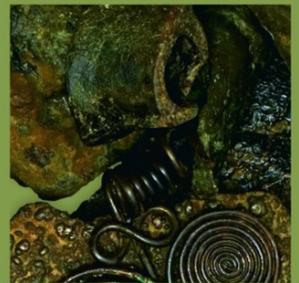
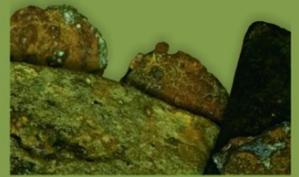


# DISSERTATIONES ARCHAEOLOGICAE

ex Instituto Archaeologico Universitatis de Rolando Eötvös nominatae



Ser. 3. No. 2. | 2014

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Budapest 2014

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*Manorial and urban manufactories in the 17th century in Sárospatak*

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# **A 15th–16th century cannon foundry workshop in Buda**

## **Craftsmen and technology of cannon moulding and the transformation of military technology from the Renaissance to the Post Medieval Period**

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*Abstract of PhD thesis submitted in 2014 to the Archaeology Doctoral Programme, Doctoral School of History, Eötvös Loránd University, Budapest under the supervision of András Kubinyi and István Feld.*

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### **Introduction**

The reconstruction and architectural rehabilitation of the Szent György Square was a very late but very important part of the post-war renovation (following the demolitions of World War II in 1944–45) of the Castle Hill at Buda. Archaeological excavations have been carried out in Buda (between the Royal Palace and the Fehérvári Gate) between 1994 and 2003. The goal of these excavations was to launch an urban planning and space reconstruction project for a medieval district in the foreground of the former Royal Palace. The remains of a medieval foundry, that is, a moulding workshop were unearthed on some plots (6 and 8 Szent György Street) during these works. We have excavated the fragments of two brick-built furnaces and four moulding pits close to the medieval city wall. These pits were full with the waste of previous casts: moulded bricks, alloy and bronze pieces (flows and drops) of the casts and clay fragments from the mould. The size of the furnaces and the shape of the pits dug next to them all referred to the production of huge and heavy bronze objects. Therefore, we can identify these remains as the royal cannon foundry established by Jacobus Maryanwerder de Pruscia. This workshop was known from some written sources of the 15th and 16th centuries.

### **Structure**

The goal of this dissertation is to reconstruct and present the cannon foundry working in Buda along the 15th and 16th centuries. It is based on the excavated archaeological material and the written sources relevant to history and technology.

The first part of the dissertation deals with the written military, economic and topographical history evidence of this workshop. This is followed by a comprehensive analysis of the sources relating to the casting history of the 15th and 16th centuries. This helps to demonstrate the contemporaneous procedure of cannon production. In the dissertation I presented a theoretical model of a cannon foundry as based on the written evidence.

In the next part, I compared the archaeological material of the excavated site with this theoretical model. The small finds were also analysed with scientific methods. This helped to understand excavated features and small finds and supported a theoretical structural reconstruction of the site and of the moulds.

Finally, the internal structural context of the archaeological site made it possible to determine periods and internal relations of the site and the workshop areas inside of it.

### **Written sources concerning the foundry at Buda**

The amount of the available written evidence is surprisingly large if compared to the general survival of the archival sources from the 15th century. There are charters from the Batthyányi archive (concerning the possession of Rohonc), well elaborated sources for house owners in the Szent György Street (the medieval Szent Zsigmond Street) in the city of Buda and royal reckoning books from the 1494 and 1495. This later describes the royal military campaign of Wladislas II against Lawrence of Újlak, in which campaign the cannon foundry of Buda and its master played a crucial role.

The workshop leader of the cannon foundry, Jacobus Marijwerder (Maryanwerder, Morganwerder) de Prussia, originates very likely from Marienberg, the Prussian settlement south of Malbork (today Kwidzyn in Poland). He most probably met and joined King Matthias during his Austrian campaign. His various services and support of the king were honoured by a donation in 1478: the villages of Hodász, Csajta, Perenye, Czag, Velem and Gwor, and the castle and town of Rohonc. Although there is no evidence for that, it is very likely that this royal master had soon moved to Buda, in the neighbourhood of the Royal Palace. The house of „*Jacobi Bombardiste familiarum regie maiestatis*” is first mentioned in a charter from 1489. It was located in the Saint Sigismund Street (Szent Zsigmond Street) leading to the castle, next to the house of the royal barber, Stephen of Raguza. „*Jacobus de Rohoncz pixidarius Regius*” sold his newly acquired possession of Rohonc in several pieces between May 1490 and January 1491. His successor and official heir, Martinus de Prussia „*Bombardius regie maiestatis*” is mentioned around 1505. He is also mentioned in 1515 as a neighbour, and in 1518 as someone who sold his house a few years before for 1200 Forints to Emerich Perényi and his sons, the former southern neighbours of the plot.

### **The royal reckoning books of 1494/1495**

The archive of the royal accounts is an important evidence for the investigation of the commerce and state budget in the era of the Jagiellonian dynasty. Some data in it also refer to the military campaign of the king against Lawrence of Újlak. This information helps clarifying the role of Master Jacob and the royal artillery in this campaign. Although the well-spread data that all the royal cannons of the military enterprise had been casted by Jacob is not fully supported by evidence, this source is very informative concerning the artillery preparations at the late 15th century, the industrial achievement of the cooperation of several craftsmen and the role of the royal cannon master and artillery in general. The majority of the data in these books refer to supplementing munitions, producing gunpowder and moving cannons; only the casting of two cannons is fully evidenced.

### **The topography of the cannon foundry in Buda**

The dissertation also considers topographic aspects in addition to the technological ones. The identification of this very special industrial area also helps localising the plots of the medieval „*platea Sancti Sigismundi*”, the later Szent György Street. There is a special investigation

in the dissertation dedicated to the internal and external relationships of the foundry: the area of the workshop, its relation to the Royal Palace and fitting to the urban structure of late medieval and early modern Buda.

### **Moulding and casting bronze cannons at about 1500**

The end of the 15th century is not simply the age of a military revolution, the general spread of the usage of artillery and firearms, but also the time of the establishment of the modern idea and literature of mining, geology and metallurgy. Incidentally, as referred to by the excavated remains of the furnace, the time of existence of the Buda cannon foundry and a shift in the Bronze casting technology coincide. A new type of cannon furnace appears: the so-called flame furnace.

While the casting technology had slightly changed thanks to the quick spread of the flame furnace, the mould-making technology had remained basically the same.

We can include a new source of evidence, because after this time the industrial technology of cannon casting procedure remained more or less the same for approximately 300 years. Analysing the relevant data of the 17th and 18th centuries, we can also use the results for investigating the late medieval casting and mould-making technologies.

### **The archaeological material of the workshop at Buda**

The dissertation investigates the features and small finds of the excavated foundry in the following structure:

- Identification of the material of the cannon foundry.
- Reconstruction of the historical industrial surroundings on the basis of comparing the excavation material and the sources of the history of technology.
- Moulds and casts as reconstructed from the finds.
- Relative chronology of the workshop.

### **Results**

The given strict technology – as referred to by the sources – and the facilities connected to this technological process create a direct logical line, in which the missing elements can be inferred. Therefore, the fragments of the furnaces and pits are structural and technological elements, which refer to the whole procedure. Consequently, we can create models for the former medieval workshop also considering the local specialities.

Based on all the above evidence, we could reconstruct five workshop districts on the two excavated plots of the Szent György Street. We can also determine the size, weight and shape of the objects. Perhaps the most interesting is the identification and theoretical reconstruction of the cannon called „...*tormenta inusitate magnitudinis...*” by Bonfini. We can presumably identify the mould remains of a cannon with extraordinary dimensions (5705 kg, at least 4,5 m long, 40 cm diameter) as the huge cannon which had been installed by Master Jacob on the field during the campaign against Újlaki.

Although the evidence is not sufficient to create a solid typology for the firearms of the era, it is enough to set up a very likely hypothesis. At about 1500 the cannon workshop in Buda produced siege guns with one bigger and two smaller calibres, howitzers and a bell of more than 300 kg (with 100–120 cm lower diameter and 110–130 cm height).

## Summary

Although the relative chronology and periods of the workshop could not be fully clarified, thanks to the written sources, the excavated material and the workshop districts could be very well located both in time and space.

According to the small finds, the stratigraphic observations and the numerous separated casting pits and furnaces, we have excavated the remains of several, non-contemporaneous casting procedures of cannons and bells. Only their succession in time, i.e. their relative chronological relationship remains unclear.

Because of the cannons, we can connect these casts to military actions and to the person of the king. In the case of the bells the customer was not necessarily the king and the production of smaller series is also probable.

Despite of the close neighbourhood of the Royal Palace, this foundry was not a royal military factory, but a privately owned manufacture, a cannon foundry, which also satisfied royal orders.

The manufacture run by first by Jacob and later by Martin is still interesting. Its speciality is its permanency; because of the typical mobility of the cannon foundry masters it is rather unique – although not exceptional – to settle in a city and create master dynasties for a longer time.

We know for sure that Martin and his wife, Margaret, sold their house in Buda in the 1510s. Martin could settle and get further orders elsewhere, but these are not known from the sources. The cannon foundry in the medieval Szent Zsigmond Street was established in the 1480s and was surely given up in 1518 the latest. The workshop is known to exist for approximately 30 years, but is without known predecessors and/or followers.

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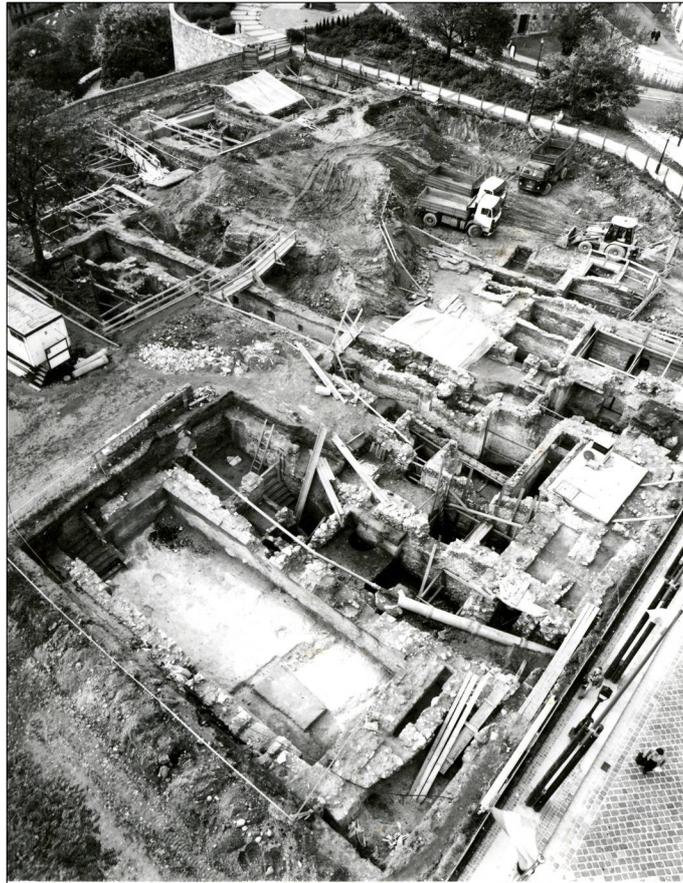


Fig. 1. Aerial photo of the excavation at Szent György Street in 1999.



Fig. 2. Photo of Szent György Street around 1890.



Fig. 3. Map of the Late Medieval house structures of Szent György Street (Medieval Szent Zsigmond Street) with the indication of the cannon foundry (drawing by Zs. Kuczogi).

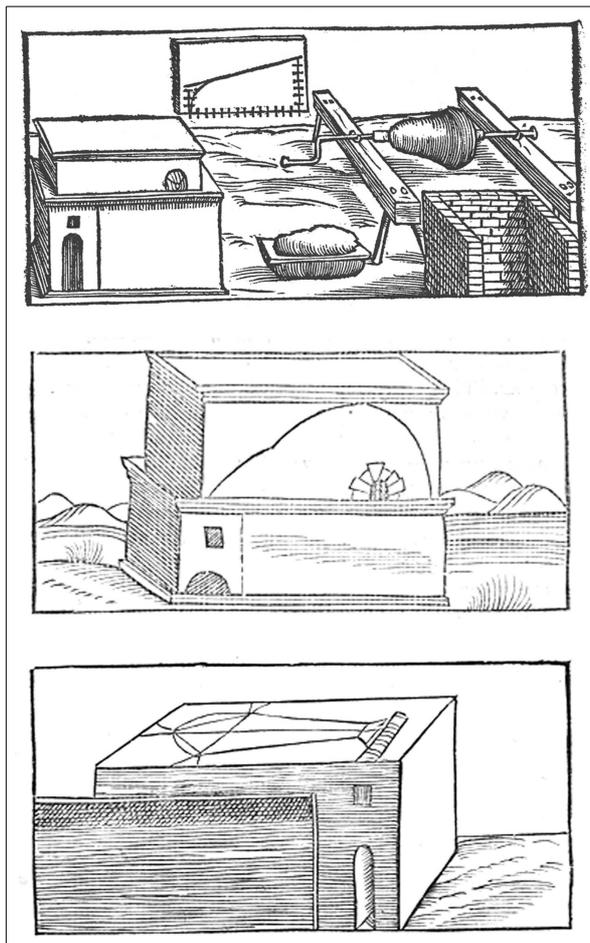


Fig. 4. Illustrations of flame furnaces from the book of Vannoccio Biringuccio.

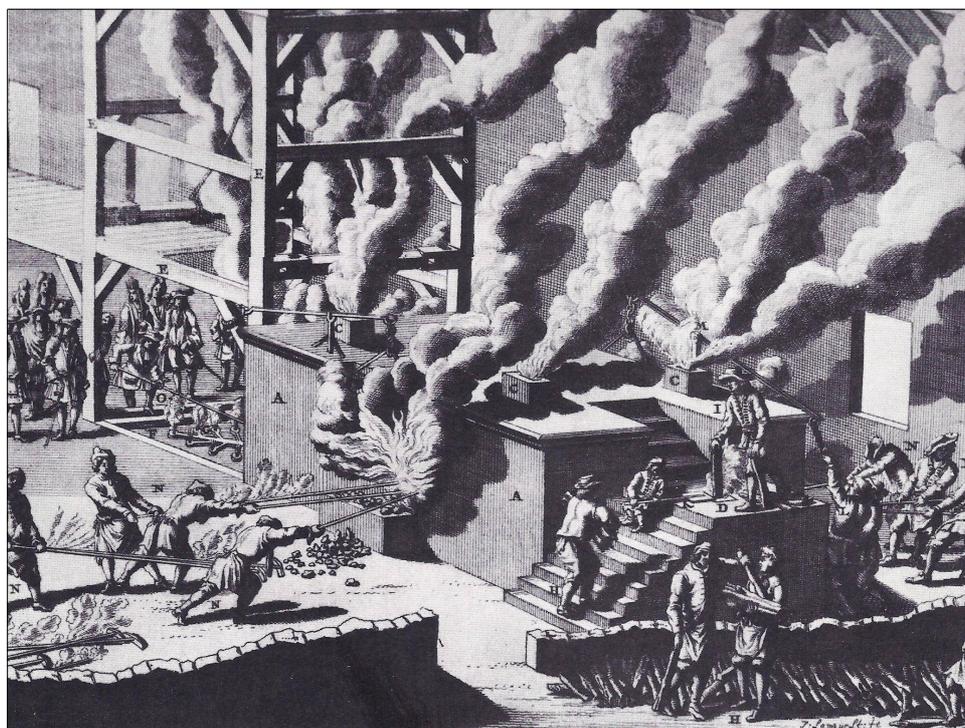


Fig. 5. Illustration of an 18th century cannon foundry.

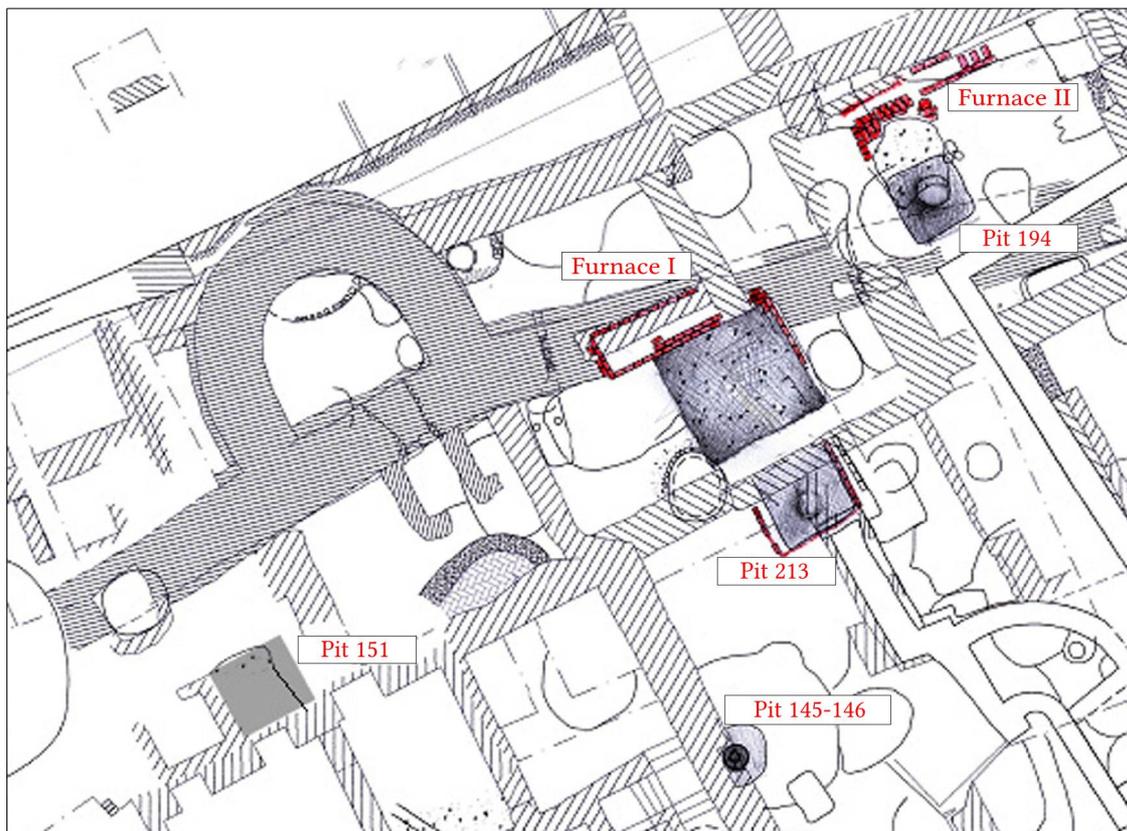


Fig. 6. Remains of the gun foundry in building plots 6 and 8 Szent György Street, close to the city walls.



Fig. 7. Casting pit nr. 213 under excavation.



Fig. 8. Excavation photo of a bell casting pit from the parcel of the 15th–16th century gun foundry.



Fig. 9. Fragments of a casting form from casting pit nr. 145.

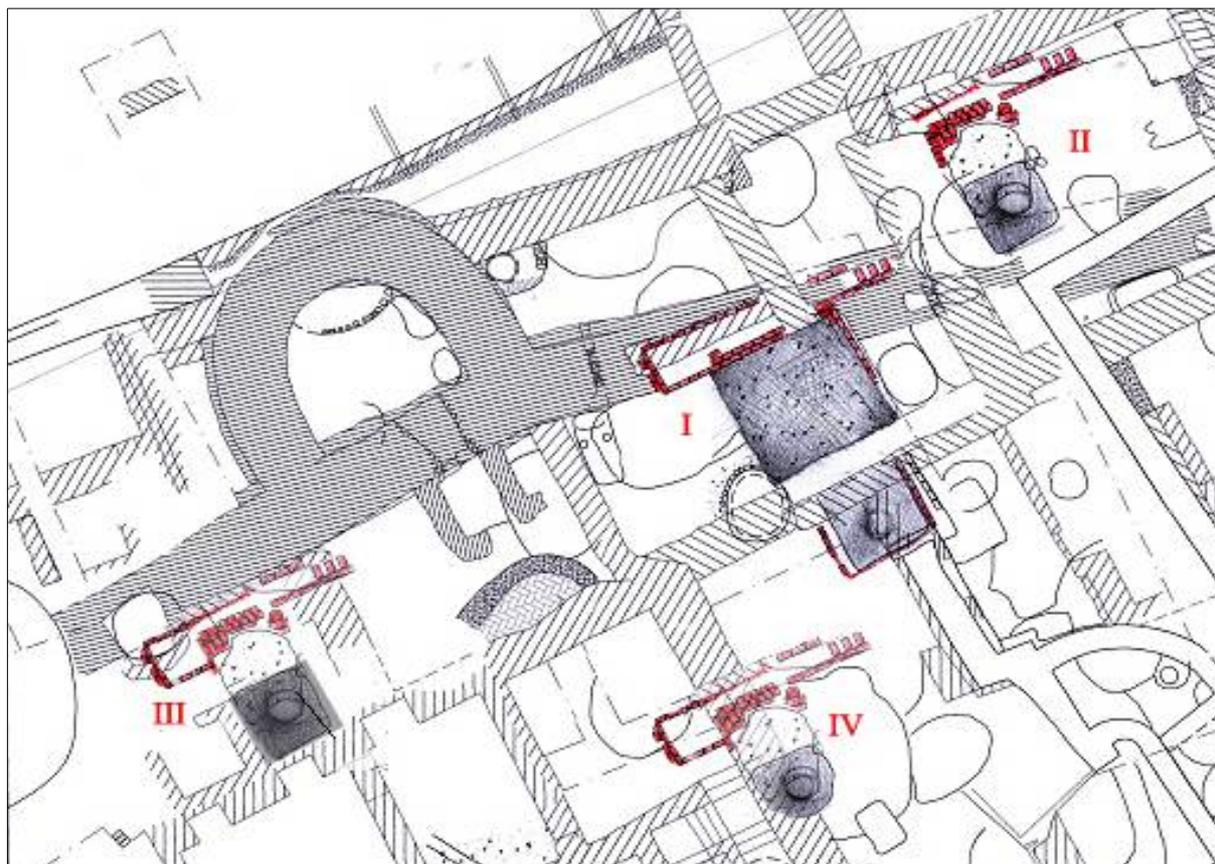


Fig. 10. Reconstructed drawing of the working areas of the foundry based on the small finds and remains of the 15th–16th century casting furnaces.

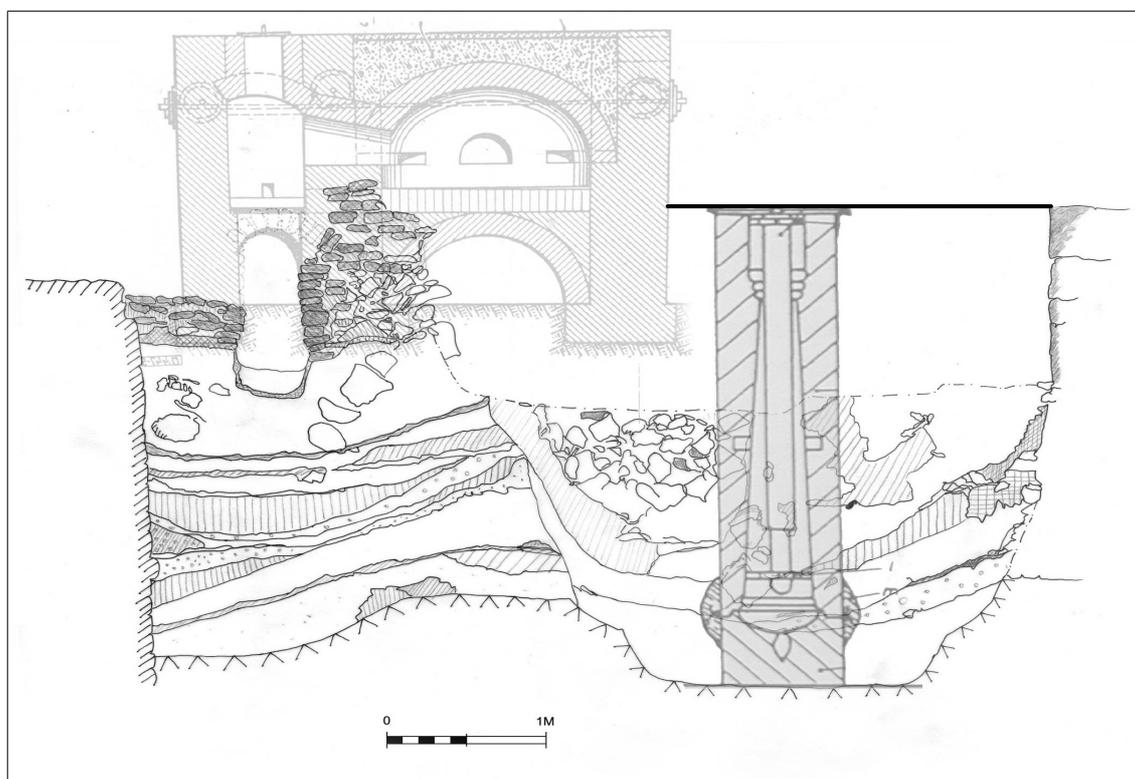


Fig. 11. Reconstructed flame furnace nr. II with the illustration of the casting form of a cannon.

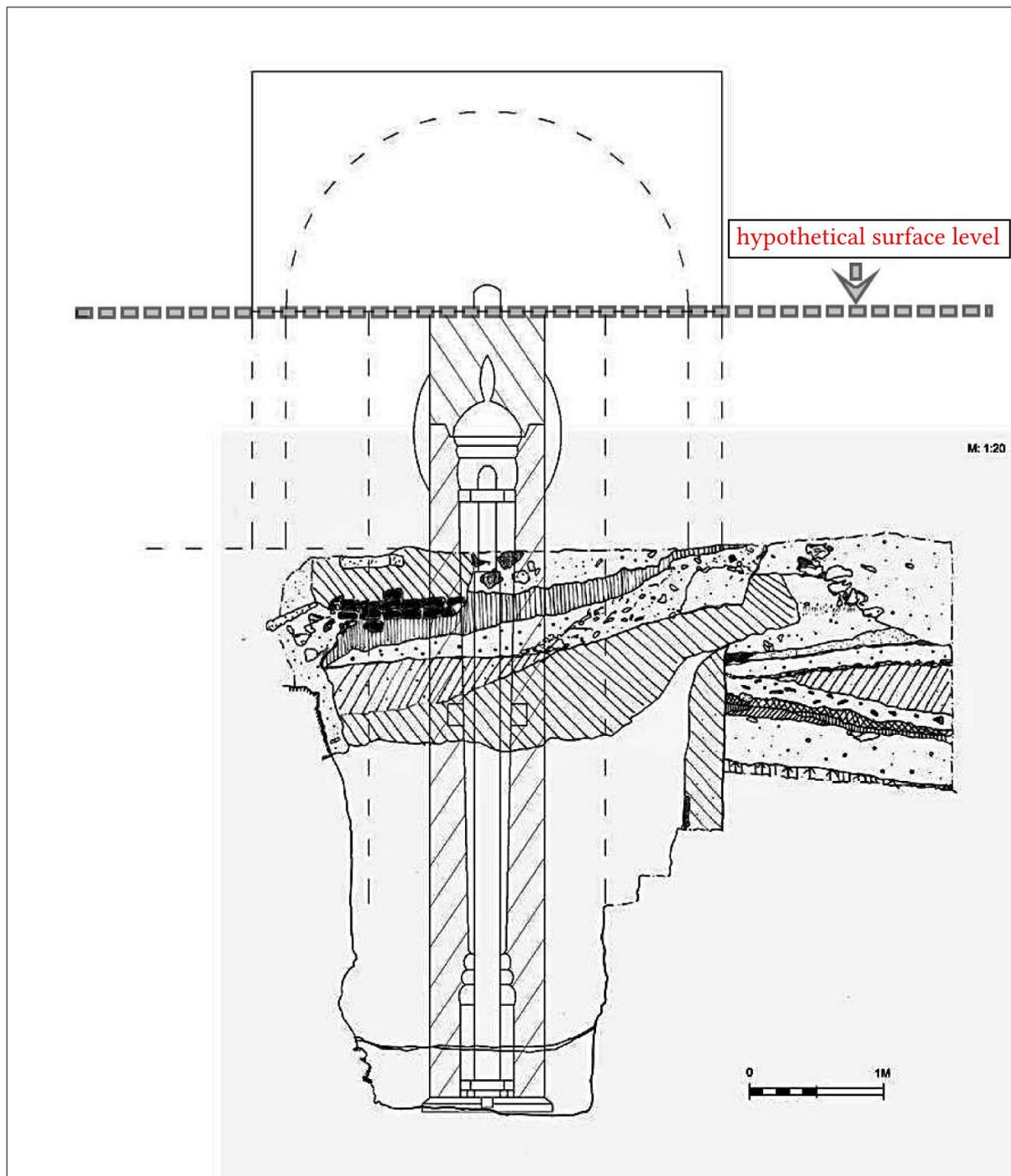


Fig. 12. Reconstructed flame furnace nr. I. with the hypothetical surface level of the cannon foundry and the working areas.