

POTTERY KILNS FROM NORTH–WESTERN TRANSYLVANIA FROM THE 2nd – 4th CENTURIES AD

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Cuptoarele de ars ceramica din nordul și nord–vestul Transilvaniei în secolele II–IV p. Chr.

În cadrul acestei lucrări am încercat să aducem în discuție cuptoarele de ars ceramica din secolele II–IV p. Chr. din zona limitrofă Imperiului Roman de la nordul și nord–vestul provinciei Dacia.

Cuptoarele pentru ars ceramica reprezintă instalația centrală a unui atelier de olar, indiferent de perioada la care facem referire sau de populația care producea ceramica. Analogii pentru cuptoarele din nord–vestul Transilvaniei se găsesc în toate regiunile Daciei, inclusiv la sud de Carpați. Și în celelalte zone locuite de comunități de daci liberi de la est de provincia Dacia sau din Muntenia se întâlnesc o mulțime de analogii pentru cuptoarele de ars ceramică.

În nord–vestul Transilvaniei au fost descoperite 24 de cuptoare de ars ceramică, dintre care, din nefericire, doar 14 au fost publicate, în timp ce săpăturile de la Lazuri așteaptă de aproape trei decenii publicarea. Aceste cuptoare se împart, la rândul lor, în trei tipuri diferite, după modul în care au fost construite, tipuri de cuptoare întâlnite și în alte regiuni de pe teritoriul României, atât în Imperiu cât și în *Barbaricum*.

În concluzie se poate afirma faptul că atât apropierea geografică, cât și cea etnico–culturală a celor două populații, daco–romană în interiorul granițelor provinciei Dacia și barbară în zonele limitrofe acesteia, au generat un intens schimb, nu numai de mărfuri, dar și de tehnici sau procedee de producere ale acestora. Același fenomen s–a manifestat și în cazul produselor ceramice, dar și pentru modalitățile de construcție a atelierelor și a instalațiilor folosite în cadrul acestei producții.

Key words: *Barbaricum*, North–Western Transylvania, pottery kilns, ceramic production.

Ceramic production played an important role in the economy of the Roman provinces from the 2nd – 4th centuries AD. Also, the populations from the areas bordering the Empire borrowed some elements from the Roman way of life, and pottery made no exception. The study of ceramic production in the immediate vicinity of the province Dacia Porolissensis brings a new perspective on the trade relations between the two areas, but also on the level of acculturation from *Barbaricum*, "besieged" by the provincial Roman civilization. The trade of products generated in time also an exchange of production technology, leading to a technological Romanization of the barbarian population in the vicinity of the province of Dacia.

Background research: The archaeological research of the territories outside Dacia, generally known as *Barbaricum*, began in the 1950's and was intensified in the next decade. According to a parallel made between the situation in the area of the province of Dacia and that in Germania, the local populations in the territory bordering the Roman Empire received the name of „free Dacians”. This term encompasses several populations that had different degrees of Dacian origins. However, we feel that the term is somewhat misleading and can be misinterpreted thus we will use instead, in the next chapters of this study, the term „barbarian local population” or just plain „local population”.

In the period between the two World Wars we can find the first scientific papers presenting elements of archaeology and material culture of the Dacian population from outside of the Empire. The main themes approached in these studies include elements such as the territory inhabited by the population, their type of material culture or their ethnic composition. From the beginning, the absolute chronology of Dacian populations had been a controversial element, archaeology being the only source able to provide an answer to these uncertainties, albeit not entirely.

The first archaeological fieldworks undertaken in a site of the „free Dacians” in north-western Romania belong to the archaeologist Egon Dörner, who organized the first excavations in 1954 at Sântana¹, a locality in Arad County. During this period began also a fruitful scientific collaboration between Ion Horațiu Crișan and Egon Dörner, materialized through a series of excavations in several Dacians sites in the Arad Plain. The first excavations took place at Pecica, the famous eponym locality of the Bronze Age culture of Periam–Pecica, and they had lasted for four campaigns in 1960, 1961, 1962 and 1964². Further excavations were conducted at Arad Ceala³ in 1962, where there had been found a pottery kiln and many other mobile artefacts. The research in Arad Plain continued with the two campaigns from Cicir⁴ undertaken by Ion Horațiu Crișan, in 1965 and 1966, which identified a settlement that belonged to the local Dacian population.

At the same time there have been recorded a series of excavations and surveys in several localities in north-western Romania like in Moroda, Cociuba Mare, Rohani, Rîpa and Tinca⁵, most of them carried out by Sever Dumitrașcu, from Oradea, Bihor County.

In the summer of 1964 there have been excavated two survey sections at Medieșul Aurit⁶ (Satu Mare County), and in the autumn of the same year there have been found here two pottery kilns. The research, led by Sever Dumitrașcu and T. Bader, has continued also in 1965 and 1966, in each of these years having been discovered four pottery kilns. From what has been discovered so far, the ceramic production centre from Medieșul Aurit is the largest of its kind found in a site belonging to the local population near the Empire’s borders from Romania. The excavations from Medieșul Aurit led to the discovery of the necropolis corresponding to the settlement.

Following a field survey conducted in the spring of 1970 in the range of Călinești commune, in the point Rogoaze there have been found several specific traces of Dacian settlements belonging to the Roman period⁷. Thorough investigations were initiated on the 19th of September 1971 by Radu Popa and Carol Kacso which led to the discovery of several Dacian settlements. The findings were published by the two in an article in SCIVA in 1974⁸.

In the area of Sălaj County there have been conducted various excavations, mostly in Roman sites, but not exclusively, by Alexandru V. Matei, senior researcher at the Museum of Zalău, who made several interesting discoveries such as the ceramic production centre from Zalău – Mâții Valley⁹. He also published in 1979 a gazetteer of Dacian settlements across Sălaj County¹⁰ in the journal of the museum from Zalău.

¹ Dörner 1971, 681–693.

² Crișan 1978, 241–244.

³ Crișan 1978, 244–245.

⁴ Crișan 1978, 245–247.

⁵ Dumitrașcu 1993, 88.

⁶ Dumitrașcu, Băder 1967.

⁷ Popa, Kacso 1974, 561–570.

⁸ Popa, Kacso 1974, 561–570.

⁹ Matei 1997, 377–400.

¹⁰ Matei 1980, 229–254.

I. The production technology of ceramic vessels

Although the production of ceramic material is a rather complicated and lengthy process, its technological algorithm has been preserved in a great deal until present date. Thus, the pottery produced in modern workshops, especially handmade ceramics, undergoes the same process as ancient pottery, produced seventeen centuries earlier. The technological process of the production of ceramic vessels from the territory in question differs according to the two types of ceramic vessels produced in the barbarian area: wheel made vessels and vessels shaped by hand.

The vast majority of local pottery, household pottery, was shaped by hand being made of coarse ware, or semi–fine ware, as some experts would call it, fired in kilns with low–oxygen firing, thus superficially supervised. The technological process of this type of vessels is identical to that of the wheel shaped vessels, in terms of the main production stages as will be described in the following lines. The major difference consists in the fact that for this type of vessels the potter shaped the clay by hand into its final form on the working table. The ornaments of these vessels were done through incisions, the application of alveolar collars, networks of lines etc., before being dried in the final stage before firing.

The technological process of ceramics begins with the careful selection of the clay, the basic raw material in the manufacturing of any kind of ceramics¹¹. The clay used by the pottery craftsmen is an inorganic compound that contains in varying proportions aluminium silicate, limestone, iron oxides, magnesium, aluminium oxide¹² etc. This type of soil originates from the decomposition of natural marls and sandstones from Lower Jurassic and is mainly found in the Transylvanian Plateau, especially near rivers, but also in the north along the riverbeds of the Criş or Someş rivers.

The clay thus collected underwent a process of levigation¹³, practically of washing, through which it was cleaned of impurities. Therefore, the clay was at first well mixed with water until it became a fluid mass. This solution was passed through multiple decantation tanks to get purified¹⁴. In the first tank the larger and heavier impurities, such as sand, pieces of organic material, small stones etc, quickly subsided at the bottom of the tank leaving the finer particles suspended which were then over flown into the second tank, where the process was repeated. The great workshops which produced fine ceramics had several such tanks, while in other workshops, which produced pottery of lower quality, the decantation was done only once. The result of the process of decantation was a very fine solution which was then spread on large surfaces for the water to evaporate¹⁵. After evaporation it remained only a very fine powder which was then stored in dry containers to be further used for the preparation of the final paste used in ceramics production.

The respective powder was then mixed with water and a degreaser used by the potter as a binder of the ware, resulting in a fine and elastic paste. The paste was afterwards tempered, in the same manner as the baker kneads the dough the potter tempered the paste to break the elastic forces from its composition. The tempering procedure conducted to another very important benefit, the oxygen particles that would have otherwise risen to the surface of the paste during firing causing the vessel to crack, were eliminated through tempering, saving thus the entire process¹⁶. It is worth mentioning that this kind of procedure was not done for each separate

¹¹ Vitruvius III, 1–6.

¹² Vernhet 2002, 24–27.

¹³ Peacock 1982, 54.

¹⁴ Mitrofan 1999, 166–173.

¹⁵ Vernhet 2002, 29.

¹⁶ Vernhet 2002, 30–32.

vessel but for a whole charge of vessels. The potter made up a ball of paste that was afterwards cut into pieces and placed on the working table.

The instruments used by the potters had been partially preserved and archaeological excavations had revealed only what was kept of them. Wooden objects had been lost entirely, even the stone or metal ones had been preserved in precarious state. In the archaeological excavations conducted in the Roman settlement from Medieșul Aurit, where it used to lay a large production centre of ceramic vessels there have been found numerous types of tools and utensils used by the potters¹⁷. Thus, following the technological process step by step, one can attempt a description of this type of tools, as they had been discovered in Medieșul Aurit.

Among the first tools required by a potter, or more likely his apprentice, is the spade for digging after the clay. This tool is usually medium or small sized, made of iron, with a handle at the top¹⁸. It was used to extract the clay from the designated areas. Another type of instrument used by the potters and discovered in Dacia, is a type of knife, shaped like a *pelta*, which was used for cutting the paste before processing it on the wheel.

Probably the most important tool in the production of pottery is the potter's wheel used for shaping the vessels. It was made largely of wood, so that archaeological excavations had revealed very little pieces of what used to be. However, some components of the potter's wheels are easy to reconstitute, especially those made of clay and metal, meaning the central disc which had to be very heavy to insure the stability and balance of the wheel when it was span at relatively high speed. These discs were in the shape of a truncated cone, with the outer circle usually exceeding 10 cm in diameter and the inner circle measuring no more than 4 – 6 cm in diameter¹⁹. In general, these discs were made of ceramic but have not been always found along the discoveries of ceramic kilns and workshops. In the province of Dacia there are several discoveries of such objects²⁰, while in the north of the province this type of tool was not included in the published archaeological discoveries.

After the vessels had been shaped at the potter's wheel they were then stored in special places to dry off. Modern ceramic factories use an artificial dryer, meaning a room where the humidity is artificially reduced, for drying out the vessels. In Britannia have been found oven shaped installations that, according to the British specialists, were used as dryers²¹. Unfortunately none were found in Dacia, or the surrounding *Barbaricum*. Therefore they were stored in a shady but airy place where the sun heat could penetrate indirectly, because such vessels could have been compromised if they were dried quickly, only at the surface and not also in depth. Furthermore, the drying could not have been performed in early spring because the cold nights or even the frost could have caused the same damage as the strong sunlight²².

From the dryer the vessels were brought back on the work table for the final touches, sometimes by applying a fine slip, after which they were placed in the oven. Introducing the vessels into the oven was a very important step in the technological process of ceramic production. Even though it might sound like a commonplace practice, the loading of the vessels into the oven required much skill and carefulness. The orifices through which the vessels were introduced into the oven were narrow while the vessels were very fragile before undergoing the process of firing, thus there was a great risk for them to crumble through a wrong handling. The arrangement of the vessels into the oven also required certain rules, thus some of the vessels

¹⁷ Dumitrașcu, Bader 1967, 121.

¹⁸ Mitrofan 1995, 118.

¹⁹ Peacock 1982, 28–29.

²⁰ Mitrofan 1995b, 119.

²¹ Peacock 1982, 67.

²² Vernhet 2002, 24–37.

were placed closer to the source of hot air and others, on the contrary, farther, depending on the thickness of the vessel wall or the type of paste²³.

The process of firing, or "baking" the vessels was the most important and most spectacular. The firing of the vessels began immediately after the vessels had been arranged into the oven. Prior to the firing, the fuel was brought, mostly wood, which was then stacked near the oven to be at hand²⁴. The fire was lightened up in the stoking area, which lay right in front of the entrance of the kiln, afterwards being introduced in *praefurnium* and replenished with fire. The process of firing the vessels was usually quite long, as the heat accumulated slowly a lot of time was required to reach the necessary temperatures. The better the isolation of the kiln, the quicker it was to reach the optimum temperature as the heat was better preserved inside²⁵.

The first step in firing the vessels was to bring the temperature very slowly to 573°C, a temperature which caused mechanical changes inside the particles of quartz. These changes transformed the paste from a sticky state into a solid and dry material very similar to the finished product in terms of porosity²⁶.

In the second phase of the firing, the temperature was increased to about 950–1050°C. Starting from approx. 850°C objects can be referred to as *ceramic* objects, because at this temperature the chemical structure of the clay changes, acquiring the characteristics typical to ceramics²⁷. From this point on, in the third stage, the temperature of the oven was gradually decreased, because any sudden change in temperature could have led to permanent alteration of the pottery. The potter also had to know the precise moment when the temperature reached its climax, because after that point on began the process of vitrification of the quartz particles, and from 1200°C on we would be dealing with a completely different craft, the production of glassware.

Ceramic vessels, which, from different causes, had been vitrified were considered scrap and therefore scrapped. Normally scrap were fairly common, the margin of error being around 20–30%, i.e. around one quarter of a charge was compromised²⁸. Nowadays such a margin of error would cause the sudden bankruptcy of a business of this type, but in the Roman period it was considered acceptable.

During firing the vessels were decreasing in weight and size by about 10–15%, and if they did not decrease uniformly, as it frequently happened, the vessels would be scrapped. The colour of the vessels would also change, from greenish–gray, the initial colour of paste, into orange or brick–red.

Broadly presented, this was the technological process that the vessels and ceramic objects underwent in general, to turn from clay into ceramic.

II. Pottery kilns

Pottery kilns represent the central piece of a pottery workshop, regardless of the period we are referring to or the population producing the ceramics. The kilns were those constructions that by using a gradual firing helped to transform the clay products into ceramics through controlled temperature and oxygenation conditions.

As it will be presented in the following chapter, pottery kilns are archaeological complexes which deserve a special attention because they can provide a lot of information both

²³ Vernhet 2002, 24–37.

²⁴ Peacock 1982, 67.

²⁵ Peacock 1982, 68.

²⁶ Facincani 2001, 275.

²⁷ Facincani 2001, 275.

²⁸ Vernhet 2002, 24–37.

about the activities of a ceramic centre or workshop as well as on the ceramic production of a culture in general.

II.1. Structural components of pottery kilns

Regardless of their utility, for firing fine or coarse handmade ceramics, pottery kilns had a very similar structure, the differences consisting mainly in the compartmentalisation of the combustion chamber and the fire tunnel. Thus, briefly listed, the items which made up a pottery kiln are as follows: the stoke-pit or stoking area, the hearth, the entrance, the flue or fire tunnel, the combustion chamber, the perforated floor, the charge chamber (the oven), the superstructure (roof, where the case)²⁹.

The stoking area was situated in front of the kiln and it was used by the potters to supply fuel to the oven and to remove the ashes from the combustion chamber. Sometimes, it is also known as **the stoke pit**, for the semi-buried kilns, as it represents a pit near the entrance of the kiln that is often found in the archaeological excavations full of ash or carbonized wood³⁰. In many cases the “stoke-pit” is called by the archaeologists “the service pit”, this term being found especially in specialized articles published in the ‘60–‘70.

The entrance of the kiln is the component that links the stoking area with the flue. For small pottery kilns, it has a circular vaulted form at the top and the walls are perpendicular to the base of the kiln. Depending on the type of pottery kiln, they can have one or two entrances corresponding to the number of flues. In some cases a single entrance serves two flues which are divided inside the kiln but outside is visible only the main entrance.

The flue or fire tunnel (*praefurnium*) begins at the entrance of the kiln and ends in the combustion chamber. Through this tunnel the potters pushed the fire already lit towards the combustion chamber³¹. Often the fire tunnel is the place where the fuel is burned. The height of the flue is usually equal to that of the combustion chamber, and its length varies from case to case, between 0.80 m and 2 m. The flue of a pottery kiln belonging to the barbarian Dacian population can be of two types, single or double. The double-flue kiln is different from the single one through a partitioning made generally by the wall that supports the grill, which in this case continues inside the flue until the entrance of the kiln.

The combustion chamber or fire chamber is the part of the kiln where, at least partially, the combustion takes place and where, more importantly, there are being formed the hot gases resulting from the intense combustion carried out inside the *praefurnium*. The bottom of the fire chamber represents **the hearth of the kiln**, which is actually a floor starting from the entrance of the kiln and continuing throughout the combustion chamber. This was usually built of beaten clay, which with time became very solid because of the successive firings that took place inside the kiln. Sometimes these hearths were built of river stones stuck together with clay that after numerous firings had hardened and vitrified themselves. The lateral walls of the kiln also varied resulting in the typology presented further on based on the building technique. The vast majority of the pottery kilns were semi-buried meaning that the fire chamber was dug into the ground. For the smaller kilns or those functioning in smaller workshops, the walls of the fire chamber were not properly built but rather obtained through the digging of the chamber into the earth that was afterwards plastered with clay (Medieșul Aurit, Lazuri, Zalău – Valea Mâții etc.). For the larger kilns the lateral walls were built of clay and lined with a softer type of clay³². In

²⁹ Popilian 1976, 140.

³⁰ Swan 1984, 29.

³¹ Popilian 1976, 140.

³² Dumitrașcu, Bader 1967, 111.

general, the thickness of the walls belonging to the combustion chamber varied between 15 and 25 cm, depending on the size of the kiln and on the thickness and weight of the floor and of the pottery charge that had to be fired.

One of the most important components of a kiln, because it helps us determine its typology, is the **central pillar** that supports the grill or its replacement, **the median wall**, serving the same purpose. The central pillar was made of clay or adobe bricks and was built on the hearth of the kiln in its central part. The height of the pillar could have varied according to that of the fire chamber. The main purpose of the pillar was to sustain the perforated floor along with the ceramic charge that was arranged on its surface. With time and after successive firings, the central pillar along with the rest of the lower oven would harden. The median wall underwent the same process with the difference that this prolonged pillar divided the fire chamber into two parts. Sometimes the median wall was extended into the fire tunnel, from a few centimetres up to where it totally divided the fire tunnel of the fire chamber³³.

The fire chamber was delimited in its upper part by **the perforated floor**. Thus, the perforated floor was situated between the fire chamber and the oven, being a very important part of the kiln. The most important purpose of the perforated floor was to support the objects that were to be fired above the combustion room so they did not enter in direct contact with the fire. The second role of the perforated floor was to regulate the heat in the fire chamber. The hot air from the fire chamber passed through the perforated plate through its orifices, most of the times of a cylindrical shape, that could have been partially blocked depending on how much heat was needed in the chamber where the ceramic objects were fired³⁴. The perforated floor of the kiln was usually made of clay and its holes were perforated with wooden stakes that were stuck into the raw clay. Sometimes in the composition of these plates there can be found fragments of pottery or most often of tiles. The layout of these orifices was of two kinds, either in lines or in concentric circles³⁵. In general, the basic idea was that the orifices had to be situated at equal distances from one other and to be relatively close. In some cases, there have been found ceramic plugs inserted in some of the orifices used to regulate temperature by the partial obstruction of the hot air coming from the fire chamber into the oven³⁶.

The oven or the chamber where the ceramic objects were fired was situated next to the combustion chamber, vertically, being separated, as mentioned before, by the perforated floor of the kiln. The oven was used to store the objects during combustion, this being also the place where the objects underwent the process of firing. In most of the *barbarian* pottery kilns, the combustion chamber was sunken into the ground while the oven was elevated above the ground. This is the reason why out of this elevation there have never been preserved more than 10–20 cm. However, from the study of the fallen fragments we were able to identify the shape, dimensions and the composition of these chambers.

The shape and size of the oven vary depending on the type of kiln in question. Thus, at circular small-sized ovens this room is dome-shaped, somewhat semi-spherical. The oven was made of clay, and on the inside it was coated with tile pieces stuck together with clay³⁷. At the top of the dome there was an open space that was used for loading the pottery into the oven. Once the oven was full this orifice was then blocked with pieces of tiles bound together with clay. After successive usages, this chamber had to be rebuilt³⁸.

³³ Peacock 1982, 68.

³⁴ Floca et alii 1974, 26.

³⁵ As for the round shaped kilns, Apulum, Slăveni, Locusteni etc.

³⁶ Only at Micia we encounter such objects at kiln no. 4, Floca et alii 1971, 38.

³⁷ Popilian 1976, 140–141.

³⁸ Popilian 1976, 140–141.

The construction of the oven, namely of the clay dome that covered the oven, can be investigated largely through successive experiments and studies of experimental archaeology. It is unanimously considered that after the pottery had been arranged into the oven, it was covered by a superstructure made of wooden twigs that represented the skeleton of the dome which was then placed above the perforated floor. Afterwards, this skeleton of twigs was covered with clay in layers varying from 5 to 15 cm thick, with a high degree of irregularity in terms of shape and thickness. Also, this construction must have had a vent in the upper part, used for exhausting the smoke and gases resulting from the combustion inside the oven, but also to create an optimum circulation of the oxygen that fuelled the combustion. The partial or total obstruction of the vent would have resulted into a reducing firing that modified the chemical structure of the ceramics inside the oven.

II.2. The Typology of the Pottery Kilns in North, North–Western Transylvania

The typology of the pottery kilns in north and north–western Transylvania is not of great complexity. The relatively small number of kilns and especially the few ceramic centres discovered here do not allow the identification of a complex and differentiated typology.

The ceramic kilns from the territory of the *barbarian* population from north–western Transylvania are divided in terms of typology into two distinct types, namely those with a central pillar to support the perforated floor and those with median wall and two combustion chambers. The second type is also divided into two subtypes, the one with central wall but with a single fire tunnel and the one with two fire tunnels, resulting from the extension of the central wall into the tunnel until the entrance of the oven. It is also worth mentioning that this typology takes into account the different support systems of the perforated floor because this is the main element that differentiates between several types of kilns that are otherwise mostly identical. Also, no matter the preservation of the kilns this element is almost always easy to identify.

Type I, according to the previous enumeration, refers to round shaped kilns with a central pillar that supported the perforated plate. For this type of kiln, the fire chamber was buried into the ground and had a circular shape. Its maximum diameter was in the range of 1.20 m and 2.50 m and the height varied according to the diameter, from 0.60 m to 1 m high. The central pillar was built either by „sparing” it while digging the fire chamber, either from superposed adobe bricks bound together with clay. Also, the "floor" or the hearth of the fire chamber could have been paved with river stones, but in most cases it was built from a very thick layer of clay, which with time would become very rigid because of the intense combustion that took place in the chamber. Both the walls and the pillar were plastered with a layer of clay with a thickness varying from one oven to another, but not exceeding 2 cm.

The combustion chamber was loaded with fuel through a fire tunnel, about 1 m long, approx. 0.60–1.00 m high and about 0.40–0.80 m wide. The perforated plate was supported by the central pillar and had a thickness ranging between 10 and 25 cm. It was crossed by a series of circular orifices arranged either in concentric circles (two or three, depending on the size of the kiln) or in lines so that the hot air could have circulated more efficiently. Sometimes, the orifices of the perforated floor could have been arranged randomly on the plate.

Above the perforated plate laid the oven built as an arch in the shape of a truncated cone. The arch was built from clay that after successive combustion cycles would become hard as a brick. However, after each firing the arch had to be re–built because its upper part was destroyed to remove the vessels from the oven. The vessels had been placed into the oven through this orifice which was afterwards covered with tiles. In fact, in some cases, the whole wall of the arch was coated with tiles, placed over the layer of clay in order to maintain a

constant high temperature³⁹. After arranging the vessels inside the oven the fire was ignited and the entrance of the fire tunnel was gradually covered. At the end of the firing process the entrance of the tunnel was completely plugged.

This type of kiln is actually the most commonly found in archaeological excavations in the area of Dacia, especially when we are considering small workshops. In these cases the kilns served a small community and the vessels produced here were traded in a limited area. Such kilns were found only in Zalău – Mihai Viteazul⁴⁰ and Zalău – Valea Mății⁴¹. Their descriptions, insofar as they had been described by those who published them, can be found in the catalogue at the end of the present paper, together with the necessary references.

Type II. The second type of kilns generally refers to the kilns found in Medieșul Aurit, but also those from Lazuri fall into the same category. These were the kilns that had a wall separating the fire chamber to sustain the perforated floor. As already mentioned in the introduction of the paper this type of kiln is divided into two other distinct categories differentiated by the arrangement of the fire tunnel. Thus, there are **Type II–A** with median wall and a single fire tunnel and **Type II–B** with a median wall that divides the fire tunnel into two distinct chambers.

Type II–A is represented by round kilns that have a fire chamber divided into two parts by a wall built in the middle of the chamber sustaining the perforated floor. Under this category fall the two kilns from Satu Mare⁴², the 10 kilns from Lazuri⁴³ and Kiln no. 9 from Medieșul Aurit⁴⁴. The main feature of these kilns is the median wall that divided the fire chamber into two parts that had a common fire tunnel.

This type of kilns has broadly the same characteristics as the previous type, the central pillar being replaced by the median wall that sustained the perforated floor. The maximum diameter of these kilns is of 1.40 m in average, meaning that they are of medium size among the kilns found in north–western Transylvania.

The fire chamber was dug into the clayey ground and the walls were hardened through a series of successive combustions. As previously mentioned, this type of kilns could have measured between 1.30 and 1.50 m in diameter and between 0.28 m and 0.37 m in height. The hearth was built from clay while digging the fire chamber and after several firings it would have become hard as a stone⁴⁵. The median wall was of the same height as the fire chamber with a thickness varying between 0.20 m and 0.23 m. It was usually “spared” while the fire chamber was dug⁴⁶.

The perforated floor was 12–15 cm thick, already a standard for any type of kilns in Dacia or in its surroundings, varying because of its prolonged contact with the heat. The perforated floor was built of clay beaten on a wooden grill, most probably made of twigs, and had a series of orifices, arranged in parallel lines or in concentric circles.

Under **Type II–B** fall the round kilns with two fire chambers and two fire tunnels, one for each chamber. The fire chambers had a semicircular shape and were separated from one another by a median wall which played multiple functions: it divided the two chambers, it supported the perforated floor and it separated the two fire tunnels. Like for the previous type,

³⁹ Floca et alii 1974, Kiln nr. 5 from Micia.

⁴⁰ Matei 1997, 382–383.

⁴¹ Matei 1997, 378–379.

⁴² Dumitrașcu, Bader 1967, 107–125.

⁴³ Lăzin 1980, 136, note 6.

⁴⁴ Dumitrașcu, Bader 1967, 112.

⁴⁵ Matei 1997, 382–383.

⁴⁶ Lăzin 1980, 134.

the fire chamber was sunken into the ground and had a hearth made of clay strengthened by successive combustions. For some kilns of this type, such as Kiln no. 3 from Medieșul Aurit⁴⁷, the fire chamber had a smaller diameter than the perforated floor and the oven which led to the creation of a niche all around the inner wall of the oven where the perforated floor was placed. This technique of sustaining the perforated floor, adjacent to the median wall, supports the theories according to which in this type of kilns used to be fired larger quantities of vessels than in the previous ones presented in the paper⁴⁸.

Under the category of kilns with median wall and with two fire tunnels, or **Type II–B** as we have noted them, fall especially the kilns from Medieșul Aurit, besides Kiln no. 9⁴⁹ which has a single fire tunnel. According to their dimensions they are the largest ceramic kilns from the north–western Transylvania⁵⁰. Out of the nine discovered kilns of this type only for six of them there could have been determined the maximum diameters⁵¹. Five out of these six kilns had maximum diameters ranging between 2.75 m and 2.40 m and one of them, Kiln no. 3, had a maximum diameter of 1.60 m⁵². Considering that the average of the ceramic kilns belonging to the two typologies was of 1.20 m we can assess beyond doubt that these kilns from Medieșul Aurit had been designed for larger charges and had a greater production than other workshops found in the area of reference.

The typology of the kilns found in the barbarian territory from the north of the province of Dacia resembles to a great extent the geographical criterion of the discoveries. As we will demonstrate further on, the situation throughout the whole province of Dacia is different, and the typology of ceramic kilns should not have a regional character, especially when we are referring to such a small area. The conclusion that could be drawn after studying the typology of the kilns is that the manner in which the perforated floor is supported is rather connected to the dimensions of the kiln and not to cultural or other kind of influences. Furthermore, it is obvious that there is a stronger connection between Type I and Type II–A than between the latter and Type II–B, despite the existence of the median wall in both cases. Thus, for the first two types of kilns the central pillar and the median wall have a single purpose to support the perforated floor while for the third type the median wall that divides the fire tunnel has an extra role on top of supporting the perforated floor that of regulating the combustion and the circulation of hot air.

II.3. Analogies from other areas near the province of Dacia

The production of pottery is an economic activity, and as any economic activity it is designed to make profit. Economic and commercial interests were sometimes beyond political boundaries, the offer of the pottery workshops being in accordance to the demand for their products. Thus, we cannot analyze the pottery production from outside the borders of the Roman Empire, implicitly of Dacia, without mentioning the pottery production and workshops of the “Roman” ceramists from within the borders of the province. The trade between the barbarians and the Romans was intense and constant, even in times of military tensions and the pottery trade made no exception. In order to compete on the market of the Roman province the *barbarian* ceramists must have been forced to improve their production techniques, starting with the main „instrument” used in a pottery workshop, the kiln. Thus, analogies of the kilns

⁴⁷ Dumitrașcu, Bader 1967, 109.

⁴⁸ Dumitrașcu, Bader 1967, 107–125.

⁴⁹ Dumitrașcu, Bader 1967, 112.

⁵⁰ Lazin 1980, 133–141; Dumitrașcu, Bader 1967, 107–125; Matei 1997, 382–383.

⁵¹ Dumitrașcu, Bader 1967, 107–125.

⁵² Dumitrașcu, Bader 1967, 109.

from north–western Transylvania can be found throughout the regions of Dacia, including to the south of the Carpathians. Also in other areas inhabited by communities of barbarian populations, eastwards from Dacia or from Walachia there can be found a lot of similarities between the pottery kilns.

As it has been already mentioned in this paper, in north–western Transylvania there have been discovered 24 pottery kilns, out of which only 14 have been published⁵³, unfortunately, while the excavations from Lazuri have not been published for nearly three decades. These kilns were divided into three different types according to the manner in which they were built, also found in other regions from the territory of Romania, both in the Roman Empire and in *Barbaricum*.

The most underrepresented type of pottery kilns from north–western Transylvania is the first type, Type I – with central pillar, which is represented only by two findings from Zalău–Mihai Viteazul⁵⁴ and Zalău–Valea Mâții⁵⁵. In each of these sites there has been found a circular kiln with central pillar supporting the perforated floor. Both of the kilns had small dimensions, the first had 1.40 m in diameter⁵⁶ and the second had only 1 m in diameter⁵⁷. They were probably used for the production of fine pottery traded inside the Empire as it can be concluded from the analysis of the pottery found here⁵⁸.

However, in the province of Dacia circular kilns with central pillar were more frequent. Thus, there have been reported 44 kilns dispersed as follows: three to *Ampelum*–Zlatna⁵⁹ (Alba County), one at *Apulum*–Alba Iulia⁶⁰ (Alba County), one in *Buridava*–Stolniceni⁶¹ (Vâlcea County), five at Cristești⁶² (Mureș County), one at *Arcidava*–Enoșești⁶³ (Olt County), eighteen kilns at Micăsasa⁶⁴ (Sibiu County), one in *Micia*–Vețel⁶⁵ (Hunedoara County), nine kilns in *Romula*–Reșca⁶⁶ (Olt County), one in *Sucidava*–Celei⁶⁷ (Caraș–Severin County), two in Slăveni⁶⁸ (Caraș–Severin County) and two at *Tibiscum*–Jupa (Caraș Severin)⁶⁹. As it can be easily observed this type of kilns had been spread throughout the province, in very large numbers; in fact, in almost all important ceramic centres from Dacia there has been found at least one circular kiln with central pillar. What is really interesting is that these kilns have been found mainly in workshops producing fine, high–quality ceramics, in sites like Micăsasa⁷⁰ or *Romula*–Reșca⁷¹, where they were widely used and the only workshops from *Barbaricum*, where this type of fine pottery kilns⁷² has been found also used to produce fine, stamped ceramics, more precisely the two workshops near Zalău. The only hypothesis that could have been drawn from

⁵³ Matei 1997, 377–455; Dumitrașcu, Bader 1967, 107–125; Lazin 1980, 133–141.

⁵⁴ Matei 1997, 381–384.

⁵⁵ Matei 1997, 377–380.

⁵⁶ Matei 1997, 381–384.

⁵⁷ Matei 1997, 377–380.

⁵⁸ Matei 1997, 377–455.

⁵⁹ Lipovan 1983–1984, 301–317.

⁶⁰ Berciu 1947–1949, 180–187.

⁶¹ Petre 1968, 87–88.

⁶² Filimon 1940, 89–95.

⁶³ Preda, Grosu 1993, 43–56.

⁶⁴ Mitrofan 1990, 129–138.

⁶⁵ Floca et alii 1974.

⁶⁶ Popilian 1997, 7–21.

⁶⁷ Tudor 1966, 13–14.

⁶⁸ Popilian 1971, 633–634.

⁶⁹ Benea 1979, 302.

⁷⁰ Mitrofan 1990, 129–138.

⁷¹ Popilian 1997, 7–21.

⁷² The workshops from Zalău.

these facts is that the fine ceramic material was produced almost exclusively in this type of kilns. Thus, these kilns are known to have the smallest diameters both in the province of Dacia as well as north of it. Giving the fact that fine ceramic vessels were generally small, cups, bowls, fruit bowls, plates and other vessels used for serving, they required less space to be fired. Moreover, the charges of such vessels could not have been very large because as compared with other types of pottery this type was relatively expensive so the production must have been lower in terms of produced units. So far this hypothesis seems to have been the only one plausible in the given context, however we should not consider that this kind of kilns were used exclusively for the production of fine ceramics because it is difficult to believe that the majority of the kilns from Dacia could have produced only fine ceramics. The reality is that this type of kilns was smaller so they had been used for smaller charges of ceramics being preferred in the workshops that were producing stamped pottery made of fine paste.

This type of kilns was present also in the material culture of the local barbarian populations outside the Carpathian arch, in a number equal to the other types. There have been found many examples of such kilns at: Șcheia–Suceava⁷³ (Suceava County) and Dărmănești–Neamț⁷⁴ (Neamț County) belonging to the culture Vârteșcoiu–Poienesti. Kilns with central pillar belonging to the Sântana de Mureș–Černjachov culture have been discovered in settlements such as: Glăvăneștii Vechi⁷⁵, Trușești–"Pe Cuhă"⁷⁶, Fundenii Doamnei⁷⁷, Cucuteni–Băiceni⁷⁸ etc. All these kilns were small, having a maximum diameter of about 1.50 m, and had been built by carving into the clayey ground and „sparing” a central pillar. In Wallachia, in the Chilia–Militari culture, there have been discovered kilns belonging to the Type I only at Străulești–Bucharest⁷⁹ (Bucharest County) where there have been found two such constructions, situated at a distance of approx. 20 cm and having a common stoke pit. An important fact is that in Wallachia there have not been discovered yet any workshops resembling those from Medieșul Aurit or Lazuri⁸⁰ and the kilns found so far were situated only in rural civil settlements.

The second type of kilns discovered in north–western Transylvania is Type II–A, namely the type represented by circular wall kilns with median wall and a single fire tunnel. As reflected in some notes and references made by the author of the excavations⁸¹, George Lazin, in several articles, the group of kilns from Lazuri belongs to the category of median wall kilns, which also comprises the two kilns from Satu Mare⁸² and the Kiln no. 9 from Medieșul Aurit⁸³. In the province of Dacia there have been found only a few kilns belonging to this type⁸⁴, namely one kiln at Locusteni⁸⁵ (Olt County), two at Micăsasa⁸⁶ (Sibiu County), six at Potaissa–Turda⁸⁷ (Cluj County) and an atypical one in Orheiul Bistriței⁸⁸ (Bistrița–Năsăud County). The dimensions of the kilns discovered in Dacia are comparable to those outside the province, and

⁷³ Bichir 1966, 499.

⁷⁴ Bichir 1966, 500–502.

⁷⁵ Nestor et alii 1951, 67–68.

⁷⁶ Petrescu–Dâmbovița et alii 1955, 174–175.

⁷⁷ Bichir 1966, 505, note 34.

⁷⁸ Popescu 1965, 591.

⁷⁹ Bichir 1984, 26.

⁸⁰ Bichir 1984, 25.

⁸¹ Lazin 1980, 136, note 6 (unpublished discoveries).

⁸² Lazin 1980, 133–141.

⁸³ Dumitrașcu, Bader 1967, 112.

⁸⁴ For the pottery workshops from the province of Dacia the most common type of kilns is the one with central pillar with 44 kilns attested in 11 different settlements.

⁸⁵ Popilian 1976, 140–142.

⁸⁶ Mitrofan 1990, 129–138.

⁸⁷ Bărbulescu 1994, 109–110.

⁸⁸ Protase, Dănilă 1967, 557–561.

the construction technique is identical. Concerning the kiln from Orheiul Bistriței it should be noted that, although it is included in this category, it represents a unique kiln because it was built almost entirely of river rock bound with clay and its shape resembled a horseshoe⁸⁹.

Analogies for median wall kilns with a single fire tunnel have been found also in many locations from the regions to the east or south of the Carpathians. For Costoboci, the bearers of the Lipița culture, there are such discoveries in Botoșani–Dealul Căramidăriei⁹⁰, Trușești–"Pe Cuha"⁹¹ Cucuteni–Băiceni⁹² and Bucharest–Crângași⁹³. In Romania, there have been found kilns with median wall belonging to the Vârteșcoiu–Poienеști culture, at Butnărești, Țiflești, Șcheia–Suceava and Bălteni⁹⁴. Also, to the south of the Carpathians, in Wallachia, in the area of the Chilia–Militari culture there have been discovered kilns with median wall at Mătăsaru and Colonești–Mărunți⁹⁵. In light of these findings it can be concluded that in the area of the Dacian cultures, outside the province of Dacia, median wall kilns with a single fire tunnel were most often used and their dimensions, construction method as well as their general characteristics were very similar both within the same culture and between different cultures.

The kilns belonging to the Type II–B, according to the typology proposed in this paper, did not have typological correspondent in the Roman province of Dacia. The Roman kilns with two fire tunnels were generally large, rectangular shaped and usually made of brick. These were large industrial kilns that have been found in *Sarmizegetusa*⁹⁶ (Hunedoara County), *Micia–Vețel*⁹⁷ (Hunedoara County) and Gornea⁹⁸ (Caraș–Severin County). Their large majority, the kiln from Sarmizegetusa and three out of the four kilns found in Micia, were used for the firing of construction materials, thus only two kilns of this type found in Dacia, one in Gornea and one in Micia, had been used for the production of ceramic vessels. Since there was no brick production in the barbarian territory, it was alleged that this type of kiln was built here because of the need for large and strong kilns used for the firing of larger vessels or of bigger charges. The ceramic workshop from Medieșul Aurit⁹⁹ is the only place where has been found this type of kilns, nine out of ten being of this type. In the other areas inhabited by Geto–Dacians represented by the Lipița, Vârteșcoiu–Poienеști or Chilia–Militari cultures, has not been certified explicitly this type of ceramic centres. However it is not excluded for such kilns to have existed, but unfortunately in some cases, the initial publication of the excavations is inconclusive in this regard.

IV. Ceramic material from the archaeological contexts of the kilns

Naturally, one cannot analyse ceramic workshops without mentioning their main purpose: the production of pottery, i.e. ceramic vessels of all types. If in the Roman areas the ceramic centres produced a large variety of ceramic products, not only vessels, in the barbarian territory outside the province of Dacia there has been certified only the production of ceramic vessels in centres subscribing to the typologies briefly presented previously. Thus, there are missing from the

⁸⁹ Protase, Dănilă, 557–561.

⁹⁰ Bichir 1966, 505.

⁹¹ Petrescu–Dâmbovița et alii., 174–175 (Kiln nr. 2).

⁹² Bichir 1966, 505.

⁹³ Zirra, Tudor 1954, 312–315.

⁹⁴ Bichir 1966, 489–503.

⁹⁵ Bichir 1984, 26.

⁹⁶ Floca 1944, 431–440.

⁹⁷ Floca et alii 1974.

⁹⁸ Benea 1982, note 32.

⁹⁹ Dumitrașcu, Bader 1967, 107–125.

analysis of the barbarian ceramic products objects such as terracotta statuettes, medallions and amulets of ceramics, ceramic lamps (excluding the discussion around the so called "Dacian cup") etc.

Ceramic production has always been an economic activity which implied that the resulting pottery was traded for profit. Thus, as in any other economic activity, the production of ceramic vessels depended on the law of supply and demand determining the ceramic workshops to produce the type of pottery that was selling best in the area or within the range where the trade makers of the workshops used to carry out their activity. Furthermore, we cannot exclude the hypothesis, although not supported by archaeological evidence, that some ceramists sometimes worked to satisfy the orders received from their clients. Thus, by studying the pottery collected from the stratigraphic sequences contemporary to the discovered pottery kilns there can be conducted an analysis of market for which these vessels had been produced, an analysis with a higher relevance for the kilns where there have been found rebutted charges or a large ceramic inventory in their stoke pit. Unfortunately, in north-western Transylvania, only one such discovery has been made, in Zalău-Mihai Viteazul¹⁰⁰ where there has been discovered a group of 12 rebutted vessels in primary position on the perforated floor of the kiln.

The most interesting pottery discoveries, made in the same context with the ceramic kilns, are those from Zalău, in the two points from Valea Mâței and the 104–106 Mihai Viteazul Boulevard mentioned above. In these two points there have been found two kilns used for the production of fine, grey pottery very similar to the imported one as quality and the typology of shapes. In the Valea Mâței point there have been found both fine and coarse ceramics, both categories of material being whell-thrown¹⁰¹, and this observation applies only to pottery found in the oven and the stoke pit. The pottery made of fine paste is grey, as a result of reducing combustion and was represented by fragments of plates or bowls, with the ring shaped base of small and medium size. The decoration of these vessels was made by stamping, the motifs being diverse, from rosettes, stylized floral motifs to various geometric patterns¹⁰². The vessels were stamped in their upper part, usually below the rim with a metal instrument containing etching model. Coarse ceramics was represented by fragments of pots with the straight base and curved walls, jar-shaped, or tall cups with handle¹⁰³.

The kiln discovered in Zalău – Mihai Viteazul is more relevant for determining the pottery it produced because inside of it there has been found a group of 12 “rebutted” vessels¹⁰⁴, in primary position, piled up for firing. The only logical assumption for this situation is that the kiln was decommissioned suddenly, right during the firing of a charge. The group of 12 vessels that were part of that charge were not rebutted, as was noted in the bibliography, but were rather abandoned inside the kiln, which led to their deterioration. Generally scraps were discarded and could not have been found on the perforated floor of the kiln, thus it is very likely that the 12 vessels represented the last charge loaded into the kiln, which for certain reasons was not removed from the oven. The vessels belonged to the category of grey ceramics, stamped, with fine paste and dark varnish. The shapes were similar to those of the pottery found in the kiln from Valea Mâței, i.e. plates and bowls, with ring shaped base and the slightly flaring rim¹⁰⁵. The stamped decoration was placed also in the upper part of the vessels under the rim, and consisted of rosettes and stylized vegetal decoration. Inside the kiln and across its entrance there have been found no less than 217 ceramic fragments of the type presented previously, dark and

¹⁰⁰ Matei 1997, 381–387.

¹⁰¹ Matei 1997, 380.

¹⁰² Matei 1997, 380.

¹⁰³ Matei 1997, 380.

¹⁰⁴ Matei 1997, 383.

¹⁰⁵ Matei 1997, 384.

stamped. It should be noted that for this type of pottery there have not been found any analogies in any of the ceramic centres in the regions inhabited by other Dacian populations, from Moldova and Wallachia. Therefore this is clearly a local trend of imitating the wheel shaped vessels from the Roman Empire.

This type of stamped ceramic has analogies both at Medieșul Aurit¹⁰⁶, and especially in Satu Mare¹⁰⁷, where we have the same proportion of fine and coarse ceramics. Also, only a few kilometres from Zalău, at Moigrad, in the Roman fort at *Porolissum*¹⁰⁸ several discoveries have been made supporting the idea that the barbarian craftsmen from Zalău exported ceramic products in the Roman Empire.

In Satu Mare the stamped grey pottery is represented by the largest number of fragments and has the most various shapes as compared with the fine ceramics found in any of the workshops examined in this paper. Thus, in Satu Mare there have been found pottery fragments belonging to vessels such as: plates with dark varnish, a pitcher with one handle, a small pot with thin walls and flaring rim, a plate with stamped decoration, a bowl with a ring shaped base, another bowl with flaring rim and ring shaped base and a plate with round base on the inside¹⁰⁹. The stamped decoration of the bowl consists of concentric circles and rosettes placed on the upper part of the vessel under its rim. The pitcher with one handle is decorated with small fir trees specific to the Dacian pottery from the classical period of this culture. In the workshop from Satu Mare there have been also discovered four fragments that belonged to some handmade vessels of porous fabric that seemed to have been parts of a “pot/jar” and the base of a Dacian cup. It is unnecessary to mention any analogies for the latter vessels, since we are dealing with two ceramic symbols of the Dacian culture, found in all its settlements and necropolises. Such vessels were found in all forts within the province of Dacia¹¹⁰, but it is impossible to believe that they used to be imported from outside the *limes*¹¹¹, their production being relatively simple and their value very low. An argument in this regard is the fact that most of the handmade pottery from the forts in Dacia Porolissensis has a brown–reddish colour¹¹², implying an oxidizing combustion in the technological process, while the vessels produced north–west of the province underwent in great proportion, a reducing firing, resulting in a gray–blackish colour.

Regarding the production of ceramics the only Dacian ceramic workshop was situated in Medieșul Aurit, where local pottery, either handmade or wheel–thrown, was prevailing¹¹³. However, the most common was the pottery shaped by hand on the potter’s table in the various typological forms, all with analogies in the different cultures of the local barbarian population. In this workshop there have been found large ceramic vessels made of coarse paste, usually without decoration, manufactured in kilns with reducing firing. In fact, apart from some fragments that had belonged to large *dolia*, all vessels were of dark blackish–gray colour, revealing a method of production preferred by the Dacian potters¹¹⁴. Very frequent were also the Dacian cups with one handle, some decorated with an alveolar belt in their lower part, just above the base. In addition to these types of pottery there have been found bitronconic vessels of different sizes, made of the same type of coarse paste, with degreasers like gravel or sand.

¹⁰⁶ Dumitrașcu, Bader 1967, 107–125.

¹⁰⁷ Lazin 1980, 133–141.

¹⁰⁸ Gudea 1980, 104–144.

¹⁰⁹ Lazin 1980, 133–141.

¹¹⁰ Gudea, Moțu 1988, 229–250.

¹¹¹ Gudea, Moțu 1988, 235.

¹¹² Gudea, Moțu 1988, 232.

¹¹³ Dumitrașcu, Bader 1967, 109–116.

¹¹⁴ Dumitrașcu, Bader 1967, 116.

The pottery discovered in the archaeological contexts of the kilns from the four ceramic centres presents no difficulties in terms of typological classification and cultural determination. Thus, we are clearly dealing with communities where the Dacian element was predominant and the pottery with Roman influences proves the fact that at the boundaries of the Roman Empire the commerce with luxury products had two ways¹¹⁵. The large quantity of Dacian pottery like the specific cups, pot-jars, plates etc. are clear evidence of the continuity of the local element among other foreign influences, like the Germanic peoples that have created turmoil at the northern borders of the province of Dacia Porolissensis in 2nd – 3rd century AD.

Conclusions

The geographical, ethnical and cultural proximity between the two populations, the Daco-Romans inside the province of Dacia and barbarian population, in the so called Dacian area in the neighbourhood of the Roman province, have generated an intense trade, not only of goods, but also of techniques and production processes. The same phenomenon occurred in the case of ceramics and pottery kilns. The area that we proposed for our research in the present paper was very important from a political and military point of view although limited in size. The movements of populations throughout this territory led to the creation of ethnically diverse settlements in which the Dacians were the predominant element.

The pottery kilns in the north-western Transylvania are in general common in terms of construction and the pottery they produced, however they are relevant to this research because they allow us to make the comparison with the Roman pottery production or of other cultures belonging to the barbarian population. Thus, there can be observed that the barbarian potters from outside the province of Dacia used the same technology and even managed to produce, in some extent, the same quality of products with that of the Roman ceramists from the province. In this respect we have made references throughout the paper to other kilns discovered in Dacia.

The conclusions we can draw after a brief overview of the material produced in the ceramic centres in north-western Transylvania are generally assumptions more or less documented. Thus, resuming an idea expressed many times throughout this work, according to their specific shape and size, the pottery kilns were generally specialized in one particular type of pottery. Thus, the workshops from Medieșul Aurit were producing large ceramic vessels in local style, used for cooking, storing or transportation¹¹⁶. To be a profitable business the production of ceramics needed to be large in terms of produced units, hence the numerous pottery kilns found in this centre. Recent geomagnetical survey researches made at Medieșul Aurit have revealed 80–100 possible kilns in the site where the others were found¹¹⁷. The smaller ceramic centres had smaller and fewer kilns that were producing decorated vessels of fine fabric. These vessels had smaller dimensions being used only for serving food thus the productivity of the workshop remained high despite having only one kiln, like the two workshops from Zalău.

The pottery production from north-western Transylvania subscribes, from all points of view, to the ceramic industry in this part of Europe, irrespective of political boundaries or ethnic and cultural influences. The kilns from Micăsasa (Sibiu County) that used to produce *terra sigillata* were similar to those in Zalău and Satu Mare, the differences between the vessels fired inside of them being determined by the ethnic and cultural differences between inhabitants of Dacia and those from *Barbaricum*. In addition, it should be noted that one cannot determine the ethnic identity of the craftsmen who built and used pottery kilns, thus the phrase "the kilns of

¹¹⁵ Gudea 1980, 111.

¹¹⁶ Dumitrașcu, Bader 1967, 107–125.

¹¹⁷ Private information, unpublished survey, provided by Robert Gindele.

the free Dacians" expresses the period and area of the ceramic workshops not the ethnic origin of the potters. For a better clarity over the several issues related to the production of ceramics in north–western Romania we are expecting with great interest the publication of the excavations from Lazuri, along with the great ceramic centre found there.

THE CATALOGUE OF THE ARCHAEOLOGICAL DISCOVERIES

For a better understanding of this section we considered necessary some clarifications from the very beginning of the abbreviations used in the section dedicated to technical data as follows:

Dmax = maximum diameter;

H = height

W = width

Dp = diameter of the pillar;

Hp = height of the pillar/partitioning wall (where applicable);

Lt = length of the fire tunnel;

Lw = length of the median wall;

Wt = width of the fire tunnel;

Ht = height of the fire tunnel;

1–10. Medieşul Aurit (Satu Mare County)

1. Kiln No. 1

a) Point: Şuculeu.

b) Kiln Type: **Type II B** (with median wall).

c) Technical data: Oven: Dmax = 245 cm. Wall: Dp = 38 cm, Hp = 35 cm. Fire tunnels: Lt₁ = 37 cm, Ht₁ = 56 cm, Lt₂ = 26 cm, Ht₂ = 40 cm.

d) Archaeological context: The first kiln from Medieşul Aurit was discovered in 1964 at a depth of approx. 30–40 cm below the current ground. The kiln had a median wall to support the perforated floor, a wall that separates the fire chamber into two parts. Thus, there were two entrances used for supply, one for each of the two combustion chambers. The floor was perforated to ensure hot air circulation from the fire chamber to the oven. These orifices were arranged in four rows, out of which only eight have been preserved, with diameters of about 15 and 20 cm. Across the kiln was the stoke pit (590 x 350 cm) which had a depth of 170 cm.

e) Date: 3rd century AD.

f) References: Dumitraşcu, Bader 1967, 107–108.

2. Kiln No. 2

a) Point: Şuculeu.

b) Kiln Type: **Type II B** (with median wall).

c) Technical data: Oven: Dmax = 260 cm. Wall: Dp = 38 cm, Hp = 70 cm. Fire tunnels: Lt₁ = 50 cm, Ht₁ = 40 cm, Lt₂ = 40 cm, Ht₂ = 35 cm.

d) Archaeological context: The walls of the oven have been preserved on a height of approx. 40 cm, resulting that it was probably in the shape of two irregular truncated cones. The walls of the fire chamber and the separating wall were made of earth. The fire tunnel and entrances were directed eastwards and had an oval stoke pit nearby (356 x 165 – 135).

e) Date: 3rd century AD.

f) References: Dumitraşcu, Bader 1967, 107–108.

3. Kiln No. 3

a) Point: Şuculeu.

b) Kiln Type: **Type II B** (with median wall).

c) Technical data: Oven: $D_{max} = 160$ cm. Wall: $W_t = 25$ cm, $H_p = 60$ cm. Fire tunnels: $L_{t1} = 50$ cm, $H_{t1} = 50$ cm, $L_{t2} = 48$ cm, $H_{t2} = 40$ cm.

d) Archaeological context: It is the best preserved kiln among the pottery kilns found in the centre from Medieșul Aurit. The hearth of the kiln was sunken into the ground with 170 cm than the current occupation level. The fire tunnel was divided in two by the median wall resulting in two supply mouths. The tunnel was built of clay on a casing made of wooden boards. The perforated floor was approx. 10 to 13 cm thick and had vent orifices arranged in parallel rows. From what has been preserved from the perforated floor there have been identified eight parallel rows of holes. For support, in addition to the central wall, the perforated floor also had a niche in the wall of the fire chamber. The oven has been preserved on a height of 60 – 70 cm, with walls having a thickness of about 20 cm; near the kiln there have been found fragments of black pottery with very fine fabric and black varnish.

e) Date: 3rd century AD.

f) References: Dumitrașcu, Bader 1967, 107–108.

4. Kiln No. 4

a) Point: Șuculeu.

b) Oven Type: **Type IIB** (with median wall).

c) Technical data: Oven: $D_{max} = 240$ cm. Wall: $H_p = 60$ cm. Fire tunnels: $L_{t1} = 52$ cm, $H_{t1} = 60$ cm, $L_{t2} = 32$ cm, $H_{t2} = 46$ cm.

d) Archaeological context: This complex was destroyed in a high degree so that there has not been preserved anything from the top of the kiln, only a part of the fire chamber and of the fire tunnels. An interesting characteristic of this kiln is the length of the fire tunnels of approx. 200 cm. Neither the stoke pit nor ceramics had been discovered inside the kiln.

e) Date: 3rd century AD.

f) References: Dumitrașcu, Bader 1967, 107–108.

5. Kiln No. 5

a) Point: Șuculeu.

b) Kiln Type: **Type IIB** (with median wall).

c) Technical Data: Due to the high degree of destruction this complex could not be measured conclusively.

d) Archaeological context: Kiln No. 5, found in Section VIII of the excavations, is almost entirely destroyed. From what has been preserved it can be observed that it had a round shape and that both the fire chamber and the fire tunnel were divided by a median wall. From the area of the kiln there has been collected pottery fragments belonging to vessels wheel-thrown, with fine or semi-fine fabric.

e) Date: 3rd century AD.

f) References: Dumitrașcu, Bader 1967, 107–108.

6. Kiln No. 6

a) Point: Șuculeu.

b) Kiln Type: **Type IIB** (with median wall).

c) Technical Data: Due to the high degree of destruction this complex could not be measured conclusively.

d) Archaeological context: This complex is also largely destroyed so the observations regarding it are relevant only for typological classification. Thus, the kiln is part of the category of kilns with median wall but its shape is rather semi-oval than round. The pottery discovered inside the kiln is worked on the wheel or shaped by hand.

- e) Date: 3rd century AD.
- f) References: Dumitraşcu, Bader 1967, 107–108.

7. Kiln No. 7

- a) Point: Şuculeu.
- b) Kiln Type: **Type IIB** (with median wall).
- c) Technical data: Oven: Dmax = 275 cm. Wall: Dp = 38 cm, Hp = 35 cm. Fire tunnels: Lt₁ = 56 cm, Ht₁ = 40 cm, Lt₂ = 56 cm, Ht₂ = 40 cm.
- d) Archaeological context: Kiln No. 7 falls under the same category as most of the kilns from Medieşul Aurit centre, having a round shape with median wall that supports the perforated plate. The flue is divided in two by the same supporting wall, and the dimensions of the two tunnels thus formed are the same. The lower part of the kiln was dug into the ground same as the median wall. The perforated floor and the fire tunnel were made by pressing the clay mixed with straw inside a wooden casing. In one side of the kiln there has been discovered a stoke pit (367 x 310 to 110 cm), semi–oval in section.
- e) Date: 3rd century AD.
- f) References: Dumitraşcu, Bader 1967, 107–108.

8. Kiln No. 8

- a) Point: Şuculeu.
- b) Kiln Type: **Type IIB** (with median wall).
- c) Technical data: Cannot be found in the existing literature (see bibliography).
- d) Archaeological context: The oven where the vessels were fired was completely destroyed. The furnace is divided into two by a median wall that also separates the flue. The stoke pit has a rich inventory consisting mainly of ceramic fragments belonging almost exclusively to *dolia*.
- e) Date: 3rd century AD.
- f) References: Dumitraşcu, Bader 1967, 107–108.

9. Kiln No. 9

- a) Point: Şuculeu.
- b) Kiln Type: **Type IIA** (with median wall and a single fire tunnel).
- c) Technical data: Fire tunnel: Lt = 70 cm, Wt = 50 cm, Ht = 37 cm
- d) Archaeological context: Kiln Nr. 9 is the only oven in Medieşul Aurit that has a median wall, but has only one supply entrance. In fact, the wall enters within the tunnel only on a distance of 10 cm. The kiln is otherwise identical to the others found in the settlement from Medieşul Aurit. The stoke pit is oval and is located outside the kiln, in its eastern side.
- e) Date: 3rd century AD.
- f) References: Dumitraşcu, Bader 1967, 107–108.

10. Kiln No. 10

- a) Point: Şuculeu.
- b) Kiln Type: **Type IIB** (median wall).
- c) Technical data: Oven: Dmax = 265 cm.
- d) Archaeological context: This kiln was found in Section X and has a relatively high degree of destruction. The combustion chamber is separated by a median wall constructed when the chamber was dug. In the stoke pit found near the kiln there have been found several fragments of pottery belonging to some *dolia*.
- e) Date: 3rd – 4th century AD.
- f) References: Dumitraşcu, Bader 1967, 107–108.

11–12 Satu Mare (Satu Mare County)

11. Kiln No. 1.

a) Point: Farm Nr. 2, former IAS Dorolț.

b) Kiln Type: **Type IIA** (with median wall).

c) Technical data: Oven: Dmax = 130 cm. Wall: W = 20 cm, H = 35 cm. Fire tunnel: Wt = 50 cm, Ht = 35 cm, Lt = 95 cm.

d) Archaeological context: From this kiln has been preserved only the combustion chamber, the median wall and a part of the fire tunnel. The walls of the combustion chamber are carved into the ground and burned along with the usual activities of a pottery kiln. The median wall was also made of earth burning hardened after successive firings. A particularity of the median wall is that it is stuck to the walls of the combustion chamber only in one side and continues inside the fire tunnel on a distance of approx. 15 cm without being stuck to it. The fire tunnel is dug into the ground and has an irregular shape, becoming narrower towards the entrance of the kiln. The perforated floor was fragmentary, collapsed inside the oven. After studying the fragments of the perforated floor there could have been inferred thickness of the perforated floor, approx. 10 to 12 cm, with holes of approximately 7 to 8 cm in diameter. The stoke pit is located in the eastern part of the kiln, at a distance of 55 cm from it, and has a circular shape with a diameter ranging between 120 and 125 cm and 105 cm deep. Inside the kiln there have not been found vessels or fragments of pottery. The pottery found in the archaeological context of the kiln is a specific to the Dacian population from 3rd – 4th century AD.

e) Date: 3rd – 4th century AD.

f) References: Lazin 1980, 134.

12. Kiln No. 2.

a) Point: Farm Nr. 2 former IAS Dorolț.

b) Kiln Type: **Type IIA** (with median wall).

c) Technical data: Oven: Dmax = 150 cm. Wall: W = 23 cm, H = 28 cm, Lw = 160 cm. Fire tunnel: Lc = 100 cm.

d) Archaeological context: From the kiln there has been preserved only the lower part of the combustion chamber, the median wall and a part of the fire tunnel. The kiln is greater than Kiln no. 1, yet it is poorly preserved. The construction method is identical and the stoke pit is common with the previous one.

e) Date: 3rd – 4th century AD.

f) References: Lazin 1980, 134.

13–14. Zalău (Chișinău, Sălaj)

13. Kiln No. 1

a) Point: Valea Mâții

b) Kiln Type: **Type I** (with central pillar).

c) Technical data: Oven: Dmax = 100 cm. Pillar: Dp = 38 cm, Hp = 35 cm. Fire tunnel: Lt = 45 cm, Wt = 40 cm, Ht = 20 cm.

d) Archaeological context: The kiln was discovered when performing utility work on Lupului street from Zalău, the top of the kiln was destroyed by blade of the excavator. The works affected the upper part of the kiln including the perforated plate that supported the vessels and the upper part of the pillar of support. The kiln was found at approx. 45 cm below the current occupation level. This type of kiln is circular having a cylindrical pillar that supported the perforated floor. It has a fire tunnel, located in the eastern part of the kiln. Also in the eastern

part there has been discovered a clay pit with a diameter varying between 120 and 200 cm whose depth does not exceed 100 cm. The pottery discovered inside the kiln is scattered on all its levels. The ceramics discovered inside the kiln is of several types, either fine gray and stamped ceramic or coarse ceramic shaped by hand. The most numerous is the fine gray pottery, worked on the potter's wheel and embossed with geometric decoration (circles, semi-circles, etc.). Typologically the ceramic fragments belonged to plates with ring shaped bases.

e) Date: 3rd century AD.

f) References: Matei 1997, 377–455.

14. Kiln 2

a) Point: 104–106 Mihai Viteazul Boulevard

b) Kiln Type: **Type I** (with central pillar).

c) Technical data: Oven: Dmax = 140 cm. Pillar: Dp = 45 cm, Hp = 35 cm. Perforated floor: W = 15–20 cm, Fire tunnel: Lt = 45 cm, Wt = 40 cm, Ht = 30–35 cm.

d) Archaeological context: The kiln was discovered in 1984 in the systematic excavations conducted in the place called „La Blocuri”, at the address 104–106 Mihai Viteazul Boulevard, in Zalău towards the exit to Șimleu. The kiln has been preserved in a very good state, being discovered at about 40 cm below the current occupation level. The kiln has a central pillar supporting the perforated floor, which has orifices arranged in two concentric circles. A particularity of this kiln is the discovery of a rebuffed charge found *in situ* on the grate. Among the ceramic fragments found inside the oven there should be mentioned a compact block of 12 ceramic vessels with fine gray fabric, decorated by stamping.

e) Date: 3rd century AD.

f) References: Matei 1997, 377–455.

15 – 24. Lazuri (Satu Mare County)

a) Point: Râțul Bela–Nagy Béla rét.

b) Kiln Type: **Type IIA** (with median wall).

c) Technical data: Given that the findings have not been published, the technical data are not available.

d) Archaeological context: In the systematic excavations carried out between 1974 and 1977 and 1979–1981 there have been discovered in the locality Lazuri, in the point „Râțul lui Bela”, near the Roman–Dacian settlement, a group of 10 pottery kilns, of circular shape, with median wall and a single fire tunnel. Both the complexes themselves and the material found around them are still unknown thus in this catalogue we can only record this discovery.

e) Date: 3rd – 4th century AD.

f) References: Lazin 1980, 134, note 6; Matei, Stanciu 2000, 61, item 79, no. 148.

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