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Archaeological research at Munga Street 18 in Tartu

Sander Jegorov, Aivar Kriiska, Ragnar Saage, Margarita Gadalšina and Silvia-Kristiin Kask

Tartu Ülikool, ajaloo ja arheoloogia instituut, arheoloogia osakond (University of Tartu, Institute of History and Archaeology, Department of Archaeology), Jakobi 2, 51005 Tartu, Estonia; sander12312@gmail.com
OÜ Arheograator, Raekoja plats 11–16, 51004 Tartu, Estonia

Arvi Haak

Tartu Linnamuuseum (Tartu City Museum), Narva mnt 23, 51009 Tartu, Estonia

INTRODUCTION

In the summer of 2022, archaeological monitoring took place at Tartu, Munga Street 18 for the construction of a rainwater drainage system (Fig. 1A). During digging the 4 metres deep trench, an intense organic-rich cultural layer of the historic moat of the medieval town was discovered that contained multiple finds and a few logs. Construction work was halted, and archaeological excavations followed. A part of the structure composed of timber, stones, and soils was unearthed, and a large number of artefacts were found. Since evidence of constructions in the moat of Tartu is completely missing, the discovery raised many questions. Initially, the interpretation of the structure as a bridge was proposed; after geolocating the position of the trench (Fig. 1B), it was confirmed that the trench was near the outer edge of the moat. Therefore, it can be assumed that it was most probably part of the moat bank support.

In this article, we provide a brief overview of observations made during excavations and the initial analysis of the finds collected during fieldwork.

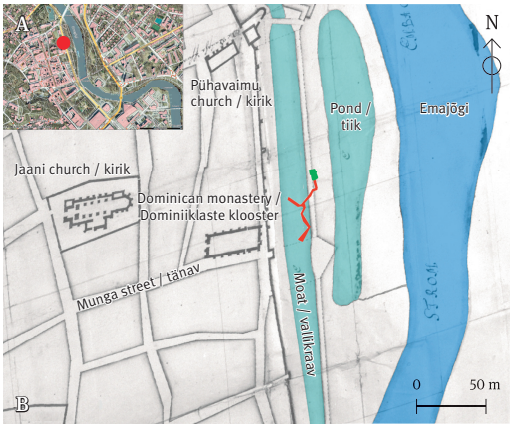

Fig. 1. *A – Situation plan of the studied area in Munga Street 18, Tartu. B – Part of the Tartu city plan from the 17th century, georeferenced into modern coordinate system. The rainwater drainage pipeline is marked in red and the excavated trench in green.*

Jn 1. *A – Tartu Munga tn 18 uuringuala asukohaskeem. B – osa 17. sajandi lõpul tehtud Tartu linna plaanist georefereerituna tänapäeva koordinaatvõrgustikku. Sademeveetorustiku kraav on markeeritud punase ja kaevand rohelisega.*

Base / Alus: RA, EAA.5393.1.18, Map collection of Estonian National Archives / Rahvusarhiivi kaardikogu
Drawing / Joonis: Sander Jegorov, Irina Khrustaleva

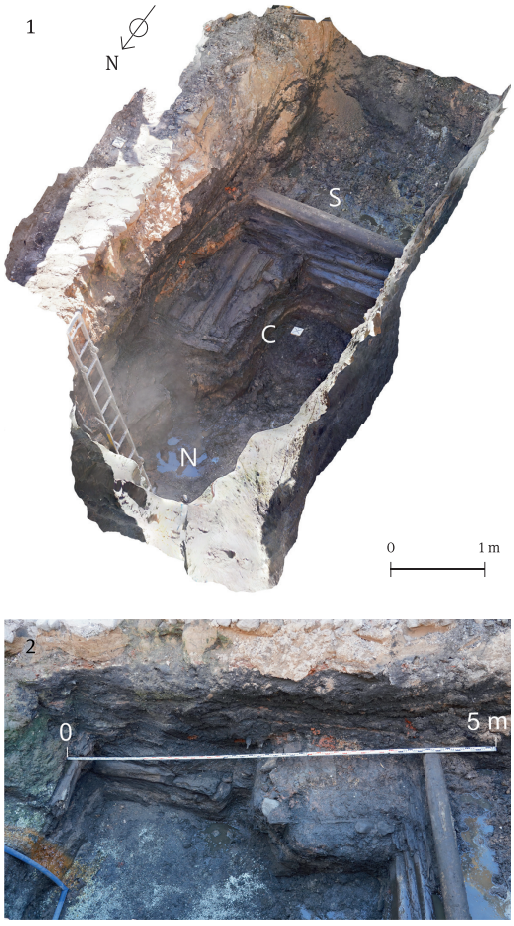

Fig. 2. *1 – 3D model of part of the moat bank support. N – northern part of the support, C – central part of the support, S – southern part of the support; 2 – part of the support, view from the west.*

Jn 2. *1 – Vallikraavi kaldakindlustuse osa 3D mudel. N – tugikonstruktsiooni põhjaosa, C – tugikonstruktsiooni keskosa, S – tugikonstruktsiooni lõunaosa; 2 – osa tugikonstruktsioonist, vaade läänest.*

Photos / Fotod: Sander Jegorov, Aivar Kriiska

MOAT BANK SUPPORT AND ITS STRATIGRAPHY

The main constructional element unearthed in the trench (Fig. 1B) was interpreted as protection of the outer bank of the moat primarily consisting of an irregular structure of hewn logs and half logs filled and supported with crystalline rocks, limestone slabs, bricks, clay, and organic-rich soils. The excavated section of the structure measured approximately 6 m in length and 2 m in width (see Fig. 2). Nevertheless, its boundaries could not be discerned in any direction. Since the required depth for the drainage pipeline was only 2 m, the supporting structure was not exposed from the part of the pipeline just south of the excavated trench that reached the depth of 4 m.

In the support of the moat bank, three distinct parts can be distinguished (Fig. 2). In the northern part two north-south and one east-west directional logs, one half log and some poles were found (Fig. 2: N). Originally, the structure consisted of more wood, including the logs that were now removed with an excavator, which led to the work being halted. The gap between the logs was filled with organic-rich soil.

In the central (Fig. 2: C) segment of the supporting structure, two parts, in turn, can be distinguished. On the western side of it the soil was organic-rich with few crystalline rocks, and on the eastern side, there was a construction made of multiple parts and various materials. The construction was covered with a pavement, made from clay, crystalline rocks (in addition, two limestone slabs) and some whole and fragmentary bricks. One brick was measurable, being 30 × 15 × 10 cm in size which correlates with common medieval brick sizes in Estonia (Bernotas 2013, 148). Beneath the stone pavement, there was a sequence of half-logs positioned on top of the moat's bottom sediments (layer 3 according to the stratigraphy shown in Fig. 3). The pavement was also surrounded by vertically placed poles, most likely to help support the structure.

The southern part (Fig. 2: S) of the supporting structure of moat bank consisted of five east-west-oriented logs stacked on top of each other. Just a few dozen centimetres to the south, there was another similar row, consisting of three logs. In between the two lower logs of the latter element, a north-south-oriented log was attached. Organic-rich soil filled the inside part of the log rows and continued further south to the end of the trench. All the

east-west-oriented logs were longer than the trench width, meaning over 2 m, continuing to both eastern and western sides. Another beam continued south from the row of logs, meaning that the construction continued further south.

The bottom log of the northern row was hewn and eventually it was discovered that it had a tenon in the middle part carved through the entire log. Several other logs in the bank support had also been treated in ways that were not necessary for building such a construction. Most likely some of the logs had previously been used in other structures, before being placed in the moat.

The archaeological trench reached to the depth of 4 m from today's ground level and several stratigraphic units were distinguishable (Fig. 3). The moat was dug into the peat located in the floodplain of the River Emajõgi (Fig. 3: 1). A thin (up to 10 cm) layer of fine light sandy soil with organic remains had settled on the peat layer inside the moat (Fig. 3: 2). On top of that, organic-rich soil had begun to settle at the bottom of the moat (Fig. 3: 3). Above this layer, the previously described support of the moat bank was built (Fig. 3: 4–7), with a height of approximately 1 m.

On top of the structure, two layers of organic-rich sediments (Fig. 3: 8 and 10), separated by clay and organic-rich soil with clay particles (Fig. 3: 9), were deposited. These were also related to the moat. Subsequently, demolition waste was spread there, and a cobblestone road (Fig. 3: 13) was built.

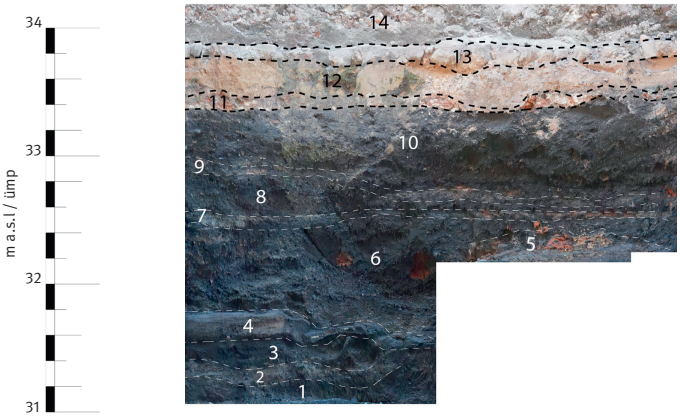

Fig. 3. *Stratigraphy of the trench in Munga Street 18 (section of the eastern wall of the trench, northern and upper segment of the central part of the moat bank support). 1 – peat, 2 – fine light sandy soil with organic remains (sediment layer at the bottom of the moat), 3 – abundant charcoal particles in the organic-rich soil (sediment layer at the bottom of the moat), 4 – part of timber structure (part of the moat bank support), 5 – clay, stones and bricks (part of the moat bank support), 6 – organic-rich soil (fill layer in the moat bank support), 7 – clay and organic-rich soil with clay pats (upper part of the moat bank support), 8 – organic-rich soil (layer deposited on the moat bank support), 9 – clay and organic-rich soil with clay pats, 10 – organic-rich soil, occasionally mixed, 11 – demolition waste, 12 – sand under the cobblestone road, 13 – cobblestone road, 14 – humus-rich filling soil.*

Jn 3. *Munga tn 18 kaevandi stratigraafia (lõik kaevandi idaseinast, vallikraavi kaldakindlustuse põhjaosa ja keskosa ülemine segment). 1 – turvas, 2 – peen hele orgaanikat sisaldav liivakas pinnas (vallikraavi põhja ladestunud kiht), 3 – rohkete söeosakestega orgaanikarikas pinnas (vallikraavi põhja ladestunud kiht), 4 – puidust tarind (osa vallikraavi kaldakindlustusest), 5 – savi, kivid ja tellised (osa vallikraavi kaldakindlustusest), 6 – orgaanikarikas pinnas (vallikraavi kaldakindlustuse täide), 7 – savi ja savitükkidega orgaanikarikas pinnas (vallikraavi kaldakindlustuse pealmine osa), 8 – orgaanikarikas pinnas (vallikraavi kaldakindlustuse peale ladestunud kiht), 9 – savi ja savitükkidega orgaanikarikas pinnas, 10 – orgaanikarikas pinnas, kohati segatud, 11 – lammutuspraht, 12 – munakividest tee alune liiv, 13 – munakivitee, 14 – huumuserikkas täitepinnas.*

Photo and editing / Foto ja töötlus: Sander Jegorov

CERAMIC FINDS

Among the ceramic items (1799 fragments) found from the trench and rainwater drainage pipeline ditch, the large majority were fragments of food-related vessels – mostly pots, and a few jugs and bowls. Although provenance analyses have not been made, the overwhelming part of the collections can be classified as locally made pottery following the Northwest Russian pottery tradition (Tvauri 2000). These sherds were exclusively found from the filling soils of the moat bank support. More specifically, ware types 3: 2, 3: 3 and 4 could be distinguished. Based on the rim sherds (n=225), ware type 3: 3, dated from the second half of the 13th to the end of the 15th century (Tvauri 2000, 104–105) clearly dominated with 157 fragments, with less than 20 fragments of the earlier 3: 2 type, and only 6 could be classified as type 4 (Tvauri 2000, 100–107). Thus, the overwhelming majority of the pottery collection can be dated between the last decades of the 13th till the end of the 15th century. It is important to note that the main ornamentation motif of the pots are straight lines (on 332 sherds), while wavy lines could be noticed only on seven fragments, in one case (TM A-290: 1616), peculiarly, on the inside of the vessel.

Quite distinctive are the pottery sherds with a composition and shape similar to local greyware, adorned with groove patterns, covered in a glassy glaze-like substance in green, brown, red, and yellow (e.g. TM A-290: 996, 1259, 1261). Often, the colour varies on a single sherd, just as the thickness of the covering material does. On some of the sherds, the glaze-like substance had already adhered after breakage, covering the fracture surface. It is possible that these ceramic items (or fragments) were somehow associated with the production of glass beads, which will be discussed in the following paragraph. Without exception, all these sherds have been found from the moat support and from beneath it. Such vessel fragments covered with a glassy mass have also been found at the glass bead production site in Sulevimägi, Tallinn (Russow 2020, 140).

Stoneware from the medieval period was represented with eight fragments: three of Siegburg, including a sherd of proto-stoneware (SIEG1)[1] and two of Late Medieval vessels (SIEG3A and 3B); there were four sherds from Southern Lower Saxony (two could be classified as LASX2, the third as LASX1 and the fourth – LASX3), and one from Raeren (RAER1), thus originating from all centuries of the medieval period in Estonia. In addition, there were four fragments of imported greyware probably from Northern Germany (two sherds of both HSN1 and HSN2), and some fragments of local replicas of stoneware jugs.

In the layers above the moat support were a few fragments of post-medieval ceramic items, including a fragment of Raeren stoneware (RAER2), post-medieval glazed redwares, including tripod pots, but also white clay pipes, including a double conical item dating from the 17th-century (TM A-290: 54), fragments of stove tiles and some fragments of industrial wares, and a fragment of porcelain probably from the 19th or early 20th century.

CUPELS

Among the ceramic collection, the most intriguing finds were fragments of cupels – ceramic items that have been used for melting. There were 61 items or fragments, including two whole items (Fig. 4). These have been found from the southern and southeastern parts of the wooden moat construction, with one exception, which was found from moat fill soil under the construction. Almost all had evidence of glassy substance – sometimes up to 2–3 mm – on the inner side, which could be yellow, green or reddish in colour. Several had a heavily

[1] Ceramic codes here and below according to Russow 2006.

burned outer surface. Based on analogues obtained from Tallinn and Riga (Russow 2020, 141), Munga Street 18 cupels can be dated to the 13th–14th century.

To determine the function of these cupels, elemental analysis was performed from the residues.[2] All vessels contained high levels of lead, to a lesser extent tin and iron, and low levels of nickel, copper and zinc. Almost all vessels had cadmium, however, there was one that had a noticeably lower cadmium concentration (Fig. 4: 1). The appearance of the cupels is also very telling, as almost all of the pieces have a glassy residue on them. However, the cupel that showed a very low level of cadmium, also had a noticeably different residue in it, resembling metallurgical vessels from Vene Street 9 in Tallinn (Saage & Russow 2020, 338). Lead was used in cupellation to purify silver or gold from unwanted impurities.

The rest of the vessels were very likely used for the production of coloured glass beads. This was confirmed by analysing yellow and green beads from the same site. In both cases lead was the most prevalent element and there was a high cadmium concentration. The green beads had a higher copper content, while the yellow beads contained more tin.

Fig. 4. *Cupels from the southern part of the moat bank support. 1 – a presumed vessel for cupellation, 2 – a presumed vessel for bead making.*

Jn 4. *Vallikraavi kaldakindlustuse lõunaosast leitud kupellid. 1 – arvatav kupellatsiooni tiigel, 2 – arvatav klaashelmeste tegemiseks kasutatud kupell.*

(TM A-290: 1558, 1557.)

Photos / Fotod: Ragnar Saage

LEATHER FINDS

During the excavations, the total of 1523 leather fragments were found from the filling soils of the moat bank support. These fragments could be divided into two main groups – (1) items or their parts, and (2) manufacturing waste. Leather artefacts were predominantly details of leather footwear (95 pieces). Of these, 22 fragments were uppers (23%), and 57 fragments (60%) were soles. The best-preserved finds are a peasant shoe, a knife sheath, and two glove fragments. One glove is missing a thumb part (Fig. 5: 1). From the second glove, only the thumb part has been preserved. The majority of the finds were classified as waste leather (1400 pieces, 92% of the total), which was in turn divided into three subgroups. Firstly, a fragment of leather with a piece of skin with fur that remained attached after the initial treatment was identified (Fig. 5: 2). It appears to be a defect in the leather processing. According to the structure of the coat and the pattern of the skin, it is most likely from cowhide. In the second group, there are leather trimmings that have remained from cutting out details before sewing items (332 pieces). Generally, there are no traces of sewing on them. The third and most numerous group consists of the trims related to production: patches, with seams along the edges; undetectable, cut-off parts of shoes; fragments of sealing strips from shoes. A large amount of various patches with traces of sewing among waste leather shows that the reuse of the material played an important role in shoe making in medieval Tartu.

[2] A portable Spectro xSORT XRF analyzer was used with the manufacturer's settings and calibrations.

The types of footwear correspond to the medieval European fashion of the 12th–14th century. The typologies are based on A. J. Larsen's (1992) analysis of the archaeological material from Gullskoen, Bergen. The same types of shoes were widely distributed in other cities in Estonia, for example, in Tallinn (Sarv 2000) and Pärnu (Samorokov 2012). Three fragments belong to high laced shoes. The uppers consist of two details with the knots serving as buttons. At least three uppers belong to low shoes fastened with a leather strap and with a V-shaped slit in the instep. A soft peasant shoe was made of a single piece of leather, with incisions at the sides for fastening the strap (Fig. 5: 3). One remarkable find is the upper part of a shoe decorated with a stamped pattern (Fig. 6: 1).

Fig. 5. *Leather finds from the filling soils of the moat bank support. 1 – a leather glove with a missing thumb part, 2 – a piece of waste leather with fur preserved, 3 – a soft peasant shoe.*

Jn 5. *Vallikraavi kaldakindlustuse täitekihtidest leitud nahaleiud. 1 – pöidlaosata labakinnas, 2 – karvadega nahajääk, 3 – pastel.*

(TM A-290: 3121, 3294, 2179.)

Photos / Fotod: Margarita Gadalšina, Sander Jegorov

The knife sheath is quite simple, decorated with rivets and double-incisions (Fig. 6: 2). The rivets and incisions are located along the position of the knife handle. Similar knife sheaths with rivets and incisions were fairly common in Tartu, Pärnu, Tallinn, as well as in Turku, Finland in the second half of the 13th and 14th centuries (Sarv & Sokolovski 2006, type 1.2; Hirsik 2019, 53). A knife, hidden in a sheath and hanging on a belt, was almost an indispensable item of the everyday image of a medieval citizen.

Fig. 6. *Leather finds from the filling soils of the moat bank support. 1 – the upper part of a shoe decorated with stamped pattern, 2 – a knife sheath decorated with rivets.*

Jn 6. *Vallikraavi kaldakindlustuse täitekihtidest leitud nahaleiud. 1 – stambiga kaunistatud jalatsi pealne, 2 – needitud noatupp.*

(TM A-290: 2850, 2491.)

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OTHER FINDS

One of the more common find groups were glass beads (36 items). Two colours, yellow (3–4 mm in diameter) and green (7–8 mm in diameter), were the most common (Fig. 7: 7). The discovery suits well with the context, since as discussed above, a number of objects for

the production of glass beads were also found. Among finds there were a few beads that seemed to have deformities compared to finished items. It appears that defective products were thrown into the moat.

Only a few items made from copper or tin alloy were found. One was a star-shaped brooch that can be dated to the medieval period, from the early 13th century (Valk & Laul 2014, 105) while in Siksälä, a burial with such a brooch was dated to 1300–1350 AD (Valk *et al*. 2014, 76). The other was typologically recognizable as a round brooch or 'hanseatic' brooch decorated with triangles (Fig. 7: 1) which were worn during the 13th and 14th centuries (Valk 1999; Valk & Laul 2014, 104). Another exceptional find was a pendant made of silver or tin alloy (Fig. 7: 2). Analogical rhombic cross-shaped pendants have usually been made from copper alloys in the 13th–15th centuries (Malve *et al*. 2018, 121, figs 7, 8; Valk *et al*. 2019, 126, fig. 9, 1–2), although a roughly similar lead alloy item is known (Valk & Laul 2014, 113, fig. 90: 2). A plaque, depicting an eagle or a peacock, made of silver or tin alloy, was discovered (Fig. 7: 3). It is noteworthy that this is an uncommon type among the medieval plaques in Estonia.

Most of the iron finds were staples for holding adjacent timber logs together (Schuster *et al*. 2012, 154). Additionally, a few knives (Fig. 7: 5) were unearthed, one of which had a preserved wooden handle. Only two pieces of flint were found throughout the entire excavations (Fig. 7: 6), where one seemed to have been used for fire making.

Fig. 7. *Metal and glass finds from the filling soils of the moat bank support. 1 – a 'hanseatic' brooch, 2 – a rhombic cross-shaped pendant, 3 – a plaque, 4 – a copper alloy detail, 5 – a knife, 6 – a Cretaceous flint flake, 7 – green and yellow beads, 8 – a fragment of a star-shaped brooch.*

Jn 7. *Metallist ja klaasist leiud vallikraavi kaldakindlustuse täitekihtidest. 1 – hansasõlg, 2 – rombikujuline ristripats, 3 – naast, 4 – vasesulamist detail, 5 – nuga, 6 – Kriidiladestu tulekivi kild, 7 – rohelised ja kollased kudrused, 8 – tähtsõle katke.*

(TM A-290: 1257, 710, 972, 973, 474, 709, 1254, 706.)

Photos / Fotod: Sander Jegorov

DISCUSSION AND CONCLUSION

The moat of Tartu has been studied several times, but in relatively small sections (e.g., Piirits 2015; Saage 2015; Vissak 2016; Bernotas & Randoja 2017). So far, the timeline for digging and filling the various sections of the moat remains unclear. The multi-part construction excavated in 2022 provided the first insight to the in structures of the Tartu moat. Since the construction continued north- and southwards from the investigated area, it might be assumed that it supported at least a part of the outer bank of the moat. The construction did not seem to be

uniform and had different elements. It was a rather robust structure that was made at least partially from secondary or recycled materials, consisting of chamber-like parts, which were likely filled with soil taken from the moat. The origin of the fill soils is primarily indicated by the fact that the organic-rich soils between the structural elements are analogous to the soil beneath the construction that settled at the bottom of the moat. A common characteristic for both is the abundance of undecomposed plant remains, which is much greater than what has developed in the cultural layers formed between medieval buildings in Tartu. In a wetland environment, the process of humification has been much slower. Additionally, the composition of the find assemblage, including fragments of cupels, is similar both in the moat's underlying structure fill layer and in the construction fill layer.

The archaeological finds also suggest that they are more likely waste disposed into the moat rather than originating from soil brought from the urban area. For example, the scarcity of iron items, including nails, and the very low number of fragments of wooden artefacts could be noted. Additionally, there is no construction debris characteristic of the medieval urban layer of Tartu, such as wood chips, traces of lime mortar, or brick fragments.

The plans from the late 17th century (Fig. 1B) clearly show that the outer bank of the medieval moat was fortified at that period, in order to make a glacis and a covered way. The few 17th-century finds from the moat may be the reflection of this episode, and we cannot exclude timbers from that period, especially in the upper fills.

The overwhelming number of items from the 3000 finds discovered in the filling soils of the supporting construction of the moat, were pottery sherds and leather manufacturing waste. Most of the pottery was locally produced, following the Northwest Russian pottery tradition, with very few fragments of foreign-produced ceramics. The majority of the finds date from the late 13th century to the late 15th century.

Undoubtedly, the rarest finds were the cupels, which allowed an insight into metal and glass working in medieval Tartu. The 13th–14th-century bead making has previously been discussed regarding cupels found in Riga where, in one case, half-melted glass beads have remained attached to the cupel (Caune 2004). Fragments of similar cupels have been found from the Sulevimägi district in Tallinn and the Botanical Gardens in Tartu (Russow 2020, 139–143). However, the finds from Munga Street 18 are the first case where elemental analysis confirms the use of such cupels for local bead production in Tartu. One of these was probably used for cupellation, but it must be stressed that it is complicated to separate glass working from metallurgical activities. Cadmium seems to be the key element to connect cupels to glass working, but further research is needed on which pigments were used to colour glass.

Regarding the earlier evidence from Riga, Tallinn and Tartu, where such finds almost exclusively originate from areas of population of ethnic Russian origin (Russow 2020, 140–141), it should be taken into consideration that the Orthodox church of St Nicholas was located on the other side of the moat, between Rüütli and Magasini streets, not very far from the excavation site. Thus, there may be a connection to the residence area around the church, which in later sources is associated with the Pskov merchants (Alttoa 1998, 36 and sources cited there).

In summary, it can be concluded that based on the composition of the finds, waste material from leather processing and bead making was discarded in this section of the moat by the local craftsmen. The use of simple local pottery and the lack of imported wares also refers to the common people of the town, who were undoubtedly the craftsmen engaged in such works at that time. It cannot be ruled out that the waste material or at least part of it was discarded by the residents of the Russian settlement area, located near the moat.

Based on the results of our excavations, it is only possible to draw very cautious conclusions regarding the construction of the moat in Tartu, or more precisely, its section on the side facing the River Emajõgi. Considering the typochronological dating of artefacts, the moat in this section could have been dug as early as the late 13th century, but it cannot be ruled out that it might originate from the early 14th century. The building date of the moat support also remains uncertain. Since at least some of the timber used in it is of secondary origin, neither dendrochronology nor radiocarbon dating can provide a direct solution. Therefore, the youngest finds from the construction context must be taken as a basis, and these date the moat support to the 14th–15th century.

The need to support the moat bank in such a way may have been influenced by several factors, but its location in peat and the richness of organic material in the fill layer leave no doubt that it was, among other things, related to the desire to reduce the proliferation of vegetation and the settling of plant particles in the bottom of the moat, which often accompanies eutrophication. The fact that there have been issues with the overgrowth of the Tartu moat, requiring constant cleaning, is also documented in written sources dating back to the mid-16th century (Kaplinski 1980, 80, 86, 116).

In the excavated area, it was not possible to document the filling of the moat. On the maps of Tartu, it is depicted until the early 18th century, but no longer in the 1760s (Raid 2015, 32–33, 37, 39, 44). At some point, this area was covered with a layer of construction rubble (Fig. 3: 11), and by the mid-19th century, there was already a street in its place (Raid 2015, 81), which was paved with cobblestones laid on a sand cushion (Fig. 2; Fig. 3: 12–13).

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REFERENCES

Alttoa, K. 1998. Das *Russische Ende* im mittelalterlichen Dorpat (Tartu). – Steinbrücke, 1, 31–42.

Bernotas, R. 2013. Brick-making in medieval Livonia – the Estonian example. – EJA, 17: 2, 139–155.

Bernotas, R. & Randoja, K. 2017. Aruanne arheoloogilisest jälgimisest Tartus Vabaduse pst 8 (Tartu vanalinna muinsuskaitsealal, reg nr 27006) ehitatava avaliku WC vee- ja kanalisatsioonitrasside rajamisel 27.07.–29.07. ja 5.10.2016. Tartu. (*Manuscript in MA.*)

Caune, A. 2004. Archäologische Zeugnisse von der Bearbeitung des Glases in Riga im 13. und 14. Jahrhundert. – Archaeologia et historia urbana. Pamięci Tadeusza Nawrolskiego. Ed. by R. Czaja, G. Nawrolska, M. Rebkowski & J. Tandecki. Elbląg, 457–464.

Hirsik, M.-L. 2019. Vööl kantavad esemed – nahast kott ja noatupp Eesti keskaja linnaarheoloogilises materjalis. [Master's thesis.] Tartu Ülikooli Viljandi Kultuuriakadeemia. Viljandi.

Kaplinski, K. 1980. Väljavõtteid Tartu Rae XVI saj. protokollidest. Tallinn. *(Manuscript in MA.)*

Larsen, A. J. 1992. Footwear from the Gullskoen Area of Bryggen. *The Bryggen Papers, Main Series, vol. 4.* Bergen.

Malve, M., Liblik, M.-A. & Juus, T. 2018. Rescue excavations at the Vastseliina borough cemetery and the 16th–17th-century war-related mass grave. – AVE, 2017, 117–132.

Piirits, P. 2015. Arheoloogiline järelvalve Tartus Munga tn. 16 kaablitrassi rajamisel. Tartu. (*Manuscript in MA.*)

Raid, T. 2015. Tartu ajaloolistel linnaplaanidel 1600–2010. Tallinn.

Russow, E. 2006. Importkeraamika Lääne-Eesti linnades 13.–17. sajandil. Tallinn.

Russow, E. 2020. Lood ja leiud Tallinna algusest. Tallinn.

Saage, R. 2015. Arheoloogiline järelvalve Tartus Vabaduse pst. 8 sadeveetorustiku ehitusel. Tartu. (*Manuscript in MA.*)

Saage, R. & Russow, E. 2020. Urban Casting Tools as Evidence for Transfer of Technology across the Baltic Sea in 13th- to 17th-Century Estonia. – Medieval Archaeology, 64: 2, 330–353.

Samorokov, M. 2012. Naha töötlemine keskaegses Uus-Pärnus läbi kirjaliku ja arheoloogilise materjali. [Master's thesis.] Tartu Ülikooli ajaloo ja arheoloogia instituut. Tartu.

Sarv, K. 2000. Finds of leather footwear from the excavations at Sauna Street 10 in Tallinn. – AVE, 1999, 79–85.

Sarv, K. & Sokolovski, V. 2006. Sauna tänav 10 hoovi arheoloogiliste kaevamiste noatuped. – Etnos ja kultuur. Uurimusi Silvia Laulu auks. Ed. by H. Valk. MT, 18. Tartu–Tallinn, 319–330.

Schuster, J., Saunders, P. & Algar, D. 2012. Objects of iron. – Salisbury Museum medieval catalogue, 4, 143–199.

Tvauri, A. 2000. Loode-Vene päritolu slaavi keraamika Eestis 11.–16. sajandil. – EJA, 4: 2, 91–119.

Valk, H. 1999. A subgroup of the 'Hanseatic brooches' in Estonia. – The Medieval Town in the Baltic: Hanseatic History and Archaeology. Ed. by R. Vissak & A. Mäesalu. Tartu, 85–100.

Valk, H. & Laul, S. 2014. Siksälä kalme, I. Muistis ja ajalugu. Tartu.

Valk, H., Malve, M., Juus, T., Liblik, M-A. & Jonuks, T. 2019. Kodavere medieval cemetery – a parish churchyard? – AVE, 2018, 119–138.

Valk, H., Ratas, J. & Laul, S. 2014. Siksälä kalme, II. Matuste ja leidude kataloog. Tartu.

Vissak, R. 2016. Tartus Lai t 37 planeeritavate juurdeehituste alal 2016. a. teostatud arheoloogilised eeluuringud. Tartu. (*Manuscript in MA*.)

ARHEOLOOGILISED UURINGUD TARTUS MUNGA TN 18

Sander Jegorov, Aivar Kriiska, Ragnar Saage, Margarita Gadalšina, Silvia-Kristiin Kask ja Arvi Haak

2022. aasta suvel toimusid arheoloogilised uuringud sadeveetorustiku rajamisel Tartus Munga tänav 18 kinnistul, mille käigus kaevati välja osa vallikraavi kaldakindlustusest (jn 1). Tegemist oli küllaltki robustsete tarandilaadsete konstruktsioonidega, mis olid ehitatud palkidest, poolpalkidest, kividest, tellistest, savist ning täidetud orgaanikarikka pinnasega. Nähtavas osas 6 m pikkune ja 2 m laiune rajatis asetses u 3,5 kuni 2,5 m sügavusel tänapäevasest maapinnast (jn 2–3).

Kaevamistel koguti rohkelt leide. Arvukalt on savinõude kilde (kokku 1799 katket), mille puhul on tegemist peamiselt Loode-Vene keraamikatraditsiooni jälgiva kohaliku kedrakeraamikaga (tüübid 3: 2, 3: 3 ja 4), mida võib dateerida 13. sajandi teisest poolest kuni 15. sajandi lõpuni. Keskaegseid kivikeraamika kilde on vaid kaheksa, need pärinevad Siegburgis, Lõuna-Alam-Saksimaal ja Raerenis valmistatud kannudest. Vallikraavi kaldakindlustuse pealsetest kihtidest koguti veidi glasuuritud keraamika kilde ja ahjukahlite tükke. Keraamika hulgas on ka kaks tervet ja kümneid katkisi kupelle (jn 4) – valuvorme, mida kasutati kupellatsiooniks (hõbeda või kulla puhastamiseks soovimatutest lisanditest) ja värviliste klaashelmeste valmistamiseks. Riia ja Tallinna analoogide põhjal võib need dateerida 13.–14. sajandisse.

Teiseks arvukaks leiurühmaks (kokku 1523 leidu) olid nahatöö tootmisjäägid (1400 tükki, 92% nahaleidudest; jn 5: 2) ja nahkesemed, mis saadi kõik vallikraavi kaldakindlustuse täitest või sellel lasuvast vallikraavist välja tõstetud pinnasest. Nahkesemed on peamiselt jalatsite detailid. Paremini on säilinud üks pastel (jn 5: 1), noatupp (jn 6: 2) ja kaks kinda katket (jn 5: 1). Analoogide järgi võib leitud nahkesemed dateerida 13.–14. sajandisse.

Muust materjalist leide on vähem, kuid sortiment on mitmekesine: kollased ja rohelised klaashelmed (kokku 36; jn 5: 7), paar sõlge (jn 5: 1, 8), ristripats (jn 5: 2), paabulinnu kujutisega naast (jn 5: 3), vasesulamist eseme detail (jn 5: 4), mõned noad (jn 5: 5), tule löömiseks kasutatud tulekivitükid (jn 5: 6) jne.

Väljakaevatud tarind on seni ainus, mis osutab, et Tartu vallikraavi kaldaid on kindlustatud. Tarandilaadsed konstruktsioonid on täidetud vallikraavist välja tõstetud pinnasega. Kogutud leiud osutavad, et vallikraavi heitsid prügi (teiste hulgas) nahatöö ja klaashelmeste valmistamisega seotud käsitöölised, võimalik, et linnas asunud etnilised venelased, kelle erioskuseks näib Tartu, Tallinna ja Riia paralleelide alusel olevat olnud just kollaste ja roheliste helmeste tootmine.

Vallikraavi rajamise aja kohta saab teha vaid ettevaatlike järeldusi. Arvestades leidude tüpokronoloogilisi dateeringuid võidi see kaevata 13. sajandi lõpul, või isegi 14. sajandi alguses. Ka vallikraavi kaldakindlustuse rajamise aega saab esialgu määrata vaid pikema perioodina 14.–15. sajandisse. Ajalooliste plaanide põhjal võeti ala uuesti kasutusele 17. sajandi lõpul, mil sinna rajati glassiivall ja varjatud tee.