SARMATIAN KILN FROM SZENTES–SCHWEIDEL JÓZSEF STREET SITE

SZARMATA KORI EDÉNYÉGETŐ KEMENCE SZENTES–SCHWEIDEL JÓZSEF UTCA LELŐHELYRŐL •

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Abstract

In the Carpathian Basin, according to our current knowledge, there are only a few sites where traces of Sarmatian pottery production can be found. The clearest and most direct evidence of local pottery production is the presence of pottery kilns, which are relatively rare in the Sarmatian age Barbaricum. In total, there are 28 settlements where pottery firing kilns have been excavated, the vast majority of which were found during excavations before the turn of the millennium. This paper deals with the processing and analysis of a well-documented Sarmatian pottery kiln excavated in Szentes–Schweidel József Street in 2006. Based on the structural design of the kiln, it can be identified as a Celtic-type of pottery kiln which was popular and widespread at the time. By comparing the pottery kiln with its parallels, we can gain an insight into the pottery-making practices of the Sarmatians living in the Southern Great Plain in the 2nd–4th centuries AD.

Kivonat

A Kárpát-medencében jelen ismereteink szerint csekély azon lelőhelyek száma, ahol kimutathatók a szarmata kori edénygyártás nyomai. A helyben folytatott edénykészítés egyértelmű és közvetlen bizonyítékai az edényégető kemencék, melyek viszonylag ritkák a szarmata kori Barbaricumban. Jelenleg összesen 28 olyan telepről tudunk, ahol edényégető kemencét tártak fel, melyek túlnyomó többsége az ezredforduló előtti ásatások során került elő. A tanulmány a Szentes–Schweidel József utcában 2006-ban feltárt jól dokumentált szarmata kori edényégető kemence feldolgozásával és elemzésével foglalkozik. A szentesi kemence szerkezeti felépítése alapján a kelta típusú edényégető kemencével azonosítható, amely a korszakban kedvelt, általánosan elterjedt formának számít. A tárgyalt edényégető kemence és párhuzamainak összehasonlítása által betekintést nyerhetünk a Kr.u. 2–4. században a Dél-Alföldön élt szarmaták edénykészítési szokásaiba.

KEYWORDS: LATE SARMATIAN POTTERY WORKSHOP, POTTERY KILNS, SARMATIAN SETTLEMENT

KULCSSZAVAK: KÉSŐ SZARMATA FAZEKASMŰHELY, EDÉNYÉGETŐ KEMENCÉK, SZARMATA KORI TELEPEK

Introduction

In the Carpathian Basin, ceramics are the most common and abundant finds from Sarmatian settlements of the 4th–5th century AD. Based on the evidence of the archaeological excavations, not all settlements produced ceramics since many conditions are necessary for producing pottery. On the one hand, the co-occurrence of raw materials – easily accessible in nature – is required, i.e., sufficient quality and quantity of clay, water, and wood for firing. On the other hand, it is necessary to have the technological knowledge of pottery making and the kilns for firing the pots.

Despite the fact that the Sarmatian period has been researched for over a century, we do not currently have much information on the pottery of the period and on the pottery kilns, and even less on the commercial network of pottery.

In the northern part of the Great Hungarian Plain, we already know pottery workshops such as Üllő, Csengersima, Beregsurány, Blažice and Aranyosmeggyes, where large quantities of ceramics were produced for commercial purposes. Wheel-thrown gritty grey ware was produced in Üllő (Istvánovits et al. 2011), while wheel-thrown stamped ware

• How to cite this paper: WALTER, D. (2023): Sarmatian kiln from Szentes–Schweidel József Street site, *Archeometriai Műhely* **XX/2** pp. 147–160.
doi: 10.55023/issn.1786-271X.2023-011

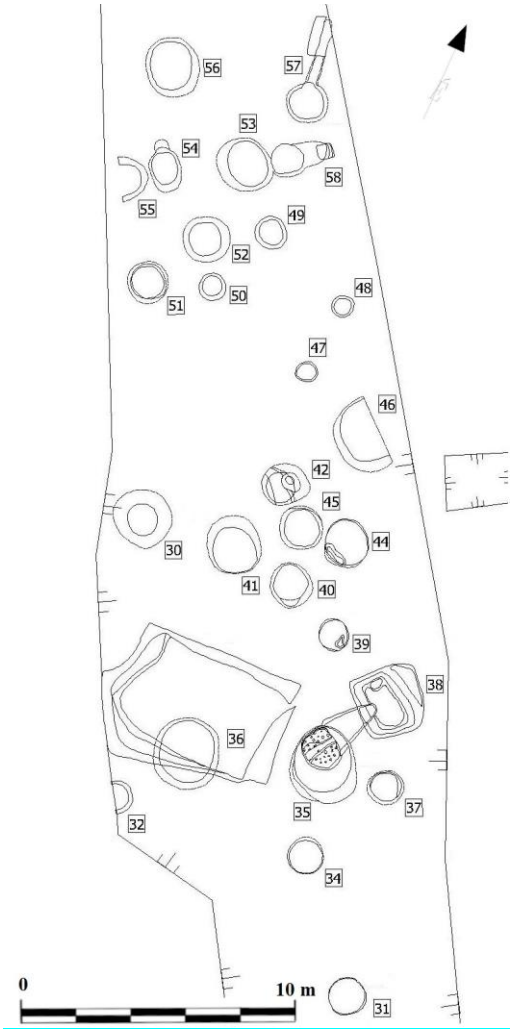

Fig. 1.: Location of the pottery kiln excavated in Szentes–Schweidel Street (feature 35) (KJM Archaeological Repository: 1028–2015)

1. ábra: A Szentes–Schweidel utcában feltárt edényégető kemence (35. obj.) elhelyezkedése (KJM Régészeti Adattár: 1028–2015)

was produced in Csengersima–Petea (Gindele & Istvánovits 2011) and Beregsurány (Csallány 1966). In addition to these important pottery workshops, there were also smaller workshops serving local needs, such as those with one or two pottery kilns in the Southern Great Plain. The aim of this study is to report and analyse a Sarmatian pottery kiln found in Szentes–Schweidel József Street and to explore and compare pottery workshops in the Southern Great Plain region.

Location and excavation of the site

The site is located on Schweidel József Street in Szentes, which is situated in the southern part of the town (called Berekhát). The dominant geographic

Fig. 2.: Photo of the pottery kiln from the view of the firing chamber

2. ábra: Az edényégető kemence tüzelőcsatorna felőli fotója

features of the area are the rivers Tisza and Kurca, as well as the former Kontra Lake (Vörös & Szabó 2019, 13).

Based on a decision of the local government of Szentes, the area was asphalted in 2006 to provide a better connection for the large traffic between Schweidel József Street and Szegvári Road. The archaeologists of the Koszta József Museum, led by János József Szabó and Ádám Bede, carried out a preventive archaeological excavation along the route of the future asphalt road. The excavation was conducted in one large phase between 15 September and 31 October 2006, during which an area of 2168 m^2 was excavated.

The archaeological features all date back to the Sarmatian period, and a fire trench from the Second World War was also found. A total of 63 features were excavated, 4 graves, including 1 house, 1 pottery kiln, 4 work-pits, 3 trenches, 1 hearth, 1 shaft furnace, 1 partially built kiln initiative, and 47 pits in various sizes. Most of the archaeological finds were quite close to the current surface, as close as 20–30 cm. Since the area of the track was part of a cart track that already existed in the 19th century, this area had not been ploughed or deep ploughed for a long time. Two circular ditched graves, a grave-pit, and an infant burial were excavated at the site. The female and the male circular ditched graves have been published recently (Vörös & Szabó 2019). Based on their inventory, the graves can be dated to the beginning of the 2nd century AD (Vörös & Szabó 2019, 20). The kiln's finds can be dated to a later period, to the 3rd century AD. The outstanding find of the excavated part of the settlements is the pottery kiln, which is investigated in this paper (**Fig. 1-2.**).

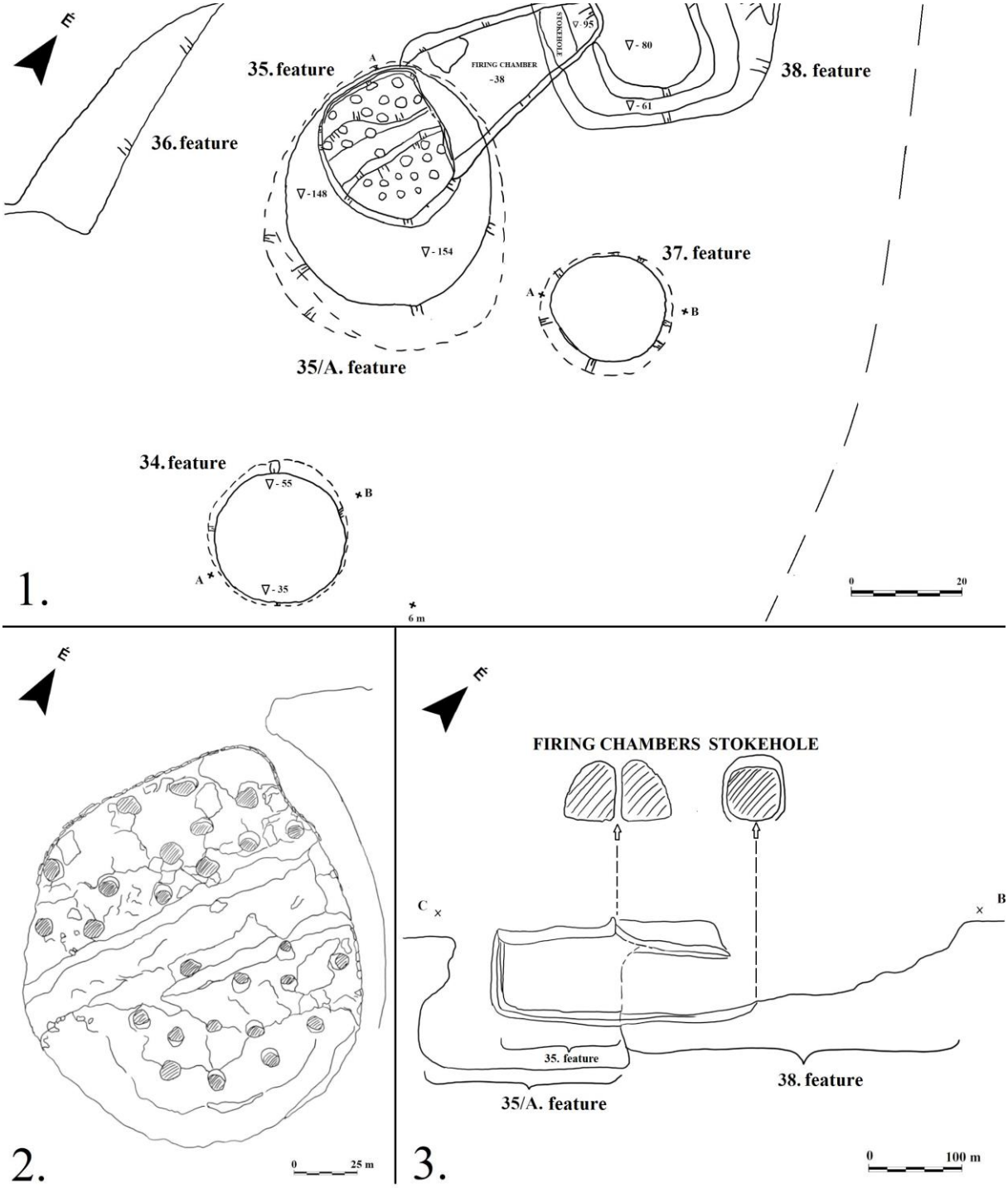

Fig. 3.: Drawings of the pottery kiln 1: location 2: ground plan and 3: profile
3. ábra: Az edényégető kemence 1: helyszín- 2: alap- és 3: hosszmetszet rajzai

Fig. 4.: Cross-section photo of the stokehole of the pottery kiln

4. ábra: Az edényégető kemence fűtőjáratának keresztmetszet fotója

Fig. 5.: Photo of the pottery kiln

5. ábra: Az edényégető kemence fotója

Fig. 6.: Photo of the raised floor of the pottery kiln

6. ábra: Az edényégető kemence rostélyának fotója

Fig. 7.: "Smoke tunnels" on the kiln's raised floor

7. ábra: „Füstjáratok" a kemence rostélyán

The structure of the kiln

The pottery kiln was found in the northern part of the site, built in a former beehive-shaped pit (feature 35/A), which was accompanied by a work-pit for firing (feature 38) (**Fig. 3.1**). The kiln was oriented from northeast to the southwest, with an overall length of 295 cm, of which the furnace section was 130 cm and the firebox was 165 cm. The maximum height of the external parts of the kiln is 110–112 cm, and the walls are 4–12 cm thick (**Fig. 1.**). Three burnt layers could be distinguished: the inner one is very hard, greyish-silvery in colour, the middle one is black and hard, and the outer one is more powdery and brick red. Most of our knowledge is about the lower part of the kiln's hearth, as the arch has not been preserved, and only traces of the base of the ascending wall, 5–8 cm high, are visible.

The kiln was a sunken up-draught kiln with two firing chambers and a perforated floor. The kiln is divided into two sections, with a central rib dividing the fire chambers to SE and NW sections (**Fig.4.**). The length of the fireboxes is 125–130 cm, and their combined width is 124–144 cm (narrowing upwards), and separately 50–54–61–62 cm, plus the rib. The filling layers of the SE firebox are light grey humus, dark grey humus, and yellowish grey humus; while the NW firebox's layers are filled with light grey humus, yellowish humus, dark grey humus, yellowish humus and yellowish-grey humus. The lower part of the firebox is burnt out in two layers, the upper one is harder and greyish, and the lower one is reddish-yellowish and powdery, with a total thickness of 1–2 cm (6–8 cm in some places). The stokehole is arched, semicircular, it has a width of 54–56 cm and a height of 64 cm, symmetrically divided in the centre (**Fig. 3.**), the length of the rib is the same as the length of the firing chamber, the direction of the rib is the same as the direction of the kiln and the firing chamber (NE–SW), its thickness varies between 14 and 20 cm. The surface facing the firing chambers has a hard-burnt, ca. 1 cm thick layer,

HU ISSN 1786-271X; urn: nbn: hu-4106

which is silverish-greyish in colour; its interior is lighter grey with a reddish tone, and the texture is much softer and more porous. The thickness of the rib continuously decreases outwards and towards the stokehole, while ending up almost pointy.

The shape of the firing chamber is rounded, square in cross-section, tapering continuously towards the stokehole. It is 165 cm long and 132 cm to 60 cm wide. Its height is between 100 cm and 70 cm. The stokehole is squared with a rounded corner, 60 cm wide and 60 cm high. The wall is av. 4–5 cm, sometimes 8–10 cm thick, with two layers: the inner one is reddish and harder, and the outer one is yellowish-brownish, and porous. The inner surface of the wall was filled with greyish burnt clay, with burnt traces of patching and smoothing. The bottom was only 1–2 cm thick, burnt through, and had a reddish-yellowish colour. The stokehole of the fire chamber opens into the area of the work-pit (object 38, **Fig. 5**). In practice, this is where the firing happened, with only hot air flowing into the "firing chamber".

Due to the lack of deep ploughing, the perforated raised floor (once used to hold the pots for firing) was found 25 cm from the cut surface (**Fig. 3.2.**). The thickness of the raised floor is min. 15 cm, max. 24–30 cm (the latter includes the upper wall of the pottery pit). The material is hard-burnt, and grey in colour, the interior is similar to the inside of the rib. The bottom has been patched with reed plaits and plant fibres, which have left negative burnt imprints (**Fig. 6.**). The latter was created by placing the reed plaits on the support, applying the patch, and then the lower support, made of organic materials, was burnt when the raised floor was first burnt out. There were 13–13 holes above both the SE and NW fire chambers (**Fig. 6**). The diameter of each hole is 7–8 cm and their length (depth) is max. 15 cm. The outer, superficial surface of the raised floor was plastered in 2–3 layers, as in the ascending wall, with grey-fired clay.

The so-called 'Celtic-type' kilns

The Szentes–Schweidel pottery kiln is one of the so-called Celtic-type pottery kilns, which are vertical, sunken up-draught kilns with one or two firing chambers and a raised floor. This type of kiln was introduced by the Celts, and almost all the kilns fit the aforementioned description. The structure of the Celtic-type kilns was first described by Fasshauser in 1959 (Fasshauser 1959, 246). Celtic-type kilns basically consist of two parts, a firing chamber (at the bottom) and an upper chamber (oven), separated by a raised floor with flues. In the firing chamber, we can find the support for the raised floor, which held the raised floor on which the pots were placed for firing. The vertical and sunken up-draught attributes refer to the air movement in the kiln. The heat (and the combustion products) from the fire, which was placed close to the stokehole, was moved upwards to the oven by the airflow and through the flues in the raised floor. The upper chamber was partially buried underground, while the other part of the kiln was part of the vault above the ground (Szöllősi 2008, 346). Researching the structure of pottery kilns is difficult since no completely intact kilns are known, as the above-ground vault usually deteriorates or collapses over time.

Compared to pit firing and open-fire firing, the biggest advantage of Celtic-type kilns is that they protect the pots much better from external environmental influences, from the sudden draughts that can damage or even destroy the vessels during firing. The operation of vertical, up-draught kilns is based on the airflow from the bottom to the top; hence the orientation of the stokehole is very important (Szöllősi 2008, 346-347). In the Carpathian Basin, the wind blows mainly from the southeast, however, the orientation of kilns is more varied. There are known kilns oriented to the east (Tiszavasvári–Városföldje, Jegyző-tag; Istvánovits 1999, 175-176), to the west (Vršac/Versec-Crvenka; Rašajski 1957, 47) and to the north (Sándorfalva–Eperjes; Vörös 1982, 36) too. At this point, no correlation can be shown between the prevailing wind conditions in the Carpathian Basin and the orientation of Sarmatian pottery kilns. Presumably, the kilns were built according to the local conditions in a micro-region, considering the prevailing wind direction, and the work-pits (Benedek-Bene & Benedek 2015, 213). The work-pits were built depending on where they wanted to place the stokehole. A lot of energy was required to heat up the kilns, so efficiency and sustainability were key factors in their design. To reduce energy loss, the kilns were sunk into the ground thus ensuring good thermal insulation (Szöllősi 2018, 347-348). The kilns were often protected by windbreaks to provide heat control and weather protection.

Celtic-type kilns in non-Celtic context can be traced back to the late La Tène period and they spread with the Romanization in the Carpathian Basin (Henning 1977, 194). They can be found in Roman, Sarmatian, Germanic, Avar and Árpádian Age settlements. Their significance is that they formed the basis of the technological development that led through the Roman and Migration periods to the Middle and Early Modern Ages, and some of their elements can still be found in folk pottery today, their original operating principle has remained unchanged over time (Szöllősi 2008, 326).

The pottery kiln of the Sopron–Krautacker site is incredibly unique, as currently it is the first and the only Celtic-type kiln in Hungary on which archaeometric investigations have been carried out (Kardos et al. 1985; Zeiler 2011). The kiln dates to

the La Tène period and was excavated in the 1980s. X-ray diffraction (XRD), X-ray fluorescence (XRF) spectrometry, differential thermal analysis (DTA), thermogravimetry (TG), and differential thermogravimetry (DTG) were used to analyse the kiln (Kardos et al. 1985 83-84). This research aimed to identify the commercial relationships of the pottery workshop in Sopron and the site's general archaeological and environmental reconstruction (Szöllősi 2008, 328). Similar scientific studies would be particularly reasonable for Sarmatian pottery kilns. The archaeometric analysis of the kilns would provide information on the pottery production process, the composition of raw materials, the firing technique, and the firing temperature could be analysed.

Process and parallels for the building of a pottery kiln at Szentes-Schweidel József Street

The construction of the pottery kilns followed a strict sequential order (Szöllősi 2008, 350). The structure of the kiln excavated in Szentes–Schweidel József Street is mainly identical to that of the pottery kilns of the period. The best parallels can be drawn with the sites Sándorfalva–Eperjes (Vörös 1982, 28), Makó–Dáliugar M43 site 40 (Sóskuti 2016, 77–78), Makó–Dáliugar M43 site 38 (Benedek-Bene & Benedek 2015, 209), Gyula–Kálvária-dűlő 4 (Implom 1935, 234) and Grădinari–Selište (Bozu 1990, 149–151). The first step in building the Sarmatian pottery kiln was to mark and create a work-pit for the kiln. The interesting thing about the kiln at Szentes is that a 120 cm diameter beehive-shaped pit, dug earlier, was used for this purpose. This means that, according to the documentation, the kiln was built in a beehive-shaped pit that had been previously filled in (**Fig.1.**). The geographically closest parallel is known from Doboz–Hajdúirtás, where a similar kiln was dug into a re-used object; more precisely, the kiln was built into the side of a house (Kovalovszki 1989, 127).

In the case of the Szentes kiln, after the construction of the work-pit, the firing chamber was dug leaving a rib to support the raised floor. The rib divided the firing chamber into two parts and cut the stokehole in two. The firing chamber, together with the work-pit, was built underground (**Fig. 5.**). The bottom, the sides, and the supporting wall of the raised floor were patched and fired before use to ensure the durability of the kiln structure. This was a common practice in the construction of pottery kilns (Implom 1935, 235). The firing chamber was built parallel to the upper chamber (oven), a part of which was below the ground level. We have no data on the exact size of the oven of the Szentes kiln; we know only the size of the bottom of the oven, which was 120 cm in diameter, round, and traces (5–8 cm in size) of the base of the ascending wall connected to the oven can be observed.

Following the construction of the oven, the raised floor was built (**Fig. 6.**) and was glued to a formwork of planks and/or branches, which was placed on the rib and the edge of the upper chamber. As a next step, by burning the wooden supports in the initial firing, the kiln was consolidated and the raised floor took its final shape and position (Szöllősi 2008, 351). When the pottery kiln was built in Szentes, cca. 15–30 cm thick raised floor was formed. Traces of reed braids can be noticed at the bottom of the raised floor (**Fig. 7.**), which probably came from the former supporting structure. When the kiln was built, thicker branches were laid on the central supporting rib, and then reed bundles were laid across them. The same branch traces can be observed on the underside of the raised floor of the pottery kilns excavated during the construction of the M43 motorway, Makó–Dáliugar M43 site 40 (Sóskuti 2016, 77–78) and Makó–Dáliugar M43 site 38 kiln No. 363 (Benedek-Bene & Benedek 2015, 210).

Holes were made on the raised floor to circulate hot air in the oven. It is probable that these holes made with 7–8 cm diameter branches that supported the raised floor, and they were burnt during the kiln's first firing, and thus the holes of almost the same diameter were formed (**Figs. 6–7.**). Unusually, a total of 26 holes were formed in the raised floor; each was circular and had a maximum length of 15 cm. The holes were distributed almost evenly across the raised floor, which is typical in Sarmatian pottery kilns. Similar hole distributions have been documented on the raised floors of Vršac/Versec–Crvenka (Rašajski 1957, 47, Plan Nr. III) and Makó–Dáliugar M43 site 38 kiln No. 363 (Benedek-Bene & Benedek 2015, 212). Pottery kilns in the Southern Great Plain usually have 10–15 holes compared to the raised floor of the Szentes pottery kiln, which has a strikingly large number of holes. The same number of holes was found on the raised floor of the Grădinari–Selište kiln No. 1 (Bozu 1990, 11; Fig. 4/1). The concentric layout of the holes along the kiln wall, and their roughly uniform spacing, is common, as exemplified by the pottery kilns of the Late Sarmatian sites of Makó–Járandószél M43 site 39 (Haraszti 2017, 145) and Sándorfalva–Eperjes (Vörös 1987, 88).

The next step was to build the stokehole and finalize the fire chamber from the work-pit. Firing happened in the arched, semicircular stokehole which was subjected to the greatest physical stresses. The stokehole was 64 cm high and 54–56 cm wide. The fire chamber was 165 cm long, having a square cross-section with rounded corners, tapering continuously towards the opening. The length of the fire chamber of the kilns varies, with a

tendency to become longer in the late La Tène and Roman periods. This is illustrated by the fact that the kiln of the Hódmezővásárhely–Újváros, Franciszti-Halmi brickworks dating to the 3rd–4th century AD, was 100 cm long (Párducz 1937, 81), while the kiln No. 363 of the Makó–Dáliugar site 38, dating to the 2nd–3rd century AD, was 216 cm long (Benedek-Bene & Benedek 2015, 207). Although, this phenomenon is also documented in the case of the kiln at Szentes, this finding cannot be used as a chronological indicator (Szöllősi 2008, 353).

Finally, the arch of the kiln was built. No pottery kiln with a fully intact vault is known to have been preserved, so there is still a lively debate among researchers of the period about the reconstruction of the vault. The most common hypothesis is that Sarmatian potters built a vault for the kiln, a part or all of which may have been aboveground. Other theories suggest that the kiln was not built with a vault, but the oven was sunk below the ground level which may have been open. The pots may have been placed in the kiln from above, and then the opening was covered with small, flat pieces of rock or pieces of broken pots (Rosner 1981, 44; Benedek-Bene & Benedek 2015, 211). The latter may be the case for kiln No. 275 in Makó–Dáliugar M43 site 38. The pot sherds found in the kiln suggest that the former cover of the opening collapsed (Benedek-Bene & Benedek 2015, 211). The underground depth of the Sarmatian kilns and the construction of the arches are similar to that of the Celtic age kilns as can be seen from excavation reports (Jerem 1984, 88, 91; H. Kelemen 1999, 89; Ilon 1996/96, 86; Szöllősi 2008, 358) and from ethnographic data (Kardos 1984, 52).

The inhabitants of the settlement probably used the kiln at Szentes for a long time, as indicated by the side walls of the kiln, which show a 12 cm thick layer of burnt patches. The kiln has been used for a long time, renewed several times, but at least twice. The stokehole was built as a secondary structure to the kiln; this is proved by the infilling of the kiln (**Fig. 4**). These suggest that the kiln was rebuilt from the earlier debris. The stokehole was patched around with the material from a previously demolished kiln, which explains the red colour on the outside of the stokehole. Probably because of the rising groundwater, it was more practical to use the debris from the previous kiln, as it is less permeable to water. To prevent the stokehole from becoming porous, it was coated with grey clay first, and then the debris of the former furnace was placed on the top (**Fig. 2**). The raised floor was also rebuilt, thus the separation is clearly visible on its surface (**Fig. 7**).

Ceramic material from the Szentes-Schweidel József Street site

1957 Sarmatian pot sherds were found on the site, belonging to a total of 1944 vessels. The pottery is characterized by sherds of wheel-thrown (1324 pieces) and hand-built (620 pieces) vessels. The findings are dominated by wheel-thrown grey ware, which accounts for 68% of the found material. The finds include sherds of pots, storage vessels, and bowls. A significant number of pottery fragments (98 pieces) were found in the kiln's features, consisting of nondistinctive, fragmented, small grey wheel-thrown and brown hand-built pottery fragments, which were tempered with grog. The vast majority of these sherds were found on the raised floor of the kiln and in the fill of the work-pit that provided the heating (feature 38) and the former beehive-shaped pit that served as the kiln site (feature 35/A). In addition to the pottery kiln, two large clay pits (pits 25 and 42) indicate pottery production. No building could be defined as a pottery workshop (opposed to Nagymágocs–Paptanya; Walter 2021, 41–42), and no overfired, deformed, or mis-shaped pots indicative of pot-making were identified among the finds in the excavated area.

The found pottery suggests that the site dates to the 3rd century AD. The finds are highly featureless, with no significant chronological differences between the grey wheel-thrown and the hand-built pottery so that no chronological distinction can be made between the beehive-shaped pit and the kiln finds.

My future goal is to perform a petrographic analysis of the ceramic material. By analysing the mineralogical composition of the vessels, among other things, the ceramic production habits and commercial relationships of the site can be studied. The Sarmatians were masters of pottery, but their traditions and the organization of pottery production are not known. Systematic research on large samples of pottery using scientific methods is notably lacking. Based on my preliminary investigations so far, the use of petrographic and geochemical (SEM, XRF) methods opens up a whole new dimension in understanding Sarmatian pottery and its organization (Walter et al. 2018; Walter & Szilágyi 2022; Kreiter et al. 2022), and thus also provides insights into the organization of their society.

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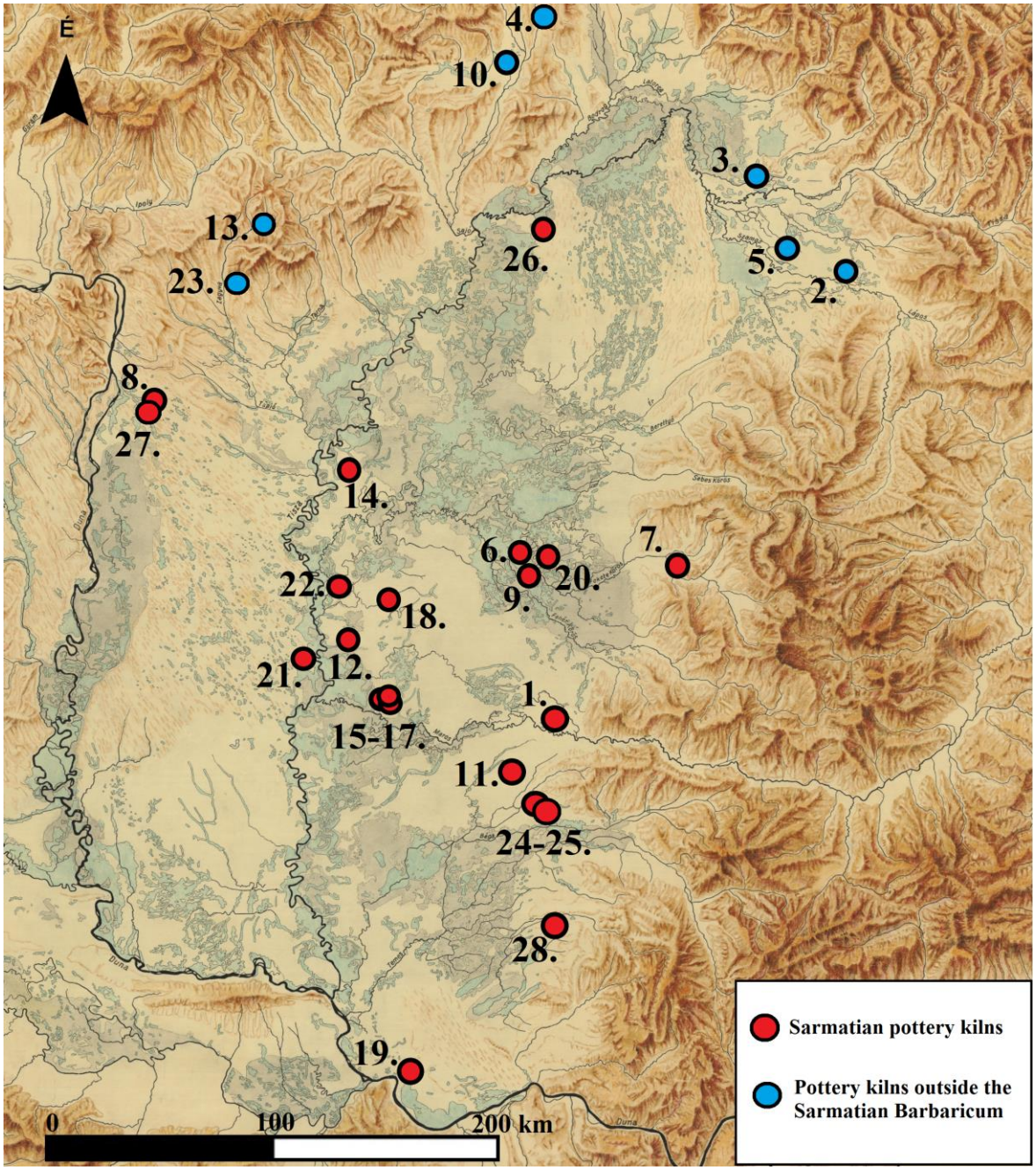

Fig. 8.: Roman-age pottery kilns in the Sarmatian territory and its borderlands

8. ábra: A római kori edényégető kemencék a szarmata szállásterületen és annak határvidékén

1. Arad–Csálya/Ceala (Dörner 1968; Crişan 1968, 246–249); **2.** Aranyosmeggyes–Şuculeu (Gindele 2018); **3.** Beregsurány (Csallány 1966); **4.** Blažice (Pastor 1960); **5.** Csengersima–Petea (Gindele & Istvánovits 2011); **6.** Doboz–Hajdúirtás (Kovalovszki 1989, 127); **7.** Grădinari/Kisnyégerfalva–Selişte (Bozu 1990, 149-151); **8**. Ecser M0 7. lh. (RKM 2004, 210); **9.** Gyula–Kálvária-dűlő 4. (Implom 1935, 234–235; Párducz 1935, 190–191); **10.** Hernádvécse–Nagy rét 4. lh. (Soós 2016); **11.**Hodoni/Hodonyi–Pustă (Bejan 1995); **12.** Hódmezővásárhely–Újváros, Franciszti-brickworks (Párducz 1937); **13.** Kazár (Vaday 2003–2004); **14.** Kengyel–Kengyel-part 1. (Cseh 1990, 70); **15.** Makó–Dáli-ugar M43 38. lh. (Benedek-Bene & Benedek 2015); **16.** Makó–Dáli-ugar M43 40. lh. (Sóskuti 2016, 76–96); **17.** Makó–Járandószél M43 39. lh (Haraszti 2017); **18.** Nagymágocs–Paptanya (Vörös 1998, 62); **19**. Pančevo/Pancsova–Najeva (Rašajski 1957, 43); **20.** Sarkad–Körösháti temető 31. lh. (RKM 2010, 337); **21.** Sándorfalva–Eperjes (Vörös 1987, 88); **22.** Szentes–Schweidel József utca (Szabó 2007, 283); **23.** Szurdokpüspöki (Bácsmegi & Guba 2007); **24.** Temesvár/Timişoara–Dragaşina (Micle 1997, 77–78); **25.** Temesvár/Timişoara–Freidorf (Mare et al. 2011, 48–49; 136–137; Grumeza 2016: 74–75); **26.** Tiszavasvári–Városföldje, Jegyző-tag (Istvánovits 1999, 175–176); **27.** Üllő 5-9. lh (Kulcsár & Mérai 2011, 61–80); **28.** Versec/Vršac–Crvenka (Rašajski 1957, 46–47).

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Sarmatian pottery kilns in the Southern Hungarian Great Plain

The geographic distribution of pottery kilns in the Carpathian Basin shows that pottery kilns are generally found in sites where clay (suitable for pottery making) is located in the near surroundings (**Fig. 8**). Therefore, Sarmatian pottery kilns are known from the northern part of the Great Hungarian Plain, along the Tisza and the Upper Tisza, in the basin of Körös–Maros–Tisza, and in the Bácska/Bačka and Bánát/Banat regions, while they are not known from most of the Danube–Tisza interfluve or the entire Homokhátság. A total of 363 pottery kilns from 28 sites in the Barbaricum region have been published so far. The distribution of the pottery kilns is uneven. Eszter Istvánovits first catalogued the Sarmatian age pottery kilns of the Carpathian Basin in her publication of the Tiszavasvár pottery kiln in 1999 (Istvánovits 1999, 175–176; 185). This collection was further extended by Eszter Istvánovits, Valéria Kulcsár, and Dóra Mérai in their analysis of the pottery kiln of Üllő (Istvánovits et al. 2011).

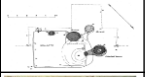
The sites can be divided into two main groups based on pottery production. One group consists of pottery production sites where several kilns were used simultaneously to produce commercial quantities of pottery. This is illustrated by the 48 pot kilns excavated at sites 5–9 in Üllő (Istvánovits et al. 2011), 52 kilns at Beregsurány, 6 kilns at Csengersima–Petea (Gindele & Istvánovits 2011), 200 kilns at Aranyosmeggyes–Şuculeu (Gindele 2018) and 27 kilns at Blažice (Pastor 1960). These pottery kilns proved to be veritable factory complexes. The other group consists of smaller workshops that meet local needs, where one or two pottery kilns are usually found. This group includes mainly the kilns excavated in the Southern Great Plain (**Table 1.**). These sites indicate to be built pottery kilns away or separate from dwellings, usually on the outskirts of the settlements, probably for fire safety reasons.

The presently accepted grouping of pottery kilns was developed by Joachim Henning in 1977 when he analysed pottery production of the 1st century AD in the Lower and Upper Danube region. In his work, Henning identified 4 types of pottery kilns: types A, B, C, and D (Henning 1977). The Henning A-type kilns are pottery kilns with fire chambers divided by a central supporting pillar, which mainly appeared with the technology of stamped pottery production in the Barbaricum (Soós 2016, 650). They are primarily typical in the northern border region of Dacia: at Csengersima and Beregsurány (Gindele & Istvánovits 2011, 157), while another one is known from Doboz–Hajdúírtás in the Southern Great Plain (Kovalovszki 1989, 127). The Henning B group (including Celtic-type kilns) is characterized by fire chambers divided into two parts by a central wall. In addition to the Szentes–Schweidel József Street kiln, most of the Sarmatian pottery kilns of the Southern Great Plain also belong to this group (**Table 1.**). The group of Henning type C kilns contains kilns without support for the raised floor, such as the kilns excavated at Makó–Dáliugar M43 site 38 (feature 275) (Benedek-Bene & Benedek 2015, 207) and Makó–Járandószél M43 site 39 (Haraszti 2017). Henning D-type kilns are not divided and do not have raised floors. No such kilns are currently known to exist in the southern part of the Hungarian Great Plain. Other kilns with unique structures are also common in this region, such as the kilns of Hódmezővásárhely–Újváros, Franciszti brick-works (Párducz 1937, 78), Makó–Dáliugar M43 site 38 (feature 363) (Benedek-Bene & Benedek 2015, 208).

All the kilns had a raised floor, and the oven's surface was, on average, 1.5 meters in diameter. The pottery kiln excavated in the Sarkad–Körösháti cemetery, site 31, had the largest raised floor, over 2 meters in diameter. Because of the large surface area of the oven, the Sarkad kiln could fire many more pots at a time than its smaller relatives. At the turn of the 4th and 5th centuries, an increase in the size of pottery kilns was observed in the north-eastern part of the Great Hungarian Plain (Lamiová–Schmiedlová & Tomášová 1995). At first sight, a similar trend can be observed in the Southern Great Plain, based on the raised floors' diameters. The kilns of the Makó–Dáliugar M43 site 38, dating to the 2nd–3rd century AD, have raised floors' diameters of 120 and 160 cm (Benedek-Bene & Benedek 2015, 207–208), while the kilns of the 3rd century AD from the same site have raised floors' diameters of about 1.5 meters (Benedek-Bene & Benedek 2015, 207–208). The kiln excavated in Szentes–Schweidel Street, dating to the end of the 4th century AD, had a raised floor with a diameter of 130 cm, while the kiln at Sándorfalva–Eperjes, dating to the end of the 4th century AD – beginning of the 5th century AD, had a raised floor's diameter of 170 cm (Vörös 1982, 28). However, if we consider the pottery kilns of Nagymágocs–Paptanya (122 cm) and Makó–Járandószél M43 site 39 (80 cm) (Haraszti 2017), which date to the Late Sarmatian period, the assumption is refuted. In my opinion, the size of the kiln (i.e. of the raised floor) depends on the size of the vessels to be fired, as exemplified by the storage vessel firing kilns with large raised floor diameters, often exceeding 2 m, at Aranyosmeggyes (Gindele 2015, 6). Another example is a kiln with a 204 cm diameter raised floor at the Sarkad–Köröshát cemetery site 31 in which large bowls and storage vessels were fired.

HU ISSN 1786-271X; urn: nbn: hu-4106

Table 1.: Characteristics of the Sarmatian pottery kilns of the Southern Hungarian Great Plain
1. táblázat: A Dél-Alföld szarmata kori edényégető kemencéinek jellemzői

Site	Figure	Pottery kiln number	Type Henning	Diameter of the raised floor	Length of the firing chamber	Date	Reference(s)
Arad-Ceala/Csálya		1	–	–	–	4th–5th century	Dörner 1968; Crişan 1968, 246–249; Kapcsos 2022, 170.
Doboz–Hajdúirtás		1	A	–	–	–	Kovalovszki 1989, 127.
Grădinari–Selişte		4	B;B;B, unique	150 cm (1.k.); 160 cm (2.k); 150 cm (3.k); 140 cm (4.k)	110 cm (1.k.) diam: 123 cm (2.k) 120 cm (3.k.) 160 cm (4.k.)	first half of the 3rd century - first half of the 4th century	Bozu 1990, 149-151; Grumeza 2016, 74.
Gyula-Kálvária-dűlő 4.		2	B;B	–	150–200 cm	–	Implom 1935, 234–235; Párducz 1935, 190–191.
Hódmezővásárhely–Újváros, Franciszti-brickworks		1	–	–	diam: 160–180 cm	3rd–4th century	Párducz 1937, 78.
Hodonyi/Hodoni-Pustă	–	1	B	170 cm	–	3rd–4th century	Bejan 1995
Kengyel-Kengyel-coast-I.		1	B	–	–	4th–5th century	Cseh 1990, 70–71.
Makó–Dál-ugar M43 38. site		2	unique (B variant); C	1: 160 x 170 cm; 2: 120 cm,	1.k: 240 cm; 2.k: 358 cm,	2nd–3rd century	Benedek-Bene & Benedek 2015, 207–208.
Makó–Dáli-Ugar M43 40. site		1	B	–	–	end of the 3rd century	Sóskuti 2016, 77–78.
Makó-Járandószél M43 39. site		1	C	80 cm	diam: 130 cm	late 4th - early 5th century	Haraszti 2017
Nagymágocs–Paptanya		1	–	122 cm	–	late 4th - early 5th century	KJM ArchRep: 115–184.
Pančevo-Najeva	–	1	–	–	–	3rd–4th century	Rašajski 1957, 43.
Sarkad-Körösháti cemetery 31. site		1	–	204 cm	–	3rd–4th century	RKM 2010, 337.
Sándorfalva–Eperjes		1	B	170 cm	170 cm	late 4th - early 5th century	Vörös 1987, 88.
Szentes-Schweidel József Street		1	B	120 cm	295 cm	the 3rd century	Szabó 2007, 283.
Temesvár/Timişoara–Dragaşina	–	1	B	–	–	second half of the 4th century	Micle 1997, 77–78.
Temesvár/Timişoara–Freidorf		2	unique	60–70 cm	–	3rd century -last third of the 4th century	Mare et al. 2011, 27–28; 136–137; Grumeza 2016: 74–75.
Versec/Vršac–Crvenka		1	C	–	155 cm	4th–5th century	Rašajski 1957, 46–47.

In the research of Sarmatian age pottery, one of the most exciting questions is what kind of pots were fired in the kilns. In the northern part of the Great Hungarian Plain and on the borderlands of the Sarmatian territory, a high degree of specialisation can be observed regarding the production of pottery in industrial-scale pottery kilns. High-quality, fast-wheeled, grey gritty ware was produced on sites 5–9 in Üllő (Kulcsár & Mérai 2011, 61-80), and stamped vessels were made in the kilns of Csengersima–Petea (Gindele & Istvánovits 2011) and Beregsurány (Csallány 1966). In Aranyosmeggyes–Şuculeu, grey wheel-thrown storage vessels were produced (Gindele 2018). We notice that Csengersima–Petea (Gindele & Istvánovits 2011), Beregsurány (Csallány 1966), and Aranyosmeggyes–Şuculeu (Gindele 2018) are Roman age pottery sites located on the borderlands of the Sarmatian territory, but not of Sarmatian ethnicity. Smaller pottery workshops that served local needs were "multifunctional", producing several different types of pottery. In rare and exceptionally fortunate cases, the load of the last firing can be found in the kilns. The first such kiln was found at Tiszavasvári–Városföldje, Jegyző-tag site. Remarkably, two types of wheel-thrown ware were excavated in one of the kilns (Istvánovits 1999, 175–176). In addition to the grey fast-wheeled vessels, ceramics tempered with sand, gravel, and finely crushed white stone particles were found, which is excellent evidence that the potters of Tiszavasvári fired two different types of pottery in one kiln at the same time, and at the same temperature. This proves that the production of grey ware in a pottery workshop was not exclusive (Vörös 2022, 175). Of the kilns in the region under study, the only remains of the last batch of fired vessels are on the raised floor of site 31 of the Sarkad–Körösháti cemetery. In this kiln, grey and red wheel-thrown vessels were fired. In other cases, pottery production at other pottery workshop of the Southern Great Plain can only be inferred from the proportion of ceramic material found at the sites, their technical execution, their shapes, and their unique decorative combinations. Today, in addition to traditional typological analyses, scientific methods are essential in exploring the pottery production of a pottery workshop. An excellent example of this is the research on wheel-shaped micaceous-pebbly pottery from the late 4th – early 5th century AD sites. These pots are known from several pottery workshops in the Southern Great Plain (Sándorfalva–Eperjes, Nagymágocs–Paptanya, Makó–Dáliugar M43 site 40, Makó–Járandószél, Timişoara/Temesvár–Freidorf) (Walter et al. 2018, 156). The main tempering material of the pots, the micaceous rock, is foreign to the central areas of the Great Plain, which raises the question of whether these pottery wares are locally made from imported raw materials or the vessels were transported to the sites. Previous research (Walter et al. 2018; Walter & Szilágyi 2022; Kreiter et al. 2022) suggests that these vessels were produced locally in the same workshops that produced the local wheel-thrown grey pottery.

In addition to the pottery kilns, other objects at the sites indicate local pottery production (defective, over-fired ceramics, pits, buildings, wells). Large clay pits are usually found at the sites from which potters extracted the clay needed for pottery production. At Szentes–Schweidel Street (house 36), Sándorfalva–Eperjes (houses 8, 9) and Nagymágocs–Paptanya (house 7), buildings identified as pottery workshops were also found (Vörös 1982, 28; Walter 2021, 41-42). Among these, prepared greyish-purple clay lumps were found on the workshop floor at Nagymágocs, indicating pottery production. Water was also needed for pottery making, mainly provided by natural water sources near the settlements. In some sites, where rivers and streams were far away from the workshops or did not exist at all, water was certainly obtained from wells dug near the workshops. The sites of Vršac/Versec–Crvenka (Rašajski 1957, 47) and Sándorfalva–Eperjes (Vörös 1982, 27–28) well exemplify this, where wells were excavated near pottery workshops.

Conclusion

In the Sarmatian age Barbaricum, 363 pottery kilns are known from 28 sites, of which 24 are located in the Southern Great Plain. While large pottery centres with several kilns have been found in the northern part of the Great Plain (Üllő, Csengersima–Petea, Beregsurány, Aranyos-meggyes–Şuculeu), the southern part has so far been dominated by smaller pottery workshops with one or two kilns to meet local needs. Based on the excavation data gathered so far, the pottery kiln excavated in Szentes–Schweidel Street belongs to the latter group. The site was excavated in 2006, and a Celtic-type kiln of the Henning B group was found. Most of the Sarmatian pottery kilns in the Southern Great Plain are of this type. Their common characteristic is that they are partly underground, sunken up-draught kilns with one or two firing chambers and a raised floor. The best parallels for the form of the Szentes kiln can be found in Sándorfalva–Eperjes (Vörös 1987, 88), Makó–Dáliugar M43 site 40 (Sóskuti 2016, 77–78), Gyula–Kálvária-dűlő 4 (Implom 1935, 234) and Grădinari–Selişte (Bozu 1990, 149–151) Sarmatian sites.

Contribution of authors

Walter Dorottya Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization.

HU ISSN 1786-271X; urn: nbn: hu-4106 © by the author(s)

Acknowledgements

This study was supported by the ÚNKP-21-3-SZTE-181 New National Excellence Program of the Ministry for Innovation and Technology from the source of the National Research, Development and Innovation Fund to WD. I would like to thank the excavation director, József János Szabó, for making the kiln of the Szentes–Schweidel József Street site available for publication. I would also like to thank Gabriella Vörös, Gábor Ilon, Eszter Istvánovits, Andrea Vaday and Szilvia Szöllősi, whose expertise was invaluable in formulating the research questions and methodology.

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