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Through Geometry Towards Functionality. Case Study: Noua pottery from Jijia catchment, NE Romania

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Abstract. *During Late Bronze Age, the evolutions of previous archaeological cultures (from the Middle Bronze Age) are continued and completed, but there are also two important cultural complexes emerging, namely: Noua-Sabatinovka-Coslogeni and Zimnicea-Plovdiv. The subject of interest in the present study is represented by Noua culture, attested in a vast area, from the middle and upper Dniester, to the east of Apuseni Mountains and from the Subcarpathian region of Ukraine to the south of the forest-steppe area between Siret and Prut Rivers. Although, over time, the specific communities of this cultural manifestation have been investigated in numerous specialized studies, the interdisciplinary methods used in recent years can offer new information that contribute to the obtaining of a much clearer picture regarding the behavior of the human groups in question. In this sense, in the present paper, special attention was paid to the ceramic material identified during the archaeological excavations of sites belonging to Noua culture which, unfortunately, in most situations, is still `trapped` in the discourse from the middle of the 20th century. In this sense, there is a continuous perpetuation of the typology created by A.C. Florescu in the '60s, namely: jar-vessels, bag-vessels, bowls, cups, glasses, etc. Thus, using the volumetric typology, developed by Anne O. Shepard almost 70 years ago, and correlating the information obtained with those regarding decoration, context and dimensions, but also with data from the field of ethnoarchaeology, this study aims to identify the intended functions of the ceramic recipients used by Noua communities from Jijia River Basin.*

Rezumat. *În perioada târzie a Epocii Bronzului sunt continuate și încheiate evoluțiile culturilor arheologice anterioare (din perioada mijlocie a aceleiași epoci), dar apar și două complexe culturale importante și anume: Noua-Sabatinovka-Coslogeni și Zimnicea-Plovdiv. Subiectul de interes al studiului de față îl reprezintă cultura Noua, atestată într-un areal vast, de la Nistrul mijlociu și superior, până la est de Munții Apuseni și din regiunea Subcarpatică a Ucrainei până în sudul zonei de silvostepă dintre Siret și Prut. Deși, de-a lungul timpului, comunitățile specifice acestei manifestări culturale au fost investigate în numeroase studii de specialitate, metodele interdisciplinare folosite în ultimii ani pot oferi informații noi care contribuie la obținerea unei imagini mult mai clare cu privire la comportamentul grupurilor umane în cauză. În acest sens, în lucrarea propusă s-a acordat o atenție deosebită materialului ceramic identificat în săpăturile arheologice din siturile culturii Noua care, din păcate, în majoritatea situațiilor, este încă „închistat" în discursul de la mijlocul secolului trecut. În acest sens, se observă o perpetuare continuă a tipologiei create de A.C.Florescu în anii '60 și anume: vase-sac, vase-borcan, străchini, boluri, cești, pahare etc. Astfel, folosind tipologia volumetrică, elaborată de Anne O. Shepard acum aproape 70 de ani și corelând informațiile obținute cu cele privind contextul descoperirii, dimensiunile și decorul obiectului, dar și cu date*

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din domeniul etnoarheologiei, acest demers își propune să identifice funcțiile intenționate ale recipientelor ceramice folosite de comunitățile Noua, folosind drept studiu de caz bazinul hidrografic al Jijiei.

Keywords: *Late Bronze Age, ceramic material, volumetric typology, functionality, spatial distributions.*

Introduction

Clay recipients have been, over time, the main cultural marker, used by archaeologists to characterize and individualize various prehistoric communities. However, the full exploitation of the informational potential that these artifacts possess can only be achieved by detaching and overcoming serial and diffusionist references[2]. A very important aspect, during the technological process of 'making' pottery, is represented by the functionality of the containers, as well as the possible reutilizations that occur, usually, after the destruction of the vessel[3]. Since functionality can undergo various changes throughout the 'life' of the artifact, relating the discovered recipients to the potential functionalities they possessed can provide important information regarding the behavior of the studied communities.

In this study the main focus is represented by the pottery of Noua human groups, specific for the Late Bronze Age in the territory located east of the Carpathians. Over the last 80 years, there have been various attempts to classify this ceramic material but, in most situations, we can see a perpetuation of the types identified in the second half of the last century[4], namely: bag-vessels, jar-vessels, bowls, cups, glasses, etc. In this context, the aim of the present paper is to identify the intended functions of the ceramic containers used by the communities of Noua culture, starting from the volumetric typology and relating the information obtained with data regarding the archaeological context, dimensions and decoration. As a case study was selected Jijia River catchment (Fig. 1), due to the high population density existing in the chronological period of interest (362 settlements, 24 burials, 6 hoards and 29 isolated discoveries) (Fig .2).

Such an analysis, in which the morphological characteristics of various recipients are related to ethnographic data, was first proposed in the comparative research of the ceramic material from two prehistoric sites of western Iran[5]. The approach was later adopted in the study of ceramic containers specific to Cucuteni culture, on various case studies from the eastern Carpathians[6]. With regard to similar studies undertaken for the chronological interval of interest, approaches of this type were carried out only for Bârlad River basin[7] and for the

[2] BODI & SOLCAN 2010, 315.

[3] RYE 1981, 3.

[4] FLORESCU 1964.

[5] HENRICKSON & MCDONALD 1983.

[6] BODI & SOLCAN 2010; MUNTEANU 2015.

[7] VIERU 2013.

microzone of Aroneanu (Iași County), the latter[8] being included in the space analyzed in the present paper.

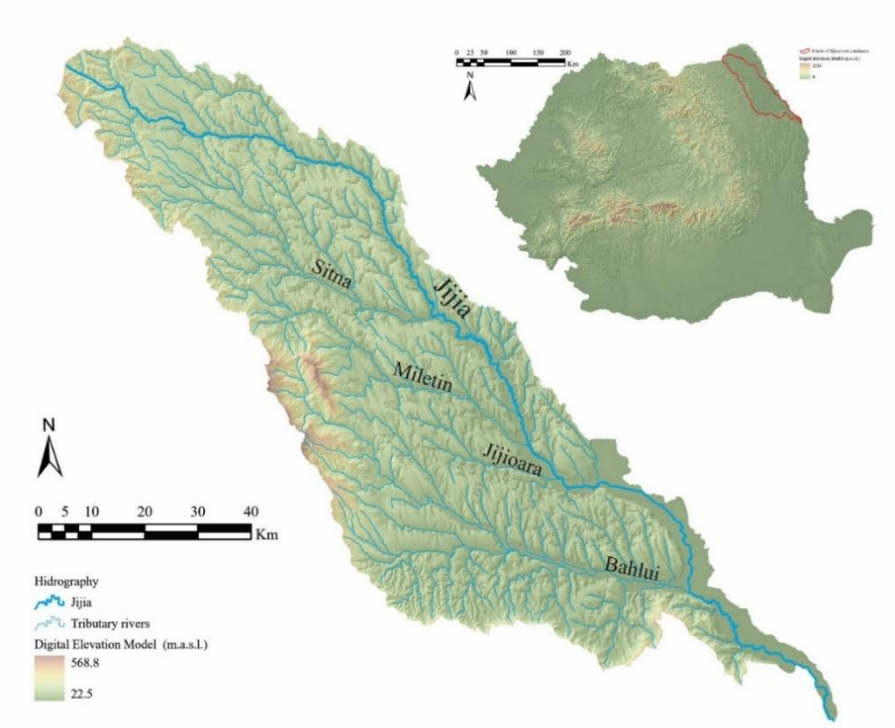

Fig.1. Jijia River's catchment and its location within the territory of Romania; source of DEM: LiDAR data from Romanian Water Administration, Prut-Bârlad branch, 10x10 m resolution.

Material and methods

In order to achieve the before-stated objective, the information existing in the specialized bibliography was used. Also, it should be noted that, in the proposed typology were included only the ceramic materials discovered during invasive archaeological research, for which I could also identify the illustrations. The main criteria used concerned the archaeological context, the dimensions, shape and decoration of the discovered artefacts, in order to obtain data regarding the morphology of the pots in question. Starting from the data set thus revealed, I tried to identify the potential uses of the recipients, establishing two main categories: utilitarian and special (ritual).

[8] BOLOHAN & DROB 2020.

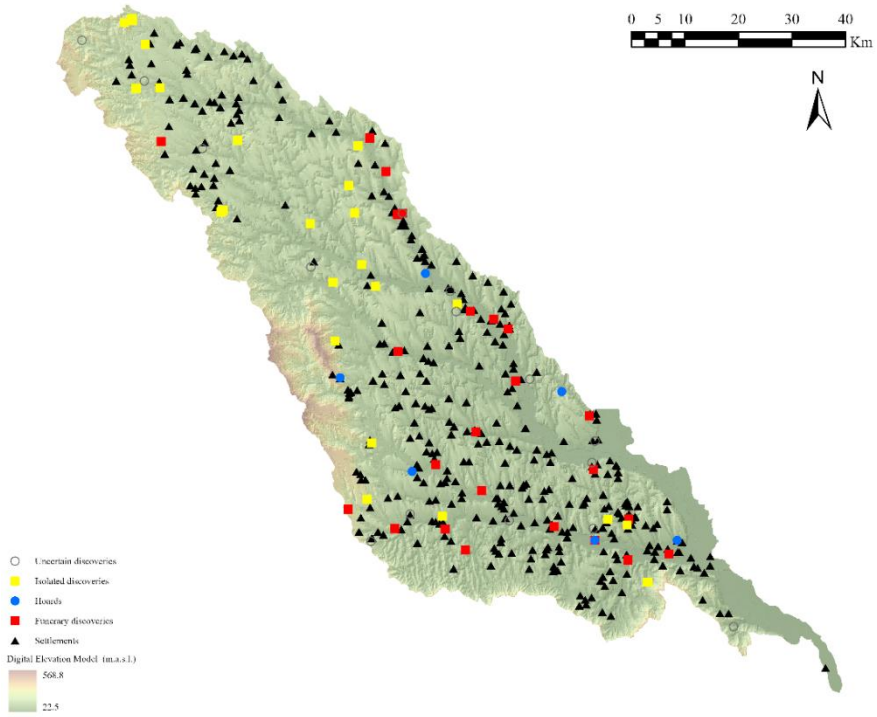

Fig.2. Spatial distribution of Noua discoveries on hypsometric map; source of DEM: LiDAR data from Romanian Water Administration, Prut-Bârlad branch, 10x10 m resolution.

The first method used was that of the volumetric typology, whose fundamental principle is represented by the description of the pot based on the number and characteristics of the volumes that compose it, as well as their sequence. In order to calculate the proportions of a vessel, were drawn tangents parallel to the 'wall' of the recipient, thus facilitating the identification of inflection points (points that mark the change, in direction and shape, of the vessel's outline)[9]. Another important aspect was represented by establishing the existing ratio between the vessels' dimensions and relating it to the data obtained from the volumetric typology, thus revealing essential information in establishing the functionality of the artifacts.

Consequently, the main functional categories identified, in the study of the pottery of Noua communities, are: cooking vessels, containers used for the preparation, serving and consumption of food, recipients for storing solid/liquid goods and pots with a utilitarian/special function.

The first type, that of *cooking ware*, is illustrated by short, sturdy containers with a large basal surface that allows the efficient transfer of the heat. They are 'restricted', having a narrow aperture, in order to prevent the fast evaporation, in case of boiling. Their dimensions suggest

[9] SHEPARD 1954, 228-229.

that these recipients usually have relatively thick walls. There is not much data regarding the existence of grabbers/handles, as tilting, lifting and carrying them is thought to be optional rather than essential[10].

The literature presents the category of vessels used for serving and consuming food. In the case of Noua ceramic materials, I also included the preparation function because I believe that some containers could have been used for this activity as well, especially since their morphological characteristics are similar to the ones specific to this category than to that of cooking ware. Thus, the predominant shape of the vessels used for the *preparation, serving and consumption of food* is that of the bowl with a flat basal surface. Containers of this type are unrestricted, being open vessels, with a maximum diameter equivalent to the aperture diameter. Most of the time, they are decorated, probably due to their frequent use and high visibility within the community. At the same time, decoration could be discouraged, in some situations, because of the relatively short life span of these recipients. The existing information suggests that the pots specific for this category are made for either individual or family use[11].

Regarding the vessels identified in the literature as having the function of *storing solid or liquid goods*, I preferred to include them in a single category since, in the case of Noua culture, there are no discoveries that fit the description of vessels used typically for storing liquids. It is hard to believe that the communities in question did not possess such containers, so I consider plausible that some finds that fit the requirements for storing solid goods were also used, by Noua communities, to store liquids, both on a short, as well as over a longer period of time. Thus, the recipients specific for this category are classified according to the duration of storage: long-term (weeks/months) or short-term (hours/days). The aperture of these containers has a tendency to be large enough in order to allow the use of a ladle. Regarding the covering of vessels, the presence of lids is attested rather rarely, which is why it was considered that the existence of an outward-facing upper-part would facilitate the binding of a flexible covering, that could protect the contents[12].

In addition to the above-mentioned functional categories, I have included a fourth class, consisting of the so-called cups with one or two high handles (*kantharos*), as well as a perforated bowl. Although these recipients were not found within the functional categories from the bibliographic material, they are clearly different from the categories presented previously.

Regarding the main methodological limitations encountered, it should be noted that most of the illustrations from the literature do not provide scales or other information regarding the dimensions of the recipients. Also, I believe that in some cases the scale was represented wrongly, as in the entire workspace not a single vessel with a maximum height or diameter greater than 30 cm has been identified, hence all the finds are consistent with the categories of

[10] HENRICKSON & MCDONALD 1983, 631; BODI & SOLCAN 2010, 317.

[11] HENRICKSON & MCDONALD 1983, 632; BODI & SOLCAN 2010, 317.

[12] HENRICKSON & MCDONALD 1983, 622-623; BODI & SOLCAN 2010, 318-319.

small and medium-sized vessels. Thus, I believe that we should not exclude the possibility of erroneous representation of the scale, especially when talking about recipients that could have been used to store various solid/liquid products, for long periods of time. Last but not least, the proposed workspace is characterized by an accentuated fragmentation of the material, the number of whole or restorable pots being very low (most of which were identified in funerary contexts).

Results

Dependent on the position of the tangent on the outline of the vessel[13], within the archaeological material from Jijiia River watershed, were documented the following: simple open vessels, with one volume; open composite vessels, with two or three volumes; closed composite vessels, with two, three or four volumes.

Open recipients allow access to the interior, being suitable for various activities that involve using hands inside the container, exposing or drying the contents. The tangent corresponding to the aperture of the recipient is, in this case, either vertical or inclined outwards. In contrast, closed vessels have restricted access, retaining the contents and thus becoming useful for storing solid or liquid products. In this case, the tangent corresponding to the opening will be inclined inwards, the aperture diameter being smaller than the maximum diameter.

- *Cooking vessels*

According to the ethnographic and archaeological data, containers of this type have various sizes (h: 6-41.5 cm; D_{max}: 12.7-56 cm), however, the constant is represented by the proportions. Thus, the ratio between height and maximum diameter is in the range of 0.8-3.4. In other words, the cooking vessels are about one-third wider than they are tall, being short and sturdy[14]. In the present context, the vessels used for cooking are composed of two or three volumes, being organized in three main types: *a-c* (Fig.3/a). Although some containers do not fit entirely into the descriptions above, their shape and proportions are suggesting this type of functionality.

Type a is represented by small pots, with two volumes, and is divided in two other subtypes, depending on the volumes and their mergence place. Thus, *subtype a1* is represented by a small-sized recipient[15], whose maximum diameter is equal to that of the aperture, being located towards the upper-part. Similar artefacts have been discovered in other areas of Romania, but also in the territory located east of Prut River[16]. *Subtype a2* is represented by several small and

[13] SHEPARD 1954, 230.

[14] HENRICKSON & MCDONALD 19883, 631; BODI & SOLCAN 2010, 317.

[15] FLORESCU 1991, fig.207/1.

[16] FLORESCU 1991, fig.199/2; SAVA 2002, taf.2/4-5, 3/2, 4/2, 31/3, 45/3, 82/4, 85/3, 145/5.

medium vessels, with heights between 9 and 21 cm, and maximum diameters between 11 and 21 cm. Usually, they present simple decorations, in relief, in the upper-part.

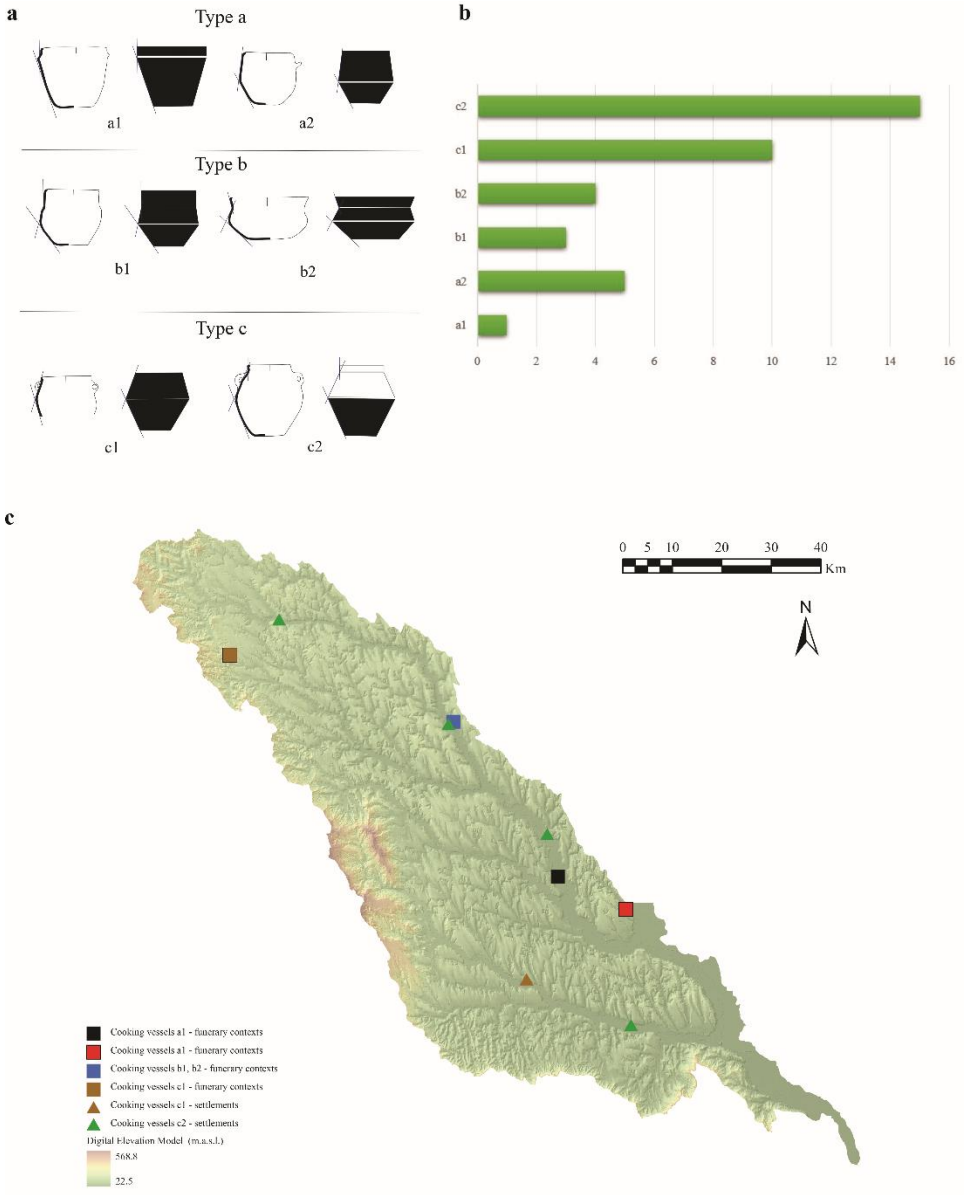

Fig.3. *Cooking ware*. **a.** Typology. **b.** Quantitative ratio of the discoveries from Jijia River catchment. **c.** Spatial distribution within Jijia River catchment

Type b is represented by small and medium-sized recipients, consisting of three volumes, with a relatively large basal surface. Next, the two sub-variants were set according to the

position of the tangent. *Subtype b1* is illustrated, mainly, by small pots, with heights between 9-11 cm and maximum diameters of 11-12 cm[17].

Subtype b2 is characterized by medium-sized vessels (with heights between 8 and 10.6 cm and maximum diameters between 15.5 and 17.7 cm), compounded of three volumes and with the aperture diameter almost equal to the maximum diameter[18]. Volumetrically, they consist of two overlapped truncated cones, followed by either a cylinder or another truncated cone. These pots present analogies inside other funerary contexts specific to Noua culture, from Romania and Republic of Moldova[19].

Type c is represented by recipients of larger dimensions, with two or three volumes (two overlapped truncated cones, to which a cylinder is sometimes added) and are, exclusively, restricted, the maximum diameter being larger than that of the aperture. However, they allow access to the contents of the vessel, which is why they have been included in the present category. The auxiliary elements specific to this type are represented by handles and simple strips of clay, placed in the upper-part. Analogies for these pieces can be established within the so-called *type IV vessels*, according to the typology of Vasile Diaconu[20], being discovered both in settlements and in necropolises[21]. They were structured in two sub-types, as follows: *c1* is represented by recipients with two volumes. Although no restorable recipients have been discovered, and the dimensions of the shards are not specified, the maximum diameter seems to be found, in all cases, in the middle area of the container, representing the merging line of the two volumes[22]. Similar containers were reported in Noua sites from Transylvania, as well as in the territory located east of the Carpathians[23]. The *c2 subtype* is represented by medium vessels, with three volumes, this being the main difference from the previous sub-type. Maximum diameters are between 16-26.6 cm, and aperture diameters between 15.1-25.7 cm. In this case also, no complete pots were found in the workspace, the discoveries consisting only of a few ceramic fragments[24].

A brief statistical inquiry (Fig.3/b) demonstrates that Noua communities had a preference for using cooking pots of larger sizes than in other cases, usually with two or three volumes, restricted, but still allowing access to the contents. The artefacts specific to subtypes *c1* and *c2*, that were discovered in Jijia catchment, are usually made with handles, which ensure the efficient handling of the recipient, especially since it was used for cooking food, thus involving contact with fire. The spatial distribution of the various sub-types of cooking vessels (Fig.3/c)

[17] SAVA 2002, taf.72/3-4; DASCĂLU 2007, pl.53/364.3.

[18] SAVA 2002, taf.70/6, 75/2; DASCĂLU 2007, pl.53/364.1-2.

[19] FLORESCU 1991, fig.167/6, 208/7; SAVA 2002, taf.50/5.

[20] DIACONU 2014, 121-122.

[21] FLORESCU 1991, fig.14/6, 16/2; DIACONU 2014, fig.85/2-3,13.

[22] FLORESCU 1991, fig.30/15,17, 31/30, 33/42-43,46, 41/8, 43/4; SAVA 2002, taf.74/3.

[23] FLORESCU 1991, fig.19/6, 20/6, 26/7, 57/24.

[24] FLORESCU 1991, fig.6/4-6, 7/1-2, 16/4, 24/9,12,14, 25/19, 37/6, 42/17.

provided information only in the case of *variant c2*, which also benefits from the highest number of discoveries. In the other cases, although the number of artefacts may have been quite large, the recipients belong only to a few investigated sites, which is why no clear conclusions could be drawn for now. Thus, the pots specific to *subtype c2* are found in the settlements of Noua culture throughout Jijia's catchment, the constant identified being linked to the presence of most of them in settlements along the main course of Jijia River. At the same time, a confirmation of the functionality of these recipients comes from the lack of discoveries identified in funerary contexts, at least for now. However, in the territory between the Carpathian Mountains and Prut River, such ceramic forms were identified in two necropolises[25].

- *Recipients used for the preparation, serving and consumption of food*

The recipients for individual use have relatively small dimensions (h: 6-8 cm; D_{max}: 10-23 cm), the existing ratio between the maximum diameter and height being between 1.3-3.1. The vessels for family use have various sizes (h:4.4-23.4 cm; D_{max}:8.4-95 cm) and a ratio that varies between 1.7 and 5.8. Thus, it is observed that, in both cases, the maximum diameter is two or three times greater than the height[26]. In the workspace, the pots corresponding to this functionality are consisting of one or two volumes, most being unrestricted. Four types specific to this functionality were identified, classified in turn into sub-types (Fig. 4/a).

Type a consists of small vessels, with a single volume[27]. The heights of the vessels are between 5.3-10.5 cm, and the maximum diameters between 7.5-14.5 cm, representing, in fact, the aperture diameters. The basal surface of the recipients of this type, from the mentioned necropolises, is between 5.4 and 8.5 cm. The small dimensions of the pots, as well as their shape, suggest their manufacture for individual use. The decoration is present only very rarely and consists of a simple strip of clay, made in the upper-area. Similar recipients were discovered in contemporary sites from eastern Romania[28], being represented by vessels from the *type VIII* of ceramic forms, according to the typology of V. Diaconu[29].

Type b is also represented by pots with only one volume. This time, the aperture diameter is at least twice the diameter of the base. The vessels specific to this category are known in the literature as *bowls*[30], their characteristic decoration consisting in simple strips of clay. Such pieces were discovered in various Noua contexts[31], corresponding to *type VI*, according to the

[25] FLORESCU 1991, fig.192/6, 197/14.

[26] HENRICKSON & MCDONALD 1983, 632; BODI & SOLCAN 2010, 317.

[27] FLORESCU 1964, fig.4/2; 1991, fig.191/1, 207/4-5; SAVA 2002, taf.71/4, 73/4, 74/4-7.

[28] FLORESCU 1991, fig.206/1; DIACONU 2014, fig.94/6-8.

[29] DIACONU 2014, 126.

[30] BOLOHAN 2016.

[31] DIACONU 2014, fig.92/1-6,11-12.

typology of V. Diaconu[32].

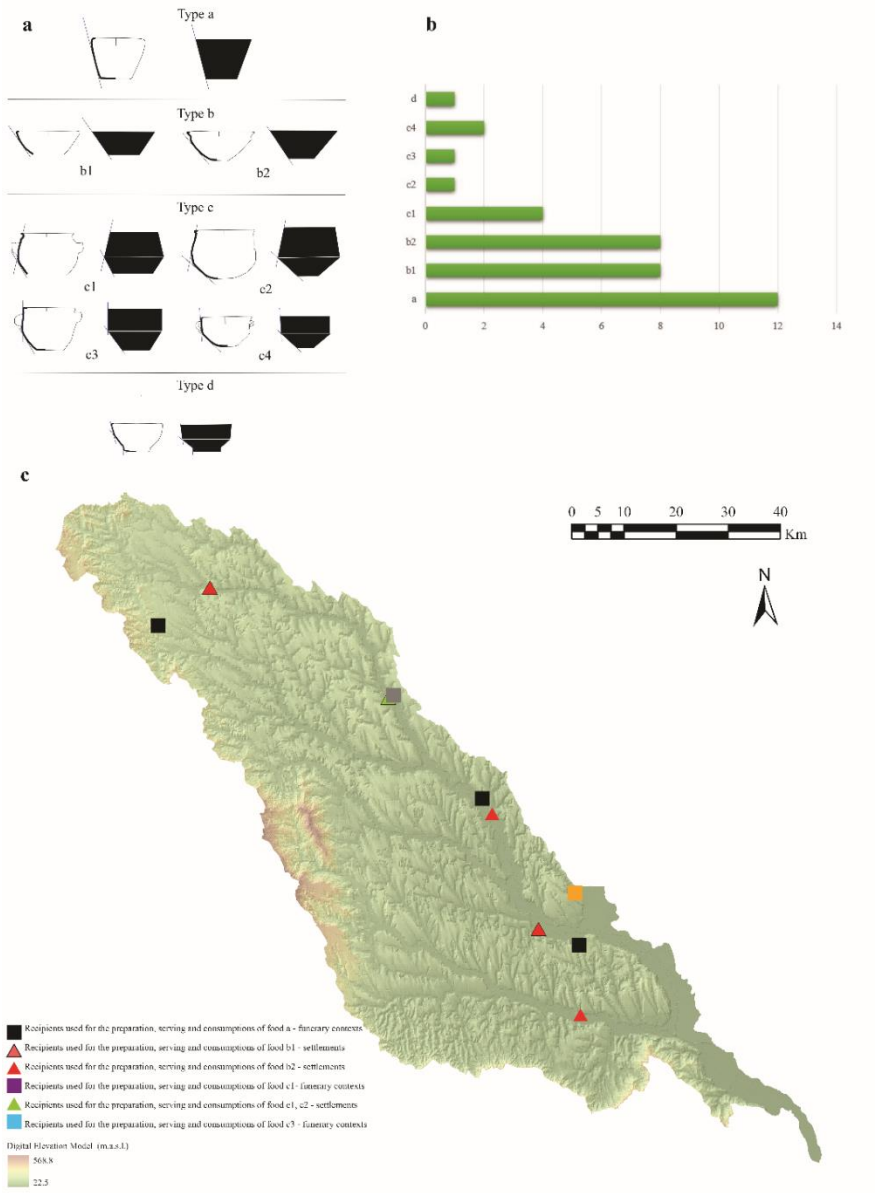

Fig.4. Recipients used for the *preparation, serving and consumption of food*. **a.** Typology. **b.** Quantitative ratio of the discoveries from Jijia River catchment. **c.** Spatial distribution within Jijia River catchment

[32] DIACONU 2014, 123-124.

Type b1 containers have an aperture diameter between 15.5-18.2 cm and could be classified as being manufactured for individual use[33]. It was not possible to analyze the relationship existing between the pots' dimensions and forms because, so far, in the workspace were not identified any whole vessels. The recipients in question have good analogies in Coslogeni cultural environment[34]. The containers specific to *type b2*, unlike the previous type, have the aperture diameter (18.2-28.8 cm) approximately four times larger than the diameter of the base (4.4-6.6 cm), while the height (6.2-11.5 cm) is just over half the maximum diameter. This category seems to have been used by the whole family[35], most of the recipients having 'grabbers' in the upper-area. Also, containers of this type were reported in Coslogeni-type contexts[36].

Type c is represented by vessels with two volumes, both open and closed. Most of them were discovered in funerary contexts and present, as auxiliary elements, handles, placed above the maximum diameter. All finds in this category appear to have been used for personal use. Further, depending on size and volume, four sub-variants could be distinguished. Thus, *sub-type c1* is usually represented by recipients made up of two overlapping truncated cones, their merging line being represented by the maximum diameter, placed closer to the base[37]. Vessels in this category usually feature handles or grabbers. For most of the discoveries, the literature does not include details regarding their dimensions. However, the range in which the aperture diameter could fit, based on the known information, is 7.2-18.2 cm. Similar discoveries were identified in Noua sites from the Republic of Moldova[38]. *Sub-type c2* is represented by a single discovery[39]. It is compound of two overlapping truncated cones, with the joining line placed near the base. The maximum diameter is about three times larger than the diameter of the base, the height being smaller than it. The specimen is decorated with wide, horizontal grooves, combined with narrow, obliquely arranged grooves, presenting analogies inside necropolises[40]. The *c3 sub-type* differs from the others through the presence of auxiliary elements: horizontally, as well as vertically, perforated handles[41]. The recipient in question is 7.5 cm high, with a maximum diameter of 9.37 cm, thus being able to be classified in the category of small vessels, with analogies in the territory located east of Prut River[42]. In *variant c4* were included

[33] FLORESCU 1991, fig.25/18, 30/16,18, 39/3.

[34] BOLOHAN 2016, pl.16/1-3,5.

[35] FLORESCU 1964, fig.6/1, 7/4; 1991, fig.24/13, 32/31, 34/49, 37/4-5, 39/8, 42/18.

[36] BOLOHAN 2016, pl.16/4.

[37] FLORESCU 1991, fig.33/44, 35/1, 189/2, 190/11.

[38] FLORESCU 1991, fig.25/2; SAVA 2014, fig.130/15-16.

[39] DASCĂLU 2007, pl.6/166a.1.

[40] FLORESCU 1991, fig.202/30.

[41] FLORESCU 1991, fig.188/27.

[42] SAVA 2002, taf.33/6.

two finds from funerary contexts[43]. Both vessels are open, being made up of a truncated cone and a cylinder, the maximum diameter being equal to that of the aperture (10.2-11.8 cm). The heights are 7.5 and 8.8 cm, while the base diameter is 4.2 and 4.4 cm, respectively. Note that the maximum diameter/aperture is at least twice that of the base and about one-third the height. One of the vessels presents four small handles, and the other one a simple strip of clay, in relief. Similar containers have been reported in Late Bronze Age contexts from eastern Romania and Transylvania[44].

Type d is represented by a three-volume vessel, open, consisting of two overlapping truncated cones, followed by a cylinder. The maximum diameter is the same as the aperture diameter and is about twice larger than the diameter of the base. Also, the height is almost half of the maximum diameter[45], showing similarities with the vessel from Brăilița, considered to be of the Srubno-Hvalinsk type[46].

The ratio of the various variants identified in this functional category (Fig.4/b) does not illustrate a clear preference due to the relatively low number of recipients discovered, for all subtypes. However, a higher number of recipients specific to *type a* can be observed, an explainable fact, given that this typological class involves the preparation, serving and consumption of certain foods. These actions are much easier when using vessels with one volume, of relatively low dimensions, but with an opening large enough to allow access to the contents of the container.

The spatial distribution (Fig. 4/c) revealed reliable results only regarding the *type b* recipients, which are found in various settlements, located on the main course of Jijia River and, in one case, of Bahlui River. The low presence of these finds within grave inventories suggests, as in the situation of cooking vessels, a possible proof of their functionality.

- *Recipients used for storing solid/liquid goods*

In general, these containers fall into two categories: for storing either solid or liquid goods. In the present case, the ceramic material, identified in the specialized literature, did not allow for a clear differentiation, which is why I preferred to include both types in one category. Vessels used to store liquids have, based on ethnographic observations, a high neck and a convex body. Such containers have not been reported during the archaeological research dedicated to Noua communities, from Jijiia River catchment, but a few finds can be mentioned that could fit, from a morphological point of view, into this type. Thus, there have to be mentioned two Belozerka pots from the territory located east of Prut River[47], and also the

[43] FLORESCU 1991, fig.187/20, 189/5.
[44] FLORESCU 1991, fig.183/4, 184/7, 199/9.
[45] FLORESCU 1964, fig.8/5.
[46] FLORESCU 1991, fig. 208/2-3.
[47] SAVA 2014, taf.191/11,14.

Srubno-Hvalinsk discovery from the workspace[48]. Since the absence of vessels with this functionality is not plausible, I have preferred to accept the possibility that some of the pots typical for storing solid goods were also used for liquids. The containers used for long-term storage are usually tall and slender, and are often fitted with handles. The latter do not necessarily serve to lift and handle the vessel but, rather, to tilt it or to tie lids or covers. These recipients are usually medium and large (h:11-150 cm; D_{max}:17.8-100 cm), the ratio between the maximum diameter and height being between 0.5-2, suggesting relatively short, stuffed forms[49]. The vessels used for short-term storage are lower and stockier (h:19-25 cm; Dm:19-22 cm), as they do not involve pouring the contents. At the same time, a center of gravity closer to the base increases safety when filling the vessel. The ratio of maximum diameter to height varies between 0.8-1.6. In the workspace, the storage vessels are diverse, in terms of volumetric components. Thus, three main categories were identified, with multiple variants (Fig.5/a).

Type a is illustrated by vessels with one volume, open, whose maximum diameter is represented by the aperture diameter. No fully restorable recipients were discovered, which is why no clear conclusions can be drawn. However, the known dimensions suggest their use for short-term storage of solid/liquid goods[50]. The discoveries have a maximum diameter between 18.3-26 cm, the decoration present on these containers consisting of a simple strip of clay. Such containers were also identified in Noua settlements from the Republic of Moldova[51].

The recipients specific for *type b* consist of two volumes and were probably used for short-term storage. Containers of this type fall into the category of bag-vessels, according to the typology of Coslogeni pottery[52], respectively of *type V vessels*, according to the typology made by V. Diaconu[53]. They are classified into two sub-types, depending on their shapes. *Sub-type b1* is characterized by the presence of two overlapping truncated cones, so that the aperture diameter is narrower, being smaller than the maximum diameter. The specimens of this type are numerous and come, mostly, from settlements[54]. Their maximum diameters are found between 10.6-24 cm, and heights between 13.6-20.8 cm. The diameter of the base is about half the aperture diameter, being two or three times smaller than the height. The decoration consists of a strip of clay, either simple or alveolate, and handles, placed in the upper part. Analogies for these pieces were reported in the settlements from the left side of Prut River, but also in the area occupied by Coslogeni communities[55].

[48] FLORESCU 1991, fig.207/8.

[49] HENRICKSON & MCDONALD 1983, 632-633; BODI & SOLCAN 2010, 318.

[50] FLORESCU 1964, fig.6/2,7; 1991, fig.29/10, 35/62, 39/11.

[51] SAVA 2014, fig.47/8.

[52] BOLOHAN 2016, 125-127.

[53] DIACONU 2014, 122-123.

[54] FLORESCU 1964, fig.7/6,9-10, 14/6; 1991, fig.24/11,16, 25/22, 29/10, 30/14, 31/29, 32/33-34,36, 33/40,45,47, 34/53, 35/61, 38/10-13,15, 39/2,4-5,7,9-10,12, 41/1,3-6, 42/19, 43/1-3,7-8, 191/4.

[55] SAVA 2014, fig.125/7, 130-131, 134, 149-152; BOLOHAN 2016, pl.10/1-8,10.

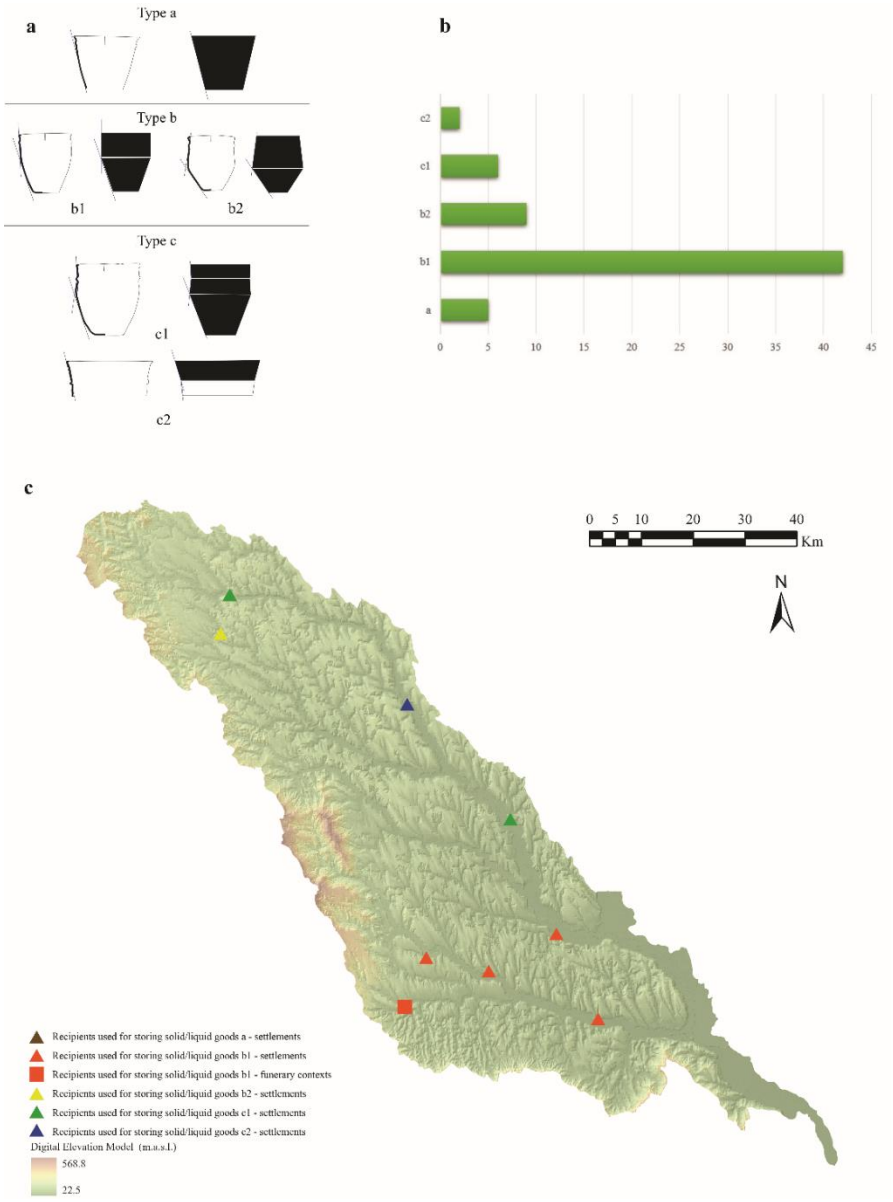

Fig.5. Recipients used for storing solid/liquid goods. **a.** Typology. **b.** Quantitative ratio of the discoveries from Jijia River catchment. **c.** Spatial distribution within Jijia River catchment

Sub-type b2 is composed of a truncated cone followed by a cylinder, the maximum diameter being equal to the aperture diameter. Discoveries of this type come, mostly, from settlements[56]. The maximum diameter is found between 10.2-22.6 cm, and the height between 12-24.6 cm,

[56] FLORESCU 1964, fig.7/7; MOSCALU 1989, fig.10/9; FLORESCU 1991, fig.29/9, 30/20, 32/35,38, 34/51-52, 38/14.

thus being included in the category of small and medium vessels. As in the previous case, the decoration consists of a strip of clay but, for this category, we note the absence of handles or grabbers. Other specimens specific to *variant b2* were found inside necropolises from eastern Romania[57].

The containers of *type c* are made up of two or three volumes and were structured into two sub-types: the *sub-type c1* stands out for its larger dimensions than in the previous cases, the maximum diameter reaching 30 cm, and the height 26.4 cm. Thus, we can consider that the vessels in this category could have been used to store solid/liquid goods in the long term. They are generally decorated with simple strips of clay[58], with analogies in similar sites from the territory located east of the Carpathians[59]. *The c2 variant* differs from the previous one by the angularity of the walls, first of all. The clay strips, which are alveolate, are located much lower than in the previous case[60], having an aperture diameter between 22.2-25.3 cm. Similar vessels were identified in the Coslogeni cultural environment[61], being included in the category of *recipients used for storing supplies*.

Regarding these recipients, the preference for restricted 'bag-vessels', made up of two volumes, is clear, their number being much higher than in any other cases (Fig.5/b). The spatial distribution (Fig.5/c) revealed important results for the pots specific to *subvariant b1*, which were identified both in settlements and funerary contexts. There is a concentration of discoveries in the lower basin of Jijia River, more precisely in Bahlui River catchment. In the case of the other discoveries, from the middle and upper basins of Jijia, the constant is represented by the settlements found on the main course of Jijia River.

- *Recipients with utilitarian/special function*

This category includes the vessels that have had a special destination, discovered most often inside the graves. Their utilitarian function is given by the possibility of using them for storing liquids or for drinking, before the time of the ritual deposition.

Type a (Fig.6/a) is represented by the cups with a single raised handle. Although these are small in size (h/D_{max} <15 cm), I think they could have also been used for storing liquid products. Given the fact that a single vessel of this type was discovered inside a settlement, while all the others were found in funerary contexts, I believe they were most likely filled with liquids and deposited as an offering. The recipients thus acquired both a special (ritual) functionality and an utilitarian one, of 'storing'. It is difficult to determine if these vessels were used before the moment of their ritualic deposition, their functionality being transformed only out of 'necessity'. In order to establish this aspect, further should be performed chemical analyzes, at

[57] FLORESCU 1991, fig.203/40.

[58] FLORESCU 1964, FIG.7/5, 14/2; 1991, FIG.25/17,21, 32/37, 206/5.

[59] DIACONU 2014, fig.86/11.

[60] FLORESCU 1964, fig.6/3,8.

[61] BOLOHAN 2016, pl. 9B/2.

least. Such containers have numerous analogies in Noua funerary contexts, being found, within the typology realized by V. Diaconu[62], in the category of *type II vessels*. Depending on the number of volumes that compose the recipient, there were identified three sub-types: The *sub-type a1* is represented by two-volume vessels, open, made up of a truncated cone, overlapped by a cylinder. Thus, the maximum diameter is equal to that of the aperture, and from a proportionate point of view, the diameter of the base is three times smaller than the maximum diameter, while the height is larger than the latter. The specimens[63] have a single raised handle that, in some cases, presents a button, without other decorative elements. Similar containers were identified in numerous contemporary sites throughout Romania[64]. *Sub-type a2* is represented by the same type of recipients, but made up of three volumes (truncated cones overlapped). These specimens[65] are restricted, because the aperture diameter is smaller than the maximum diameter, but they do allow access to the content. The available dimensions place the heights of the containers (without taking into account the auxiliary elements) in the range of 6.2-12.8 cm, while the maximum diameters are found between 7.5-19.1 cm. The heights seem to be almost equal to the aperture diameters, but smaller than the maximum diameters, so that the vessels are short and stocky. Similar specimens were also discovered in neighboring territories, as well as in the Coslogeni cultural environment[66]. *Sub-type a3* is illustrated by a single discovery[67], made up of four volumes (truncated cones overlapped). Although the vessel is restricted, and the aperture diameter is smaller than the maximum one, the access to the content is allowed. Its dimensions are: 8.5 cm high, 9.2 cm maximum diameter and 7 cm the aperture diameter. The vessel is decorated with upside down triangles with double sides, while their base is delimited by a horizontal line, presenting, also, one raised handle with a button. Similar discoveries were identified within Noua sites from eastern Romania[68].

Type b is represented by the cups with two raised handles. They could be classified according to the number and type of component volumes, as well as according to the position of the tangent. *Sub-type b1* is represented by cups with two volumes (overlapping truncated cones), that present raised handles, simple or with buttons[69]. The containers are small sized, with heights between 5.7-12.6 cm, and maximum diameters between 5.7-15.3 cm. It is noted that, in general, the height is equal to the aperture diameter.

[62] DIACONU 2014, 119-120.

[63] FLORESCU 1991, fig.187/24.

[64] DIACONU 2014, fig.82/6-8,11-12.

[65] FLORESCU 1964, fig.2/2,4; 1991, fig.33/41, 35/60, 41/2, 42/14-16, 185/1, 186/1,4,11, 187/12-13, 188/28; SAVA 2002, taf.71/3, 72/5, 73/5; DASCĂLU 2007, pl.39/112.

[66] DIACONU 2014, fig.80/2,4-5,11; BOLOHAN 2016, pl.18b/1, 24a/2-3.

[67] FLORESCU 1991, fig.191/2.

[68] FLORESCU 1991, fig.200/10, 204/1.

[69] FLORESCU 1964, fig.2/1; 1991, fig.185/2,5, 187/13, 188/26,29,31, 189/1,8; SAVA 2002, taf.71/7.

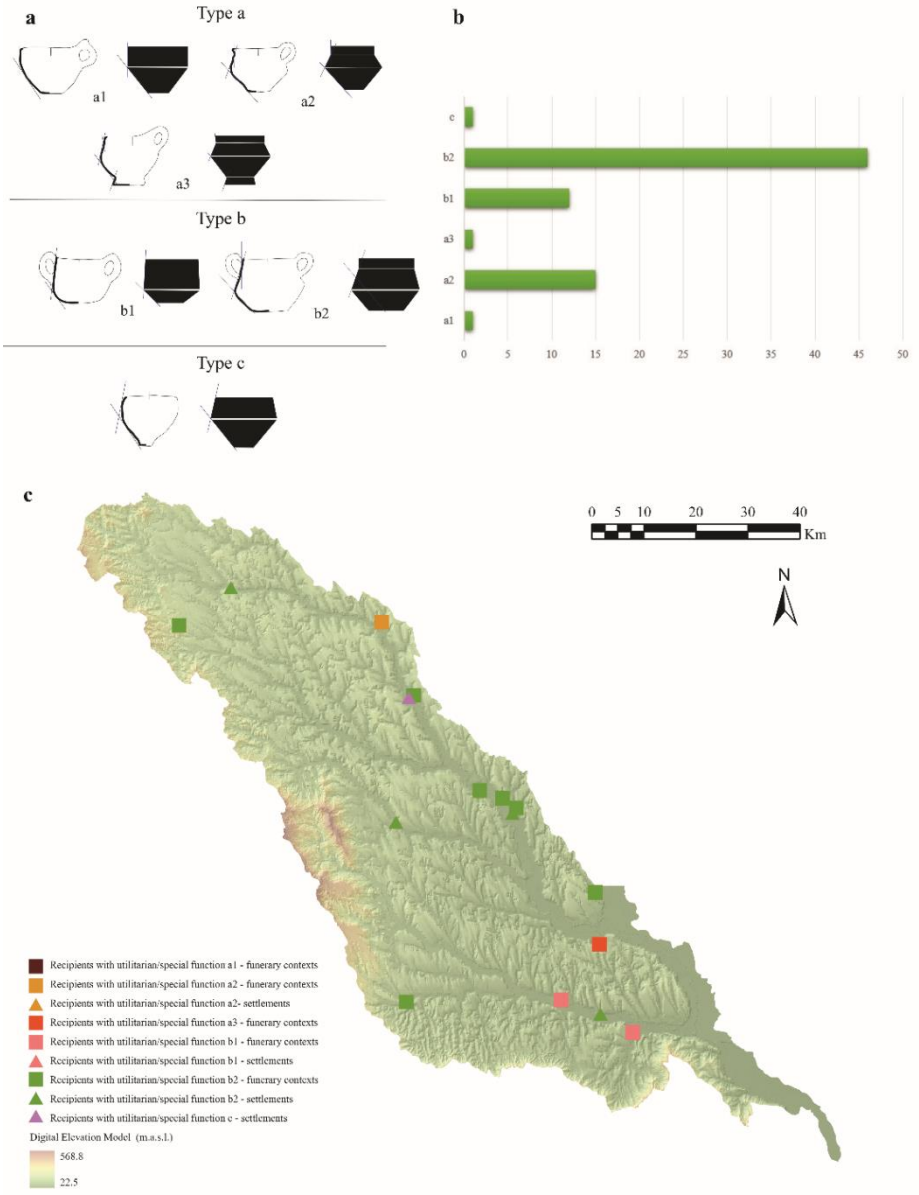

Fig.6. Recipients with a utilitarian/special function. **a.** Typology. **b.** Quantitative ratio of the discoveries from Jijia River catchment. **c.** Spatial distribution within Jijia River catchment

Among these discoveries, only one presents decoration, namely bands of horizontal and oblique grooves, made in the middle area of the vessel. Similar recipients were reported in numerous funerary contexts specific to both Noua and Coslogeni cultures[70], being known

[70] DIACONU 2014, fig.73/9, 75/10-11, 77/5,8, 79/4,6,9; BOLOHAN 2016, pl.23A/1,5-6.

within the specialized literature as *kantharos*[71] or as *type I vessels*, according to the typology of V. Diaconu[72].

Sub-type b2 is represented by cups with two raised handles made up of three volumes (two overlapping truncated cones, followed by a cylinder). This time there are slight differences compared to the previous category. Such containers appear in a much higher number inside settlements[73], although the preponderance remains within the funerary discoveries[74]. The recipients' dimensions vary between 5.4-7.7 cm in height and between 7.2-24.4 cm regarding the maximum diameter. In this sub-type, the recipients' sizes are larger than before, belonging mostly to the medium-sized category. At the same time, another difference, in comparison with the previous version, is given by the much higher presence of the decorative motifs on the recipients. In this category were included also three other discoveries that are, in terms of shape, corresponding to the *b2 sub-type*, but which present either small handles, located in the upper-part of the vessel, or small grabbers, found in the area of the maximum diameter. Since the context of the discovery is the same, as in the previous cases, I consider that these recipients could also have had a utilitarian/special function. Last but not least, such specimens appear in almost all Noua contexts, from the Romanian territory[75], but also from the area located east of Prut River[76].

Type c was added to the present typology in order to be able to include a shard[77] that belongs to a perforated bowl with a height of 12.8 cm and a maximum diameter of 11.5 cm. Specimens of this type are usually considered either strainers or smoke-vessels. In this case, I took into account the relatively small dimensions of the object, which, from my point of view, leans more towards a possible usage in ritualic ceremonies. For this reason, I preferred to include the discovery in the category of recipients with a utilitarian/special function, remaining, however, at the level of a simple hypothesis. Similar discoveries were identified in numerous settlements[78], but also in during field-walks performed within the workspace[79].

The vessels with a utilitarian/special function are present in almost all the funerary contexts belonging to Noua communities, being represented, in particular, by *types a and b*. However, there is a predilection for the cups with two raised handles (*kantharos*), made up of three volumes and, most of the times, decorated (Fig.6/b). In the case of the cups with a single

[71] BOLOHAN 2016, 129-130.

[72] DIACONU 2014, 118-119.

[73] FLORESCU 1991, fig.29/8, 30/13, 34/48, 37/2; DASCĂLU 2007, pl.9/83.

[74] FLORESCU 1964, fig.2/1,5-6, 8/2; 1991, fig.186/5,9-10, 187/15-17,19,22-23, 188/25,27,30,32, 189/3-4,7, 190/9-10,12-13, 191/3,5, 207/7; SAVA 2002, Taf.70/1,4,8, 71/2, 73/2,6, 74/2, 75/3; DASCĂLU 2007, pl.39/295.1-2, 74/420/a-b.

[75] DIACONU 2014, fig.73/3,10, 75/13, 76-77, 79/5,7,10, 83/12-14.

[76] SAVA 2014, fig. 14/1-3.

[77] FLORESCU 1991, fig.35/2.

[78] DIACONU 2014, fig.94/17,19.

[79] BRAȘOVEANU 2021, pl.54/4-6.

raised handle, a predilection can be distinguished, as in the previous case, for the specimens made up of three volumes. Although the number of discoveries of ceramics with utilitarian/special function is quite high, regarding the spatial distribution (Fig.6/c) we obtained results only for pots specific to the *sub-type b2*, identified, mainly, in the necropolises from the eastern border of the current workspace, but also in other sites located on the main courses of some important hydrographic arteries, such as Bahlui or Miletin rivers.

The ceramic analysis could not be complete without highlighting, at least, some aspects regarding the decorative elements encountered. It is true that most recipients specific for Noua culture, from the workspace, are undecorated, however I will attempt a short presentation of the main decorative motifs identified. Depending on the manufacturing method, the decoration was made by incisions, in relief (plastic applications), impressions or grooves. Thus, the *incised decorations* generally consist of horizontal, vertical lines and triangles and appear alone, or combined. *Embossed decorations* are predominant in the pottery specific to Noua culture and, usually, consist of strips of clay, buttons or grabbers. It is possible that their positioning, in particular, in the upper half of the storage vessels was intended to strengthen that area of the recipient. Due to the high frequency, the simple, horizontal, continuous, strips of clay can be considered as a decorative element specific to coarse vessels[80]. Also, the horizontal, continuous strip, indented both vertically and obliquely, occurs frequently in the settlements investigated from Jijia catchment, and beyond. This decoration appears, sometimes, associated with a row of perforations made at the top. As for the buttons or grabbers, these auxiliary elements are probably made through 'pinching' the soft paste of the vessel[81] and are more or less conical. *The decoration through impression* was not very common within Noua pottery from Jijia catchment, being discovered only on some ceramic fragments. Last but not least, the *grooves* through their manner of distribution and arrangement on the pottery determined the existence of numerous variants. In the workspace, the communities belonging to Noua culture performed narrow or wide grooves, arranged horizontally, vertically or obliquely, both alone and in combination.

The pottery represents the main component used by archaeologists while defining a set of characteristics specific to a prehistoric community, and more. The ceramics specific to Noua culture, that were discovered in the sites from Jijia catchment are very diversified, summing 93 complete and 16 fragmentary vessels, to which are added 105 other typical ceramic fragments. Regarding the discovery contexts, the existing ratio (Fig.7), is, to some extent, the expected one, since cooking vessels, along with those used for the preparation, serving and consumption and those for storing liquid/solid goods are found, predominantly, within settlements, while the containers with special functions are found, in particular, in funerary contexts.

[80] DIACONU 2014, pp.130-131.

[81] DIACONU 2014, p.132.

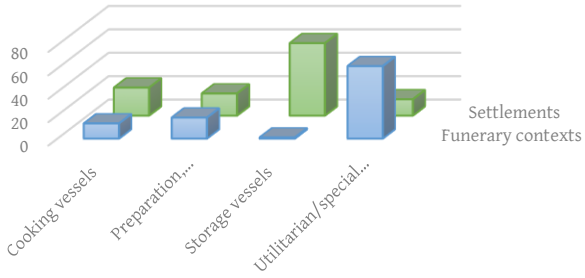

Fig.7. The existing ratio between the functional typology and the context of discoveries

Discussions

Although the number of discoveries is high, most ceramic fragments were found inside the main Noua settlements or necropolises investigated within the work-space, namely: Truşeşti – *Movila din sesul Jijiei/Puturosul*, Corlăteni – *Pe ţarină*, Andrieseni – *Vatra satului II/Terenul Şcolii Generale*, Truşeşti – *Ţuguieta*, Probota – *În baie*, etc. Thus, the fact that the concentration area of the discoveries is found in the lower basin of Jijia (Bahlui River watershed) and on the eastern extremity of the workspace, especially on the main course of Jijia River, is not surprising, being, in reality, the result of the research undertaken. In this sense, the codependency relationship existing between the two components (the data obtained and the current stage of research) should not be overlooked. The number of invasive researches is very small, and their nature did not aim to carry out exhaustive research. Added to these aspects is the fact that the results of the excavations have not been fully published, in many cases being identified only mentions of some recipients, without illustrations.

Regarding the auxiliary elements present on the pottery under analysis, the main types consist of incisions, embossed decorations, impressions and grooves and perforations (Fig.8).

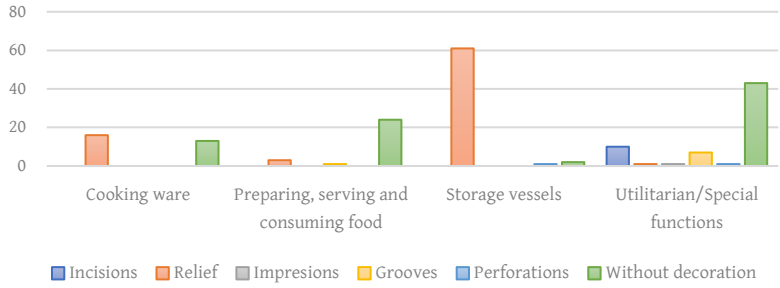

Fig.8. The existing ratio between type of decoration and the functional typology.

Thus, the cooking vessels are, in most cases, decorated with strips of clay in relief, just like the storage vessels. At the same time, the ceramic ware used for preparation, serving and consumption and also for special activities is not decorated. In the exceptional situations,

where decorative motifs are discovered, the vessels of the first category show strips of clay in relief or grooves, and those of the second category have incisions, grooves and, less often, impressions, strips of clay or perforations. The most common auxiliary elements are the handles, especially in the cases of the *type c* of cooking vessels and *kantharos*, followed by small grabbers.

Conclusions

In the present study, the typology relied on the combination of two different types of classification, depending on the component volumes and the possible functionality of the container. Thus, the vessels were divided into four categories: for cooking, for preparation, serving and consumption, for storing solid/liquid goods and with a utilitarian/special function, each of these presenting variants and sub-variants.

The typological analysis carried out demonstrated a preference for the usage of cooking vessels of relatively large sizes, closed and made up of two or three volumes, but without restricting the access to the contents, allowing the efficient heat transfer while preventing the rapid evaporation. Most common form, in the entire workspace, is the one specific to *sub-type c2*, the discoveries being found, mostly, in the eastern area of the workspace, although probably this is a consequence of the current stage of research since, certainly, these pots were needed in all settlements. Most of these ceramic forms feature handles, ensuring the efficient maneuvering of the vessel, especially if they were used for cooking food, thus involving direct contact with fire.

Regarding the recipients used for the preparation, serving and consumption of food, we can observe a predilection for the ones made for individual use, small-sized, consisting of one or two volumes, but which have an aperture diameter large enough to allow the access to the contents. Most forms are undecorated, which may happen because of their relatively short lifespan. Also, there is a pattern regarding the deposition of these recipients inside graves, being used, probably, for the ritualic deposition of offerings.

The pottery used for the storage of solid/liquid goods was, mostly, of medium size, consisting of two volumes, with an aperture large enough to allow the use of a scoop or ladle. The presence of the outward-facing superior part suggests, according to ethnographic and experimental data, the possibility of tying a flexible cover, in order to protect the contents of the container, since, until now, no lids have been reported. Also, the decoration specific to these vessels is the one made in relief, and its placement, in particular, in the upper half of the recipient, aims to strengthen that area of the vessel, being, moreover, a decorative element specific to coarse pottery. The spatial distribution of the discoveries illustrates as area of concentration Bahlui River catchment. Apart from this, another constant can be observed regarding the presence of this type of pottery in the settlements located on the main course of Jijia River.

The last category, of recipients with utilitarian/special functions, was realized in order to be able to include the numerous cups with one or two raised handles (consisting usually of three volumes) identified, over time, in almost all funerary contexts belonging to Noua culture. The utilitarian function is given by the possibility of using the pots for storing liquids or for drinking, prior to the moment of ritual deposition. With the inclusion of these vessels in the funerary inventory, they acquired both a special (ritualic) as well as a 'storage' functionality. The spatial distribution of the utilitarian/special vessels revealed a concentration of pottery in the funerary contexts from the eastern border of the studied territory, followed by a relatively high presence within the funerary discoveries located near the main streams of Bahlui and Miletin Rivers.

Most of the ceramic materials analyzed were discovered in the main sites investigated within the workspace, so it is somewhat predictable that their concentration is in the lower segment of Jijia River catchment, as well as on the eastern extremity of the study area, regions where the few large-scale excavations carried out.

Acknowledgements

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