Studia Antiqua et Archaeologica 22(1): 5–18

Pottery kiln: A technological approach to Early Eneolithic black-topped production in Transylvania

Alina BINȚINȚAN[1], Mihai GLIGOR[2]

Abstract. *The present paper uses the parameters revealed by archaeometric investigations of the Foeni group Early Eneolithic pottery from Alba Iulia–Lumea Nouă site, in order to make possible the experimental reconstruction of the black-topped pottery local firing technique. The distinctive features of this fineware category are the well burnished red body, with black (sometimes metallic) look on the rim, as well as on the pot interior. The results indicate the chromatic effect is due to the controlled mixed firing, oxidation and reduction atmosphere, in one step operation technique. This process was carried out using an updraught kiln with a circular base having 0.80 m in diameter and a height of 0.90 m. During firings the temperatures reached did not exceed the temperature indicated by the analyses (700–850°C), and both firing atmospheres had been achieved simultaneously. The experimental samples resembled Foeni vessels completely. The most important aspect of the firing method which we used is the fact that the results are controllable and repeatable.*

Rezumat. *În acest articol se utilizează parametrii investigaţiei arheometrice a ceramicii din aşezarea de la Alba Iulia–Lumea Nouă, aparţinând grupului cultural Foeni din eneoliticul timpuriu, cu scopul de a face posibilă reconstituirea experimentală a tehnicii de ardere a ceramicii cu glazură neagră. Aspectul cel mai important al acestui experiment îl reprezintă faptul că rezultatele sunt controlabile şi repetabile.*

Keywords: kiln, pottery, black-topped, mixed firing, Early Eneolithic, Transylvania.

1. Introduction

Archaeological research conducted in the last few decades has contributed to important changes in our understanding of the Transylvanian Neolithic and Eneolithic periods. The emergence of the Neolithic lifestyle, together with the sedentarisation process, led to the development of skills in pottery production.

Certain Late Neolithic communities related to the Foeni cultural group and originating from the area today known as Greek Macedonia are considered to be responsible for the

[1] "1 Decembrie 1918" University of Alba Iulia; alina.bintintan@yahoo.com
[2] "1 Decembrie 1918" University of Alba Iulia; mihai.gligor@uab.ro

emergence of this culture in the Banat region. At the end of the Late Neolithic period, Foeni communities spread from Banat to Transylvania,[3] this migration corresponding to the beginning of the Transylvanian Eneolithic.[4] In the present-day territory of Romania, we have so far identified no fewer than 28 Foeni sites,[5] from which the most consistent and well-represented habitation in Transylvania is Alba Iulia–*Lumea Nouă*.[6]

The Lumea Nouă settlement is situated in the northeast area of Alba Iulia city (Transylvania, Romania), and is one of a chain of Neolithic and Eneolithic sites through the middle of the Mureș Valley[7]. Previous research at the Lumea Nouă settlement has shown that the area was most intensively settled by the Foeni group (Early Eneolithic, 4750–4400 BC)[8] to which we attribute a distinctive style of pottery production known as the black-topped technique.[9]

The main features of this category of fine ware are a well-burnished red body with a black, sometime metallic appearance on the rim and in the interior of the pot[10] (Figure 1).

Figure 1. Foeni black-topped pottery from Alba Iulia–*Lumea Nouă* site (Gligor 2007).

[3] DRAȘOVEAN 2004, 32–34; 2005, 22.

[4] GLIGOR 2009; 2014, 95–97.

[5] GLIGOR 2008, 11–12, fig. 1; 2014, 92–93.

[6] GLIGOR 2009, 25–58, 71–86.

[7] GLIGOR 2009, 21–24, Pl. I.

[8] GLIGOR 2009, 141–144; 2014, Tab. 1, fig. 2, 6a–6b.

[9] GLIGOR 2009, 72.

[10] GLIGOR 2007, 52, 55–61.

Archaeometric analyses of the chemical composition of Foeni black-topped pottery and the local clay have led to the observation that, as far as current research can ascertain, the black-topped pottery was produced locally, using clay obtained from natural deposits.[11] The majority of the investigated pottery samples were fired at an estimated temperature of 700–850˚C.[12]

Black-topped pottery represents a significant percentage of the archaeological discoveries from the Early Eneolithic stratum of this site. Besides the potters' control of firing conditions, the variety of shapes, the refined polishing of the surface and the advanced stage of fragmentation of the ceramic artefacts discovered in most varied contexts continue to amaze.

Ceramic pots which were destined to cover practical socio-economic, aesthetic or even spiritual needs, embody the considerable technical efforts which went into making them,[13] thus evidencing on-going endeavour and improvement. Through the production techniques it reveals, pottery expresses the technical development of the society which produced it. Black-topped pottery can thus be considered proof of the existence of local ceramic production based on experience, tradition and the cultural options of this community.

However, the lack of discoveries of pottery kilns, which could help to clearly identify analogies with ceramic production processes elsewhere, greatly hampers efforts to decipher the significance of these ceramic artefacts.

The structure, dimensions and functioning principles of kilns from archaeological excavations offer key information on the chemical and physical transformation of the clay at the particular temperature reached. Experimental archaeology has proven to be an excellent way to explore this through rebuilding and testing the technology,[14] especially with regards to the firing process.[15] In the absence of actual discoveries of such installations, this experimental approach can help determine correlations between the characteristics of locally found ceramics and existing functioning models of known kilns from the relevant chronological period. The present study adopts this type of experimental approach.

Experimental studies on other variants of Neolithic ceramic decoration from Predynastic Egypt have been conducted on several occasions.[16] As well as exploring the utility of such objects and the meaning of their chromatic decoration, these studies have raised many questions regarding the pyro-technological aspect of production. From the early experiments

---

[11] FABBRI *et alii*, 2008, 136.

[12] FABBRI *et alii*, 2009, 136, 138.

[13] MANIATIS 2009, 2–3; BUKO 2008, 26.

[14] PAARDEKOOPER, FLORES 2014; COLE 2014; HARRY 2010, 13–46; MILLSON 2010.

[15] BORREGAARD 2005, 23–33; TENCARIU 2004, 85–92; 2009, 175–198, 2010, 120; ANGHEL 2011, 339–350; THÉR 2004, 35–82; DAWSON, KENT 1984, 13–17; 1985, 70–79; 1987, 34–41.

[16] HENDRICKX *et alii* 2000, 171–187; BABA, SAITO 2004, 575–589.

of Alfred Lucas[17] to the present time, this approach has proven very useful; however, it appears that there is still much to disentangle in terms of the nature and number of steps involved in production.

Our goal is to examine the firing conditions that lead to the spectacular black-topped chromatic effect in this type of fine ware. The starting point of our experimental research is to identify an optimal kiln design that is able to create the necessary internal conditions, and then use this hypothetical model to identify the main features of the local historical working processes.

2. Materials and methods

The theoretical foundation of our project is based not so much on hypotheses and suppositions as on what we actually know about the manufacturing of black-topped pottery, based on chemical analysis and observations from archaeological excavations, as well as previous experimental approaches.

First we took into consideration Eissa *et al.*'s 1974 study, which established that the black surface on the rim was the result of a reduction atmosphere when firing, combined with incomplete firing and carbon smudging.[18] Previous experiments, both in kiln[19] and open air firing[20] have shown that the colour difference is also due to differences in the temperature to which various parts of the vessel are exposed, and the positioning of the vessel upside-down in the chamber.

Archaeometric analysis has indicated a maximum firing temperature of 700–850˚C[21] for black-topped artefacts. Furthermore, based on archaeometric analysis of Foeni culture black-topped pottery samples from the Alba Iulia–*Lumea Nouă* site, the existence of local ceramic production has been confirmed.[22]

As mentioned above, the analysis of technical objects associated with the production process is of major importance in reconstructing the steps involved in creating such artefacts. In the Alba Iulia–*Lumea Nouă* site, the lack of discoveries of ceramic kilns from the period to which we refer continues to feed hypotheses regarding various possible methods of controlling the mixed firing atmosphere. It should be noted that this lack of kilns also seems to be an ascertained feature of the early Predynastic Egyptian period, of which the black-topped ceramic type was also characteristic.[23]

---

[17] LUCAS 1929, 113–129; 1932, 93–96.

[18] EISSA *et alii* 1974, 85–98.

[19] HENDRICKX *et alii* 2000, 178–184.

[20] BINȚINȚAN 2013, 10–14.

[21] FABBRI *et alii* 2009, 136, 138.

[22] GLIGOR 2009, 96; FABBRI *et alii* 2008, 136; 2009, 138.

[23] HENDRICKX *et alii* 2000, 177–178.

2.1. The Neolithic pottery kiln: a hypothetical model

Starting with a disputed subject which is both interpreted as a shortcoming and a potential trace of the techniques used—namely, the lack of discoveries of kilns in archaeological excavations—, we proceeded with the identification of an analogy in the specialised literature dealing with how to hypothetically ascertain the reach of the technical parameters imposed by the studied type of artefact.[24]

The identification both of a proper functioning principle and a model kiln, to align to the imposed requirements of the studied artefact characteristics, was made in the area of Cucuteni-Tripolye culture, well known for its extensive production of top quality ceramics, mainly in Late Eneolithic period.[25]

The bicameral kiln with vertical disposal is considered the most advanced type of Neolithic and Eneolithic ceramic kiln in the present-day territory of Romania,[26] and was used intensively by the Cucuteni-Trypolie communities.[27] In order to gain the most accurate reference for the proposed experiment, we also drew upon technical details of discoveries belonging to the Trypillian complex which lay beyond Romanian territory.[28]

The goal of the experiment was to construct a kiln which could replicate the conditions needed to create the black-topped chromatic effect on the surface of test pieces made of local clay and manually formed according to Foeni typology. Our primary concerns were that the procedure should be efficient, and should not require special laboratory conditions or involve materials or actions which were technically beyond the studied period. The results were registered and measured with modern equipment, this being the only intrusion of today's technology in the experimental work.

The installation was of the bicameral type, with vertical disposal, equipped with a fuelling tunnel, two lateral ventilations and a smoke evacuation opening. This opening, in the upper part, guarantees the circulation of hot air from the combustion chamber to the chamber where vessels are placed and closes the kiln in the shape of a clay arch. The first element to be constructed was the hearth, sunk in the ground at a depth of 20 cm, in the shape of a circle with a diameter of 80 cm (Figure 2.1). The wall of the firing chamber was raised above the ground to approximately 30 cm, and was 12 cm thick at the lower point (Figure 2.2).

From the firing chamber's wall, sustaining holders were made for the clay perforated plate which separates the two chambers of the kiln. The wall's thickness gradually reduced with height, reaching approximately 10 cm at the perforated plate and 8 cm in the upper part

[24] MILLSON 2010, 1–6; OUTRAM 2008, 2.

[25] ALAIBA 2007, 67–78.

[26] DUMITRESCU *et alii* 1954, 189–198; COMȘA 1976, 24–25.

[27] TENCARIU 2009, 99–110; 2010, 124, 138, fig. 4/2.

[28] MARKEVIĆ 1981, 131; TENCARIU 2009, 102, fig. 55/2.

of the arch. The construction of the kiln's wall up to the cover was made in a single day (Figure 3.1).

In experimental conditions, we chose to build a bicameral type kiln, because its operating principles allow fine-grained control of temperature and of air combustion. Therefore, we used partially the space for vessels arrangement as a combustion chamber, to obtain reducing atmosphere. This made our installation to not function as a typical bicameral kiln.

Figure 2.1. Hearth sunk in the ground at a depth of 20 cm.

Figure 2.2. The wall of the firing chamber raised above the ground.

1 2 3

Figure 3.1–3.3. Different stages during the construction of the kiln.

The clay, obtained from a local natural deposit, was mixed with water, river sand and gravel, and added through beating. At the front the kiln was lengthened by the fuelling tunnel, 35 cm in length and 40 cm in width; the thickness of its wall was similar to that of the kiln's base, i.e. 12 cm. On the second day of construction the kiln's wall was still wet, but it was rigid enough to allow the construction of the cover, which was designed from the beginning as a mobile piece, easy to remove for loading vessels into the superior chamber (Figure 3.2). The cover was designed to allow the evacuation of gas and smoke during the firing, but also to facilitate the obturation of circulation for the control of both the firing atmosphere and the temperature (Figure 3.3). Designed as a mobile piece of the vessel-baking chamber, it allowed the experimental kiln to be used to fire vessels of varied diameters and heights. The kiln was dried gradually over a fortnight, kept away from inappropriate atmospheric conditions such as direct sunlight and rain. Superficial flaws or splits which appeared as the additional water evaporated did not require reconstructive interventions.

2.2. Moulding the vessels

As mentioned above, the distinctive features of this type of fine ware is a well-burnished red body with a black, sometime metallic appearance on the rim and the interior of the pot. Another notable feature of the local black-topped pottery is that some artefacts indicate a production process involving pressing the clay into pre-shaped (concave) moulds,[29] whilst others were made using the coiling technique.

Therefore, in our experiment, some pots were made by mixing the techniques of hand moulding for the bottom of the pot and coiling for their upper part, while other vessels were built using the pressing method. All the pieces complied dimensionally and typologically with the original vessels, namely biconical bowls and amphoras.[30]

The surfaces of the experimental pots were treated in various ways. Mainly, they were smoothed using water then polished intensely with a stone, a well-burnished surface being considered a characteristic aspect of Foeni decorative techniques. For the surface of other vessels, wooden tools were used to remove imperfections and the surfaces were smoothed with water, using circular movements (Figure 4).

2.3. Experimental firing

After drying, the vessels were placed bottom-up on a layer of combustion material composed of thick oak wood (Figure 5).

Once a temperature of 250˚C was reached, the wood consumed from around the vessel rims made the pot sink in the ember. In time, the ember turned into ash, which had an insulating role and allowed the reducing of oxygen.

The firing took place over four and a half hours; the rise in temperature was made gradually and it was constantly registered by an electronic thermoregulator (Pixys ATR236).

---

[29] BINȚINȚAN 2015, 89–100.

[30] GLIGOR 2007, fig. 33–36, 43–44.

During the first hour, the temperature rose slowly and did not exceed 250°C. After another hour and a half, the continually rising temperature inside the kiln doubled and the vessels, which had blackened until that moment, started to change colour. At the exterior of the kiln, more profound cracks appeared, mainly in the area of plate's sustaining holders. These were caused not only by contraction, which appears with internal vitrification, but also by the weight the sustaining holders have to bear (the vessels). The exterior of the firing chamber and the cover changed colour to brick-red. From time to time, between fuelling times, the smoke evacuation opening, as well as the fuelling tunnel, were partially obturated. Immediately after each loading, these were opened wide again in order to help raise the temperature. After three hours, a temperature of 640°C was reached (Figure 6).

Figure 4. The surface of experimental pots treated in various ways.

Figure 5. Placing the dried pots bottom-up on the layer of combustion.

Figure 6. The kiln during firing (640°C).

During the last hour of firing, after continuous feeding, the desired temperature of 780°C was reached and was maintained for another 30 minutes (soaking time) before fuelling was stopped. In fact, the installation could have reached temperatures in excess of 800°C, as it was very efficient, but the parameters of the experiment demanded this lower limit. Slow and prolonged cooling of the kiln over a period of 12 hours guaranteed the recuperation of the vessels to an almost perfect state.

3. Results and discussions

The experimental results obtained can be used to establish some general principles regarding black-topped pottery production in Transylvania.

The experiment indicated that black-topped pottery does not require a firing temperature in excess of 780°C, with a firing duration of 4–5 hours. As some researchers have already noted, a higher temperature and a firing time prolonged excessively can have negative effects on the intensity of the black on the rim and interior of the pot.[31] The relatively low temperature is also confirmed by positive results previously obtained in open air firings.[32]

As regards the surface of the experimentally created vessels, it can be asserted that any treatment of the vessels did not have any influence on the appearance of the black-topped effect. On the other hand, the upside-down placement of the vessels and the composition of the firing wood layer decisively influenced the effects of the reducing atmosphere and conferred the desired appearance to the objects. The insulating layer of ash separating the two firing atmospheres brought about the presence of the two specific colours in the same chamber and on the body of the same pot. At the same time, as a good insulator, the ash layer prevented the vessels' surfaces from being exposed to uniform temperatures. As a result, surfaces exposed to oxygen reduction were fired at a lower temperature, at least with 200˚C. The unconsumed wood from the combustion layer can be reclaimed after the cooling in the form of charcoal, and it is responsible for the oxygen consummation. The best results in terms of the intensity of the black-topped effect were obtained using oak wood and intense polishing before firing, which heightens the nuances of the black surface and makes the vessels impermeable.

As expected, for a reducing firing under 800˚C, even if the raw material comes from different sources, there are no visible colour differences from one sample to another.[33] The different red nuances were the result of the raw materials used, because it is known that the clay used in the ceramic production has varied qualities, depending on its composition and

[31] HENDRICKX *et alii* 2000, 174, 183.

[32] BINȚINȚAN 2013, 14.

[33] MANIATIS 2009, 9.

mineralogical characteristics.[34] It should be mentioned that the surfaces of the pots exposed to oxidation firing did not obtain a uniform brick-red nuance. This aspect was linked to the positioning of the vessels in the firing chamber and their direct contact with the flame.

The method used in this study for manufacturing black-topped pottery produced experimental pieces very similar to the original discoveries (Figure 7). As with previous studies based on open air firings, this manufacturing procedure also contradicted the hypothesis of a two-phase production[35] which has been proposed in the past.

Figure 7. Black-topped replicas obtained from the experiment.

[34] BUKO 2008, 17–25; MANIATIS 2009, 7.

[35] BINȚINȚAN 2013, 10–13; 2014, 7–16.

The graphical representation both of the firing atmosphere and the temperature distribution in the firing chamber during the four and a half hours offers insight into the way in which the operation progressed in reality. In particular, it suggests that there is no point in building a bicameral vertical firing installation with a structure designed to separate the fuel in the firing chamber, given that the creation of the chromatic effect depends on contact between the vessels and the combustive material.

There is evidence of such kilns being used in the production of painted pottery since the Early Neolithic in the area inhabited by Starčevo-Criș communities in what is now Hungarian[36] and Croatian territory.[37] In fact, in the territory of Romania, there is evidence of three types of monocameral kiln being used during the Neolithic and Eneolithic periods, where they existed in parallel with both simpler and more sophisticated installations.[38] In Transylvania, the use of monocameral kilns has been documented in Tărtăria (Alba County), from the Middle Neolithic in the area inhabited by the Vinča culture[39] and in Ariușd (Covasna County).[40]

4. Conclusions

The experimental kiln turned out to be a great tool for understanding conditions during the whole firing process and for identifying a suitable installation.

1. Black-topped pottery production is a one-step operation and can be considered strong evidence of a high degree of specialization in the craft of pottery, based on the large amount of fine ceramics found in archaeological excavations.

2. As intended, the experimental pots produced in several sessions for this study resemble Foeni black-topped vessels, showing that the results of this method are entirely controllable and repeatable.

3. Due to the bicameral structure of the kiln, in the terms of experimental work presented in this study, we had full control over the temperature and the reducing atmosphere; those two are the main factors in obtaining the black colour on the upper part and inside of the pots.

4. Based on this experiment, it is possible to draw other possible conclusions about the firing technique and to identify the main procedures involved in prehistoric practices. It should be noted that at least some of the fuel must have been intentionally located together

[36] MAKKAY 2007, 176, fig. 111/1–5.

[37] MINICHREITER 2007, 27–28, fig. 3; 2010, 112, Fig 5a–b, 115, fig. 8–9a–c, 116, fig. 10a–b.

[38] TENCARIU 2010, 122–127.

[39] HOREDT 1949, 50–51.

[40] LÁSZLÓ 1914, 313; SZÉKELY, BARTÓK 1979, 56–57; ZAHARIA *et alii* 1981, 3–4.

with the vessel. This suggests the possibility that a type of kiln with a simpler structure but using the same controlled air-draft principle might have been used as well.

5. The experiment results indicate that a monocameral horizontal structure would be sufficient enough to obtain similar results. The kiln dimensions, in particular its diameter, can be established only in relation to the number of vessels which are to be fired and to the quantity of fuel needed. The single chamber of kiln would fulfil all the functions and fired conditions controlled precisely by the potter. We intend to check this working hypothesis in terms of a new experiment in further research.

Acknowledgments. This work was supported by a grant from the Romanian National Authority for Scientific Research, CNCS–UEFISCDI, project number PN-II-RU-TE-2012-3-0461.

References

ALAIBA, R. 2007. *Complexul cultural Cucuteni-Tripolie. Meșteșugul olăritului*. Iași.

ANGHEL, D. 2011. Experimente de ardere a ceramicii în cuptoare de tip arhaic. *Terra Sebus. Acta Musei Sabesiensis* 3, 339–350.

BABA, M., SAITO, M. 2004. Experimental studies on the firing methods of black-topped pottery in Predynastic Egypt. In: S. Hendrickx, R.F. Friedman, K.M. Cialowicz, M. Chlodnicki (eds), *Egypt at Its Origins. Studies in Memory of Barbara Adams*: *proceedings of the international conference "Origin of the State, Predynastic and Early Dynastic Egypt"*, 575–589. Krakow.

BINȚINȚAN, A. 2013. Arheologie experimentală. Arderea controlată în aer liber – o posibilă modalitate de obținere a efectului cromatic black-topped. *Buletinul Cercurilor Științifice Studențești* 19, 7–19.

BINȚINȚAN, A. 2014. Arheologie experimentală. Arderea în instalația verticală – o posibilă modalitate de obținere a efectului cromatic black-topped. *Buletinul Cercurilor Științifice Studențești* 20, 5–16.

BINȚINȚAN, A. 2015. Confecționarea experimentală a ceramicii preistorice: tehnica presării în forme de lut. *Analele Banatului S. N., Arheologie–Istorie* 23, 89–100.

BORREGAARD, T. 2005. Experimental kiln firings: why bother? *Bulletin of the Northern California Experimental Firing Group* 3, 23–33.

BUKO, A. 2008. Ceramology: what is it and way? *Archaeologia Polona* 46, 15–27.

COLE, J. 2014. *Archaeology by experiment*. New York.

COMȘA, E. 1976. Caracteristicile și însemnătatea cuptoarelor de ars oale din aria culturii Cucuteni-Ariușd. *Studii și Cercetări de Istorie Veche și Arheologie* 27 (1), 23–33.

DAWSON, D., KENT, O. 1984. Methods of kiln reconstruction. *Bulletin of the Experimental Firing Group* 2, 13–17.

DAWSON, D., KENT, O. 1985. Kiln superstructures — the Bickley experiments. *Bulletin of the Experimental Firing Group* 3, 70–79.

DAWSON, D., KENT, O. 1987. Experiments in reduction firing. *Bulletin of the Experimental Firing Group* 5, 34–41.

DRAȘOVEAN, F. 2004. Transylvania and the Banat in the Late Neolithic. The origins of the Petrești culture. *Antaeus* 27, 27–36.

DRAȘOVEAN, F. 2005. Zona thessalo-macedoneană și Dunărea mijlocie la sfârșitul mileniului al VI-lea și la începutul mileniului al V-lea a. Chr. *Apulum* 42, 12–26.

DUMITRESCU, Vl., DUMITRESCU, H., PETRESCU DÎMBOVIȚA, M., GOSTAR, N. 1954. *Hăbășești. Monografie arheologică*. București.

EISSA, H.A., SALLAM, S.A., TAIEL, F.M., KEZTHELYI, L. 1974. Moessbauer effect study of Ancient Egyptian pottery and the origin of the color in black ware. In: A. Bishay (ed.), *Recent Advances in Science and Technology of Materials III*, 85–98. London–New York.

FABBRI, B., GUALTIERI, S., VARVARA, S., GLIGOR, M. 2008. Archaeometric characterisation of Foeni pottery from the Alba Iulia-Lumea Nouă archaeological site (Romania). In: C. Cosma, S. Varvara, M. Gligor (eds.), *Vârste absolute prim metode nucleare de datare*, 128–139. Cluj-Napoca.

FABBRI, B., GLIGOR M., GUALTIERI S., VARVARA S. 2009. Archaeometric comparison between the Neolithic pottery of different cultures at the archaeological site of Alba Iulia (Transylvania, Romania). *Studia Universitatis Babeș-Bolyai, Geologia* 54(1), 23–26.

GLIGOR, M. 2007. Foeni cultural group. In: B. Ciută, C. Florescu, M. Gligor, P. Mazăre, C. Șuteu, S. Varvara, *A history lesson — pottery manufacturing 8000 years ago*, 51–63. Alba Iulia.

GLIGOR, M. 2008. Contribuții la repertoriul descoperirilor aparținând grupului Foeni pe teritoriul României. *Patrimonium Apulense* 7-8, 11–18.

GLIGOR, M. 2009. *Așezarea neolitică și eneolitică de la Alba Iulia–Lumea Nouă în lumina noilor cercetări*. Cluj-Napoca.

GLIGOR, M. 2014. Începuturile eneoliticului timpuriu în Transilvania: o abordare bayesiană. *Analele Banatului S.N., Arheologie–Istorie* 22, 91–105.

HARRY, K. G. 2010. Understanding ceramic manufacturing technology: the role of experimental archaeology. In J.R. Ferguson (ed.), *Designing Experimental Research in Archaeology. Examining Technology Through Production and Use*, 13–45. Colorado.

HENDRICKX, S., FRIEDMAN, R., LOYENS, F. 2000. Experimental archaeology concerning black-topped pottery from Ancient Egypt and the Sudan. *Cahiers de la Ceramique Egyptienne* 6, 171–187.

HOREDT, K. 1949. Săpături privitoare la epoca neo-eneolitică. *Apulum* 3, 44–66.

LÁSZLÓ, F. 1914. Fouilles à la station primitive de Erösd (1907–1912). *Dolgozatok-Cluj* 5 (2), 279–386.

LUCAS, A. 1929. The nature of the colour of pottery, with special reference to that of ancient Egypt. *Journal of the Royal Anthropological Institute* 69, 113–129.

LUCAS, A. 1932. Black and black-topped pottery. *Annales du Service des Antiquités de L'Égypte* 32, 93–96.

MAKKAY, J. 2007. *The excavation of Early Neolithic sites of the Körös culture in the Körös valley, Hungary. The final report I. The excavation: stratigraphy, structures and graves*. Trieste.

MANIATIS, Y. 2009. The Emergence of ceramic technology and its evolution as revealed with the use of scientific techniques. In: A.J. Shortland, I.C. Freestone, T. Rehren (eds.), *From Mine to Microscope: Advances in the Study of Ancient Technology*, 1–18. Oxford.

MARKEVIĆ, V.I. 1981. *Pozdnetripol'skie plemena Severnoi Moldavii*. Chișinău.

MILLSON, D.C.E. 2010. Introduction. In: *Experimentation and interpretation. The Use of Experimental Archaeology in the Study of the Past*, 1–7. Oxford.

MINICHREITER, K. 2007. The white-painted Linear A Phase of the Starčevo culture in Croatia. *Prilozi Institute of Archaeology* 24 (1), Zagreb , 21–34.

MINICHREITER, K., BOTIĆ, K. 2010. Early Neolithic burials of Starčevo culture at Galovo, Slavonski Brod (Northern Croatia). *Documenta Praehistorica* 37, 105–124.

OUTRAM, A.K. 2008. Introduction to experimental archaeology. *World Archaeology* 40(1), Routledge, 1–6.

PAARDEKOOPER, R., FLORES, J.R. 2014. *Experiments pasts. Histories of experimental archaeology*. Leiden.

SÂRBU, G. V. 2015. Goncharnye kompleksy pozdnego èneolita Pruto-Dnestrovskogo mezhdurechja (po materialam poselenija Trinka-Izvorul luj Luka. *Stratum Plus. Archaeology and Cultural Anthropology* 2, 171–178.

SZÉKELY, Z., BARTÓK, B. 1979. Cuptoare de ars oale din așezarea neolitică de la Ariușd. *Materiale și Cercetări Arheologice* 13, 55–57.

TENCARIU, F.A. 2004. Experiments on pottery manufacture. *Journal for (Re)construction and Experiment in Archaeology* 1, 85–92.

TENCARIU, F.A. 2009. *Instalații de arderea ceramicii în civilizațiile pre- și protoistorice de pe teritoriul României.* Unpubished PhD Thesis. Iași.

TENCARIU, F.A. 2010. Some thoughts concerning the pottery pyrotechnology in Neolithic and Chalcolithic. In: N. Bolohan, F. Mățău, F. A. Tencariu (eds.), *Signa praehistorica: studia in honorem magistri Attila László septuagesimo anno*, 119–140. Iași.

THÉR, R. 2004. Experimental pottery firing in closed firing devices from the Neolithic–Hallstatt period in Central Europe. A pilot study based on experiments executed at the Centre of Experimental Archaeology in Všestar. *Journal for (Re)construction and Experiment in Archaeology* 1, 35–82.

ZAHARIA, E., GALBENU, D., SZÉKÉLY, Z. 1981. Raport preliminar asupra săpăturilor din 1979 de la Ariușd, jud. Covasna. *Cercetări Arheologice* 4, 3–6.