

HYPOTHESES REGARDING THE POTTERY PRODUCTION AND CIRCULATION (THE 8th-12th CENTURY)

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Abstract: *Confirming the archaeological data and the ethnographical information, the author presents the reconstitution of an 8th-12th centuries potter workshop (structure, inventory, working area etc), to identify minimum of necessary time to produce the quantity of vessels (from the discovery of the clay source up to the burning process), some workshops production capacity and the spreading area of their production.*

Rezumat: *Coroborând datele arheologice cu cele etnografice, autoarea urmărește reconstituirea unui atelier de olar din sec. VIII-XII (structură, inventar, suprafață de lucru etc.), să identifice un minim de timp necesar pentru producerea unei cantități date de vase (de la descoperirea depozitului de lut până la procesul de ardere), capacitatea de producție a unor ateliere și aria de răspândire a mărfurilor acestora.*

Key words: *the 8th-12th century, pottery workshops, the production capacity.*

Cuvinte cheie: *sec. VIII-XII, ateliere de olari, capacitate de producție.*

The impressive quantity of pottery found in the 8th-12th century settlements permit the supposition the pottery art had an essential role for the economic activity of that period, the products being requested sufficiently by the community. As pottery is the most frequent material in the early medieval sites, sometimes the only one, we might believe there are no news about it, that all about ceramics is already known. But, one can easily see there are a lot of unknown aspects in connection with the pottery skill itself, as well as with this material circulation, aspects we are going to analyse in the next lines, but not pretending to finalize the discussion.

It is possible, we expected or wished to see also more often, during the researches, workshops and specific installations for this trade, based on which to be able to suggest hypotheses on the production capacity of such a „centre”. Retrospectively, taking into consideration the researches of the last seven decades, we record six pottery workshops and 29 kilns for burning pots, on the present territory of Romania¹. There is no doubt the small number of these complexes results from the extension of the inhabited areas, being already known the fact that working areas were situated, usually, at the outskirts of the settlements, both for practical reasons (the neighbourhood with different primary necessary resources) and the protection of the houses, understanding by that avoiding fires, or, in the situation of other trades, avoiding the remains with pestilential smells. The phenomenon is current mainly for large settlements or towns. Or, it can be possible in a later period, even during a modern one. Many workshops were near a water course. The changing of its direction or an increased output could be causes not permitting those complexes to last until our time. Not last, the research still incomplete of some sites or not knowing others can represent other causes, and, obviously, not the last ones.

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¹ We add to these few kilns found at Isaccea (Tulcea County) in the '90's of the last century, unpublished (piece of information offered by Gh. Mănușu-Adameșteanu, to whom we offer our gratitude), a possible kiln for burning pots (?) from Tuțcani, Mălușteni commune, Vaslui County (Diaconu 1987, 118; Teodor 1997, 160), as well as a possible workshop from Gornea-Căunița de Sus, Caraș-Severin County (Uzum, Țicu 1978, 298, note 30).

But now are going back to the already known information until our days. According to these, a potter in the 8th-12th century used to carry on his activity in an workshop with an area of about 5.5 × 5.5 m, including probably a table (sort of bench) for the potter, the wheel, an area to preserve the clay and other necessary materials (degreasing, ochre), possibly an oven to warm the chamber². Leaving aside the specific inventory, the workshop aspect was similar to an inhabited room. It used to have a floor of tread clay; in the deepen side, the walls could be covered by planks or stone, and in the superior side they could be made of knitted twigs on which there was applied clay; the roof was made of a wood framework on which there was set a stratum of reed sufficiently thick not to permit the rain water to pass over. When it was found, the trade complex from Garvăn–*Dinogetia* (Tulcea County) was still preserving an arranged area, higher with 12 cm from the floor, where there were two clay bowls and fragments of unburnt pots. The existence of some chalk pits inside the room floor, set at about 1 m from the northern side, let us suppose there were apertures for the potter table, of which it was possible to be also set the wheel „of the type with fixed axle”³. Otherwise, for the workshop from Garvăn–*Dinogetia* we have, for the moment, the most detailed description of such a trade complex⁴.

Appealing the ethnographical data, we are going to refer to everytime it is necessary during our study, for a possible supplement of its image, we'll see it is not very different from a traditional potter workshop (where there were not introduced the electrical wheel and mixer), of the last century and not only. Thus, we can add on the table to the above mentioned inventory a vessel with water mixed with some clay⁵ where the potter wets his hands during work to assure an easier clay moulding, their slide on its surface as well as a smothering of the pot surface⁶. We can also add on the potter table a vessel with sand or ashes for pressing on the wheel when there was necessary an easier detachment of the pots⁷; the comb used to finish the forms during moulding⁸; a leather or textile piece to polish the pots surfaces, after it was previously wet into the water, but especially the lip⁹; a wire to detach the pots from the wheel (when speaking about a rapid wheel)¹⁰; a comb with many teeth to achieve the horizontal cut lines or in wave¹¹; a small

² As it was reported at Garvăn–*Dinogetia* (Tulcea County), cf. Ștefan *et alii* 1967, 123, fig. 68-124.

³ Ștefan *et alii* 1967, 123.

⁴ At Isaccea (Baumann *et alii* 1998, 35) and Radovanu (Barnea 1993, 403) the finding of some potter workshops was only mentioned, at Capidava supposed based on kiln and a tool for decorating ceramics (Florescu, Florescu, Diaconu 1958, 247; Covacef 1980, 256, pl. 2/2 at 258; Diaconu 1987, 118), and at Sânnicolau Român revealed by the emergence in the neighbourhood of some kilns for burning pots of an „oval flat thick tempered clay mould and which was not used from the pots moulding” (Dumitrașcu, Crișan 1990, 104). Otherwise, the existence of such complexes can be supposed in all the sites where there were found kilns for burning pots.

⁵ A part of the clay in the vessel comes from the successive potter hands wetting, during work.

⁶ Mihăescu 2005, 53.

⁷ Florescu, Florescu, Diaconu 1958, 224.

⁸ This is wood, made, its trapezoidal shaped, thin and polished, and it has a hole, central or on a side, through which it is introduced the finger to be better kept. Usually, it is used for finishing the shapes, but in some workshops its corners could serve to achieve the horizontal cut lines or in wave. (Petrovsky 1975, 143; Vlăduțiu 1975, 350, fig. 92/4; Robea 1987, 55; Iordache 1996, 85-87, fig. 23/a at 86; Mihăescu 2005, 53).

⁹ Petrovsky 1975, 144; Iordache 1996, 88.

¹⁰ Iordache 1996, 86, fig. 23/c.

¹¹ In Dobruja this kind of bone combs, used to decorate the pots were found at Garvăn–*Dinogetia* (Barnea 1955a, 105), Capidava (Covacef 1980, 256, pl. 2/2 at 258) and Oltina (unpublished).

cogged wheel (where it is necessary). For the tools and the materials necessary making the decoration after the vessels were dried and burning (polished, dyed, enameled) we suppose the existence of a place specially arranged to keep them (wooden shelf; a tread clay „bed”; an extremity of the potter table or in one of the workshop corners, on the floor). A place to let the vessels dry, immediatly after they were made, we suppose the existence of some hung shelves¹². There would be also the potter chair, present in almost all the workshops with a rapid wheel. In the workshops with slow wheel, usually, the wheel was attached to the chair¹³, there was no potter table or being replaced by a simple wood bench. In this last situation we might say the term „workshop” is more generic, as the chair with the slow wheel being mobile can be displaced where the potter wanted to carry on his activity (a shed, close to the house, in open air, inside it for bad weather), which permitted though later to watch of the pots. This can be also a reason for which there were not identified yet the early medieval pottery workshops in many sites in the period, the trade being traced only by the kilns for burning pots. It is obvious in this case, anyway in majority as a working technique, the potter house could be an „workshop” as well, its inventory is being now in the digging with little exception (clay balls, comb for decoration etc.), but not compulsory, different from other complexes. An outbuilding for pots drying or storage after burning, seems enough necessary. Was it possible the skillful inhabitants borrow among themselves the slow wheel chair? If for pots burning installations the usage in „common” seems possible¹⁴, why not accepting a selective borrowing of the chair with the wheel. Maybe this way one can explain the existence of some different decorations (more rare, more hesitant etc.), of some shapes („innovations”?, copies ?), of the technological qualities of some vessels (difference in clay cleaning, rough general aspect etc.). It is only a hypothesis, enough difficult to accept, but not impossible. It seems more viable in the small settlements where the potter could be also a farmer, having some gains by lending installations.

In our opinion¹⁵, such an workshop could store about 40 average size pots/m², when they were still row, and, when, by superposing, about 100, after drying, but not been burnt. If we suppose that of the area of about 30 m² of the workshop (the Garvăn–*Dinogetia* one, found entirely, was 28 m²) the potter needed for his activity a minimum of 10 m², then, there would be an area of about 20 m² where he could store his pots until burning them. Here, one could store more than 700 unburnt pots. After burning, being more resistant, they could be placed on more levels and their number could increase evidently. A necessary hypothesis to have an idea about ther goods quantity the potter could sell at a certain moment (we mention the calculation was made for pots with the maximum diameter of 17-18 cm). Incidentally, we mention that though we are not aware about the existence of some workshop outbuildings-stores for this period, though, their presence could not be neglected totaly.

The final producing time (including burning) for 700 pots is, obviously, variable from one centre to another, the difference results from potter’s skill, the distance to the clay deposit and wood source, as well the climate conditions enough diverse from one area to another (low temperature, rainy weather and humidity representing factors to slow the production process).

¹² Their presence can be seen almost in all the working potter workshops in Romania in the last century (Petrovsky 1975, 154; Florescu 1958, 30; Robea 1987, 59; Bucur 1995, 228, 238; Mihăescu 2005, 65).

¹³ Bobrinski 1978, 56-57, fig. 21, 126-127, fig. 41.

¹⁴ In the last century the practice of the common usage of the kilns, as well as some necessary actions for production process in common were still noticed (Dunăre 1967-1968, 40).

¹⁵ Paraschiv-Talmațchi 2008, 44.

Appealing the ethnographical information, we try to identify a minimum of necessary time to produce 700 pots. There are areas where the large clay deposits (being exploited for decades) are to be found at some hills foot. These are the best situations, as the potter goes to a precise place, not losing time to find them. But even in this situation, he needs time, as in many situations, the superior quality clay can be found at 3-4 m depth¹⁶, 7-10 m¹⁷, even 12-15 m¹⁸, this meaning more working days¹⁹. Usually, in the pit destined to provide clay, the potter crosses patiently many strata choosing the right one: a stratum of brown ground (arable) of almost 0.90 m in height; one stratum of brown ground mixed with clay of about 0.80 m height; the clay stratum follows of about 0.50-0.80 m; then a sand one²⁰. The strata and their thickness are different from one area to another. In few areas, the clay could be found even in the potter's garden²¹, but this means an inferior quality demanding its mixture with a better clay to make it more resistant to the fire. But, usually, the potters should identify such places on rivers banks, where the clay deposits are formed in time and not in the same area²². One can loose even a week to identify them²³. In this last case the deposit is uncovered by the 15-20 cm thick sand stratum²⁴, sometimes more²⁵, and its exploitation for 2-3 days (usually meaning, one-two carriages/3-4 m³). The clay is put to dry near the deposit, two-four sunny days, than it is transported to the potter house. There are also situations when the clay is brought from about 5 km distance²⁶. Rarely it was recorded its buying²⁷.

For the early middle age only a comparative analysis of the pots paste from a site with the ground in the area could offer information about possible clay sources. In our country such analyses are very few. A case is that from Bucov (Prahova County) where the nuclear energy based analyses say, in the local settlements (Bucov-Tioca and Bucov-Rotari) all categories of common usage were produced, as well as Byzantine type enameled pots²⁸, showing a local clay source. At Nufăru (Tulcea County), following the investigations by activating neutrons on many

¹⁶ Maier 1964, 474; Petrescu, Stahl 1956, 12-13; Mihăescu 2005, 45.

¹⁷ Petrovsky 1975, 144.

¹⁸ Zderciuc, Butoi, Mihai 1969, 118.

¹⁹ Sometimes to reduce evidently the working time, even to one day, potters help among themselves (Petrovsky 1975, 144).

²⁰ Florescu 1958, 25-26.

²¹ Florescu, Mózes 1967, 136, 180.

²² Maier 1964, 474; Zderciuc, Butoi, Mihai 1969, 115; Robea 1987, 52; Iordache 1996, 78, 80; Florescu, Mózes 1967, 154.

²³ Antonescu 2000, 7.

²⁴ Paraschiv-Talmațchi 2006, 58.

²⁵ Leonov 2008, 55.

²⁶ Cărbăș 1971, 231.

²⁷ In February 1843 many families from a village in Wallachia were not content they had to pay for clay: „As we have a little trade with pottery and we had something on our land: only the clay, not talking about the wood; land agent did not let us to take, asking us money; he who did not have customs, but pots we gave”; „...and he sells the clay to other potters from other lands...” (Dumitrescu 1969, 466); the payment for the clay by the land owners was also done in the second half of the last century in some regions (Robea 1987, 52).

²⁸ The analyses were done in the National Laboratory Brookhaven (SUA) by prof. G. Harbottle and aimed „the paste of 19 trials, 17 of them representing the majority of the ceramics categories from the settlements Bucov-Tioca and Bucov-Rotari, a clay trial and a trial of burnt clay from a house” (Comșa 1978, 55, 112-113).

categories of pots found in or around a potter kiln (from the beginning of the 12th century) resulted that inside that installation there were burnt jar-pots, clay bowls and buckets, mostly of them made of „clay taken from one place”, few being those moulded using „clay taken from other places of the settlement”²⁹. But the kaolin pottery was coming from „different area and centres”, every trial (of five) presenting different particularities³⁰. At Garvăn–*Dinogetia*, E. Comşa made an investigation on the spot, finding from villagers that clay *can be found properly at the village end, near Dealul Mare*. The presence of that deposit makes possible the existence of local clay sources also at the end of the 10th century and in the first half of the next one, period for which chronologically here it is recorded a potter workshop (above mentioned) and three kilns for burning pots³¹.

Moulding previous stages. After the clay was transported in the potter workshop/house, there are some activities necessary before the moulding moment. These are: leaven, cleaning and working. The first two operations are different from one centre to another/from a potter to another. The cleaning role is to eliminate the big impurities (stones, vegetal remains), the operation including breaking up the clay with specific tools³². Then, the clay is put to leaven³³, and the clay is wet many times. This last operation is determined by the clay quality, the standard accepted by the potter, the market urgent demand. It can be a day³⁴, a week³⁵, a month³⁶, more than an year³⁷, being recommended to pass a winter as by winter freezing improves the clay quality³⁸. Working is the stage before moulding. By this operation, taking many hours, the small impurities are eliminated, the paste knots are destroyed and it becomes homogenous. The clay is stepped, working with hands and making clay balls³⁹.

The degreasing substance. We see very often in the specialized studies the expression „paste having as degreasing substance” and then follow words like: „sand”, „a large quantity of

²⁹ The analyses have been done at the Institute of Physics and Nuclear Engineering from Măgurele (Romania) by dr. S. Apostolescu and researcher E. Popescu and aimed „20 trials to represent in percentage all the found types” (Mănușu-Adameșteanu 1991, 67-73).

³⁰ Mănușu-Adameșteanu 1991, 72.

³¹ Ștefan *et alii* 1967, 127 and the note 124.

³² Gheorghe 1977, 39; Iordache 1996, 80.

³³ As a mass covered with something to maintain the humidity, in twig or wood enclosures, in pits fenced by stones (Iordache 1996, 80).

³⁴ Mihăilescu 1975, 116.

³⁵ Gheorghe 1977, 39.

³⁶ Robea 1987, 52; Leonov 2008, 55.

³⁷ Petrescu, Stahl 1956, 13; Mihăilescu 2005, 46.

³⁸ „In fact, the degreased clay is the best for working. The long clay leaven was also well put into light by the laboratory analyses. Thus, there was noticed the clay let to freeze has a maximum plasticity and consistence, as the frozen water penetrates inside the particles and assures their breaking” (Iordache 1996, 82); „The main purpose of these physical deformations is to organize structurally the working paste, of setting by external impulses and electrostatic actions of the crystals in parallel strata. But the remains of a rigid chaotic structure inside the paste make it not uniform with thicker walls. All these lead to considerable rejects during burning process, the achievement of inferior quality objects. The left interspaces make, during burning an exaggerated volume diminish of the pots, thus influencing the shiver quality” (Klush 1981, 258).

³⁹ Petrescu, Stahl 1956, 14-16; Florescu 1958, 27-28; Iordache 1996, 82-83.

sand", „sand and pebbles", „rough sand and mica", „microgrits", and rarely „pound fragments and sand" or „minced husk". The degreasing substance is used in two situations: when the clay is too fat and when the pots are to be used for boiling, but they are not enameled. The following situations are to be read in the ethnographical studies: a bucket of yellow sand is added to the clay necessary to make pots⁴⁰; the thicker white clay is mixed with a thinner yellow one, in proportion 1 to 1, or a yellow thinner one is mixed with a white thicker clay in proportion of 3 to 1⁴¹; the mixture of the two types of clay is made to obtain one more resistant to the fire⁴²; clay with sieved sand⁴³; white clay and fine sand, almost white, in proportion of 1 to 1⁴⁴; clay mixed with softwood ashes⁴⁵ etc. There are numerous the situations when the presence of the degreasing substances is not necessary, as they are already present in the clay deposits (mostly when they are formed on the rivers valleys)⁴⁶; the degreasing substance is not wanted⁴⁷; or their presence does not mean degreasing⁴⁸.

Making a retrospective on the clay, we notice: the degreasing substance can be also another clay category, coming from another deposit; the sand used for degreasing clay is, usually, chosen and sized on purpose; the clay including more sand (sometimes 50%) is more resistant to the fire, unlike the fat one⁴⁹; the pots made of clay with much sand can be easily enameled⁵⁰; for pots of different sizes in some centres, the two type of clay percentages are changed⁵¹; to make non-oxidant burnt it is preferred the fat, emollient clay is preferred including less sand⁵²; the presence of some lime impurities in the paste can lead to some cracks in the pot wall or small breakings during burning or later on⁵³; there are centres where, depending on the pots shape, the clay was brought from deposits situated in different places⁵⁴; the pots not enameled are more resistant to the fire of the traditional fireplaces and heat more rapidly⁵⁵.

⁴⁰ Florescu, Mózes 1967, 136.

⁴¹ Florescu, Mózes 1967, 136.

⁴² Florescu, Mózes 1967, 136.

⁴³ Florescu, Mózes 1967, 165, 172.

⁴⁴ Bărcă 1981, 342.

⁴⁵ Mocioi, Vasilescu 1974, 82.

⁴⁶ Iordache 1996, 78-79; Paraschiv-Talmațchi 2006, 58.

⁴⁷ „There the ground is emollient like clay, yellow, without any sand, viscous and greasy like soap. When the potter sees it, he becomes happy" (Agapi 2002, 46).

⁴⁸ Stepping clay can be done on a veal leather, on a counterpane or on a wooden bridge, upon which, to avoid the clay sticking, its put or not, previously, a stratum of sand or ashes, in a small quantity for not to affect essentially the paste composition. For 100 kg of clay some potters use 4-5 kg of sand (Pușcașu, Semendeaev 1991, 62, 67 note 17; Iordache 1996, 82).

⁴⁹ Iordache 1996, 78.

⁵⁰ Iordache 1996, 78.

⁵¹ Stoica, Mirescu 1970, 323.

⁵² Florescu 1958, 27; Agapi 2002, 46.

⁵³ Pușcașu, Semendeaev 1991, 62; „The pebbles, mostly the lime ones, destroy the pots because burning dehydrate and transform them in quick lime; when put into water, it becomes slaked lime and the pot breaks" (Petrescu, Stahl 1956, 14).

⁵⁴ „The clay was taken usually from Poiana Marcului. At the bridge upon Vâlsan river there used to be the best clay for bowls, and the most appreciated for pitchers was in Măgura clearing" (Iordache 1996, 79). See and Robea 1987, 52.

⁵⁵ Butură 1989, 344.

Moulding and drying. Today a potter makes a pot at a rapid wheel in 1.5-3 minutes⁵⁶, referring to vessels of small and medium sizes (bowls, pots). As in the 8th-12th century the slow wheel as mostly used, and the decoration was made also on the wheel in the pot raw paste, we consider that making a pot took about 20-30 minutes (including preparing the clay ball⁵⁷, making the pot, decoration, taking out of the wheel and setting it on a side to create working room), a skilled artisan could make, probably, 3-4 pots/hour.

Calculating an average of 7-8 working hours/per day (the average value was calculated taking into consideration the difference of day light and climate between March and November⁵⁸), considering also the time for other domestic activities, we mention 20-30 pots.

Until they were burnt into the kiln, pots are dried and a part of the water accumulated in the paste is eliminated, up to this moment. This dry action includes many stages: the first stage takes place even in the workshop, where pots are set on shelves (the heat and humidity of the place assures a slow dry); then, pots are set in an uncovered place, but protected from sun and wind; only after few days here, period during which the potter keeps changing their place in order to reduce the contact surface directly with the air, they can be put in the sun⁵⁹. All these stages are obligatory and this means avoiding a rapid dry, thus determining pots cleaving and deformation. This one (the final stage is in the kiln, at the beginning of burning) takes a variable number of days (2-7) depending on the weather⁶⁰.

It is also to be added the clay balls prepared by potters to make the vessels have different sizes, determined by the shape and their dimensions⁶¹. Thus, from a ball of about 400 g there are made 1 litre pots and for a 8 litres pot, the ball weights about 1.5 kg⁶².

The burning of the pots. As the pots are already decorated, after they dry, the potter begins to prepare the kiln. The kiln burning takes 5-12 hours⁶³, rarely 24⁶⁴, and its cooling takes 1-2 days depending on its size and the burning type (oxidant or reducer)⁶⁵. As the atmospherical phenomena change the clay condition, it is recommended to fill the kiln in a clear day, without fog, rain, drizzle etc⁶⁶.

⁵⁶ Petrescu, Stahl 1956, 17; Maier 1964, 475; Some potters can make even 300 bowls/day (Leonov 2008, 60), other „no less than 100 objects” (Mihăescu 2005, 50).

⁵⁷ The number of balls prepared by the potter at the beginning of the working days, usually, equivalent with his capacity of production, as the left balls dry and clay loses its plasticity (Gheorghe 1977, 45 the note 10).

⁵⁸ There are few potters working during the winter months, as a constant temperature must be maintained inside the workshop, so that the water in the paste composition not to freeze. This means an increased wood consumption (Gheorghe 1977, 42; Bărcă 1981, 349). But in the regions where the agricultural activities have the precedence, the pots are made “after the autumn seed, until the spring activities” (Florescu, Mózes 1967, 169).

⁵⁹ Florescu, Mózes 1967, 146-147.

⁶⁰ „... during the summer four-five days, during the winter seven days” (Petrovsky 1975, 154); „...in the shadow, when it is warm, for 2-3 days; if it is rain, they need a week to dry” (Bărcă 1981, 347).

⁶¹ Maier 1964, 474.

⁶² Agapi 2002, 48.

⁶³ Florescu, Mózes 1967, 148, 175; Iordache 1996, 143 and the note 337; Agapi 2002, 56-57; Mihăescu 2005, 86.

⁶⁴ Florescu, Mózes 1967, 166; Mózes 1967-1968, 132.

⁶⁵ Petrescu, Stahl 1956, 19; Bărcă 1981, 348; Agapi 2002, 58.

⁶⁶ Agapi 2002, 56.

The kilns from the 8th-12th century found in our country, had normal to small sizes, comparing with the present ones. Thus, the kiln from Epureni (Vaslui County, with a perforated fire-grate between its two chambers) used to have the pots burning chamber of 0.70-0.80 m in height, the basis diameter of 0.80 m⁶⁷. The burning chamber of the kiln from Gornea (Caraș-Severin County, with a perforated fire-grate) had the basis diameter of 0.70 m and still preserved 0.30 m of the walls height⁶⁸, and that of the kiln nr. 1 (C1) from Hârșova (Constanța County, with a perforated fire-grate) presented a basis diameter of 0.78 m and it still preserved 0.90 m in height⁶⁹. The kiln from Remetea-Mare–*Gomila lui Pituț* (Timiș County, with a perforated fire-grate) had a circulary-ovale burning chamber, with the axes of 0.90 × 0.70 m, still preserving 0.30 m in height⁷⁰. The one-chamber kilns (simples) from Garvăn–*Dinogetia* (Tulcea County) had diameters between 2.20-1.87 m, an opening of 0.50 m in the upper part, and the maximum height preserved was 0.90 m⁷¹. Discussing the capacity of the kiln from Epureni, there were suggested charges of 20-30 pots, which height can reach 0.35-0.40 m⁷², and a kiln from Nufăru (Tulcea County) presented, when it was found, a charge of 15 pitchers of different sizes⁷³.

For comparison, we go back to the ethnographical information. In the last century at Târnăvița (Hunedoara County) there were kilns with a basis diameter of 1.30 m and a height of 1 m⁷⁴. At Marginea (Suceava County), they presented a basis diameter of 1.50 m, the mouth diameter (the upper part of the burning chamber) of about 0.80 m and a height of 1-1.20 m⁷⁵, inside there could be put between 140-180 pots, depending on their size, or about 120 pots, if there are more pots with a handle⁷⁶ (some pots with capacities between 6 and 20 kg⁷⁷). In the centres on Vâlsan Valley (Argeș County) the kilns have, generally, the basis diameter of 1.20 m and a height of 1.50 m, there could be put 400-500 different pots⁷⁸. At Poiana (Deleni commune, Iași County) there were one-chamber kilns (as the majority of those mentioned above) having the basis diameter of 1.70 m, the mouth diameter 0.80 m and a height of 1.80 m⁷⁹. There were considered to be of small capacity as there could be put inside them 500-600 pots⁸⁰.

The volume of the kiln at Marginea is about 1.17 m³, there can be put 180/120 pots inside, meaning about 153/102 pots/m³. The volume of the kilns in the centres on Vâlsan Valley is about 1.43 m³, as we have mentioned above, there can be put 400/500 pots inside, meaning 280/350 pots/m³. The volume of the kiln at Poiana is about 2.29 m³, there can be put 500/600 pots inside, meaning about 220/260 pots/m³.

⁶⁷ The burning chamber was cone-like shaped (Teodor 1987, 145).

⁶⁸ Uzum, Țeicu 1978, 296.

⁶⁹ Panait *et alii* 1995-1996, 132.

⁷⁰ Bejan 1995, 72.

⁷¹ Ștefan *et alii* 1967, 127-129.

⁷² Teodor 1987, 146 – „20-30 small and midst size pots or even large pots of about 0.35-0.40 m height”.

⁷³ Mănușu-Adameșteanu 1998, 81.

⁷⁴ Florescu, Mózes 1967, 154.

⁷⁵ Florescu 1958, 18-20.

⁷⁶ Florescu 1958, 37.

⁷⁷ Florescu 1958, 47.

⁷⁸ Robea 1987, 57.

⁷⁹ Agapi 2002, 52.

⁸⁰ Agapi 2002, 53.

Going back to the early middle age kilns we notice that at Epureni this one had a volume of 0.31 m³ (calculated with the height of 0.80 m and with a suggested mouth 0.60 m in diameter, in order to put the pots inside). For this one there was suggested a capacity of about 20-30 pots, the last value being very close to our estimation (32), referring to the pots number/m³ from Marginea, speaking about a charge of 120 pots (we consider these data as they refer to pots, the most used pot in early medieval every day life; in the same time, the data are coming from the observations on the spot, but not from the potter declarations).

The kiln from Hârșova (C1) has a volume of about 0.35 m³ (\varnothing_{\max} 0,80 m/ \varnothing_{\min} 0,60 m/h 0,90 m). Referring to the same data, a possible load means 35-37 pots. The volume of the kiln no. 1 from Garvăn–*Dinogetia* (\varnothing_{\max} 2 m/ \varnothing_{\min} 0,50 m/h 0,90 m) was about 1.25 m³. According to the same report, there is possible a load of about 127-130 pots. If we report it to the capacity on m³ from Poiana, the load would be about 275-325 pots.

Obviously, there are only approximative data, the report can be done for each of the early medieval centres and the contemporary ones, we have motivated our choice for Marginea few lines above.

We mention that for the majority of the medieval kilns the construction was made digging the chambers inside the clay, as usually on a sloping ground. Referring to this aspect, we notice the declaration of a potter from Dobruja, in 2008: „I was making the kiln half burried in the ground, not to be broken. It was more stable (...). If the kiln is all outside, the wind is blowing in front of the fire, you can loose hest, the temperature is not constant. How to say it, it isn't a good work. If I did like that (*n.n. burried*), the kiln lasts five, six and ten years. It was not broken. Only the fireplace can broke, if one does not make it well”⁸¹. Thus, we notice more advantages determining the choice of the costruction modality: resistance in time; constant temperature; accumulated temperature; protection of the fire source. But there is also a shortcoming: impossibility to use it during the months with an increased humidity, rains and snow, mostly the access pits are not to be used⁸².

The pots making during the cold months seems an activity difficult to perform for the analysed period. An experiment, including the building of two houses (one specific for the 6th-7th century, other specific for the 9th century), near Praga, in the site from Brężna, showed that, during the first two monts of the year, when the temperatures were below 0 degrees, these house assured inside 6-7°C, and, at an intensive and long heating there were 14°C⁸³. If the second temperature seems reasonable, but not favourite for working, we think the first is not to be taken into consideration. Anyway, for the cold season, we can accept a reduced production (as much pots as can be stored on some shelves), but with the pots burning only at beginning of the summer, when it is possible to use the kiln.

A retrospective upon the above mentioned data lead us to the conclusion that, for burning a kiln of pots, a handicraftsman had to assign, an average of about one month and half (including here all the operations, beginning with the clay providing until the kiln is cooled; providing the wood for the fire; days with cold weather not permitting to work and the rest days). Taking into consideration the season aspect of the potter work, however allowing him to make his pots during the winter, the pots necessary for burning in the first kiln, we assume, an average of 4-5 charges/year.

⁸¹ Leonov 2008, 57.

⁸² Florescu 1958, 21.

⁸³ Curta 2006, 242-245.

Starting from these data, we notice that: at Epureni, where a charge included about 30 pots, there can be made, at an average of five kilns, about 150 pots/year; at Hârșova, where a charge included about 37 pots, there could be made, about 185 pots, in the same period; in the same time at Garvăn–*Dinogetia*, where a charge included 130 pots, there could be made about 650 pots.

Coming back to the time necessary for producing 700 pots and taking into consideration the same average number of five charges/year, we notice that the potter from Epureni needed more than four years (about 23 charges), that one from Hârșova almost four years (about 19 charges), and the potter from Garvăn–*Dinogetia* almost one year (about five charges).

Thus, we ascertain the possibility to store 700 pots was not possible, as a production capacity, but only in the workshop from Garvăn–*Dinogetia*⁸⁴. These reasons determine us to believe the potters from Epureni and Hârșova didn't need a workshop of the sizes of the Garvăn–*Dinogetia* one, but a smaller workshop, not excluding the possibility that here, the house or the barn to be used as a production area⁸⁵, not a dedicated room in particular. Probably, the production capacity of a potter workshop in the early middle age was in connection not only with the handicraftsman skill, but also with the local and area goods demand. Thus, in some settlements, there are to be recorded both workshops and some real trade districts⁸⁶.

The objects produced in a workshop are to be sold in a larger or smaller area, generally in connection with their quality and the presence of other workshops in the area. The first condition is determined by the technical and aesthetical level of this good, quality usually imposed both by the society and community development level where the workshop functioned. The second condition determines competition, meaning a better attention upon the first, as well as the market demand, innovations being appreciated up to the level the buyers accept them, seeing both their quality and if they are functional, because many times the local or area needs lead the ceramic vessels shape. For the early middle age, in the settlements of the Carpathian-Danubian-Pontus Euxinus area, the pot without a handle represents the vessel present in every house, existing in many samples, and as a consequence the good category most asked to the potter. The request for tureens was more reduced, these being probably replaced with wooden vessels. For the 11th century, at Nufăru we notice an „improvement” of a potter for a good category (pitchers) usually assigned, in the specialised studies to the import sources. At Bucov, we previously mentioned, the producing of the Byzantine type enameled pots, and at Nufăru kaolin pots brought from other centres. Thus, there was a demand determining certain shapes to be produced, and in some workshops a specialization. The last one supposes a larger market, beginning with covering the local community needs and becoming a counterpart of the trade at larger distances.

In the settlement from Garvăn–*Dinogetia*, there was recorded a great number of marked pots which paste includes in its composition white chalk⁸⁷, stone specific to the area. For the period this centre was active with a mark and white chalk inside the paste we notice some dobroudjan settlements on the Danube line, as well as in Wallachia and Moldavia.

The pots produced at Epureni were sold beyond the village borders, more elements specific to the pots produced here are to be seen in places in the neighbourhood⁸⁸.

⁸⁴ Theoretically speaking, as a part of them, if not all, could be sold during two charges.

⁸⁵ See the discussion about the slow wheel.

⁸⁶ Totev 1996, 135-150.

⁸⁷ Ștefan *et alii* 1967, 134, 174.

⁸⁸ Teodor 1987, 146.

The phenomenon of the marked pots trade at smaller or larger distances⁸⁹ can be proved, mostly because these findings correspond chronologically as well, to the presence of some pots made of kaolin, so having a North-Dobrudjan origin, both in the centre, South and East of Wallachia, as well as inside the Carpathians. The non-marked kaolin pots, found in the territory between Prut and Dniester, are also considered as coming from the Lower Danube area⁹⁰.

Another element to be taken into consideration when studying the trade of the common usage pottery was the decoration. In the second half of the 10th century there appeared in Dobrudja the decoration made with the cogged small wheel, knowing, in the first part of the next century, a large spreading in the settlements placed in the northern part of this province⁹¹. The rare emergence of such pots in the south of the province permits us to suppose they came here by trade⁹².

Anyway, beyond these factors, more or less viable, there is not to be neglected the possibility that some of these pots, far away from the production centre, have reached in the finding place as a „package” for food or as a vessel for water used by a person forced to cover a larger way, or as package for other goods.

Beside the common usage pottery in some early medieval settlements (mostly in Dobrudja), we meet also imported pottery, of a superior quality, including amphoras, pitchers, cups, pots, tureens, bowls and plates. Including enameled pots or not, sometimes presenting decorations in relief, other time decoration in sgraffito technique, this category represents a proof for the pots circulation existence also at larger distances⁹³. The emergence centres of these pots were situated either in the northern of the Black Sea (Chersones⁹⁴, Sarkel–*Belaja Veja*⁹⁵ or, more inside the territory, Kiev⁹⁶), or to the South in the Byzantine Empire (Constantinople⁹⁷ or others⁹⁸). They were brought either as luxury goods; either they served for transporting some products (for example amphoras).

The production capacity of a potter workshop and its products spreading area can be reconstructed with certain limits, by connecting archaeological and ethnographical data. The pottery conservative aspect in Romania allows, obviously with the necessary reserved attitudes, some reconstructions. We would like to underline, this way, the discussions about the inner aspect of the workshop, clay, degreasing substance, the production capacity of some workshops and pots burning process⁹⁹.

⁸⁹ See in detail at Paraschiv-Talmațchi 2008, 43-56.

⁹⁰ Postică 1994, 103.

⁹¹ Barnea, Ștefănescu 1971, 252.

⁹² Olteanu 2001, 224-226.

⁹³ Enameled pots and amphoras were also made in the Dobrujan centres, but at smaller scale, comparing with the sand ones. See Vilceanu 1972, 407; Nicolescu 1977, 229; Baraschi 1991, 143-144; Mănucu-Adameșteanu 1998, 81.

⁹⁴ Barnea 1954, 516; Vilceanu 1962, 382.

⁹⁵ Barnea 1954, 527.

⁹⁶ Barnea 1954, 527.

⁹⁷ Barnea 1954, 516; Barnea 1955b, 3; Baraschi, Damian 1993, 243.

⁹⁸ Vilceanu 1962, 384; Barnea, Ștefănescu 1971, 282.

⁹⁹ „It is necessary to have a temperature of at least 900°C in the kiln in order to burn well the pottery. During the burning process, there are produced the following physical and chemical phenomena: up to 250°C the absorption water is evaporated (...) the material porosity increases; [...] between 450-600°C the chemical water is eliminated (the clay has up to 14% chemical water); at 700°C – the pot becomes red, if it includes among its chemical compounds at least 5% iron oxide (Fe₂O₃) and

Beside the unknown elements mentioned along our study, which we tried to explain as much as possible, other aspects are still expecting their answer. We wonder if it is possible to prove, for the early middle age, there used to be – on regions – a demand referring to some pottery shapes and up to which level we are able to mark the limits of these areas; if the grey core of the majority of pots of this period can explained by an initial reducing burning¹⁰⁰; up to what level the quantity of pots present in a site of the above analysed period can reflect its fragility (with some data about the trade technological level reached in the area) or the inhabitation period etc.

Therefore, we do not consider the subject closed, otherwise even from the beginning we mentioned we were not suggested that¹⁰¹, but the too many attitudes of reserve along the time in connecting the archaeological data with the ethnographical ones had no result but losing the few data from the traditional pottery centres still, potential ways to understand some aspects.

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aluminium oxide (Al₂O₃); [...] The pottery burnt above 870°C when cooling off has no sudden changes or temperature and it is less exposed to deterioration (Iordache 1996, 144).

¹⁰⁰ Showing some ceramics fragments to a potter, the grey core caught his attention. He didn't agree when I told him that it is considered an incomplete burning, saying the pot I was broken when it was filled with some liquid or when put to boil. In a study dedicated to early medieval pottery worked at the rapid wheel, the researcher Ioan Stanciu affirmed that the majority of the fragments have „a black or grey core, indicating a initial burning phase, produced in a reducing stage” (Stanciu 2000, 128).

¹⁰¹ We are going to bring up this subject in forthcoming time.

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