise ajal (13.–14. sajandil), kui puudus veel linnamüür, ei olnud Tartus ruumikitsikust. Väljakäigu lampkasti täitumise korral rajati eelmise kõrvale uus. Hilisematel sajanditel tekkis linnamüüri piiratud alal rahvaarvu ja hoonestuse lisandudes tõenäoliselt ruuminappus ning kaste hakati regulaarselt tühjendama ja tühjendamist raskendavat prahti neisse enam ei visatud.

Vaadeldes käesoleva uurimuse käigus saadud dendrokronoloogilisi dateeringuid ja kõrvutades neid leiumaterjaliga, võib kindlalt väita, et juba 14. sajandi esimesest poolest on jäätmekaste ehitatud eesmärgiga kasutada neid korduvalt ning varasemad, kastide tühjendamist alles varauusajast alates toetavad seisukohad pole tõesed. Vaadeldes näiteks Ülikooli 15 jäätmekasti 1b dateeringut 1335. aastal ja võrreldes seda leiumaterjali dateeringutega (hiliseimad leiud pärinevad 15. sajandi algusest), võime kindlalt väita, et see oli kasutuses vähemalt kolmveerand sajandit.

Võrreldes Ülikooli 15 jäätmekasti 1b ja Ülikooli 14 jäätmekasti 14G-14F dendrokronoloogilisi dateeringuid ning leiumaterjali, tuleb välja mõlemaid objekte ühendav huvitav nüanss: mõlemas jäätmekastis tekivad esimesed dateeritavad leiud orienteeruvalt 40 aastat pärast kasti ehitusaega (Ülikooli 15 jäätmekast 1b ehitati 1335. aastal ja leiumaterjal pärineb valdavalt 14. sajandi viimasest veerandist või 15. sajandi algusest; Ülikooli 14 jäätmekast 14G-14F ehitati 1362. aastal ja leiumaterjal kuulub kõige varasemalt 15. sajandi algusse). Seega võib oletada, et see kokkulangevus pole juhuslik, vaid viitab mingile seni kindlaks tegemata süsteemsele keskaegses jäätmemajanduses. Küsimus, miks jäätmekaste edasi ei tühjendatud ja viimastesse kastidesse jäänud leiu komplekside dateeringud on just sellised, nagu need on, ootab edaspidist lahendamist.

THE MEDIEVAL AND MODERN ERA BUILDING COMPLEX AT 2 LUTSU STREET IN TARTU

RESULTS OF THE ARCHAEOLOGICAL, ARCHITECTURAL HISTORICAL, DENDROCHRONOLOGICAL AND OSTEOARCHAEOLOGICAL RESEARCH

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In December 2008, archaeological investigations started in Tartu at 2 Lutsu Street (Fig 1), in connection with the renovation of the house in use by the Tartu Toy Museum and the establishing of the cellar rooms. The investigations that were planned as short-term monitoring works turned out to be almost year-long fieldwork. Archaeological research implied that in the course of the construction of one of Tartu's oldest preserved wooden houses, established in the middle of the eighteenth century, the earliest structures had not been destroyed completely but some of these had remained underneath the building. At least two medieval buildings can be discerned that have been preserved to a considerable extent. Moreover, in addition to walls, a complete stove-hypocaust was unearthed. The disposed medieval constructions were preserved almost completely, and a part of these can be observed in the museum.

The completed investigations provide much information about the medieval houses of Tartu and specify the street network of the period. The material of the filling layers amassed in the course of rebuilding and dismantling the houses, including one of the biggest tile and everyday pottery collections of Estonia, offers data about the modern era processes in Tartu, for example the changes in heating systems, the extent of war damages, etc.

The excavations took place in several stages and proceeded primarily from the needs of the renovation works and the foundation depths of new rooms. Therefore, only one of the medieval rooms was entirely opened and excavated to the natural soil, and the majority of rooms were only partly

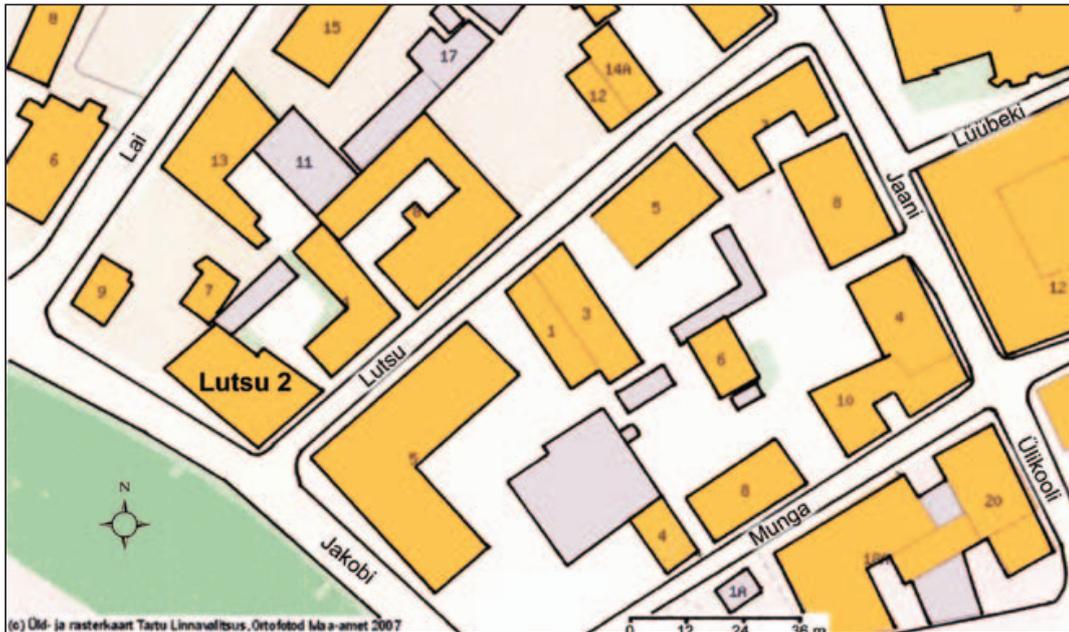


Fig 1. The situation plan of 2 Lutsu Street. Kristel Külljastinen.

unearthed and merely until the planned floor levels. In these cases, test pits were dug in order to gain data about the strata beneath. The gathered find material and the documentation of the building remains is huge, as a result of which the analysis is still being completed by different specialists and will be continued for years. In spite of this, the main part of the information has been organized, the first radiocarbon analysis has been made, and the initial standpoints have been formed which could quickly reach the academic circles. In the current article we concentrate descriptively on the medieval construction remains, presenting the bulk of the material and tentative conclusions. In the main part, however, we will discuss the find material, especially glazed tiles and human bones, from modern era layers, and we will also present the results of dendrochronological analyses.

*Medieval constructions*¹

BUILDING I

In the first medieval dwelling house, three rooms were opened almost entirely and one partly. The total number of rooms is unclear. Building I had been established on a previously used territory. Several planning

¹ About medieval period building remains, see also Aivar Kriiska, Raido Roog, Kaur Alttoa, "Mittelalterliche Überreste der Lutsu-Strasse 2, Tartu: Verläufige Forschungsergebnisse", *Baltic Journal of Art History* (Spring, 2010), 171–200.

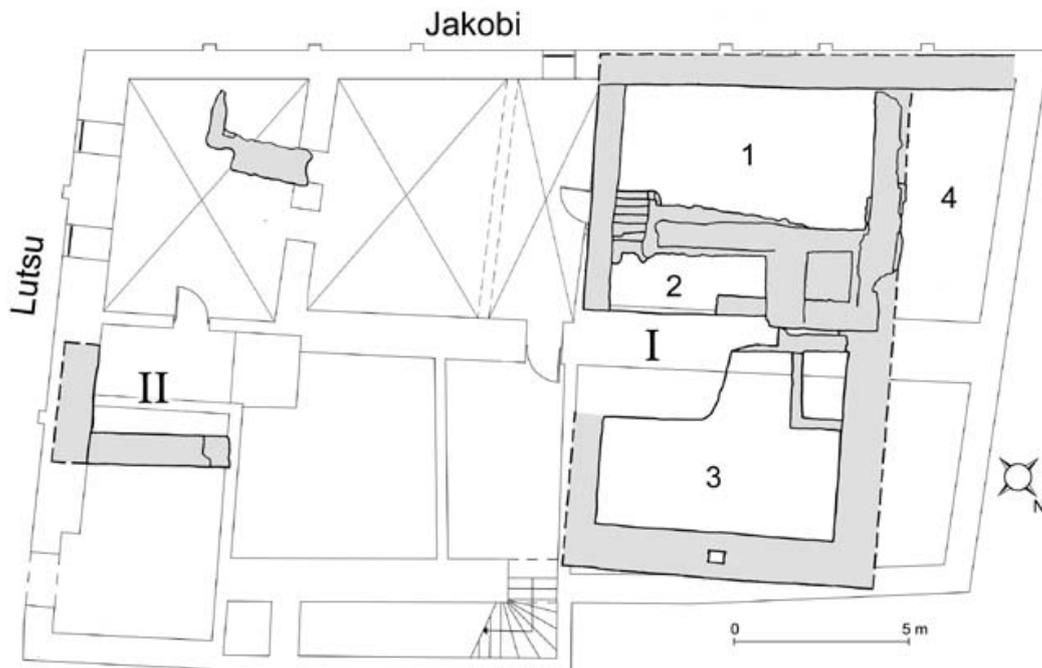


Fig 2. Medieval wall remains on the contour of the present building. Kristel Külljastinen.

layers lay under the walls, and two wooden constructions are older than the building. One of these was situated in the southern corner of room no 1 (Fig 2). The remains of logs were found from the depression dug into the natural soil at a depth of approximately 110–120 cm. Longer logs (approximately 1 m long in their visible section, 8–16 cm thick) lay in the northeast-southwest direction. The exact construction of the formation remains unclear, but we were apparently dealing with a sort of system for irrigation or water ducting.² The other part of the wooden construction – the stratum of 24–26 cm wide northeast-southwest directed logs – was unearthed in test pits dug into different parts of room no 3. The radiocarbon analysis gave the result of 1330 ± 80 AD for the date of one of the burnt logs and 1470 ± 170 AD for the other (Tab 1). The latter is apparently incompatible and can be explained by the contamination of the sample with later carbon, since the charcoal from the cultural layer covering the wooden construction was also dated to the fourteenth century.

Room no 1 is approximately $7 \times 3-4$ m (Fig 2). The preserved parts include the walls of the ground floor laid of boulders and bricks³ up to a height

² Through the area of Lutsu Street, an underground water flume ran from Toome Hill to Emajõgi River. See August Mieler, “Tartu aseme geomorfoloogia ja hüdroloogia”, *Tartu* (Tartu, 1927), 185.

³ The proportions of bricks are ordinarily $30-31 \times 14-14,5 \times 9-9,5$ cm. Those kinds of bricks were used in Tartu through the medieval period.



Fig 3. View of room 1 of medieval building I from the northwest. Kristel Külljastinen.

of more than two meters until the supporting structures of the partition joists of the main floor (Fig 3).

The southwestern outer wall, which also reaches room no 4, was established of bricks and boulders without a discernable foundation on top of the mortar layer. In places, plaster has been preserved on the walls approximately 75 cm from the foundation depth. In the southeastern part, a relieving arch of bricks has been discerned above the earlier wooden construction (Fig 4). Four holes for the ceiling joists were found in the top part of the southwestern wall.

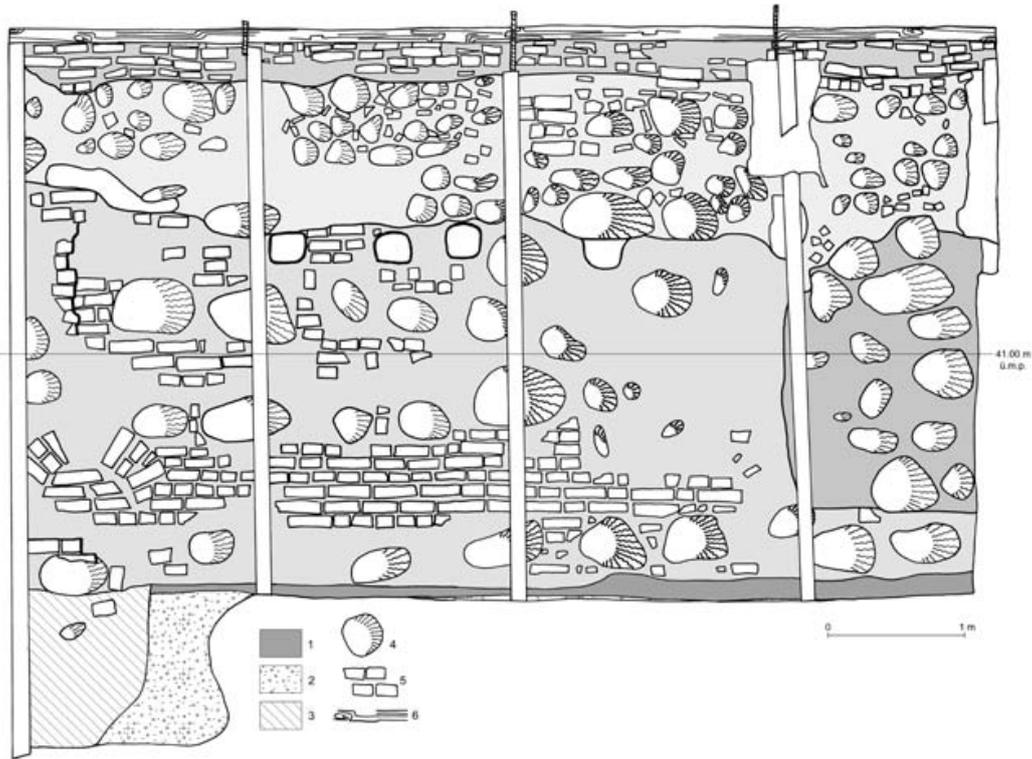


Fig 4. The southeastern wall of room 1 of medieval building I. Symbols: 1–black soil layer, 2–grey natural gravel, 3 – a pit , 4 – granite, 5 – brick, 6 – wood. Kristel Külljastinen.



Fig 5. View of the northwestern wall of room 1 of medieval building II from the south-east. Kristel Külljastinen.



Fig 6. Part of the northeastern wall of room 1 of medieval building I, and a staircase. Kristel Külljastinen.

The exact founding depth of the southeastern wall, which also reaches room no 2, could not be determined. The wall was established of bricks and boulders and was plastered, perhaps also repaired with bricks. We are supposedly dealing with the outer wall.

The 90–110 cm thick northwestern wall was built on the filling layer, consisting of pieces of bricks against the southwestern wall of room no 1 and continuing towards the northeast into room no 3. The foundation was laid of boulders and the wall of bricks. In the northeastern part of the northwestern wall the section protrudes from the rest of the wall by one vertical brick layer, a probable later inset. A vaulted door (gate?) opening, with a height of 190 cm and a width of 230 cm that was bricked in with boulders with a diameter of up to 60 cm, is located in the southwestern part (Fig 5). The filling was covered with plaster.

The northeastern wall was built in several stages. This part of the wall was laid on a foundation of bricks and boulders on top of the cultural layer rich in brick debris. The earliest stage consists of bricks. A wall of boulders and bricks was established on top of and next to the brick wall of the first construction stage. The wall of boulders and bricks was covered with plaster. In the upper part of the described wall there are six holes for ceiling joists. The inner surfaces of these holes consisted of mortar and pieces of bricks and roof tiles.

A 95 cm wide staircase (Fig 6) of bricks is situated in the northeastern wall of room no 1. The staircase has seven preserved steps with a height of 18–24 cm and a depth of 25 cm. The staircase was established against the southeastern wall of room no 1. The northwestern inner side of the stairway, made of bricks, was laid against the second construction stage of the northeastern wall. As indicated by the 7–15 cm deep and 2 cm high gaps in the partition wall and the back wall of the highest step, the staircase was covered by boards. In parts, timber was preserved which gave 1330 ± 70 AD (Tab 1) as the result of the radiocarbon analysis.

Tab 1. Radiocarbon dates from the excavation plots of 2 Lutsu Str.

Sample	Lab. no.	Radiocarbon age (BP)	Measuring age (1s) (AD)*	Measuring age (2s) (AD)*
Building I, room no 1, wood from the burnt layer 39.4 m asl	SPb-79	680±100	1250–1400	1150–1450
Building I, room no 1, wood from the boarding of the staircase in the northeastern wall	SPb-80	670±50	1270–1390	1260–1400
Building I, room no 3, charcoal from the cultural layer on the natural soil ca 38.55 m asl	SPb-156	665±60	1270–1400	1250–1420
Building I, room no 3, brand from the wooden construction 38.85 m asl	SPb-157	470±80	1320–1620	1300–1640
Building I, room no 3, brand from the wooden construction	SPb-180	680±50	1270–1390	1250–1410
Building I, room no 3, charcoal from the layer on the wooden construction	SPb-179	700±60	1250–1390	1210–1400
Building I, room no 3, wood in front of the southeastern door	SPb-182	90±30	1690–1920	1680–1930
Building II, coal from the burnt layer ca 39.4 m	SPb-81	570±50	1310–1420	1290–1490

* All the calibrations by: Atmospheric data from Paula J. Reimer and others, “IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP”, *Radiocarbon*, 46:3 (2004), 1029–1058; Christopher Bronk Ramsey, OxCal (computer programme). Version 3.10. The Manual, 2005 (available at <<http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm>>); cub r: 5 sd: 12 prob usp[chron].



Fig 7. The southeastern wall of room 2 of medieval building I. Kristel Külljastinen.

There were several floor layers in room no 1, but only one of these can be clearly distinguished. At a depth of 3.4 m from floor level prior to the reconstruction works, a floor pavement of bricks was laid on the sand cushion. Some finds from the burnt layer underneath the bricks and the sand cushion helped determine the age of the floor: a piece of wheel-thrown pottery (TM⁴ A 178: 4795) originates from the late sixteenth century, a fraction of a tripod (Fig 18: 4) from the second half of the sixteenth century, and a piece from the narrow edge of a corner tile (TM A 178: 4887) from the third quarter of the sixteenth century. The brick floor probably was laid after the destructions of the Livonian War (1558–83).

The status of room no 2 is not entirely clear. The modern rebuilding conceals whether it was detached from room no 3 entirely or only partly

⁴ TM = Tartu City Museum.



Fig 8. View of the orifice of the stove-hypocaust from the northeast. Kristel Külljastinen.

with a partition wall. If the part of wall opened in room no 3 is a fragment from a former partition wall, then room no 2 was approximately 7×2 m large and a stove-hypocaust encompassed 5,5 sq m of this (Fig 2).

The uneven southwestern wall of room no 2 was built of boulders joined with mortar and wedged with roof tiles and pieces of bricks. The southwestern wall is secondary in relation to the southeastern wall (Fig 7). In the upper part of the wall, a 20 cm deep step laid of bricks was discerned that supported the former ceiling construction. The part of the wall above the step had been preserved at a height of 30–40 cm. Differently from the wall below, it had been laid very carefully, using bricks and carefully chosen boulders that had a flat side or were hewed into shape.

The southeastern wall of room no 2, only part of which was opened, was established on a dark soil layer deposited on natural travertine. The lower part of the wall consisted of bricks that supported a row of boulders, and the upper part was made of both bricks as well as boulders. Differently from room no 1, this wall in room no 2 has not been daubed, although we are dealing with the continuation of the same wall. An approximately 145 cm high and 65 cm wide vaulted door opening (Fig 7) is situated in the central part of the unearthed wall. The door had been bricked in with boulders and densely covered with plaster.



Fig 9. View of the inner vaults of the stove-hypocaust from the south. Kristel Külljastinen.

From the northwestern side, room no 2 was encircled by a stove-hypocaust (Fig 2). The inner dimensions of the hypocaust from the top were 130 cm from northwest to southeast, in the northwestern wall 145 cm, and in the southeastern wall 135 cm from northeast to southwest. The heater cobbles with the diameter of 10–40 cm had been swollen and brittle from the strong heat. The cobbles had been laid on the arches and against the inner walls of the stove so that smaller ones could be situated above with bigger ones below. The inner walls of the stove, laid of bricks and some boulders, were built against the detaching wall of rooms 1 and 2 in a way that indicates that the northeast-southwest directed walls of the stove were established first and the northwest-southeast directed wall with the stove orifice later. Red clay was used as the binder. The up to 52 cm high and 68 cm wide vaulted orifice of the burner of the hypocaust is located in the northeastern wall (Fig 8). A step of bricks and boulders was established by the southeastern, southwestern, and northwestern walls of the stove. The step supported both the two arches that carried the heater cobbles (Fig 9) as well as the heater cobbles themselves (Fig 10). Both the width as well as depth of the heating chamber under the arches is 100 cm, and the height measured from the bottom of the stove up to the center of the arches is 60 cm. The bottom of the chamber was laid of bricks.



Fig 10. View of the heater rocks of the stove-hypocaust from the northeast. Kristel Kül-ljastinen.

On the main floor above the stove-hypocaust there were floor panels made of baked clay and with a hole located in the centre. Two of these panels were found in the first filling layer, the first one from the filling layer of room 4 (TM A 178: 10893) and the second one from the filling layer of room 2 (TM A 178: 4391). Pieces of caps meant for closing the above mentioned holes were found in filling layers of the houses (e.g. TM A 178: 5677).

In the case of room no 2, it is possible that it was filled up already during the use of the building in the Middle Ages. This is indicated by both the unevenness of the southwestern boulder wall (it seems that the stones were laid directly on the soil) and the filling material that provided neither the fragments of tiles nor pot-like tiles. Certain findings from the filling, such as the fragments of fourteenth- and fifteenth-century wheel-thrown pottery (TM A 178: 5240, 5244, 5242), stoneware from Siegburg with annealed surface dated to the last quarter of the fourteenth century and the last quarter of the sixteenth century⁵, glazed North-West Russian pottery dated to the third quarter of the fourteenth century and the first quarter of the fifteenth century⁶, or the fragment of a glass goblet (TM A 178: 5227), biconical

⁵ Erki Russow, *Importkeraamika Lääne-Eesti linnades 13.–17. sajandil* (Tallinn: Tallinna Ülikooli Ajaloo Instituut, 2006), table in the end of the book.

⁶ *Ibid.*

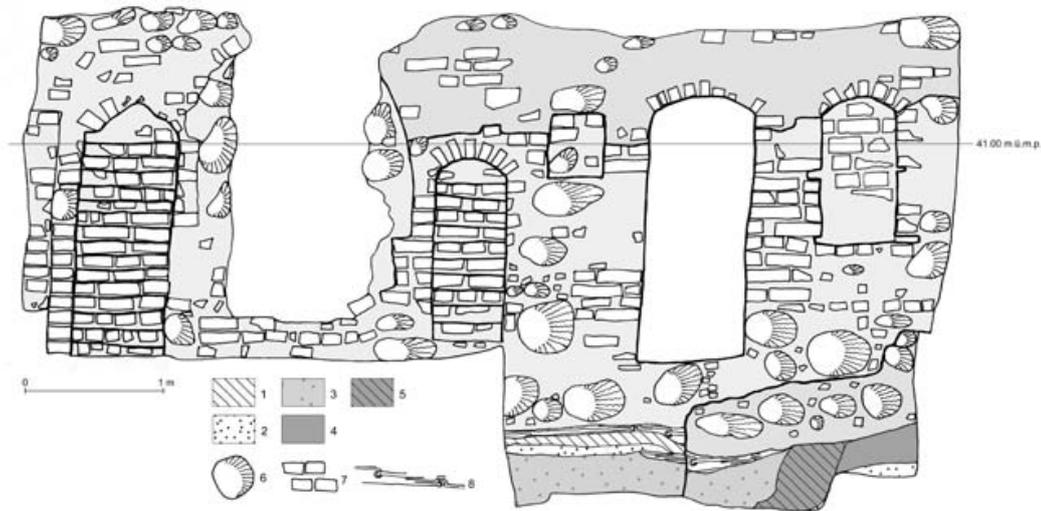


Fig 11. The northeastern wall of room 3 of medieval building I. Symbols: 1 – dark-grey rubble layer, 2 – natural river lime, 3 – brown layer with brands, 4 – black soil layer, 5 – mixed black soil layer, 6 – granite, 7 – brick, 8 – wood. Kristel Külljastinen.

ceramic spinning wheel (TM A 178: 5237), and the needle made of bone (TM A 178: 5263) dating back to the Middle Ages. The filling layer also contains a lot of animal bones. This room probably formed in the course of building the stove-hypocaust. The stove does not originate from the first construction stage. This is indicated by the fact that there is a bricked in door opening just above the stove in the wall between the rooms 1 and 4. If the stove and the wall between the rooms 1 and 2 as well as the staircase had been established simultaneously, and there is hardly any reason to doubt that, then the radiocarbon date of the boarding of the staircase also dates the building of the stove. In the case of the hypocaust, we are dealing with a heating system widely used in Old Livonia, more than 90 of which have been documented in the area of Estonia,⁷ though this is only the sixth oven of this type extant in Tartu.⁸ On the basis of the oldest finds of stove tiles gathered from the filling layer (if these originate from the same building), it can be suggested that this hypocaust was still used during the sixteenth century.

Room no 3 is situated at the side of the yard of the building under discussion and is 5/5.5×7 m large (Fig 2). The preserved parts include the walls

⁷ Andres Tvauri, "Late medieval hypocausts with heat storage in Estonia", *Baltic Journal of Art History* (Autumn 2009), 76.

⁸ Andres Tvauri, "Õhkküte keskaegses Viljandis ja mujal Eestis", *Viljandi Muuseumi aastaraamat 2007* (Viljandi: Viljandi Muuseum, 2008), 82.

of the ground floor built of boulders and bricks up to more than two meters until the supporting constructions of the partition beams of the main floor.

Several construction stages can be discerned in the northeastern wall of room no 3. The older part is 90–120 cm thick and built on a foundation of boulders, pieces of bricks, and mortar. The foundation could be followed by 1.7 m length in the southeastern part of the northeastern wall and it protrudes from the northeastern wall maximally by 60 cm. The northeastern wall northwest of it had been established on the debris layer with pieces of bricks. The bricks and boulders wall under discussion is primary in relation to both the southeastern as well as northwestern walls. Two door openings, two shafts, and one niche can be discerned in the wall (Fig 11). The northwestern door opening was almost entirely dismantled. The opening is, however, indicated by the threshold carefully laid of bricks and a few preserved bricks of the vault. The width of the door opening at the narrowest spot is approximately 90 cm and the height by the vault approximately 190 cm. The height of the southeastern door opening is 190 cm by the vault and 200 cm in the center and its width is 82 cm. The northwestern shaft was laid of bricks as a diagonal plane rising towards northeast, so that every upper brick is 3–4 cm behind the lower. The height of the shaft opening in the wall by the vault is approximately 165 cm and in the center approximately 180 cm, the width being approximately 65 cm. The southeastern shaft is analogous to the previously described one, its height being approximately 120 cm by the vault and approximately 115 cm in the center, the width being approximately 65 cm. The function of the shafts is not entirely clear. Most probably these were airing shafts,⁹ which were supposed to relieve the cellar of moisture penetrating the floor underneath.¹⁰ There are grooves in the side walls of the niche that used to hold the timber shelf planks. The first groove was situated in the bottom of the niche and the other one 45 cm from the bottom of the niche.

The southeastern wall of room no 3 has been preserved only partially. The wall of boulders and bricks was created on reddish debris layer and is secondary in relation to the earlier construction stage of the northeastern wall.

The northwestern wall of bricks and boulders was probably built in different stages. Its earliest part was located on a protruded foundation. The foundation was constructed partly on sand and partly on dirt of boulders and pieces of bricks. There is a 14–16 cm deep step in the upper part of the preserved wall. The step supported a former ceiling construction.

⁹ It has been suggested that these were fireplaces. But this cannot be true, as the foot of the shaft does not have a vertical wall, which is always the case with fireplaces.

¹⁰ See footnote 2.

The nature of the southwestern wall of the room is more difficult to assess. The location of the wall has gradually changed with time. The wall with the door opening laid of bricks or the part of it that hides the stove-hypocaust (Fig 8) were preserved better. The width of the door opening is 110 cm, its height in the middle of the vault is 190 cm and by the vault 178 cm. Part of the wall is 220 cm long, and it is not clear whether or not they are the remains of the full partition wall between the rooms 2 and 3. The thickness of the walls on the internal side is 50 cm and only 31–32 cm under the vault of bricks, in other words, the length of one brick. Another part of the wall of bricks was situated northeast of it. This 48 cm thick wall, which has been documented by the length of 250 cm, was preserved up to 80 cm in height.

A part of a brick construction (Fig 2) was excavated in front of the orifice of the stove-hypocaust in the western corner of the room. Its north-east-southwest directed side was approximately 180 cm and northwestern-southeastern side approximately 120 cm long. Its purpose or the time of construction could not be determined, but it could have been simply the platform in front of the hypocaust or the foundation of the heating chamber.

The dimensions of room no 4 are not clear, but its existence is indicated by the continuation of the southwestern wall of the building towards the northwest of room no 1, as well as the step of the ceiling construction on the northwestern side of the northwestern wall of room no 1. In the course of excavations, a part of the southeastern and southwestern wall of room no 4 were unearthed.

The southeastern wall was rebuilt several times (Fig 12). The wall of bricks is located on a foundation of boulders laid in a single row, whereas the latter was erected directly on a natural gravel layer. The southwestern part of the wall is thinner than the northwestern part by one brick, whereas the wall was established simultaneously. A door opening filled with bricks was located in the northeastern part of the wall. The biggest height of the door opening was 183 cm in the middle of the vault and 153 cm by the vault, the width being 238 cm.

The southwestern wall of room no 4 could only be studied in a 2.5 m long section. The brick wall was established on a foundation of boulders laid in a single row. A 102 cm wide door opening was situated in the southeastern part and a 106 cm high and 60 cm deep niche of bricks in the northwestern part of the wall.

The time of the establishment of the first dwelling house is unclear but the burnt layer under the sand cushion, in case of which the fire inside the stone building cannot be excluded, gave 1300 ± 150 AD (Tab 1) for the date.

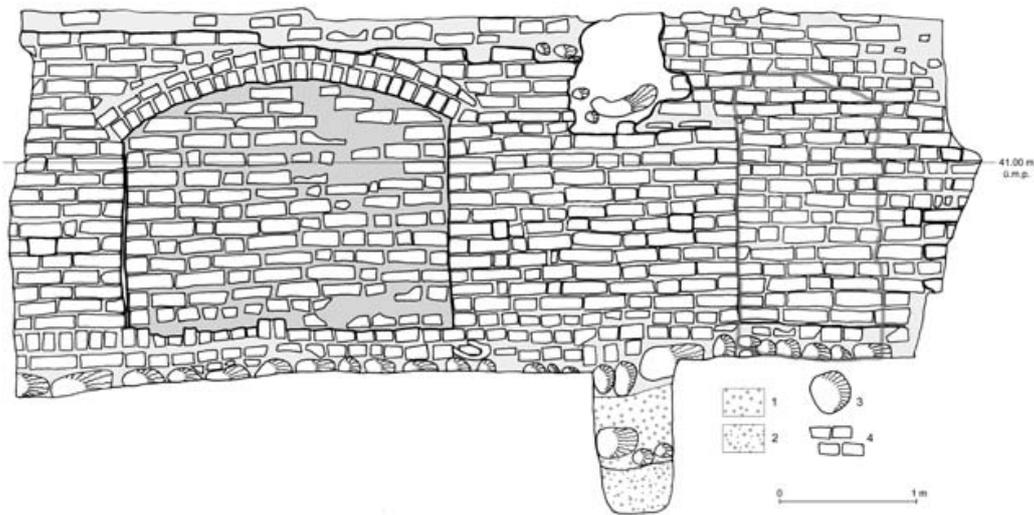


Fig 12. The southeastern wall of room 4 of medieval building I. Symbols: 1 – yellowish gravel, 2 – grey natural gravel, 3 – granite, 4 – brick. Kristel Külljastinen.

The charred pieces of wood found in the cultural layer deposited directly on the natural soil layer in room no 3 were also dated to the first half of the fourteenth century (1335 ± 85 AD, Tab 1), but even here the connection to the building is not entirely certain. Findings from the described layer do not help determine the age more accurately, but they certainly do not contradict the above dating. The time of usage of Langerwehre (*Southern Lower Saxony*) stoneware¹¹ with engobe (TM A 178: 5059, 5060) in West-Estonian towns has been placed into the period between the last quarter of the thirteenth century and the second quarter of the fourteenth century.¹² Proceeding from these dates, the first quarters of the fourteenth century could be suggested for the construction time.

The ground floor of the building was rebuilt on several occasions. According to the radiocarbon date from the sample from the covering boards of the steps of the staircase, it could be proposed that the partition wall of room no 1 and the staircase leading to the main floor were rebuilt in the second half of the fourteenth century. The shape of the building, its size, and the planning of rooms is not entirely certain since only two sure outer walls (southwestern and northeastern) and one supposed outer wall (southeastern) were excavated, and at the same time the boundaries of the house towards the northwest are not sure. In any case, at least one room was in the part of the building next to Jakobi Street, but it cannot be excluded that there was another

¹¹ Determined by Arvi Haak, March 2011.

¹² Russow, *Importkeraamika Lääne-Eesti linnades*, table at the end of the book.



Fig 13. View of the lower paving above room 4 of medieval building I from the south-east. Kristel Külljastinen.

room behind it by the yard. The latter statement is supported by room no 4 and the collection of finds among the filling material on top of the upper cobble stone pavement northeast of the room, as well as its chronological similarities. These include numerous fragments of stove tiles from the end of the seventeenth century and the beginning of the eighteenth century, in case of which we might be dealing with the dismantling rubbish of not only the excavated house but several buildings in the neighborhood.

The northwestern part of building I was dismantled by the end of the Middle Ages or in the early modern period. It is tempting to associate this with the damages of the Livonian War in the second half of the sixteenth century, but archaeological proof for this is absent. After the dismantling a cross-road was established there, the surface of which was paved with boulders. The pavement laid on the sand cushion was at least 2 m wide, and bigger boulders (with a diameter of 30–50 cm) encircled the deposit of smaller stones (with a diameter of 5–20 cm). The area was filled between 1500–1700, and another at least 2 m wide pavement of boulders (with a diameter of 5–30 cm) was built (Fig 13). On the basis of the finds gathered from the sand cushion under the stones, the upper pavement can be dated to the seventeenth century.



Fig 14. View of the remains of the walls of medieval building II from the northwest. Kristel Külljastinen.

The southeastern side of building I was continuously used and was damaged during the Great Northern War. It cannot be excluded that the house was used after the war as well, but in any case it could not be restored or adapted to the needs and possibilities of the time. The buildings were dismantled and the rubbish (which dated to the beginning of the eighteenth century) was used to partly fill the rooms of the ground floor of the medieval dwelling house. Apparently the dismantling was simultaneously taking place in several buildings, so the fragments of the same stove tiles have been found from rooms no 1 and 4 of building I and from building II.

BUILDING II

The building was situated on the corner of Lutsu Street and Jakobi Street, southeast of building I (Fig 2). The limited volume of archaeological research did not determine whether the two buildings were located next to each other during the Middle Ages or with space between them. One cannot even rule out the possibility that all the rooms were part of the same building or that at a certain point the two houses were reconstructed from a single building. The initial size of the building and its spatial division is unclear, since a single room was only partly opened during the excavations. Some kind

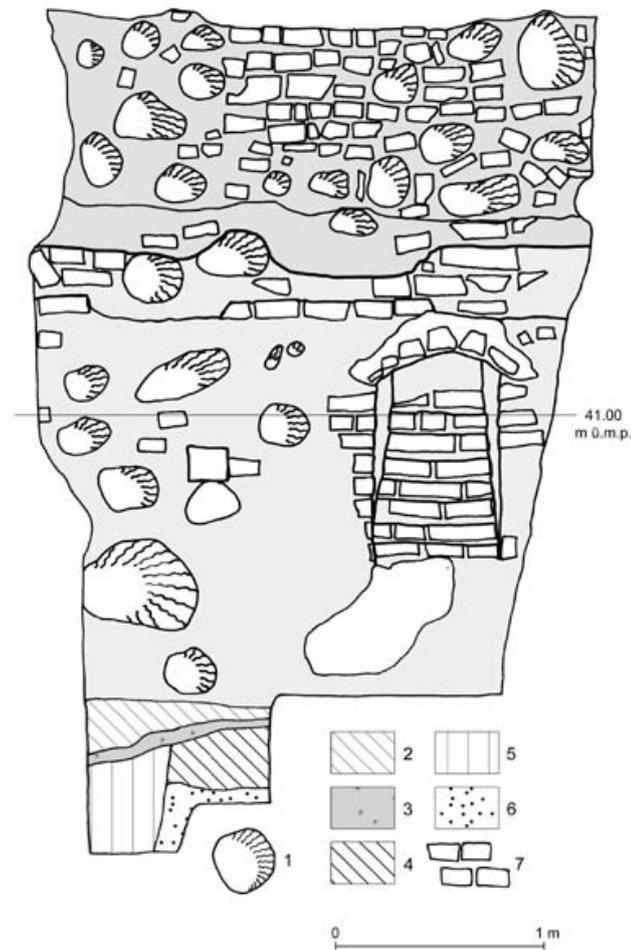


Fig 15. The southeastern wall of medieval building II. Symbols: 1 – granite, 2 – reddish rubble layer, 3 – burnt layer, 4 – dark soil layer, 5 – a post hole, 6 – natural river lime, 7 – brick. Kristel Külljastinen.

of structure had stood on the spot already before the construction of the stone building. Black burnt layer consisting of charcoal and pieces of burnt wood was located under the stone walls and the planning layer probably preceded the walls that included the debris of bricks and roof tiles. The charred piece of log taken from the burnt layer was radiocarbon dated to 1360 ± 70 AD (Tab 1). The dating was fully consistent with the fragments of wheel-thrown pottery unearthed (e.g. TM A 178: 6214, 6219, etc).

The northeastern and southeastern walls of the ground floor (Fig 14) of the unearthed stone building have been preserved up to a height of 2 m and were simultaneously established on the above-described reddish planning layer. The walls of bricks and boulders were erected on the foundation consisting of boulders. In the upper part of the preserved sections of both walls, there is a 14–18 cm deep step that supported the former ceiling

construction. The thickness of the northeastern wall below the step is approximately 105 cm and above the step approximately 90 cm. A 100 cm high and 55 cm wide shaft (Fig 14 and 15) is situated in the southwestern part of the southeastern wall. Both the edges of the shaft as well as the diagonally risen plane have been laid of bricks. A 15×18 cm big and approximately as deep hole, probably established for the scaffolding, is situated in the northeastern part of the same wall. Both walls were plastered. The initial floor was a 5–10 cm thick layer of light lime mortar of even composition.

The house was seriously damaged in the Great Northern War and was dismantled probably in the middle of the eighteenth century in the course of the construction of a new building. Among other things, this is reflected in the filling material, the main part of which includes shattered (with few exceptions of intact) everyday vessels, including pottery, which were probably used until the first half of the eighteenth century.

A LATRINE BIN

Outside the building, primarily modern era layers have been investigated in connection to the securing of the foundation, the laying of pipes, and the works in the courtyard. As an exception, a medieval latrine bin was opened up (Fig 16). It was located 1.4 m to the northeast from the center of the northeastern side of the modern building at 2 Lutsu Street. It was possible to investigate the latrine only to the extent needed for construction works. The southwestern side of the bin, 2.4 m long, and partly on the southwestern side (1.15 m) were excavated and cleaned to the depth of seven logs. The bin had been built from unpeeled logs of an average diameter of 10–15 cm, and connected by saddle-notch corners. In the bin there was a dark brown organic-rich layer of soil, from which some leather objects and leftovers from leather crafting (TM A 178: 10882, etc.) as well two pieces of a birch bark vessel (TMA A 178: 10 880, 10 881) were found. Since other latrine bins found and examined in Tartu have been as a rule situated in central parts of the lots in central areas of house quarters,¹³ it is reasonable to assume that the bin at 2 Lutsu Street was also placed in what was previously a courtyard and that similar latrine bins could be found in the proximity.

The beams of the latrine bin were dated dendrochronologically. The common dendrochronological practice in Europe requires multiple wood

¹³ Rivo Bernotas, “14. sajandi teise poole jäätmekast Tartus Ülikooli 15 õuel”, *Tartu Linnamuuseumi aastaraamat XIII* (2007), 54, 61.



Fig 16. View of the partly excavated latrine bin from the southeast. Kristel Külljastinen.

samples from different beams.¹⁴ The tree-ring series of the samples should contain at least 70 tree rings, to ensure the reliability of their similarity. From the tree-ring series, the most similar series are selected and averaged. For measuring and statistical treatment of the ring-width series, computer

¹⁴ Dieter Eckstein, *Dendrochronological dating*, Handbooks for Archaeologists 2 (Strasbourg: European Science Foundation, 1984), 55.

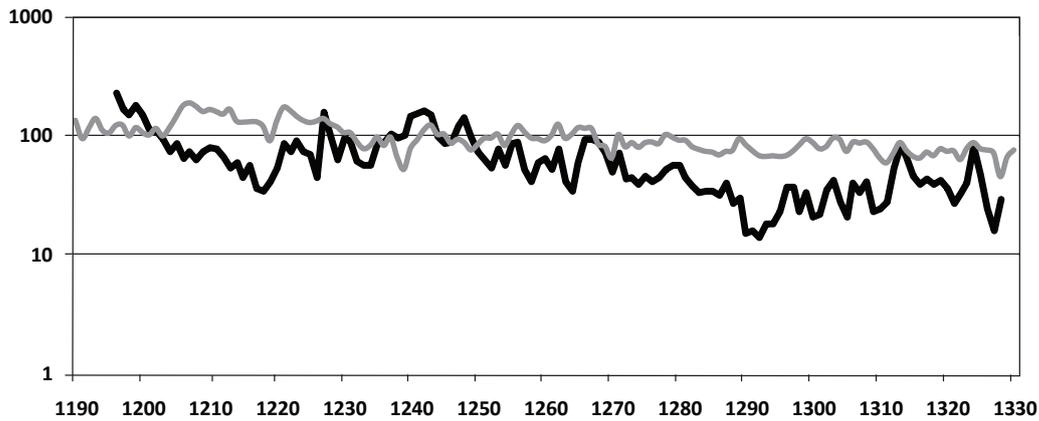


Fig 17. The average of samples of latrine from 2 Lutsu Street (black line) in Estonian pine chronology (grey line). Y-axis marks the width of annual ring and x-axis marks the years. Rivo Bernotas.

programs Catras (Aniol) and TSAP-Win (Rinntech) were used. Similarity of the series is assessed by Student's *t*-criterion and by the percentage of agreement (*Gleichläufigkeit*) *W*. In the case of 100-year coverage of the pair of series, the Student's $t \geq 4$ is considered to be significant. Higher *t* shows higher similarity of the two series. The agreement is the percentage of common year-to-year variations (either decreasing or increasing) in the two ring-width series.¹⁵ The program Catras shows if the percentage of common variations is significant at 95.0, 99.0, or 99.9 significance level. Besides these two statistical similarity indices, all similarities of series were checked visually on graphs. The same statistics and visual checking were used in dating the sample series with the dated reference series.¹⁶

From the beams of the southwestern wall of the latrine bin, six cross-sections were removed and the width of their tree-rings measured. Two series of them appeared similar with each other and they were averaged into a mean series replu2a1, with length 133 ring-widths. Matching of this mean series with dated reference chronologies produced dendrochronological dating of the mean series of 2 Lutsu Street: AD 1328. The reference chronologies included Estonian pine chronology 3epalaja ($t = 5,30$, $W = 68,2$), a latrine bin of 14 Ülikooli Street in Tartu 3epy14o1 ($t = 4,40$; $W = 67,0$),

¹⁵ *Multilingual glossary of dendrochronology: terms and definitions in English, German, French, Spanish, Italian, Portuguese and Russian*, ed. by Michèle Kaennel and Fritz Hans Schweingruber, Swiss Federal Institute for Forest, Snow and Landscape Research (Bern: Paul Haupt Publishers, 1995).

¹⁶ Alar Läänelaid, "Puude aastarõngalaiuste võrgustik Eestis", *Publicationes Instituti Geographici Universitatis Tartuensis*, 89 (2004), 298–312.

and Novgorod pine chronology 3rpnovo5 ($t = 4,76$; $W = 64,0$) (Fig 17). As the waney edge was not preserved in both averaged samples of 2 Lutsu Street, we assumed from the extremely fine outer rings that no more than ten rings had disappeared from the trunk surface. So the probable felling date of the trees for construction beams of the latrine bin would be in the limits of 1328 to 1338. As a simple construction like a latrine bin was probably built from raw timber (i.e. during next year after dendro-dating), the likely building year falls into period AD 1329–39.

The finding material from modern era layers

The ruins of medieval buildings were filled with soil containing all kinds of findings. The layers were in most cases actually constituted from rubble heaped during demolishing works after the Great Northern War. The filling was done gradually over many years and, in addition to the two houses described above, rubble from other houses was probably used in the filling. Apart from room 2 of medieval building I, most of the filling layers of the other rooms were more or less of the same age and of the same thickness, more than 3 m. Only in room 4 of medieval building I was the layer thinner than elsewhere, reaching the modern street pavement described above.

The finding material from the filling layers is rich and diverse, including pieces of buildings (bricks, roof blocks) and everyday pottery (Fig 18, 19), metal tools, coins from Poland-Lithuania, Sweden, and Riga (Fig 20: 1–9, 12), jewellery (Fig 20: 11, 13, 14), seventeenth-eighteenth-century cups and shanks fragment of pipes made from kaolin clay (TM A 178: 164, 5337, 5406, 5431), and animal and even human bones.

The volume of everyday pottery found in the filling layers is different in each room. From the filling of the ground floor of medieval building II many tripods with glaze, probably made in Tartu (Fig 18: 1, 2, 3, 5), as well as fragments of bowls and plates (e.g. TM A 178, etc.) and a complete clay mug were found. There are somewhat fewer examples of imported pottery in the findings; among the material there are fragments of a Frechen stone-ceramic bottle dated to the seventeenth century (TM A 178: 3928) and of a Westerwald jug with blue décor (TM A 178: 172, 3535).¹⁷ There are also pieces of unglazed wheel-thrown pottery, some of which are from the medieval and early modern periods. Some tools – for example knives, scissors, axes – were also found in the filling layer (TM A 178: 6056, 8619). Some findings relate to the practice of war, such as a cross-bow bolt from

¹⁷ Russow, *Importkeraamika Lääne-Eesti linnades*.



Fig 18. Fragments of tripods from the filling layer of medieval building II (1,2,3,5) and from room 1 of medieval building I (4) (TM A 178: 5694, 5708, 5712, 4829, 6050). Kristel Külljastinen.

the fourteenth century found in room 3 of medieval building I (TM A 178: 8628, 8629) (dating Ain Mäesalu 12.05. 2010), a stone cannonball (TM A 178: 5857) from medieval building II, and a bomb completely preserved in a cast-iron shell (with gunpowder intact) (TM A 178: 10 890) from room 1 of building I, and a decorative bone-plate of a stock of the crossbow or the gun (TM A 178: 10891). The latter depicts a man, naked, wearing a lion skin on his back, with a moustache and a beard – possibly Hercules (Fig 21). Among the rest of the finding material was a large bronze Orthodox cross (Fig 20: 10), a bronze penannular brooch from the thirteenth century and another one from the thirteenth–fourteenth centuries (dating by Heiki Valk, 21.05.2010, Fig 20: 13–14), a playing piece made of horn (TM A 178: 3536), and bone combs. One of the combs is a double composite (TM A 178: 4630) and three are double simple combs (TM A 178: 8889, 10445, 10583).



Fig 19. A ceramic cup and fragments of clay pots from the filling layer of medieval building II (TM A 178: 6054, 5710, 5683, 569). Kristel Külljastinen.

Analogues of combs decorated with circles and with flat connecting plates dated to the thirteenth-fourteenth century¹⁸ and trapezoid simple combs to the twelfth-fourteenth century. Combs and few other findings, for example the fragments of wheel-thrown pottery mentioned above, indicate that the filling layer heaped up in the eighteenth century contains material not only from the modern but also from the medieval era.

A more thorough analysis has been done only in the case of stove tiles and glazed tiles. Among the glazed-tile findings there were, of course, many fragments of flanges, but some tiles were complete and still others could be restored by plastering. The result of this work is one of the largest and most complete collections of modern glazed tiles, which is well researched and therefore compares easily with earlier collections gathered from excavations in Pärnu¹⁹ and 22–26 Suur Street in Narva.²⁰ In this article only some more general results will be presented.

¹⁸ Heidi Luik, "Muinas- ja keskaegsed luukammid Eestis", *Muinasaja teadus*, 6 (Tallinn: Ajaloo Instituut 1998), 97.

¹⁹ Aldur Vunk, "Pärnu 16. sajandi ahjukahlite tüpoloogias ja valmistamise tehnoloogiast", *Stilus*, 6 (1996), 37–42.

²⁰ Aldur Vunk, "Narvast, Suur tänav 22–26, Leitud 16.–18. sajandi ahjupotid", *Linnas ja linnuses. Uurimusi Narva ajaloost*, Narva Muuseumi toimetised, 6 (2006), 74–89.



Fig 20. Coins (1–9, 12), an orthodox cross (10), string of beads (11) and penannular brooch (13–14) (TM A 178: 10761, 10770, 10763, 10764, 10767, 10772, 10762, 10766, 10765, 10892, 10773, 10771, 10774, 10769) found at excavations at 2 Lutsu Street. Kristel Külljastinen.



Fig 21. Decorative plate of bone (TM A 178: 10891). Kristel Külljastinen.

The finding material from room 1 in building I contains rubble from the demolition of stoves of different periods. Many burnt fragments of low relief tiles, which probably belonged to a baroque-style green tower oven with plant ornament (Fig 22: 8, 23: 3) from the second half of the seventeenth century, were found from the top layer (about a meter thick) of the filling, but also from the lower layers, and even from rooms 3 and 4 of building I, and from the northeastern corner of room 4, from which the filling was removed only a few dozen centimeters deep. This was probably an oven produced in Tartu in the Swedish period, because the context of findings allows one to connect the oven to the representative low relief massive crest tiles (TM A 178: 1821, 2729, 9221) with a stylized image of the crest of Tartu.

From the same place large volumes of demolition rubble were found, which all originate from a green box A-oven depicting the rulers of Sweden, Gustav II Adolf (ruled 1611–32) and Christina (ruled 1632–54), dated to the second half of seventeenth century. From the second meter of the filling layer, well-preserved pieces of edge tile of a green B-II- and C-oven with geometrical ornament (e.g. TM A 178: 1998) from the second half of the seventeenth century were found. From the third meter of the lower layer of the filling in the described room, tiles of at least 15 different tiled stoves were found (this is in addition to the pieces of tiles of ovens described above). Most of these ovens were in use in the second half of the seventeenth century or in the beginning of the eighteenth century, but some findings also belong to earlier periods starting from the second quarter of the sixteenth century.



Fig 22. Glazed tiles found at excavations at 2 Lutsu Street (TM A 178: 67, 790/ 816, 3533/3534, 3502/ 3516, 9302, 2018 (1), 783, 768/3392 (1)/4239, 36/9291/9801/9825). Kristel Külljastinen.

From the filling layers of room no 3 of building I, mostly fragments of medallion tiles from the second quarter of the sixteenth century and the second quarter of the seventeenth century, as well as demolition rubble from a green tiled stove (e.g. TM A 178: 7742–7755) from the beginning of the eighteenth century, were found. A burnt fragment of a baroque-style edge tile, probably waste from the production of tiles (TM A 178: 7699) was also uncovered. It is possible to connect this finding to the pottery workshop run in Tartu from 1684–1708 by Johann Rehn. This theory is substantiated by the fact that the dates of the construction of the wooden house at 2 Lutsu Street and of the *Church of the Assumption of the Virgin Mary* (built in 1752/1753 and destroyed by fire in 1775), which was built on the place of the former workshop of Rehn, coincide to a large extent,²¹ and it is known that rubble from the location of the church was brought as filling

²¹ Niina Raid, *Tartu vanemaid ehitisi* (Tallinn: Eesti Raamat, 1981), 52.

material to other construction grounds in the town.²² One of the oldest tiles originate from the filling of room 3 (TM A 178: 7987), which can be dated probably even to the second half of the fifteenth century up to the first quarter of the sixteenth century.

The filling layer from room no 4 of building I, the depth of which was only 2 m, contained more findings in the higher stratum. Tiles originate from about seven ovens. The dark green rosette oven can be dated to the second half of the sixteenth century, the green oven with Moresque ornament (Fig 22: 1) to the second half of the sixteenth century or the first quarter of the seventeenth century,²³ the light green box oven with saints to the first half of the seventeenth century, and the light green A-oven with geometrical ornament (Fig 22: 9), the green B-oven with geometrical ornament (Fig 22: 5), and the light green-greenly brown-light brown E-oven with geometrical ornament to the second half of the seventeenth century. The use of another tile oven can be dated more loosely to the seventeenth century or the beginning of the eighteenth century. Many fragments of the ovens from room 4 have also been found in the filling layer in room 1 (TM A 178: 1995, 1999, 2001, 2002, etc).

Tile findings have been collected also from the northeastern corner of room 4, where another medieval room may have been situated (as discussed above). The filling layer in that corner was removed only in the depth of 1 meter, yet quite rich finding material was collected. Most of the tile findings can be dated to the second half of the seventeenth century or to the beginning of the eighteenth century. One can identify the remains of at least three different tile ovens – of a baroque-style black tower oven, of a baroque-style black tower oven with wallpaper pattern, and of a green box B-oven with the rulers of Sweden. By the rock debris in the mixture of clay, we can suppose that tiles from the black tower oven were made in Johann Rehn's workshop,²⁴ while the tiles of other ovens were probably produced elsewhere.

The filling layer of building II was rich. The relatively large volume of everyday pottery, which came in large pieces (a few even complete) (Fig 18: 1–3, 5; 19: 1), suggests that the ruins of the building were used for some time as a place for the disposal of waste. Among other things, pieces of tiles dated to the second half of the seventeenth century were found; some of them are the same as those which were found in room 2 of building I.

²² Andres Tvauri, Romeo Metsallik, "The production of the workshop of potter Johann Rehn of Tartu (ca 1684–1708)", *Estonian Journal of Archaeology*, 10 (1) (2006), 29, 54.

²³ Ieva Ose, "Ähnliche Verzierungsmotive der Ofenkeramik in Lettland und Litauen im 17. Jahrhundert", *Archaeologia Lituana*, 9 (Vilnius, 2008), 142.

²⁴ Tvauri, Metsallik, "The production of the workshop of potter Johann Rehn of Tartu", 37.



Fig 23. Glazed tiles found at excavations at 2 Lutsu Street (TM A 178: 439/2007, 35, 113/1064/2143, 51/9198 (1)/9198 (2)/10046, 61 (1)/61 (2)/83/360/373, 1994/3677, 9298, 9200/9962/9974). Kristel Külljastinen.

A fragment of a blue faience corner tile (TM A 178: 5553), dated from the first half of the eighteenth century, and a fragment of a baroque-style cone-shaped crest corner tile, which can be dated to the second half of the seventeenth century or the beginning of the eighteenth century, are included in the finding context researched here. The latter dating also applies to a fragment of a frieze tile (TM A 178: 5681). From the deeper parts of the filling layer, a faience cornice tile (TM A 178: 5872) dated to the beginning of the eighteenth century was found.

During the excavations, several human bones – one hip bone from the attic and the rest from the filling layer – and a relatively compact and disturbed skeleton were found. Among the stray bones at least nine individuals could be distinguished (five adults and four subadults). The adults were all male; the sex of the subadults was impossible to determinate due to undeveloped sex indicators on their bones. Among the mixed material no bone pathologies were discovered, but several tooth pathologies were

found (caries, hypoplasia, tooth stone). The only fully preserved skeleton, which was found behind the burner of the stove-hypocaust, belonged to a male aged 35–45 years (according to the skull structure). Excavation works were complicated by concrete that had gotten into the soil when construction poles were installed, and this had the result that the position of the skeleton could not be precisely determined. In any case this is not a full skeleton: it included a skull, ribs, shoulder blade, spine, but hand and foot bones as well as a hip bone were missing. The bones were situated in a north-south direction with the skull in the north. The head was lying lower than the rest of the skeleton. A bit higher up in the same filling layer there was a bronze penannular brooch (Fig 20: 13); the connection to the skeleton is, however, doubtful. How and why the skeleton got there is not clear. It is probable that part of the body or part of the half-decomposed body was placed purposefully in front of the mouth of the hypocaust. The person had pathological signs on the *thoracic vertebrae* (Th 2–7). It is an intervertebral discs disease of backbone called Schmorl's nodes. The origin of the disease could be congenital or caused by hard work or trauma.

Dendrochronological dating of the present wooden house

In March 2009, 21 borer samples were taken from the wall beams of the house at 2 Lutsu Street for dendrochronological dating. Another objective of the dendrochronological investigation was to establish if the horizontal and vertical wall beams were contemporary or not. For the selection of suitable beams for boring, the main criterion was the intact waney edge (the preserved outermost tree ring). Nevertheless, five cores appeared to be without waney edge. The sample cores were numbered and the location of each sample in the construction was recorded (core no 21 was taken from a removed post). Tree species was determined either visually or in some cases by microscope. Seventeen sampled beams appeared to be made of Norway spruce (*Picea abies* Karst.) and 4 beams of Scots pine (*Pinus sylvestris* L.). The width of the tree rings of the cores was measured to the nearest 0.01 mm in program TSAP-Win by using the measuring device Lintab (both Rinntech) and microscope Leica S4E. Four samples were left out for their small number (fewer than 40) of tree-rings. The ring-width series of the wood samples were synchronized with each other in pairs using program Catras (Aniol). The similarity of the ring-width series at a certain position was assessed by two statistics – the Student's t-criterion and the percentage of agreement. All similarity positions of the series were checked

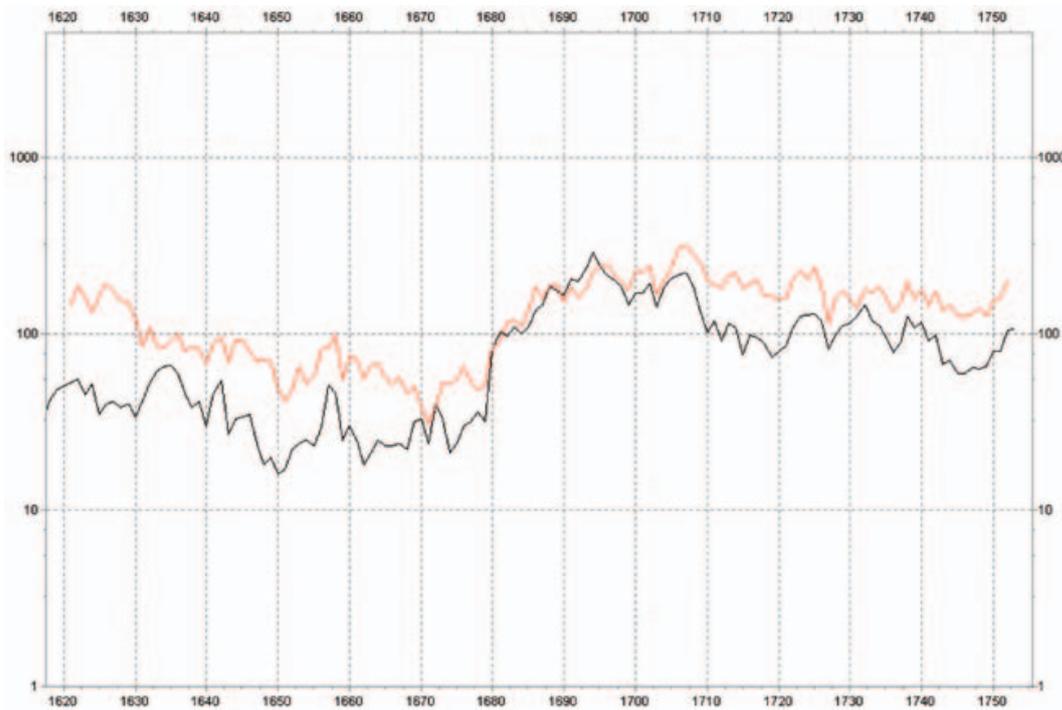


Fig 24. The mean ring-width series of 10 spruce samples of 2 Lutsu Street 1eslu204 (the red graph line) in synchronous position with mean spruce series of the Tampere House in Tartu (Student's $t = 9.21$, per cent of agreement $W = 69.1$ at 99.9 significance level). Abscissa – calendar years, ordinate – ring width in 0.01 mm. Alar Läänelaid.

also on graphs. The reliable similarity of tree-ring series enabled step-by-step averaging of the ring series of ten beams into a mean series 1eslu204 with a length of 132 years.

For dendrochronological dating, this mean series 1eslu204 was synchronized with averaged spruce tree-ring series of Estonian buildings (altogether 56 series) as dated references.²⁵ The result was that the mean series of 2 Lutsu Street was significantly similar to a number of references (the Tampere House, 5 Lutsu Street, 30 Lutsu Street, Karlova Manor, 2 Struve Street, the Uppsala House, and 8 Jaani Street in Tartu, Järva-Madise Church, Palamuse Church, Catherine's Quay in Pärnu, Saadjärve Manor, and others) at the position where the last year of the 2 Lutsu Street series was AD 1752 (Fig 24). After this dendrochronological dating, it was possible to date also the single samples. As the mean series 1eslu204 contains tree-ring series from both horizontal and vertical beams, these single series were averaged into separate means. Figure 25 shows that the similarity of the mean series of horizontal beams and the mean series of the vertical

²⁵ Alar Läänelaid, "Puude aastarõngalaiuste võrgustik Eestis".

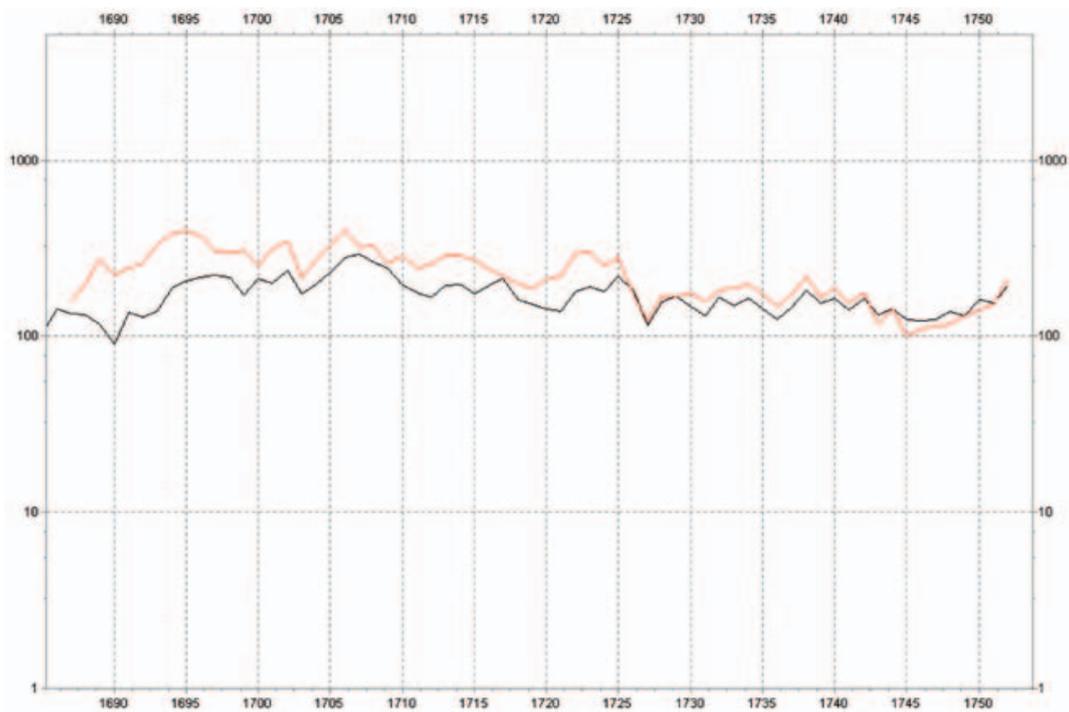


Fig 25. The mean ring-width series of 3 vertical beams 1eslu205 (the red graph line) and the mean ring-width series of 10 horizontal beams 1eslu206 in synchronous position. Note that both graphs end with the same year, AD 1752. Abscissa – calendar years, ordinate – ring width in 0.01 mm. Alar Läänelaid.

beams is evident, while both series end with the same date AD 1752. The dendrochronological dating AD 1752 refers to the last growth year before felling the trees. The spruces for building the house were felled after the summer of 1752 and before the next vegetation period of 1753, i.e. in the winter period of 1752/53. Assuming the use of raw timber, as was common in constructions in earlier centuries, the present house of 2 Lutsu Street was probably erected in AD 1753. The tree-ring analysis proved that the inner covering of the walls made of vertical beams was contemporary with the walls of horizontal beams, both dated to AD 1752.

Conclusions

As pointed out above, the research of the material from 2 Lutsu Street has only started and will probably continue for years. Therefore, we have not yet distinguished all medieval and modern era construction stages, which in some way or another can be followed in the excavated construction remains. As is often the case, there are hardly enough clues for dating the stone formations. For the time being, we will predominantly lean on the relative chronology

of the construction stages, radiocarbon dates, and the initial analysis of find material. The dating results of many wood and charcoal samples are not known yet, and the analysis of the find material is in a way superficial. Dendrochronology has added important details about the time of the construction of the preserved building and the age of the latrine bin. The latter is the fourth latrine bin dated with the methods of dendrochronology in Tartu.²⁶

The medieval secular buildings in Tartu have not been much researched. On a number of occasions during excavations the remains of medieval buildings have been found,²⁷ but often these have been very fragmentary and have not resulted in substantial conclusions about the buildings themselves, let alone the wider picture. One should also note that in many cases there has been no attempt to analyze the unearthed ruins from the perspective of construction techniques. In this context of neglect, the analysis of the ruins at 2 Lutsu Street mark the beginning of research on medieval secular architecture in Tartu. One could expect that the results of this investigation will support future research on similar buildings and that information collected from analogous buildings in the future will present new possibilities to interpret more accurately the problems arising in connection with the structure at 2 Lutsu Street.

First results are intriguing. Archaeological investigations at 2 Lutsu Street indicate that the area was developed already by the beginning of the fourteenth century. However, the wooden buildings located there soon burnt down, but already in the first half of the fourteenth century stone building I and in the mid-fourteenth century stone building II were erected. It is open to debate whether this was the fire that according to the chronicles took place either in 1328 or 1329 and destroyed the whole town.²⁸ After the catastrophe, several important shifts in construction techniques in downtown Tartu can be detected: for instance, in several locations there was an attempt to plan and prepare the ground in grand scale. In any case, the datings of timber confirm rather than refute the hypothesis that the cause for the construction of the buildings in question was the conflagration of 1328/29. After the large fire, in the period between 1229–39, a latrine box was built of logs.

The ground plan and the scope of both buildings are unclear, since only part of the rooms on the lower ground were opened up by archaeological

²⁶ Rivo Bernotas, “Dendrodates of three medieval latrines of Tartu”, *Estonian Journal of Archaeology*, 12 (2008), 16–29.

²⁷ Romeo Metsallik, “Tartu arheoloogilisest uurimisest”, *Tartu arheoloogias ja varasemast ehitusloost*, Tartu Ülikooli Arheoloogia Kabineti Toimetised, 8 (1995), 32.

²⁸ Konstantin Höhlbaum, “Beiträge zur Quellenkunde Alt-Livlands“, *Verhandlungen der Gelehrten Estnischen Gesellschaft*, Bd. VII, H. ¾ (Dorpat, 1873), 66.

methods. It is not even known whether in the Middle Ages the houses were situated side by side or had space between them. What is clear is that building I faced Jakobi Street with its facade, which means that the line of the modern street developed already in the Middle Ages.

The buildings were reconstructed many times over. Building I went through several changes in the second half of the fourteenth century, when the stove-hypocaust, a screen in front of it, and a staircase leading up to the main floor were apparently built. This created a small room, which was filled with soil. The findings suggest that the northeastern side of building I was demolished already by the end of the Middle Ages or in the early modern period. It is quite possible that the building was severely damaged during the Livonian War in the second half of the sixteenth century, when at least a third of the buildings in Tartu were destroyed.²⁹ After this, a street with granite paving crossing to Jakobi Street was laid. From the sixteenth–seventeenth centuries, the area was filled and another granite paving was established. The upper paving can be dated through the findings collected from the sand cushion underneath to the seventeenth century. Reconstruction works have also been carried out in the northeastern part of building 1, where among other improvements a brick floor paving was laid in room no 1.

Both houses were severely damaged in the Great Northern War. During the attack on Tartu in June–July 1704, around 100 houses were hit or destroyed entirely in massive bombings,³⁰ and some of the ruins were torn down by the defenders in order to restore parts of the town wall that had been damaged,³¹ and the remaining houses or the ones that had been hastily restored were again destroyed in July 1708, when the Russian army blew up the stone defence structures of the city and then set the houses on fire.³² The bombing during the Northern War is reflected well in the archaeological material collected elsewhere in the town, and in many places cannon balls fragments have been found.³³ In some written sources, it has been recorded that bombs hit graveyards and even blew bodies out of graves.³⁴ One cannot be certain, however, if this could explain the presence in the filling layer at 2 Lutsu Street of scattered bones belonging to eight different individuals. They were probably scattered beforehand, covered by rubble, and left in the

²⁹ Margus Laidre, *Dorpat 1558–1708: Linn väe ja vaenu vahel* (Tallinn: Argo, 2008), 185.

³⁰ *Ibidem*, 582.

³¹ *Ibidem*, 597.

³² *Ibidem*, 662.

³³ Romeo Metsallik, “Toomemäe põhjanõlva kujunemisest”, *Tartu ja kultuur* (Tallinn: Eesti Teaduste Akadeemia kodu-uurimise komisjon, 1990), 71.

³⁴ Laidre, *Dorpat 1558–1708*, 597.

soil. It is impossible to date them through the finding context. One of the partly preserved skeletons in front of the mouth of the hypocaust, however, was placed there before the flesh had fully decomposed and was probably laid or buried there purposefully. The preserved bomb with a cast-iron shell is also linked to the Northern War, as thousands of such bombs were fired and some of them did not explode.³⁵

The Northern War and the destruction of the town left a mark on the city for many years. The sorry state of the town center and existing ruins were mentioned even in the mid-eighteenth century.³⁶ The houses at 2 Lutsu Street were in ruins at least by 1734.³⁷ Both ruins were probably demolished up to the inserted ceiling of the lower floor in the mid-eighteenth century during the construction of a new wooden house. This is clearly reflected among others in the filling layer, which in the main part consists of broken (sometimes even preserved) everyday cutlery, including pottery that could have been used as late as the first half of the eighteenth century. Demolition rubble was planned in a way that it filled part of the rooms of the lower floor of the medieval building. Demolition works apparently ran simultaneously in many buildings, which explains the fact that the pieces of the same tiles were located in rooms 1 and 4 of building I and also in building II.

The construction of the wooden building, which has been preserved until today, was probably commissioned by T. Plaschning, the pastor of St. John's congregation. Houses planned by the Russian architect Domenico Trezzini served as a model.³⁸ Dendrochronological methods indicate that the logs used in the building were cut in the winter of 1752/53, but according to written records the house was completed in 1775.³⁹ According to the stones and mortar, three construction stages can be discerned in its ground walls, so it cannot be excluded that the building in its present dimensions was built in several phases.

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³⁵ Laidre, *Dorpat 1558–1708*, 577, 580, 582.

³⁶ Mati Laur, "Vene võimu all 18. sajandil", *Tartu. Ajalugu ja kultuurilugu* (Tartu, 2005), 59.

³⁷ Raid, *Tartu vanemaid ehitisi*, 31.

³⁸ *Ibidem.*

³⁹ *Ibidem.*

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KOKKUVÕTE: Tartu Lutsu tn 2 kesk- ja uusaegne ehitistekompleks. Arheoloogiliste, arhitektuuriajalooliste, dendrokronoloogiliste ja osteoarheoloogiliste uuringute tulemusi

Kirjalike allikate kohaselt 1755. aastal valminud Jaani kiriku pastor T. Plaschningi elamu Lutsu tn 2 (joonis 1) on üks väheseid puithooneid Tartus, mis jäi puutumata peaaegu kogu linna hävitanud 1775. aasta tulekahjust. Hoone renoveerimisel Tartu mänguasjamuuseumi tarbeks toimusid seal 2008. ja 2009. aastal arheoloogilised välitööd, mis osutasid, et maja rajamisel 18. sajandi keskel ei ole lõhutud varasemaid ehitisi terves ulatuses, vaid osa neist on jäänud praeguse hoone alla. Selgus, et kohati on keskaegsete hoonete müürid säilinud enam kui kahe meetri kõrguselt kuni põhikorruse vahetalade kandekonstruktsioonideni. Välja kaevati ka terve kerishüpokaustahi. Toimunud uuringud andsid rohket teavet Tartu keskaegsete kodanikemajade kohta ja täpsustasid teadmisi toonasest tänavatevõrgust. Hoonete ümberehitamiste

ja lammutamise käigus kuhjatud täitekihtidest koguti rikkalik leiumaterjal, sh esinduslik ehitus- ja tarbekeraamika kollektsioon, ning leiti ka inimluid. Käesolevas artiklis keskendume keskaegsetele ehitusjäänustele, peamiselt uusaegse täitekihi leiuainesele, ennekõike kahlitele ja inimluudele ning esitame dendrokronoloogiliste uuringute tulemused.

Arheoloogilised uurimistööd Lutsu tn 2 osutasid, et piirkond oli hoonestatud juba 14. sajandi alguseks. Sealsed puitehitised põlesid aga peagi maha ja asemele rajati tõenäoliselt kaks kivihoonet (joonis 2). Neist üks (keskaegne elamu I) rajati arvatavasti 14. sajandi esimesel poolel ja teine (keskaegne elamu II) 14. sajandi keskel. Mõlema kivihoone puhul selgus, et need on ehitatud pärast mingit põlengut. Võimalik, et tegemist on 1328. või 1329. aasta tulekahjuga, mil kroonikate teatel põles maha kogu Tartu linn. Senised radiosüsiniku dateeringud (tabel 1) pigem toetavad kui välistavad sellist tõlgendust. Linnapõlengu järel, dendrokronoloogilise dateeringu järgi vahemikus 1229–39, on rajatud hoovialale ka palkidest jäätmekast (joonis 16, 17).

Kummagi elamu planeeringud ja suurused ei ole selged, sest arheoloogiliselt avati vaid osa alakorruse ruumidest, selge ei ole ka see, kas need paiknesid keskajal kõrvuti või vahega. Vähemalt elamu I on tõenäoliselt olnud fassaadiga Jakobi tänava poole, osutades muuhulgas, et praegune tänavajoon järgib keskaegset. I keskaegsest elamust avati kolm ruumi peaaegu tervikuna ja üks osaliselt (joonised 2–3), sellest kagu pool paiknenud II keskaegsest elamust aga vaid üks ruum ja sedagi osaliselt (joonised 2, 14). Tellistest ning maakividest seintes on säilinud mitmeid ukseavasid, šahte, nišše, laetalade auke ja mademeid ning elamus I ka alakorruselt põhikorrusele viinud trepp (joonised 4–7, 11–12, 15). Kahtlemata atraktiivseim leid on I hoonest väljakaevatud tellistest kerishüpokaustahi, millest on säilinud nii seinad, küttekolle kui ka kerisekiivid ja nende alused telliskaared (joonis 8–10).

Hooneid on korduvalt ümber ehitatud. Elamus I on üks selline ajajärk olnud 14. sajandi teisel poolel, mil alakorrusele on rajatud kerishüpokaustahi, vahesein selle ette ja eelmainitud trepp. Leidude järgi osutades on hoone I loodeosa lammutatud juba keskaja lõpus või varauusajal. Võimalik, et ehitis sai raskelt kahjustada Liivi sõja ajal 16. sajandi teisel poolel. Seejärel tehti sinna Jakobi tänava risti paiknenud tänav või hoovitee, mille pind sillutati maakividega. 16.–17. sajandil ala täideti ja rajati veel üks maakividest sillutis (joonis 13). Ülemise sillutise võib kivide alusest liivapadjast saadud leidude järgi dateerida 17. sajandisse. Ümberehitustöid tehti ka hoone I säilinud kagupoolses osas, muuhulgas rajati ruumi nr. 1 telliskividest põrandasillutis.

Mõlemad majad said tugevaid kahjustusi Põhjasõjas ning kirjalike allikate järgi olid ehitised varemeis veel 1734. aastal. Varemed lammutati kuni

aluskorruuse vahelaeni arvatavasti 18. sajandi keskel uue puitmaja ehitamise eel. See kajastub muuhulgas täitematerjalis, millest põhiosa moodustavad purunenud (erandina isegi terved) tarbenõud, sealhulgas keraamika, mille kasutuse aeg võib ulatuda 18. sajandi esimesse poolde. Lammutuspraht planeeriti nii, et sellega täideti osa keskaegse elamu aluskorruuse ruume. Täitmine on toimunud järk-järgult ja tõenäoliselt on lisaks eelkirjaldatud kahe elamu lammutusprahile toodud sinna materjali veel mujaltki lähikonnast. Täitekihtidest saadud leiuaines on rikkalik ja mitmekesine, sisaldades ehitus- ja tarbekeraamika katkeid (joonised 18, 19), metallist tööriistu, 16.–17. sajandi Riia, Poola-Leedu ja Rootsi münte (joonis 20:1–9, 12), ehteid (joonis 20: 11, 13, 14), ammu või püssi kaba luust kaunistusplaati (joonis 22), 17.–18. sajandi kaoliinsavist piipude katkeid ja rohkesti ahjukahleid (joonised 22–23). Vanimad kahlileiud pärinevad 15. sajandi lõpust ja 16. sajandi esimesest veerandist. Enamus kahleid on aga erinevatest peamiselt 17. sajandil kasutatud ahjudest nagu barokkstiilis taimornamendiga roheliseks või mustaks glasuuritud kahlitest tornahjud (joonised 22:8, 23:3), geomeetrilise- (joonis 22:9) ja moreskornamendiga (joonis 22:1), pühakute (joonis 22:4) või Rootsi valitsejate (joonis 22: 2, 7) kujutistega roheliseks glasuuritud kahlitega ahjud jne Noorimad kahlileiud, nagu sinise maalinguga fajansist kahli katked, pärinevad aga juba 18. sajandist.

Lutsu tn 2 täitekihtidest leiti ka seitsmele eri inimesele kuulunud üksikluid. Ilmselt on need olnud juba pinnaseteisaldustöödele eelnevalt laiali paisatud. Erinev on aga kaheksanda indiviidi, 35–45 aastase mehe osaline luustik hüppokaustahju suu ees, mis peab olema toodud paigale enne liha luude küljest lahti kõdunemist ja on nii sinna pandud või sängitatud ilmselt tahtlikult.

Tänini säilinud puitelamu rajamisaega töid selgust dendrokronoloogilised uuringud, mille kohaselt on ehitamiseks kasutatud puud langetatud 1752/53. aasta talvel (joonised 24–25).

Rivo Bernotas

MEDIEVAL TOWN WALL OF TARTU IN THE LIGHT OF RECENT RESEARCH

The present study of the town wall of Tartu will try to summarize the results obtained so far during the archaeological investigations and discuss the condition of the town wall, the date of construction and its symbolic meaning to inhabitants of the medieval Old Livonia. As a result of archaeological research, it can be said that the wall consists of dry stone, soil and irregularly poured lime mortar to bind the stones. For constructing the wall, stone and limestone, intact bricks and the fragments of bricks have been used. The improvement and modification of the fortifications continued probably throughout the whole medieval period. Although the construction of medieval town wall of Tartu has been dated according written sources to the second half of the 13th century, namely to the time after the Russians' raid in 1262, the existing research results show that it seems more likely that similarly to Tallinn, the wall was built in the first half of 14th century, when the former city seems to have been completely re-planned.

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Introduction

Besides Tallinn, Haapsalu, Pärnu, Viljandi and Narva, medieval Tartu was one of the six towns in Estonia surrounded by walls. As written sources are scarce and the wall, unlike the Tallinn town wall, has been completely destroyed – by becoming severely damaged in the hostilities at the beginning of the 18th century, and the remnants were demolished after the fire of 1763 (Vaga 1980, 59) – hence for more information we need to pay more attention to the archaeological aspects.

After the conquest of Tartu in 1224, the Germans began organizing the diocese under the leadership of bishop Hermann. The bishop's castle is first mentioned in written sources in 1234. Over the years in the south part of Dome Hill, a bailey, situated west from the castle, was built. The castle and the Dome Hill belonged to the authority of bishop, at the foot of the castle by the mid-13th century an urban merchants and artisans settlement, the so-called downtown was developed, with its own ruling town council. The town council was subject to the bishop (Prints 1967, 14 ff.).

The wide floodplain valley of River Emajõgi, bound from north-west to south-east direction in the town territory, is the central element of relief in Tartu. At the current north-west side of the city it has steeper slopes and narrows down to approximately 800 m. At the south-east side it widens to 1.5 km with smoother slopes. The absolute heights at the floodplain valley are 30–35 m and on the edges of the valley about 50–60 m above sea level (Marksoo 1980, 14).

Medieval Tartu was situated at the south-west side of floodplain of River Emajõgi. The bishop's castle along with Dome Hill (where the Dome Church was situated), which belonged to the diocese of Tartu, were located on the edge of the floodplain, distinguished from the rest of the plain by the moat. The medieval town of Tartu, reaching almost to River Emajõgi, was located directly next to the bishop's castle at the floodplain and its slopes.

Bishop's castle at Dome Hill was the centre of the medieval defense installations, consisting of the main castle and an elongated bailey, which were separated by a deep moat. As mentioned in council transcript dating to year 1555 (Tuulse 1942, 54), the main part of the castle was the east wing, which had a weapons' room in it. This hypothesis is based on the Polish documents and confirmed by Voldemar Vaga. He pointed out that audits meticulously describe the eastern basements and the first floor of the bishop's castle as the most important part of the castle (Vaga 1969, 179).

The town wall, which consisted of altogether 27 towers (9 of them with gates) (Prints 1967, 39) and measured 2,145 km in length¹, started from the west corner of the bishop's castle, completed a circle around the west and north side of the Dome Hill, descended to the floodplain and proceeded between the current streets of Lai and Kroonuaia towards River Emajõgi (Fig. 1). The wall turned south-east on the shore of Emajõgi and proceeded between Magasini Street and Vabaduse Avenue towards south-east, across the Town Hall Square and up to Poe Street. From Poe Street the wall turned south-west and extended up to the east corner of the bishop's castle.

We know nothing about the formation of town wall during the Middle Ages because of the loss of the town council archives. The earliest specific data are the town plans from the 17th century, which consist of the location of the town wall during late Middle Ages.

The archaeological investigations of the medieval town wall of Tartu have so far been scarce. In most cases investigations have taken place in the form of archaeological monitoring, on sporadic cases also as archaeological excavations. Several research reports have been lost over the years. Since the monitoring results obtained during the work are still largely unpublished, and not easily available, this article also has the purpose of source publication.

The present study of the town wall of Tartu will summarize the results obtained so far during the archaeological investigations and find the answers to three questions still unanswered:

¹ Measured on the digital map at Town Government of Tartu.

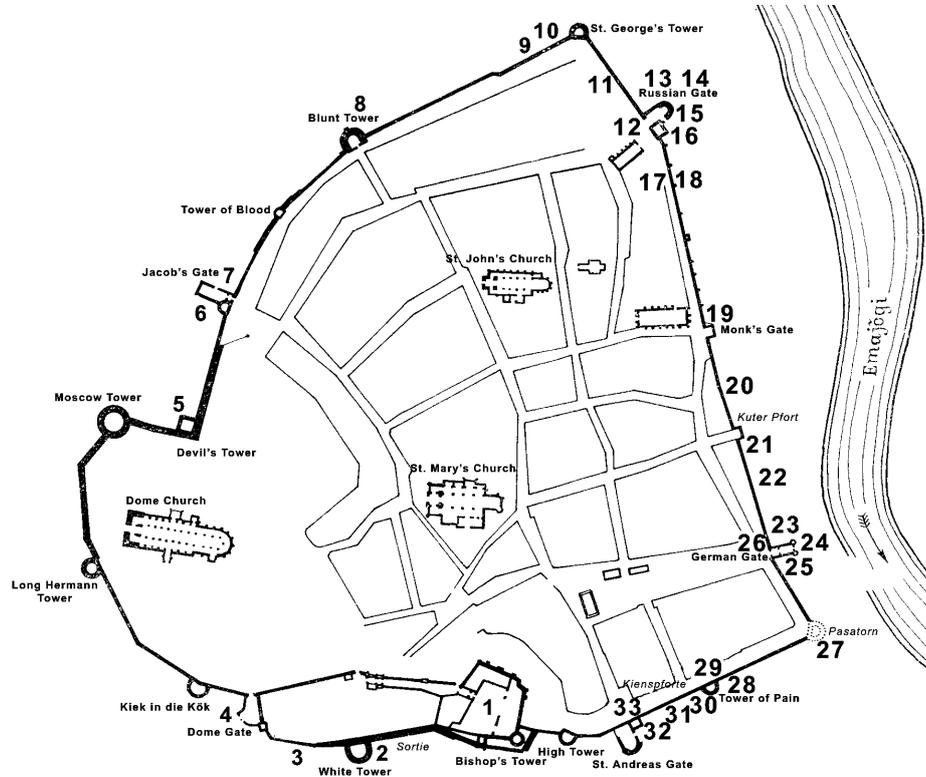


Fig. 1. Excavations carried out in the area of the town wall. 1 Trummal 1964, 2 Piiirts 1996, 3 Jonuks & Tvauri 1999, 4 Hermann 1968, 5 Hermann 1974, 6 Hermann 1974, 7 Altoa 1979, 8 Hermann 1974, 9 Hermann 1974, 10 M6esalu & Trummal 1988–1990, 11 Bernotas 2010, 12 Vissak & Heinloo 2005, 13 Hermann 1974, 14 Tiirmaa 1977, 15 Piiirts 1998, 16 Piiirts 2006, 17 Metsallik & Tiirmaa 1996, 18 Bernotas 2009, 19 Tvauri 2010, 20 Stange 1933, 21 Vissak & Piiirts 2008, 22 Piiirts 2008, 23 Stange 1933, 24 Tvauri 2005, 25 Piiirts 2005, 26 Piiirts 2004, 27 Tvauri & Bernotas 2006, 28 Tvauri 2001b, 29 Heinloo & Vissak 2010, 30 Tvauri & Bernotas 2006, 31 Tiirmaa 1979, 32 Metsallik 1982, 33 Hermann 1974.

1. How and in what form has the medieval town wall of Tartu survived in the ground?
2. When was the wall built?
3. What was the function of the wall in the Middle Ages?

Theoretical background

Herbert Sarfatij (1990, 193) has said that generally speaking and literally seen from the inside as well as from the outside, the town defenses may be considered as possibly the most prominent material expression of medieval urban character,

which has made them useful for archaeological examination as well. It should be stated that because only sporadic ruins have survived of medieval walled towns in what are now Estonia and Latvia (leaving aside Tallinn) – as in Riga, Tartu, Valmiera, Cēsis, Pärnu, Viljandi (Altoa 1975, 3), or no remains have survived on the ground at all – as in Haapsalu and Narva, the archaeological investigation is a necessary solution to interpret specific fortification works.

Creighton and Higham (2005, 32) have defined the town walls, gates and related structures as strikingly multifunctional, representing a complex blend of military pragmatism and commercial logic, allied with the aspiration for communities to express their political identities and social status through conspicuous building projects. To some they were, indeed, symbols of power, pride and prosperity; to others who lived both within and beyond them, they were monuments of oppression (perhaps representing the dominance of a colonial authority) and repression (for example, symbolizing seigneurial control over tenants) or just rather inconvenient; or to others they might on occasion provide real and much needed protection (op. cit., 249). There are also examples from Europe, where the walls were built against attacks apparently not only by human enemies but also by river floods, in example Nijmegen along Waal and Dordrecht along the Old Meuse in Netherlands (Sarfatij 1990, 194).

Since this study is somewhat limited to only archaeological material, I, however share the standpoint of Oliver Creighton and Robert Higham (2005, 121–164) that for better research, three major approaches to the physical remains of town walls should be considered: topographical study, architectural analysis and archaeological inquiry.

From countries adjacent to Estonia, scientific methods of dating have been used for getting the dendrochronological dates of the wood from town fortifications of Visby, Gotland (Bråthen 1995, 30 ff.). Although sawing the discs for dendrochronological dating from the alleged raft (Stange 1933, 25) of medieval town wall of Tartu has been a question at issue on several occasions, the excavations have not yet started.

The results of this research have largely been achieved by using the so-called historical-comparative method, which is widely used in archaeology. To respond to the third question from introduction, I will try to contemplate the function of the town wall of Tartu more broadly than just in the light of defense function. Although enclosing with walls was common, there were also a number of towns, which flourished without the need for defense. As an example from countries adjacent to Estonia, the town of Turku in Finland, which was founded at the end of the 1280s (Hiekkanen 2003, 49), had no town wall, but was defended by the castle instead (Uotila 2003, 159). It is noteworthy that while “private” traditions of defense, as represented by the castle, were a peculiarity of the medieval period, the defended town had both pre-medieval ancestry and a post medieval future (Creighton & Higham 2005, 21 f.).

Current research

The petition of the town council of Tartu to the town council of Lübeck, which asks for support to build the fortifications, is the earliest written source where the town wall was mentioned. As the source (LUB I: CCXVI) is cited in nearly all texts related to the town wall of Tartu, then only the paragraph concerning the town wall is quoted here:

Your decision, keeping in mind the fact that our fortification, when it will be done, is support not only to our province but to shield the lands situated below us, and forewall to ensure the safety of residents, welfare to travelers passing by, peace to people both near and far.²

This petition, which shows the intention of building a wall, is dated by most scholars to the period after the Russians' raid in 1262 (e.g. Freymuth 1927; Tuulse 1942; Vaga 1969; Mäesalu & Vissak 2002; Heinloo 2006). However, it does not conclude from any written source, when the town wall of Tartu was actually built.

The town plan drawn up by Georg Schwengell, dated to 1636 (EA, f 2623, n 1, s 2050, 1.11), is the oldest remaining source, on which we can determine the location of the wall. Having the names of the towers written on them, makes the latter one, and the 1683 plan, drawn up by Carl von Friesen (EA, f 2623, n 1, s 2050, 1.20) the most important ones (Vaga 1969, 162). Unfortunately, in the oldest plans it is difficult or impossible to distinguish medieval towers and parts of wall from the ones built during the Livonian War by Russians and the refurbishments made in the 17th century. Relying on those plans we cannot alas conclude anything about building phases during the Middle Ages. From the late 17th century derives the oldest survived maquette of fortifications of Tartu, which is deposited in the army museum of Stockholm, Sweden (AM.072587, Armémuseum). The oldest publication of the reconstruction plan of the medieval Tartu is published by Richard Otto (1918, 14 f.).

The oldest depictions of the town wall and fortifications derive from year 1704. They depict the siege and conquest of Tartu by Russian forces during the Great Northern War (Laidre 2008, 352, the original in Krigsarkivet, Stockholm, Sweden). These, however, are only imprecise overviews of the town.

The earliest research written as a scientific material is published by Otto Freymuth (1927), who has dated the building of town wall to the period after the 1262 Russians' raid (1927, 4).

Armin Tuulse has concentrated only on the bishop's castle on Dome Hill. Tuulse (1942, 52 ff.) also presumed that the castle and the city wall were built after the 1262 Russians' raid, and that the fortress was merged into town defense system in the second half of the 13th century.

Polish audits from 1590 and 1616, which are disserted in detail by architectural historian Voldemar Vaga (1969), provide important information about the fortifications of Tartu during the post-Livonian War period. Based on those, Vaga

² Translation from Latin to Estonian by Jaan Unt (Altoa 1995, 149).

(1969, 164) specified that not all fortifications depicted on the 17th century plans date from the Middle Ages, but parts of it were built by Russians during the Livonian War (1558–1583). Vaga suggested that the town wall was built in the end of the 13th century (EArA 1965, 63 f.), which he later clarified as the period after 1262 (1969, 165).

The most meticulous description of the town wall is published by building historian Olav Prints (1967, 39), who examined the earlier plans of Swedish researchers and described a series of towers and gates, which in Vaga's "Architectural History of Estonia" are not mentioned. Prints (1967, 18) correlated the construction of town wall in the second half of the 13th century with the adoption of Tartu to the Hanseatic League. This assumption cannot however be accurately read, because the Hanseatic League was a merchants' organization where no "adoption" of towns as subjects occurred (Anti Selart, pers. comm.).

Archaeologist Vilma Trummal (1970, 4, 26), who excavated the remnants of the bishop's castle on Dome Hill, assumed that the construction of wall started in the second half of the 13th century, but added that the stone buildings from the eastern part of the town (including the town wall) were not erected before the 14th century.

Historian Ago Vallas (1987, 22) has assumed that the building of town wall was carried out in several phases. In his opinion, the building probably started at Dome Hill, continued with the fortification of northern and southern side of town and finally finished with the reinforcing of eastside part next to River Emajõgi.

Kaur Alttoa (1975, 27), who has analyzed the Russian Gate and the section of wall south from it, has dated the mentioned parts of wall to the 14th century. He also pointed out (1985, 36 ff.) that the Russian Gate has details distinctive to the defense architecture of the 16th century and it might have been built in several phases. Based on written sources (1995), he discussed the time of construction of town wall, the supposed wall separating downtown and Dome Hill and the ancient road from Lai Street across the Dome Hill. Alttoa assumed that the construction of the town wall might have begun in the second half of the 13th century, but left open the completion dates of the later perimeter (1995, 141 ff.). Later (1999, 16) he specified the beginning of building of the wall to the last third of the 13th century and the riverside part of wall not before the 14th century.

Archaeologist Romeo Metsallik (1995, 31) has summed up the results of archaeological investigations of Tartu until 1995 and presumed the completion of town wall in the 14th century.

Archaeologists Ain Mäesalu and Rünno Vissak (2002, 155) have assumed that before the 1262 Russians' raid the town could have been surrounded by wooden and earthen fortifications and that the re-planning of the town territory began the same year after the town was burnt down. The authors assumed that the town had serious difficulties constructing the wall during the second half of the 13th century.

Although several authors have proposed their opinions about the date of construction of the town wall, so far these have been based mainly on written sources. Sources based on archaeological surveys, publications by Eero Heinloo

(2006; 2007) should be noted. Heinloo has also dated the beginning of the wall construction to the second half of 13th century (2006, 67).

Although over the years the town wall has been excavated altogether in 33 places³ (Fig. 1), there have been no findings for exact scientific dating found and hitherto all the published dates have been based on the written sources or in individual cases (Metsallik 1982; Bernotas 2010a) also derived from the stratigraphy of cultural layer.

While most authors have dated the construction of the wall primarily on the basis of the petition of the town council of Tartu to the time after the Russians' raid in 1262, I do not think the construction of the wall in the second half of the 13th century is particularly likely. Therefore I raise the hypothesis of my own: after the German conquest medieval Tartu was until the 14th century a wooden town, reaching up to the present-day Tartu University Botanical Gardens in the north and to the Tartu post office plot in the south. Building of stone masonry started at the beginning of the 14th century when the new town plan was introduced. The new town plan included the building of medieval town square/market, town wall, masonry churches and houses.

Archaeological material

Today, the town wall has survived on surface in very few remaining fragments in Tartu University Botanical Gardens, Vabaduse Avenue and Jakobi Street. The best-preserved section is the section in the Vabaduse Avenue, where the height of the wall on the ground, measured from the riverside part, extends up to 5 meters (Alttoa 1975, 13).

The wall rests, according to current knowledge, partly on a dry stone⁴ foundation (e.g. walls of the bishop's castle; Trummal 1964, 23), the fundament of the Devil's Tower (Hermann 1974, 43), for building Jacob's gate (Alttoa 1979, 28 f.) and at Poe Street (Tvauri & Bernotas 2006b, 5); at some places also packing with soil is used. At the section between the Russian Gate and the Monk's Gate the wall was stacked into ditch as a wedge under 45-degree angle and had irregular lime mortar thrown between wall tiles (see Figs 2–3) (Bernotas 2010a). It should be noted that the last-mentioned masonry stacked into ditch as wedge has not yet been discovered anywhere in Estonia. Pairing with lime mortar is also used for various parts of wall (e.g. Ain Mäesalu, pers. comm.; Piirits 1998; Jonuks & Tvauri 1999, 5 f.; Vissak & Piirits 2008, 13 f.). At Gildi Street area, 4–5 inch thick pinewood logs as a foundation raft were laid under the wall (Stange 1933, 25). Unfortunately, there are no reports or drawings from the last-mentioned excavations.

³ Excluded are excavations carried out by Õ. Utter in 1959 at Jakobi Street area and excavations conducted by K. Lange in the University Botanical Gardens in 1992, as the reports of both surveys have been lost and the material is unpublished.

⁴ Building method by which structures are constructed from stones without any mortar to bind them together.

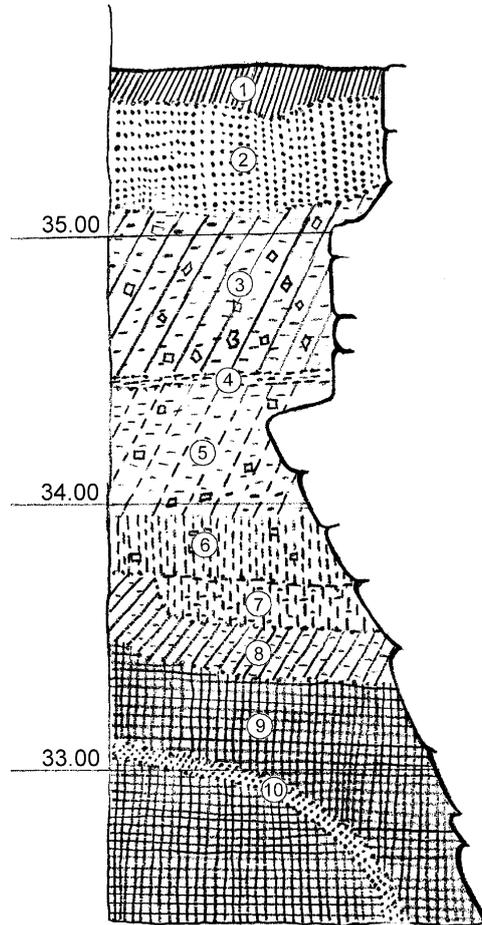


Fig. 2. The southern profile of the excavation pit in Vabaduse Avenue (according to Bernotas 2010a). 1 layer of turf (10–22 cm thick), 2 sand (30–40 cm thick), 3 brown layer of debris, consists of fragments of bricks, transparent material, limestone, and slate (60–65 cm thick). This was also the depth of the pit, excavated during the restoration works of 1997–1999, 4 stria of lime (4–5 cm thick), 5 brown soil, included fragments of bricks and lime (50 cm thick), 6 dark brown organic-rich soil, included sporadic fragments of bricks (20–25 cm thick), 7 dark brown organic-rich soil, included fragments of bricks and lime (16 cm thick), 8 dark brown organic-rich soil with striae of lime (18–30 cm thick), 9 dense brown organic-rich layer, included fragments of lime and several smaller stones (90–100 cm thick), inside of which at absolute height 33.10 above sea level, 10 stria of sand started (10 cm thick), from which the water washed out all the sand.

The wall is stacked of stones, between which both fragments of bricks (Metsallik 1982, 3 f.; Metsallik & Tiirmaa 1996, 2; Piirits 2004, 3; 2005, 18 f.; Tvauri 2005, 3 f.; 2011; Bernotas 2010b, 3), intact bricks (Tiirmaa 1979; Piirits 1998, 5; Tvauri & Bernotas 2006b, 13 f.; Bernotas 2010b, 3) and limestones (Jonuks & Tvauri 1999, 5 f.) are attached. For cladding the parts of wall and



Fig. 3. Town wall in the excavation pit in Vabaduse Avenue (according to Bernotas 2010a). Photo by Rivo Bernotas.

towers, bricks are also used abundantly (Hermann 1974, 43; Tiirmaa 1977; Alttoa 1979, 29; Piirits 1996; 2006, 8; Vissak & Heinloo 2006, 113 f.; Heinloo & Vissak 2010, 11). In single cases slate stones (Metsallik & Tiirmaa 1996) and monk-nun type of roof tile fragments (Piirits 2008, 3 f.) have been used for cladding the wall.

The thickness of the town wall has been different in different areas: 1.7 to 2 m on the north side (e.g. Hermann 1974; Alttoa 1979), up to 2–2.4 m on the east side (e.g. Vissak & Piirits 2008; Bernotas 2010b, 4) and up to 2–2.9 m (e.g. Tvauri & Bernotas 2006b) on the southern side. The thickness of excavated walls of towers is ranging from 1.9 to 3.5 m at the White Tower (Piirits 1996) to 2.17 m at Jacob’s Gate tower (Alttoa 1979), 2 m at Blunt Tower (Hermann 1974, 43), up to 4.5 m at the front gate of the Russian Gate (Vissak & Heinloo 2006) and approximately 2.3 m of tower Pasatorn (Tvauri & Bernotas 2007, 171). At the construction of German Gate also “huge stones and strong mortar” have been mentioned (Stange 1933, 16). The varying thickness of different sides of wall are albeit too small for making far-reaching conclusions of the exhaustive fortification of one or the other side.

From the point of view of dating the town wall, medieval layers have so far been unearthed only at a few places. A shred of stoneware vessel, originating from Lower Saxony (TM A 160: 13), which can be dated to the 14th century, and one fragment of the bottom of Langerwehe stoneware vessel, which can be dated to the 15th century (TM A 160: 12) have been found from the organic-rich layer nearby a wall of tower Pasatorn. The pottery found from the 2009 excavations at the section of town wall between Russian Gate and Monk’s Gate (Bernotas 2010a) belongs to north-west Russian wheel-thrown pottery type 3.2 (TM A 180: 6;

TM A 181: 8) (Tvauri 2000a, 101), the time of usage of which expires at the end of the 13th or at the beginning of the 14th century, and to type 3.3 (TM A 181: 9), which is dated from the second half of the 13th century until the end of the 15th century (op. cit., 104 f.). It should be noted that the 13th century version of pottery type 3.2 was the dominant group in the excavations of a few hundred meters to north-west, in the Botanical Gardens, in the 13th century cultural layer, which revealed numerous findings of Russian origin (Tvauri 2000b, 25).

Discussion

The construction of the medieval town wall of Tartu resembles mostly the outer wall of medieval convent castle and the town wall of Viljandi (Tvauri 1999, 21; 2001c, 100). Both are up to 2–3 layers stacked of stones packed with sand or mortar as rows of stone and are around 2 to 2.5 m thick. There are also marked similarities between the section of wall south from the Russian Gate and the defense wall of the Holy Spirit convent in Riga (Altoa 1975, 23).

Related to the new town plan, the problems relating to the area of Town Square should be firstly examined here. During earlier excavations in the western part of the Town Hall Square a wide range of timber frame buildings (Metsallik 1995, pl. 4) and in the east part remnants of woven wooden fence and about 60 cm thick 13th–14th century cultural layer (Tvauri & Bernotas 2006a, 107) have been found. In this light, expanding the Town Hall Square area upon an urban market-place in the second half of the 13th century (Heinloo 2006, 64) seems doubtful.

A comparative example would be a situation in Tallinn, where the remains of buildings and the ceramics, dating to the first half of the 13th century – mid-14th century, which is referring to the early stage colonial period, have been discovered. The latter is a proof that the Town Hall Square in its current form derives from a later period (Mäll & Russow 2003, 194). At the end of the 13th century – at the beginning of the 14th century, real estates located at Town Hall Square were liquidated, covered with a layer of fill and then the central square and a medieval market of Tallinn in this territory was established. While the area was overly moist as referred to drainage discovered during previous excavations, filling the site instead of excavation to eradicate traces of earlier settlements was preferred (Mäll 2004, 257). Similar activities have occurred in Europe, for example in s'Hertogenbosch town in Netherlands. Excavations at the most central area of the town, the market square, have shown that the original settlement started on this spot in the late 12th century with the building of some very small dwellings. After a partial removal of these buildings and the raising of the surface level by means of fillings between the middle of the 13th and middle of the 14th century, the area was transformed into a market square in the second half of the 14th century (Sarfati 1990, 185).

Based on the research findings we cannot say so far whether the towers and gates have been secondary to the wall or not. Looking at the thickness of walls of

some of the towers and gates (e.g. Moscow tower, the thickening of the forewall of front gate of the Russian Gate), there is no doubt that these have been built in an era of developed firearms. Most likely the improvement of the towers and gates persisted throughout the medieval period. The secondary counterforts attached to the wall in the section between Russian Gate and Monk's Gate at the Vabaduse Avenue, suggest that the town wall could have been modified.

Clay mines, the clay-conservation concavities, wodge of cull-bricks and kilns for firing bricks found from the area between Ülikooli–Vallikraavi–Vanemuise streets were all dated to the end of the 13th – beginning of the 14th century (Vissak 2000, 116; Heinloo 2006). It is quite clear that all these antiquities were related to the construction activity, which started in town. Heinloo assumes that during the fourth quarter of the 13th century a suburban settlement was already developing (2006, 73), the area was used as an industrial centre until the second quarter of the 14th century (2006, 65), and the output of bricks was for the later construction stages of town wall, churches, and the castle (2007, 70). However, I would consider this date as too early. Let us remember that the oldest firmly dated stone masonry in Tartu, St. John's Church is built after the year 1321, when a log raft underneath the church walls was laid (Läänelaid 2002).

Looking at the drainage ditches situated in the Riga-suburb of Tartu, their direction either towards the river or contemporary moat stands in contrast. The earliest drainage ditches are dated from the second half or the end of the 14th century (Heinloo 2007, 70). It can be assumed that the construction of the drainage system has more to do with dates of the completion of the city wall and filling the moat with water.

According to opinions from various scholars, the eastern part of the area enclosed by town wall from Rüütli Street towards River Emajõgi has been overly moist and unfit for habitation before the Middle Ages (Trummal 1970; Abakumova 1990; Tvauri 2001a, 32). Sample of soil from the riverside part of the Kүүtri Street from the prehistoric layers indicated a typical river plantage (Abakumova 1990, 26) and the remains of plantage found from the cultural layer of the Late Iron Age from the central part and nearby of the Town Hall Square show the existence of a moist environment for growth (Abakumova 1990, 24). Macro-fossils found from the Late Iron Age surface in Tartu University Botanical Gardens suggest a marshy meadow ground, floodplain and waterside (Abakumova 1990, 26). If we look at the excavations conducted in 2009 in the section between the Russian Gate and Monk's Gate, where the town wall was stacked into trench as a wedge (Bernotas 2010a), this would rightly raise a question, who would build this type of construction on a marshy soil? Based on the data mentioned above and material gathered from the cultural layer during the last-mentioned excavations, we should consider the possible date of construction of the wall to the furthest time since the end of the Late Iron Age (1227).

Trummal (1970, 14, 25) has assumed that the execution of the meadow of Emajõgi at a depth of 2–3 m required a lot of manual labor and working time and that the part of the town wall near Emajõgi was completed much later than

elsewhere, where the walls were built on a higher surface. She presumed that the intense preparatory work for the erection of fortifications started immediately after the conquest of Tartu by the Germans.

Based on the results of archaeological excavations and on the ordinance of Danish Queen Margareta from 1265 of establishing fortifications in Tallinn, historian Jaak Mäll has assumed that the Danish post-Conquest urban settlement, developed since 1220s, had a relatively irregular shape, and “stretched” along existing streets, thus the future course of wall perimeter was negotiated, existing buildings were disassembled, former plots reallocated, and humus containing “black” soil was dug. The latter was moved to the established mound (Mäll 2004, 259 ff.). While written sources about Tartu offer only a few details about this period, however, we may suggest that a similar process was also carried out in Tartu.

An interesting nuance is that in the other Old Livonian towns enclosed by walls, the building of walls might have begun during the same period. The town wall of Viljandi was dated by Andres Tvaauri (2001c, 107) from the end of the 13th or the beginning of the 14th century, which he later clarified as the first half of the 14th century (Andres Tvaauri, pers. comm. in March 2010). The town wall of Pärnu might be dated similarly, where the first written reference about the building of town fortifications comes from 1420 (Vaga 1965, 66), and a radiocarbon date from the log raft found under the section of town wall at Munga Street during the excavations at the beginning of the 1990s is with 68.2% probability from AD 1310–1405 (590±–30 BP⁵) (Bernotas et al. 2009, 155). The town wall of Haapsalu is dated to the 15th century (Pärn 1997, 41), but the 14th century cannot be ruled out either (Erki Russow, pers. comm.). Also, in the town of Narva, construction of the wall began during the 1370s (Kaljundi 1979, 50). The question whether such a bearing dated to the 14th century has been sporadic, or associated with the general trend of medieval towns of Old Livonia, needs another study.

It should probably be presumptive that the bishop’s castle and stone wall, built after the German conquest of Tartu, were not only military buildings, but symbolized the current way of life and demonstrated the power of the new rulers to indigenous people, as well as to the governors of the neighboring countries. It should be noted that although never examined, but looking at Tartu town wall from the perspective of defense function, the question arises – why and against whom was it built? After the Russians’ raid in 1262, the next act of war under the walls of Tartu was in 1558 in the Livonian War (military raid by the master of Teutonic Order, Wennemar von Bruggenei in 1396 was limited to capturing the castles and looting the land of diocese; Freymuth 1927, 25); the Russian invasion against the diocese in 1481 left Tartu intact (Freymuth 1927, 29). Thus it seems safe to say that the town wall of Tartu, having the deterrent effect against attacks by foreign enemies, in addition to the above-mentioned symbolic sense, was more

⁵ Calibrated by computer program CAL40.DTA OxCal v2.18 cub r:4 sd:12 prob[chron] (Bronk Ramsey 2005).

than just the protection-based military building. Finally, we should not overlook symbolism in the 1708, when the town was destroyed by the troops of Peter the Great, the demolished city wall and bishop's castle as traditional symbols of old power gave the people a clear signal that the former time and way of life were never coming back.

Summary

Of the extent of the town wall of Tartu during the late Middle Ages, only ruins survive today. So far as a result of archaeological research, it can be said that the wall is partly founded as a dry stone, partly soil or irregularly poured lime mortar was used to bind the stones. For constructing the wall, stone and limestone, intact bricks and the fragments of bricks have been used. The improvement and modification of the fortifications continued probably throughout the whole medieval period.

Although the date of construction of the medieval town wall of Tartu is largely based on written sources, i.e. to the second half of the 13th century, namely after the Russians' raid in 1262, the existing research results show that it seems more likely that the wall was actually constructed in the first half of the 14th century, when the former town seemed to have been completely re-planned. While at least in three different sections (Metsallik 1982; Tvauri & Bernotas 2006b; Bernotas 2010a) the town wall was built through the cultural layer dating to the 13th–14th centuries, it is logical that the wall was built later, which indicates that a settlement had previously been in this area.

The antiquities related to clay manufacturing dated to the same period (Heinloo 2006) allow us to consider that in addition to the town wall, the construction of stone houses and stone churches also probably began after the re-planning of the town. The different constructions and the cultural layer from the 13th – 14th century at Town Hall Square suggest that the medieval Town Hall Square as a market square derives from the first half of 14th century. This hypothesis is also supported by the fact that at the same time a new street network, Town Hall Square and the location of defense fortifications were planned in Tallinn.

Similarly with Tallinn, somewhere during the turn of the 13th – 14th centuries dramatic changes in the infrastructure of Tartu took place, when old wooden buildings were demolished and an entirely new network of streets was established

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References

- Abakumova, M.** 1990. Taimseid ja loomseid leide Tartu vanalinnast – Tartu ja kultuur. Tallinn, 22–30.
- Altoa, K.** 1975. Tartu linnamüür Oktoobri puiesteel ja Vene värav. Ajalooline õiend. Tallinn. Manuscript in National Heritage Board.
- Altoa, K.** 1979. Jakobi värava ja Katariina kloostri oletatav ümbrus Tartus. Ajalooline ülevaade ja aruanne 1978. aasta kaevamistest. Manuscript in the National Heritage Board.
- Altoa, K.** 1985. Uusi andmeid Lõuna-Eesti hiliskeskaegsetest linnakindlustustest. – Ehitus ja Arhitektuur, 1985, 1/2, 35–39.
- Altoa, K.** 1995. Tartu keskaegsetest kaitsemüüridest ja peamisest muinasteest. – Tartu arheoloogias ja vanemast ehitusloost. Artiklite kogumik. Ed. H. Valk. (Tartu Ülikooli Arheoloogia Kabineti Toimetised, 8.) Tartu, 141–150.
- Altoa, K.** 1999. Tartu keskaegsed kindlustused. (Eesti Arhitektuur, 4.) Tallinn, 16–17.
- AM.072587, Armémuseum.** <http://www.digitalmuseum.se/things/fastningsmodell/S-AM/AM.072587>
- Bernotas, R.** 2010a. Aruanne arheoloogilistest uuringutest Tartus Vabaduse pst 9 2009. aastal. Manuscript in the National Heritage Board.
- Bernotas, R.** 2010b. Aruanne Tartu keskaegse linnamüüri arheoloogilistest uuringutest Tartu Ülikooli Botaanikaaias 2010. aasta septembris. Manuscript in the National Heritage Board.
- Bernotas, R., Kriiska, A. & Vunk, A.** 2009. Archaeological fieldwork at Pärnu medieval and modern fortifications from 2007 to 2009. – AVE, 2008, 155–165.
- Bråthen, A.** 1995. Dated Wood from Gotland and the Diocese of Skara. Forlaget Hikuin, Sweden.
- Bronk Ramsey, C.** 2005. OxCal (computer program). Version 3.10. The Manual (available at <http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm>).
- Creighton, O. & Higham, R.** 2005. Medieval Town Walls. An Archaeology and Social History of Urban Defence. Tempus Publishing, Great Britain.
- EArA** 1965. Eesti arhitektuuri ajalugu. Eesti Raamat, Tallinn.
- Freytmuth, O.** 1927. Tartu linn orduajal. Tartu, 12–43.
- Heinloo, E.** 2006. Tartu lõunapoolne eeslinn kesk- ja varausajal arheoloogia andmetel. Peaseminaritöö. Tartu. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Heinloo, E.** 2007. Keskaegne Tartu Riia-eeslinn ehitusjäänuste põhjal. – Tartu Linnamuseumi aasta-raamat. Tartu, 65–76.
- Heinloo, E. & Vissak, R.** 2010. Kūüni tänava rekonstrueerimise käigus toimunud arheoloogiline järelvalve 2009. aastal. Manuscript in the National Heritage Board.
- Hermann, U.** 1974. Keskaegse Tartu topograafiast. (Ehitus ja Arhitektuur, 1.) Tallinn, 39–44.
- Hiekkanen, M.** 2003. Turun kaupungin perustaminen. Tulkintayritys uusien arkeologisten tutkimusten perusteella. – Kaupunkia pintaa syvemmältä. Arkeologisia näkökulmia Turun historian. Ed. L. Seppänen. (Archaeologia Medii Aevi Finlandiae, IX.) Hansaprint Oy, Turku, 42–52.
- Jouks, T. & Tvauri, A.** 1999. Aruanne arheoloogilisest järelvalvest Tartus Toomemäel gaasitrassi paigaldustöödel 1999. aasta juunis. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Kaljundi, J.** 1979. Narva – kindlustusarhitektuuri muuseum. – Teine elu: kultuuriväärtuste restaureerimisest. Ed. E. Valk-Falk. Kirjastus Kunst, Tallinn, 48–58.
- Läänelaid, A.** 2002. Jaani kiriku algus ja aastarõngad. – Horisont, 1, 30–34.
- Laidre, M.** 2008. Dorpat 1558–1708. Linn vaenu ja väe vahel. Argo, Tallinn.
- LUB** = Liv-, Est-, und Curländisches Urkundenbuch nebst Regesten. Bd. I. Hrsg. von F. G. von Bunge. Reval, 1857; Bd. XI. Hrsg. von P. Schwartz. Riga, 1905.
- Mäesalu, A. & Vissak, R.** 2002. On the older topography of Tartu. – The Medieval Town in the Baltic: Hanseatic History and Archaeology, II. Eds R. Vissak & A. Mäesalu. Tartu, 145–165.
- Mäll, J.** 2004. Arheoloogilise kultuurikihi spetsiifikast. Tallinna vanalinna territooriumil. – Linnusest ja linnast. Toim ja koost A. Haak, E. Russow & A. Tvauri. (MT, 14.) Tartu, 2004.

- Mäll, J. & Russow, E.** 2003. Kuidas otsiti Kalevipoja parteipiletit. – 50 aastat arheoloogilistest kaevamistest Tallinnas Raekoja platsil. Eds V. Lang & Ü. Tamla. (MT, 13.) Tallinn, 173–200.
- Marksoo, A.** 1980. Asend ja loodus. – Tartu ajalugu. Ed. R. Pullat. Tallinn, 13–17.
- Metsallik, R.** 1982. Tartu Barclay platsi kaevand. Ajaloolised uuringud, aruanne, joonised, fotod. Manuscript in the archive of town government of Tartu.
- Metsallik, R.** 1995. Tartu arheoloogilisest uurimisest. – Tartu arheoloogiast ja vanemast ehitusloost. Artiklite kogumik. Ed. H. Valk. (Tartu Ülikooli Arheologia Kabineti Toimetised, 8.) Tartu, 15–35.
- Metsallik, R. & Tiirmaa, U.** 1996. Linnamüüri uuringud Magasini tn 5 hoovil. Manuscript in the archive of LLC ARC Projekt.
- Otto, R.** 1918. Zur Ortsbeschreibung und Entstehungsgeschichte von Burg und Stadt Dorpat. – Aus Dorpats Vergangenheit. Dorpat, 3–15.
- Pärn, A.** 1997. Haapsalu linn Saare-Lääne piiskopkonna keskuste kujunemisloos. (Läänemaa Muuseumi toimetised, I.) Haapsalu, 26–48.
- Piirits, P.** 1996. Arheoloogilised fikseerimistööd Tartus Toomemäel Valgetorni asukohal. Manuscript in the National Heritage Board.
- Piirits, P.** 1998. Arheoloogiline järelvalve Tartus Laia tn kanalisatsioonitrassi kaevukohtadel. Manuscript in the National Heritage Board.
- Piirits, P.** 2004. Arheoloogilised järelvalvetööd Tartus Raekoja platsi O-ossa rajatud surfis. Manuscript in the National Heritage Board.
- Piirits, P.** 2005. Arheoloogilised uuringud Tartus Raekoja platsi sillutise ja trasside uuendamisel. Manuscript in the archive of town government of Tartu.
- Piirits, P.** 2006. Arheoloogilised järelvalvetööd Tartus Vabaduse pst. – Poe tn. – Kүүni tn. – Lai tn. ja Rүүtli tn. kaablitrasside rajamisel. Manuscript in the archive of town government of Tartu.
- Piirits, P.** 2008. Arheoloogilised järelvalvetööd Tartus Vabaduse pst 6 parkla rajamisel. Manuscript in the National Heritage Board.
- Prints, O.** 1967. Tartu kui kindlus. Manuscript in the National Heritage Board.
- Sarfati, H.** 1990. Dutch towns in the formative period (AD 1000–1400): the archaeology of settlement and building. – Medieval Archaeology in the Netherlands. Eds J. C. Besteman, J. M. Bos & H. A. Heidinga. Assen, 183–198.
- Stange, N.** 1933. Archäologisch-Topographisches aus Alt-Dorpat. Dorpat.
- Tiirmaa, U.** 1977. Tartu linnamüüri ja Vene värava torni 1977. aasta arheoloogiliste väliuurimiste aruanne, III. Joonised. Manuscript in the archive of LLC ARC Projekt.
- Tiirmaa, U.** 1979. Tartus Nõukogude tn kaevises väliuurimiste aruanne. Manuscript in the archive of LLC ARC Projekt.
- Trummal, V.** 1964. Arheoloogilised kaevamised Tartu linnusel. – TRÜ Toimetised, 161, 36–54.
- Trummal, V.** 1970. Arheoloogilised kaevamised Tartu vanalinna territooriumil. – TRÜ Toimetised, 258, 3–27.
- Tuulse, A.** 1942. Die Burgen in Estland und Lettland. Dorpater Estnischer Verlag, Tartu, 52–55.
- Tvauri, A.** 1999. Arheoloogilised uuringud Viljandi linnuses 1998. aastal. (Viljandi Muuseumi aastaraamat.) Viljandi, 1998, 20–27.
- Tvauri, A.** 2000a. Loodes-Vene päritolu slaavi keraamika Eestis 11.–16. sajandil. – EJA, 4: 2, 91–119.
- Tvauri, A.** 2000b. Pihkva pottsepad Viljandis ja Tartus 13. sajandil. – EJA, 4: 1, 21–30.
- Tvauri, A.** 2001a. Muinas-Tartu. Uurimus Tartu muinaslinnuse ja asula asustusloost. (MT, 10.) Tartu.
- Tvauri, A.** 2001b. Aruanne arheoloogilistest uuringutest Tartus Poe tänava lõunaküljel 2001. aastal. Manuscript in the Institute of History and Archaeology of the University of Tartu.
- Tvauri, A.** 2001c. Viljandi linnamüüri arheoloogilised uuringud aastatel 1997–1999. (Viljandi Muuseumi aastaraamat.) Viljandi, 2000, 92–110.
- Tvauri, A.** 2005. Aruanne arheoloogilisest järelvalvest Tartus Raekoja platsil vee- ja kanalisatsioonitrasside renoveerimisel. Manuscript in the Institute of History and Archaeology of the University of Tartu.

- Tvauri, A.** 2011. Aruanne arheoloogilisest järelvalvest Tartus Munga 16 hoone renoveerimise juures 2010. ja 2011. aastal. In preparation.
- Tvauri, A. & Bernotas, R.** 2006a. Archaeological investigations carried out by the University of Tartu in 2005. – AVE, 101–110.
- Tvauri, A. & Bernotas, R.** 2006b. Aruanne arheoloogilisest järelvalvest Tartus Poe tänava kanalisatsioonitorustiku ehitusel 2006. aastal. Manuscript in the National Heritage Board.
- Tvauri, A. & Bernotas, R.** 2007. Archaeological investigations in Tartu and Vorbuse settlement site. – AVE, 2006, 167–181.
- Uotila, K.** 2003. Turun linna ja sen kaupunki. – Kaupunkia pintaa syvemältä. Arkeologia näkökulmia Turun historiaan. Ed. L. Seppänen. (Archaeologia Medii Aevi Finlandiae, IX.) Hansaprint Oy, Turku, 153–160.
- Vaga, V.** 1965. = **EArA** 1965. Eesti arhitektuuri ajalugu. Eesti Raamat, Tallinn.
- Vaga, V.** 1969. = **Bara B.** Средневековые оборонительные сооружения Тарту. – Труды художественно-архитектурного факультета Тартуского государственного университета, 229.) Tartu, 162–184.
- Vaga, V.** 1980. Linnakindlustused. Tartu ajalugu. Eesti Raamat, Tallinn, 59–60.
- Vallas, A.** 1987. Tartu kindlused. – Äratrükk: Tulimuld, 1, 2, 4.
- Vissak, R.** 2000. Results of the archaeological investigations at the SE foot of Toomemägi, Tartu. – AVE, 1999, 113–120.
- Vissak, R. & Heinloo, E.** 2006. Archaeological investigations at Lai Street in Tartu. – AVE, 2005, 111–117.
- Vissak, R. & Piirits, P.** 2008. Arheoloogilised järelvalvetööd Tartus Küttri-Kompanii tn sadeveetrassi rajamisel. Manuscript in the National Heritage Board.

Rivo Bernotas

TARTU KESKAEGNE LINNAMÜÜR UUEMATE UURIMISTULEMUSTE VALGUSES

Resümee

Käesolevas uurimuses on kokku võetud seniste arheoloogiliste kaevamiste käigus saadud tulemused Tartu linnamüüri kohta, soovides leida vastused küsimustele, kuidas ning millisel kujul on see maapinnas säilinud, millal on müür ehitatud ja milline oli selle funktsioon keskajal.

Linnamüür on tänapäeval maapinnal säilinud vaid üksikute fragmentidena Tartu Ülikooli Botaanikaaias, Vabaduse puiesteel ja Jakobi tänaval. Kõige paremini on müür säilinud Vabaduse puiesteel, kus selle kõrgus jõepoolsest osast mõõdetuna ulatub maapinnal kuni 5 meetrini. Müür on seniste uurimistulemuste põhjal vundeeritud osaliselt kuivmüürina, pinnasega pakkimist on kasutatud Jakobi värava juures ja Poe tänaval, kasutatud on ka lubimördiga sidumist. Vene värava ja Mungavärava vahelises lõigus oli müür laotud 45-kraadise nurga all; kiiluna kraavi ning müürikivide vahele oli korrapäratult loobitud lubimörti. Gildi tänava alal on mainitud ka alusparveks laotud 4–5 tolli paksuseid männipuust latte.

Müür on laotud maakividest, mille vahele on lisatud nii tellisetükke, terveid telliseid kui ka lubjakive. Müüriosade ja tornide voorderdamisel on samuti kasutatud rohkesti telliseid. Üksikutel juhtudel on müüri voorderdatud ka paekividega ja müüritäiteks on kasutatud munk-nunn-tüüpi katusekivi katkeid.

Linnamüüri paksus on piirkonniti olnud erinev, olles 1,7–2 m paksune põhjaküljel, 2–2,4 m idaküljel ja 2–2,9 m lõunaküljel. Kaevatud tornide müüride paksus ulatub 1,9–3,5 meetrini Valge torni müürifragmendil, 2,17 meetrini Jakobi värava tornil, 2 meetrini Tõmptornil, kuni 4,5 meetrini Vene värava eesväraval ja 2,45 meetrini Pasatornil. Linnamüüri paksuste vahed erinevatel külgedel on siiski liiga väikesed, et nende põhjal ühe või teise külje põhjalikuma kindlustamise kohta kaugeleulatuvamaid järeldusi teha. Müüri erinevate lõikude ehituslikest erinevustest tulenevalt tuleb arvata, et linnakindlustuste täiustamist ja uuendamist jätkati vastavalt vajadusele kogu keskaja jooksul.

Ehkki seni on valdavalt kirjalikele allikatele tuginedes Tartu keskaegse linnamüüri ehituse dateeringuks pakutud 13. sajandi teist poolt, täpsemalt 1262. aasta venelaste rüüsteretke järgset aega, näib seniste uurimistulemuste põhjal siiski tõenäolisem, et müüri ehitus toimus 14. sajandi I poolel, mil senine linn näib olevat täielikult ümber planeeritud. Kuna vähemalt kolmes erinevas lõigus on linnamüür ehitatud läbi 13. sajandi lõpu ja 14. sajandi kultuurkihi, on loogiline, et müür rajati hiljem, mis näitab, et varasemalt oli sellel alal juba asustus olemas. Samasse perioodi ajanduvad savitöötlemissel seotud muistised nn lõunapoolse eeslinna alalt lubavad tõenäoliselt pidada, et lisaks linnamüürile alustati linna ümberplaneerimise järel ka kivikirikute ja -majade ehitust. Raekoja platsi lääneosast avastatud mitmesugused sõrestik- ja raamkonstruktsioonidega ehitised, idaküljes paiknenud vitstest punutud tara jäänus ja umbes 60 cm paksune 13.–14. sajandi kultuurkiht lubavad oletada, et ka Raekoja plats keskaegse turuplatsina pärineb linna ümberplaneerimise järgsest perioodist.

Vaadates Tartu linnamüüri vaid kaitseotstarbekuse aspektist, tekib küsimus, miks ja kelle vastu see rajati? Pärast 1262. aasta venelaste rüüsteretke toimus sõjategevus Tartu müüride all uuesti alles 1558. aastal Liivi sõja ajal (ordumeister Wennemar von Bruggenei 1396. aasta sõjakäik Tartu vastu piirdus vaid piiskopkonna linnuste vallutamise ja maa-ala rüüstamisega; 1481. aastal piiskopkonda tunginud venelased jätsid Tartu samuti puutumata). Seega tuleb pidada tõenäoliseks, et ka Tartusse pärast Saksa vallutust ehitatud kivist piiskopilinnus ja hilisem linnamüür polnud ainult välisvaenlaste tõrjumiseks püstitatud militaarehitised, vaid sümboliseerisid senise elukorralduse muutust ning uute valitsejate võimu nii põliselanikele kui ka naabermaade valitsejatele. Lõpuks ei saa sümbolismist mööda vaadata ka 1708. aasta linna hävitamise puhul Peeter I vägede poolt: purustatud piiskopilinnus ja linnamüür kui senise võimu sümbolid andsid siinsetele elanikele selge signaali, et endine aeg ei tule enam kunagi tagasi.

MEDIEVAL FORTIFICATIONS OF PÄRNU An archaeological approach

by

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1. Introduction
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1. Introduction

Between 1100 and 1350 Eastern Europe was transformed by a wave of German immigration (*Ostsiedlung*), which moved the eastern boundaries of the German-speaking world hundreds of miles beyond its former limits on the rivers Elbe and Saale. In some areas, this new settlement came in the wake of conquest by German lords and knights, but in many other regions the local rulers encouraged German settlement. The new settlers wanted land, and the local rulers were happy to grant it and to profit, directly or indirectly, from the taxes, rents and tithes flowing from the new villages. Rural settlements were complemented by new urban foundations. German burgesses formed the core of most of the new chartered towns founded in Eastern Europe in these centuries. They brought their language, culture and law with them. German urban settlement spread far beyond the limits of German rural settlement and up to the borders of Russia¹ in the present territory of Estonia, the area which was then the northern part of medieval Old Livonia.

It has been suggested that, in Estonian territory, the average development from the rudimentary urban settlement to the walled medieval town took around 50–100 years. In Estonian territory, the town walls were probably erected during the 14th century.

Enclosing the towns with walls in Old Livonia has been assumed to be a phenomenon of Western European culture represented by German settlers rather than a wide-spread tendency around the Baltic Sea. Although fortifying the towns seems to have been quite widespread in Old Livonia, the similar trend is not always followed in adjacent areas.²

Medieval Pärnu³ was one of the six towns fortified with stone walls in Estonian territory along with Tallinn, Tartu, Viljandi, Narva and Haapsalu. Nowadays, the aboveground segments of the walls (with the exception of Tallinn) are preserved only in sporadic fragments. As the written sources are scarce, and the aboveground medieval town walls and earthen fortifications from modern times have been almost completely destroyed, the archaeological aspects deserve more attention.

Pärnu is located in modern south-western Estonia (fig. 1), on a creek flowing into the River Pärnu. In the Middle Ages, there were two towns in the area of modern Pärnu, Vana-Pärnu⁴ and Uus-Pärnu separated from each other by the River Pärnu. Based on the favourable location on the right tributary of the river, Heinrich, bishop of Saare-Lääne declared Vana-Pärnu (founded after 1241 at the mouth of the River Sauga), to be the location of the diocesan chapter in 1251 and its church as the main church of the diocese. After the burning of Vana-Pärnu in 1263 by the Lithuanian Prince Traniate, the centre of the diocese was moved to Haapsalu. Vana-Pärnu was primarily inhabited by agricultural labourers and did not have a wall, but was surrounded by a fence.⁵ Vana-Pärnu was almost completely destroyed during

¹ Bartlett 1997, 97.

² Bernotas 2012, 24 ff.

³ Referred in German as Pernau.

⁴ Referred in German as "Alt-Pernau".

⁵ Laakmann 1930b, 3–4.

the Livonian War in 1560 and 1575,⁶ and after the war the rebuilding of the town was prohibited by the Swedish kings Sigismund III Wasa as well as by Charles IX.⁷ Fields were established on the sandy terrain of the town area.⁸ In the second quarter of the 17th century, the Uus-Pärnu town council began to buy the plots of former citizens, preventing them from entering into foreign hands. In the middle of the 19th century, a village of fishermen and sailors emerged in the town area and was incorporated into Uus-Pärnu in 1919.⁹

Uus-Pärnu, the town of the Teutonic Order, on the left bank of the River Pärnu, was established in 1265 through the privilege of the master of the Livonian Order Konrad von Mandern.¹⁰ In the first half of 16th century the town had approximately 1000 inhabitants.¹¹ It covered a total area of 6.5 ha and was separated from the castle to the west by walls and a moat. The medieval wall (fig. 2–3) ran along present-day Põhja Street towards the east as far as the corner of Hommiku Street, turning from the south from there to the only currently intact and preserved part of the town wall, the Red Tower. From there it ran to the west along Rüütli Street to Munga Street. The wall continued from this point across Lastepargi square to the south-east corner of the castle roughly opposite the present-day Russian Church.¹² In addition to the walls, the fortifications contained moats which surrounded the town to the east and the south, and a bailey on the south and west sides.¹³

At the end of the Middle Ages, the town wall of Uus-Pärnu was 0.91 km long, enclosing the town on three outer sides, with the addition of the 0.14 km long wall of the bailey on the western side. The whole defensive perimeter was surrounded by a moat.¹⁴ During the Late Middle Ages the town wall had six towers and eight gates (fig. 2).¹⁵ The wall was severely damaged in the wars of the 16th–17th centuries. In the course of the construction of new bastions between 1670 and 1710, the northern part of the wall was adjusted to be the support for a new curtain wall.

The artillery tower inside the Venus bastion and the White and Red Towers were customized as stores for gunpowder. The remaining parts of the wall and the towers were demolished in stages.¹⁶

During the archaeological fieldwork, parts of the medieval town wall of Uus-Pärnu were investigated through several surveys and excavations. Viewed separately, they do not provide much information. However, it is important to gather information about the tangible remnants of the wall, its basic design parameters, the documentation of precise positions, and radiocarbon and dendrochronological dates of wooden constructions. Written records are problematic as sources of independent research, as in the fire of 1524 the whole medieval town council archive of Uus-Pärnu was destroyed.¹⁷ In available written sources, the town wall is mentioned only briefly. The oldest preserved town plans, where the walls were marked, derive from the 17th century. To understand when and how the town was fortified during the medieval period, it is necessary to combine the archaeological data gathered in the fieldwork, the written sources, and historical plans of the town.

Bruce and Creighton¹⁸ state that the key issues and challenges town walls present to researchers include their extent, their relationship with the urban context, their effects as barriers within the townscape, and the divisive dissonance of a heritage owned, used and exploited by different groups over the centuries. A historic perspective is vital, as, to some extent, urban communities always regarded walls as part of their “heritage”.

Regarding the subject of the “town”, it has been stated¹⁹ that the documentary sources give information on urban legal rights and political, economic or social events. Rarely or never do they inform us about the material or environmental conditions under which towns originated and developed. As another example, the political and military background and the rights of fortification find a place in the documentary sources, but, as a rule, there is nothing in them about the size, organization, construction, residential arrangements or occupation of specific sites. Even the important question of dating, often decisive for placing a town in its historical role, cannot be answered with textual evidence. While the mention

⁶ Vaga 1965, 49.

⁷ Laakmann 1930b, 4–5.

⁸ Kivimäe et al. 1998, 48.

⁹ Laakmann, 1930b, 4–5.

¹⁰ Kivimäe et al 1998, 55.

¹¹ Põltsam-Jürjo 2009, 71.

¹² Laakmann 1930b, 6.

¹³ Sedman 1977, 21.

¹⁴ Raie 1996, 102.

¹⁵ Alttoa 1979.

¹⁶ Raie 1996, 102.

¹⁷ Kivimäe et al. 1998, 9; Põltsam-Jürjo 2009, 24.

¹⁸ Bruce/Creighton 2006, 249.

¹⁹ Fehring 1991, 15–16.



Fig. 1 Location of Pärnu on the Livonian map from the late 17th century (map NOVA TOTIVS LIVONIAE accurata Descriptio).

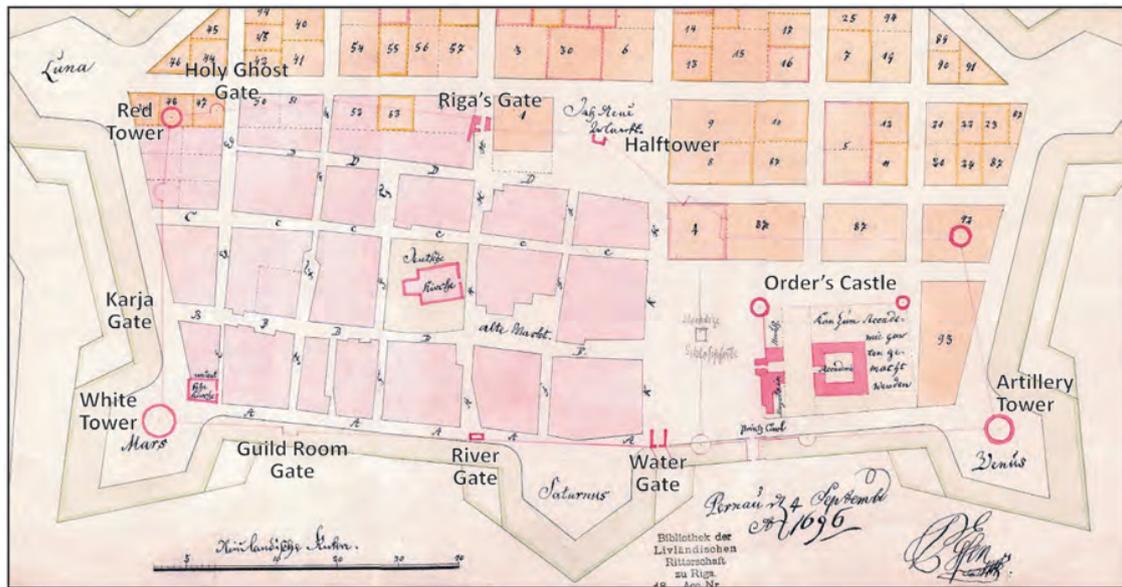


Fig. 2 Towers, gates and bastions of the town wall of Pärnu according to von Essen 1696. The plan is adjusted to the south (Riksarkivet Krigsarkivet 0406: 28: 039: 014; plan modified by the author).

of a site in documents only testifies to its existence at that time, archaeology, on the other hand, can often show that the origins and early roots were often centuries older.

The purpose of the current article is to summarize the results obtained so far in the excavations of the town wall of Pärnu and to answer the questions of how, and in what form, it is preserved in the ground. On the basis of recent data, the possible time of construction of the wall will be analysed and the significance of the wall for medieval Old Livonian residents will be discussed. Also, on the basis of comparable material from towns in Europe the place of the fortifications of Pärnu in the Baltic context is analysed.

2. Written and visual sources

The oldest plan of the town fortifications and castle of Uus-Pärnu was drawn up by Georg Schwenngell c. 1640. This was a modernization project of the entrenchments, which included the Order's castle, the bailey, the town wall, moat and bastions.²⁰ Several other town plans relating to creating entrenchments are known from the second half of the 17th century (fig. 2).²¹ During the 20th century, several scholars have contributed to reconstructing the medieval town plan.²²

The first written reference to the existence of town fortifications of Uus-Pärnu is from 1420.²³ However, with the first privilege from 1265, a third of the court revenue of the Commander of Pärnu was granted to securing the town. In 1318 this amount was raised to half of the revenue of administration of justice in Uus-Pärnu.²⁴ In 1492, a "town wall with many towers and a moat in front of it" is explicitly mentioned.²⁵

The oldest written source which informs us about the extent of the town wall of Pärnu in the Late Middle Ages is the town book of Uus-Pärnu, which extensively covers the real estate purchase, sale and inheritance transactions of the town in the 16th century. The edited town book was published by

Heinrich Laakmann²⁶, and translated into Estonian and annotated with comments by the historian Küllike Kaplinski.²⁷ Based on the town book is drawn the oldest reconstruction of the town fortifications which depicts Pärnu in 1554.²⁸

In the compendium of the Old Livonian castles by Karl von Löwis of Menar, the author mentions wall and ditch separating the castle from the town on its east side. The author speculates that the town had already been secured at a very early stage and notes that fortifying the town was the obligation of its citizens.²⁹ The earliest archaeological excavations known in the area of medieval fortifications of Pärnu were also carried out by Karl von Löwis of Menar in 1896 at the Order's castle (fig. 3, excavation 18).³⁰

Armin Tuulse has extensively discussed³¹ the Teutonic stronghold, indicating its importance for the protection of the port in its vicinity, and suggesting its essential role as the outpost against the Saare-Lääne diocese and the Danes ruling in Northern Estonia.³² Tuulse also mentions that when the town was surrounded by the wall, a bailey was built for the stronghold, connecting the fortress and the town into collective defence system.³³

Helju Sirel included a comprehensive overview of the town wall of Pärnu in her analysis of the town fortifications on the basis of written sources. She argued that the first building in Uus-Pärnu was the Commander's castle, the construction of which started in the 13th century³⁴, and lasted throughout the 14th the century. The castle was built at the same time as the first bailey, and the second bailey was built after the construction of the stone wall around the town. The town and the castle were separated by a moat.³⁵ Sirel dated the beginning of the construction of the town wall to the 14th century³⁶, with completion at the end of the century.³⁷

It has been suggested that an urban settlement surrounded by a fence, an earthen rampart and a

²⁰ Aluve 1993, 17.

²¹ Raie 1977a, 4–5; Kaljundi/Raie 1981.

²² E.g. Schneider 1911, Löwis of Menar 1922, Tuulse 1942, Laakmann 1956.

²³ Vaga 1965, 66.

²⁴ Quellen, 18–20.

²⁵ Hausmann 1906, 40.

²⁶ Laakmann 1930c.

²⁷ Kaplinski 1979.

²⁸ Sirel 1970b.

²⁹ von Löwis of Menar 1922, 40.

³⁰ von Löwis of Menar 1897.

³¹ Tuulse 1942.

³² Tuulse 1942, 134.

³³ Tuulse 1942, 138; also see von Löwis of Menar 1897.

³⁴ Sirel 1970a, 10.

³⁵ Sirel 1970a, 6.

³⁶ Sirel 1970a, 11.

³⁷ Sirel 1970a, 67.

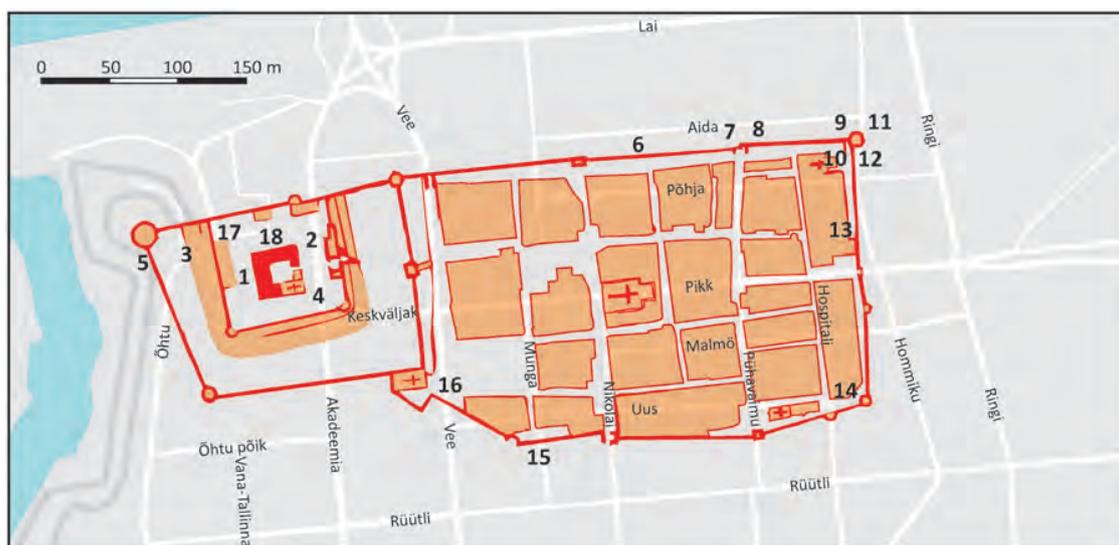


Fig. 3 Archaeological investigations in the area of the town wall and the approximate location of the wall on a contemporary map of Pärnu: 1 Metsallik 1985; 2 Vunk/Jonuks 1999; 3 Kadakas et al. 2003; 4 Kadakas et al. 2003; 5 Tvauri 2010; 6 Kadakas et al. 2003; 7 Bernotas et al. 2009; 8 Bernotas et al. 2009; 9 Bernotas et al. 2009; 10 Bernotas et al. 2009; 11 Raie et al. 1978; 12 Bernotas et al. 2009; 13 Bernotas et al. 2009; 14 Sedman 1977; 15 Tamla 1992; 16 Kadakas et al. 2003; 17 Vissak 2012 in prep.; 18 von Löwis of Menar 1896 (map from the Estonian Land Board webpage: <http://www.maaamet.ee>, modified by the author. The relevant excavation reports are available in the archives of the National Heritage Board Tallinn, the Museum of Pärnu and the Department of Archaeology of the University of Tartu).

moat simultaneously evolved in front of the Order's castle mentioned in 1265.³⁸ This hypothesis is also supported by Ervin Sedman, who pointed out that the securing of Uus-Pärnu had to come on the agenda after at least the first complete destruction of Vana-Pärnu in 1263.³⁹

Ervin Sedman's report of the fieldwork concerning the Red Tower comprehensively discusses the examination of the tower during the 1970s. Sedman suggests that the town fortifications were built in the middle of the 14th century. The author also notes the hypothesis of the simultaneous establishment of the lower floor of the Red Tower and the town wall, which was confirmed in these investigations.⁴⁰

The most comprehensive study based on written sources is a monograph by Inna Põltsam-Jürjo. She analyses the town fortifications with reference to her doctoral thesis on Uus-Pärnu in the first half of the 16th century and relies on archival documents (town council books of records, urban records, correspondence, etc). The author describes in detail the renovations and repairs of the wall and the construction of preventive fortifications. She assumes that the

intensive construction work of the first half of the 16th century might be related to the initiative of the burgomaster Johann van Lynthem.⁴¹

3. Archaeological research

At present, nothing visible above ground has survived of the Uus-Pärnu town walls and towers, with one exception, the Red Tower, named after its brick plastering⁴² and located in the centre of present-day Pärnu in Hommiku Street. The other parts of the wall have survived more or less demolished under the modern surface layers.

The area under the town wall was investigated geologically by Rein Raie, who discovered that the investigated area was located within an absolute range of 3.5 to 6.5 m above sea level. The layers of the area consisted of fill, deposits of alluvial mud, sands containing organic, flowing clay-soils of the Baltic Ice Lake, glacially transported sand and gravel, and boulder clay.⁴³

Excavations conducted by Romeo Metsallik in the area of Order's castle (fig. 3, excavation 1) meas-

³⁸ Raie 1982, 6.

³⁹ Sedman 1977, 14.

⁴⁰ Sedman 1977, 22 ff.

⁴¹ Põltsam-Jürjo 2009, 38–48.

⁴² Raie 1996, 102.

⁴³ Raie 1977b.

red the western wall of fortress to be 155 cm thick.⁴⁴ The wall was built about half a meter deep in the sand base. The foundation was built of large stones, and pieces of brick and formwork boards were used for its construction. Metsallik assumes that the construction of the walls of earth began after the completion of the foundation over the whole area of the castle.⁴⁵

The walls of the foundation of the Order's castle (fig. 3, excavation 2) measured around 1 m in thickness in places, consisting of dry-stone work at the bottom employing stones 20–30 cm in diameter; the upper part consisted of limestone and smaller stones, which in turn were associated with large amounts of mortar. The excavated wall of the bailey of the Order's castle was 155 cm thick and constructed primarily of stones bound with lime-mortar, stacked with pieces of limestone and bricks in between. The eastern part of the wall of the bailey was 160 cm thick and laid with bricks in the upper part. The eastern part of the wall was built of lime-mortar bound stones, as large as 90 cm in diameter and averaging up to 30 cm diameter, with limestone and brick between. On the north side of the wall, a 20 cm thick mortar footing was documented.⁴⁶

The thicknesses of the three walls of the room documented in the Order's castle were from 80 cm up to 2 meters. The walls were laid of stones and bound with lime mortar. The stones of the walls measured c. 30 cm, and a few stones were as much as 60 cm in diameter.⁴⁷ The thickness of the walls surrounding the other room measured 105–110 cm. The walls were constructed of medium-sized (up to 20 cm in diameter) lime-mortar bound stones, brick and limestone. Visible on the sides of the wall in places were the locations of horizontal logs embedded in mortar.⁴⁸

The western wall of the inner bailey of the Order's castle, situated in Öhtu Street ran in an east-northeast west-southwest direction and consisted of large stones bound with lime-mortar and pieces of bricks. This wall crossed the 1.75 m thick northern wall of the Order's castle (fig. 3, excavation 3). The southern wall of the inner bailey on Akadeemia Street (fig. 3, excavation 4) measured about 1.5 meters in thickness and comprised large stones bound with lime mortar and pieces of bricks.⁴⁹

The artillery tower located in the northwest corner of the bailey⁵⁰ was made of horizontal rows of limestone and stones without any use of bricks (fig. 3, excavation 5). The interior wall of the tower and the walls of the loopholes were covered with a thin layer of lime daub. The thickness of the wall of the tower measured 4.66 m and it had a 20 cm wide socket on the outer side. Inside the tower there was a layer of brown clay as the floor, which could possibly act as a damp course. The walls of the tower were covered with a 1.1–1.2 m thick cultural layer. The external diameter of the tower was 16.48 m and the internal diameter 7.22 m.⁵¹

The town wall in Aida Street (fig. 3, excavation 6) measured 1.35–1.5 m in thickness, and had survived to a height of two meters. Two lower lines of stones extended 40 cm from the inside of the wall. Up from this height on the inside of the wall, smaller stones were used than on the surfaces. The wall was of stacked stones bound with lime mortar. Roof tiles and fragments of bricks were added into masonry joints. The wall was of stacked rows of stones, abundant use of mortar was characteristic at the upper part.⁵²

In Aida Street, in an area of 4.5 m (east-west) × 2.7 m, a fragment of the alleged town wall was excavated (fig. 3, excavation 7); it was probably part of the so-called “Guild Room” gate. This stone construction consisted of stones (diameter 30 cm) placed irregularly on top of each other. Near the last mentioned alleged part of the wall, another fragment of wall up to 1.6 m in width was excavated (fig. 3, excavation 8). The wall was built of stones with a diameter of 25–30 cm and bound with lime mortar. Under the southern side of the fragment, a log foundation was discovered. Possibly this part of the wall was also part of the Guild Room Gate.⁵³

Another part of the town wall was excavated at the intersection of Aida and Hommiku St (fig. 3, excavation 9). A town wall fragment running from east to west measured 1.84 meters in thickness. The wall consisted of stones up to 30 cm in diameter, bound with friable lime mortar which contained fragments of bricks.⁵⁴

⁴⁴ Metsallik 1985, 4.

⁴⁵ Metsallik 1985, 6.

⁴⁶ Vunk/Jonuks 1999, 16 ff.

⁴⁷ Vunk/Jonuks 1999, 8.

⁴⁸ Vunk/Jonuks 1999, 13–15.

⁴⁹ Kadakas et al. 2003, 181.

⁵⁰ After the establishment of bastions in the 17th century, the tower remained intact within bastion Venus (fig. 4; Tvauri 2010, 168).

⁵¹ Tvauri 2010, 168–169.

⁵² Kadakas et al. 2003, 185.

⁵³ Bernotas et al. 2009, 159.

⁵⁴ Bernotas et al. 2009, 159.

A fragment of the town wall discovered in Hommiku Street (fig. 3, excavation 10) measured 2.3 meters in thickness and was of stacked stones with a diameter of 30 cm, bound with pieces of brick and limestone containing lime mortar.⁵⁵

The tower known as the White Tower, located in the northeast corner of the town, is known from both written sources and archaeological material.⁵⁶ This tower was built of fieldstones bound with lime mortar. The ground floor level, equipped with dual loopholes, is preserved. In parts of the loopholes, dolomite stones and bricks were used (fig. 3, excavation 11). The tower is elliptical in plan with a northwest-southeast orientation. It is 13–14 m in diameter, the inner diameter varying from 6.8–7.2 m. The thickness of the external wall is about 3 m. The thickness of the tower wall in the northern part of the town wall in the longitudinal direction is 3.5 m.⁵⁷ In 2008, the walls of the tower were re-excavated (fig. 3, excavation 12) to document their precise location.⁵⁸

A part of the town wall was discovered at the corner of Pikk and Hommiku streets (fig. 3; excavation 13). It was of stacked stones up to 30 cm in diameter and fragments of bricks, bound with lime mortar.⁵⁹

Fieldwork in the immediate vicinity of the Red Tower (fig. 3, excavations 14; fig. 4) revealed that the thickness of the southern part of the town wall was 1.35 m and the eastern section of wall was 1.5 m thick.



Fig. 4 Red Tower, view from the east (photo by the author).

The height of the wall from the original ground level was 3 meters; the final height was approximately 6.8 m, plus a part of the balustrades. The wall was built of fieldstones bound with brittle and porous lime mortar and was faced with bricks. The mortar used for bonding the bricks was tighter, lighter and stronger in concentration.⁶⁰ In the eastern section of wall, the gaps in masonry were tightly filled with clay. Since there was no such clay filling on the town side of the wall, it can be concluded that the walls were covered with damp proofing to prevent the rising of water from the moat, which was significant during periods of frequent rise in the river level.⁶¹ The thickness of the outer wall of the Red Tower extends to 2.5 m. The inner wall of the ground floor was lined with bricks.⁶²

The most widely opened section of the town wall of Uus-Pärnu was excavated in 1990–1991 in Munga Street (fig. 3, excavation 15). This 23 m long section of the wall was stacked in its lower part of stones up to 60–70 cm diameter and in the upper

⁵⁵ Bernotas et al. 2009, 159.

⁵⁶ The White Tower, a round tower in at the northeast corner of the town wall which is described in detail in written records, was built in the 16th century. There was, however, an earlier tower in the same location. It is mentioned in the town records, in a description of the fire in 1533, which burned down a large part of New Pärnu and blew up the tower in the northeast corner where the gunpowder was kept (Altoa 1979, 20). The new tower was built between 1533 (when the gunpowder explosion destroyed the White Tower's predecessor) and 1543 (when the new tower is mentioned in historical records) (Laakmann 1956). The tower was of innovative design in comparison with earlier firearms towers, with a lower deck customized for defence due to the increased firepower of cannons (Altoa 1979, 22). The White Tower was heavily damaged in the siege of 1562 (Renner 1995, 119), and the hostilities of 1575, when the Russians destroyed presumably half of it (Laakmann 1930b, 7). The tower was probably restored in the coming decades because in 1624 it was in use again. During the construction of a parallel net of bastions under the Swedes, the White Tower was left inside bastion Mars, perhaps at first with no function, but later as a gunpowder cellar (note from 1670), which was completed in the early years of the Great Northern War (Altoa 1979, 21 ff). In the second half of the 19th century, bastion Mars and the White Tower were demolished.

⁵⁷ Raie et al. 1978, 12–13.

⁵⁸ Bernotas et al. 2009, 160.

⁵⁹ Bernotas et al. 2009, 159.

⁶⁰ Sedman 1977, 19.

⁶¹ Sedman 1977, 26.

⁶² Sedman 1977, 28–29.

part of stones up to 20 to 50 cm in diameter. The stones were bound with lime mortar, and fragments of limestone and bricks were also used. Underneath the wall, a log foundation was discovered and provided a radiocarbon date of 590 ± 30 ^{14}C years (cal. 1310–1405 AD with the probability of 68.2 %).⁶³

The town wall section at Vee Street (fig. 3, excavation 16) was 2.3 m thick at the lower part and 1.7 m at the upper part. The wall was of stacked stones, limestone and bricks, and bound with lime mortar. On the north side of the wall, two wooden stakes were discovered, and on the southern side of the wall, at a distance of 2 meters from it, a parallel line of six wooden stakes was discovered.⁶⁴

Although the dendrochronological dating of wood from archaeological material has somewhat intensified in recent years in Estonia⁶⁵, the number of samples obtained from the town fortifications still turned out to be insufficient. In neighbouring countries the dendrochronological method used for dating constructions have been applied e. g. to the town fortifications of Visby, Gotland⁶⁶ and the fortifications of Lübeck.⁶⁷ Sawing sampling discs from the alleged log raft foundation of the medieval town wall of Tartu⁶⁸ for dendrochronological dating has been on the agenda several times over the years, but the excavations have not yet begun.⁶⁹

Of the four wooden discs collected by Rünno Vissak from Õhtu Street from the contemporaneous cultural layer directly next to the bailey wall⁷⁰ (fig. 3; excavation 17), one sample could be dated dendrochronologically.⁷¹ Comparing the 148-year

length test disc *Oepprna1* with the Estonian pine chronology⁷² (*3epestcr*, $t = 8.73$, $W = 71.1$; see also fig. 5), the samples from the Kolm Õde building complex in Tallinn (*3ep3od14*, $t = 5.08$, $W = 60.3$), from the Tallinn Town Hall (*3eptlr04*, $t = 6.57$, $W = 62.1$), from a waste-pit at Ülikooli Street 14, Tartu (*3epy1406*, $t = 4.9$; $W = 67.0$), and from Vene Street 12 building (*3epv1202*, $t = 5.47$, $W = 67.0$), the last tree ring growth shows the year 1347.⁷³

4. Discussion and results

The archaeologically investigated sections of the town wall of Uus-Pärnu reveal that it has been relatively homogeneous in terms of building technology. In the northern part, it was made mostly of stones with a diameter of 30 cm. They were stuck in place with lime mortar and fragments of bricks. Also roof tiles and pieces of limestone were used in the seams. The thickness of the wall facing the riverside part of the town varied from 1.35 m to 1.84 m. At least in some cases, a log foundation layer was located underneath the wall. On the east side of the wall the construction was also of stones up to 30 cm in diameter which were used along with fragments of bricks and stuffed in the gaps. Near the Red Tower, clay was used for plastering to prevent leaking through the wall during the increase of water in the moat. The thickness of the wall on the east side is up to 1.5 m. On the south side, the thickness of the town wall varies from 1.35 m near the Red Tower to 1.7 m at Vee Street. The wall was built of fieldstones

⁶³ Tamla 1992, 291; see also Bernotas et al. 2009, 155.

⁶⁴ Kadakas et al. 2003, 188.

⁶⁵ E. g. Bernotas 2008; Kriiska et al. 2011; Bernotas 2011b. Bräthen 1995, 30–37.

⁶⁶ Glaser-Mührenberg 1996, 62.

⁶⁷ Stange 1933, 25.

⁶⁸ Bernotas 2011b, 3.

⁶⁹ Vissak 2012 in prep.

⁷⁰ Vissak 2012 in prep.

⁷¹ According to the methodology currently followed in Europe, wooden structures are dated using a series of average annual ring widths advisably taken from ten different log samples. In order to achieve sufficient reliability of compared series, they must be long enough. The recommendation is 100 years, but in some cases 50–60 years. To assess the similarity and reliability of the series the Student t -value is used for parametric methods and a so-called sign-test in non-parametric cases. The Student t -value is calculated from the correlation coefficient and the length of the compared series. The larger the t value, the more reliably similar the series are. Comparing a hundred pairs of numbers, the similarity is considered 95% reliable when t is higher than 4. When comparing identical series the value is $t=100$. In practice, the value of t is calculated

using different formulas in computer programs and that is why its value is slightly influenced (Sander/Levanic 1996, 269–272). – The Sign test (Gleichläufigkeit) gives the percentage of change in the same direction (increase or decrease) of neighbouring rings in two compared series (Kaennel/Schweingruber 1995, 162). When the growth (width of year ring) decreases for two ring-widths placed beside each other, then it is considered to be one similarity point. When in both series the increase is higher in the next year, then this also gives one similarity point. When one of the year ring-widths remains unchanged, then this gives half a point. When counting the points for the same direction changes and dividing this figure with the sum of total changes (length of series) the ratio W is obtained (Gleichläufigkeit). Depending on the length of the series the program also gives a confidence level, at which the calculated W is reliable (0,95; 0,99 or 0,999). The Sign test is used alongside the Student t -value (Läänelaid 1999, 142). – In order to measure and date samples well-known dendrochronology programs in Europe, TSAP (Time Series Analysis) (Rinntech) and Catras (Computer Aided Tree Ring Analysis System), were used (Aniol 1983, 46).

⁷² Läänelaid/Eckstein 2003.

⁷³ Bernotas 2011b, 2.

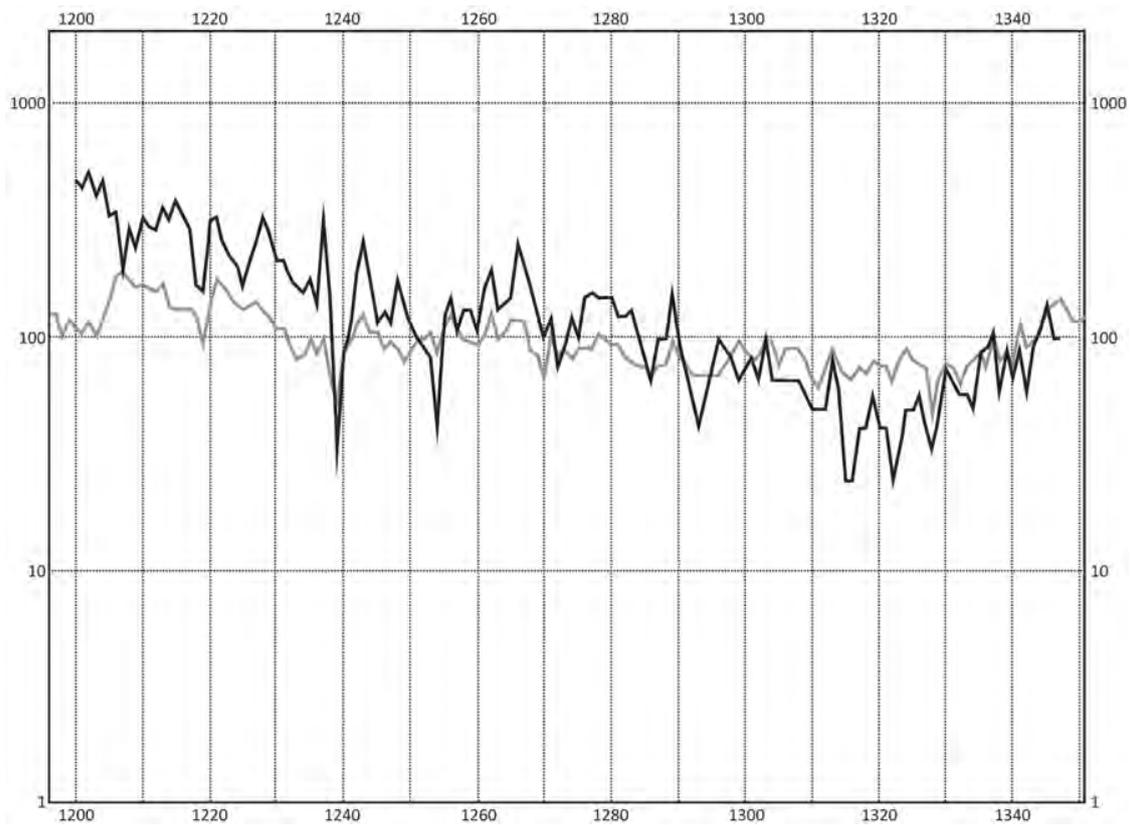


Fig. 5 Average of sample from Õhtu Street (*Õeppna1*, black line) in comparison with the Estonian pine chronology (*Zepester*, grey line). Y-axis marks the width of annual ring and x-axis marks the years.

between which bricks were placed employing brittle lime mortar (near the Red Tower). Limestone was sometimes used in the construction (Vee Street), as well as the brick and limestone fragments (Munga Street). According to archaeological research, the walls of the Order's Castle were mostly built of stones up to 30 cm in diameter. For building the walls of the bailey, large stones up to 90 cm in diameter were sometimes used. Part of the castle's foundation was built as dry-stone work. Limestone and brick fragments were placed in the masonry. The thickness of the outside walls of the castle in the studied areas ranged from 1.5 m to 1.6 m, and that of the internal walls from 0.8 m to 2 m. Medium-sized stones, bricks and limestone tiles were used in the interior walls. The thickness of the walls of the investigated towers varies from 2.5 meters in the Red Tower to 3 m in the White Tower and up to 4.66 m in the Artillery Tower in the northwest corner of the bailey. The towers are similarly built to the walls of fieldstones. In places, limestone (the Artillery Tower in the northwest corner of the bailey), bricks and dolomite stones were used (the White Tower).

With reference to the archaeologically explored town wall sections, it is impossible to say for the time being whether or not the towers and gates were secondary to the wall. Looking at the thickness of some of the walls of the investigated towers (such as the Artillery Tower in the northwest corner of the bailey and the White Tower), it is clear that they were erected in the age of advanced firearms. We may assume that the upgrading and refurbishing of the wall probably continued throughout the medieval period, in the same manner as, for example, in Tartu.⁷⁴ Several alterations to the town wall are known from the 16th century. The reinforcement of the wall is documented during the period from 1533 to 1556.⁷⁵ Restructuring work took place around the year 1520. Probably at that time the round towers of the east side and semicircular tower at the southwest corner of the town wall were built.⁷⁶

⁷⁴ Bernotas 2011a, 66.

⁷⁵ Quellen, 282–290.

⁷⁶ Vaga 1965, 66.

Similarities have been noted between the town wall of Pärnu and the fortifications of Tallinn, where the oldest parts of the wall were from 0.9 to 1 m thick and at least 3 m high. The so-called Kanne wall near Nunnatorn Tower, erected at the beginning of the 14th century, was 1.30 m thick and 6.2 m high. The Tallinn town wall with arched niches between Hellemanni Tower and the Viru Gate, presumed to be contemporary with the alleged age of the town wall of Pärnu, was 6.5 m high.⁷⁷

Based on finds of ceramics and the ¹⁴C analysis of a plank found in the layer of debris of a wooden building near the town wall at a plot situated at Aida Street 5/Hommiku Street in the northern part of the town, the origins of settlement in this area can be dated most likely to the second half of the 13th century.⁷⁸ According to the radiocarbon data, the log raft discovered under the town wall at Munga Street 2 dates with 68.2 % probability from the period between 1310 and 1405 AD (590 ± 30 ¹⁴C years). The above information and the date obtained for the wooden sample from Öhtu Street next to the bailey wall (last growth year 1347), might quite possibly date the construction of the town wall of Uus-Pärnu to the second half of the 14th century. The possibility of secondary wood, however, cannot be completely eliminated, which could explain only one confirmed date of the four samples of wood collected. An analogous example from Western Europe is the first town wall of Antwerp, which written sources date to around 1200, while an identified sample from a large pole from under the wall indicates the period around AD 1000.⁷⁹

What can be concluded from the documentary research about the initial condition and the builders of the wall? According to written sources, it has been noted that 12 masons and 24 workers worked six weeks on the construction of the White Tower in 1540.⁸⁰ It has been suggested that they originated either from the suburbs, the nearby countryside or from other towns.⁸¹ Unfortunately from the written sources it does not conclude if the construction was completed or not. It has been also suggested that stonemasons and other craftsmen from Gotland

connected with the building activity continued to work in the Baltic region until the end of the medieval period.⁸² The best Scandinavian example of the international urban culture of the 13th and 14th centuries is Visby, which had a predominantly German population since the early 13th century. In the late 13th century, substantial walls were built around Visby, partly in the context of open conflict with the surrounding countryside of Gotland.⁸³ After the death of Wolter von Plettenberg, the building activity of the Livonian Order ceased and the craftsmen from Gotland returned home or found new markets. On their home island there were probably few opportunities for work in the building industry, as the latter part of the 15th century had turned into long period of economic depression.⁸⁴ External factors were not uncommon elsewhere in the neighbouring areas as for example in Poland the first established towns attracted new settlers who, in turn, proposed new solutions for the organization of the economy, technology and building.⁸⁵

Comparing the date of the medieval town wall of Pärnu presented in this study with other walled Old Livonian medieval towns, the construction of walls elsewhere also appears to have begun in the 14th century. The construction of the town wall of Tartu most likely began in the first half of the 14th century⁸⁶, and the town wall of Viljandi is dated by Andres Tvauri to the end of the 13th or the 14th century⁸⁷, a date which he later refined to the first half of the 14th century.⁸⁸ Anton Pärn has assumed the construction of the town wall of Haapsalu to have taken place in the 15th century⁸⁹, while the 14th century has also been suggested.⁹⁰ According to current information, the construction of the town wall of Narva began in the fourth quarter of the 14th century.⁹¹

The rapidly developing Baltic Sea ports generated great interest among the residents of the western German lands and attracted settlers from the Lower Rhine and Westphalia as well as from Lower Saxo-

⁷⁷ Sedman 1977, 27.

⁷⁸ Talvar 1999, 23.

⁷⁹ Veeckman 2010, 114.

⁸⁰ Põltsam-Jürjo 2009, 257; 270; 291. Põltsam-Jürjo has referred to the White Tower as "New Tower".

⁸¹ Põltsam-Jürjo 2009, 270.

⁸² Reisnert 2004, 182–183.

⁸³ Andrén 1998, 165 ff.

⁸⁴ Reisnert 2004, 182–183.

⁸⁵ Moździoch 1994, 148.

⁸⁶ Bernotas 2011a, 68.

⁸⁷ Tvauri 2001, 107; Tvauri 2010, 158.

⁸⁸ Bernotas 2011a, 67.

⁸⁹ Pärn 1997, 41.

⁹⁰ E. g. Raam 1969, 14; Bernotas 2011a, 67.

⁹¹ Kaljundi 1979, 50; Altho 2011, 40–41; see also Kaljundi 1997.

ny. Many of them finally established themselves in other new settlements around the Baltic Sea, and thus members of the same family could be living in Dortmund, Soest, Lüneburg, Lübeck, Wismar, Rostock, Stockholm, Visby, Riga, Tallinn and Tartu, organizing trade and leading an urban life as members of the town councils.⁹² It can be concluded that the erection of the Old Livonian town walls, which began during this period was a stage of the German medieval eastward expansion (*Ostsiedlung*). This period saw the founding of several influential towns in Mecklenburg and Vorpommern around the Baltic Sea such as Stralsund, Wismar and Greifswald⁹³ as well as Neubrandenburg⁹⁴, all of which are related to growing trade along the coasts of the Baltic Sea. Cities were founded in the 13th century and at the beginning of the 14th century in important nodal points, developing in places where roads coming from the inland met on the Baltic Sea coast with trade routes from Schleswig to Estonia.⁹⁵

Considering the town wall of Uus-Pärnu solely from the perspective of defence, analogous to the town wall of Tartu⁹⁶, the question arises of the possible real defensive purposes for which it was built. After almost three hundred years of peace, the next act of war involving the walls of Uus-Pärnu was during the Livonian War in the 16th century. In the meantime, Swedish pirates looted Vana-Pärnu in 1473, while leaving Uus-Pärnu untouched. Vana-Pärnu was sacked again in 1533, as a result of the affray between Bishop Reinhold von Buxhoevden and Margrave Wilhelm von Brandenburg.⁹⁷ Buxhoevden's forces burned Vana-Pärnu and Audru Manor. Wilhelm's camp was not able to do anything apart from writing letters of complaint.⁹⁸ Nor were similar conflicts rare in the vicinities of the other walled Old Livonian towns: the city of Riga participated actively in the schism between the bishop and the Order regarding commercial interests, which twice resulted in a military conflict with the Order (1297–1330, 1481–1491).⁹⁹ After all, the history of Uus-Pärnu's adjacent neighbour, the diocese of Saare-Lääne, was

quite turbulent. In the years 1423–68 there were continuous confrontations between the two rivals for the bishopric; from 1449 to 1457 the diocese was even formally divided between the two bishops. New conflicts continued in the 16th century when Bishop Johann Kievel IV (1515–1527) came into conflict with his vassals.¹⁰⁰

Despite the long periods of peace, the active wailing of towns was not uncommon in the countries around the Baltic Sea either. E. g. in Kraków, after two Mongol raids and the conquest of the city by Konrad II in 1285, the city was surrounded by a five-kilometre wall, but the next military action at the walls took place in the 17th century with an attack by the Swedes.¹⁰¹ The town wall was often a political statement expressing the town's strength and independence vis à vis feudal and ecclesiastical authority.¹⁰² On the basis of discussed information we must consider that in addition to external military threats from enemies, one reason for the construction of the town wall of Pärnu was its symbolic significance to the town's residents as well as to the governors of the countries around. Interestingly, the medieval rulers of Sweden did not follow the same trends, as in their total area of government only four towns had surrounding walls (Viipuri [Vyborg], Stockholm, Visby, and Kalmar).¹⁰³

It is clear, though, that the protective function of the walled town in times of unrest or war was important. However, other roles should also be noted. The walls aided in the running of a well-ordered mercantile community: taxes were collected at their gates on goods entering the town. Watchmen could monitor undesirables and exclude them if they thought it necessary. Gates could be closed to keep out the plague or at night to keep out burglars. They were a visual reminder of the bounds of municipal jurisdiction. On their gates were displayed the heads and other body parts of criminals and traitors who had transgressed town rules.¹⁰⁴ Many of the defended towns were a product of colonization within a potentially hostile area as well as an exercise in self-defence, independently undertaken by an established urban community for the protection of its own people, buildings and goods.¹⁰⁵

⁹² Hasse 1963, 6.

⁹³ Kraft 1977, 137 ff.

⁹⁴ Schumacher, 1977, 228.

⁹⁵ Kraft 1977, 139.

⁹⁶ Bernotas 2011a, 67.

⁹⁷ Laakmann 1930b, 4.

⁹⁸ Maasing 2010, 126.

⁹⁹ Sne 2002, 264.

¹⁰⁰ Maasing 2010, 122–123.

¹⁰¹ Torbus 2008, 131.

¹⁰² Steane 2001, 204.

¹⁰³ Saksa/Taavitsainen 2008, 395.

¹⁰⁴ Steane 2001, 196.

¹⁰⁵ Bond 1987, 92.

How should Pärnu with its 6.5 ha enclosed area, be placed in the context of other walled towns in countries around the Baltic Sea? Compared with larger towns, such as Lübeck (107 ha), Hamburg (c. 75 ha), Rostock (58 ha), Wismar (58 ha), Stralsund (45 ha)¹⁰⁶, and Neubrandenburg (a 2.3 km long wall, 40 hectares, erected around 1300)¹⁰⁷, Pärnu was one of the smallest towns. Several towns of similar size may be found in Poland: Kościan (10 ha, with a wall 1150 m long, established at the end of the 14th and the beginning of the 15th century), Wschowa (5 ha, length of wall 900 m, probably built by 1350)¹⁰⁸, Gniezno (6 ha, length of wall 850 m, built in the 14th century), Konin (8 ha, length of wall 1100 m, built by 1350)¹⁰⁹, Rypin (a small border town, 4 ha, length of wall 800 m, built by 1350)¹¹⁰ and Inowłódz (6 ha, length of wall 900 m, built before 1370).¹¹¹

The last stage in the history of the medieval town wall of Pärnu as a primarily defensive fortification came as elsewhere in Europe¹¹², in the 16th century with the tendency to construct of earthen ramparts. As this clearly correlates with the wider spread of firearms, the main reason for establishing the earthen fortifications was probably the need to protect the town walls, especially their lower parts against cannonballs. Wider platforms for cannons were also a need for the defence of the town. These works began in Uus-Pärnu in the second quarter of the 16th century. It is known from written sources that a mound was built around the town wall in 1560.¹¹³ Similarly, the conversion of old fortifications into a new fortification perimeter was carried out in Europe, for example in Bruges¹¹⁴ and Antwerp.¹¹⁵ The fortifications of Uus-Pärnu were complemented between 1562 and 1565, when the town belonged to Sweden.¹¹⁶

¹⁰⁶ Albrecht/Feiler 1996, 30.

¹⁰⁷ Schumacher, 1977, 232.

¹⁰⁸ Kajzer/Salm 1999, 119; 136.

¹⁰⁹ Kajzer/Salm 1999, 121; 136.

¹¹⁰ Kajzer/Salm 1999, 125; 136.

¹¹¹ Kajzer/Salm 1999 131; examples of other Polish towns see Kajzer/Salm 1999, 136, table 1–5.

¹¹² E. g. Veeckman 2010, 123; Groothedde 2010, 179

¹¹³ Renner 1995, 152.

¹¹⁴ De Witte 2010, 109.

¹¹⁵ Veeckman 2010, 123.

¹¹⁶ Laakmann 1930a, 724.

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5. References

Albrecht, Uwe/Feiler, Anke 1996: Stadtarchäologie in Kiel. Ausgrabungen nach 1945 in Wort und Bild (Neumünster).

Altoa, Kaur 1979: Pärnu keskaegsed linnakindlustused. Ajalooline õiend, manuscript in the Archives of the National Heritage Board (Tallinn).

Altoa, Kaur 2011: Kaks ekskurssi keskaegse Narva ehituslukk. Linnamüür ja linnakirik. Narva Muuseumi Toimetised 11 (Maakonnas, linnas ja muuseumis. Uurimusi Narva ajaloo), 39–57.

Aluve, Kalvi 1993: Eesti keskaegsed linnused (Tallinn).

Andrén, Anders 1998: Från antiken till antiken. Stadsvisioener i Skandinavien före 1700. In: Staden, himmel eller helvete. Tankar om människan i staden, ed. S. Thorman/M. Hagdahl (Stockholm) 142–193.

Aniol, Roland W. 1983: Tree-ring analysis using CATRAS. *Dendrochronologia*, 1, 45–53.

Bartlett, Robert 1997: The Ostsiedlung. In: Atlas of Medieval Europe, ed. David Ditchburn/Simon MacLean/Angus MacKay (London, New York) 97.

Bernotas, Rivo 2008: Dendrodates of three medieval latrines of Tartu. *Estonian Journal of Archaeology* 12, 16–29.

Bernotas, Rivo/Kriiska, Aivar/Vunk, Aldur 2009: Archaeological Fieldwork at Pärnu Medieval and Early Modern Fortifications from 2007–2009. In: Arheoloogilised välitööd Eestis 2008/ Archaeological fieldwork in Estonia 2008 (Tallinn) 155–165.

Bernotas, Rivo 2011a: Medieval town wall of Tartu in the light of recent research. *Estonian Journal of Archaeology* 15, 56–72.

Bernotas, Rivo 2011b: Aruanne Pärnust, Õhtu tn linnamüüri äärest ja Kalda tänavalt leitud puitkonstruktsioonide dendrokronoloogilistest dateeringutest, manuscript in the library of department of archaeology of University of Tartu (Tartu).

Bernotas, Rivo 2012: Estonian small towns in Middle Ages. *Archaeology and history of urban defense* (in print).

Bond, C. J. 1987: Anglo-Saxon and medieval urban defences. In: *Urban Archaeology in Britain*, ed. John Schofield/Roger Leech. *Urban Archaeology in Britain Report* 61 (London) 92–116.

Bråthen, Alf 1995: Dated wood from Gotland and the diocese of Skara (Stockholm).

Bruce, David/Creighton, Oliver 2006: Contested identities. The Dissonant Heritage of European Town Walls and Walled Towns. *International Journal of Heritage Studies* 12, 3, 234–254.

De Witte, Hubert 2010: The City fortifications of Bruges. A short survey. In: *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII. Die Befestigungen*, hrsg. Manfred Gläser (Lübeck) 99–110.

- Fehring, Günther 1991: The archaeology of Medieval Germany. An introduction, transl. Ross Samson (London).
- Gläser-Mührenberg, Manfred 1996: Burgen und Stadtmauern auf dem Lübecker Stadthügel. In: *Castella Maris Baltici II*, ed. Magnus Josephson/Mats Mogren. *Lund Studies in Medieval Archaeology* 18 (Nyköping) 59–68.
- Groothedde, Michel 2010: The Development of the fortifications of the City of Zutphen. In: *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII. Die Befestigungen*, hrsg. Manfred Gläser (Lübeck) 163–186.
- Hasse, Max 1963: Lübeck. Aufnahmen von Wilhelm Castelli (München).
- Hausmann, Richard 1906: Studien zur Geschichte der Stadt Pernau (Dorpat).
- Kadakas, Villu/Haak, Arvi/Russow, Erki/Saluäär, Ulla/Sarv, Krista 2003: Archaeological investigations in Pärnu. In: *Arheoloogilised välitööd Eestis 2002/Archaeological Fieldwork in Estonia 2002* (Tallinn) 179–209.
- Kajzer, Leszek/Salm, Jan 1999: Burg und Stadt im mittelalterlichen Polen. In: *Castrum Bene 6. Burg und Stadt*, ed. Tomáš Durdík (Praha) 113–138.
- Kaljundi, Jevgeni 1979: Narva. Kindlustusarhitektuuri muuseum. In: *Teine elu. Kultuuriväärtuste restaureerimisest* (Tallinn) 48–58.
- Kaljundi, Jevgeni 1997: Narva uusaegsed kindlustused. In: *Eesti Arhitektuur 3. Harjumaa, Järvamaa, Raplamaa, Läänemaa, Ida-Virumaa* (Tallinn) 181–183.
- Kaljundi, Jevgeni/Raie, Rein 1981: Pärnu plaanid Rootsi sõjaarhiivis. In: *Pärnu linnas ja rajoonis. Kodu-uurijate seminarikokkutulek 20.–23. augustini 1981* (Tallinn) 109–118.
- Kaennel, Michele/Schweingruber, Fritz Hans (ed.) 1995: *Multilingual Glossary of Dendrochronology. Terms and Definitions in English, German, French, Spanish, Italian, Portuguese and Russian* (Birmensdorf).
- Kaplinski, Küllike 1979: Uus-Pärnu päruseraamat 1543.a, manuscript in the archives of the National Heritage Board (Tallinn).
- Kivimäe, Jüri/Kriiska, Aivar/Pölsam, Inna/Vunk, Aldur 1998: Merelinn Pärnu (Pärnu).
- Kraft, Ingo 1977: Stadtrekonstruktion und Denkmalpflege. Zum Bestand und zur Erneuerung der Städte Wismar, Stralsund und Greifswald. In: *Denkmale in Mecklenburg. Ihre Erhaltung und Pflege in den Bezirken Rostock, Schwerin und Neubrandenburg* (Weimar) 137–159.
- Kriiska, Aivar/Roog, Raido/Alttoa, Kaur/Allik, Andreas/Läänelaid, Alar/Bernotas, Rivo/Malve, Martin 2011: The medieval and modern period building complex at 2 Lutsu Street in Tartu. Results of archaeological, architectural historical, dendrochronological and osteoarchaeological research. *The Estonian Historical Journal* 1 (135), 3–40.
- Laakmann, Heinrich 1930a: Ajalugu. In: *Pärnumaa. Maateaduslik, tulunduslik ja ajalooline kirjeldus*, ed. August Tamme-kann/Johan Köpp/Edgar Kant. *Eesti. Maateaduslik, tulunduslik ja ajalooline kirjeldus IV* (Tartu) 718–741.
- Laakmann, Heinrich 1930b: Pärnu ajalugu. Äratrükk koguteosest Pärnumaa (Tartu).
- Laakmann, Heinrich 1930c: Das Erkebuch von Neu-Pernau IX. S–B (Pernau) 24–120.
- Laakmann, Heinrich 1956: Geschichte der Stadt Pernau in der Deutsch-Ordenszeit (bis 1558) (Marburg/Lahn).
- Läänelaid, Alar 1999: Dendrokronoloogia uurimiseis Eestis. *Ajalooline Ajakiri* 3/4 (106/107), 141–152.
- Läänelaid, Alar/Eckstein, Dieter 2003: Development of a Tree-ring Chronology of Scots Pine (*Pinus sylvestris* L.) for Estonia as a Dating Tool and Climatic Proxy. *Baltic Forestry* 9, no. 2, 76–82.
- von Löwis of Menar, Karl 1897: Ausgrabungen der Deutschordenskomturei Pernau. *Sitzungsberichte der Gesellschaft für Geschichte und Altertumskunde der Ostseeprovinzen zu Riga* 1896, 141–149.
- von Löwis of Menar, Karl 1922: *Burgenlexikon für Alt-Livland* (Riga).
- Maasing, Madis 2010: Saare-Lääne ja koadjuutorivaenus: keskaegse Liivimaa viimased kodusõjad. *Ajalooline Ajakiri/The Estonian Historical Journal* 2010, 2 (132), 115–151.
- Metsallik, Romeo 1985: Arheoloogilised fikseerimistööd Pärnu ordulinnuse alal, manuscript in the archives of the National Heritage Board (Tallinn).
- Możdzioch, Sławomir 1994: The origins of the medieval Polish towns. *Archaeologia Polona* 32, 129–153.
- NOVA TOTIUS LIVONIAE accurata Descriptio. [Ca 1:1 500 000] (Amsterdam 1642). Copper engraving; 50 × 37 cm [Jan Jansson, *Nouveau theatre du monde ou nouvel atlas*, 1 31; from the Estonian National Library <http://www.nlib.ee/html/digi/maps/kaart4s.jpg>].
- Pärn, Anton 1997: Haapsalu linn Saare-Lääne piiskopkonna keskuste kujunemisloos. In: *Läänemaa Muuseumi toimetised I* (Haapsalu) 26–48.
- Pölsam-Jürjo, Inna 2009: Liivimaa väikelinn Uus-Pärnu 16. sajandi I poolel (Argo).
- Quellen : Pärnu linna ajaloo allikad 13.–16. sajandini/Quellen zur Geschichte der Stadt Pernau 13.–16. Jahrhundert I, comp. Inna Pölsam/Aldur Vunk (Pärnu 2001).
- Raam, Villem 1969: Haapsalu piiskopilinnus. *Ajalooline öiend*, manuscript.
- Raie, Rein 1977a: Pärnu plaanide kogu Rootsia arhiivis Stockholmis, manuscript in the archives of the National Heritage Board (Tallinn).
- Raie, Rein 1977b: Eeltööd eritingimuste koostamiseks Pärnu linnamüürile. *Ehitusgeoloogiline ülevaade*, manuscript in the archives of the National Heritage Board (Tallinn).
- Raie, Rein 1982: Pärnu hiliskeskaegse linnastruktuuri rekonstruktsiooni katse, manuscript in the archives of the National Heritage Board (Tallinn).
- Raie, Rein 1996: Pärnu keskaegsed kindlustused/Pärnu uusaegsed kindlustused. In: *Eesti Arhitektuur 2. Läänemaa, Saaremaa, Hiiumaa, Pärnumaa, Viljandimaa* (Tallinn) 102–104.
- Raie, Rein/Dubovik, Boris/Tamm, Jaan 1978: Pärnu ajalooliste linnakindlustuste 1977. aasta väliuurimistööde aruanne. *Kõide III*, manuscript in the archives of the National Heritage Board (Tallinn).
- Reisnert, Anders 2004: Some Scanian and Scandinavian castles and their relations to the Livonian Order. In: *Castella Maris Baltici 6. Archaeologia Medii Aevii Finlandiae VII*, ed. Albinas Kuncevičius (Vilnius) 173–183.
- Renner, Johann 1995: Liivimaa ajalugu 1556–1561, transl. Ivar Leimus/Enn Tarvel (Tallinn).
- Riksarkivet Krigsarkivet 0406: 28: 039: 014: Grundt-Riss von der Stat Pernau mit deren Plätzen (1696).
- Riksarkivet Krigsarkivet 0406: 28: 039: 036: Grund Rytningen Med Profil af Kruht tohrnet uti Pernau (1696).
- Saksa, Aleksandr/Taavitsainen, Jussi-Pekka 2008: Viipuri (Sw. Wiborg, Ru. Vyborg). In: *De förste 200 årene – nytt blick på 27 skandinaviske middelalderbyer*, red. Hans Andersson/Gitte Hansen/Ingvild Öye. *Universitetet i Bergen Arkeologiske Skrifter Nordisk* 5 (Bergen) 393–400.

- Sander, Constantin/Levanic, Tom 1996: Comparison of t-values calculated in different dendrochronological programmes. *Dendrochronologia* 14, 269–272.
- Schneider, Paul 1911: Versuche einer Rekonstruktion des Planes der Stadt Parnau ums Jahr 1550. *Sitzungsberichte der Altertumsforschenden Gesellschaft zu Parnau* 1910, 30–45.
- Schumacher, Paul 1977: Die Stadtbefestigung von Neubrandenburg. Ihre städtebauliche Bedeutung und denkmalpflegerische Erhaltung. In: *Denkmale in Mecklenburg. Ihre Erhaltung und Pflege in den Bezirken Rostock, Schwerin und Neubrandenburg* (Weimar) 228–242.
- Sedman, Ervin 1977: Pärnu Punase torni väliuurimistööde aruanne. Tekstiline osa. Kõide I, manuscript in the Archive of the National Heritage Board (Tallinn).
- Sirel, Helju 1970a: Pärnu linnaehitusajalooline, arhitektuuriajalooline ja kultuurilooline ülevaade muinsuskaitse aspektist. Tekstiline osa. Kõide A, manuscript in the archives of the National Heritage Board (Tallinn).
- Sirel, Helju 1970b: Keskaegne Pärnu a 1554. LW Laakmani rekonstruktsioon Pärnu pärusraamatu 1543 alusel. PKM kogust. Repro R. Valdre 1970. Pärnu ajalooline linnakeskus. Kõide B. Fotod, manuscript in the archives of the National Heritage Board (Tallinn).
- Sne, Andris 2002: Castles, towns and villages – different landscapes of power in territory of Latvia from the 11th to 16th century. In: *Medieval Europe Basel 2002. Centre, region, periphery 2*, ed. Guido Helmig/Barbara Scholkmann/Matthias Untermann (Hertingen) 261–265.
- Stange, Nikolai 1933: *Archäologisch-Topographisches aus Alt-Dorpat* (Dorpat).
- Steane, John M. 2001: The archaeology of power (Charleston).
- Talvar, Peeter 1999: Aruanne arheoloogilistest päästekaevamistest kanalisatsioonitrassi alal Pärnus Aida tn 5/Hommiku tn 1 krundil, manuscript in the archives of the National Heritage Board (Tallinn).
- Tamla, Ülle 1992: Archäologische Ausgrabungen in Neu-Pärnu in der Munga-Strasse 2. *Eesti Teaduste Akadeemia Toimetised. Humanitaar-ja sotsiaalteadused* 4, 41, 287–292.
- Torbus, Tomasz 2008: Das Krakauer „Rondell“ als Musterbeispiel der spätmittelalterlichen Barbakane und seine polnischen Nachfolgebauten. *Forschungen zu Burgen und Schlössern* 11. *Burg und Stadt* (München) 129–146.
- Tuulse, Armin 1942: Die Burgen in Estland und Lettland (Tartu).
- Tvauri, Andres 2001: Viljandi linnamüüri arheoloogilised uuringud aastatel 1997–1999. *Viljandi Muuseumi Aastaraamat* 2000, 92–110.
- Tvauri, Andres 2010: Archaeological trial excavations at the location of the tower of Venus bastion in Pärnu. *Arheoloogilised välitööd Eestis 2009/Archaeological Fieldwork in Estonia 2009* (Tallinn) 165–170.
- Vaga, Voldemar 1965: Linnakindlustused. In: *Eesti arhitektuuri ajalugu*, ed. Harald Arman/H. Papp/Uno Kammal/H. Öprus (Tallinn) 51–66.
- Vissak, Rünno 2012: Aruanne arheoloogilistest uuringutest Pärnus Öhtu tänaval (in prep.).
- Vunk, Aldur/Jonuks, Tõnno 1999: Arheoloogilised kaevamised Pärnus, *Akadeemia* 3, manuscript in the archives of the National Heritage Board (Tallinn).
- Veckman, Johan 2010: The archaeology of Antwerp's fortifications from its origins to the 16th century. In: *Lübecker Kolloquium zur Stadtarchäologie im Hanseraum VII. Die Befestigungen*, hrsg. Manfred Gläser (Lübeck) 111–126.

Zusammenfassung: Die mittelalterlichen Befestigungen von Pernau. Eine archäologische Studie

Von der mittelalterlichen Stadtmauer und -türmen von Pernau ist heutzutage nichts mehr zu sehen, ausgenommen der Rote Turm, der seinen Namen wegen seines Backsteinmauerwerks erhielt. Die Ergebnisse aktueller archäologischer Untersuchungen zeigen, dass die Mauer aus mit Kalkmörtel zusammengefügt Feldsteinen bestand. Kalkstein-, Backstein- und Dachziegelfragmente wurden in den Mauerfugen verbaut. Im östlichen Bereich der Mauer verwendete man Lehm zur Isolierung. An einigen Stellen fand sich unter der Mauer eine Pfahlfundamentierung. Die frühe Burg der Ordensritter baute man teilweise in Trockenmauerwerk. Wahrscheinlich lässt sich die Errichtung der mittelalterlichen Stadtmauer von Pernau in die zweite Hälfte des 14. Jahrhunderts datieren. In anderen Städten des alten Livlands scheint der Bau von Stadtmauern ebenfalls im 14. Jahrhundert eingesetzt zu haben.

Man kann annehmen, dass neben den militärischen Anforderungen zur Abwehr militärischer Feinde ein wesentlicher Grund für die Errichtung der Stadtmauer von Pernau ihre symbolische Bedeutung sowohl für die Stadtbewohner als auch für die Herren der Nachbargebiete war. Pernau gehört mit 6,5 ha befestigter Fläche zweifellos zu den kleinen Städten im mittelalterlichen Umfeld der Ostsee. Die letzte Etappe in der Geschichte der Pernauer Stadtmauer als Befestigung war, wie anderswo in Europa, die Anlage von Schanzen im 16. Jahrhundert. Die Mauer wurde während der Kriege des 16. und 17. Jahrhunderts schwer beschädigt. Durch die Errichtung neuer Bastionen zwischen 1670 und 1710 erhielt der nördliche Bereich der Stadtmauer zusätzlichen Schutz. Der Rote und der Weiße Turm waren zunächst Schießpulverlager. Die verbliebenen Teile von Mauer und Türmen wurden Stück für Stück abgetragen.

Summary: Medieval fortifications of Pärnu. An archaeological approach

Of the medieval town wall and towers of Uus-Pärnu, nothing is visible on the ground nowadays, with the exception of the Red Tower, named thus because of its brick cladding. The results of current archaeological research show that the wall was built of fieldstones joined to each other with lime mortar. Limestone, brick and roof tile fragments are used in the masonry construction joints. In the eastern part of the wall, clay was used as damp proofing. In some places a log foundation layer was laid under the wall. The foundation of the Order's Castle was built partly in dry-stone work. The construction of the medieval town wall of Pärnu can quite possibly be dated to the second half of the 14th century. The construction of the town walls seemed to have begun in the 14th century in other Old Livonian towns as well.

It can be assumed that in addition to external military threats from enemies, one reason for the construction of the town wall of Pärnu was its symbolic significance to the town's residents as well as to the governors of the adjacent territories. Pärnu with its walled area of 6.5 ha is without doubt among the small towns in the context of fortified towns of the medieval Baltic Sea countries. The last step in the history of the town wall of Pärnu as a defensive fortification was, as elsewhere in Europe, the creation of earthen fortifications in the 16th century. The wall was severely damaged in the wars of the 16th and 17th centuries. In the construction of new bastions in 1670–1710 on the northern part of the town wall became a support for the curtain wall. The White and Red Towers were at first gunpowder stores. The remaining parts of the wall and the towers were demolished step by step.

**ARCHAEOLOGICAL
FIELDWORK
IN ESTONIA**

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**ARHEOLOOGILISED
VÄLITÖÖD EESTIS**

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ARCHAEOLOGICAL FIELDWORK AT PÄRNU MEDIEVAL AND EARLY MODERN FORTIFICATIONS FROM 2007 TO 2009

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INTRODUCTION

From 2007 to 2009 substantial archaeological fieldwork took place in connection with new buildings and communication trenches in the north-eastern part of the former town of New-Pärnu in the Streets of Aida, Hommiku, Lai, Pikk and Põhja (Bernotas 2008; 2009a–b). More extensive work took place in the summer and autumn of 2007 in the plot of Aida St 5 (with the former address Aida St 7) where the foundation depression for a business and dwelling house was dug (Bernotas 2009b); in 2008 and at the beginning of 2009 in the plot of Lai St 7, where a parking house was built. Elsewhere archaeological monitoring in the area of the trenches for water pipes, sewage and electricity cables was carried out and in one section a part of a medieval corner tower was unearthed in order to specify the exact location of the construction (Bernotas 2009a). Sections of the medieval town wall as well as parts of the early modern rampart fortifications were excavated.

THE PARTS OF TOWN WALL

New-Pärnu was one of the five medieval towns surrounded by a town wall in the area of present Estonia. The exact construction time of the town wall that in the end had altogether six towers and eight gates (Altoa 1979), is not known. The first written reference to the existence of town fortifications originates from 1420 (Vaga 1965, 66). However, one third of the court expenses of the Pärnu Commander of the Teutonic Order had been allocated for the erection of town fortifications already with the first town privilege from 1265 and in 1318 the sum was raised to half of the profits of the administration of justice in Pärnu (*Quellen*, 18–20). The age of the log raft under the part of the town wall excavated in Munga St 2 in 1990s has been radiocarbon dated to 590±30 BP¹ (cal. 1310–1405 AD² with the probability of 68.2%). In the 15th century

¹ Tln.

² Calibrated by computer program CAL40.DTA OxCal v2.18 cub r:4 sd:12 prob[chron] (Bronk Ramsey 2005).

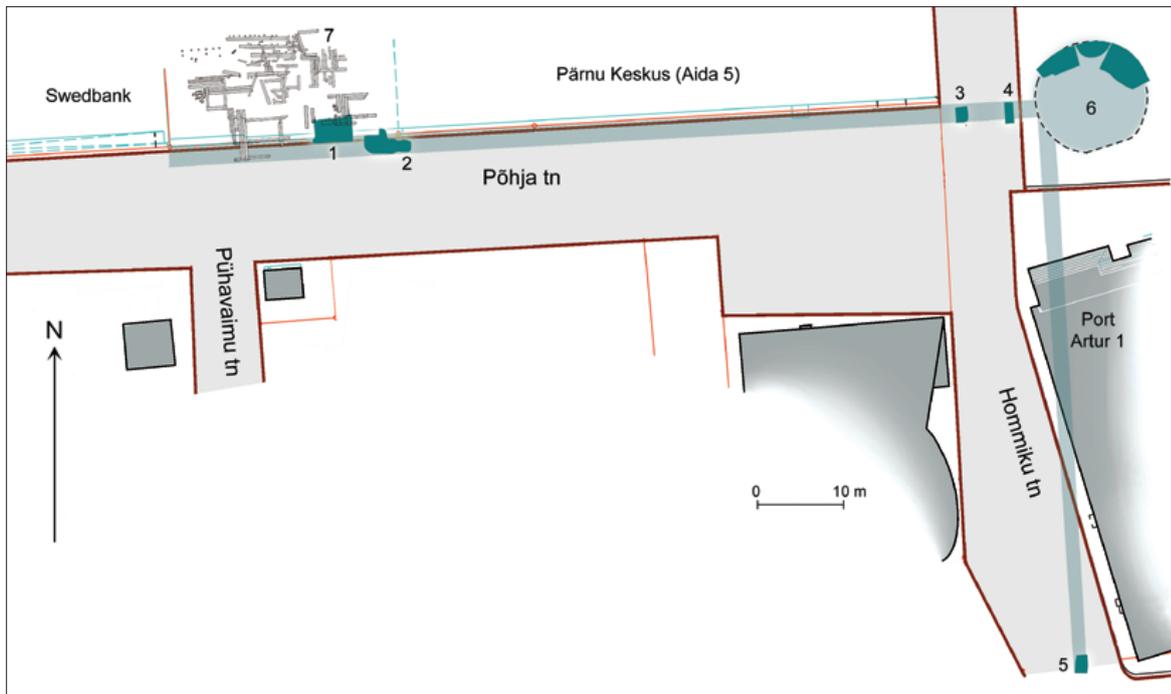


Fig. 1. Present Street network, medieval town wall and the positions of the opened sections (1 – 6) of the town wall and rampart fortifications.

Jn 1. Praegune tänavavõrgustik, keskaegne linnamüür ja välitöödel avatud keskaegse linnamüüri ning muldkindlustuste osad (1 – 6).

Drawing / Joonis: Kristel Külljastinen (Based on map by EOMAP Maamõõdukeskus OÜ)

the town wall enclosed an area of 7 ha. Since the wall was erected over a long period and several sections were repaired or rebuilt³, different constructional nuances were detected there, the most conspicuous of which was the existence of both square as well as round towers. At present nothing of the town wall of New-Pärnu can be seen anymore, except for a single tower – the Red tower named after its brick cladding – at Hommiku St in the present town centre of Pärnu. The rest of the wall parts have been destroyed to a smaller or bigger extent and preserved under the modern soil strata.

So far the parts of the town wall have been unearthed in the course of several archaeological excavations, more extensively – by the length of 23 meters – it has been researched during the excavations of Munga St 2 in 1990–1991 (Tamla 1992, 291). To a lesser extent the wall fragments have been documented in the course of other work (e.g. Vunk 1998; Kadakas *et al.* 2003). During the excavations of 2007–2009 in the north-eastern part of the medieval town the town wall was opened in six sections, and the so-called White tower in the north-eastern part of the town was localized with a small test excavation (Fig. 1).

³ The reinforcement of the town wall has been documented for example in the time span between 1533 and 1556 (*Quellen*, 282–290).



Fig. 2. Supposed section of town wall in the western side of the plot of Aida St 5. View from the north-east.

Jn 2. Oletatav linnamüüri lõik Aida tn 5 krundi läänekülje. Vaade kirdest.

Photo / Foto: Rivo Bernotas



Fig. 3. Section of town wall on the plot of Aida St 5. View from the north.

Jn 3. Linnamüüri lõik Aida tn 5 krundil.

Vaade põhjast.

Photo / Foto: Rivo Bernotas

In the western side of the plot of Aida St 5 a supposed part of the town wall (Fig. 1: 1, 2), probably including a fragment of the gateway of the so-called Guild room, was excavated by a 4.5 m long (from east to west) and 2.7 m wide area. The stone construction exposed by 1.2 meters comprised of boulders⁴ with the diameter of 30 cm that had been irregularly piled together on top of each other. Unfortunately the described part of the town wall has been repeatedly damaged in the course of earlier construction work. The wall has probably been torn down already during

⁴ Here and henceforth it is the common name for igneous and metamorphic rocks.

Fig. 4. Section of town wall in Põhja St by the south-eastern corner of the plot of Aida St 5.

View from south-east.

Jn 4. Linnamüüri lõik Aida tn 5 krundi kagunurgas Põhja tänaval. Vaade kagust.

Photo / Foto: Rivo Bernotas



Fig. 5. Section of town wall in Hommiku St.

View from the south.

Jn 5. Linnamüüri lõik Hommiku tänaval. Vaade lõunast.

Photo / Foto: Rivo Bernotas



laying the stone pavement of Pühavaimu St in the 19th century and the northern part of the wall was probably demolished during the housing of the plot in the 20th century. In this way the archaeological material is considerably scarce and only the location of the unearthed stone formation on the same line with the parts of the town wall excavated so far allows us to suggest that the formation is a fragment of the town wall. We may assume that there was a gateway only on the basis of the town plans⁵ from the 17th century. The excavations destroyed the northern side of the wall fragment.

Another, an up to 1.6 m wide piece of the town wall, was opened in Aida St 5 in the vicinity of the supposed wall fragment described above (Fig. 1: 2, 3). The wall has been built of boulders with the diameter of 25–30 cm joined together with lime mortar. A raft of logs orientated in the same direction as the stone formation was detected under the wall. The raft had only been preserved in the southern side of the wall fragment. Two parallel logs with the diameter of 30 cm (the southernmost being 2.5 m and the northernmost 2.9 m long) were unearthed directly under the stone layer. It is possible that this piece of the wall has also been a part of the gateway of the Guild room.

Directly by the south-eastern corner of the plot of Aida St 5 another fragment of the town wall was unearthed. It was situated at the depth of 0.5 m from the present ground level and was 1.4 m long from east to west and 1.84 m wide from north to south (Fig. 1: 3; 4). Excavations did not reach the footing, thus leaving 1.55 m for the height of the opened part of the wall. The wall comprised of boulders with the diameter of up to 30 cm joined together with brittle lime mortar that contained pieces of brick. The wall was preserved and covered with sand; St covering was put on top of it.

In Hommiku St a town wall fragment (Fig. 1: 4) partly destroyed during previous excavations was unearthed approximately 1 m deep from the present ground. The wall fragment was opened by 1.2 m in length and 1 m in height (Fig. 5). The 2.3 m thick wall had been laid of boulders with the diameter of 30 cm joined together with lime mortar containing pieces of brick and limestone. The wall was preserved and covered with sand; a heating trench was established on top of it.

On the corner of Pikk and Hommiku Streets a north-south directed 2.9 m long and 1.2 to 1.8 m wide town wall fragment was excavated in the depth of 1.5 m from the present ground level (Fig. 1: 5). The wall had been laid of boulders with the diameter of 30 cm joined together with lime mortar. Pieces of brick were detected between the boulders. The wall fragment was preserved, the rainwater drainage was grounded on top of it.

⁵ E.g. Riksarkivet Krigsarkivet, 0406 H: 28: 039: 003 Pernau Pernow. The time of the building of the gate is not known but it is mentioned in 1540 in the inheritance records of the town. It was seriously damaged in the military action in 1575 when the Russians blew up the gate of the Guild room with a gun powder keg, possibly it was never restored again (Alttoa 1979, 18–19).

Fig. 6. Preserved part of White tower. View from the west.

Jn 6. Müürijäämused Valgest tornist.
Vaade läänest.

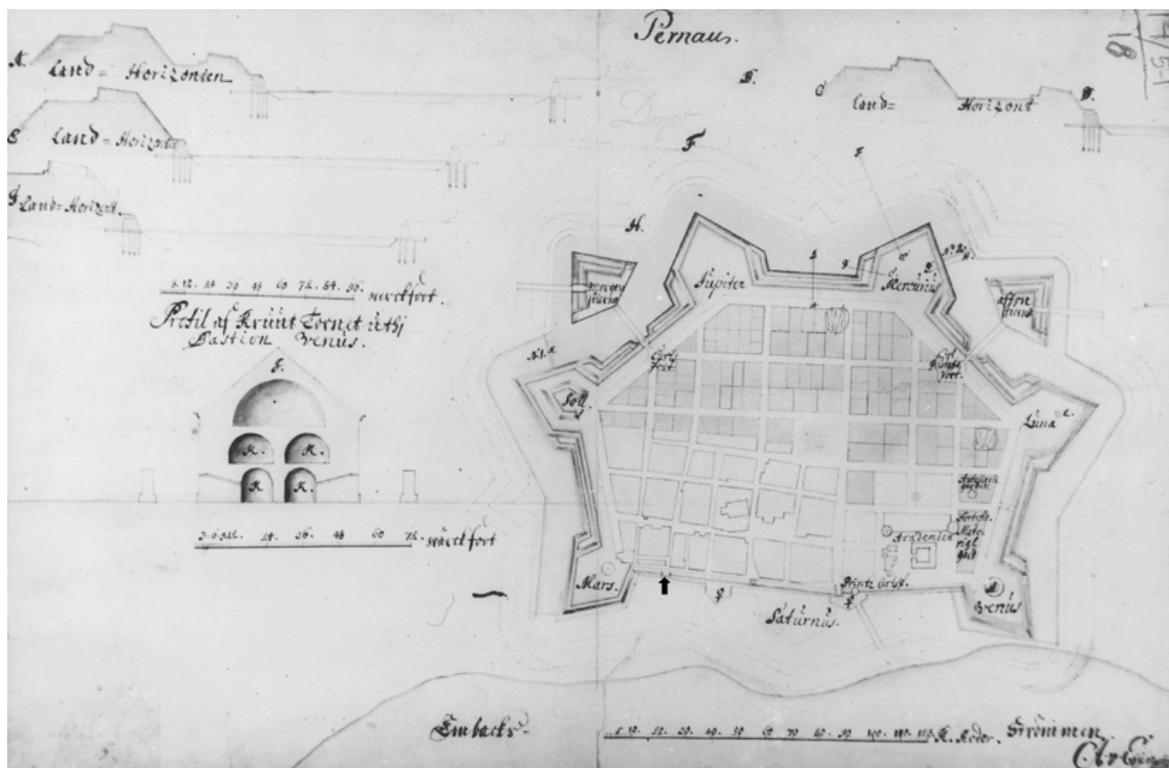
Photo / Foto: Rivo Bernotas



By Hommiku St near the Port Artur-1 trade centre a part of the so-called White tower located in the north-eastern corner of the town wall was reopened (Fig. 1: 6). The tower has been built between 1533 (after the predecessor of White tower was exploded) and 1543 (the new tower has been mentioned in historical records) (Laakmann 1956). The preserved part of the tower was excavated in 1976 (Vali *et al.* 1978, 5) but was thereafter covered with soil again. Its re-excavation in December 2008 was brought about by the need to specify the location of the remains of the tower in order to compile special conditions required for the establishment of a fountain in the historic area. The excavations opened a 62.5 m² large area (Fig. 6). The northern part of the tower with double-embrasures was unearthed. After documenting the results the foundation of the tower was re-covered with sand.

RAMPART FORTIFICATIONS

From the second quarter of the 16th century rampart fortifications on the basis of the medieval town wall were started to be built in New-Pärnu.



It is known from written sources that the entire town wall was supported with earthwork in 1560 (Renner 1995, 152). These fortifications were complemented during the time-span of 1562–1565 when New-Pärnu belonged to Sweden (Laakmann 1930, 724). Smaller reinforcement work was completed in the first half of the 17th century as well (Laakmann 1930, 729), however, a thorough rebuilding took place in the end of the 17th century. On the basis of the design ratified by king Karl XI in 1686 a heptangular 170 m wide belt of bastions was established under the leadership of the fortification engineer Paul von Essen (Kivimäe *et al.* 1998, 112, fig. III). The reconstruction design of the fortifications in Pärnu was compiled by von Essen already in 1667 (Raie *et al.* 1982, 4), but the work was completed probably only in the 1670–1690s (Laakmann 1930, 729). Among other things it meant filling up the small branch (Germ. *Kleine Becke*) of the Pärnu River in the northern part of the town. As it appears on the blueprint drawn by von Essen in 1693 in Tallinn, depicting a timber construction to be founded inside the earthwork of the bastion Saturnus, that branch had already partly overgrown by the time (Kaplinski *et al.* 1977, 5–6).

Fig. 7. Town plan of Pärnu (1699). The arrow marks the area where parts of rampart fortifications were opened in 2007–2009.

In 7. Pärnu linna plaan (1699). aastast. Noolega on tähistatud piirkond, kus 2007.–2009.a välitöödega avati muldkindlustuste osi.

(Riksarkivet Krigsarkivet, 0406: 28: 039: 005 a.)

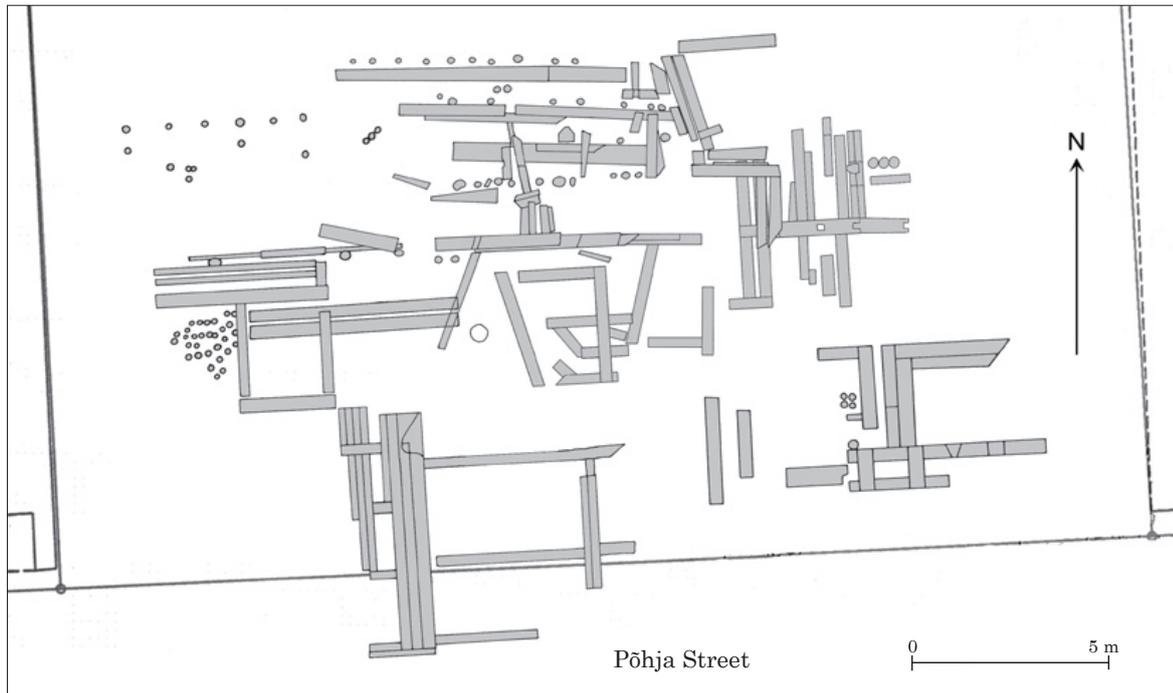


Fig. 8. Timber constructions of rampart fortifications.
 Jn 8. Muldkindlustuste puitkonstruktsioonid.
 Drawing / Joonis: Kristel Külljastinen

The belt of fortifications in Pärnu was significantly changed in the second half of the 19th century when the majority of rampart fortifications were dismantled and green areas were established instead (Kivimäe *et al.* 1998, 134). Rampart fortifications have been seriously damaged during later construction activity as well. By now only Venus, Luna and Mercurius – or Vallikäär and Munamägi with present Estonian toponyms – have survived to some extent.

The area investigated in 2007–2009 remained between the bastions Mars and Saturnus (Fig. 7). A part of the rampart fortifications established alongside the town wall was opened in the plot of Aida St 5 (Fig. 1: 7) and single fragments of timber constructions that are probably connected with fortifications were documented in the plot of Lai St 7. An east to west oriented timber construction covering approximately 200 m² was unearthed in the plot of Aida St 5 (Fig. 8). The structure consisted of horizontally placed logs and stakes rammed into the ground. The logs used for construction work had the diameter of 15–35 cm and judging by the marks of hewing and the traces of dowels were at least partially in secondary use. The earthwork piled on the timber construction has been completely destroyed in this section during the town planning in the 19th century and the erection of later buildings, the structure cannot be dated more exactly, but it has probably been completed in the end of the 17th century together with the construction of the belt of the town bastions (Bernotas 2009b).

CONCLUSION

In 2007–2009 archaeological fieldwork took place in a very attractive area from the point of view of studying the fortifications of New-Pärnu. During the Middle Ages the town wall with a single tower and a gateway were located there, in the Early Period they were replaced by rampart fortifications. Although both defence structures could be investigated in the studied area only by small sections, they nevertheless offer additional information on fortifications here. Archaeological research of modern rampart fortifications is exceptional in whole Estonia. So far analogical work has been done in considerably smaller volume, the only exception being the inner constructions of the bastions excavated at Vabaduse Square in Tallinn in 2007–2009 (Kadakas *et al.* 2008, 184).

During the rescue excavations of 2007–2009 where the depth and width of the plot were determined by the intended measurements of the trench, the town wall could only be opened in small fragments. The foundation raft was reached in one case and even this was already partly destroyed, in other sections only the upper part of the preserved wall fragments was opened. Therefore the collected data adds nothing to the dating of the town wall. Since the soil in this part of the town is mostly mixed with the establishment and dismantling of the rampart fortifications and the construction work of the previous century, the stratigraphy or the gathered find material was of very little assistance. Various finds, including medieval stoneware and a fragment of a hewn limestone with a rose, were collected directly by the town wall from the plot of Aida St 5, but these originate from the filling layers of the 19th and the 20th century that started directly from the outer side of the wall and extended until the timber constructions of the rampart fortifications. Information about the preservation of the wall, main parameters of the construction and the more specific documentation of the position of the wall fragments is of primary importance. The gathered data, especially about the construction material, suggests that the town wall of New-Pärnu was homogeneous. In all opened pieces the town wall has been laid of boulders joined together with lime mortar. At least in sections the town wall has been erected on a foundation raft of logs.

In order to strengthen the horizontal defence system of the Early Period constructions of vertical and horizontal logs have been established before the piling of the soil. The hewing and dowel marks refer that some logs have been secondarily used; it is possible that these originate from smaller earth fortifications that lay in the same location before the extensive rebuilding of 1670.

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AND EARLY MODERN FORTIFICATIONS FROM 2007 TO 2009

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References

- Altoa, K. 1979.** Pärnu keskaegsed linnakindlustused. Ajalooline õiend. Tallinn. (Manuscript in MA.)
- Bernotas, R. 2008.** Arheoloogilised eeluuringud Pärnus Aida 7 krundil. Tartu. (Manuscript in MA.)
- Bernotas, R. 2009a.** Aruanne arheoloogilistest eeluuringutest Pärnus Hommiku tn 2a Valge torni alal. Tartu. (Manuscript in MA.)
- Bernotas, R. 2009b.** Aruanne arheoloogilistest päästekaevamistest Pärnus Aida 5 krundil 2007. aastal. Tartu. (Manuscript in MA.)
- Bronk Ramsey, C. 2005.** OxCal (computer program). Version 3.10. The Manual (available at <http://www.rlaha.ox.ac.uk/oxcal/oxcal.htm>).
- Kadakas, V., Haak, A., Russow, E., Saluäär, U. & Sarv, K. 2003.** Archaeological Investigations in Pärnu. – AVE, 2002, 179–209.
- Kadakas, V., Nurk, R., Püüa, G. & Toos, G. 2008.** Investigations in Tallinn and the counties of Harjumaa, Läänemaa, Ida-Virumaa and Järvamaa. – AVE, 2007, 183–203.
- Kaplinski, K., Kaljundi, J. & Raie, R. 1977.** Pärnu plaanide kogu Rootsi Sõjaarhiivis Stockholmis. Pärnu. (Manuscript in PÄMu.)
- Kivimäe, J., Kriiska, A., Põltsam, I. & Vunk, A. 1998.** Merelinn Pärnu. Pärnu Linnavalitsus. Pärnu.
- Laakmann, H. 1930.** Ajalugu. – Pärnumaa. Maateaduslik, tulunduslik ja ajalooline kirjeldus. Eesti. Ed. by A. Tammekann, J. Köpp & E. Kant. *Maateaduslik, tulunduslik ja ajalooline kirjeldus, IV.* Eesti Kirjanduse Selts. Tartu, 718–741.
- Laakmann, H. 1956.** Geschichte der Stadt Pernau in der Deutsch-Ordenszeit (bis 1558). *Wissenschaftliche Beiträge zur Geschichte und Landeskunde Ost-Europas*, 35. Marburg/Lahn.
- Raie, R., Täheväli, L. & Zobel, R. 1982.** Pärnu Vallikraav. Muinsuskaitsealased eritingimused puhastusprojekti koostamiseks. Pärnu. (Manuscript in PÄMu.)
- Reimer, P. J., Baillie, M. G. L., Bard, E., Bayliss, A., Beck, J. W. 2004.** IntCal04 terrestrial radiocarbon age calibration, 0–26 cal kyr BP. – Radiocarbon, 46: 3, 1029–1058.
- Renner, J. 1995.** Liivimaa ajalugu 1556–1561. Translated by I. Leimus & E. Tarvel. Olion. Tallinn.
- Tamla, Ü. 1992.** Archäologische Ausgrabungen in Neu-Pärnu in der Munga-Strasse 2. – TATÜ, 41: 4, 287–292.
- Vaga, V. 1965.** Linnakindlustused. – Ed. by H. Arman *et al.* Eesti arhitektuuri ajalugu. Eesti Raamat. Tallinn, 51–66.
- Vali, J., Raie, R., Dubovik, B., Tomson, A. & Ahonen, H. 1978.** Pärnu ajalooliste linnakindlustuste 1977. aasta väliuurimistööde aruanne. Köide III. Tallinn. (Manuscript in MA.)
- Vunk, A. 1998.** Arheoloogilised kaevamised Pärnus, Nikolai 7. Aruanne. Pärnu. (Manuscript in MA.)
- Quellen** = Pärnu linna ajaloo allikad 13.–16. sajandini / Quellen zur Geschichte der Stadt Pernau 13.–16. Jahrhundert, I. Comp. by I. Põltsam & A. Vunk. Pärnu Linnavalitsus. Pärnu, 2001.

ESTONIAN SMALL TOWNS IN THE MIDDLE AGES: ARCHAEOLOGY AND THE HISTORY OF URBAN DEFENSE

Rivo Bernotas

The main period for the construction of urban defenses in Europe was during the thirteenth and fourteenth centuries.¹ The contemporary Estonian area – the northern part of medieval Old Livonia – was conquered during the Livonian Crusades by the Danes and Germans at the beginning of thirteenth century and subsequently divided into feudal principalities by the lands of the Bishopric of Tartu (Dorpat), the Bishopric of Saare-Lääne (Ösel-Wiek), and the lands ruled by the Livonian Order.² The northern parts became a Duchy of Estonia (1219–1346) under the Danish reign. There were six stone-walled towns located in this territory. Now the aboveground parts of the walls are preserved only in sporadic fragments. The exception here is Tallinn (Reval), the only town with almost fully-preserved medieval fortifications, and understandably it has attracted the attention of most researchers so far.³ Recently articles have been published

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¹ Barbara Scholkmann, “The anatomy of medieval towns”, *The archaeology of medieval Europe, 2: twelfth to sixteenth centuries*, ed. by M. Carver and J. Klápště (Aarhus University Press, 2011), 379–403 (382). Although new towns were built with fortifications right down to the late seventeenth century in certain places.

² Sulev Vahtre, *Muinasaja loojang Eestis: vabadusvõitlus 1208–1227* (Tallinn: Olion, 1990), 171.

³ E.g. Rein Zobel, *Tallinna keskaegsed kindlustused* (Tallinn: Valgus, 1980); Villu Kadakas, Jaak Mäll, “Märkmeid Tallinna vanemast topograafiast”, *Keskus - tagamaa - ääreala: uurimusi asustushierarhia ja võimukeskuste kujunemisest Eestis = Centre - hinterland - margin: studies in the formation of settlement hierarchy and power centres in Estonia*, ed. by Valter Lang, Muinasaja teadus, 11 (Tallinn-Tartu: Ajaloo Instituut, Tartu Ülikool, 2002), 409–430.

from the archaeological point of view covering the town walls of Tartu and Uus-Pärnu (Neu-Pernau).⁴ The walls of small towns – Viljandi (Fellin), Haapsalu (Hapsal), Narva – are preserved only in the ground and written sources are rare, therefore in addition to pictorial and cartographic material they must be studied by archaeologists.⁵ The archaeological investigation of the medieval walls of Estonian small towns has unfortunately so far been scarce. The publications cover predominantly specific excavations, although for single cases more detailed reviews have been published.⁶ In most cases, the research was conducted as archaeological monitoring, with periodic instances of archaeological excavations.

Town defenses were central elements of townscapes. The defensive purpose of their construction was as important as their significance as a symbol of the town, and providing security for the urban community against the outside world was the communal duty for the townsfolk. Defenses were generally laid out soon after the foundation of the town and, within the limitations of the local topography, as closely as possible to an ideal geometric form. The layout of the late medieval town was formed by its defensive circuit, the network of streets and the plots adjoining them, one or several marketplaces, the densely built fabric of houses, civic structures, and ecclesiastical buildings. But only the well populated, largely autonomous, economically strong, and socially differentiated towns possessed all of these elements. Small towns and minor towns developed only partly along these lines.⁷ Stone walls were considered to be the best instrument for urban defense. But, to a certain extent, the desire for stone walls was also driven by considerations of prestige and symbolism. They stood for power, wealth, urban independence, and civic pride.⁸

⁴ Rivo Bernotas, “Medieval town wall of Tartu in the light of recent research”, *Estonian Journal of Archaeology*, 15 (2011), 56–72; Rivo Bernotas, “Medieval fortifications of Pärnu: an archaeological approach”, *Zeitschrift für Archäologie des Mittelalters*, Jg. 40 (2012), 185–199.

⁵ Similar differences in the research are not uncommon in Western Europe either, e.g. David Palliser, “Period surveys: the medieval period”, *Urban archaeology in Britain*, ed. by J. Schofield and R. Leech (London: Council for British Archaeology, 1987), 54–68 (62).

⁶ E.g. Andres Tvaari, “Viljandi linnamüüri arheoloogilised uuringud aastatel 1997–1999”, *Viljandi Muuseumi Aastaraamat 2000* (2001), 92–110.

⁷ Scholkmann, “The anatomy of medieval towns”, 382.

⁸ Especially when they were provided with a multitude of towers, they could even serve as a reference to the heavenly Jerusalem (Wim Boerefijn, *The foundation, planning and building of new towns in the thirteenth and fourteenth centuries in Europe: an architectural-historical research into urban form and its creation*, PhD thesis (University of Amsterdam, 2010), 83.

This publication is divided into an introduction, a summary of the written sources and the current research, a review of archaeological research, and a discussion with the results. I have, for all three towns, dealt only with the town walls and neglected the castles – after all, sufficiently specialized publications have appeared about all of the castles located in the towns.⁹ The purpose of this article is to summarize the current material gathered from the excavations of the medieval town walls from three small towns in Estonia, to discuss when they were erected, and to analyze their place in Old Livonian and Baltic contexts. Comparable material from towns in Scandinavia and Lithuania are used as examples. As some of the archaeological research results¹⁰ are still waiting to be published, the current article also serves the purpose of being the source publication.

Historical background and current research

Viljandi is situated in Southern Estonia (see fig. 1) and its genesis has been greatly influenced by its favorable geographical situation. The town is situated at the crossroads of the three major roads, connecting Southern and Northern Estonia, separated by forested and bog areas.¹¹ The medieval town and the neighboring Order's castle were separated by a moat. The town actually formed a fourth outer bailey of the castle.¹²

The area of Viljandi was one of the smallest amongst Estonian walled towns in the Middle Ages (see fig. 2).¹³ The population was probably between 1000 and 1500.¹⁴ The wall surrounded the 10.2 ha of town which, together with 4.6 ha of the Order's castle, covered 14.8 hectares of protected area.

⁹ E.g. Karl von Löwis of Menar, *Burgenlexikon für Alt-Livland* (Riga: Walters und Rapa, 1922); Armin Tuulse, *Die Burgen in Estland und Lettland* (Tartu: Dorpater Estnischer Verlag, 1942); Kaur Alttoa, "Das Konventshaus in Estland", *Castella Maris Baltici I*, ed. by Knut Drake, *Archaeologia Medii Aevi Finlandiae I* (Stockholm: Almqvist & Wiksell, 1993), 11–18 (see also Narva); Arvi Haak, "The castle of Viljandi (Fellin), Estonia: the role of its location on its construction (13th–16th century)", *Burg und ihr Bauplatz*, ed. by Tomáš Durdík, *Castrum Bene 9* (Praha, 2006), 127–138 etc.

¹⁰ For example, the 2008 excavations of the town wall of Viljandi; smaller surveys in Viljandi in 2008 and 2010.

¹¹ Heiki Valk, "About the role of the German castle at the town-genesis process in Estonia: The example of Viljandi", *Castella Maris Baltici I*, 219–223 (220).

¹² See references in Haak, "The castle of Viljandi", 129.

¹³ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 92.

¹⁴ Arvi Haak, "Tartu värava eeslinna tekkest, hävingust ning taaskujunemisest: uusi andmeid arheoloogilistelt kaevamistelt 1996–2005", *Viljandi Muuseumi Aastaraamat 2005* (2006), 68–87 (68).



Figure 1. Discussed towns on the map of Baltic: 1. Viljandi; 2. Haapsalu; 3. Narva.

The total length of the town wall was about 1.2 km.¹⁵ The wall surrounded the town on three sides, while the south side was defended by the castle. On the west side of the wall was Riga's Gate,¹⁶ and a quadrangular tower was located on the northwest corner. On the north side of the wall were a half-circular tower and the Tartu Gate. The east side of the wall had the Moscow Tower, the access gate to the lake near Pikk Street, and a smaller, half-circular tower. The gates had no towers¹⁷ and were projected outside of the wall-line. Based on the latter, it has been suggested that they were built after 1350.¹⁸ The town wall was already greatly damaged during the Livonian War, and was subsequently damaged in the seventeenth-century wars between Poland and Sweden. As shown on the oldest map of Viljandi

¹⁵ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 92.

¹⁶ The medieval names of the gates and towers are not known, and the names presented here are quoted from the Polish revision from 1599 ("Viljandi linn 1599. aastal", trans. by Katrin Vabamäe, comment. by Kaur Alttoa, *Viljandi Muuseumi Aastaraamat 1998* (1999), 114–162).

¹⁷ Kaur Alttoa, "Viljandi linnamüür", *Eesti arhitektuur 2: Läänemaa, Saaremaa, Hiiumaa, Pärnumaa, Viljandimaa*, ed. by Villem Raam (Tallinn: Valgus, 1996), 166.

¹⁸ *Eesti arhitektuuri ajalugu*, ed. by Harald Arman (Tallinn: Valgus, 1965), 65–66.

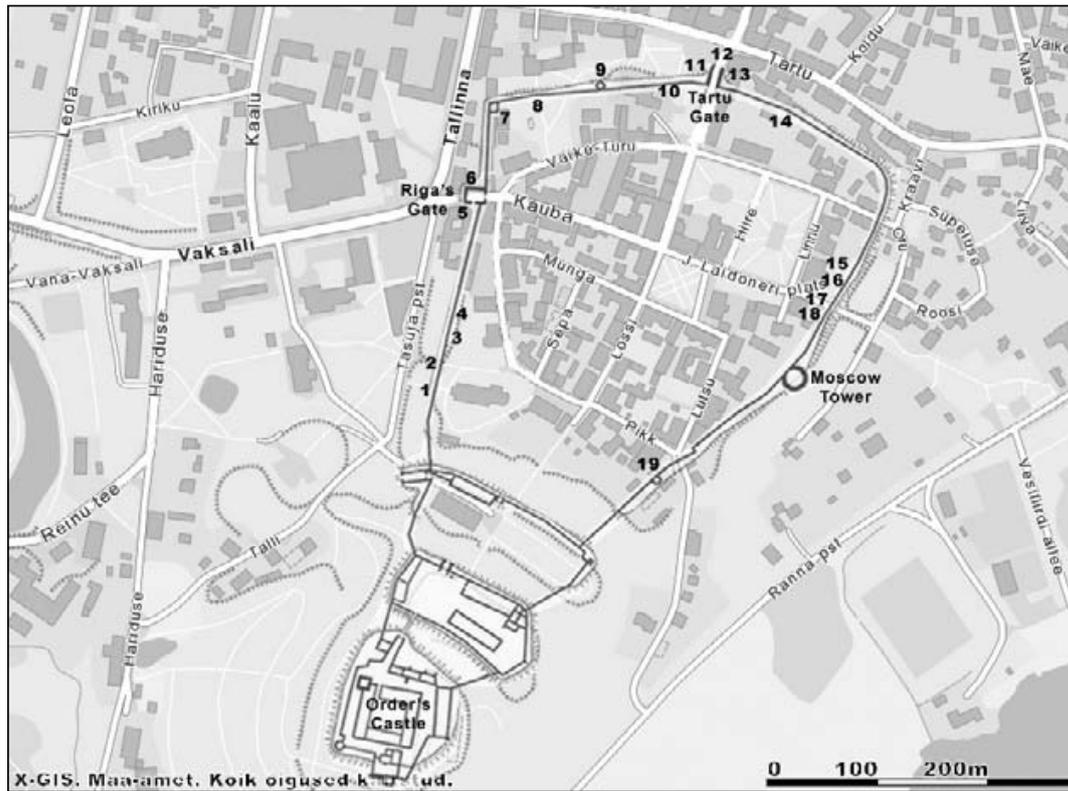


Figure 2. Excavations carried out in the area of the town wall and the approximate location of the town wall of Viljandi (the year marks the publication): 1. Selirand 1982; 2. Valk 1993; 3. Tvauri 1999; 4. Tvauri 1999; 5. Alttoa 1982; 6. Alttoa 1983; 7. Tvauri 1998; 8. Piirits 2008; 9. Tvauri 1998; 10. Tvauri 2010; 11. Freymann 1918; 12. Valk 1994; 13. Alttoa & Moora 1979, Tvauri 1999; 14. Tvauri 2001; 15. Tvauri 2001; 16. Haak & Lätti 2005; 17. Bernotas 2010; 18. Tvauri 2008; 19. Tvauri 2001.

from 1688,¹⁹ the town wall and the castle were still standing at that time. From the eighteenth century most of the town wall, gates, and towers were dismantled and used as construction material.²⁰ Currently the remains of the wall can be seen above ground level in only a few places.²¹

The oldest known depiction of Viljandi is the engraving by Jacobus Laurus, which shows the conquest of the town by the Poles in 1602 (see fig. 3). The town, castle, and their vicinity are depicted. As this engraving has several errors in the details and size ratio, it has been noted that it was

¹⁹ Original in the Stockholm War Archives (Krigsarkivet); a copy in the Viljandi Muuseum.

²⁰ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 92; Andres Tvauri, "The archaeological investigations in Viljandi, Tartu, and Kärkna", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 1999* (Tallinn: Muinsuskaitseamet, 2000), 54–62, (55); Alttoa, "Viljandi linnamüür", 166.

²¹ Tvauri, "The archaeological investigations in Viljandi, Tartu and Kärkna", 55.

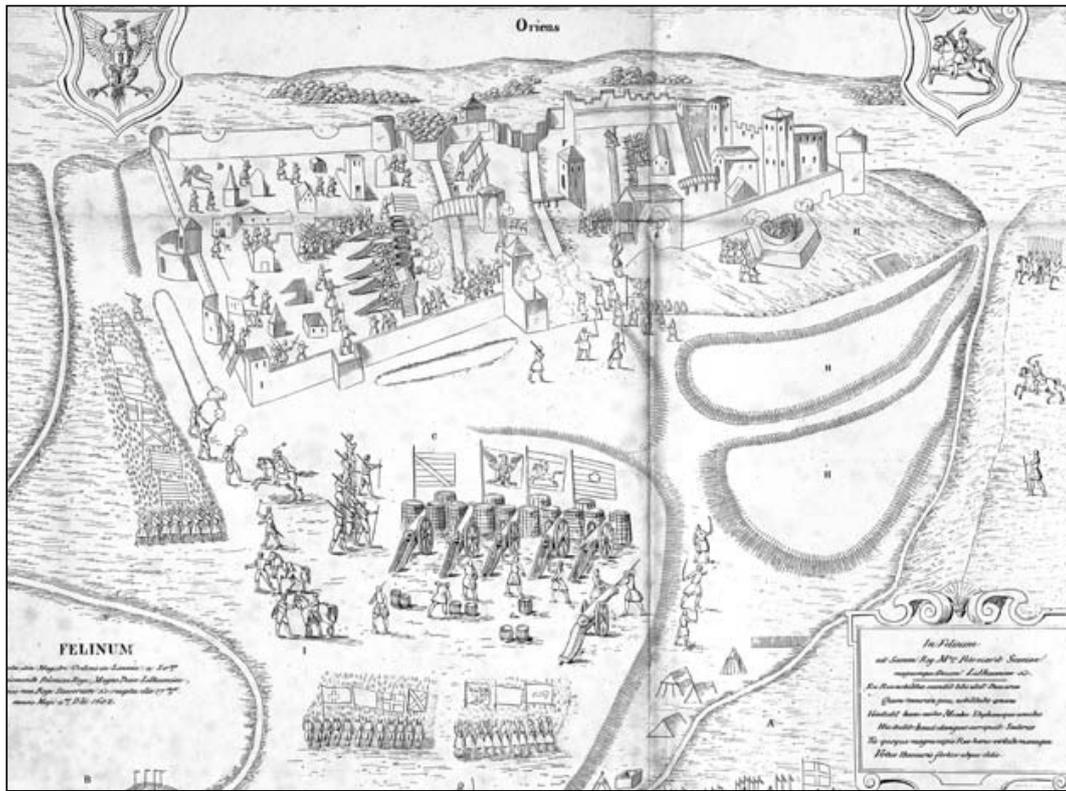


Figure 3. The Poles conquering Viljandi, Jacobus Laurus' engraving from 1602 (*Collectanea vitam resque gestas Joannis Zamoyscii magni cancelarii reipublicae polonae illustrantia*, edidit Adamus Titus comes de Koscidec Działyński (Posnaniae: [s.n.], 1861).

probably not drawn on the spot but from a cursory sketch or even from memory.²² The town wall and towers are also mentioned in the documents of the Polish officials from 1599, although it doesn't say anything about the constructional details.²³

The town of Haapsalu is located on the south coast of Haapsalu Bay (see fig. 1). The geological characteristics of Western Estonia have had significant impacts on the development of the town. The rise of the ground of 2–3 mm per year has resulted in a substantial increase of the town area over the centuries.²⁴ The establishment of the Haapsalu castle can be dated to the 1260s, when the town-creation attempts of the bishop of Saare-Lääne had failed both in Lihula and Old-Pärnu.²⁵

²² Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 93.

²³ "Viljandi linn 1599. aastal".

²⁴ Tõnis Padu, "Haapsalu", *Eesti arhitektuur* 2, 8–10 (8).

²⁵ Ervin Sedman, *Haapsalu vanalinna detailplaneerimine. Uurimistööd I osa. Lühikäsitte Haapsalu linna tekkest, kujunemisest ning arengust XIII sajandist käesoleva ajani* (1974, manuscript in the archive of the National Heritage Board), 22.

The first phase of the town occurred at the same time as the construction of the castle. During the initial period of construction, the authority figures, members of their defense, and the builders lived outside of the building site, i.e. in the future urban territory²⁶ on the north side of the castle district. In 1294, Haapsalu received town rights. In 1323, the boundaries of the town area were marked and the harbor locations determined. The regular town structure was oriented from the castle and a central marketplace. The continuous withdrawal of the sea caused a change in the location of the harbor. As the town expanded westward, the building of a wall with five gates started on the seaward side of Haapsalu. The location of the structure was determined by natural features, the position of the castle, and the earlier urban settlement.²⁷

According to previous research Haapsalu was an unfortified town,²⁸ until in 1965 excavations revealed massive wall remnants.²⁹ Additionally, the most famous chronicler of the sixteenth century, Balthasar Rüssow, does not mention Haapsalu in the list of Old Livonian fortified towns.³⁰ On the oldest known map from the end of the seventeenth century, the town wall is not depicted.³¹ The existence of the wall found confirmation in the town documents from 1551 to 1689.³² The earliest description of the town wall comes from 1761. It has been noted, that the wall encircled the town on the seaward side and was 1.2 km long.³³ It has also been suggested that the length of the wall was 850 m.³⁴ The wall (see fig. 4) had five gates, which protected against the dangerous directions.³⁵ Villem Raam has noted³⁶ that Haapsalu was initially fortified with a wooden stockade and the town wall was erected during the reign of bishop Winrich von Kniprode (1385–1419).

²⁶ Sedman, *Haapsalu vanalinna detailplaneerimine*, 23.

²⁷ Padu, "Haapsalu", 8–9.

²⁸ *Eesti arhitektuuri ajalugu*, 31.

²⁹ Villem Raam, "Haapsalus leiti keskaegne linnamüür", *Sirp ja Vasar*, 10.9.1965, 5.

³⁰ Balthasar Rüssow, *Balthasar Rüssow's Livländische Chronik, aus dem Plattdeutschen übertragen und mit kurzen Anmerkungen versehen durch Eduard Pabst* (Reval: F. J. Koppelson, 1845), 1b.

³¹ Anton Pärn, "Die Wehrbauten von Haapsalu", *Castella Maris Baltici I*, 177–182 (181–182).

³² Kalev Jaago, *Haapsalu arhitektuuri ajalugu XIII–XIX sajandil* (1989, manuscript in the Department of History of the University of Tartu), 17.

³³ Pärn, "Die Wehrbauten von Haapsalu", 182

³⁴ Sedman, *Haapsalu vanalinna detailplaneerimine*, 34.

³⁵ Pärn, "Die Wehrbauten von Haapsalu", 182.

³⁶ Villem Raam, *Haapsalu piiskopilinnus. Ajalooline õiend* (1969, manuscript in the archive of the National Heritage Board), 14.

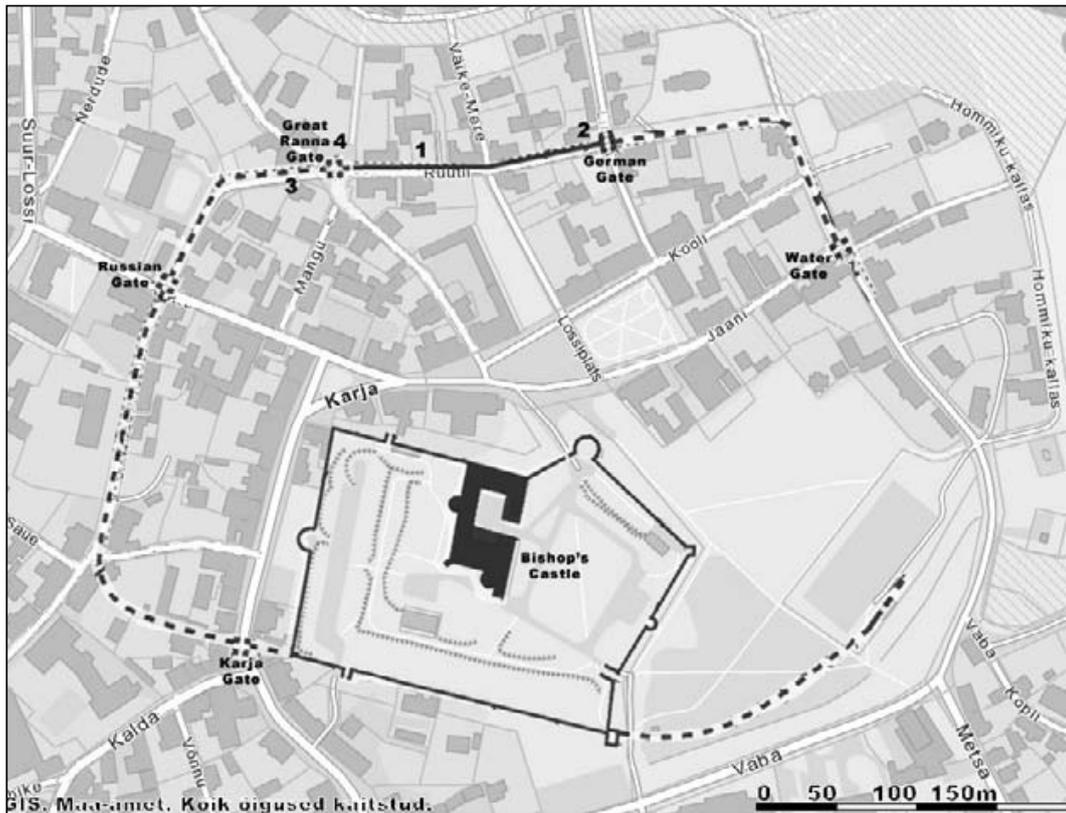


Figure 4. The excavations conducted and approximate location of the town wall on the contemporary map of Haapsalu (according to Russow, “Kaks aastakümnet linnaarheoloogiat Haapsalus”): 1. Raam 1965; 2. Pärn 1996; 3. Russow 2005; 4. Russow 2003.

The existence of the earthen rampart, palisade, and moat surrounding the initial town core have been suggested by other scholars as well.³⁷

The bishop's castle in Haapsalu played a large role in the development of the town. The development of the town was only due to the founding of the bishop's residence there, as it mainly served the economic and military needs of the castle. After the disappearance of the important trade routes, the independent development of the town ceased.³⁸ In the late Middle Ages, the area of the bishop's castle was 2.9 ha and the town was about 5.5 ha.³⁹

In the Livonian War in 1560, the Muscovians invaded Läänemaa and looted Haapsalu. The raid was so thorough that only three houses remained intact in the town. Apparently the town wall was also destroyed, as it is

³⁷ Sedman, *Haapsalu vanalinna detailplaneerimine*, 24.

³⁸ Raam, *Haapsalu piiskopilinnus*, 9.

³⁹ Sedman, *Haapsalu vanalinna detailplaneerimine*, 34; Pärn, “Die Wehrbauten von Haapsalu”, 182.

rarely mentioned in later written sources.⁴⁰ After the war, the demolished town with the castle was in Swedish possession for more than a century (1581–1710). The defenses of the castle were improved and repaired. The destroyed town wall, however, was not restored.⁴¹ The course of the town wall is characterized by a radial road, which represents the outline of Haapsalu in the period before the Livonian War.⁴²

Narva is situated in the northern part of Estonia (see fig. 1), i.e. in the area that belonged to Denmark. There were three major fortified administrative footholds in this territory: Tallinn, Rakvere, and Narva. For centuries the position of Narva was the boundary between the two cultural worlds, or at least between the Western and Eastern Churches, separated by the Narva River.⁴³ From the end of the thirteenth century, merchants began to travel to Russia via Narva. The first reliable notice of the existence of an urban settlement next to Narva Castle comes from 1342. The birth of the town of Narva can be dated to 1345.⁴⁴ The total population of Narva in 1530 can be estimated to ca. 600–750. Narva's almost constant complaints of poverty and insecurity have been well documented. These were particularly in times of threats of war, trade embargoes, or the plagues when the citizens left the town.⁴⁵

It has been suggested that around the downtown, the establishment of limestone walls had already begun during the 1370s (see fig. 5). The builders were the townspeople in support of the Order and Tallinn. The wall was completed probably in 1385–90. In 1415–19, the walls were reinforced. Despite the repeated reinforcements, the walls were weak, which was also noted at the Livonian Diet (*Landtag*) in 1518. The total length of the fortification perimeter was 1,58 km. The length of the town wall was 1 km. The

⁴⁰ Sedman, *Haapsalu vanalinna detailplaneerimine*, 29.

⁴¹ Padu, "Haapsalu", 8–9.

⁴² Anton Pärn, "Die Lage der Wehrbauten in der topographischen Situation und der Stadtplanung von Haapsalu", *Castella Maris Baltici II*, ed. by M. Josephson and M. Mogren, Lund Studies in Medieval Archaeology, 18 (Stockholm: Almqvist & Wiksell International, 1996), 151–156 (156).

⁴³ Kaur Alttoa, "Narva Castle – an outpost of the Occident", *Castella Maris Baltici II*, 13–18 (14); see also Anti Selart, *Eesti idapiir keskajal* (Tartu Ülikooli Kirjastus, 1998), 95.

⁴⁴ Enn Küng, "Narva kesk- ja varauusaegne linnaõigis ja seda mõjutanud tegurid", *Linna asutamine, esmamainimine, inimtegevuse jäljed*, ed. by Merike Ivask, Narva Muuseumi toimetised, 5 (Narva: Narva muuseum, 2005), 51–64 (52).

⁴⁵ Jüri Kivimäe, "Medieval Narva: featuring a small town between East and West", *Narva and the Baltic Sea region*, Studia humaniora et paedagogica collegii Narovensis (Narva, 2004), 17–27 (21).

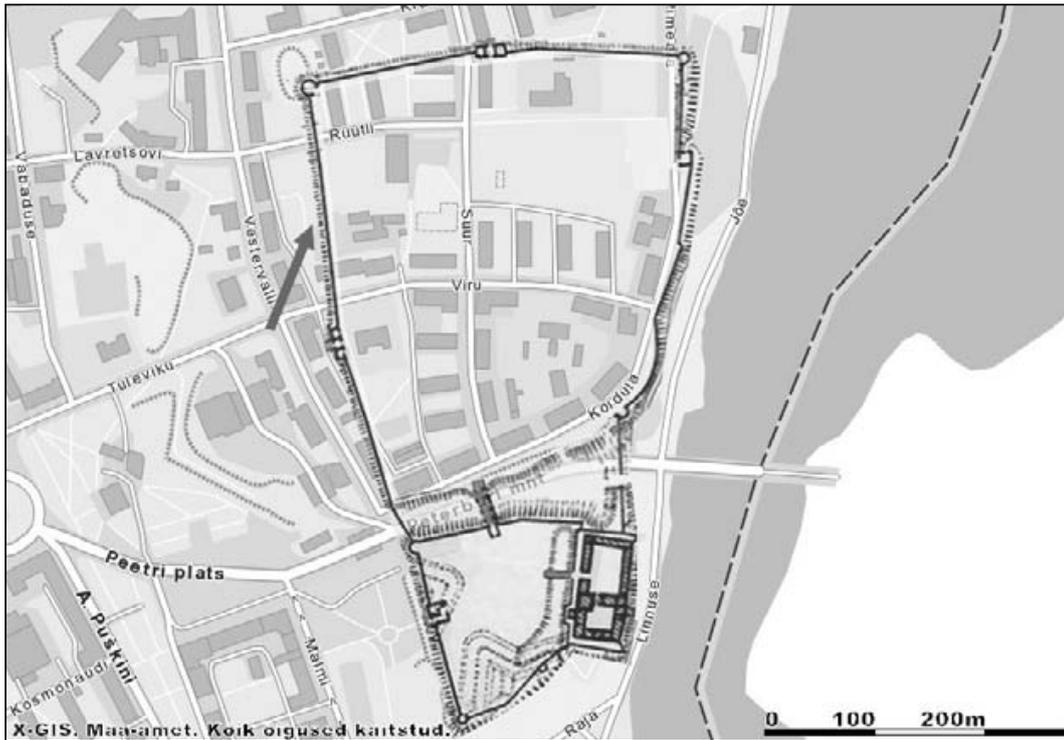


Figure 5. The excavations conducted and the approximate location of the town wall on the contemporary map of Narva (medieval map of Narva according to John Leighly, “The towns of medieval Livonia”, University of California Publications in Geography, 6:7 (1939), 280). The line marks the excavations conducted in 2008.

defensive boundary⁴⁶ and the moat⁴⁷ between the castle and the town have also been mentioned.

The wall had at least seven towers, three of them with gates.⁴⁸ As the eastern wall was located high on the edge of the escarpment, there were no towers on this side. The distance between the towers on the western side of the town was about 200 m. The Karja Gate on the north side had two half-circular flanking towers, and Viru Gate on the west side had a circular gate tower. The latter was exceptional in the medieval defensive architecture. Besides the gate towers, there were rounded cannon towers on the northwest and northeast corners of the wall. The fortifications were reconstructed in the sixteenth century. The oldest depiction of the fortifications of Narva is the relief of the siege of Narva on the sarcophagus of

⁴⁶ Jevgeni Kaljundi, “Narva keskaegsed kindlustused”, *Ehitus ja arhitektuur 3: Harjuma, Järvamaa, Raplamaa, Lääne-Virumaa, Ida-Virumaa*, ed. by Villem Raam (Tallinn: Valgus, 1997), 181.

⁴⁷ *Eesti arhitektuuri ajalugu*, 63.

⁴⁸ Kaljundi, “Narva keskaegsed kindlustused”, 181.

Pontus de la Gardie in the Dome Church of Tallinn. The relief was made by Arent Passer in 1595.⁴⁹

Regarding previous research, the monograph by S. Karling should be mentioned.⁵⁰ Based on the archival data, he also discusses the fortifications. The author mentions the town wall in the old town area of Narva.⁵¹ Kaur Altoa has published the most recent research on Narva's town wall.⁵² Based on the written sources, the author discusses the date of the construction of the wall. Altoa assumes that by the 1390s, the wall on the west and north side of the town was marked on the ground and the work had begun. He assumes that the wall was mostly already erected in its initial form by 1418.⁵³

Archaeological research

The town wall of Viljandi is the most archaeologically excavated construction discussed in this publication (see fig. 2). Several archaeological surveys, funded by the city council of Viljandi, were conducted in 1999. The aim of the surveys was to determine the exact location of the remains of the wall. The most thorough publication so far relied on the material gathered from nine test pits excavated in the course of the aforementioned surveys on the different sections of the wall.⁵⁴

The thickness of the fragment from the foundation of the wall near the Franciscan Monastery on the west side of the town was 2.2 meters.⁵⁵ The foundation near the St. John's Church was laid on the natural intact sand.⁵⁶ In the courtyard of Pikk Street 4, the foundation of the wall measured 2.2–2.35 meters. The two lowermost layers of stones were bound with yellowish clayish sand and the uppermost layer with lime mortar.⁵⁷ In the

⁴⁹ *Eesti arhitektuuri ajalugu*, 63.

⁵⁰ Sten Karling, *Narva: Eine baugeschichtliche Untersuchung* (Tartu: K. Mattiesen, 1936).

⁵¹ Karling, *Narva*, 78.

⁵² Kaur Altoa, "Kaks ekskurssi keskaegse Narva ehituslukku: linnamüür ja linnakirik", *Maakonnas, linnas ja muuseumis: uurimusi Narva ajaloost*, ed. by Merike Ivask, Narva Muuseumi toimetised, 11 (Narva: Narva muuseum, 2011), 39–57.

⁵³ Altoa, "Kaks ekskurssi keskaegse Narva ehituslukku", 41.

⁵⁴ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud".

⁵⁵ Urmas Selirand, "Über die Untersuchungen des Franziskanerklosters in Viljandi", *Eesti NSV TA Toimetised*, 31:4 (1982), 398–401 (400–401).

⁵⁶ Valk, "About the role of the German castle", 223, fig. 5.

⁵⁷ Andres Tvauri, *Aruanne Viljandi linnamüüri arheoloogilistest uuringutest Tasuja, Kauba ja Pika tänava vahelise kvartali nr 172. alal 1999. aastal* (1999, manuscript in the archives of the National Heritage Board), 2 ff.

courtyard of Kauba Street 12, the thickness of the wall was 2.13 meters.⁵⁸ Near Riga's Gate, the wall was constructed mostly of fieldstones, without the horizontal step between the foundation and the wall.⁵⁹ The wall of Riga's Gate was laid secondarily against the town wall and built mostly of fieldstones with an abundant use of mortar. The corners of niches were sometimes plastered with limestone. Pieces of bricks and flat roof tiles (the so-called *Biberschwanz* stone) were used as a filling.⁶⁰ A quadrangular tower was situated on the northwest corner of the town wall. The thickness of the eastern wall of the tower was 1.3 meters. The eastern wall of the tower was built separately from the town wall, while the southern wall seemed to be built together with it.⁶¹ The walls of the tower were laid onto the original soil. The two lowermost rows of stones were stacked as dry stone.⁶² The dimensions of the bottom of the tower were 7.5 × 8.6 meters.⁶³

The tower located on the north side of the town wall, between the northwest corner and Tartu Gate, was projected outside of the wall. The outside diameter of the tower was 8–10 meters, and the thickness of the walls reached 1.6–1.7 meters.⁶⁴ The walls were built of granite and plastered with the pieces of bricks. The joints of the inner wall of the tower were thoroughly filled with lime mortar. Also, pieces of brick were compressed between the wall stones.⁶⁵ The thickness of the town wall, in the section between the northwest corner tower and Tartu Gate, was 2.2–2.3 meters. The lower part of the wall consisted of large granite stones with brick rubble and yellowish mortar between them.⁶⁶ Prior to the erection of the wall, the yellowish sandy loam was piled on the inner slope of the moat. A similar layer of sandy loam leaned against the lowermost stones of the wall on both sides and extended partly below them. The lowermost stones of the wall were bound with sandy clay. The higher stones were connected with

⁵⁸ Kaur Alttoa, *Viljandi linnamüüri konserveerimise ettepanek* (1983, manuscript in the archive of the National Heritage Board).

⁵⁹ Kaur Alttoa, *Viljandi Kauba tn 12 Riia värava 1981. aasta väliuurimiste aruanne, 3: ehitusarheoloogiline ülevaade* (1982, manuscript in the archive of the National Heritage Board), 5.

⁶⁰ Alttoa, *Viljandi Kauba tn 12*, 6.

⁶¹ Andres Tvauri, "Archaeological investigations in the old part of Viljandi", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 1997* (Tallinn: Muinsuskaitseamet, 1998), 81–86 (82).

⁶² Building technique where the stones are stacked without any mortar to bind them together.

⁶³ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 102.

⁶⁴ Tvauri, "Archaeological investigations in the old part of Viljandi", 82–83.

⁶⁵ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 103.

⁶⁶ Tvauri, "Archaeological investigations in the old part of Viljandi", 81–82.

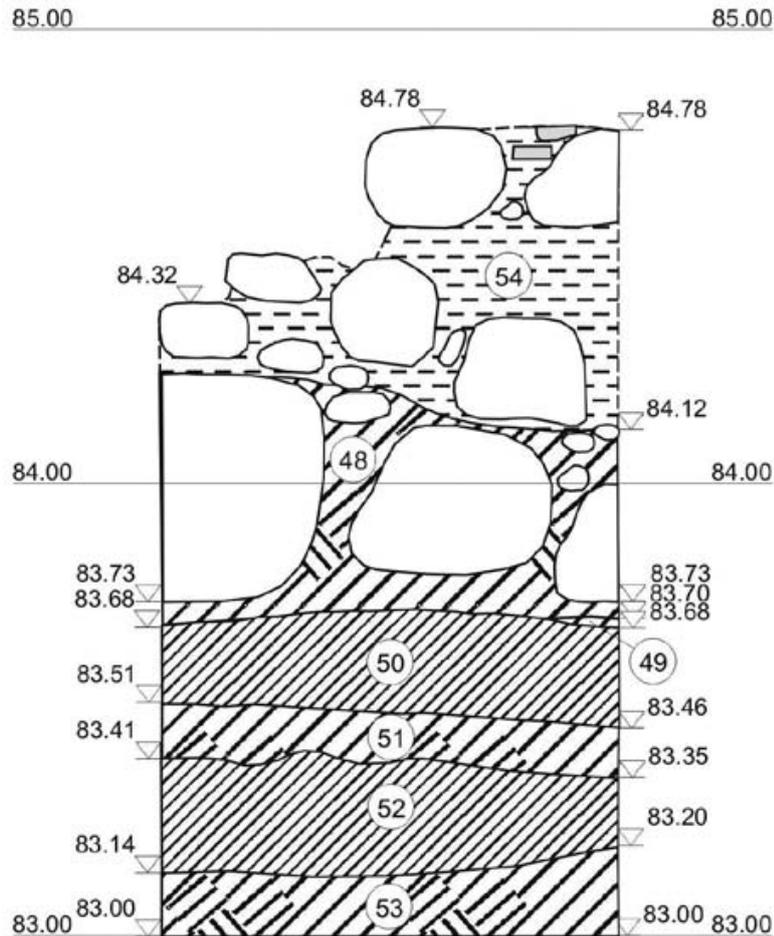


Figure 6. Surface layers under the town wall of Viljandi (according to Piirits, *Arheoloogilised uuringud Viljandis*): 48. beige layer of sandy clay (contained pebbles); 49. beige layer of sandy clay (contained patches of surface); 50. brown layer of clayish sand (contained abundant patches of beige surface, charcoal, pebbles, burned clay, and bones); 51. light brown clayish sand mixed with beige clayish sand (contained burned clay, charcoal, and pebbles); 52. brown clayish sand (contained charcoal and pebbles); 53. beige layer of sandy clay; 54. white lime mortar.

lime mortar. An extensive layer of sandy loam probably emerged from the digging of the moat.⁶⁷

In the area between Tallinn Street and Lossi Street, a test pit was excavated east of the preserved fragment of wall. The research revealed a ca. 50 cm high foundation, part of which was packed with soil and projected from the wall ca. 70 cm. The beige sandy clay layer containing small pebbles was

⁶⁷ Tauri, “Archaeological investigations in the old part of Viljandi”, 82.

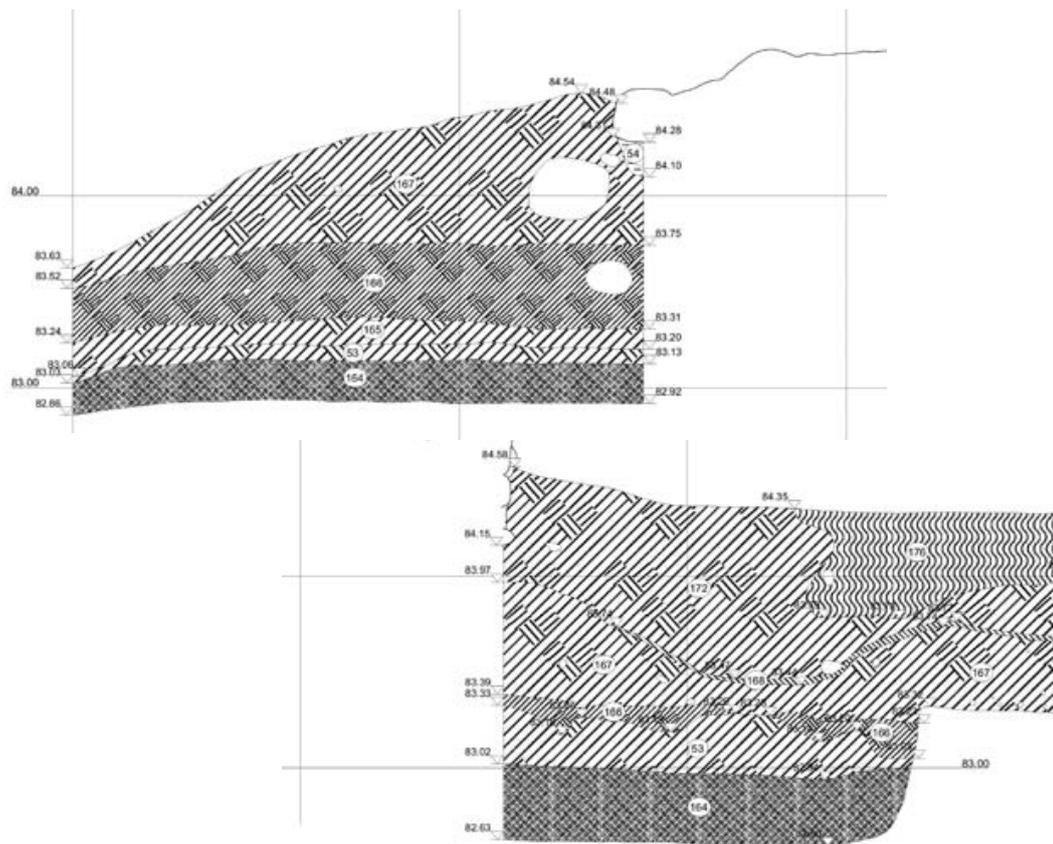


Figure 7. Town wall of Viljandi and the surface layers surrounding it (according to Piirits, *Arheoloogilised uuringud Viljandis*): 53. beige sandy clay; 54. white lime mortar; 164. layer of clay (contained patches of beige sand and pebbles); 165. beige sandy clay (contained patches of surface, rotten wood, and pebbles); 166. brown sandy clay layer (contained patches of beige sand, pebbles, brick dust, bones, and charcoal); 167. beige sandy clay layer (contained rocks, branches, and brick dust); 168. line of gray clayish sand (contained brick dust, charcoal, pebbles, rotten wood, patches of beige clayish sand, and surface); 169. light gray layer of clayish sand (contained rocks, beige sandy clay, charcoal, and brick rubble); 170. beige layer of sandy clay (contained rocks, patches of gray clayish sand, brick rubble, and charcoal); 171. gray layer of clayish sand (contained rocks, charcoal, brick rubble, roots, and patches of brown soil); 172. beige layer of sandy clay (contained rocks, pieces of bricks, charcoal, and patches of surface); 173. light brown layer of sandy clay (contained pebbles, roots, brick rubble, patches of surface, and charcoal); 174. gray layer of clayish sand (contained rocks, brick rubble, beige lime mortar, charcoal, and bones); 175. line of charcoal; 176. black-brown layer of soil (contained rocks, pieces of bricks and roof-tiles, roots, charcoal, lime mortar, and modern glass); 177. line of charcoal (contained brick rubble); 178. dark gray layer of clayish sand (contained abundant charcoal, bones, pebbles, brick rubble, slag, and rotten wood); 179. brown line of clayish sand (contained abundantly pieces of bricks, slag, and pebbles); 180. gray layer of clayish sand (contained charcoal; pebbles and pieces of bricks); 181. beige layer of sandy clay (contained rocks, pieces of bricks, charcoal, and patches of surface); 182. dark gray line of clayish sand (contained pebbles, pieces of bricks, and charcoal); 183. layer of mixed red clay (contained pebbles and patches of surface).



Figure 8. View of the niche in the town wall of Viljandi, view from the southeast. Photo by Peeter Piirits.

found between two rows of stones. A similar layer of clay extended directly under the foundation (fig. 6 and 7).⁶⁸

The length of the preserved part of the wall was approximately 40 meters and the height was 0.6–0.7 meters. The thickness of the wall was up to 2.3 meters. The wall was made of stacked fieldstones and bound with lime mortar (see fig. 8). The stones of the masonry foundation were packed and on both sides stacked with a natural beige sandy clay layer. This layer likely originated from the natural trench of the moat. The wall was made of fieldstones up to 80 cm that were bound with a solid white lime mortar. The part of the foundation of stones packed with soil projected up to 0.7 meters outside of the wall. Inside of the wall, a niche was discovered (see fig. 8). The width of the niche in the outer part reached 1.4 meters and the inner part was 1.5 meters. The depth of the niche was 1.7 meters. Therefore the scope of the outside of the town wall was only 0.6 meters. The insides of the niche were plastered with bricks and bound with beige lime mortar. The niche is assumed to have been established simultaneously with the rest

⁶⁸ Peeter Piirits, *Arheoloogilised uuringud Viljandis Tallinna mnt. – Lossi tn. 21 trasside rajamisel ja linnamüüri väljapuhastamisel* (2008, manuscript in the archive of the National Heritage Board), 12.

of that part of the wall. The foundation stones packed with grained gravel started directly under the filling layers of the niche. The similar layer of gravel was also between the foundation stones outside of the niche.⁶⁹

The thickness of the town wall in Lossi Street was 2.25 meters. Three layers of big boulders had been laid on the initial ground in horizontal rows. The gaps between the boulders had been filled with silt and smaller stones. The town wall was bound with lime mortar and laid on top of the foundation of boulders. Smaller boulders and pieces of limestone had been wedged between big stones.⁷⁰

On the eastern side of the town, the remains of the wall and Tartu Gate were first discovered in 1911.⁷¹ Archaeological research was conducted in the adjacent area in 1979.⁷² The thickness of the wall was 1.6–1.7 meters.⁷³ The thickness of the foundations of the western and northern walls of the foregate of Tartu Gate were 1 and 1.1–1.3 meters.⁷⁴ The excavations also yielded information on the construction of the town wall near Tartu Gate: its foundation with an average thickness of 1.7 meters consisted of granite stones with a diameter of 30–40 cm. The stones were packed with a mixture of yellow sandy clay and natural brown soil. Most of the intact brown soil had been removed underneath the foundation. The bottom of the wall, made of loose stones, was supported from both sides by mixed yellow subsoil. The foundation was made of loose stones and supported by mixed ground. The higher lying stones were bound with lime mortar.⁷⁵ From Tartu Gate up to the northeast corner of the town, the foundation of the wall is preserved in the ground.⁷⁶

The thickness of wall on the east side at Linnu Street was 2 meters. The outer side of the original wall revealed a narrower granite stone wall.⁷⁷ The

⁶⁹ Piirits, *Arheoloogilised uuringud Viljandis*, 14.

⁷⁰ Andres Tvauri, "Archaeological excavations at Lossi 21, Viljandi", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2009* (Tallinn: Muinsuskaitseamet, 2010), 157–163 (158).

⁷¹ Georg von Freymann, "Überreste der mittelalterlichen Fellin", *Jahresbericht der Felliner litterarischen Gesellschaft 1912–1917* (Fellin, 1918), VI–IX.

⁷² Kaur Alttoa, Henn Moora, *Viljandi linnamüüri arheoloogilised kaevamised V. Kingissepa t 22 hoovis* (1979, manuscript in the archive of the National Heritage Board).

⁷³ Alttoa, Moora, *Viljandi linnamüüri arheoloogilised kaevamised*, 3.

⁷⁴ Heiki Valk, "Excavations at the medieval town gates of Viljandi", *Eesti Teaduste Akadeemia Toimetised. Humanitaar- ja sotsiaalteadused*, 43:1 (1994), 90–96 (91).

⁷⁵ Valk, "Excavations at the medieval town gates of Viljandi", 93.

⁷⁶ Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 98.

⁷⁷ Arvi Haak, Priit Lätti, "Archaeological investigations at the town wall of Viljandi and the construction site at Tartu Street 8a", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2005* (Tallinn: Muinsuskaitseamet, 2006), 177–188 (178).

height of the preserved foundation of the wall behind the town hall of Viljandi is 1.4 meters.⁷⁸ The latter wall consists of large granite stones, 20–50 cm in diameter and is about 70–80 cm wide. The stones were bound with lime mortar and the most recent addition to the wall consisted of larger stones loosely placed on top of the wall.⁷⁹ In the southern part, both edges of the wall were built of larger fieldstones with a diameter of 30–50 cm. The smaller, generally less than 30 cm diameter stones bound with lime mortar were used as filling. The thickness of the wall was 2 meters.⁸⁰ The recent archaeological surveys conducted at Trepimägi Street revealed that the section of town wall was built from stones up



Figure 9. Town wall of Haapsalu at the crossroad of Wiedemanni, Rütli, Suur, and Mere Streets. Photo by Erki Russow.

to 60 cm in diameter. The stones were bound with lime mortar. The lime mortar had smaller rocks and pieces of bricks inside it. The width of the wall was from 2–2.1 meters.⁸¹ The lower part of the wall is preserved on the southwest side of the Pikk Street, east from the last mentioned section.⁸² In the test pit near Pikk Street 22, the thickness of the wall was 2.1 meters. The supposed first floor of the small half-circular tower was documented. The date of the building of the mentioned tower is dated to 1560–82.⁸³

The town wall of Haapsalu has been archaeologically excavated so far only on the north side of the town (see fig. 4). Erki Russow has summarized the archaeological research in a review article. He notes that the

⁷⁸ Tvauri, “Viljandi linnamüüri arheoloogilised uuringud”, 99.

⁷⁹ Haak, Lähti, “Archaeological investigations at the town wall of Viljandi”, 179.

⁸⁰ Haak, Lähti, “Archaeological investigations at the town wall of Viljandi”, 187.

⁸¹ Andres Tvauri, *Aruanne Viljandi keskaegse linnamüüri arheoloogilisest uuringust Trepimäe tänava lõunaküljel 2007. aastal* (2008, manuscript in the Department of Archaeology of the University of Tartu), 2; Rivo Bernotas, *Aruanne arheoloogilisest järeelvalvest Viljandis Trepimäe tänaval toimunud Viljandi linnamüüri markeerimistöodel* (2010, manuscript in the archive of the National Heritage Board), 2.

⁸² Tvauri, “Viljandi linnamüüri arheoloogilised uuringud”, 99.

⁸³ *Ibid.*, 103–104.

oldest traces of urban settlement of housing in Haapsalu date to the mid-thirteenth century.⁸⁴ The first stone houses date to the end of fourteenth century. Based on the intensity of the cultural layer, it can be stated that the decisive enlargement of urban settlement happened at the end of the thirteenth century or at the turn of the thirteenth and fourteenth centuries.⁸⁵

In the area of the town wall at Viieristi Square, the earliest finds date to the end of the thirteenth or the first half of the fourteenth century. The exposed town wall was approximately 1 meter high and 2.2 meters thick (see fig. 9). Granite stones with a diameter up to 80 cm on the outer side and limestone with a diameter up to 30–40 cm on the inner side of the wall were used.⁸⁶ The course of medieval town wall in the courtyard of Wiedemanni Street 2 was up to 3 meters from the contemporary street line.⁸⁷ The thickness of the section of wall on the north side of the town under Rütli Street⁸⁸ was 2.8 meters. The limestone wall rested on top of a heavy granite stone foundation. Additionally, remnants of German Gate with a square layout (4.2 × 8.5 m) were discovered.⁸⁹ The wall at Rütli Street was built of limestone about 300 meters in length.⁹⁰ The thickness of the wall at Rütli

⁸⁴ Erki Russow, “Kaks aastakümnet linnaarheoloogiat Haapsalus – mitte ainult potikildudest ja müürikatkeist. Ühe väikelinna mineviku uurimise olevikust ja tulevikust”, *Läänemaa Muuseumi toimetised*, XI (Haapsalu, 2008), 7–41 (18); see also Anton Pärn, “Külaehitiste jäljed Haapsalu varases linnaehituses”, *Linnusest ja linnast: uurimusi Vilma Trummali auks = About hillfort and town: studies in honour of Vilma Trummal*, ed. by Arvi Haak, Erki Russow, Andres Tvaauri, Muinasaja teadus, 14 (Tallinn, Tartu: Teaduste Akadeemia Kirjastus, 2004), 269–289 (280).

⁸⁵ Erki Russow, Heiki Valk, Arvi Haak, Anton Pärn, Ain Mäesalu, “Medieval archaeology of the European context: towns, churches, monasteries and castles”, *Archaeological Research in Estonia 1865–2005*, ed. by Valter Lang, Margot Laneman, Estonian Archaeology 1 (Tartu: Tartu University Press, 2006), 159–192 (173–174).

⁸⁶ Erki Russow, “Weitere Forschungen in der Stadt und Burg Haapsalu”, *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2003* (Tallinn: Muinsuskaitseamet, 2004), 148–159 (152); see also Erki Russow, “Linn linna all II: arheoloogilised kaevamised Haapsalus 2003. aastal”, *Läänemaa Muuseumi toimetised*, VIII (Haapsalu, 2004), 99–110 (101).

⁸⁷ Erki Russow, “Verschiedene Dokumentationsarbeiten in Haapsalu”, *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2005* (Tallinn: Muinsuskaitseamet, 2006) 207–218 (216); see also Russow, “Linn linna all”, 102.

⁸⁸ Raam, “Haapsalus leiti keskaegne linnamüür”, 5; Pärn, “Die Wehrbauten von Haapsalu”, 180–182.

⁸⁹ Urmas Arike, *Haapsalu Rütli ja Linda tn. ristmik. Haapsalu linnamüüri Saksa väravatorni konserveerimine* (1997, manuscript in the archive of the National Heritage Board).

⁹⁰ Russow, “Weitere Forschungen in der Stadt und Burg Haapsalu”, 151.

Street was more than 2 meters and was made of 20 × 40 cm stones. In comparison, the thickness of the wall of German Gate nearby was 2.5 meters.⁹¹

Archaeological investigation of the town wall of Narva has been scarce. Traces of urban settlement originate from the end of the thirteenth century or the first half of the fourteenth century, as the limestone foundation of the probable two-sectioned half-cellar house can (according to the analogies from Estonia, Germany, and Latvia) be dated to the same period.⁹² The excavated foundation of the medieval town wall of Narva at Vestervalli Street dates to the fourteenth century. The wall was demolished during post-war construction work on the territory of the old town and until the present day it was not known that its foundation had been preserved. Part of the wall was traced for more than 30 m, with the upper part of the quarry stones being almost at the level of the modern-day surface. The depth of the wall was more than 3 meters.⁹³ The area of the medieval moat was investigated in the course of research at Vestervalli Street. The find material consists of abundant artefacts from the eighteenth and nineteenth centuries, therefore it might be suggested that after the end of the seventeenth century, when the new line of bastions was built, the old moat was no longer cleaned and quickly filled with garbage.⁹⁴

Discussion and results

The beginning of construction of the fortification perimeter of Viljandi has so far been dated to the second half of the thirteenth century⁹⁵ and to the

⁹¹ Erki Russow, "Archäologische Rettungsgrabungen in Haapsalu", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2002* (Tallinn: Muinsuskaitseamet, 2003), 210–220 (211, Fig. 1; 216).

⁹² Aivar Kriiska, Mari Lõhmus, "Archaeological excavations on Suur-Street, Narva town", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia* (Tallinn: Muinsuskaitseamet, 2006), 189–206 (192).

⁹³ Aleksandr Nikitjuk, "Archaeological excavations in Narva in 2008–2009", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2009* (Tallinn: Muinsuskaitseamet, 2010), 177–183 (181–182).

⁹⁴ Aleksandr Nikitjuk, "Archäologische Aufsichtsarbeiten in Narva auf dem Territorium der Bastei "Triumph", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 1997* (Tallinn: Muinsuskaitseamet, 1998), 165–175 (166).

⁹⁵ Arvi Haak, "Viljandi linna kujunemisest peamiselt arheoloogiliste allikate põhjal", *Linna asutamine, esmamainimine, inimtegevuse jäljed*, Narva Muuseumi toimetised, 5 (Narva: Narva muuseum, 2005), 17–28 (25). Also more specifically mid-century / in the third quarter of the thirteenth century has been suggested (Valk, "Excavations at the medieval town gates of Viljandi", 94).

fourteenth century⁹⁶ and also related to the construction of the castle.⁹⁷ The erection of the masonry wall reinforced with towers is suggested to date to the second half of fourteenth century.⁹⁸ The inhabitation of the urban space of Viljandi likely developed gradually over several generations of settlement during the thirteenth century. The area enclosed by the town wall has been suggested to have been populated after the conquest of Viljandi in 1223. As evidenced by the current archaeological research results, as well as by radiocarbon dating, it has been suggested that the whole territory of the old town was inhabited during the thirteenth century.⁹⁹ As for Tartu and Pärnu, it has been suggested, that the development from the first traces of urban settlement to complete medieval towns took around a century, and it seems probable that in Viljandi those processes took more rather than less time.

Based on the absence of traces of earlier cultural layers, it has been suggested that the earlier cultural layers and natural humus soil were removed prior to building the wall.¹⁰⁰ Also, it has been suggested that the construction of the wall took place before the beginning of intensive urban occupation.¹⁰¹ As discovered during recent excavations, the earliest cultural layer and natural soil were removed in the northeastern part of town as well.¹⁰² Similar examples of ground leveling have also occurred in Tallinn.¹⁰³ Thus, it seems more probable that before the construction works began, the humus-containing soil was dug. This is not uncommon in the rest of Europe either, for example the excavations at Shrewsbury in England provided evidence that before the construction of defenses the area was cleared down to the natural clay, which was then partially scarped. The waste clay was then

⁹⁶ Kaur Altkoa, "Viljandi linna kujunemisest", *Ehitus ja arhitektuur*, 2 (1978), 48–54 (50).

⁹⁷ *Eesti arhitektuuri ajalugu*, 65–66.

⁹⁸ Elmo Raadik, *Viljandi arhitektuuri ajalugu feodalismi perioodil XIII–XIX sajandi keskpaigani*, diplomitöö (1960, manuscript in the archive of the Department of History of the University of Tartu), 67.

⁹⁹ Haak, "Viljandi linna kujunemisest", 25.

¹⁰⁰ Valk, "About the role of the German castle", 223; see also Tvauri, "The archaeological investigations in Viljandi", 55.

¹⁰¹ Valk, "Excavations at the medieval town gates of Viljandi", 94.

¹⁰² Rivo Bernotas, *Aruanne arheoloogilistest eeluuringutest Viljandis Linnu tn 4, Uue Kunsti Muuseumi ehitatava juurdehituse territooriumil* (2008, manuscript in the archive of the National Heritage Board), 3. The earlier surface was probably peeled before the new stage of settlement.

¹⁰³ Jaak Mäll, "Arheoloogilise kultuurikihi spetsiifikast Tallinna vanalinna territooriumil", *Linnusest ja linnast*, 249–268 (259 ff.).

used to form a low bank that was fronted by a stone wall, the foundations of which were set deep in a trench.¹⁰⁴

The creation of the moat around Viljandi has been dated to the second half of the thirteenth century or the fourteenth century.¹⁰⁵ The oldest human settlements in the territory north of the town can be dated based on the find material to the second half of the thirteenth century.¹⁰⁶ Similarly, for example, the origins of settlement in the northern part of Uus-Pärnu, have also been dated to the second half of the thirteenth century.¹⁰⁷ The erection of the town wall did not start there until approximately a century later.¹⁰⁸ The excavation results enable us to suggest dating settlement genesis in the northern suburban area of medieval Viljandi to the fourteenth century.¹⁰⁹ The usage period of the drainage ditch discovered near the town wall has been dated to the fourteenth century.¹¹⁰ For example, the drainage ditches in the Riga suburb of Tartu have been dated to the second half or to the end of the fourteenth century.¹¹¹ This date is associated with the completion of the town wall of Tartu and filling the moat with water.¹¹² As the building of the wall was a costly and manpower-consuming undertaking,¹¹³ it seems

¹⁰⁴ John R. Kenyon, "Medieval fortifications", *The archaeology of medieval Britain* (Leicester, London: Leicester University Press, 1990), 187.

¹⁰⁵ Alttoa, "Viljandi linna kujunemisest", 53; Tvauri, "Viljandi linnamüüri arheoloogilised uuringud", 107; Aivar Kriiska, Arvi Haak, Mari Lõhmus, "Arheoloogilised välitööd Viljandi linnas Tallinna ja Oru tänava vahele rajatud kaugküttetorustiku kraavi alal", *Viljandi Muuseumi Aastaraamat 2006* (2006), 101–129 (124).

¹⁰⁶ Kriiska *et al.*, "Arheoloogilised välitööd Viljandi linnas", 124; Near St. John's Church on the western side of the town, the earliest traces of human settlement have suggested to the second quarter of the thirteenth century, and the end of the formation of cultural layer related with the establishment of urban settlement to the end of the thirteenth or beginning of the fourteenth century (Heiki Valk, "Viljandi Jaani kiriku kalmistu", *Linnusest ja linnast*, 421–450 (424)).

¹⁰⁷ Bernotas, "Medieval fortifications of Pärnu", 16.

¹⁰⁸ *Ibid.*, 21.

¹⁰⁹ Arvi Haak, Heiki Valk, "Archaeological investigations of medieval and post-medieval Viljandi", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2001* (Tallinn: Muinsuskaitseamet, 2002), 91–104 (99).

¹¹⁰ Kriiska *et al.*, "Arheoloogilised välitööd Viljandi linnas", 115.

¹¹¹ Eero Heinloo, "Keskaegne Tartu Riia-eeslinn ehitusjäänuste põhjal", *Tartu Linnamuuseumi aastaraamat* (2007), 65–76 (70).

¹¹² Bernotas, "Medieval town wall of Tartu", 66.

¹¹³ For example, during the construction of the tower Kiek in die Kök in Tallinn, from June to October 1475, there were approximately 570 men working every day (Küllike Kaplinski, "Uusi andmeid Tallinna linnamüüri Tõnismäe-poolse osa kindlustamisest 15. sajandi viimasel veerandil ja 16. sajandi I poolel", *Eesti NSV Teaduste Akadeemia Toimetised*, 24 (1975), 330–344 (334)); in the reconstruction works of White Tower of Pärnu, 12 masons and 24 workers worked every day (Inna Põltsam-Jürjo, *Liivimaa väikelinn Uus-Pärnu 16. sajandi I poolel* (Tallinn: Argo, 2009), 291). Even in wealthier

questionable that it started simultaneously with the establishment of the oldest human settlement in Viljandi. Based on the previous information, it seems more probable that the construction of the town wall started also during the fourteenth century.

So far, it has been suggested that the whole town wall of Viljandi was erected similarly and that the same kind of construction was used. The thickness of the wall was supposedly the same everywhere. The lowest one or two layers of stones were situated on natural ground without the foundation and grouted with clayish sand between the stones. The thickness of the lowest part of the wall was 2 meters. The highest layer of stones was grouted with lime mortar containing a lot of clayish sand.¹¹⁴ Other authors also have suggested the hypothesis that the wall was built at the same time.¹¹⁵ The fieldwork done in 2008 showed that the thickness of the wall on the northern side of the town extends up to 2.3 meters, although the niche found during the excavation slimms this measurement at places to 60 centimeters. In comparison, the thickness of the town wall of Tallinn in the presumed location of an arched niche near Karja Gate was 1.4 meters.¹¹⁶

It might be assumed that the town wall, towers, and gates evolved during the whole medieval period in accordance with the development of weaponry. The Moscow Tower on the east side of the town wall was built by the Muscovites in 1560–82. The tower directly resembles the Moscow Tower of Tartu, which was built at the same time.¹¹⁷ Riga's Gate has characteristic features distinctive to the defensive architecture of the beginning of sixteenth century. The outlets in the lower zone of the town wall correspond with the horizontal defense principle, which began to spread in the late fifteenth century and especially at the beginning of the sixteenth century.¹¹⁸ Comparable examples would be Fat Margaret tower in Tallinn (built from 1510–30¹¹⁹) and White Tower in Pärnu.¹²⁰ The excavation results also

areas of Europe (e.g. Florence), it usually took some decades before stone fortifications were actually finished, due to a lack of finances or professional manpower (Boerefijn, *The foundation, planning and building*, 207).

¹¹⁴ Tvauri, "The archaeological investigations of Viljandi", 55.

¹¹⁵ Valk, "About the role of the German castle", 223.

¹¹⁶ Ragnar Nurk, Villu Kadakas, Garel Püüa, Guido Toos, Peeter Talvar, "Investigation of the medieval and early post-medieval Karja Gate and the suburb in front of it in Tallinn", *Arheoloogilised välitööd Eestis = Archaeological fieldwork in Estonia 2010* (Tallinn: Muinsuskaitseamet, 2011), 115–126 (120).

¹¹⁷ *Eesti arhitektuuri ajalugu*, 65–66.

¹¹⁸ Alttoa, *Viljandi Kauba tn 12*, 15.

¹¹⁹ Zobel, *Tallinna keskaegsed kindlustused*, 223 ff.

¹²⁰ Kaur Alttoa, *Pärnu keskaegsed linnakindlustused*, ajalooline öiend (1979, manuscript in the archive of the National Heritage Board), 19.

suggest that Tartu Gate was constructed in at least three different stages.¹²¹ The thickening of this foregate wall is similar to the thickening of the foregate wall of Russian Gate in Tartu.¹²² Thus it may be suggested that it was built in the same period.

Although the dating of the wall of Viljandi to the second half of the thirteenth century seems disputable, the building of it still seems to have begun rather shortly after the establishment of the town. The opposite example is Haapsalu, where the network of streets and buildings evolved first and subsequently the town wall was erected.¹²³ Therefore, within Estonian territory, the approximate time of development from the first traces of urban settlement to a complete walled medieval town was likely from 50 (Viljandi) to close to 100 years (Haapsalu, but also Narva).¹²⁴

Table 1. Comparing the development from urban settlement to medieval town within the Estonian territory

Town	Town rights	Feudal lord	First finds of urban settlement	Completely developed medieval town
Viljandi	1283	Teutonic Order	Second half of 13th century	First half of 14th century
Haapsalu	1294	Bishop of Saare-Lääne	Second half of 13th century	End of 14th century
Narva	1345	Before 1346 the Danish king, afterwards the Teutonic Order	First half of 14th century	End of 14th century

¹²¹ Before the foregate was built, part of the moat had been filled with soil. As foregates, intended to protect the main gate from artillery fire, were not introduced into the fortification traditions before the mid-fifteenth century, an earlier dating is evidently out of the question. During the third stage of works, the gate was strongly fortified. The wall on its western side was made thicker so that the width of its foundation stretched to 4.5 meters. On the northern side, the old outer wall was demolished and replaced by a new one with tooled surfaces and a thickness of about 4 meters (Valk, "Excavations at the medieval town gates of Viljandi", 90–91).

¹²² Bernotas, "Medieval town wall of Tartu", 64. The thickness of the forewall of the front gate of Russian Gate in Tartu extends up to 4.5 meters.

¹²³ For example in Europe, the development of the settlement Brno ended with the construction of walls around the town (Dana Cejnková, Irene Loskotová, "Brno", *Medieval archaeology: an encyclopedia*, ed. by P. J. Crabtree (New York & London: Garland Publishing, 2001), 30–32 (32)).

¹²⁴ See Table 1.

Town	Town rights	Feudal lord	First finds of urban settlement	Completely developed medieval town
Uus-Pärnu	1318	Teutonic Order	Second half of 13th century	Second half of 14th century
Tartu	1262	Bishop of Tartu	First half of 13th century	First half of 14th century
Tallinn	1248	Before 1346 the Danish king, afterwards the Teutonic Order	First half of 13th century	First half of 14th century

The construction of the town wall of Haapsalu resembles the town wall of Pskov's Middle Town district. The building of the latter began in 1309 and its foundation was also stacked fieldstones that were supporting the limestone wall bound with lime mortar.¹²⁵ The town of Haapsalu and the castle were located on favorable terrain and distinguished from the mainland with water obstacles. Thus the medieval defense system of Haapsalu is mentioned as strong in written records. The town was also defended by the powerful castle.¹²⁶ According to the archaeological material, the average thickness in the excavated sections of the town wall of Haapsalu is over 2.3 meters and in the thickest part 2.8 meters. The average thickness of the town wall of Tartu based on the excavated sections is 2.16 meters.¹²⁷ The average thickness of the town wall of Pärnu according to excavated sections is 1.54 meters.¹²⁸ Therefore, Haapsalu's town wall appears to be rather comparable with the strongest walls in the Estonian territory. The reason for building on the western side of the town was to avoid the lowland, which was covered with water during flooding and thus not suitable for construction.¹²⁹ Although the existence of a wall on the western and northeastern sides of town is awaiting archaeological confirmation, it seems that the town wall was at least planned to be built as strong as the strongest walls in other towns in the contemporary Estonian area.

¹²⁵ Inga Konstantinovna Labutina, "Arkheologicheskie ostatki ukrepleniï 1309 goda na territorii Srednego goroda Pskova", *Linnusest ja linnast*, 97–112 (111).

¹²⁶ Sedman, *Haapsalu vanalinna detailplaneerimine*, 30.

¹²⁷ Bernotas, "Medieval town wall of Tartu", 64.

¹²⁸ Bernotas, "Medieval fortifications of Pärnu".

¹²⁹ Sedman, *Haapsalu vanalinna detailplaneerimine*, 32.

How high were the walls of Estonian small towns? The height of Haapsalu's town wall has been stated to be 6 meters on the basis of analogies.¹³⁰ For example, the so-called Kanne wall in Tallinn near Nunnatorn Tower, erected at the beginning of the fourteenth century, was 6.2 meters high. The height of the arched-niched section of the town wall of Tallinn, between Hellemanni Tower and Viru Gate, was 6.5 meters.¹³¹ The suggested height of the town wall of Uus-Pärnu was also 6.5 meters.¹³² This seems to have been quite common in the German areas, as well. Similar heights were characteristic even with cities, and the height of the wall does not correlate with the number of towers. For example, the height of the town wall of Wismar (36 towers in total) was between 6 and 8 meters.¹³³ The height of the town wall of Zürich was 7 meters.¹³⁴ The height of the city wall of Cologne was 7.5 meters.¹³⁵ Based on the thickness of the town wall of Viljandi, Elmo Raadik has estimated its height in the Middle Ages to have been about 10 meters.¹³⁶ According to the previous data, however, this must be considered far too high. Similarly in Western Europe, the town walls have been assumed to be around 6 meters high and 1.8 meters thick.¹³⁷

Although Tartu and Pärnu throughout the Middle Ages were the towns of peacetime, and where acts of wars after the second half of the thirteenth century took place only during the Livonian War,¹³⁸ the history of Haapsalu was anything but quiet. In the thirteenth to fourteenth centuries, the town was a whirlpool of internal disputes and was sacked several times. In 1383, militant vassals raided Haapsalu castle and burned the fence of the stronghold and the houses of the clergy.¹³⁹ After 1419 (the end of bishop Winrich von Kniprode's government), there was a period of intense building of urban

¹³⁰ Sedman, *Haapsalu vanalinna detailplaneerimine*, 31.

¹³¹ Ervin Sedman, *Pärnu Punase torni väliuurimistööde aruanne. Tekstilise osa, I* (1977, manuscript in the archive of the National Heritage Board), 27.

¹³² Bernotas, "Medieval fortifications of Pärnu".

¹³³ Gerd Baier, "Das Stadtbild als Spiegel der Geschichte: die großen Küstenstädte und ihre Baudenkmale", *Denkmale in Mecklenburg. Ihre Erhaltung und Pflege in den Bezirken Rostock, Schwerin und Neubrandenburg* (Weimar, 1977), 53–136 (106).

¹³⁴ Jürg E. Schneider, "Zürich", *Stadtluft, Hirsebrei und Bettelmönch: die Stadt um 1300* (Stuttgart: Konrad Theiss, 1992), 69–92 (83).

¹³⁵ Klaus Militzer, "Die Stadtmauer im Laufe der Zeiten: das Kölner Beispiel", *Fasciculi Archaeologiae Historicae: Architecture et guerre. Fasciculus XVI–XVII* (2005), 87–92 (90).

¹³⁶ Raadik, "Viljandi arhitektuuri ajalugu", 67.

¹³⁷ Boerefijn, *The foundation, planning and building*, 83.

¹³⁸ Bernotas, "Medieval town wall of Tartu", 67; Bernotas, "Medieval fortifications of Pärnu", 18.

¹³⁹ Sedman, *Haapsalu vanalinna detailplaneerimine*, 26.

fortifications.¹⁴⁰ In 1427, the Vitalic Brothers looted and burned the town.¹⁴¹ The peacebuilding and normalizing attempts by bishop Johnannes Orgas (1492–1515) were also without any particular results.¹⁴² The latter information shows that in proportion with the troubled atmosphere of Haapsalu, the scheme of building a more heavily fortified wall made perfect sense. On the other hand, we should consider that building the wall, as stated earlier, was costly and manpower-consuming – and during the restless times, there were definitely more obstacles than during the times of peace.

The village buildings typical to the thirteenth century were no longer present in fourteenth-century Haapsalu.¹⁴³ The state of today's research is connected to the barn-dwellings from Haapsalu and Lihula, similar to buildings from North West Germany. The Baltic Crusades, started at the beginning of the thirteenth century, led the Crusaders to Estonia mainly from this area.¹⁴⁴ Also, the close connection to the city of Riga had a decisive importance in the construction history of Läänemaa, as master builders from Riga brought their building traditions with them.¹⁴⁵ Might this be the key to the connection in similarities of the town plans of Cēsis (Wenden) (in modern-day Latvia) and Haapsalu? The Cēsis castle was one of the earliest strongholds built by the Livonian Order in its process of conquering the country.¹⁴⁶ Haapsalu seems to spread out in the same ways as the town around the castle at Cēsis.

¹⁴⁰ Sedman, *Haapsalu vanalinna detailplaneerimine*, 28.

¹⁴¹ Padu, "Haapsalu", 8.

¹⁴² Sedman, *Haapsalu vanalinna detailplaneerimine*, 28.

¹⁴³ Anton Pärn, "Linnalise asustuse algusest arheoloogilise allikmaterjali taustal", *Linna asutamise, esmamainimise, inimtegevuse jäljed*, 7–15 (9).

¹⁴⁴ Pärn, "Linnalise asustuse algusest arheoloogilise allikmaterjali taustal", 14. The new people brought with them century-old building traditions, as for example around 1120/25 a wall of stone was built on top of the earlier Duisburg fortification. In the thirteenth century the fortification was strengthened and numerous towers were added (Günter Krause, "Duisburg and its environs at the confluence of Rhine and Ruhr from the late Antiquity to the Industrial Age – essential aspects of its development according to archaeological and historical sources", *Medieval Europe Basel 2002: centre, region, periphery, 2: sections 4 and 5*, ed. by G. Helmig, B. Scholkmann, M. Untermann, 3rd International Conference of Medieval and Later Archaeology (Hertingen, 2002), 155–165 (159)).

¹⁴⁵ Sedman, *Haapsalu vanalinna detailplaneerimine*, 20.

¹⁴⁶ John Leighly, "The towns of medieval Livonia", *University of California Publications in Geography*, 6:7 (Berkeley, California: University of California Press, 1939), 235–314 (264 ff). The town Cēsis occupied a position with respect to the castle that is repeated elsewhere by the small towns that grew under the protection of castles – a position not very different from that occupied by the foreburgs of the castle. But even a small town needed more room than a spacious foreburg required, and so could not be laid out simply as an enclosure, one dimension of which was provided by a dimension of the castle (the pattern followed by most of the foreburgs). Several solutions to the problem of articulat-

The towns with similar plans to Viljandi in the Estonian area were Narva and Uus-Pärnu, and in the Latvian territory there were Koknese (Kokenhusen) and Valmiera (Wolmar). Tartu, Haapsalu, Tallinn,¹⁴⁷ and also Riga¹⁴⁸ were fortress towns with a combined defense system type of layout and a rather round ground plan. Viljandi, Narva, and Uus-Pärnu on the other hand were based on a quadrangular plan. In this layout, the town wall functions as the outer bailey of the castle.¹⁴⁹ The system of baileys, where the large areas protected by stone walls were established directly in front of the castle, has been stated to be the typical feature of the fortification sites of the Order.¹⁵⁰ However, this is not completely accurate, as Valmiera was a town of the Teutonic Order, and Koknese on the contrary was one of the strongholds of the Archbishop of Riga.¹⁵¹ Thus, even though it seems tempting to divide the town plans into groups according to the feudal lord (Bishop/Order) we cannot jump to any conclusions on this subject.

It has been also suggested that Scandinavia and Eastern Europe can be treated together with the northern parts of Germany. The peak of urbanization was reached at the end of the thirteenth century. By this time, an urban network had been established that did not change radically until the

ing town and castle were found: it was one of the primary form problems of the smaller Livonian towns. At Cēsis, the solution was to enclose a sector of an irregular ring about the castle on the gentle slope southward from the eminence on which the castle stood.
¹⁴⁷ Jaan Tamm, "Combination of the castle and town in Tallinn", *Castella Maris Baltici* 3/4, ed. by K. Altho, K. Drake, K. Pospieszny, K. Uotila, Archeologia Medii Aevii Finlandiae, V (Turku [u.a.]: Society for Medieval Archeology in Finland [u.a.], 2000), 179–184 (181).

¹⁴⁸ Andris Caune, "Bischofshöfe in Riga im 13. Jahrhundert", *Castella Maris Baltici* 3/4, 27–34 (28).

¹⁴⁹ For Koknese (Heinz Sauer, "Vir Nobilis Bernhardus de Lippia (1140–1224), Spurensuche im Balticum", *Castella Maris Baltici* VI, ed. by A. Kuncevičius (Vilnius: Savastis, 2004), 185–196 (189)), Valmiera, Viljandi, Narva, and Pärnu also a term "auf dem Schilde" has been used to refer to the type of town, a distinctive feature of which is the second fortification in front of the castle – an urban settlement, separated from the castle with moat and functioning as an outer bailey (Paul Johansen, *Lippstadt, Freckenhorst und Fellin in Livland: Werk und Wirkung Bernhards II. zur Lippe im Ostseeraum* (Münster Westf.: Aschendorffsche Verlagsbuchhandlung, 1955), 154)). Although it has been referred to as a distinctive type of town in Old Livonia (*ibid.*, 119), similar examples can be found from Europe, e.g. Friedberg in Germany (Rainer Zuch, "Burg und Stadt Friedberg: von der Reichsstadt zur Kreisstadt, von der Reichsburg zum Stadtteil, Stationen eines schwierigen Verhältnisses", *Burg und Stadt, Forschungen zu Burgen und Schlössern*, 11 (München: Deutscher Kunstverlag, 2008), 75–90 (80)).

¹⁵⁰ *Eesti arhitektuuri ajalugu*, 63.

¹⁵¹ Ieva Ose, "Burg und Stadt im mittelalterlichen Lettland während des 13.–15. Jahrhunderts", *Burg und Stadt*, ed. by Tomáš Durdík, *Castrum Bene*, 6 (Praha, 1999), 213–231 (229).

industrial revolution.¹⁵² However, it should be taken into account that Old Livonia, particularly in the thirteenth to fourteenth centuries, was still an area of peripheral countries in the colonization phase. So it may be suggested that all tendencies arrived there with delays.

There have also been suggestions that the characteristic castles of the German Knight Order in the Baltic could have been inspired by the Bohemian castles of the period of King Premysl Otakar II, as he was the one who founded Königsberg during the Prussian campaign in 1255. Though this hypothesis is noted to be very probable, the rise of a new type of order castle is a complicated process, modified by many influences and demands.¹⁵³ Therefore it seems that using the material from more distant areas in the historical-comparative method is justified. Although fortifying the towns seemed to be quite widespread in Old Livonia, the similar trend is not followed in adjacent areas such as in Scandinavia. Scandinavians towns, although small, had an important economic role as centers in which craftsmen produced tools, equipment, and clothing; in the regular town markets, imports were distributed and surplus produce gathered, and some were the sites of major seasonal fairs that attracted large numbers of people from wide regions. Even small towns were key parts of complex networks through which the larger cities and the households of rulers, magnates, and bishops as well as religious communities were supplied with their needs.¹⁵⁴ Though Sweden and Denmark, like Western Europe, saw a broader wave of urbanization from about 1200,¹⁵⁵ in general the medieval Scandinavian towns appear not to have been fortified.

However, simple fortifications in the form of earthen walls with palisades and ditches were not uncommon in Denmark. They were rarer

¹⁵² Hans Andersson, "The development of medieval towns", *The archaeology of medieval Europe*, 2, 370–375 (373–374).

¹⁵³ Tomáš Durdík, "Mitteleuropäische Kastelle – ein mögliches Vorbild der Ordensburgenarchitektur im Baltikum", *Castella Maris Baltici I*, 45–50 (43).

¹⁵⁴ See Birgit Sawyer and Peter Sawyer, "Medieval Scandinavia. From conversion to reformation circa 800–1500", *The Nordic Series*, 17 (Minneapolis: University of Minnesota Press, 1993), 159–160.

¹⁵⁵ Hans Andersson, "Urbanisation", *The Cambridge history of Scandinavia, I: prehistory to 1520*, ed. by Knut Helle (Cambridge: Cambridge University Press, 2003), 312–342 (329); see also Göran Dahlbäck, "The towns", *ibid*, 611–634 (615): Scandinavian towns were small by contemporary European standards. Stockholm and København, the largest towns in Sweden and Denmark, may each have had some 5000–6000 permanent residents, followed by Danish Malmö with about 4500. The modest number of other Scandinavian towns probably counted their inhabitants in the low thousands such as Viborg, Ribe, Roskilde, and Lund in Denmark, and Kalmar, Turku, Linköping, and Uppsala in Sweden.

in Sweden and almost non-existent in Norway. More advanced stone walls with towers protected only a few towns, such as Visby, Stockholm, Kalmar,¹⁵⁶ and Viipuri (Vyborg) in Sweden, and Kalundborg, Vordingborg, and København in Denmark,¹⁵⁷ although it was only in the late Middle Ages that the Danish capital was entirely surrounded by walls and towers. Based on the large-scale *Ziegelummauerung* from the middle of the fourteenth century, it is unclear whether Vordingborg can be considered as a town or a castle.¹⁵⁸ The walls around the Kalundborg castle were closely connected to the large wall around the town, which during excavations has been dated to 1356.¹⁵⁹ It was from the thirteenth century in particular that new stone walls with mural towers and gatehouses were built to enclose the larger towns.¹⁶⁰ However, from the Swedish territory, a number of towns flourished without the need for an enclosing wall, for example Malmö. Getting its most important economical resources from herring fishing, the herring market was probably the reason for Malmö's good trade connections, especially with the Hanseatic cities on the southern shores of the Baltic.¹⁶¹ When the second castle was built in 1434, it was seen both by the king and the citizens as a privilege for the inhabitants. The king needed the citizens of Malmö

¹⁵⁶ Nils Blomkvist, "När hanseaterna kom: En stadshistorisk jämförelse mellan Visby och Kalmar", *Meddelanden från Föreningen Gotlands fornvänner*, Årgång 69, ed. by B. Radhe (Gotländskt Arkiv, 1997), 47–70 (69): Kalmar, on the east coast of the Swedish mainland, opposite Öland, was a typical colonial town of its period with a church on the market square, a couple of other ecclesiastical institutions, and a large castle. German traders may have founded Kalmar at the end of the twelfth century, as a joint venture with the Swedish central power. See also J. E. Kaufmann, H. W. Kaufmann, *The medieval fortress: castles, forts and walled Cities of the Middle Ages* (Da Capo Press, 2001), 245: Kalmar castle initially served to check the activities of Swedish pirates. Kalmar stood near a walled town, whose fortifications were built at the beginning of the fourteenth century. Turrets, open on the sides that faced the castle, flanked the town's curtain wall.

¹⁵⁷ Andersson, "Urbanisation", 339.

¹⁵⁸ Ingolf Ericsson, "Stadtbevestigungen im mittelalterlichen Dänemark", *Schriften des Kulturhistorischen Museums in Rostock: Archäologie des Mittelalters und Bauforschung im Hanseraum* (Rostock: Konrad Reich, 1993), 143–148 (146).

¹⁵⁹ Vivian Etting, "The royal castles of Denmark as centres of regional administration, tax collection and mobilization in the late Middle Ages", *Castella Maris Baltici V*, ed. by J. Skaarup, N. Engberg, K. Borch Vesth, *Archaeologia Medii Aevii Finlandiae VI* (Rudkøbing, 2001), 43–50 (48); see also Anders Ödman, "Feudal iron production and castle-building in the marginal zone of medieval Denmark", *Castella Maris Baltici II*, 125–133 (130): Kalundborg was enclosed with a town wall by Esbern Snare (King Valdemar's brother), who also built the castle and most likely planned the building of the town's church before his death in 1204.

¹⁶⁰ Sawyer and Sawyer, "Medieval Scandinavia", 183.

¹⁶¹ Anders Reisnert, "The city of Malmö and the castle Malmöhus", *Castella Maris Baltici 3/4*, 159–166 (160).

to maintain trade in this area and to protect the coast; the inhabitants of the town needed the castle for the defense of their property.¹⁶²

Several important Scandinavian urban communities never had a castle (e.g. Århus and Lund) or only had it at a distance from the town.¹⁶³ Therefore, it may be suggested that the building of urban fortifications was not always directly related to military necessity, but was also due to the specificity of cultural space, which arrived to Old Livonia simultaneously with the German settlers. For example, in the south of Old Livonia the main rival of the Order in the region was the pagan Grand Duchy of Lithuania, crusades against which were launched with the blessing of the Pope. The battles of Duchy were both offensive in the eastern direction and defensive in the west. In its present territory, Lithuania was the scene of defensive battles against the Teutonic Order in the thirteenth to early fifteenth centuries, and its castles played an important role. Despite this, due to different reasons, the technique of building with stone was far behind in Lithuania compared with Western Europe. According to the most recent data, the first stone castles appeared in Lithuania during the first half of the fourteenth century. The majority of the old Lithuanian castles are represented by wooden constructions.¹⁶⁴

In summary, the situation in Old Livonia seems to clearly indicate an ordinary colonization policy, which is not something unique in Europe. For example, even the English strategy in Ireland was to defend a fortified zone 50 miles around Dublin and to control the rest of the island by using the great lords and walled towns as largely autonomous authorities.¹⁶⁵ As has been noted, the locations in border areas were due to the fact that boundaries between the various lordly territories were often not clearly determined. A newly created settlement in an area where lordly rights were not yet clearly fixed could serve as an anchor point for dominion.

¹⁶² Reisnert, “The city of Malmö”, 166.

¹⁶³ Anne Nissen Jaubert, “The royal castles during the reign of Erik Menved (1286–1319)”, *Journal of Danish Archaeology*, 7 (Odense University Press, 1988), 216–224 (216).

¹⁶⁴ Gintautas Zabiela, “The interior of the Lithuanian wooden castles”, *Castella Maris Baltici V*, 161–168 (162); see also Gintautas Zabiela, “Castle warfare between Lithuania and the Order in Lower Panemunė in the late Middle Ages”, *Castella Maris Baltici VI*, 211–218 (212).

¹⁶⁵ Eric Klingelhofer, *Castles and colonists: an archaeology of Elizabethan Ireland* (Manchester & London: Manchester University Press, 2010), 35. Similarly the first burst of building activity in France was in the last half of the thirteenth century after the Albigensian crusade when confiscated lands seized from the Cathar heretics were absorbed into the kingdom of France. The second burst of building started after the beginning of the Hundred Years’ War (1340–1450) (John M. Steane, *The archaeology of power* (Charleston: Tempus Publishing, 2001), 195).

In this way, territories were enlarged by colonization and the creation of new legal structures, rather than by military conquest. It is also relevant that frontier regions were relatively uncultivated and under-populated due to less favorable geographical conditions, as is usually the case with border areas. Because of the growing population pressure and the increasing knowledge of agrarian technology, it became profitable to cultivate these marginal lands.¹⁶⁶

According to the discussed information, it might be concluded that the average development from rudimentary urban settlement to walled medieval town in the Estonian territory took around 50–100 years. The town walls were erected in the Estonian territory probably in the fourteenth century. When a military threat was present, the fortifications were at least planned to be built stronger than in the peaceful areas, while at the same time the process of development from urban settlement to medieval town took longer in areas made vulnerable by internal disputes. The tendency to dispense the towns into typologies on the basis of the landlord does not seem to find much support. It might be suggested, that walling the towns in Old Livonia was a phenomenon of Western European culture represented by German settlers, rather than a wide-spread tendency around the Baltic.

ABSTRACT

Town defenses are central elements of townscapes. The defensive purpose of their construction was as important as their significance as a town symbol. The purpose of the current article is to summarize the material gathered from the excavations of the medieval town walls from the Estonian towns of Viljandi, Haapsalu, and Narva, to discuss when they were erected, and to analyze what their place was in Old Livonian and Baltic contexts. Although fortifying the towns seemed to have been quite widespread in Old Livonia, the similar trend was not followed in adjacent areas such as in Scandinavia. According to the information discussed in this article, it might be concluded that the average development from rudimentary urban

¹⁶⁶ Boerefijn, *The foundation, planning and building*, 107–108.

settlement to walled medieval town in the Estonian territory took around 50–100 years. The town walls were erected in the Estonian territory probably in the fourteenth century. The tendency to dispense the towns into typologies on the basis of the landlord does not seem to find much support. It might be suggested, that walling the towns in the Old Livonian area was a phenomenon of Western European culture represented by German settlers, rather than a widespread tendency around the Baltic.

KEYWORDS: urban archaeology, town walls, medieval fortifications, medieval Estonia.

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KOKKUVÕTE: *Eesti väikelinnad keskajal: linnakindlustuste arheoloogia ja ajalugu*

Keskaegse Eesti alal paiknenud kuuest kivimüüridega kindlustatud linnast on tänapäeval müüride maapealsed osad säilinud vaid üksikute fragmentidena. Ainsaks erandiks on siin Tallinn kui ainus pea täielikult säilinud keskaegsete kindlustustega linn, mis on arusaadavalt siiani ka enim uurijate tähelepanu pälvinud. Viimastel aastatel on avaldatud arheoloogilisest vaatepunktist lähtuvaid publikatsioone ka Tartu ja Pärnu linnamüüride kohta. Mis puudutab väikelinnu Viljandit, Haapsalut ja Narvat, siis sealsed müürid on säilinud vaid maapõues ning ka kirjalikke allikaid napib, seega tuleb neist tervikliku pildi saamiseks võtta appi arheoloogia. Arheoloogilised uuringud on seni olnud napid, piirdudes publikatsioonides enamasti vaid konkreetsete kaevanditega, üksikutel juhtudel ka kaevamisi juhatanud arheoloogi pikema kokkuvõttega. Käesoleva artikli eesmärgiks on võtta kokku seniste arheoloogiliste kaevamiste käigus saadud materjal kolme Eesti väikelinna – Viljandi, Haapsalu ja Narva – keskaegsete linnamüüride kohta; leida vastus, millal need rajati, ning võrdlevatele näidetele naabermaadest tuginedes analüüsida, milline oli Eesti ala väikelinnade koht

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Vana-Liivimaa ja Läänemere-äärsete linnade kontekstis. Kuna mõningate käsitletavate uuringute tulemused on siiani teaduskäibesse toomata, on käesoleva publikatsiooni näol tegu ka allikapublikatsiooniga.

Seni põhjalikumalt on arheoloogiliste uuringute käigus uuritud Viljandi linnamüüri. Avatud lõikudest ilmneb, et müür on rajatud maakividest, mis alaosas on laotud nii kuivmüürina kui ka seotud pinnase ja saviga ning ülaosas lubimördiga. Tornide ja niši vooderdamisel on kasutatud nii telliseid kui ka lubjakivi, telliste ja katusekivide tükke. Müüri paksus ulatub 1,6 kuni 2,35 meetrini. Haapsalu linnamüüri on seni arheoloogiliselt uuritud vaid linna põhjaküljel. Müüri paksus varieerub 2,2 kuni 2,8 meetrini. Müüri ehitusel on kasutatud nii lubja- kui ka maakive.

Seni napimalt on arheoloogiliselt uuritud Narva linnamüüri. Vestervalli tänaval uuritud müürilõik on dateeritud 14. sajandisse. Samuti Vestervalli tänaval keskaegse vallikraavi alal teostatud uuringute käigus dokumenteeriti, et pärast 17. sajandi lõppu, mil rajati uus bastionideliin, on vana vallikraavi kasutamisest loobutud.

Viljandi kindlustusvööndi ehituse algust on oletatud alates 13. sajandi keskpaigast kuni 14. sajandini. Arheoloogilistele uuringutele tuginedes on märgitud, et 13. sajandi jooksul võeti kogu keskaegse linna territoorium eluruumina kasutusele. Tuginedes võrdlevatele näidetele Tartust ja Pärnust, kus keskaegse linna areng esimestest märkidest linnalisest asutusest täielikult välja arenenud keskaegse linnani võttis aega kuni sajandi, näib tõenäoline, et ka Viljandis toimus see protsess aeglaselt. Kuna linnamüüri ehitamine oli kulukas ja inimtööjõudu nõudev ettevõtmine, siis on samuti küsitav, kas see võis alata samaaegselt varaseima linnaarengu etapiga. Võrreldes Haapsaluga, kus kõigepealt arenes välja tänavatevõrk ja hooned ning seejärel alustati linnamüüri püstitamist, näib Viljandis müüri ehitamine olevat siiski toimunud võrdlemisi lühikese aja jooksul pärast linna rajamist. Eelnevale tuginedes võib väita, et areng linnalise asustuse esmastest jälgedest kuni müüri ümbritsetud keskaegsete linnadeni võttis Eesti alal ligikaudu 50–100 aastat.

Kuigi linnade kindlustamine kivimüüridega oli keskaegsel Liivimaal laialt levinud, ei järgitud seda alati naabermaades, nagu Skandinaavias ja Leedus. Skandinaavia linnad, kuigi väikesed, olid olulised majanduskeskused, kus toimus tootmine ja kaubavahetus. Lihtsamaid kindlustusi, mis koosnesid muldvallidest kraavide ja palissaadidega, esines Taanis ning mõnevõra vähem Rootsis. Tornide ja kivimüüridega kindlustatud linnadeks olid vaid Visby, Stockholm, Kalmar ja Viiburi Rootsi alal ning Kalundborg, Vordinborg ja Kopenhaagen Taanis. Mitmed linnad õitsesid

ilma kaitsva müürita, nagu näiteks Malmö. Mitmetel olulistel linnalistel keskustel puudus ka linnus või asus see linnast eemal. Leedu alad oli kivi-ehitiste püstitamise tehnoloogialt Lääne-Euroopast kaugel maas ning isegi enamik sealseid linnuseid oli ehitatud puust. Seega tuleb arvata, et linna-kindlustuste rajamine polnud mitte alati seotud sõjaliste vajadustega, vaid esindas pigem kultuuriruumi eripära, mis saabus Vana-Liivimaa aladele koos Saksa kolonistidega.

Tuginedes käesolevas artiklis vaadeldud andmetele, võib väita, et kesk-aegse Eesti alal alustati linnamüüride püstitamist 14. sajandil. Rahutustest ümbritsetud piirkondades näivad kindlustused olevat planeeritud tugevamad, samas on müüride püstitamine toimunud aeglasemalt kui piirkondades, kus sisetülisid ei olnud. Varasemate autorite poolt soovitatud linnade tüpologiseerimist maaisanda järgi ei saa vaadeldud informatsioonile tuginedes lugeda alati korrektseks.