AKADÉMIAI KIADÓ

Reconstructing the riverside of the Danube in the medieval city of Pest

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ABSTRACT

In early 2017, an astonishing number of archaeological finds were unearthed during the excavation of two sites in Molnár Street (Budapest), led by the archaeologists of the Budapest History Museum. As the construction works of a new hotel took place on a registered archaeological site, and historical monuments of the city were expected to be found, the presence of archaeological professionals became essential. Even though the location was inhabited for centuries, the early modern and medieval layers were found unaffected.

Because of the nature of the site, the wet and muddy soil layers along the Danube provided a favourable environment for the preservation of organic materials and metals. As the climatic conditions in the Carpathian Basin are less favourable for the survival of organic material, the findings are very special both on a local and a broader regional level. In the Middle Ages, the Danube flowed over a much wider area than it does today. Today's embankment was often under water due to its proximity to the river, especially in the days before its regulation. The population, accustomed to the threat of spring floods, built their houses much further inland and along the river. Only urban landfills and, in safer times, ports and loading docks were established.

The aim of this paper is to specify past ground levels along the river, and changes in the water levels as well as the path of the Danube, with the help of as many environmental archaeological methods as possible. Similar research was already conducted on Margaret Island, in Vác and in Visegrád, so this new case study is hoped to be a useful contribution to reconstructing past landscapes along the river.

KEYWORDS

Landscape archaeology, Carpathian Basin, Pest, Danube, foreshore

INTRODUCTION

In the first half of 2017, the Budapest History Museum carried out an excavation in the inner part of Budapest, at 7–9. Molnár Street, District 5, prior to the construction of a hotel.[1] The area, located in the medieval city of Pest, once was the direct waterfront of the river Danube, based on the observed stratigraphic relations. Since the environment remained wet and muddy for centuries, the unearthed organic and metal find material was found in excellent condition.[2] Fortunately, as the constructions made in the 19th–20th centuries left the medieval strata intact, we could follow the history of the territory from the 14th century to the present. The aim of this paper is to present and interpret the documented stratigraphic relations, through which past groundwater levels, especially the waterfront, as well as the relation between the city and the river become easier to reconstruct.

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[1]Preliminary report on the excavation: P. Horváth (2020).

[2]About knives: P. Horváth (2018); pilgrim badges: Pomázi-Horváth (2021); the tannery workshop: P. Horváth and F. Komori (2018).

TOPOGRAPHY OF THE SITE

The excavation took place in the inner part of the city, on the foreshore of the Danube. During the 13th–14th centuries, the extension of the settlement on the river's left bank began to grow: Pest soon became a rich and independent town led by a self-government.

The researcher of the medieval topography of the city can rely primarily on the building and place names appearing in the surviving charts, as no contemporaneous map, engraving or view of the city are available. Maps depicting the view of Buda and Pest have been preserved only from the 17th century onwards, especially made on the occasion of wars and other military events. From the earlier times, the Hungarian and European Archives keep several reports and descriptions by Western or Eastern travellers who chronicled their experiences about the art, architecture, and everyday life of Pest (Fig. 1).

The excavated plots are located in the heart of the city, near the Danube, between present-day Belgrade Quay (Belgrád rakpart) and the parallel Molnár Street. If we consider the extent of Pest in the Árpádian Age (between the 11th and the beginning of the 14th century), the site was located on the southern edge of the former settlement, while in the 15th–16th centuries, when Pest was surrounded by a massive stone wall. The site was located near the central square and the Church devoted to Virgin Mary. It can be easily observed how much the role of the area changed over the centuries, as the city expanded to become a central place – unless it was flooded by the Danube at the time. With the help of historical and archaeological sources, we attempt to trace the most important changes of this area (Fig. 2).

CHRONOLOGY

Various groups of sources were used to determine the chronology of the area. The recent history of the plots can be reconstructed more easily with the help of written and

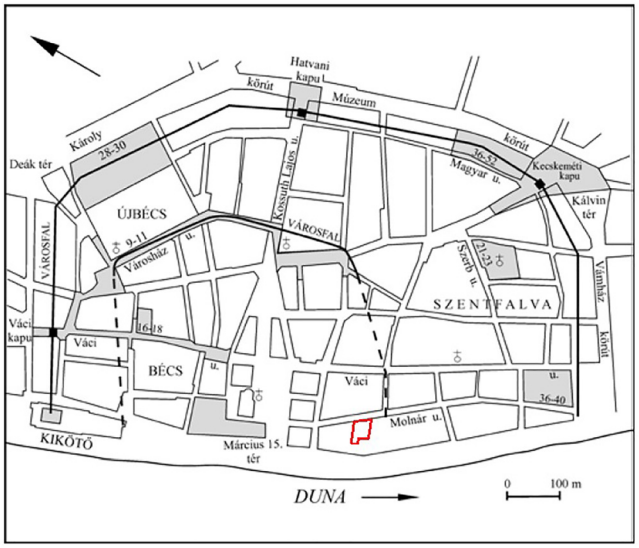

Fig. 2. Excavations on the territory of medieval Pest; the red line refers to the presented site. After Írásné Melis (2012) 52. Fig. 3

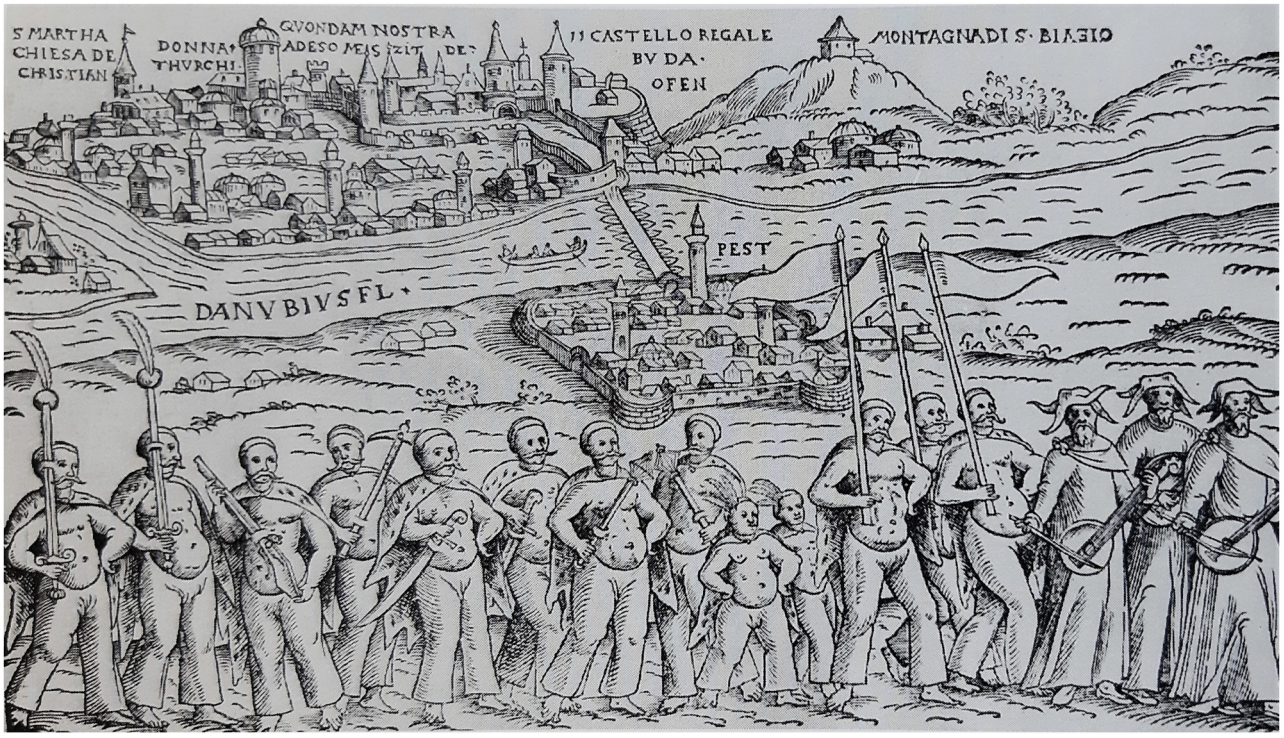

Fig. 1. Buda and Pest in 1595. After Rózsa (1963) pl. II

pictorial sources, but the history before the 18th century cannot be outlined with such certainty.[3] In addition to stratigraphy, coins, science-based dating methods, and the typochronology of ceramic and metal artifacts can assist in the dating of the unearthed phenomena.

Among archaeological sources, coins can primarily be considered as the most helpful artifacts. During the excavation, 181 metal coins were unearthed.[4] Hundred and nine of them were found outside archaeological features, however, the chronology determined by the rest cannot be considered as exclusive dating, since the time of minting and the creation of the strata usually do not overlap. The earliest were six small Roman bronze coins from the third–fourth centuries AD, certainly of secondary use. The latest coin is a copper Kreuzer minted in 1859.

Most of the coins (140 pieces) derive from the 14th–15th centuries, while no coins from the 1500s and 1600s were unearthed. This surprising hiatus can perhaps be linked to the declining economy and cash flow during the Ottoman-Turkish era. The 22 coins from the Árpádian Age (of King Stephen III 1162–1172, King Béla III 1172–1196, King Andrew II 1205–1235, King Béla IV 1235–1270, King Ladislaus IV 1272–1290, and from abroad the King Wenceslaus II of Bohemia 1278–1305, Duke Ottokar II of Bohemia 1251–1276, Archbishop Ebenhardt II 1200–1246, Henry IV of Andechs-Meranien 1204–1228, Raymond II, Count of Tripoli 1137–1152, Prince Archbishop of Salzburg, and other uncertain mints) are mostly found in a secondary position. In our opinion, some of the coins were lost during loading and paying for the imported products, while others were brought by river sediment from the north upstream. However, the significant number of foreign moneyers from the Árpádian Age indicates the mixed origins of the inhabitants of Pest and their lively foreign (trade) relations.

The 140 coins of the 14th–15th centuries were mainly issued by the Hungarian Kingdom (130 pieces) and the remaining mints can be connected to the Duchy of Austria (during the 14th century, 9 pieces) and the Patriarchate of Aquileia (1402–1411, 1 piece). It can be clearly seen that the cash flow increased during this period, and was dominated by the internal moneyers, especially of King Sigismund of Luxembourg (1387–1437, 28 pieces). The two other most common types of coins were minted by King Louis I (1342–1382, 13 pieces) and Governor John of Hunyad (1446–1453, 11 pieces) (Fig. 3).

Beside the coins, dendrochronological dating was also used on the wood remains found on the territory. Unfortunately, the samples from the structure made of 46 wooden piles were unsuitable for dating. However, it turned out that two other samples from a tanning pit and a plank were made and used at the same time: before 1401, in the 14th century.[5]

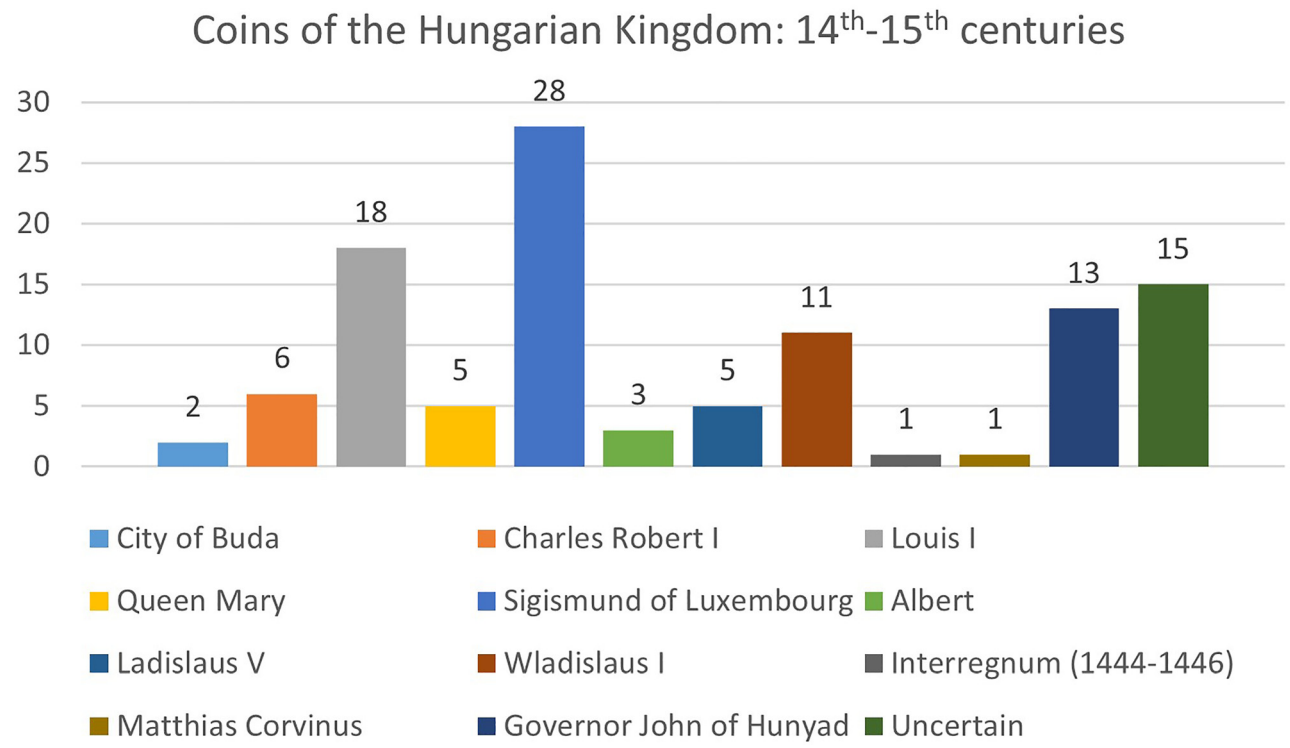

Fig. 3. Coins minted by the rulers of the Hungarian Kingdom in the 14th–15th centuries

[3]From the 19th century on, land registers, site plans, surveys and later directories are to help us. Mészáros and Vízy (1993) II. 73–74.

[4]The identification of the coins was carried out by Orsolya Gálvölgyi and Tamás Szatmári. The diagram presented in this paper was created by Orsolya Gálvölgyi.

[5]The analysis was carried out by András Grynaeus.

To sum up, the examined area was used at least in four consecutive periods. The first *in situ* archaeological features and artefacts can be dated to the 14th century. The life of this area is still unknown before this time. It seems certain that people did not live here for a longer period at that time. The tanning pits filled with Ottoman-Turkish ceramics indicate a next phase when the area was used for leather tanning. As tanning is considered to have been a most polluting activity,[6] the workshops were mainly established outside of the inner town, to avoid the spread of strong smells in the inhabited area. Not far from this site, at 36–40 Molnár Street, another tannery was excavated by Katalin Írásné Melis in 1994,[7] which indicates the contemporaneous function of this area on the Danube foreshore. The southern part of Pest could have been an ideal area for tanning due to the prevailing northerly wind direction.[8] In the Early Modern Age, during the time of urban planning, a house made of stone and brick was created on one of the plots. The cityscape seen today was formed at the beginning of the 20th century.

RECONSTRUCTING PAST GROUND LEVELS AND WATER LEVELS OF THE DANUBE NEAR PEST

Based on the stratification of the site, we try to specify the former ground levels, with the help of the traces of workshops and other archaeological features. The first were structures of demolished wall sections of a 18th–19th century residential building which were located at an average level of 99.5 m above the Baltic Sea level. It means that at the turn of the 19th–20th centuries, during the period of the centrally organized urban development, a significant increase in the street level can be observed.[9] In addition to create orderliness, one of the main purposes for this was to secure the Danube bank against floods, which was achieved by filling it with earth.[10]

The slow development of the city of Pest started after the loss of its former commercial character, following Rákóczi's War of Independence (1703–1711). We can read about the urban development activities carried out in the 18th century in the collection work of Nóra T. Polónyi, who outlined the technical changes in the city of Pest based on the data obtained from the reports of the city council.[11] The research found out that before the Great Flood of 1838, there was no artificial intervention in the course of the Danube riverbed, so it had remained unchanged since at least the Late Middle Ages.[12] Significant changes were first made after the floods of 1768: in view of the damage, the city council decided to rebuild the former wooden bridges in stone.[13]

Two decades later, János Schilson, head of the Pest Chamber Administration, made plans to strengthen the section of the Danube bank from the pontoon bridge to the salt houses (approximately from present-day Chain Bridge to Freedom Bridge) by building an embankment.[14] The construction of the embankment started in stone, supported by earth, mainly to facilitate the mooring of the ships and to protect the town from flooding. The Pest side of the riverbed was narrowed for the first time during these years (Fig. 4).

Before the construction works of the quays of Pest in the second half of the 19th century, only small embankments served for flood protection purposes. Besides, shipping on the Danube was not always a safe process. During the regulation of the riverbed, a large territory was cut away from the original course and the riverbed was also deepened.[15] On the picture made by famous Hungarian city photographer György Klösz, around 1878, it can be observed that one part of the quay had already been built while the remaining section seen on the right was still covered with earth and single storey buildings.[16] By taking this photo, Klösz captured a very exciting moment in the time of urban development (Fig. 5).

Among the archaeological features at Molnár Street, a skeleton and four leather tanning barrels were found on the level of the aforementioned residential building, which means they seem to have been contemporaries. The use of the area in the earlier period is indicated by the pits (SE-024 and SE-043) filled with Ottoman-Turkish ceramic waste. The top of the first pit appeared at the level of 99.1 m, the bottom at 98.54 m. The second pit fell between 99.68 and 98.32 m above the Baltic Sea level, which means that the former ground level here was on average 0.5 m deeper in the 16th–17th century. Two timber-framed features (SE-072 and SE-073) were found at altitudes of 97.5–98.8 and 98.85 m above the Baltic Sea level, which indicates an even lower ground level in the 14th–15th century (Fig. 6). It should be noted that based on the typochronology of the ceramic finds and coins, most of the silty-sandy alluvial layers were formed during this period, suggesting a series of great floods. The bedrock of the SE-093 ditch or former watercourse was measured at 97.2 m above the Baltic Sea level. Thus, in this

[6] Bartosiewicz (2003) 180.

[7] Írásné Melis (1996).

[8] Bartosiewicz (2003) 181.

[9] The embankment refill of the street level of Molnár Street was decided in 1874. The journal *A Hon*, January 14, 1874, without page number.

[10] In June 1838, an article was published in the journal *Jelenkor* about the altitude data of four floods marked on the house walls of 153 Molnár Street in the 1700's. During the well-known flooding of March 1838, the highest water level was 29 feet and 4 inches, while heights of 20–23 feet were recorded during the floods between 1732 and 1798. *Jelenkor*, 30 June 1838.

[11] Tóth (1961).

[12] Kiss (2007) 272–273.

[13] Reports of Buda and Pest City Council, 15 March 1768: Budapest City Archives, BFL. IV. 1202a, 353a: 79v.

[14] Tóth (1961) 269.

[15] Írásné Melis (1983) 5.

[16] Fortepan/Budapest City Archives. Archival reference: HU.BFL.XV.19.d.1.05.181.

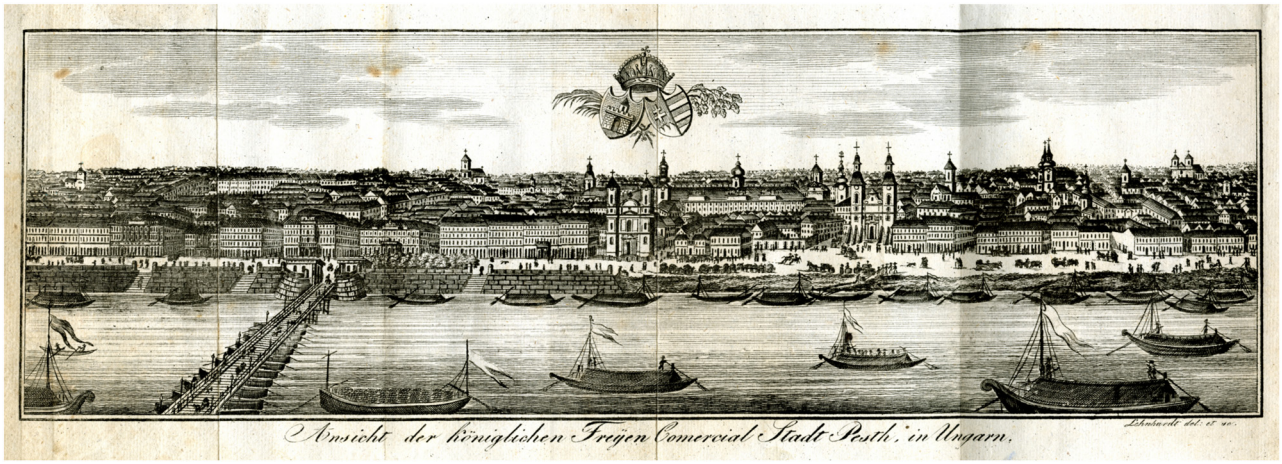

Fig. 4. Samuel Lehnhardt: Ansicht der königlichen Freyen Comercial Stadt Pesth, in Ungarn [A view of the city of Pest], 183? From the Collection of Budapest Picture Archive of the Ervin Szabó Library, ID: AN004076. With the kind permission of Budapest Picture Archive of the Ervin Szabó Library

Fig. 5. A view of Pest from Gellert Hill, around 1878. Fortepan/Budapest City Archives. Archival reference: HU.BFL.XV.19.d.1.05.181

case, no significant difference could be documented over the decades.

Taking into consideration the aforementioned data, we can assume that the average water level of the Danube was significantly lower than today, as the operation of the medieval and Early Modern Age tannery had to be ensured. Muddy layers covering the area prove the frequent flooding of the river, which the artisans had to deal with somehow, as the floods threatened the town's inhabitants every year (Fig. 7).

The geographical location of the site raises the need to compare the results of historical and scientific research conducted in a similar environment. Archaeological excavations near the riverbank have been carried out in only a few places in the medieval city of Pest (Fig. 8). During her research on the sites between Dorottya Street and Apáczai Csere János Street, Eszter Kovács observed that medieval archaeological features occurred in several cases in excellent condition under basements built in modern times. Regarding the same area, she noted that the alternating "woody-gravel, pebble-sand" layers, like at the site on Molnár Street, slope steeply towards the Danube.[17]

During the test excavation at 6 Dorottya Street led by Zoltán Kárpáti on the side of the plot near the river, an 18th–19th century embankment was found at a depth of 3.5 m below the current street level, under which late medieval finds were unearthed. The dark grey, charcoal-spotted layers showed a strong slope toward southwest; a large number of organic residues were also found. These characteristics are

[17]BTM RA, Inv. no. 2921–2008.

Fig. 6. Remains of a wooden platform sloping towards the Danube

Fig. 7. Silty-sandy flood layers

almost identical to those observed in the area discussed in this paper, even though the two sites are 800 m apart. Yet, it appears that the topographic changes in the Danube riverbank occurred at the same time and in the same way in both the northern and southern parts of Pest.[18]

It is worth examining the 23 m long, 4 m wide tower building connected to Sigismund of Luxembourg by Katalin Írásné Melis, found on the corner of today's Régiposta and Váci Streets. According to the description of the abandoned tower mentioned by Bertrandon de la Broquière, a Burgundian traveller who visited Pest in 1432, it stood on the banks of the Danube, which shows the extent of the changes in the town plan that have taken place over the centuries since then. The intersection of Régiposta and Váci Street is located approximately 250 m away from the riverbank, but then the Danube occupied a slightly wider area than it does today.[19]

It can be seen from the plans of the river regulation works of the 19th century that hardly any changes were made in this part of Pest,[20] so the width of the river probably changed so much in previous centuries (Fig. 9). This coincides with the fact that no medieval features are known from the area northwest of the downtown parish Church, bordered by the Danube-bank – Türr István Street – Március 15. Square. In our opinion, this can be explained by the fact that in the Middle Ages the river flowed a little bit elsewhere than today, and perhaps there had a bend north of the Church.[21]

The relationship between the Dominican nunnery on Margaret Island and the Danube has recently been examined by András Vadas, comparing medieval diplomae, pictorial, and archaeological data.[22] The topic is exciting because the building complex had continuously been threatened by floods as it was located very close to the river. According to the sources examined, the number of documented difficulties caused by the river began to rise in the Late Middle Ages. Vadas concluded that at the end of this period, the level of the river began to rise slowly but surely, posing a constant threat to the complex of buildings previously considered safe. As a result, water construction works had to be done: the ground levels, floors and embankment were raised continuously year after year.

INVESTIGATIONS ALONG THE DANUBE ON THE IMPACTS OF MEDIEVAL CLIMATE CHANGE

One of the main consequences of the phenomenon reported in Western Europe from the turn of the 13th–14th century by some researchers[23] (of which center of gravity can be dated from the last decades of the 16th century)[24] lasting to the end of the 19th century, known as the 'Little Ice Age' in climate history research, was an increase in the frequency and intensity of floods, which is also supported by the nature of the sites presented above.[25] Although the weather in the Carpathian Basin often differs from that of Western Europe, certain events and periods show much similarity. Following the previous climate optimum characterized by warm and dry

[18] BTM RA, Inv. no. 2732–2007.

[19] A description written in 1567 considered the pontoon bridge connecting Buda and Pest a quarter mile long (cca. 400 m). The width of today's Danube is cca. 320–330 m. Bánfi (1936) 119.

[20] Map of the part of the river Danube between Buda and Pest with the established regulation line. Catalogue of maps of Budapest 267. Budapest City Archives. BFL XV.16.d.241/13.

[21] Based on data from the Modern Age, along the section between Elizabeth Bridge and Chain Bridge, on the so-called „Danube-Corso", the river was much wider than it is today. Mészáros and Vízy (1993).

[22] Vadas (2012), Vadas (2013).

[23] Pfister (1992).

[24] Bradley and Jones (1992).

[25] Brázdil et al. (2005) 388–394; Rácz (2008) 29–33.

Fig. 8. Location of the sites presented in the paper

weather (around 1000–1300 AD), European average temperatures dropped by a few degrees, with rainy, cool summers, harsh and long winters becoming common. During this period, climate gradually became colder and wetter.

In Hungary, researchers have collected relatively high quantity of data regarding the agricultural impact of the Little Ice Age. Based on historical and scientific sources, the 17th century was the most characteristic period in that time.[26] Lajos Rácz stated that the conditions of agricultural production did not deteriorate in general during the Little Ice Age period: quality of the grape crop improved significantly.[27]

In the Carpathian Basin, a special phenomenon occurred in addition to the decrease of the temperature: as a result of the increase in the quantity of rain, the level of natural waters began to rise in a well-documented manner.[28] From this point of view, case studies regarding the Danube could

[26] Rácz (2020) 50.

[27] Rácz (2020) 58–59.

[28] This phenomenon was observed on several excavations of medieval settlements. Györffy and Zólyomi (1994); Mészáros and Serlegi (2011); Molnár and Sipos (2013).

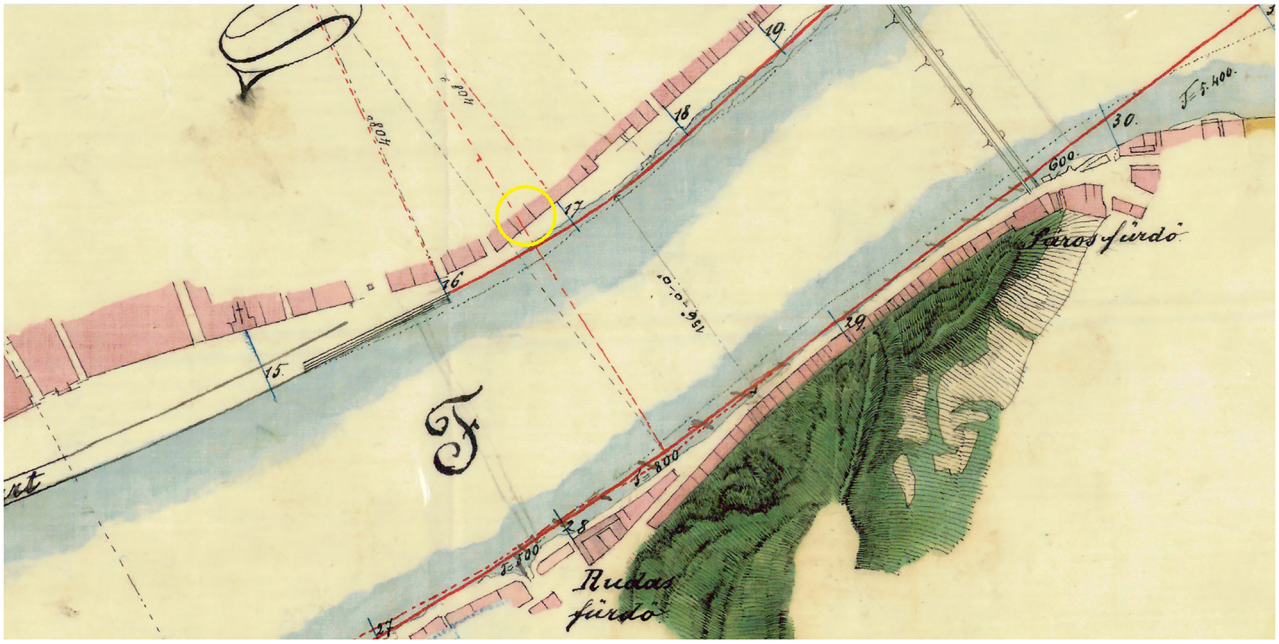

Fig. 9. Map of the part of the river Danube between Buda and Pest with the established regulation line. Yellow circle: site of the excavation in Molnár Street. Red line: planned new coastline. Catalogue of maps of Budapest 267. With the permission of the Budapest City Archives. Archival reference: BFL XV.16.d.241/13

be particularly important since it is one of the most significant rivers of Europe – and one of the highly regulated ones as well. In the middle section of the river, regulations began already at the beginning of the 19th century, which reached their peak with the complete transformation of the Pest-Buda section after the Great Flood of 1838. With the help of different types of data (both historical and archaeological sources), the long-term changes in the flooding of the river can be detected in the late medieval period. The most common data appearing in written sources is the construction of dams, river embankments filling with earth, raising the floors by diggers, or modifying the structure of houses, especially of the entrances.[29]

North of Pest, in Vác and Visegrád, researchers focused on the changes in the geographical features of the settlement, the Medieval and Early Modern development of hydrographic conditions, as natural features can be defined as one of the most important elements of urban development (Fig. 8).[30] Excavations carried out in both settlements near the bank of the Danube unearthed 13th–18th century remains of the cities, with the same method seen in Molnár Street.

The excavation at Piac Street in Vác, mentioned in the analysis carried out by Orsolya Mészáros and Gábor Serlegi, was located 3–400 m far and in Visegrád 50–100 m far from the present line of the Danube.[31] In the case of Visegrád, it was observed that the area covered with a thick modern embankment was never built-in, especially not with a stone building. Medieval layers appeared here at a depth of 2–3.5 m below the current street level, and according to the finds, some of the remains of the building found here might have belonged to a workshop, so it can be assumed that the area was avoided by river flooding.[32]

In Piac Street of Vác, the aim of the environmental reconstruction investigations was to examine the medieval wells, the wooden-lined cellar, and the former ground levels. The wooden structure was built at the turn of the 13th–14th century and its survival is due to the presence of constant groundwater. Its abandonment was explained by the drastically rising water level.[33] The analysis showed that the mouth of one of the wells dug in the 13th century was about 5 m lower than that of another from the Modern Age, which shows a significant increase in ground levels, similar to the conditions mentioned in Pest.[34]

It is very important to highlight the work of Andrea Kiss and József Laszlovszky, which deals with the 14th–16th century Danube flood events, based on available documentary evidence.[35] In their paper, the published records are discussed as a source for further investigation. According to the collected written and archaeological sources, a major flood period occurred on the Danube in the second half of the 16th century.[36] Periods of increased fluvial activity was

[29]Vadas (2013), Rácz and Vadas (2013) 221–222.

[30]Mészáros and Serlegi (2011).

[31]Mészáros and Serlegi (2011) 207.

[32]Mészáros and Serlegi (2011) 209; Mészáros (2017) 129.

[33]Mészáros and Serlegi (2011) 212.

[34]Mészáros and Serlegi (2011) 212, Fig. 7.

[35]Kiss and Laszlovszky (2013) 2, Fig. 1.

[36]Kiss and Laszlovszky (2013) 8, Fig. 4.

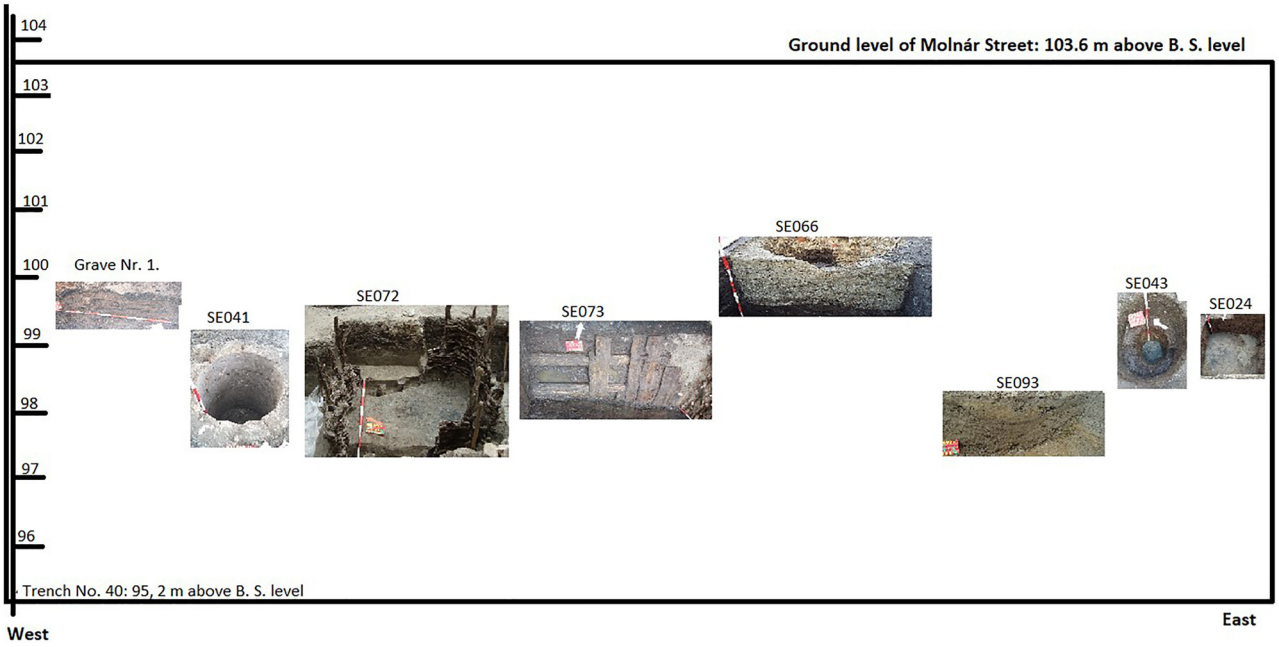

Fig. 10. East-West section of the excavated area

detected in the character of sedimentation, in the same way that in Molnár Street was observed. A well-marked change could be detected in case of layers becoming sandier and siltier during this period. The same phenomenon was documented in the town of Orth and Šamorín, where in addition, the earlier used wooden structures were replaced by brick-based buildings.

In Nagymaros, a 16th century flood left a gravel layer mixed with loess, which may suggest a major event.[37] Long-term processes were also documented in the Danube Bend, mainly in case of Visegrád. In the Franciscan friary, the general rise of the ground levels could be identified from the 14th century, due to its location close to the river. When the friary was built in the 1420s on the remains of an earlier settlement, the two new cellars were made on the same floor level as that of the settlement, which indicates a minimum of 2 m difference of ground levels. Damages – namely the sinking – of the northern part of the building could also be detected, as it was affected by the floods mentioned in written sources several times according to the opinion of the archaeologists.[38]

SUMMARY

During our excavation carried out at 7–9. Molnár Street, Budapest, we managed to observe another detail of the medieval city of Pest. Approximately 20 different layers were identified: the thin, light, brownish grey layers had one thing in common: the muddy-sandy character. The coastal floods and sandbanks were spectacularly outlined in their section and remains of dry hydrophytes were also found in several layers. In some cases, we were able to date the layers of archaeological age *terminus post quem* with coins, so it can be said that the oldest cultural layer directly above the subsoil was created at the end of the 13th century (Silver Grosch of King Wenceslaus II of Bohemia, around 1300).

The 140 coins of the 14th–15th centuries were mainly issued by the Hungarian Kingdom: 130 pieces of coins were found from the reign time of Charles Robert I (1308–1342) to Matthias Corvinus (1453–1490). One should notice that no piece of coin was found from the 16th–17th centuries on the excavation, which fact cannot be explained yet. Presumably, it can be connected to the trade decline of the war periods. The last era of the site is indicated by three coins of Maria Theresa, Empress of Hungary (1765), Emperor Franz I (1800) and Emperor Franz Joseph (1859). The building that can be seen today was created after all these years.

The area has always sloped strongly towards the river: between the eastern and western end points of the strata, approximately a difference of one to one and a half meters could be documented (Fig. 10). Features of the Árpádian Age and later periods, as well as houses, and outdoor furnaces known from the Pest area were not found here, which means that it was a site unsuitable for settling before the Modern Age and was not inhabited for a long time. However, the existence of the phenomena related to tanning activity shows the process of change in the function of the area (Fig. 11).

[37] Kiss and Laszlovszky (2013) 4–5.

[38] Kiss and Laszlovszky (2013) 7.

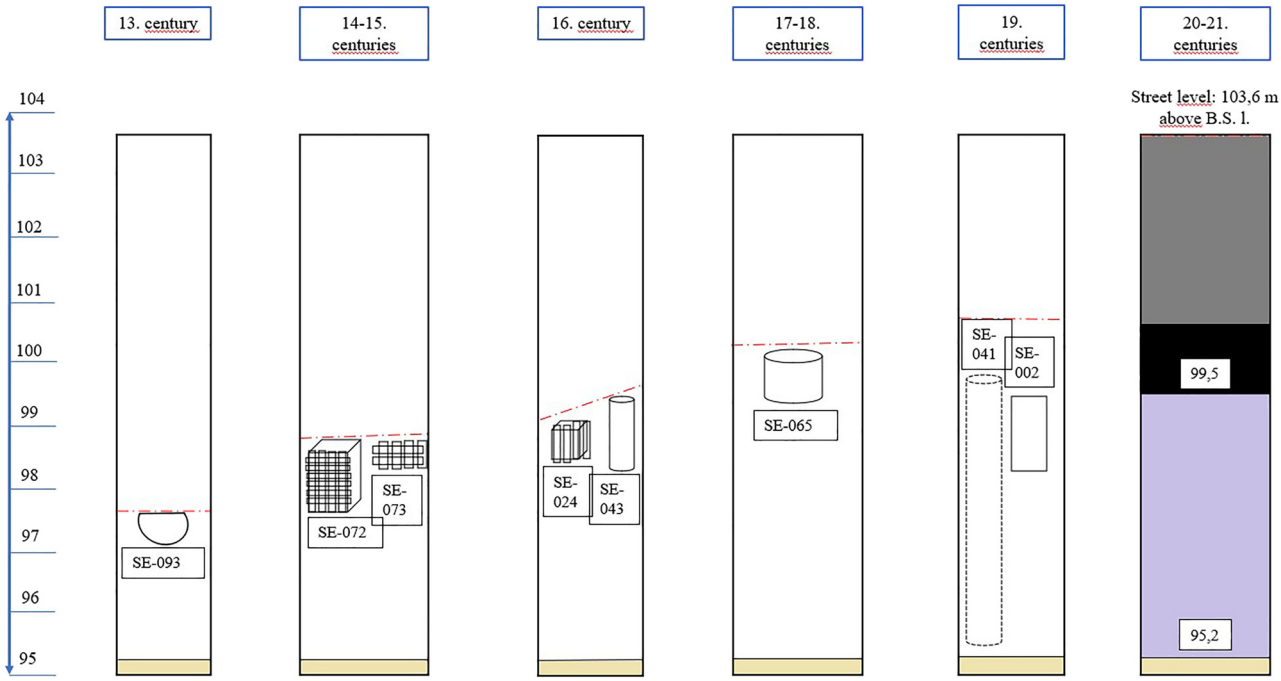

Fig. 11. Changes of ground levels on the excavated area based on archaeological features. *Legend:* Beige = subsoil, light grey = medieval strata, black: early modern smelly, wet layer, dark grey = modern rubbish. Red interrupted line = walking levels at each period

ACKNOWLEDGEMENT

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ABBREVIATIONS

BFL Budapest Főváros Levéltára (Budapest City Archives)
BTM RA Budapest History Museum, Archaeological Archives

REFERENCES

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