

# The Historical Evolution Of Bathhouses In Budapest: A Comparative Study Of Bathhouse Architecture Of The Roman And Ottoman Era

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**Abstract:** *This paper examines the historical differences between bathhouses constructed during the Roman era and the Ottoman era in the city of Budapest. With the city of Budapest experiencing the rule of both mighty empires, each era's cultural, social, and architectural characteristics are reflected in their bathhouses. Incorporating evidence of what these bathhouses looked like during their times, a comparison is drawn to highlight the similarities and differences between the two eras. Highlighted are the differences in the use of space, heating, and the cultural importance given to the bathhouses. Our analyses show the developments made by the Romans and Ottomans for bathhouses.*

**Keywords:** *Bathhouses /Ottoman Baths /Roman Baths /Budapest /Architecture*

## I. INTRODUCTION

Although the nation of Hungary is landlocked, it is studded with more than 1300 thermal water springs (Carolyn, n.d.). The capital, Budapest alone has 123 of these water sources, thus, rightly nicknamed “the thermal capital of the world”. These water sources have differing amounts of dissolved minerals based on location; some are sulfurous in smell, some salty, and others have varying characteristics (Carolyn, n.d.). The nature of the water springs has made them centers for therapeutic healing and a thriving spa culture in Hungary for hundreds of years. Soaking in the warm mineral waters may feel decadent, but these spas aren't seen as indulgences. In Hungary, they are just part of a balanced life (Béni, 2017).

Throughout history, the Hungarian people have experienced the rule of different empires and rulers including the Romans and the Ottomans. The architectural nature of these bathhouses was subjected to the different cultural impacts of the inhabitants of Hungary throughout the different

ages as is the case with art, culture, politics, and the overall lifestyle of a people, highlighting the uniqueness of each era.

In this research, the architecture and culture of the eras in question are of great interest rather than the sources of the water (they may or may not be from thermal springs). It should be generally noted that the abundance of thermal springs in Budapest facilitates the bathing enterprise, as fewer resources are required to heat and transport the waters (Gömör B, 2008).

## II. HISTORY OF BATHHOUSES IN BUDAPEST

The history of baths consists of a wide spectrum of advancements from notable historical periods, with some contributing more than others. For the sake of this research, the Greek origin of baths, and the development of baths in Budapest distinctly during the Roman, Árpád, and Ottoman periods are highlighted.

## A. ORIGIN OF BATHHOUSES

Originally, bathing was a very popular treatment for diseases during classical times. Physicians recommended baths for the cure and prevention of diseases. The Greeks initially confined bathing to the affluent, but it later became accessible to the general public (van Tubergen A, 2002). These bathhouses were sacred housing for Greek deities.

In Roman times, baths at home, private baths, and public baths became a societal norm. With the introduction of aqueducts, the public baths later developed into huge and impressive edifices (thermae) with a capacity for thousands of people (van Tubergen A, 2002). The ancient Romans believed that daily exercise and bathing were necessary components to maintaining a healthy lifestyle; which is not so different from us today (Mingoia, 2022). Bathhouses gradually morphed from places of medical treatment to ones of relaxation and pleasure.

## B. THE ROMAN ERA IN BUDAPEST (AD 1<sup>ST</sup> CENTURY- AD 4<sup>TH</sup> CENTURY)

Aquincum, part of modern-day Budapest (Obuda) was occupied by the Romans in the AD 1<sup>st</sup> century under the Pannonia province (Aquincumi Múzeum, 2022). It is a monumental example of the achievement of the Roman Empire. Inhabitants enjoyed benefits such as central heating in their homes, temples, amphitheaters, and also public bathhouses. The first baths in the Hungarian region were built in the ancient Roman province of the Carpathian basin, but when and how they were built is still unknown (Béni, 2017).

“Bathing was an important part of the Roman way of life, which, in addition to cleansing and physical and mental refreshment, was also a place for active social life for the citizens of the empire” (termalfurdo.hu, 2017). In Pannonia, baths were first introduced by the military; Aquincum later became rich in thermal baths for both the military and civilians (termalfurdo.hu, 2017). Baths were built later on by the wealthy in their private residences.

## C. THE ÁRPÁD DYNASTY IN BUDAPEST (1000-1301)

There is little evidence to represent the further development of bathhouses or bath culture as their Roman predecessors during the Árpád dynasty. In the age of the Árpáds, baths were connected to healing and were not the scene of social life (termalfurdo.hu, 2017).

According to writings, the medicinal value of thermal springs was revered during the early middle ages. For example, the springs in Rózsadomb were the water source from which Saint Elizabeth was said to heal lepers and lazars (termalfurdo.hu, 2017). In the middle ages, Hungarians still valued bathhouses but their construction and further development of them were less important.

## D. THE OTTOMAN ERA IN BUDAPEST (1541-1699)

The reign of the Roman Empire saw the birth of bathhouses and bath culture in Budapest, but the Ottoman Empire presided over the development of this phenomenon.

The 16<sup>th</sup> century saw the construction of some of the most astonishing baths constructed, some of which are still in use today. The Turkish subjection saw the flourishing of baths.

The development of baths was connected to Pasha Sokollu, the leader of Buda who envisioned a stable military center and a flourishing city (termalfurdo.hu, 2017). The three Hévíz baths and the ilicas (the Turkish word for spas) of Buda during the Turkish era were also considered landmarks by contemporaries. The Kucsuk ilica, located on the site of today's Rác bathhouse, was the closest to the castle quarter, and the green columned ilica, the predecessor of today's Rudas bathhouse, was not too far from it (termalfurdo.hu, 2017).

An interesting pattern about Turkish baths is that many of them were built on previously known, and occupied bath locations. Some of these were previously hospitals, while others were built on deteriorating Christian buildings. In addition to laying down the footing for thermal baths, the Turks also introduced the Hungarians to various ‘wellness’ routines such as massages and the use of oils and creams as part of bath time; they were skeptical at first when these were introduced (Béni, 2017). It is worth mentioning that Hungarians were only allowed to use these baths during the night.

## III. ROMAN BATHS

To have a clear understanding of what thermal baths were like in Budapest under the Romans, it is important to have a picture of what baths were like in other parts of the empire. In this section, the general characteristics of Roman bathhouses and heating are introduced. Then the baths of Caracalla, Rome are introduced and described as a foreign sample, the baths of Aquincum are used as a Roman example of thermal baths in Budapest.

### A. ROMAN BATH CHARACTERISTICS

#### a. *THE STRUCTURAL AND SPATIAL CONTEXT OF ROMAN BATHS:*

Apodyterium (changing room): It was the first place the users of the baths would go to upon arrival. These rooms usually had benches and cabinets for the users to keep their belongings, but at the risk of the belongings being stolen (baths were a common place to find thieves). However, privately owned slaves or those rented at the baths could watch over the belonging of the users (Foundation, 2000).

Palestra (open exercise space): Before getting into a series of baths, the users usually preferred to exercise in the outdoor spaces called palaestrae which were commonly surrounded by columns. These exercises were not competitive or intensive, rather, exercises to maintain health.

Caldarium (hot bath): This was the hottest room in Roman bathhouses with air and water temperature reaching above 100° Fahrenheit. The rooms and the waters were heated by the hypocaust (Foundation, 2000); the furnace system.

Tepidarium (warm bath): The tepidarium served as the transition pool between the caldarium and the frigidarium (cold water pool) (Mingoia, 2022). Some users made use of

this pool before and after hot and cold baths to ease the transition between temperatures.

**Frigidarium (cold bath):** This was the ‘cold water room’ in the baths. After visiting the caldarium, users of the baths would cool off in the frigidarium pools to help close all the pores that were opened.

**Natatio (outdoor pool):** Unlike the other baths, the natatio was open-to-air and unheated. This pool is nearly identical to modern-day swimming pools.

### b. HEATING SYSTEM

**Hypocaust:** This is the underfloor heating system that was used to heat the baths in the Caracalla, it is a system of hollow chambers underneath from which hot air flowed through to heat the baths. The source of the generated heat was a furnace (Asaff, n.d.). The heat traveled through terracotta pipes to the various spaces to warm the spaces and the water. The hypocaust was below ground and was worked by slaves who heated the tanks from which water pipes transported the heated water to the respective pools.

The Romans were the inventors of this technique which is the predecessor of modern-day heating systems.

## B. ROMAN BATH EXAMPLE IN EUROPE

### a. THE BATHS OF CARACALLA

In 206 A.D. Emperor Septimus Severus began construction of a thermal bath complex which was to become the largest and most beautiful in Rome (Caracalla Thermal Baths, n.d.). Sited on eleven hectares, this bath took 9,000 workers to complete. The baths at Caracalla could accommodate 1,600 people at a time including men, women, and children; both free and enslaved (Foundation, 2000). A total of 8,000 visitors were expected daily (Mingoaia, 2022). Inside the confines of the thick rectangular walls was the main building surrounded by gardens, a library, an entertainment room, and a gymnasium. On the opposite side was the heating reservoir fed by the ‘Aqua Mania’ (Caracalla Thermal Baths, n.d.). A venue bustling with activities, you would find masseurs, poets, musicians, and food vendors to mention the least.

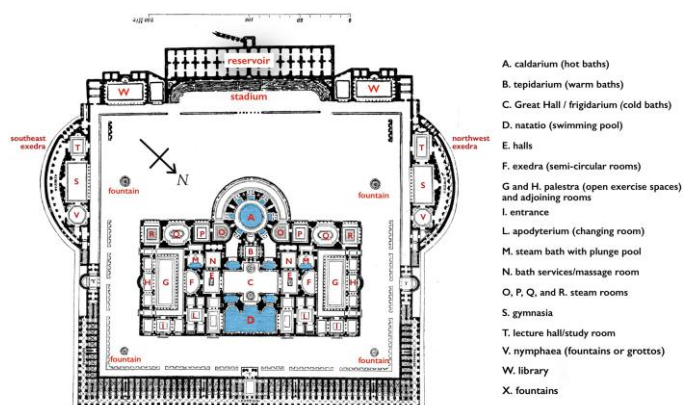


Figure 1: Plan of Caracalla Baths (Mingoaia, 2022)

### The Structural And Spatial Context Of Caracalla Baths

**Apodyterium (changing room):** There were two changing rooms in the building placed symmetrically in the building each serving the opposite genders.

**Tepidarium (warm bath):** The tepidarium was a small room with two pools. It served mainly as a transition space between the cold and hot baths due to the moderate temperature.

**Caldarium (hot bath):** This was a large circular room roofed with a 40-meter dome. The Caldarium had three large glass windows facing the southwest to receive more sunlight and warmth during the day (Mingoaia, 2022).

**Frigidarium (cold bath):** The frigidarium was in the middle of the structure close to halls that extended to the palaestra; one on each side.

**Palaestra (open exercise space):** There were two palaestra in the Caracalla used for exercising. Alternatively, some users chose to run in the stadium.

**Natatio (outdoor pool):** This large open-to-air pool was similar to today’s Olympic-size swimming in dimension (at 50 meters in length, 22 meters in width, and 1 meter in depth). Surrounded by four walls, it was divided by colossal granite columns into three sections (Mingoaia, 2022).

The structure of the baths of Caracalla is made of brick-faced concrete with large vaults. These vaults had coffers (sunken panels) that reduced their weight (Mingoaia, 2022). Several million bricks were used in construction, it consisted of at least 252 columns, 16 of which stood at a height of at least 12 meters (The Editors of the Madain Project, 2023).

### Heating System

**Hypocaust:** The hypocaust heating specifically heated the walls and floors of the tepidarium and the caldarium.

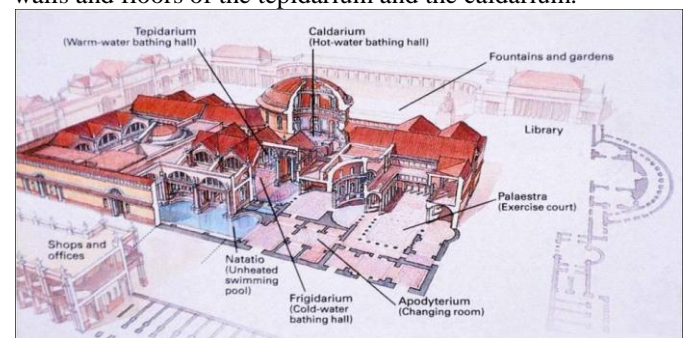


Figure 2: Caracalla Baths (Zusmann, n.d.)

### Materials

**Floors:** The floors were made of marble mosaic which often depicted art of mythical sea creatures or fish scale patterns (Cartwright, 2013).

**Walls:** An estimated 6.9 million bricks lined with marble and granite were used in the construction of the wall (Cartwright, 2013). Marble slabs decorated the walls of the Caracalla, and in some places, stucco paint covered the upper parts of the walls.

Ceiling: “The ceiling was decorated with glass mosaic which reflected light from the pools in an iridescent effect” (Cartwright, 2013).

### C. ROMAN BATH EXAMPLE IN BUDAPEST

Although the city is no longer in existence, archeological work on the remains has helped us better understand what the city was like. The Aquincum Museum provided a lot of information for this section of the research carried out on Budapest bathhouses from the Roman era.

The city of Aquincum had 9 public baths and four private baths. The archeological ruins of Aquincum have a public bath called Kettős fürdő (Double bath).

#### a. AQUINCUM KETTŐS FÜRDŐ (DOUBLE BATH)

Kettős fürdő which got its name from the two rows of rooms arranged on the axis of the building was probably one of Aquincum’s finest baths. The layout of the bath suggests men and women may have used the baths simultaneously, but separately. The vestibule of the bath is opposite the western rows of rooms, while the eastern side does not have a vestibule.

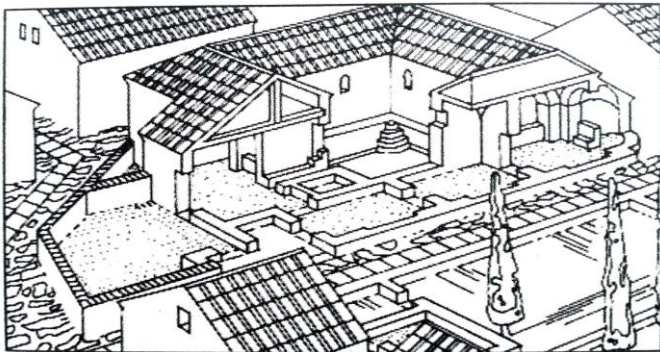


Figure 3: Reconstruction drawing of the double bath (Aquincumi Múzeum)

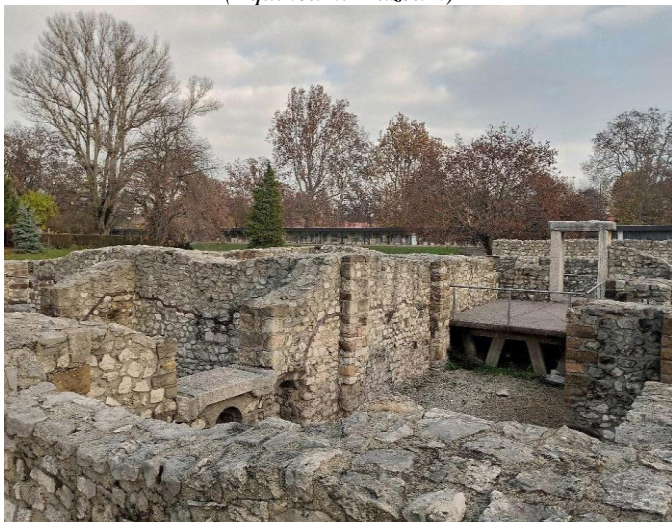


Figure 4: Interior of the double bath

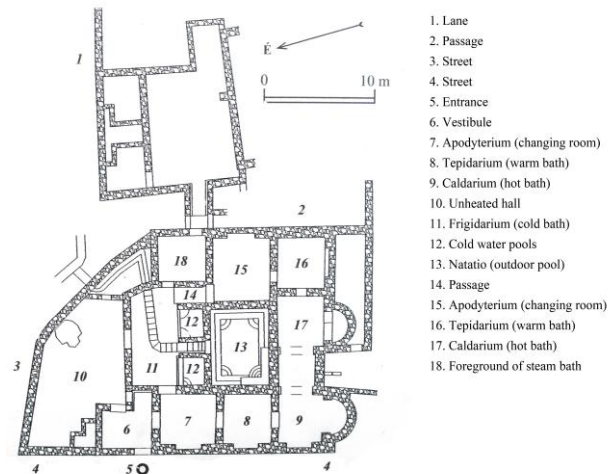


Figure 5: Layout drawing of the double bath (Aquincumi Múzeum)

#### The Structural And Spatial Context Of Kettős Fürdő

**Apodyterium (changing room):** There are two changing rooms in the building. There is a changing room to the right of the vestibule of the western wing and another on the eastern wing which is accessed from the passage which connects to the frigidarium. These rooms were heated.

**Tepidarium (warm bath):** The warm bath is accessed from the right of the apodyterium on the western wing. The tepidarium is right next to the apodyterium of the eastern wing as well. This bath served as a transition bath between the cold and bath for the users.

**Caldarium (hot bath):** The hot bath is to the right of the tepidariums, and contained two pools; one on the eastern wing, and another on the western wing of the building.

**Frigidarium (cold bath):** There are two cold water baths, that are separated by a path that would lead the users to the outdoor pool.

**Palestra (open exercise space):** The bathhouse does not have a palestra.

**Natatio (outdoor pool):** The large central outdoor pool is accessed through the passage from the frigidarium. It was the only bath that had just one pool.

In terms of the structural context of the construction of the bathhouse, much of what is visible today is the stone and cement structure remains of the original structure. The overhead structure did not survive, but the reconstruction drawing (Figure 3) of the bath suggests parts of the bath were covered with overlapping roof tiles (common in Roman architecture).



Figure 6: Natatio of the double bath

### Heating System

Hypocaust: The hypocaust heating system was adopted for this bathhouse. There are arched openings at the bottom of the pools which suggests there were elevated floors to properly accommodate the hypocaust system.



Figure 7: Arched openings of the Hypocaust system

### The Materials

Floors: The floors of the swimming pools were made from terracotta floor tiles.

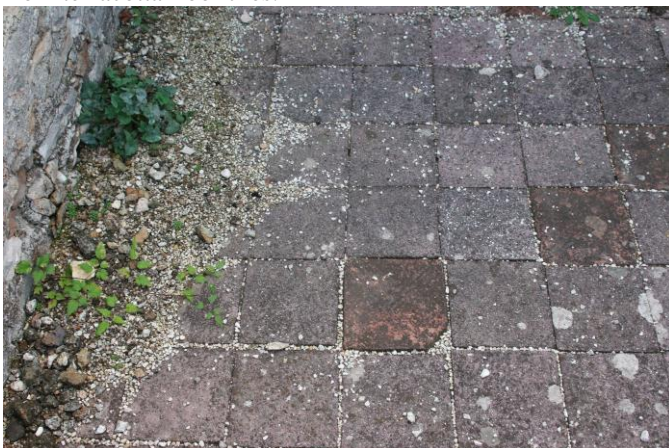


Figure 8: Terracotta floor tile finish

Walls: The walls were constructed with stone and cement as seen in the figure below. There are marble plaques in some parts of the ruins which suggests marble may have been used to cover some of the walls in the building.

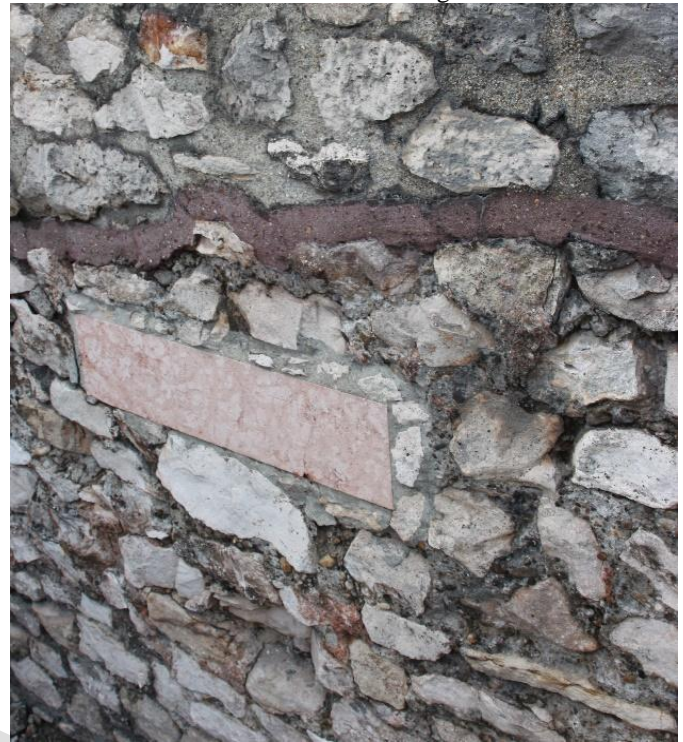


Figure 9: Stonewall structure with a marble plaque

Ceiling: There is no existing ceiling structure to accurately illustrate the material used for the ceiling in the bath. However, Figure 3 depicts what it may have looked like.

## IV. OTTOMAN BATHS

Generally, the structure of Ottoman baths follows the classical scheme similar to Roman and Byzantine baths. The Turks took advantage of the hot springs in Hungary. They built medicinal baths, hammams, and steam baths.

These hammams served three functions: religious, as the Quran emphasizes personal cleanliness; social, as the baths served as meeting and discussion spots; and medicinal due to the thermal waters' curative effects (Korchnak, 2013)

### A. OTTOMAN BATH CHARACTERISTICS

#### a. THE STRUCTURAL AND SPATIAL CONTEXT OF OTTOMAN BATHS

It is noticed that the bath schemes have architectural characteristics, both in terms of plan layout, cross-section, and frontal view. These properties can be handled in a structural and spatial context (Karatosun, 2017).

In the structural context, the walls are carriers for the domes which are the top cover. Brick and stone were the general structural components with the inclusion of marble coverings on those walls and even in the courtyard.

In terms of spatial value, the original spatial arrangement of these structures and the interrelationships between the

spaces in the arrangement are some of the important features constituting the cultural heritage value (Karatosun, 2017).

Turkish bathhouses are classified according to their plans, which create certain typologies. These typologies have importance to the social use of Turkish baths. These typology types are:

- ✓ Cruciform, four eyvans, corner washing part type.
- ✓ Stellate heat part type.
- ✓ Washing parts around a square heat part type.
- ✓ Multi-cupola heat part type.
- ✓ Middle domed, double washing parts, and transverse heat part type.
- ✓ Cold, heat parts, and washing parts, which are the same room type.

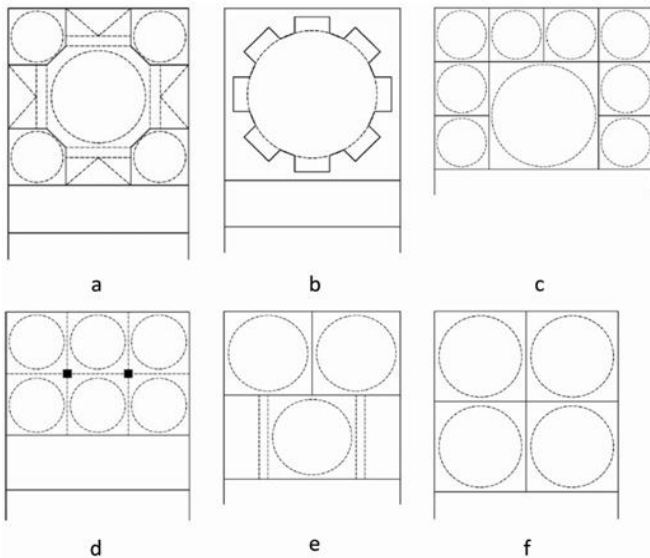


Figure 10: Schematic drawings of Turkish baths' plans (Karatosun, 2017)

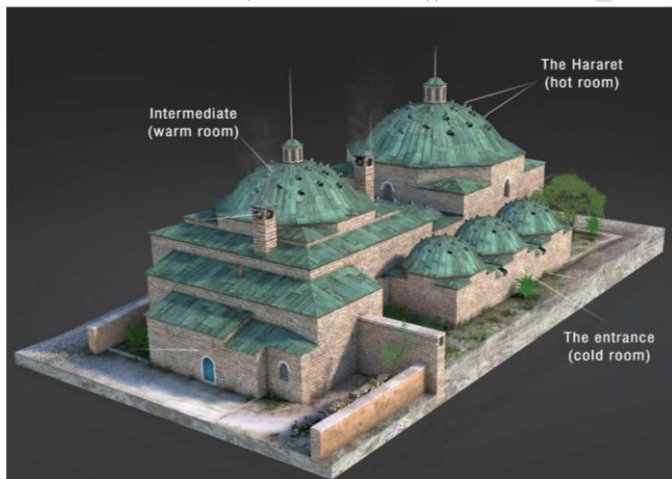


Figure 11: Morphology of an Ottoman bathhouse- the main distribution of rooms (Mozaik Education, 2023)



Figure 12: Section box (Mozaik Education, 2023)

### Heating System

As we can see in Figure 13, the air in bathhouses was heated by a system of heating built under the marble floors in the rooms, this heating system is attributed to the Roman hypocaust. In the Turkish hypocaust, the surface is elevated by stone, or brick footings of 1 meter from beneath the ground which allowed heated air to circulate the spaces as required (N. & G.). Hot water in the water storage rooms was heated by the furnace of fire directly beneath the storage rooms (N. & G.).

In addition, vertical (tüteklik) inside the walls at certain intervals allowed heat and excess smoke to circulate through these pipes and exit through the chimneys; the walls of the bathhouses were heated during this process (N. & G.).



Figure 13: Thermal heating system- behind the walls (Mozaik Education, 2023)

## B. OTTOMAN BATH EXAMPLE IN EUROPE

### a. BEY HAMMAM

Bey Hammam is one of the first hammams of the Ottomans. It was built in 1444 with the classical period hammam typology and construction technique of the empire. It was in use with the name Baths of Paradise until 1968. Bey Hammam is a classical double bathed hammam, with two separate parts for men and women; the male quarters are the most spacious and luxurious, but both follow the succession of three parts, the cold, tepid, and hot rooms (Tsikaloudaki, 2013).

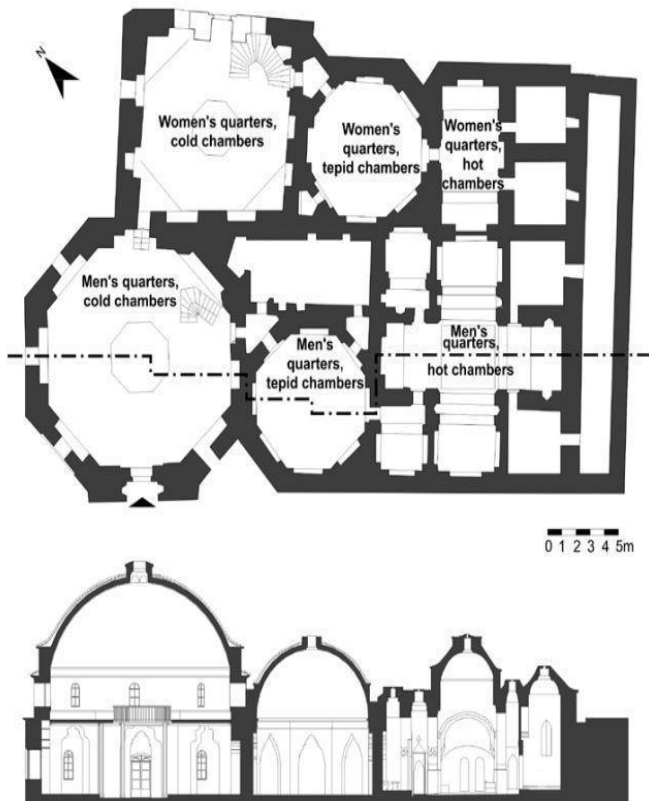


Figure 14: The ground plan of Bey Hammam (Tsikaloudaki, 2013)

The male quarters include a large octagonal-shaped cold room, where lateral windows are arranged in two levels on the external masonry providing daylight to the interior. Four windows are located on the ground floor on each free side of the octagonal envelope, while eight shorter windows are positioned on each side of the octagonal envelope at the upper level. An oculus at the top of the vault helps towards achieving uniformity of daylight across the height of the room (Tsikaloudaki, 2013).



Figure 15: The light openings on the dome of the cold area of Bey Hammam (Tsikaloudaki, 2013)

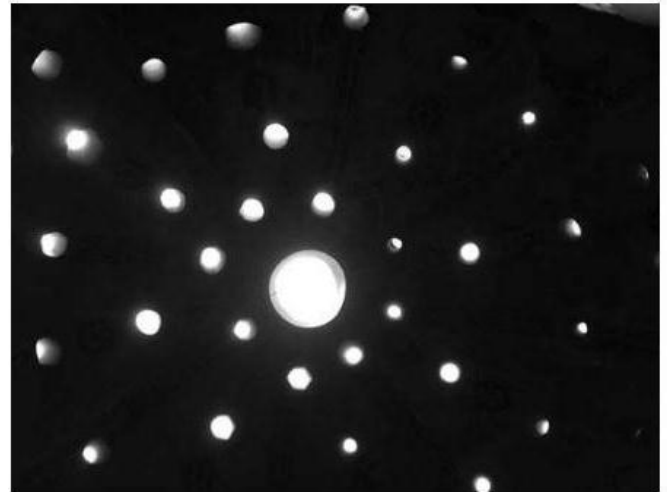


Figure 16: The light openings on the dome of the tepid area of Bey Hammam (Tsikaloudaki, 2013)

Further to the east lies the complex of hot chambers, ordered around a large cruciform room, where the massage table stands in its center. Eight smaller areas open in this space, each of which is covered by a separate dome. Light openings are located on each dome, as well as between adjacent arches supporting the domes.

It is characteristic that only the central dome of the hot area, which is directly above the massage table, is equipped with an oculus; 24 circular light openings distributed in two concentric circles provide daylight to the heart of the hot chambers (Tsikaloudaki, 2013).

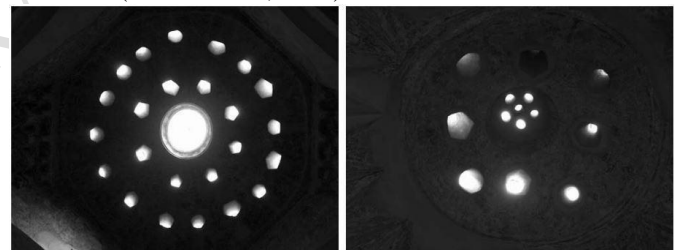


Figure 17: The configuration of light openings on the central (a) & on one of the peripheral domes (b) of the hot chambers in Bey Hammam (Tsikaloudaki, 2013)

## C. OTTOMAN BATH EXAMPLE IN BUDAPEST

### a. KIRÁLY BATH

The Király bath is one of the oldest Ottoman hammams in Budapest. In 1565, a quarter of a century after the fall of Buda, Arszlán Pasha began to build it, in a rather special place, as there were no heat sources nearby. The bath was built there because the area was already inside the castle walls, so the Turks could bathe peacefully even during battle periods. For the Turks, the bathhouses had a sacred role, which was why they brought the thermal water to the Király from a distance of about one kilometer, from the area of the modern-day Lukács bath (Korchnak, 2013).



Figure 18: Király bath dome Exterior (Budapest Thermal Bath & Spa Guide, 2023)

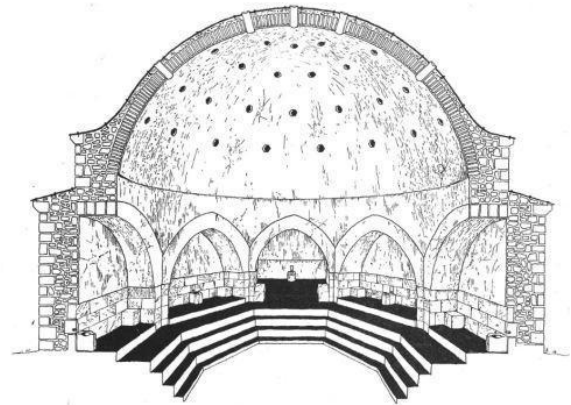


Figure 20: The dome hall after restoration (Gyözö)

The overall design of the building is typical of the baroque styled Ottoman architecture that prevailed during the period, and the same can be found in the design of the courtyard, small pools, and hallways (Headout, 2022).



Figure 21: Interior of the octagonal bath (Headout, 2022)

There are four pools in the Király bathhouse. The main pool resides beneath a quintessential Turkish dome. The bath area is lit only by natural sunlight that seeps in through the holes of the Turkish dome which creates a beautiful effect. The thermal baths at Király maintain temperatures between 78.8°F and 104°F and the medicinal waters that come from deep hot springs of the neighboring Lukács baths contain minerals such as sodium and calcium (Headout, 2022).

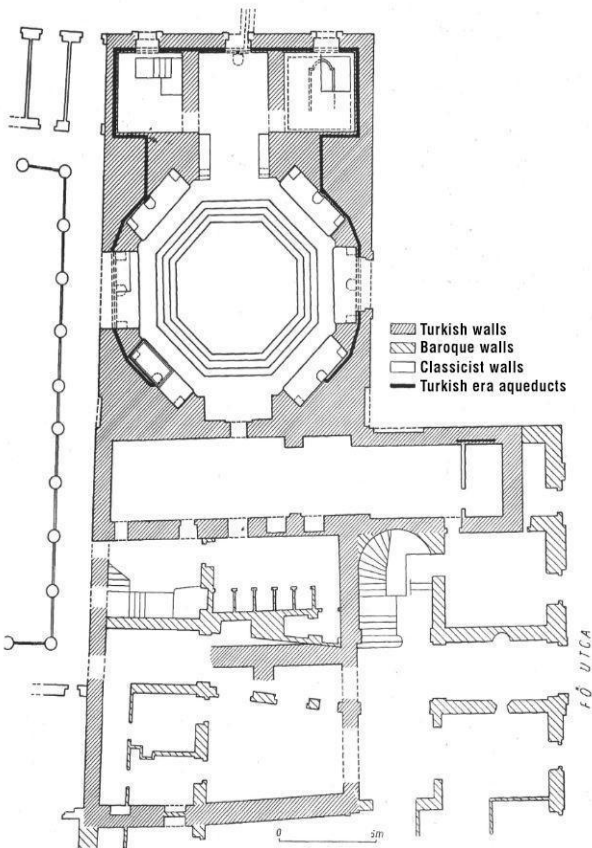


Figure 19: Király bath Plan. (Gyözö)

Domes were an integral part of Ottoman architecture. The central dome over the main pool in the Király bathhouse has holes to let natural sunlight into the bath. Around the pool are colorless arches, complimenting the Ottoman-style architecture. The floors are marbled, and the baths are tiled. There are benches around the main pool for visitors to rest (Headout, 2022).

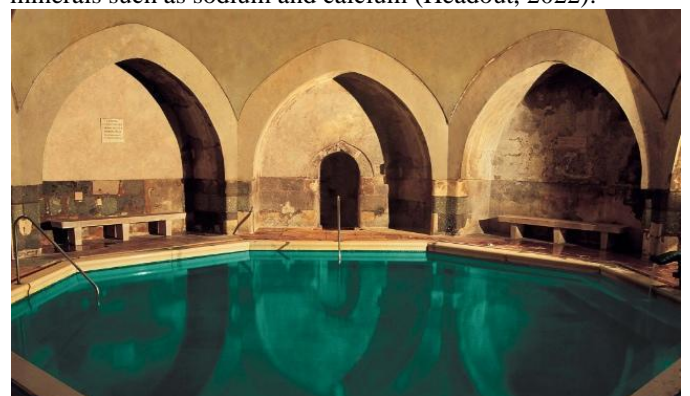


Figure 22: Interior style of arches in the hot room (Headout, 2022)

The Kiraly bathhouse is an authentic Turkish thermal bathhouse from medieval times. Turkish thermal baths, however, are not the same as Turkish steam baths, also known



as hammams. In Budapest thermal baths, warm water with medicinal properties is used, while Turkish hammams use steam and hot water. Turkish thermal baths such as the Király bathhouse are known as Ilidzas (Headout, 2022). Temperatures in the four pools vary, however, the recorded normal temperatures are between 78.8°F and 104°F.



Figure 23: One of the small pools (Headout, 2022)

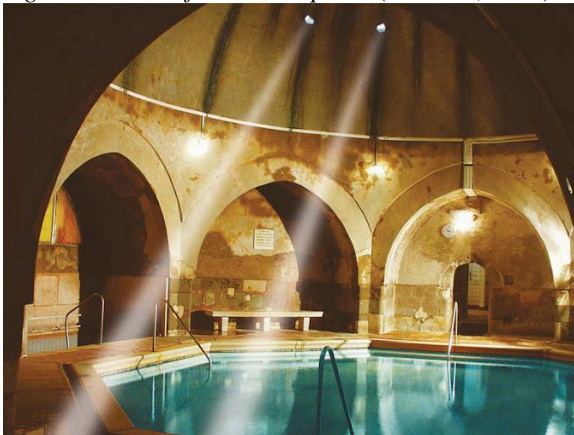


Figure 24: Sunlight through the dome holes (Headout, 2022)



Figure 25: Stairs (Headout, 2022)

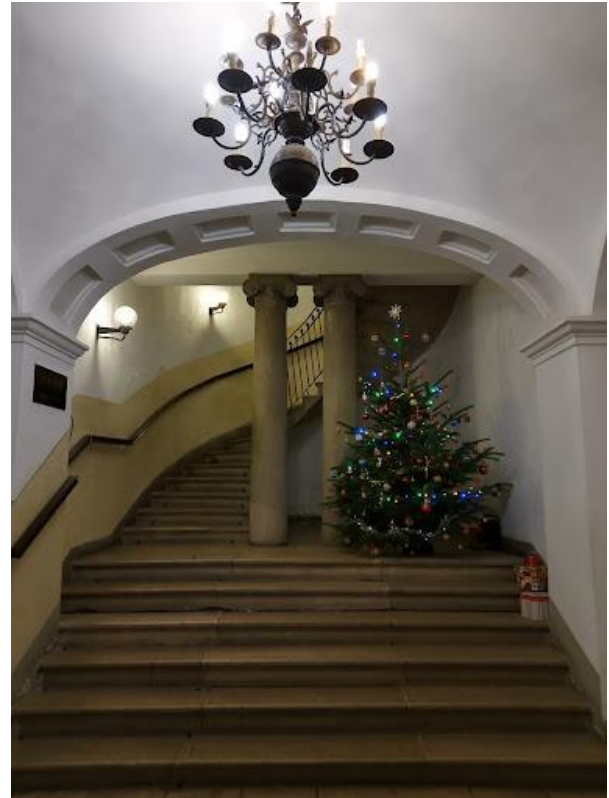


Figure 26: Columns (Headout, 2022)

## V. COMPARATIVE ANALYSIS OF HISTORICAL BATHS OF BUDAPEST

Two of the greatest architectural representations that over time have influenced the architecture within Europe, the world and specifically Hungary; the Roman and Ottoman architectural styles have been highlighted within the “pearl of the Danube” with monumental bathhouses. After the previous analysis of the bathhouses, the following is a series of analyses of the formal and functional aspects of both Ottoman and Roman architecture in bathhouses.

### A. USE OF THE BATHHOUSES

| Roman Bathhouses  | Ottoman Bathhouses   |
|---|--|
| <ul style="list-style-type: none"> <li>• Romans inherited the Greek use of bathhouses for medicinal cleansing.</li> <li>• Bathhouses were the ideal places for bodily cleansing and physical and mental rejuvenation. Activities such as exercises, massages, and even intellectual activities, affirm the wholesome nature of the bathhouses.</li> <li>• They were locations of social gathering for all regardless of age, wealth,</li> </ul> | <ul style="list-style-type: none"> <li>• The Ottoman had medicinal baths, and thermal and steam baths.</li> <li>• They inherited the Roman understanding of bathhouses being wellness centers in addition to bodily cleansing. They introduced the use of oils, and creams to bath routines.</li> <li>• During the Ottoman occupation in Hungary, the local Hungarians were only allowed to visit</li> </ul> |

|  |  |
|--|--|
| <p>and social status.</p> <ul style="list-style-type: none"> <li>• It was common sometimes for men and women to use the baths, although, some indications suggest separate facilities for both genders as seen in the Kettós Fürdő bathhouse.</li> </ul> | <p>bathhouses at night; it was a segregated social gathering.</p> <ul style="list-style-type: none"> <li>• There were strict gender policies in the use of bathhouses, mostly grounded on the religious beliefs of the Ottomans. The Bey Hammam is an example of a double-bathed hammam for men and women separately.</li> </ul> |
|--|--|

Table 1: Use of Bathhouses Comparison

The bathhouses addressed in this research responded to the needs of the different historical moments in Budapest. Both the Kettós Fürdő work of the Roman Empire and the Király baths built in times of Ottoman sovereignty served the hygienic and leisure needs of their populations. These archetypes exerted the custom of bathing as a communal activity whilst connecting and inciting the culture of water and body. For both the Ottoman and Roman civilizations, the role of water was crucial to their social and economic development. One of the most popular water-related infrastructures was the bathhouses; public baths that included spaces reserved for a spectrum of exercise and recreational activities. The bathhouses were more than just spaces for personal hygiene. Both eras' bathhouses were frequented by the bourgeoisie and wealthy citizens who made it a complete act of celebrating life, and an experience full of care that began in water therapy.

## B. HEATING COMPARISON

| Roman Bathhouses  | Ottoman Bathhouses  |
|---|---|
| <ul style="list-style-type: none"> <li>• The Romans were the inventors of the hypocaust which was the underfloor heating system of hollow chambers underneath from which hot air flowed through to heat the baths.</li> <li>• The heat traveled from the furnace through terracotta pipes to the various spaces to warm the floor and walls of the spaces and the water.</li> </ul> | <ul style="list-style-type: none"> <li>• They were heated by a system of heating built under the marble floors in the rooms. This is attributed to the Roman hypocaust system.</li> <li>• Water was heated by the fiery furnaces underneath the raised floors. The steam generated traveled through the chambers.</li> <li>• The walls were heated by vertical (tüteklik) pipes that ran inside the walls.</li> </ul> |

Table 2: Heating Comparison

The Ottoman heating technology in their bathhouses was based on the principles of the Roman hypocaust, as seen in Table 2. In the case of the Király thermal baths, we observe the tripartite arrangement of the immersion and pool baths according to their temperature, heir to the Roman concept of bathing temperature. The novelty introduced in the original project would be the organization of the baths in a tangential axis that has the warm water pool as its center, placing the cold immersion bath at the end of the route, at the farthest point from the entrance to the enclosure.

### a. Structural and spatial context comparison

| Roman Bathhouses   | Ottoman Bathhouses  |
|--|---|
| <p><i>Structural context</i></p>   |   |
| <ul style="list-style-type: none"> <li>• The structure of the baths of Caracalla was a construction of brick-faced concrete with large vaults.</li> <li>• Aquincum's Kettós fürdő were made of stone and concrete and possibly roofed with overlapping roofing tiles.</li> </ul>   | <ul style="list-style-type: none"> <li>• The walls are carriers for the domes which were the top covering. Domes were an integral part of Ottoman architecture, which the Király baths of Budapest possess.</li> <li>• Brick and stone were the general structural components with the inclusion of marble coverings.</li> </ul>  |
| <p><i>Spatial context</i></p>  |   |
| <ul style="list-style-type: none"> <li>• The Roman bathhouses were formulated with some principal spaces: the <i>caldarium</i> (hot bath), the <i>tepidarium</i> (warm bath), and the <i>frigidarium</i> (cold bath).</li> <li>• <i>The natatio</i> (outdoor pool) was the only pool located outdoors in addition to the other spaces indoor.</li> <li>• Some bathhouses like the Caracalla extended to include features such as palaestrae (exercise spaces) and even a library.</li> </ul> <p>Bathhouses were usually extensive construction feats that aimed to serve the general public.</p> | <ul style="list-style-type: none"> <li>• Turkish baths are classified according to their plans, which creates a certain typology: <ul style="list-style-type: none"> <li>✓ Cruciform, four eyvans, corner washing part type</li> <li>✓ Stellate heat part type</li> <li>✓ Washing parts around a square heat part type</li> <li>✓ Multi-cupola heat part type</li> <li>✓ Middle domed, double washing parts and transverse heat part type</li> <li>✓ Cold, heat parts, and washing parts, which are like the same room type.</li> </ul> </li> <li>• The original spatial arrangement of Turkish bathhouses and the relationship between the spaces possessed a cultural heritage value.</li> </ul> <p>Bathhouses were usually smaller in size compared to Roman bathhouses.</p> |

Table 3: Structural and spatial context comparison

One of their functions was to represent the magnificence of the Roman Empire through the large scale of its architecture, which is evident in the Caracalla bathhouse, while Aquincum's Kettós Fürdő is a reduced scale by comparison. The difference in scale results in different structural content. However, their spatial contexts are uniform.

Stone and bricks were the structural components of the Turkish bathhouses, in addition, domes were also integral parts of the structures. Turkish baths are classified according to their plans.

## VI. CONCLUSION

After the analysis and comparison of the spatial, structural, and architectural styles of the bathhouses, we

conclude that there are certain differences in the use of space, heating, and the cultural importance given to the bathhouses. Likewise, the users who made use of these baths also had their particularities.

With these comparisons, we deduce that the ideological focus given to bathing by both Roman and Ottoman cultures is similar. Both have some similarities, primarily because certain details were taken by the Ottomans from their Roman predecessors. The architectural quality of the bathhouses which is the subject of this work isolates the bather from the outside world with the thickness of their walls, and the waters themselves, regardless of their scale or formation. The custom of bathing may have begun as a civic act, however, it morphed into a recreational activity.

The thermal waters in Budapest have made possible the continuity of the tradition of baths in the city. The culture of bathing promotes an exhilarating experience of self-complacency. From its traditional role as a social condenser, now a phenomenon for socialization. The baths of Budapest are part of the heritage of the city and are a source of pride for its inhabitants, some thermal baths of these architectural styles both Ottoman and Roman are still frequented almost exclusively by tourists, and continue to maintain the popular character of the tradition of bathing in Classical antiquity (Hodgson, 2020)

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