

8TH-9TH CENTURY METALSMITH'S FURNACE FROM VISEGRÁD, SIBRIK-DOMB

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In the summer of 2017 at a multi-period archaeological site at Sibrik-domb in Visegrád a metalsmith's furnace that can be dated between the end of the 8th century and the 9th century was successfully excavated.² Due to two fortunate circumstances, the furnace can be dated with a close approximation. On the one hand the find materials discovered in the infill (crucibles and raw material residue) were not intermixed, and on the other hand the majority of the ceramic fragments that provide a date had strong marks of secondary firing, so could be directly linked to the use of the furnace. The object, in addition to it being an extraordinarily rare find from the aspect of the history of early medieval technology, also definitively indicates the site's early medieval period. Due to this, it became even clearer that the Late Roman fort was not only used as a royal center in the early Árpád period, but was a location of outstanding significance in the preceding period as well.

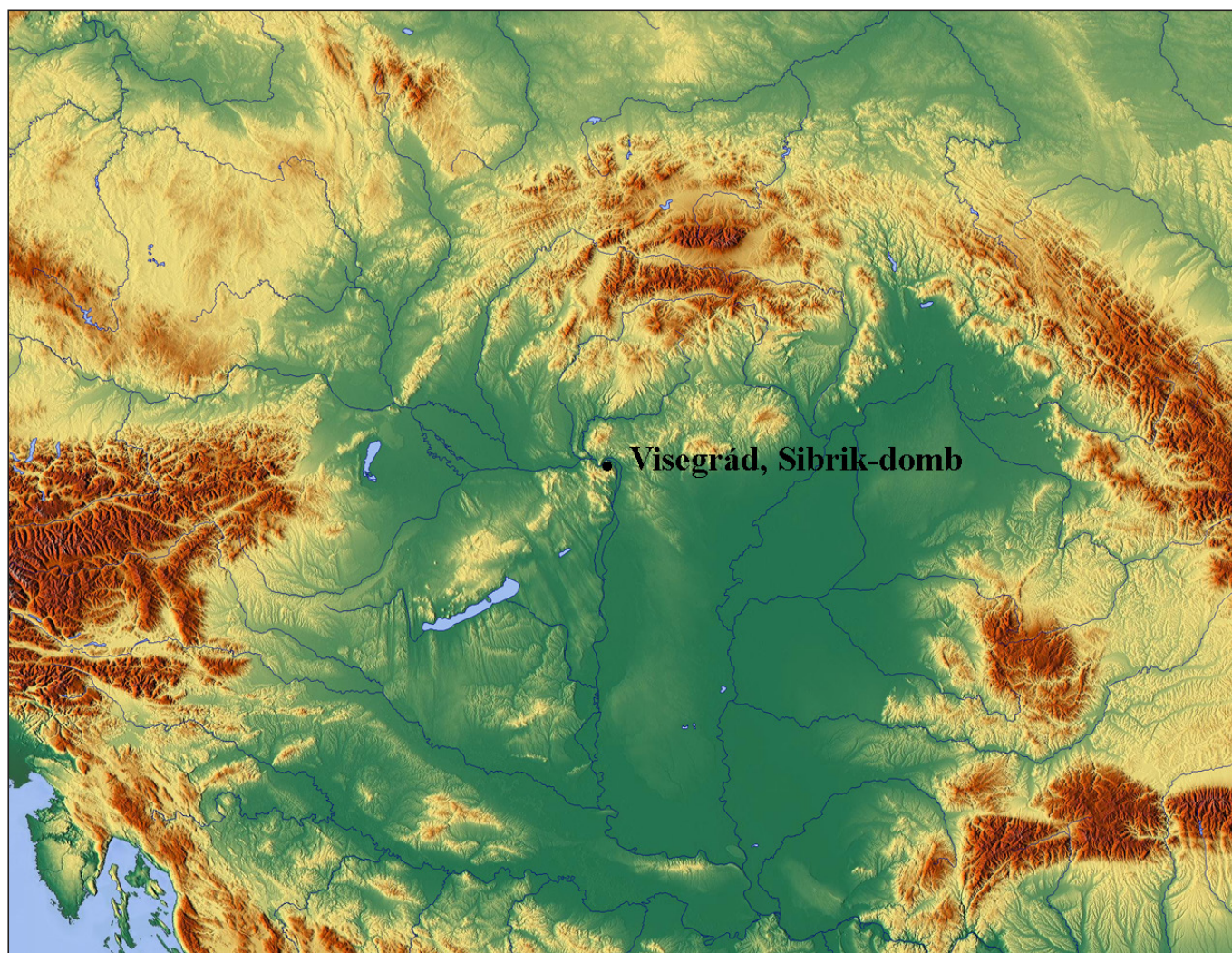


Fig. 1: The location of the site in the Carpathian Basin. Source of the map:
https://commons.wikimedia.org/wiki/File:Central_Europe_relief_map_with_waterbodies.png

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² The excavation took place within the framework of a planned excavation of the Hungarian National Museum's Mátyás Király Museum (Visegrád) in cooperation with the Hungarian Academy of Sciences, Research Centre for the Humanities, Institute of Archaeology. The research was supported by the National Cultural Fund.

THE RESEARCH HISTORY OF THE SITE

The archaeological excavations performed in recent years at Sibrik-domb in Visegrád (Figs. 1-3) were preceded by a long history of research at the site. The Roman fort identified in the middle of the 19th century was first investigated more intensively in 1951-1952,³ then in the first half of the 1970s (1970–1972 and 1974–1975)⁴, and later minor excavations were performed in 1985 and in 2009.⁵ The work performed up to this point has primarily concentrated on the walls and towers of the fort and has successfully proven that in addition to its Late Roman use, there are traces of reconstruction and reutilization that took place when the Árpád period ispán district was being organized.



Fig. 2: The site from the Visegrád Citadel.



Fig. 3: Drone photograph of the excavation performed in 2017 at Visegrád, Sibrik-domb

THE 8TH-9TH CENTURY SITE IN LIGHT OF THE MORE RECENT INVESTIGATIONS

A geophysical survey performed in 2010 provided a new impetus for research, which stimulated our research team in 2013 to further excavations, primarily in the interior of the fort.⁶ The result of the early medieval archaeological analysis of the micro-region (that is, the chronology determined through the processing of the Visegrád-Várkert settlement site) and the planned excavations at Sibrik-domb clearly prove that at the end of the Avar period or in the (Early) Carolingian period a new population appeared within the abandoned

³ Soproni, Sándor: A visegrádi római tábor és középkori vár (The Roman Camp and Medieval Castle in Visegrád). *Archaeologiai Értesítő* 81 (1954), 49-54.

⁴ In summary: Szőke, Mátyás: A visegrádi várispánsági központ kutatása (Research into the Castle Ispán District Center at Visegrád). *Dunakanyar* 1980/2. 35-37.

⁵ The detailed research history of the site is summarized in: Tolnai, Katalin: A Visegrád-Sibrik dombon feltárt maradványok története (The History of the Excavated Remains at Sibrik-domb in Visegrád). *Archaeologia – Altum Castrum Online* 2013.

⁶ Currently Katalin Boruzs (Roman period), Szabina Merva (8th-9th and 11th century), Balázs Sándor Szabó (12th-13th century), Gergely Buzás (the history of the ispán district center) and Katalin Tolnai (GIS) are engaged in archaeological research on the site. The restauration of the findings is done by Zsuzsanna Grósz. For the more important summaries of the recent results of the archaeological research performed on the site, see: Buzás, Gergely – Boruzs, Katalin – Merva, Szabina – Tolnai, Katalin: A kora középkori kontinuitás kérdése a visegrádi későcsászárkori erődben a legújabb régészeti kutatások tükrében (The Issue of Early Medieval Continuity at the Late Imperial Period Fort in Visegrád in Light of the Most Recent Archaeological Investigations). *Hungarian Archaeology Online Magazine* (spring 2014). Summary of the results from the excavations performed in 2013-2015: Buzás, Gergely – Boruzs, Katalin – Merva, Szabina – Tolnai, Katalin: Régészeti kutatások a visegrádi Sibrik-dombon (Archaeological Research at Sibrik-domb in Visegrád). *Communicationes Archaeologicae Hungariae* 2017. In press. On the research performed in 2017: Boruzs, Katalin – Merva, Szabina – Szabó, Balázs Sándor: Előzetes jelentés a Visegrád, Sibrik-dombon 2017-ben végzett tervésatásról (Preliminary Report on the Planned Excavation Performed at Visegrád, Sibrik-domb in 2017). In: *Archaeologia – Altum Castrum Online* (2018).

walls of the 4th century Roman fort known as Pone Navate. This group in part (re)used the stone buildings (constructed in the Roman period?) and in part erected wood framed buildings and a palisade enclosing these in the interior of the fort. The periodization was based on radiocarbon data⁷ and the identification of 8th-9th century household ceramics. The latter makes up 20% of the total ceramic materials alongside the Roman period and Early and Late Árpád period find materials. The remains of the newly settling community indicate an interregional system of relationships. It is telling that at the Várkert-dűlő site, a village-like settlement established at the same time as the center, import graphite ware were discovered that are probably from the Nedvědice region in South Moravia.⁸ At Sibrik-domb in Visegrád, in the eastern border region of the empire, an Early Carolingian type spur primarily known from western Europe dated to the second half of the 8th century to the beginning of the 9th century⁹ and also a Carolingian earring type known from one of the graves in the cemetery around the Szűz Mária Church that was consecrated in 850 and excavated at Zalavár-Vársziget came to light.¹⁰ Besides these, some of the most important finds are the so-called yellow polished luxury ceramics, which are present at the site, although in small numbers, and which are items for display and tableware of the contemporary elite in the Lower Danube region, as well as at the Carolingian sites at the lower course of the Zala River or at the southern Moravian centers.¹¹

At present it has not been clarified what kind of role the Danube Bend region may have played in the history of Carolingian Pannonia. In any case, this site identified at the northeastern tip of the province, its find materials and its characteristic features relate to the larger centers contemporary with it, without losing sight of the fact that Sibrik-domb in Visegrád may have been a local center without an agglomeration. The Sibrik-domb center models in small scale both the Zala Valley sites of the province of Pannonia and the 9th century elite centers that can be found in western Slovakia or southern Moravia. The most recent excavation also reinforces this hypothesis, with consideration of the fact that the community that settled at Sibrik-domb had its “own” metalsmith who worked at the site.

EARLY MEDIEVAL METALSMITH'S FURNACE

In August of 2017 sections were extended aligned with the sections from 1976 in the western part of the fort about 10-15 meters to the east of the keep that had been reconstructed in the Middle Ages (*Fig. 4*). A particularly fortunate find was discovered at the southern edge of section 131, a metalsmith's furnace that was able to be linked with the early medieval horizon. Its significance goes beyond the context of the site, considering that contemporary metalsmith's furnace finds that are discovered preserve little or no information due to their short period of use.

This pear-shaped feature with a flue and open at the top was noticed 50 cm below the current ground level. The dimensions of this nearly intact furnace that had collapsed and had strong firing marks from use

⁷ The 2 sigma data of the three samples are rather uniform: cal AD 660 – cal AD 860 (section 2013/I./feature 5, sample code: DeA-3319), cal AD 660 – cal AD 770 (section 2013/I./feature 4, sample code: DeA-3320), cal AD 660 – cal AD 860 (section 2013/II./feature 1, sample code: DeA-3486). Dr. Mihály Molnár (Hungarian Academy of Sciences, Atomki – Isotoptech Zrt., Debrecen) coordinated the examination.

⁸ Dr. György Szakmány (Eötvös Loránd University, Faculty of Science, Department of Petrology and Geochemistry) performed the examination.

⁹ Kind, Thomas: Westliche Einflüsse auf der östlichen Balkanhalbinsel im Spiegel der früh- und hochmittelalterlichen Reitausrüstung. In: *Post-Roman Towns, Trade and Settlement in Europe and Byzantium: Heirs of the Roman West (Millennium Studien/Millennium Studies)*, vol. 1, ed. Henning, J. (Berlin – New York: Walter de Gruyter, 2007), 543-612. 554, 549., Karte 1., 556. Abb. 3: 5. As a part of the ‘Tassilo Chalice style horizon’, second half of the 8th century-beginning of the 9th century.

¹⁰ Szőke, Béla Miklós: A Karoling kor (The Carolingian Period). In: *Magyar régészet az ezredfordulón (Hungarian Archeology at the Turn of the Millennium)*. Head Editor: Visy, Zsolt. (Budapest, 2003), 312-317. 313, fig. 58. The archetype of the earring may be the find from grave 177 at the Pilismarót-Basaharc site: Fettich, Nándor: *Das awarenzeitliche Gräberfeld von Pilismarót-Basaharc*. Studia Archeologica III. (Budapest, 1965), 59, or the finds from the Zala Valley from essentially the same time, such as grave 20 at Söjtör (Szőke, Béla Miklós: Die Beziehungen zwischen dem oberen Donautal und Westungarn in der ersten Hälfte des 9. Jahrhunderts (Frauentrachtzubehör und Schmuck). in: F. Daim (hrsg.): *Awarenforschungen II.* (Wien 1992), 841-968. 962, Taf. 38), where the upper chronological ceiling is the first third of the 9th century (Szőke 1992, 886, Abb. 1.).

¹¹ Herold, Hajnalka: The Ceramic ‘Tableware’ of the Carolingian Period in Zalavár, South West Hungary. *Antaeus* 31-32. (2010) 155-172.

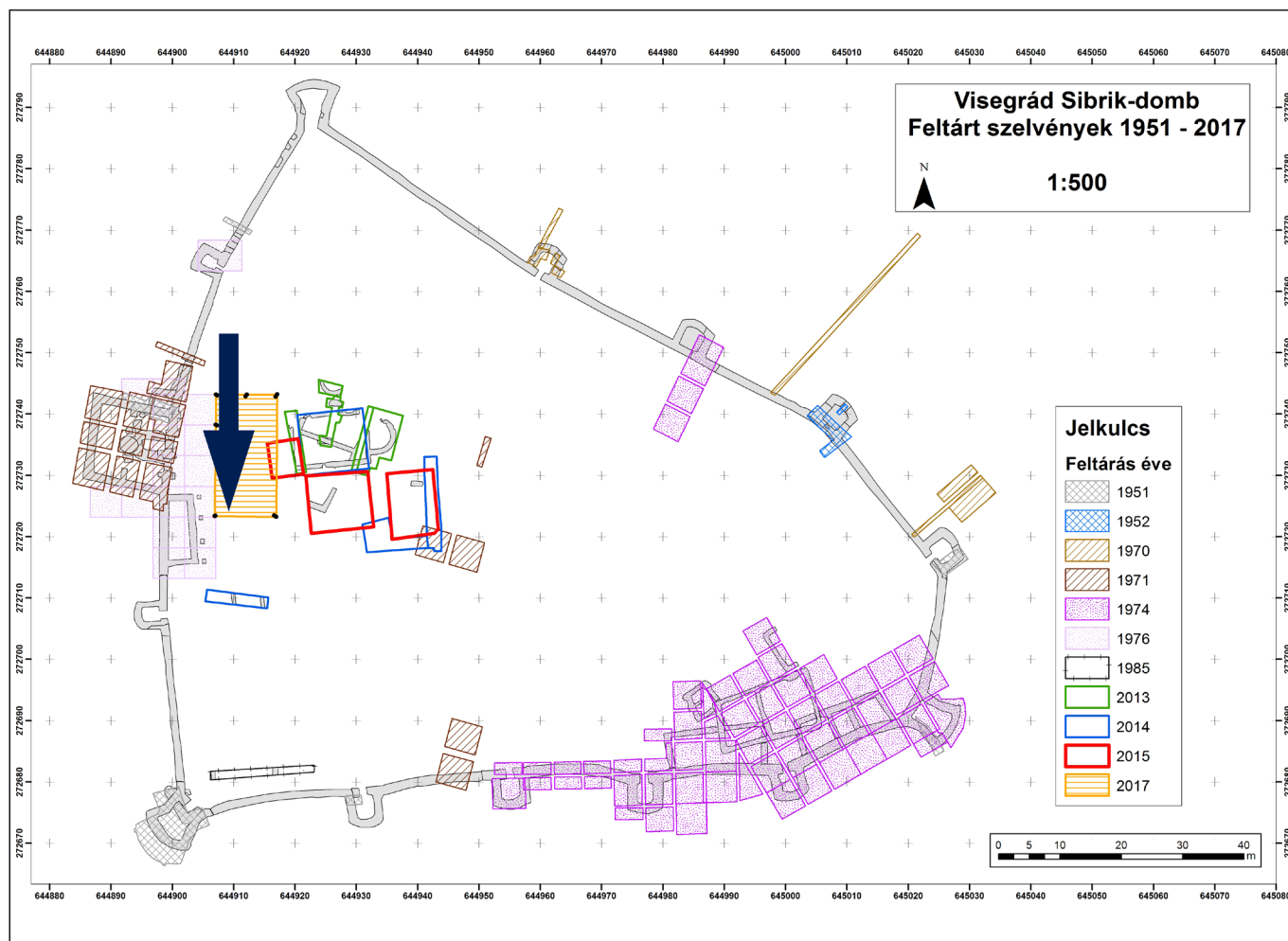


Fig. 4: The excavated sections at the site (Prepared by: Katalin Tolnai). The location of the feature is indicated by an arrow.

were as follows: length, 70 cm; greatest width, 54 cm; internal height, 20 cm; and the internal height of the surviving 28 cm diameter flue section, 26 cm. The mouth of the furnace is found at the eastern end of the feature, above which it was possible to observe a shallow work pit (5-15 cm deep, 92x70 cm) (Figs. 5-6). Numerous crucibles or their fragments, raw material waste, small Roman-period objects to be melted down (a perforated coin,¹² a gilded bronze stud and needles), burnt rocks, fired clay objects (clay rectangular cuboids and a cube) and bones (animal bones as well as fish bones in a particularly large proportion) were discovered in the infill of the feature.¹³

The fortunate circumstance that provides the probable dating of this rare find is that the infill of the feature is primary, the find materials are not mixed.¹⁴ The majority of the ceramic fragments suitable for dating had strong marks of secondary firing due to the heat of the furnace, so their surfaces had vitrified or had become stained from the ceramic slag of other objects (Figs. 10-12). This observation was given particular emphasis because these objects can be directly linked to the use of the furnace, and thus are contemporary with it. It does occur that the vessel fragments found in the infill of the furnace or in the work pit can

¹² The discernible figure on the obverse may have been a depiction of Principi Iuventutis. Cf.: Plant, Richard J.: *Roman Base Metal Coins. A Price Guide.* (2009), 5, fig. 26.; 61, 324 tpq. I give thanks to Friderika Horváth for aiding me in the identification.

¹³ I give thanks to Erzsébet Vassné Angyal, to our volunteer for helping the work with finding a crucible belonging to the feature from the humus layer.

¹⁴ Of the 60 pieces of ceramics fragments that can be linked to the feature, 15 pieces of Roman-period wares turned on a fast wheel (with no secondary firing marks and not linked to the period of use) were discovered, which presumably landed up in it during the construction of this furnace that was dug in the interior area of the Roman fort, and one Roman-period find from the plastering of the furnace's vault.



Fig. 5: The metalsmith's furnace (section 131/feature 79). 1. Photograph of the feature's stain. 2-3. During excavation

be interpreted as reutilized domestic waste (broken household ceramics) in connection with this furnace used to melt non-ferrous metals. In consideration of the slow change in the forms or decoration of early medieval pottery and the periodization of the site, the feature cannot be dated more precisely than the period of the second half of the 8th century – the 9th century.

THE OPERATION OF THE FURNACE AND THE INTERPRETATION OF THE FINDS¹⁵

Proceeding from similar excavated furnaces as well as deducing from the small amount of copper (alloy) and gold raw material waste found¹⁶ and the small volume of the crucibles (max. 4-5 cl), non-ferrous metals were probably melted in the furnace (Fig. 8).

Six crucibles that were intact or could be reconstructed, as well as numerous fragments of these objects, were discovered in the feature (Figs. 14-15). The Roman objects utilized in a secondary manner or intended for melting¹⁷ and the thin, coarsely cut metal plates were without doubt raw material waste (Fig. 13). The fish bones – in part found in the crucibles – as well as the other animal bones were used to purify the metals due to their phosphorus content (Fig. 14, items 4-5). In the explanation of the other finds, an unrivalled work of medieval technical literature, the book entitled



Fig. 6: The excavated metalsmith's furnace and associated work pit

¹⁵ At this time, I would like to thank Dávid Schwarcz, Gergely Szenthe and Csaba Bíró for their useful advice. I give thanks to Péter Langó for the assistance he provided in the collection of the literature. I would like to thank Viktor Szinyei for editing the figs.

¹⁶ A precise determination of their metallic composition has not yet been performed.

¹⁷ In the case of items 4 and 5 in figure 13, the identification is not clear; item 4 may have been a Roman-period cosmetic implement or a simple wire, and item 5 can be identified as either a Roman-period medical implement or a tool used for soldering.

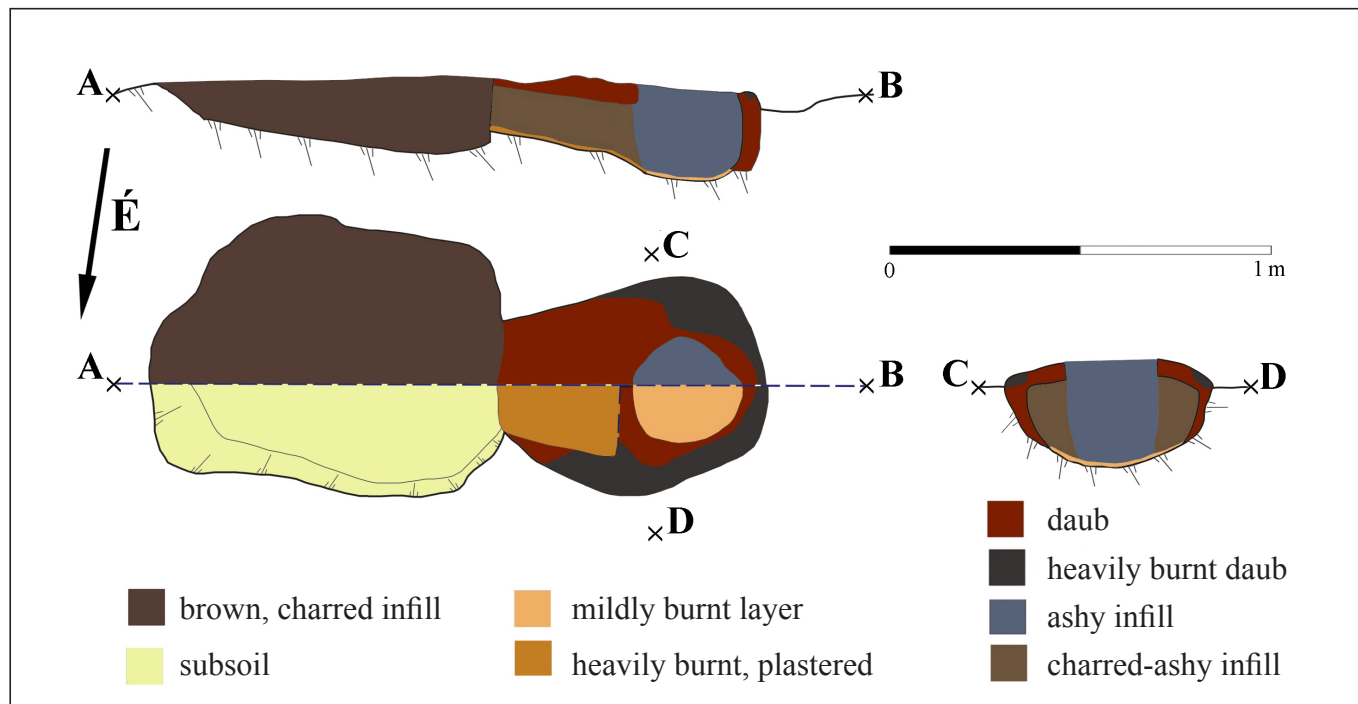
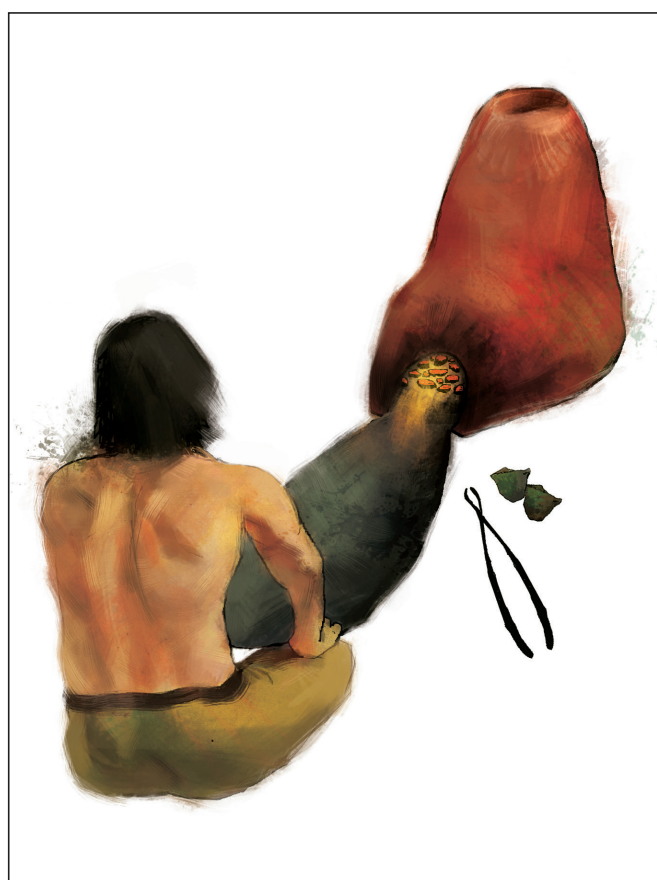


Fig. 7: The surface and cross-section drawings of the feature

Schedula diversarum atrium by the 12th century monk Theophilus Presbyter provided indispensable assistance.¹⁸ The text preserved in the medieval manuscript summarizes the methods for various craft trades, and thus presents numerous craft techniques of metalworking as well:

“When all of these things are on hand, take white clay and grind it very fine, then old vessels in which gold and silver had been melted previously and break them apart one at a time. If you do not have these, take broken pieces of white pottery and place them in a coal fire until they glow white, and when they no longer crack, let them cool and grind them one at a time. Then take two parts ground clay and one part fired potsherd and mix them together with warm water, grind it thoroughly and from this make the larger and smaller vessels in which you will melt gold and silver.”¹⁹

One possible interpretation of the fired clay cuboids is that they served as the raw material for the casting molds (Fig. 9, items 1 and 4). The source quoted also serves as a possible explanation for the presence of ceramic objects (clay forms and broken cooking vessels) in the metalsmith's furnace; the ceramic fragments may



The metalsmith's furnace in use. Reconstruction according to the discovered feature

¹⁸ In Hungarian translation: Theophilus Presbyter, *A különféle művességekről (On Various Arts)*. With an introduction and annotations by Vilmos Takács. (Budapest, 1986.)

¹⁹ Theophilus 1986, 87. Excerpt from chapter XXII (Crucibles for melting gold and silver).



Fig. 9: Find materials discovered in the furnace or in the work pit. 1-2, 4: Scorched clay objects. 3, 5: Burnt stones

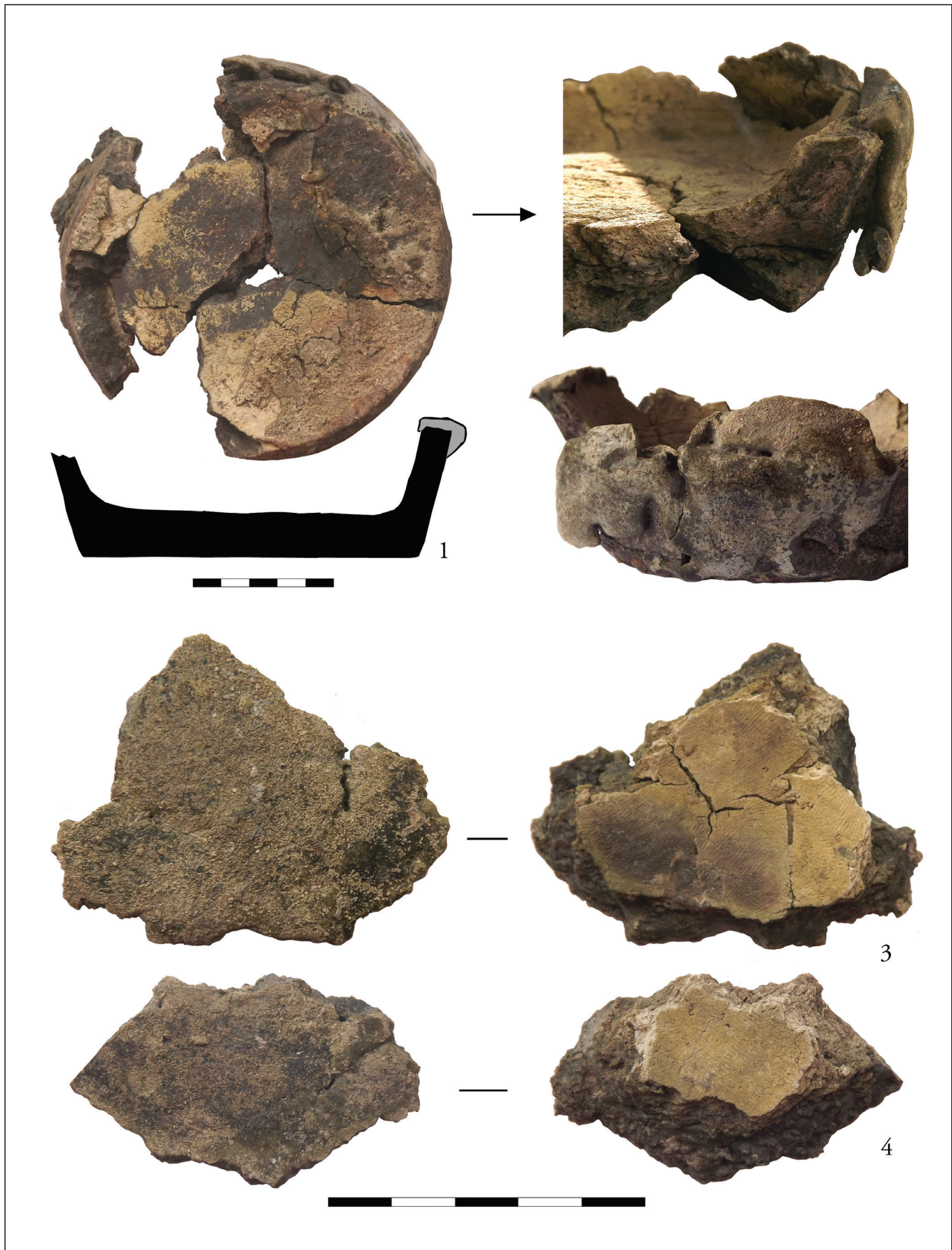


Fig. 10: Fragments from the work pit of the furnace belonging to a vessel subjected to heavy secondary firing with vitrification on the exterior side



Fig. 11: Household pottery fragments from the work pit of the furnace that were subjected to heavy secondary firing during the use of the furnace and have vitrified

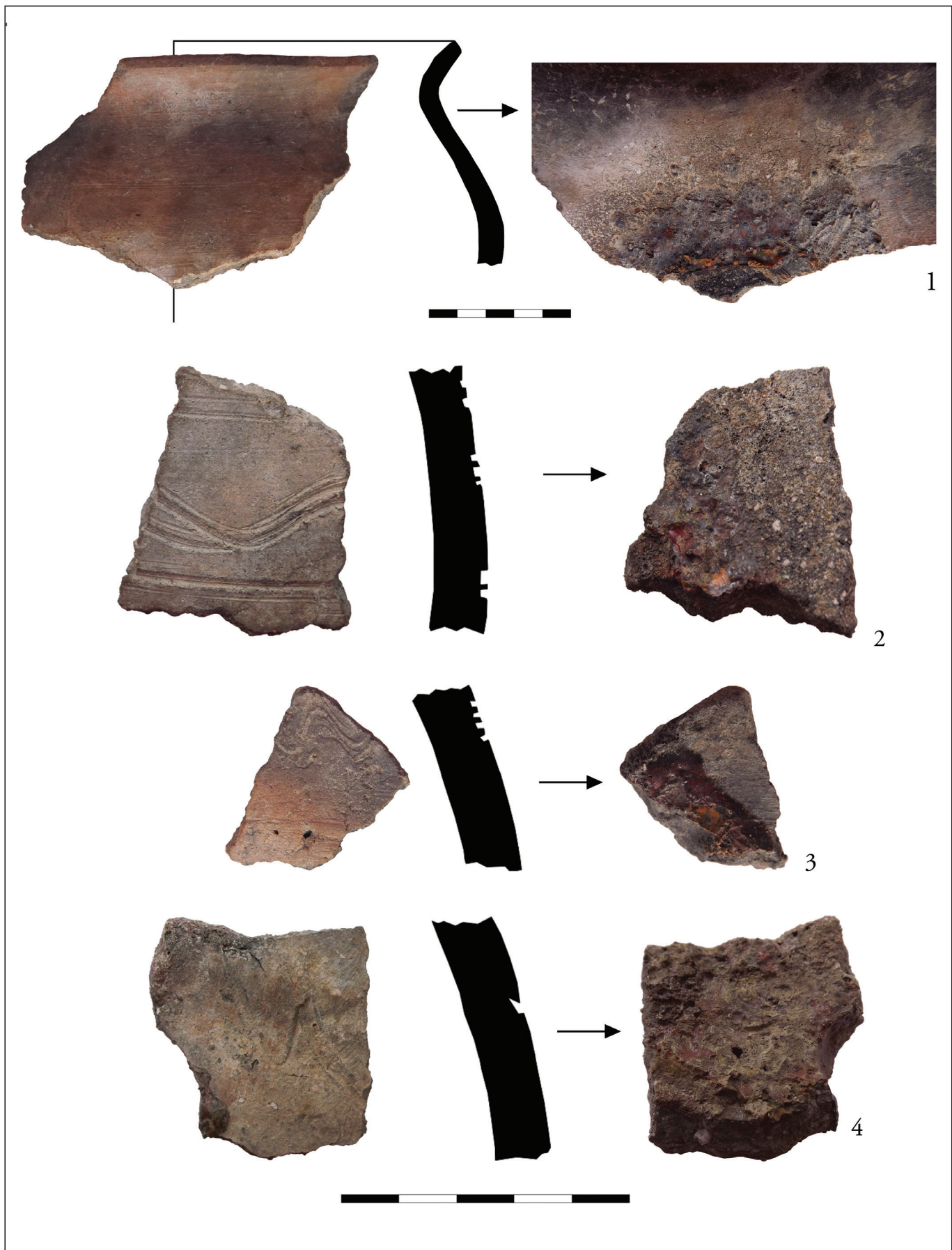


Fig. 12: Household pottery fragments from the work pit of the furnace (1-3) or the infill of the furnace (4) that were subjected to heavy secondary firing during the use of the furnace and have vitrified



Fig. 13: Finds from the infill of the furnace's work pit. 1-2, 5-6: Roman-period metal objects intended to be melted down. 1. Stud. 2. Perforated Roman-period coin. 5-6. Roman-period styluses. 3. Raw material waste. 4. Vitrified ceramic fragments from the flue of the furnace

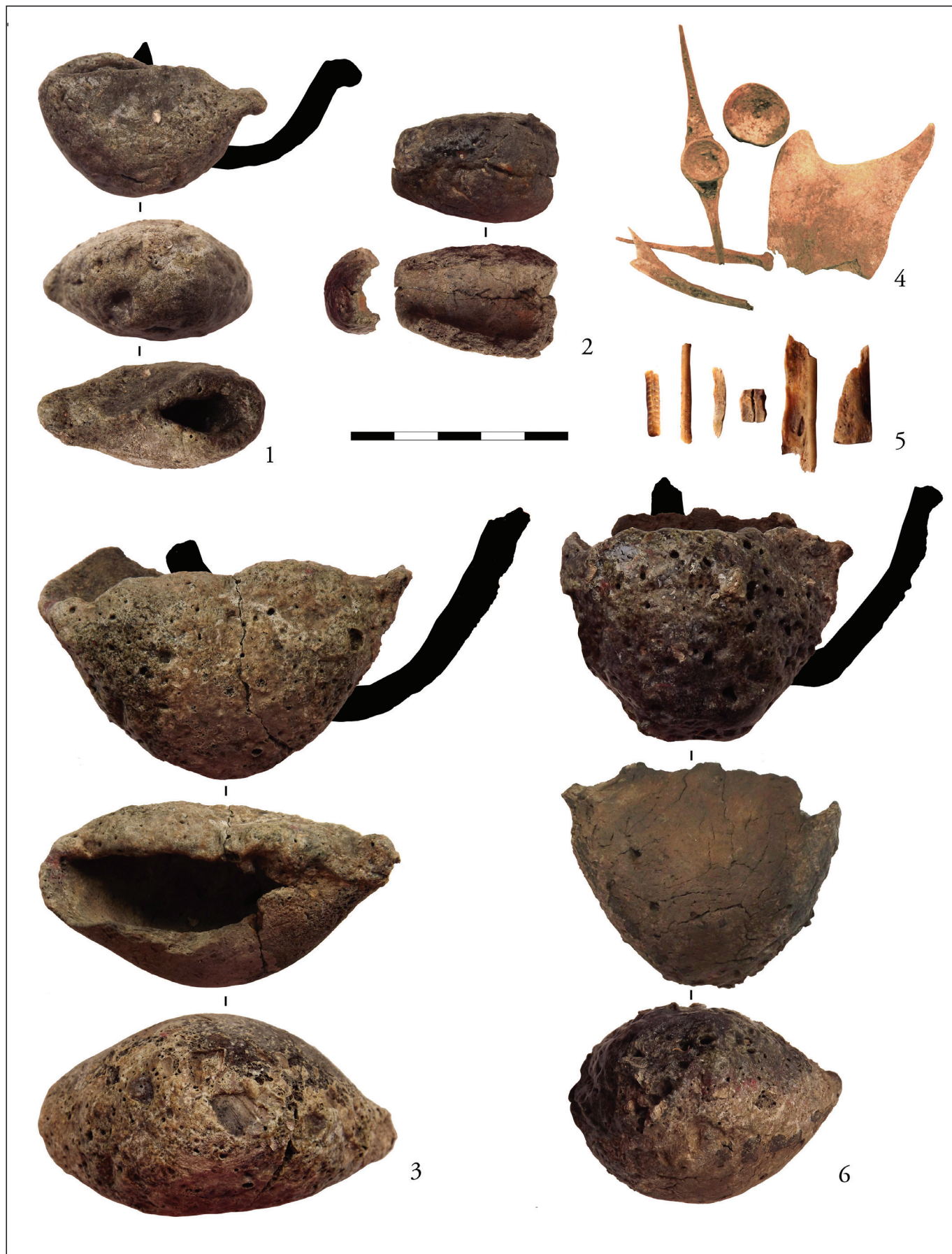


Fig. 14: Finds from the infill of the furnace's work pit. 1-3: Crucibles. 4: Fish bones. 5-6: Crucibles and the fish bones found in it (scattered)

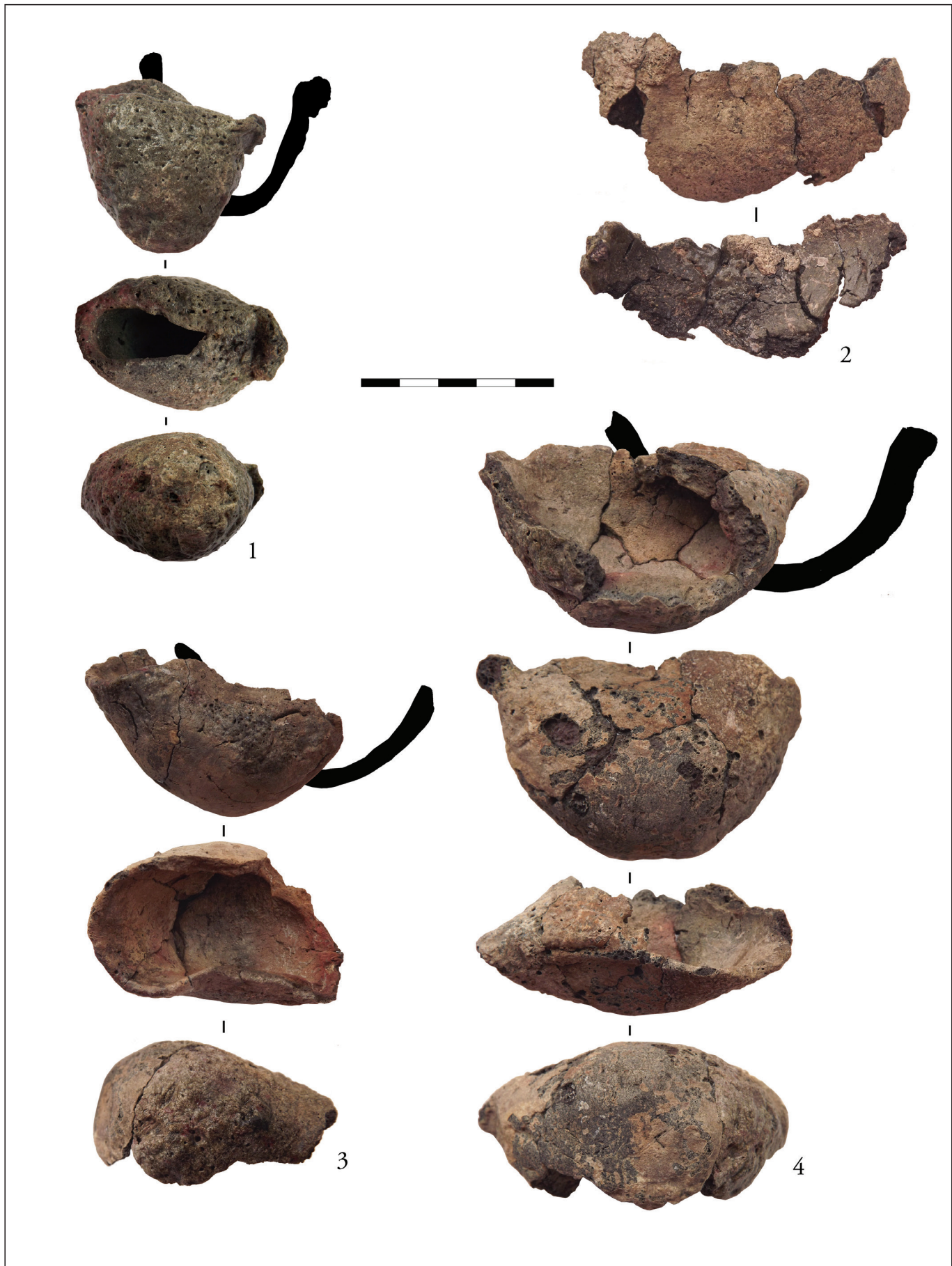


Fig. 15: Crucibles (fragments) 1: From the infill of the furnace. 2-4: From the infill of the flue of the furnace

have been placed in the fire on purpose so that after this they could grind the fired objects and use this as a raw material for the crucibles.²⁰ At the same time it is worthwhile to consider the following description as well:

“...After this put together a furnace from stone and clay, two feet in height and a foot and a half in width, somewhat wider on the bottom and narrower at the top, with an opening in the middle from which protrude three long, hard stones that can withstand the flames for a long time. Upon these, place the vessels filled with gold and cover them with other potsherds.”²¹

This passage contains a brief description of the design of medieval foundry furnaces. In addition to this it aids in understanding the role of the burnt stones found (*Fig. 9, items 3 and 5*) and the larger clay cube (*Fig. 9, item 2*) in the feature at Visegrád as pieces of the furnace; these are what the crucibles were placed upon or aided in supporting them. The excerpt quoted also contains further important information. The ceramic fragments found may not have only served as raw materials for the crucibles, it cannot be ruled out that they were (also) used to cover the crucible during melting. The potsherds with strong marks of secondary firing shown in *figure 10* can also be interpreted in this manner (side and base fragments), whose exterior sides were heavily burnt and vitrified from the powerful flames.

Finally, it is worthwhile to mention in connection with the capacity of the furnace, that in a single crucibles 4 cl, or 357 grams, of copper could be melted, which would have been sufficient for the production of 90 pairs of earrings that were 4 grams per pair.²²

OUTLOOK

The metalsmith's furnace, beyond the fact that it is also outstandingly rare from the perspective of the history of early medieval technology, is also considered a fortunate find that definitively indicates the role of the Sibrik-domb as a central location. Finds or, in fortunate cases, features indicating metalsmithing and craftsmen's colonies in fortified centers or at sites related to centers have been excavated previously, but in the village-like settlements of the Carpathian Basin in the 8th-9th century that have been researched in ever increasing numbers, no metalsmith's furnaces had yet been known. In the area of Carolingian province of Pannonia a find group that could be linked to metalsmithing has been excavated at Zalavár-Vársziget previously, from which a dozen or so crucibles that can be classified in this type and casting mold finds can be mentioned.²³ From the neighboring region, a crucibles was found during the castle excavations at Nitra.²⁴ Contemporary analogies from further away can be mentioned from the Lower Danube region, in the Preslav district,²⁵ and from the 9th century centers in southern Moravia from Vyšehrad in Prague,²⁶ but early medieval

²⁰ While the melting point of gold is 1064 °C and that of silver is 961.8 °C, clay melts at between 1150 and 1800 °C, the thinner the clay, the lower the temperature. In connection with the latter see: Grofcsik, János: A kerámia (Ceramics). <https://www.kfki.hu/~cheminfo/hun/eloado/kemia/keramia.html>

²¹ Theophilus 1986, 95. Excerpt from chapter XXXIII. (Heating the gold).

²² For the calculation, see: <http://www.thecalculatorsite.com/conversions/substances/metal.php>

²³ The 9th century, so-called 'bundle-shaped' ceramic crucibles ('Beutelförmige' Keramiktiegel) from Zalavár: Szőke, Béla Miklós: *A Karoling-kor a Kárpát-medencében (The Carolingian Period in the Carpathian Basin)*. (Budapest, 2014), 85, 66. kép, 86.

²⁴ Bednár, Peter: Nitriansky Hrad v 9. storočí. Die Nitraer Burg im 9. Jahrhundert. In: *Bojná. Hospodárske a politické centrum Nitrianskeho kniežatstva. Wirtschaftliches und politisches Zentrum nitraer Fürstentums*. (Nitra: AÚ SAV – Ponitrianske múzeum, 2006, 205-215.), 208, Obr. 6., 214.

²⁵ Metalsmith's workshops that can be dated to the first half of the 10th century, the sites of Novosel and Zlatar. Стела Дончева - Стойчо Бонев, *Старобългарски производствен център за художествен метал при с. Новосел, Шуменско*. Фабер, 2011. casting crucible types: 248-256.; or: Doncheva, Stela: *Metal Art Production in Medieval Bulgaria. Jewelry craftsmanship in Bulgaria at the Middle Ages*. (Saarbrücken, 2012). The same crucible types: Doncheva 2012, 17., Fig. I. 10.

²⁶ At that site, findings can be connected to metallurgy dated back to the 2nd half of the 10th century - 1st half of the 11th century. Varadzin, L. – Zavřel, J., Pozůstatky raně středověké metalurgie stříbra, zlata a dalších neželezných kovů na vyšehradské akropoli – The remains of early medieval metallurgy of silver, gold and other non-ferrous metals at the Vyšehrad Acropolis – Überreste der frühmittelalterlichen Metallurgie von Silber, Gold und anderen Nichteisenmetallen auf der Vyšehrad Acropolis. In: V. Moucha, B. Nechvátal, L. Varadzin et al., *Vyšehrad. Knižecí a královská akropole. Svědectví Archeologie*. [Vyšehrad. The Princely and Royal Acropolis. The Testimony of Archaeology.] (Praha, 2015), 391–419.

metalsmithing activity can also be found in the region between the Elba and the Dnieper rivers,²⁷ at the excavated fortifications in the eastern Slavic regions²⁸ and in Scandinavia as well.²⁹ A general observation is that while in northern, central eastern and southern Europe the so-called 'beutelförmige Tiegel' type is widespread; in the Carolingian Empire crucible types with a round cross-section are characteristic.³⁰

At the Visegrád site located on the eastern edge of the empire, the Late Avar period and Early Carolingian period material culture related to one time period is uniquely mixed, and in the ever more nuanced understanding of the site it is important to compare it with the material culture of the elite from both Pannonian and the Moravian areas.

RECOMMENDED LITERATURE

BUZÁS, GERGELY – BORUZS, KATALIN – MERVA, SZABINA – TOLNAI, KATALIN:

A kora középkori kontinuitás kérdése a visegrádi későcsászárkori erődben a legújabb régészeti kutatások tükrében (The Issue of Early Medieval Continuity at the Late Imperial Period Fort in Visegrád in Light of the Most Recent Archaeological Investigations). *Hungarian Archaeology Online Magazine* (spring 2014).

KLANICA, ZDENĚK:

Práce klenotníků na slovanských hradištích. Studie Archeologického ústavu Československé akademie věd v Brně Ročník II/1974. Sv.6. (with a summary in German)

LAMM, KRISTINA:

Helgö as a goldsmiths' workshop in Migration Period Sweden. In: *Goldsmith Mysteries. Archaeological, pictorial and documentary evidence from the 1st millennium AD in northern Europe*. Edited by Alexandra Pesch and Ruth Blankenfeldt. (Neumünster, 2012), 143-156.

PRESBYTER, THEOPHILUS:

A különféle művességéről (On Various Arts). With an introduction and annotations by Vilmos Takács. (Budapest, 1986.)

²⁷ Polish sites: Rajewski, Zdzisław, Zagadnienie złotnictwa wczesnośredniowiecznego na ziemiach polskich, *Wia-domości Archeologiczne* 20 (1954) 3-20.

²⁸ Plesneck, Kyjev, Novgorod, Stará Ladoga, Novotrojickoje lelöhelyek: Ryndina, N. V. 1963: Technologija proizvodstva novgorodskich juvelirov X.-XV v. *MIA* 117, 200-268. Klanica 1974, 90.

²⁹ As an example, the site of Helgö and its scale is illustrated by the fact that a total of 56,000 crucibles have been discovered in the excavated workshops: Lamm, Kristina: Helgö as a goldsmiths' workshop in Migration Period Sweden. In: *Goldsmith Mysteries. Archaeological, pictorial and documentary evidence from the 1st millennium AD in northern Europe*. Edited by Alexandra Pesch and Ruth Blankenfeldt. (Neumünster, 2012), 143-156.

³⁰ 799 - *Kunst und Kultur der Karolingerzeit. Karl der Große und Papst Leo III. in Paderborn*. Teilband 1: Katalog der Ausstellung. Paderborn, 1999. Handbuch zur Geschichte der Karolingerzeit. Stiegemann, Christoph - Wemhoff, Matthias [Hrsg.]. (Mainz, 1999), 392-407.; Krabath, Stefan - Lammers, Dieter - Rehren, Thilo - Schneider, Jens: Die Herstellung und Verbreitung von Buntmetall im karolingerzeitlichen Westfalen. In: 799 - *Kunst und Kultur der Karolingerzeit. Karl der Große und Papst Leo III. in Paderborn*. Teilband 3. 430-437.