THE LATE SARMATIAN MICACEOUS-PEBBLY CERAMIC CONUNDRUM REVISITED: PETROGRAPHIC ANALYSIS OF CERAMICS FROM SÁNDORFALVA–EPERJES AND NAGYMÁGOCS–PAPTANYA SETTLEMENTS

A KÉSŐ SZARMATA KORI KAVICSOS-CSILLÁMOS KERÁMIÁK REJTÉLYÉNEK VIZSGÁLATA: SÁNDORFALVA-EPERJES ÉS NAGYMÁGOCS-PAPTANYA TELEPEK KERÁMIÁINAK PETROGRÁFIAI ELEMZÉSE •

KREITER[1], Attila; WALTER, Dorottya[2] & VIKTORIK, Orsolya[1]

[1]Hungarian National Museum, National Archaeological Institute, Archaeometry Laboratory, H-1113, Budapest, Daróci út 3.

[2]University of Szeged, Hungary Doctoral School of History Medieval Studies Archaeology Doctoral Program, H-6722 Szeged, Egyetem utca. 2.

E-mail: kreiter.attila@mnm.hu, walterdorottya6@gmail.com

Abstract

In this study a petrographic analysis was carried out on the ceramic material uncovered from two late Sarmatian settlements in the southern part of the Great Hungarian Plain, Sándorfalva–Eperjes and Nagymágocs–Paptanya. The aim of the study is to confirm the working hypothesis that the micaceous-pebbly vessels of the settlements are made from locally available raw materials and the micaceous rock needed for their tempering was imported to the settlements. For this purpose, we analysed thin sections of grey fast-wheeled vessels (fine wares), which were dominant in the finds of the Nagymágocs site, then we compared the obtained data with earlier results on micaceous-pebbly vessels (Walter & Szilágyi 2022). In addition, the results are compared with the petrographic analysis of micaceous-pebbly ceramics from the Late Sarmatian settlement of Sándorfalva–Eperjes.

Kivonat

A tanulmány témája két, a Dél-Alföld területén található késő szarmata kori edénygyártó telep, Sándorfalva–Eperjes és Nagymágocs–Paptanya kerámiaanyagának természettudományos vizsgálatának bemutatása. A vizsgálat célja azon felállított munkahipotézis igazolása, hogy a telepek leletanyagában fellelhető kavicsos-csillámos edények helyi gyártmányok és a soványításukhoz szükséges csillámos anyagot importálták a telepekre. Elkészítettük a nagymágocsi telep leletanyagában domináns szürke gyorskorongolt edények vékonycsiszolati leírásait, majd a kapott eredményeket összehasonlítottuk a már rendelkezésünkre álló kavicsos-csillámos edények vizsgálati eredményeivel (Walter & Szilágyi 2022). A kutatás részét képezte mindemellett Sándorfalva–Eperjes késő szarmata kori telep kavicsos-csillámos kerámiáinak petrográfiai vizsgálata is.

KEYWORDS: LATE SARMATIAN SETTLEMENT, CERAMIC PETROGRAPHY, MICACEOUS-PEBBLY CERAMIC, SLOW-WHEELED VESSEL, GREY FAST-WHEELED VESSEL

KULCSSZAVAK: KÉSŐ SZARMATA KORI TELEPEK, KERÁMIA PETROGRÁFIA, KAVICSOS-CSILLÁMOS KERÁMIA, LASSÚKORONGOLT KERÁMIA, SZÜRKE GYORSKORONGOLT KERÁMIA

• How to cite this paper: KREITER, A., WALTER, D. & VIKTORIK, O., (2022): The Late Sarmatian micaceous-pebbly ceramic conundrum revisited: petrographic analysis of ceramics from Sándorfalva–Eperjes and Nagymágocs–Paptanya settlements / A késő szarmata kori kavicsos-csillámos kerámiák rejtélyének vizsgálata: Sándorfalva-Eperjes és Nagymágocs-Paptanya telepek kerámiáinak petrográfiai elemzése, *Archeometriai Műhely* **XIX/2** 125–136.
doi: 10.55023/issn.1786-271X.2022-010

Introduction – archaeological background

The vast majority of the finds in the 4th–5th centuries AD Sarmatian settlements are ceramics. Most of the pottery from the late Sarmatian – Hun period is fast-wheeled grey vessels of various shapes, but new types of ceramic materials, new types of vessels and new decorative motifs also appeared. From the end of the 4th century AD to the first half of the 5th century, a slow wheeled micaceous-pebbly type ceramic spread in the Great Hungarian Plain. The importance of researching these vessels is that they have a dating value and due to their characteristic raw materials, the fragments of the pots clearly and easily can be identified in the settlements' materials. Moreover, the main tempering material used in these vessels, 'glittering rock', is foreign to the central areas of the Great Hungarian Plain (Walter 2022, 31). Therefore, in connection with the study of the vessels, a logical and expedient question arises as to where they have been made. Based on the distribution map of this ceramic type, the production centre is likely located in the Körös–Maros–Tisza region. We currently know five settlements in the area from this period, where both micaceous-pebbly vessels and pottery kilns were found in the sites: Sándorfalva–Eperjes (Vörös 1982), Nagymágocs–Paptanya (Vörös 1984), Makó–Dáli-ugar M43 40. site (Benedek et al. 2017), Makó–Járandószél (Haraszti 2017) and Timişoara–Freidorf (Mare et al. 2011). In this study a petrographic analysis was carried out on fast-wheeled grey vessels (fine ware) and micaceous-pebbly slow-wheeled vessels from the Late Sarmatian settlements of Sándorfalva–Eperjes and Nagymágocs–Paptanya. Recent archaeological analysis (Walter 2017; Walter 2022) and preliminary petrographic analysis (Walter et al. 2018; Walter & Szilágyi 2022) of the micaceous-pebbly ceramics from the two sites have already been published. Our goal is to supplement the previous research on the micaceous-pebbly ceramics with additional scientific data.

Excavations and the local environment

Both Late Sarmatian settlements are located in Csongrád-Csanád County. The settlement of Sándorfalva–Eperjes is located on the right bank of the Tisza, on the border between Sándorfalva and Algyő. The site is situated on the southern part of the South Tisza valley micro-region, which is a long river valley floodplain. Good quality, easily formable clay is essential for the production of ceramics in the immediate geological environment of the sites. The surface of the micro-region is usually covered by alluvial mud, meadow clay, clayey mud and river sediments (Dövényi 2010, 190–191). The excavation of the site took place between 1980 and 1981, in three stages, led by Márta Galántha and István Fodor (Walter 2017, 34). As a result of the excavation, the Late Sarmatian settlement is represented by 254 archaeological features, 9 semi-subterranean dwellings, 1 well, 1 pottery kiln, 3 circular ditches and 240 pits of various shapes.

The Late Sarmatian settlement of Nagymágocs–Paptanya is located 32 km north-east of Sándorfalva–Eperjes in the SE part of the Great Plain, in the saline-swamp steppe surrounded by the Tisza–Körös–Maros rivers. It is situated on the southern high bank of the present-day Mágocs-brook canal, on a sloping cone plain, covered with both river and eolian sediments. The settlement was excavated in four stages between 1983 and 1986, led by Gabriella Vörös. The Late Sarmatian settlement is represented by 88 archaeological features (semi-subterranean dwellings, trenches, ovens, a metallurgical/blacksmith workshop, a smoking complex and pits)(Walter 2022, 31–32).

The micaceous-pebbly ceramics accounted for 12% of the ceramic material from Sándorfalva, while it represented 25% of the finds in Nagymágocs (Walter 2022, 43, Tab.1). Ceramics were made at both sites, as evidenced by the excavated clay pits, pottery kilns and pottery workshops. According to the latest research, both sites are likely to have produced micaceous-pebbly slow-wheeled vessels in addition to fast-wheeled grey ceramics (Walter et al. 2018; Walter 2022, 33, 36–37). An essential condition for the operation of a pottery workshop is the availability of raw materials that are easily obtainable in the local environment, such as clay, water and wood for firing, which can be found in the immediate environment of both sites. The water needed to prepare and shape the pots may have been provided by a well in Sándorfalva, while in Nagymágocs it was provided by the Mágocs-brook. Additionally, the proximity of water was also important for fire protection. Nevertheless, in both sites pottery kilns were built on the outskirts of the settlements, usually away from residential buildings.

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

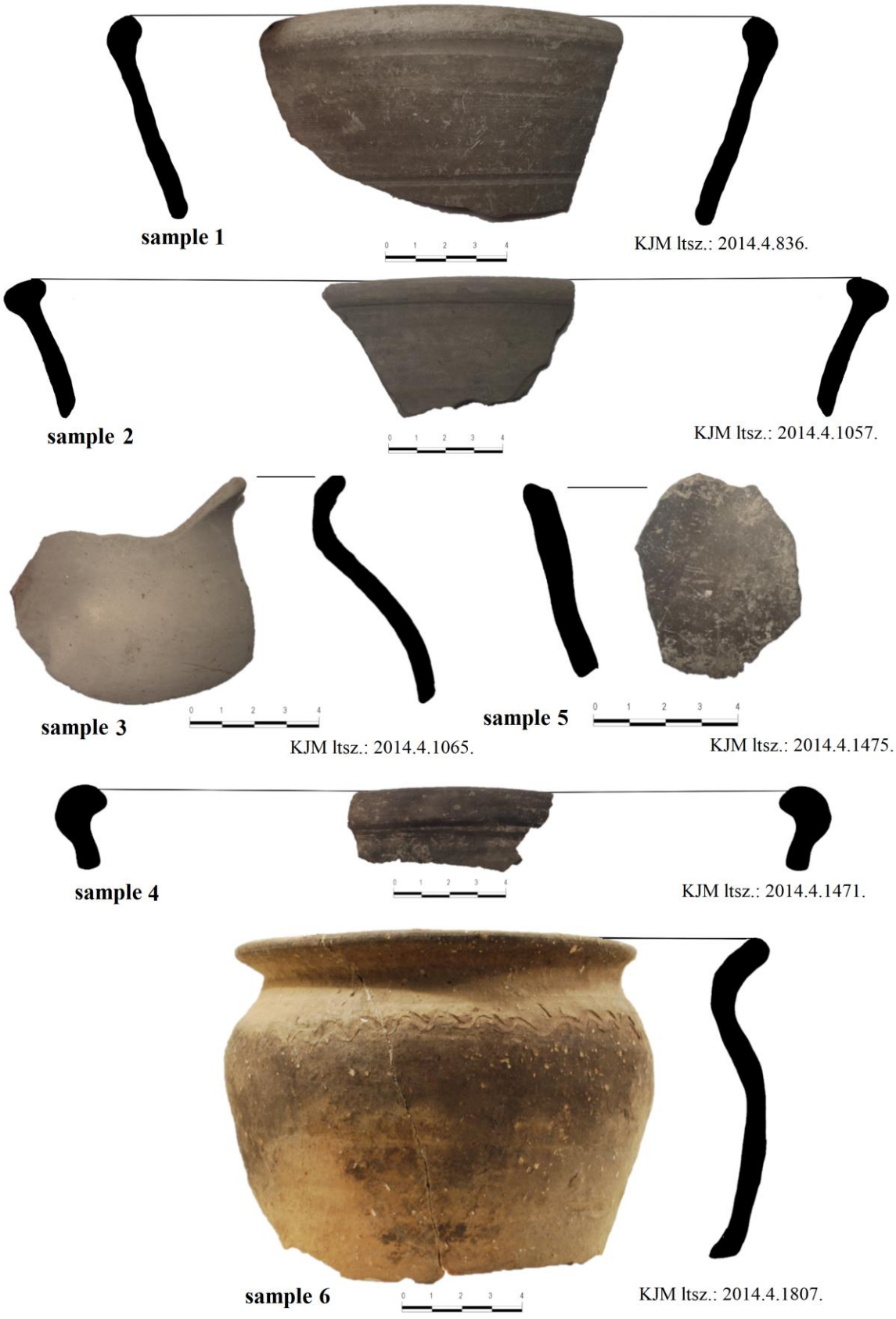

Fig. 1.: Photos of the examined sherds from Nagymágocs–Paptanya
1. ábra: A vizsgált nagymágocs–paptanyai kerámiatöredékek fotója

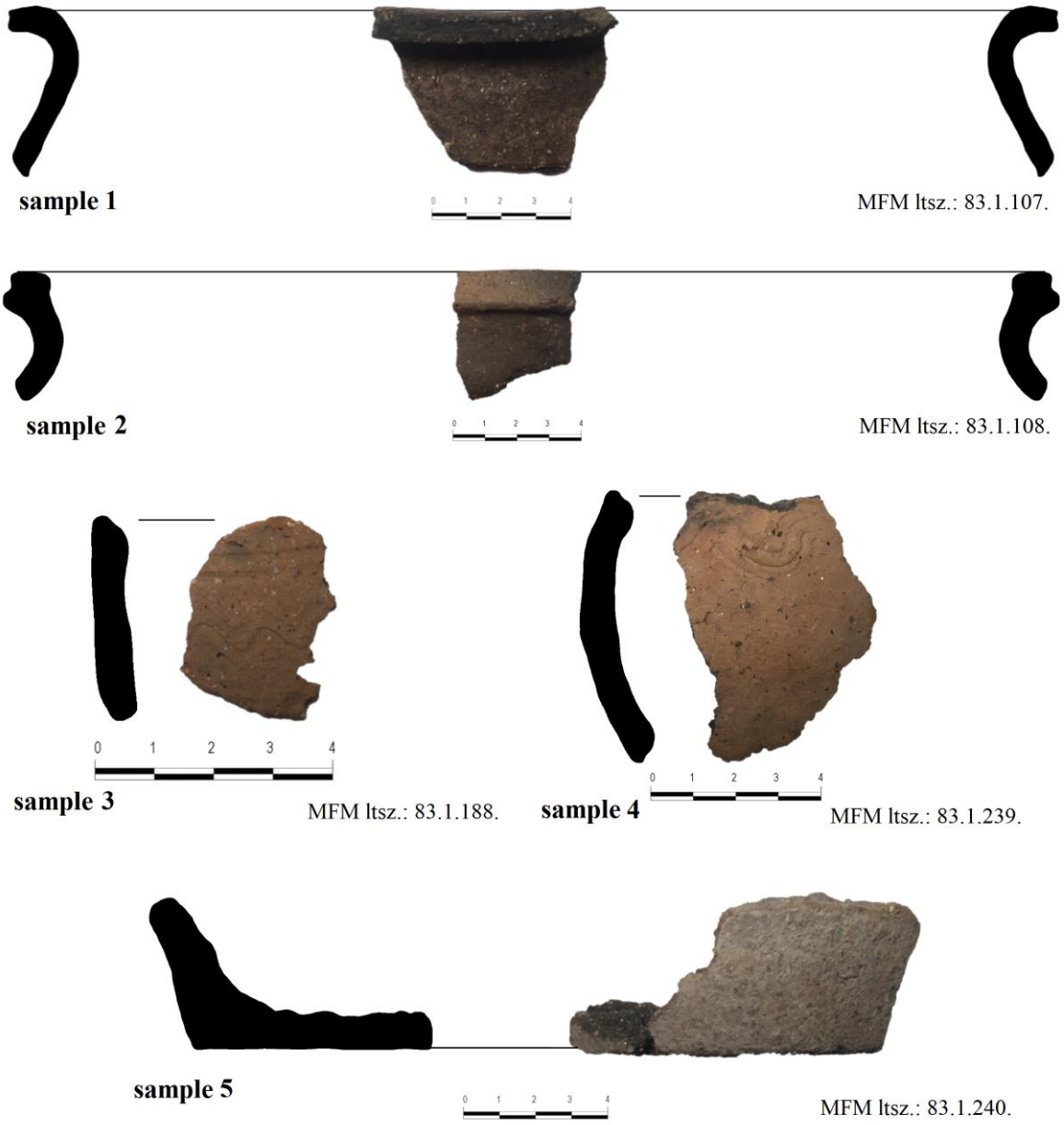

Fig. 2.: Photos of the examined sherds from Sándorfalva–Eperjes
2. ábra: A vizsgált sándorfalva–eperjesi kerámiatöredékek fotója

The analysed samples and the results of petrographic analysis

Five fast-wheeled grey vessels and a fragment of a gritty pot from Nagymágocs–Paptanya (**Fig. 1.**) and five micaceous-pebbly slow-wheeled vessels from Sándorfalva–Eperjes (**Fig. 2.**) were selected for petrographic analysis. The aim of the analysis is to describe and compare the composition of a total of 11 Sarmatian ceramics from the two sites and to assess raw material and temper preferences, highlight possible correlations between technological practices and characterise the raw material of the rock used for tempering the micaceous-pebbly slow-wheeled vessels. The ceramics from each site were classified into fabric groups, then the results were compared with earlier results of petrographic analysis on micaceous-pebbly ceramics (15 pieces) from Nagymágocs–Paptanya (Szilágyi 2021; Walter & Szilágyi 2022).

During the petrographic analyses the inclusion density, size categories, inclusion sorting and roundness of the components were determined based on a slightly modified version of the guidelines of the Prehistoric Ceramic Research Group (PCRG 2010).

Table 1.: The analysed ceramics from Nagymágocs–Paptanya

1. táblázat: A vizsgált kerámiák Nagymágocs–Paptanya lelőhelyről

Sample ID	Inventory No.	Vessel type	Feature	Petrographic group
1	2014.4.836.	Fast-wheeled grey bowl	Pit 48	2
2	2014.4.1057.	Fast-wheeled grey bowl	Pit 61	1
3	2014.4.1065.	Fast-wheeled grey globular pot	Pit 61	2
4	2014.4.1471.	Fast-wheeled grey bowl	House 7	2
5	2014.4.1475.	Fast-wheeled grey undiagnostic fragment	House 7	4
6	2014.4.1307.	Fast-wheeled grey gritty pot	Stray find	3

Inclusion density: rare (1–2 %), sparse (3–9 %), moderate (10–19 %), common (20–29 %), very common (30–39 %) and abundant (40 %+). Size categories: very fine (< 0.1 mm), fine (0.1–0.25 mm), medium (0.25–1 mm), coarse (1–3 mm) and very coarse (> 3 mm). Inclusion sorting: poorly sorted, moderately sorted, well-sorted, and very well-sorted. Roundness classes: angular, subangular, subrounded, rounded and well-rounded.

Six ceramics were analysed from Nagymágocs–Paptanya which were divided into four fabric groups (**Table 1.**).

The raw materials of the ceramics are very fine-grained, but minor differences are identified. One sample belongs to Fabric 1 (2: 2014.4.1057.), its raw material is very fine-grained, the amount of these inclusions is around moderate. There are rare amounts of fine and also rare amounts of medium grains. Inhomogeneity is identified in the sample indicating inappropriate raw material preparation (**Figs. 3-4.**).
Three samples belong to Fabric 2 (1: 2014.4.836., 3: 2014.4.1065., 4: 2014.4.1471.) (**Figs. 5-11.**). This is a calcareous raw material which contains small, evenly dispersed micrite (< 0.005 mm); the amount of very fine inclusions is moderate. There are rare amounts of fine and also rare amounts of medium inclusions. Inhomogeneity is also identified in Sample 4, indicating inappropriate raw material preparation (**Fig. 11.**). All samples have calcareous inclusions, these are oval, rounded and isometric in shape.

Fabric 3 is represented by one sample (6: 2014.4.1307.) (**Fig. 12.**). There are moderate amounts of very fine, rare fine and also rare medium inclusions. Compared to Fabric 1 the amount of very fine inclusions is more in Fabric 3. Compared to Fabric 2 the amount of very fine inclusions is similar, however Fabric 2 is calcareous, although larger calcareous inclusions also appear in the non-calcareous Fabric 3 and the amount of fine inclusions is also more in this fabric. The gritty appearance of this vessel is the result of larger (0.24–2.77 mm) calcareous inclusions.

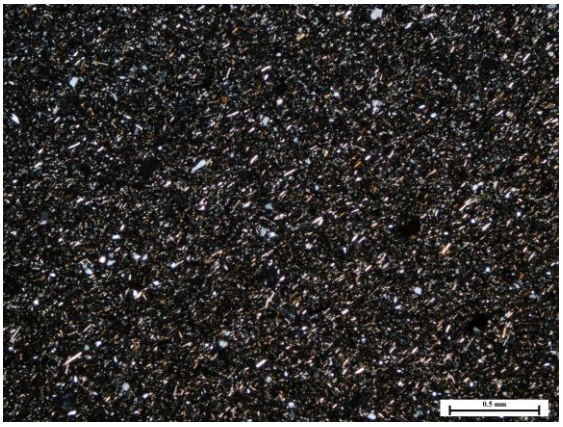

Fig. 3.: Fabric 1, Sample 2 (2014.4.1057.), (40x, +N), very fine-grained, non–calcareous raw material

3. ábra: 1. csoport, 2. minta, (2014.4.1057.), (40x, +N), nagyon finomszemcsés, karbonátmentes nyersanyag

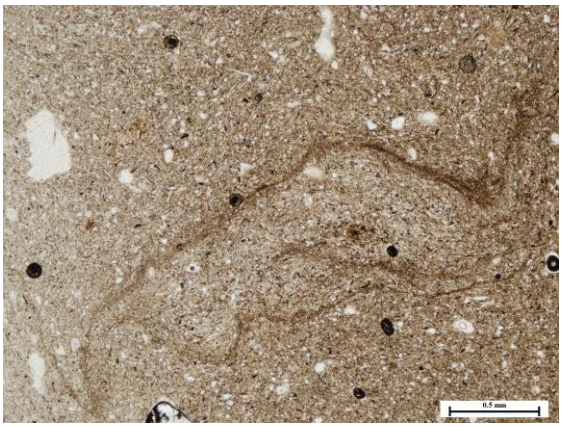

Fig. 4.: Fabric 1, Sample 2. (2014.4.1057.), (40x, 1N). In the middle of the micrograph the irregular shape is a results of inappropriate raw material preparation, the clay was not kneaded long enough to homogenise the raw material

4. ábra: 1. csoport, 2. minta, (2014.4.1057.), (40x, 1N). A mikroszkópos fotó közepén lévő elnyúlt, szabálytalan sáv nem megfelelő nyersanyag homogenizálás eredménye, az agyag nem teljesen lett összegyúrva, így az nem homogén

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

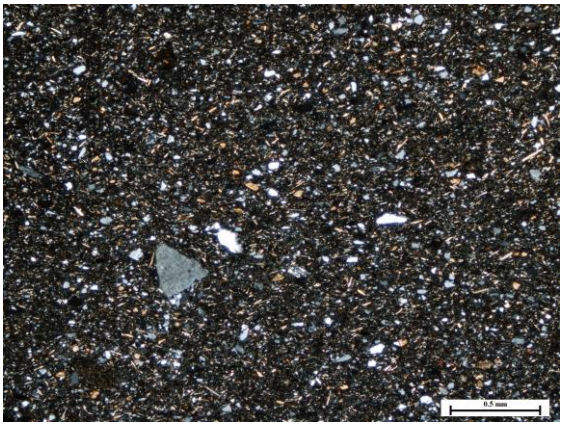

Fig. 5.: Fabric 2, Sample 1 (2014.4.836.), (40x, +N), very fine-grained raw material containing micrite inclusions

5. ábra: 2. csoport, 1. minta, (2014.4.836.), (40x, +N), nagyon finomszemcsés, karbonátos nyersanyag

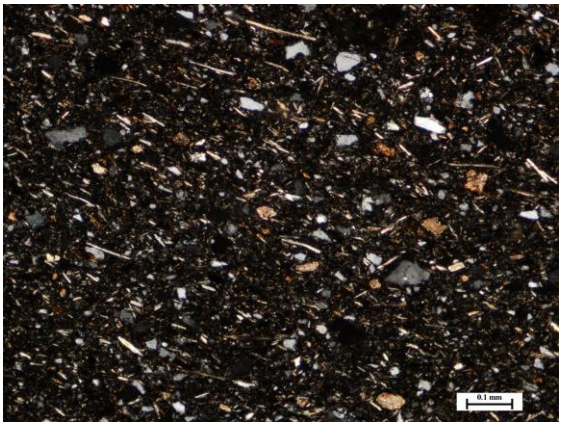

Fig. 6.: Fabric 2, Sample 1 (2014.4.836.), (100x, +N), very fine-grained micrite inclusions

6. ábra: 2. csoport, 1. minta, (2014.4.836.), (200x, +N), nagyon finomszemcsés karbonátos nyersanyag

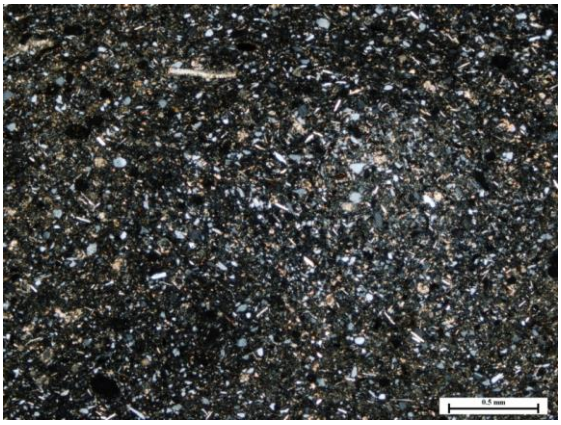

Fig. 7.: Fabric 2, Sample 3 (2014.4.1065.), (40x, +N), very fine-grained raw material containing micrite inclusions

7. ábra: 2. csoport, 3. minta, (2014.4.1065.), (40x, +N), nagyon finomszemcsés, karbonátos nyersanyag

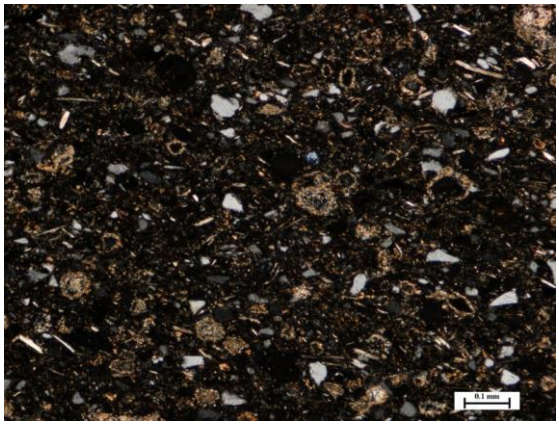

Fig. 8.: Fabric 2, Sample 3 (2014.4.1065.), (100x, +N), very fine-grained micrite inclusions

8. ábra: 2. csoport, 3. minta, (2014.4.1065.), (100x, +N), nagyon finomszemcsés karbonátos nyersanyag

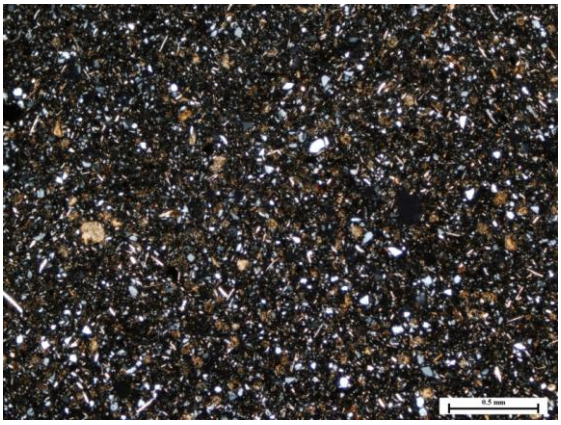

Fig. 9.: Fabric 2, Sample 4 (2014.4.1471.), (40x, +N), very fine-grained raw material containing micrite inclusions

9. ábra: 2. csoport, 4. minta, (2014.4.1471.), (40x, +N), nagyon finomszemcsés, karbonátos nyersanyag

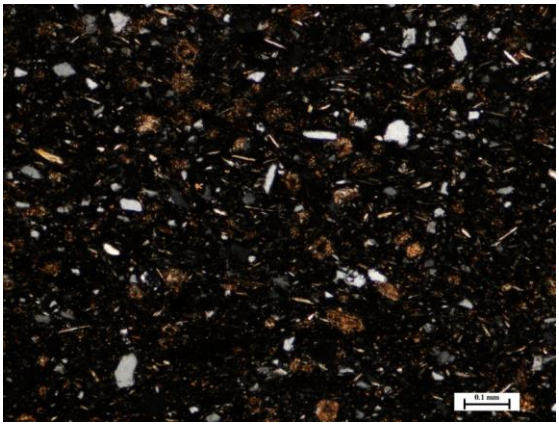

Fig. 10.: Fabric 2, Sample 4 (2014.4.1471.), (100x, +N), very fine-grained micrite inclusions

10. ábra: 2. csoport, 4. minta, (2014.4.1471.), (100x, +N), nagyon finomszemcsés karbonátos nyersanyag

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

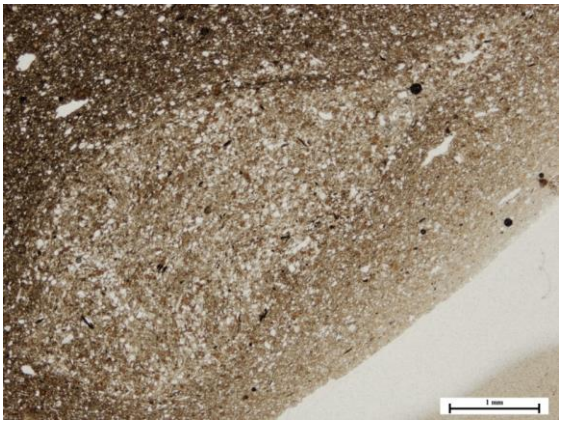

Fig. 11.: Fabric 2, Sample 4 (2014.4.1471.), (20x, 1N). In the middle of the micrograph the oval, pellet-like shape is a results of inappropriate raw material preparation, the clay was not kneaded long enough to homogenise the raw material

11. ábra: 2. csoport, 4. minta, (2014.4.1071.), (40x, 1N). A mikrofotó közepén lévő ovális elnyúlt, pellet-szerű sáv nem megfelelő nyersanyag homogenizálás eredménye, az agyag nem teljesen lett összegyúrva, így az nem homogén

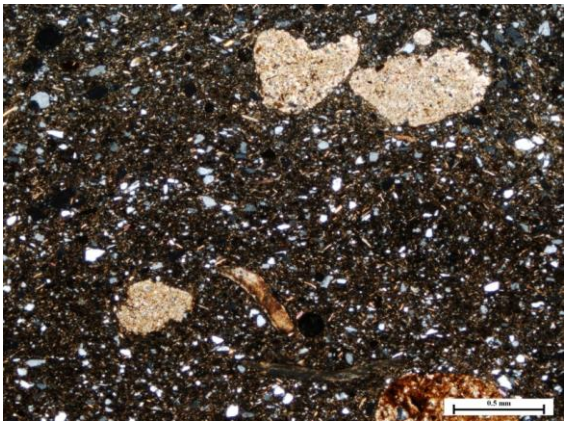

Fig. 12.: Fabric 3, Sample 6 (2014.4.1307.), (40x, +N), very fine, fine-grained, non–calcareous raw material with larger calcareous inclusions

12. ábra: 3. csoport, 6. minta, (2014.4.1307.), (40x, +N), nagyon finom-, finomszemcsés karbonátmentes nyersanyag nagyobb méretű karbonátgöbecsekkel

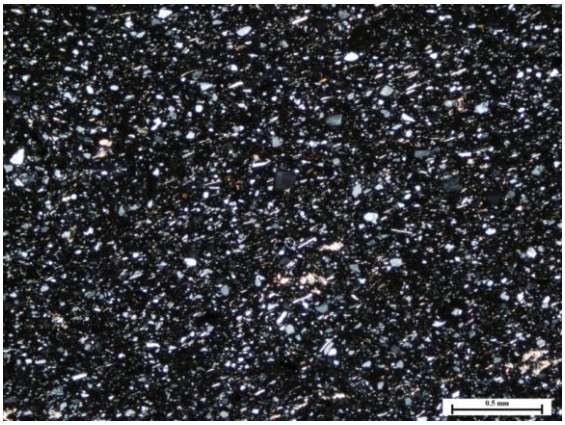

Fig. 13.: Fabric 4, Sample 5 (2014.4.1475.), (40x, +N), common amounts of very fine-grained inclusions, non–calcareous raw material

13. ábra: 4. csoport, 5. minta, (2014.4.1475.), (40x, +N), sok nagyon finomszemcsés mennyiségű összetevőt tartalmazó, karbonátmentes nyersanyag

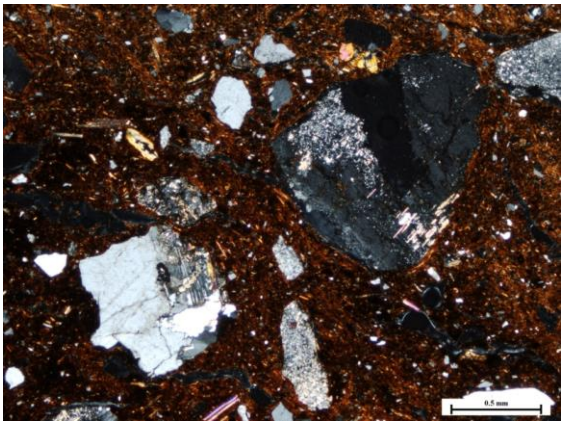

Fig. 14.: Fabric 1, Sample 1 (83.1.107.), (40x, +N), the raw material is a fat clay, tempered with granitic/metagranitic rock fragments

14. ábra: 1. csoport, 1. minta, (83.1.107.), (40x, +N), a kerámia nyersanyaga kövéragyag, amit granitoid/ metagranitoid eredetű finom–nagyon durvaszemcsés kőzettörmelékkel soványítottak

Fabric 4 is represented by one sample (5: 2014.4.1475.)(**Fig. 13.**). There are common amounts of very fine and rare fine inclusions. This fabric contains more non-plastic inclusions than Fabrics 1–3. The fabric of this ceramic is also isotropic, which indicates a higher firing temperature.

In general, the analysed fast-wheeled grey vessels have very fine-grained raw materials and no purposeful tempering could be identified (**Table 2**). The minor differences between the size and amount of inclusions between the fabrics can be accounted for by the differences in raw material preparation (levigation, cleaning) or by the variability in the naturally available raw materials. Nevertheless, for one group of vessels potters choose a calcareous raw material (Fabric 2).

Five ceramics were analysed from Sándorfalva–Eperjes which were divided into three fabric groups (**Table 3**). The analysed five ceramics were divided into three fabric groups (**Table 4**). The basic raw materials of the ceramics (before tempering) may come from the same environment, only minor differences can be observed. Fabrics 1–3 have very fine-grained raw materials, which were tempered with fine to very coarse granitic/metagranitic rock fragments. The raw material of Fabric 1 is a fat clay, the raw material of Fabrics 2 is also somewhat fat, very fine grained, although it contains more inclusions. The raw material of Fabric 3 shows

Table 2.: The main characteristics of fabric groups. VF: very fine, F: fine, M: medium.

2. táblázat: Az összetételcsoportok főbb jellemzői. VF: nagyon finom-, F: finom-, M: közepes szemcseméret

Fabric group	Inclusion size and percent	Main inclusions and accessory minerals	Calcareous inclusions	Sample No.
1	VF (8–10%) F (<1%) M (<1%)	*Main inclusions:* monocrystalline quartz, muscovite, K-feldspar, plagioclase, biotite, polycrystalline quartz, quartzite, aggregate of muscovites, granitic rock fragment. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, garnet, tourmaline, epidote, hematite, opaque minerals.	-	2
2	VF (10–15%) F (<1%) M (<1%)	*Main inclusions:* monocrystalline quartz, muscovite, K-feldspar, plagioclase, biotite, polycrystalline quartz, quartzite, granitic rock fragment, aggregate of muscovites, chalcedony. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, garnet, tourmaline, epidote, rutile, apatite, brown amphibole, pyroxene, hematite, zircon, opaque minerals.	Calcareous raw material	1, 3, 4
3	VF (15%) F (1–2%)) M (<1%)	*Main inclusions:* monocrystalline quartz, muscovite, K-feldspar, plagioclase, biotite, polycrystalline quartz, quartzite, granitic rock fragment, chalcedony. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, garnet, tourmaline, epidote, zircon, hematite, opaque minerals.	Occasional calcareous inclusions	6
4	VF (20–25%) F (<1%)	*Main inclusions:* monocrystalline quartz, muscovite, K-feldspar, plagioclase, biotite, polycrystalline quartz, quartzite, microcrystalline silica. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, garnet, tourmaline, epidote, rutile, green amphibole, hematite, opaque minerals.	-	5

Table 3.: The analysed ceramics from Sándorfalva–Eperjes

3. táblázat: A vizsgált kerámiák Sándorfalva–Eperjes lelőhelyről

Sample ID	Inventory No.	Vessel type	Feature	Petrographic group
1	83.1.107.	Slow-wheeled micaceous-pebbly pot	Pit (pottery workshop) 207	1
2	83.1.108.	Slow-wheeled micaceous-pebbly pot	Pit (pottery workshop) 207	1
3	83.1.188.	Slow-wheeled micaceous-pebbly pot	Pit 186 (pit in front of a pottery kiln)	3
4	83.1.239.	Slow-wheeled micaceous-pebbly pot	House 8	2
5	83.1.240.	Slow-wheeled micaceous-pebbly pot	House 8	1

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

Table 4.: The main characteristics of fabric groups. VF: very fine, F: fine, C: coarse, VC: very coarse.

4. táblázat: Az összetételcsoportok főbb jellemzői. VF: nagyon finom-, F: finom-, C: durva-, VC: nagyon durva szemcseméret

Fabric group	Inclusion size and percent	Main inclusions and accessory minerals	Calcareous inclusions	Tempering material	Sample No.
1	VF (5–7%)	*Main inclusions:* quartz, K-feldspar, plagioclase, muscovite, biotite. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, garnet, tourmaline, epidote, rutile, green amphibole, hematite, opaque minerals.	-	rock fragments (F–VC: 15–31%)	1, 2, 5
2	VF (10–15%)	*Main inclusions:* quartz, K-feldspar, plagioclase, muscovite, biotite. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, garnet, tourmaline, epidote, opaque minerals.	-	rock fragments (F–C: 11–12%)	4
3	VF (7–10%)	*Main inclusions:* quartz, K-feldspar, plagioclase, muscovite, biotite, microcrystalline silica. *Accessory minerals:* zoisite/clinozoisite, titanite, leucoxene, rutile, garnet, tourmaline, epidote, zircon, opaque minerals.	Calcite single crystals	rock fragments (F–VC: 19–20%)	3

subrounded/rounded calcite single crystals and also contains more and larger tourmaline crystals than the other groups.

Three samples belong to Fabric 1 (1: 83.1.107., 2: 83.1.108., 5: 83.1.240.)(**Figs. 14-16.**). The raw material of the samples is fat clay. The amount of very fine inclusions is sparse, there are rare to sparse amounts of fine, sparse to moderate medium, sparse to moderate coarse and rare or missing very coarse inclusions. These vessels were tempered with granitic/metagranitic fine to very coarse rock fragments.

One sample belongs to Fabric 2 (4: 83.1.239.)(**Fig. 17.**). In this raw material the amount of very fine inclusions is moderate, there are rare amounts of fine, sparse medium and sparse coarse inclusions. This vessel was also tempered with granitic/metagranitic fine to coarse rock fragments.

Fabric 3 is also represented by one sample (3: 83.1.188.) (**Fig. 18.**). In this raw material the amount of very fine inclusions is rare/moderate, there are rare amounts of fine, sparse medium, moderate coarse and sparse very coarse inclusions. This vessel was also tempered with granitic/metagranitic fine to very coarse rock fragments, but there are also weathered calcite single crystals, and more and larger (0.1 mm) tourmaline crystals also appear than in the previous samples.

Discussion and conclusion

Comparing the raw materials of fast-wheeled grey (fine wares, Nagymágocs) and slow-wheeled micaceous-pebbly vessels (Sándorfalva) the raw materials of the ceramics are clearly different, they most probably developed in different geological formations. The ceramic raw materials from Nagymágocs–Paptanya are very fine-grained lean clays, they contain more very fine inclusions, muscovite and accessory minerals and calcareous raw materials also appear. The ceramic raw materials from Sándorfalva– Eperjes are also very fine-grained but these are fat clays, thus the basic raw materials themselves (without tempering) are fundamentally different, they contain much less muscovite and accessory minerals. These latter vessels were tempered with granitic/metagranitic fine to very coarse rock fragments. These rock types do not appear locally, therefore these vessels were probably made somewhere else, since their basic raw materials (without tempering) are different from that of the fast-wheeled vessels (fine wares), or at least the rocks used for tempering came from a different place.

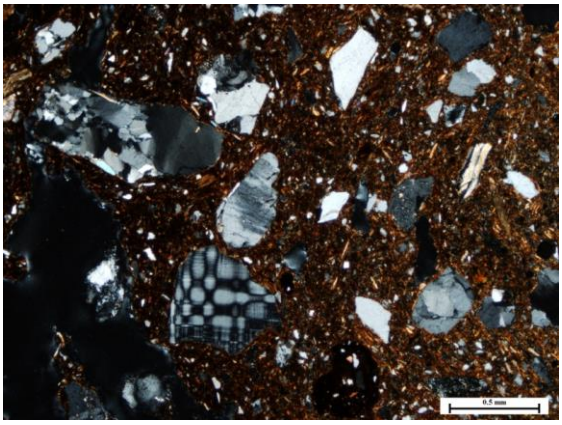

Fig. 15.: Fabric 1, Sample 2 (83.1.108.), (40x, +N), the raw material is a fat clay, tempered with granitic/metagranitic rock fragments.

15. ábra: 1. csoport, 2. minta, (83.1.108.), (40x, +N). A kerámia nyersanyaga kövéragyag, amit granitoid/ metagranitoid eredetű finom–nagyon durvaszemcsés kőzettörmelékkel soványítottak.

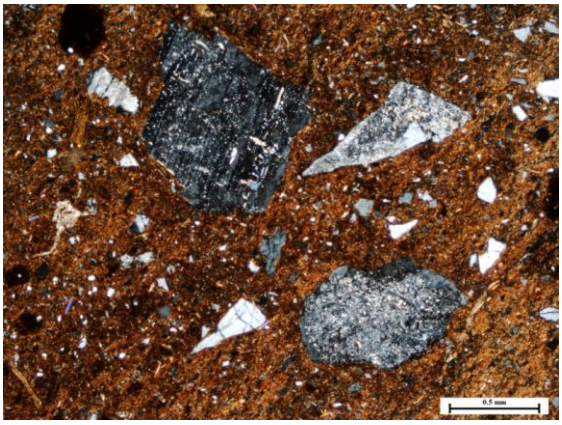

Fig. 16.: Fabric 1, Sample 5 (83.1.240.), (40x, +N), the raw material is a fat clay, tempered with granitic/metagranitic rock fragments.

16. ábra: 1. csoport, 5. minta, (83.1.240.), (40x, +N), a kerámia nyersanyaga kövéragyag, amit granitoid/metagranitoid eredetű finom–nagyon durvaszemcsés kőzettörmelékkel soványítottak.

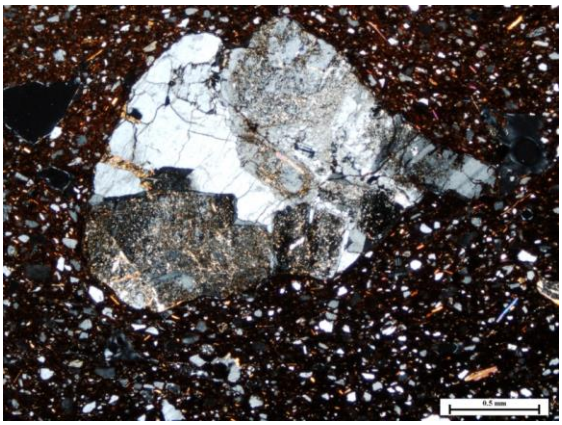

Fig. 17.: Fabric 2. Sample 4 (83.1.239.), (40x, +N). The raw material of Sample 4 is also somewhat fat, very fine-grained, although it contains more inclusions and was tempered with granitic/metagranitic rock fragments.

17. ábra: 2. csoport, 4. minta, (83.1.239.), (40x, +N). A kerámia nyersanyaga kövérebb jellegű agyag, több nem plasztikus összetevővel, amit granitoid/metagranitoid eredetű finom–nagyon durvaszemcsés kőzettörmelékkel soványítottak.

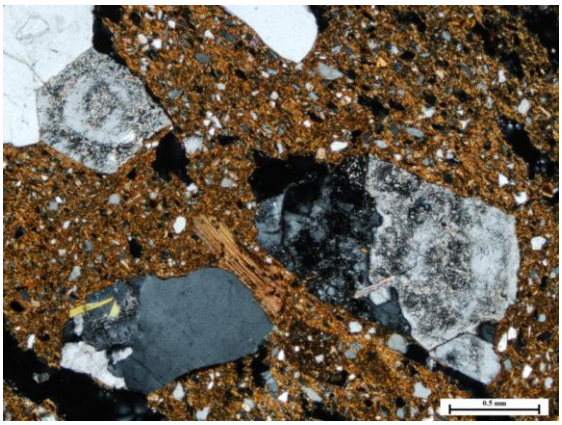

Fig. 18.: Fabric 3. Sample 3 (83.1.188.), (40x, +N). The raw material of Sample 4 is also somewhat fat, very fine-grained, although it contains more inclusions and was tempered with granitic/metagranitic rock fragments.

18. ábra: 3. csoport, 3. minta, (83.1.188.), (40x, +N). A kerámia nyersanyaga szintén kövérebb jellegű agyag, több nem plasztikus összetevővel, amit granitoid/metagranitoid eredetű finom–nagyon durvaszemcsés kőzettörmelékkel soványítottak.

The analysed ceramics were compared to slow-wheeled micaceous-pebbly ceramics from Nagymágocs–Paptanya analysed earlier (Walter & Szilágyi 2022). The raw materials of these, however, do not show similarities with the here analysed vessels from Nagymágocs (fast-wheeled grey), but they are rather similar to the analysed micaceous-pebbly ceramics from Sándorfalva. Thus, micaceous-pebbly ceramics from the two sites show similarities, while the raw materials of fast-wheeled grey wares in Nagymágocs (analysed here) are different from the raw materials of micaceous-pebbly ceramics in Nagymágocs (Walter & Szilágyi 2022). The micaceous-pebbly vessels at Nagymágocs were also made from very fine-grained, somewhat fat clays, which were also tempered with granitic/metagranitic fine to very coarse rock fragments. However, the tempering materials show less metamorphism than the ceramics analysed in this study from Sándorfalva. The latter vessels show muscovite, which is transformed into sillimanite and kyanite indicating higher degree of metamorphism. Therefore, the micaceous-pebbly vessels from Sándorfalva, may originate from different sources indicating different sites of production for micaceous-pebbly vessels. The inclusions in the micaceous-pebbly wares from Nagymágocs originate from gneiss (Walter & Szilágyi 2022), but in our samples from Sándorfalva we did not observe gneissose texture. Walter and Szilágyi (2022) also analysed a rock fragment from Nagymágocs (sample 1876, two mica gneiss), but

this raw material did not match with the tempering of the ceramics analysed by her. We also compared this rock (Nagymágocs) with the tempering of ceramics from Sándorfalva and we also found it different from the rock tempering of ceramics. Apart from the two-mica gneiss, epidote is also missing from the ceramics, plagioclase minerals are different in their appearance, in the biotites pleochroic zircon inclusions appear and the texture of the rock is oriented. Therefore, according to the differences in the rock tempering of slow-wheeled vessels from Sándorfalva and Nagymágocs there were probably not made in the same workshop, or at least the rocks used for tempering came from different places.

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.

References

BENEDEK A., PÓPITY D., SÓSKUTI K. (2017): Késő szarmata teleprészlet a Makót elkerülő út területéről (M43, 29. lelőhely) – Late Sarmatian settlement part on the territory of the bypass at Makó. In: GÁBOR, T.Sz. & CZUKOR, P. (szerk.): *Út(on) a kultúrák földjén. Az M43-as autópálya Szeged–országhatár közötti szakasz régészeti feltárásai és a hozzá kapcsolódó vizsgálatok.* Móra Ferenc Múzeum, Szeged, 151–174.

DÖVÉNYI Z. (2010): *Magyarország kistájainak katasztere második, átdolgozott és bővített kiadás.* MTA Földrajztudományi Kutatóintézet, Budapest, 190–191.

HARASZTI L. (2017): Szarmata edényégető kemence a Makó–Járandószél lelőhelyről. – Sarmatien pottery klin from Makó–Járandószél site. In: GÁBOR, T.Sz. & CZUKOR, P. (szerk.): *Út(on) a kultúrák földjén. Az M43-as autópálya Szeged–országhatár közötti szakasz régészeti feltárásai és a hozzá kapcsolódó vizsgálatok.* Móra Ferenc Múzeum, Szeged, 129–150.

MARE, M., TĂNASE, D., DRAŞOVEAN, F., SUSI, el G. & GÁL, S.Sz. (2011): *Timişoara–Freidorf. Cercetările arheologice preventive din anul 2006.* Cluj-Napoca: Mega, 136–137.

PCRG (2010). *The study of later prehistoric pottery: general policies and guidelines for analysis and publication*. Prehistoric Ceramic Research Group: Occasional Papers Nos 1 and 2. 3rd edition revised, 78 p.

SZILÁGYI, V. 2021. Szarmata kori kerámiák mikroszkópos petrográfiai vizsgálata, Nagymágocs – Paptanya (SZTE BTK RT). *Publikálatlan szakértői jelentés*, 15 p.

VÖRÖS G. (1982): Késő szarmata fazekasműhely Sándorfalva–Eperjesen. *Múzeumi Kutatások Csongrád Megyében* 27–36.

VÖRÖS G. (1984): Késő szarmata-hunkori telep feltárása Nagymágocs–Paptanyán. *Múzeumi Kutatások Csongrád Megyében* 18–22.

WALTER D. (2017): Sándorfalva–Eperjes késő szarmata település csillámos anyaggal soványított kerámiaanyagának elemzése. —The analysis of the mica-gravel tempered pottery of the Late Sarmatian settlement Sándorfalva–Eperjes. In: RÉVÉSZ L. (főszerk.): *Acta Universitatis Szegediensis, Acta Iuvenum Sectio Archaeologica tomus III.* SZTE BTK Régészeti Tanszék, Szeged, 33–59.

WALTER D. (2022): Főzőfazekak és bográcsok, avagy Nagymágocs–Paptanya késő szarmata kori lassúkorongolt, kavicsos-csillámos kerámia anyagának elemzése. — Cooking pots and pans. Analysis of the late Sarmatian gravel-gritter ceramic material of Nagymágocs–Paptanya. *Veritatis Imago* **2021/2** 31–60.

WALTER D., FINTOR K. & SKULTÉTI Á. (2018): A sándorfalva–eperjesi késő szarmata kavicsos-csillámos kerámia soványítóanyagának előzetes petrográfiai vizsgálata. – The preliminary petrographic examination of the diluent used for a late Sarmatian micaceous-pebbly ceramic from Sándorfalva–Eperjes. In: BÁRKÁNYI I. & F. LAJKÓ O. (szerk.): *A Móra Ferenc Múzeum Évkönyve.* Új folyam 4. Szeged: Móra Ferenc Múzeum, 133–157.

WALTER D. & SZILÁGYI V. (2022): Late Sarmatian pottery workshop in Nagymágocs–Paptanya. *Acrheometriai Műhely* **XIX/2** 113–124.

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