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Early Metallurgy North of the Danube: A Necklace from a Boian-*Vidra* grave discovered at Glina-*La Nuci*

Cristian Eduard Ştefan[1]

Abstract. In the old collections belonging to the National Museum of Antiquities ("Vasile Pârvan" Institute of Archaeology) some interesting artefacts were found (shell, rock and copper beads). They belong to a necklace discovered in a Boian-Vidra grave at Glina-*La Nuci* (Ilfov County) in 1946. Similar items found in funerary contexts at the Lower Danube are discussed (Andolina, Cernica, Popești-Vasilați, Sultana-*Valea Orbului*). The Vidra phase of Boian culture has only a few radiocarbon dates until now, and corroborating other data ("imports", indirect links, stratigraphy) we can state its existence around 5000 cal BC, a period of remarkable changes at the Lower Danube, such as the transition to tell settlements or the rise of metallurgy. The combination of shell and copper beads is rather rare at the Lower Danube in the first half of the 5th millennium BC, sometimes instead of copper other materials being used (e.g. malachite). The fact that our necklace was discovered as an inventory of a child grave raises the question of the status of so-called children (anthropologically speaking) in ancient societies. The XRF analysis proved that the copper sheets utilised to make beads were very pure (over 99%), which leads us to the conclusion that the ancient metallurgist used copper nuggets. Also, the 158 pieces of the necklace showed a variety of raw materials used (*Spondylus* & *Dentalium* shells, copper, limonite, marl and limestone) and high technological skills (melting/cold hammering and bending copper, cutting and abrasion of shells).
Keywords*:* copper, graves, Boian culture, early metallurgy, necklace.

Metalurgia timpurie la nord de Dunăre: un colier dintr-un mormânt Boian-*Vidra* descoperit la Glina-*La Nuci*. În vechile colecții aparținând Muzeului Național de Antichități (Institutul de Arheologie „Vasile Pârvan") au fost găsite câteva obiecte interesante (mărgele din scoică, rocă și cupru). Acestea aparțin unui colier descoperit într-un mormânt Boian-Vidra de la Glina-*La Nuci* (județul Ilfov) în anul 1946. Sunt discutate obiecte similare descoperite în contexte funerare la Dunărea de Jos (Andolina, Cernica, Popești-Vasilați, Sultana-*Valea Orbului*). Faza Vidra a culturii Boian are numai câteva date radiocarbon până acum, dar coroborându-le cu alte argumente („importuri", legături indirecte, stratigrafie), putem stabili existența acesteia în jurul datei de 5000 î. Hr., o perioadă de mari schimbări la Dunărea de Jos, cum ar fi trecerea la așezări de tip *tell* sau intensificarea metalurgiei. Combinația de mărgele din cupru și scoică

[1] "Vasile Pârvan" Institute of Archaeology, Romanian Academy, Bucharest, Romania; Institute of Bioarchaeological and Ethnocultural Research (ICBE), Chișinău, Republic of Moldova; cristarh_1978@yahoo.com.

este mai degrabă rară la Dunărea de Jos în prima jumătate a mileniului V î. Hr., uneori în locul cuprului fiind folosite alte materiale (malahitul, de exemplu). Colierul provine din inventarul unui mormânt de copil și acest lucru ridică problema statutului așa-numiților copii (din punct de vedere antropologic) în societățile arhaice. Analizele XRF au arătat că foițele utilizate pentru a face mărgelele erau din cupru pur (peste 99%), ceea ce ne poate duce la concluzia că metalurgistul a folosit pepite. De asemenea, cele 158 de piese ale colierului ne arată o varietate de materii prime folosite (scoici *Spondylus* și *Dentalium*, cupru, limonit, marnă și calcar) și calități tehnologice dezvoltate (topire/batere la rece și îndoire pentru cupru, abraziunea scoicilor).
Cuvinte cheie: cupru, morminte, cultura Boian, metalurgie timpurie, colier.

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Introduction

If we look at the distribution of copper artefacts between the 7th and 4th millennia BC, as they were analysed in a relatively recent overview (Mareș 2002), we count only eight items in the interval between 6000 and 5500 cal BC, 172 items between 5500 and 4500 cal BC, a real boom consisting of 1517 copper objects between 4500 and 3500 cal BC followed by a dramatic downfall after 3500 cal BC (77 items, i.e. a few kilograms). In this contribution, we are discussing the inventory of a Boian-Vidra grave (re)discovered in the old collections of the National Museum of Antiquities ("Vasile Pârvan" Institute of Archaeology).

The grave was found in the settlement of Glina-*La Nuci*, near Bucharest (**Figs. 1, 2**). This site was researched during three main stages: the first one in 1926-1927 (with Ion Nestor in charge), the second one in 1943-1948 (with Mircea Petrescu-Dâmbovița in charge) and the third one in 1969-1970 (with Mircea Petrescu-Dâmbovița and Eugen Comșa in charge) (Nestor 1928; Nestor 1933; Petrescu-Dâmbovița 1944; Ștefan 2016).

The stratigraphy of the settlement has a thickness of approximately 4 m and comprises layers of habitation belonging to Boian-Vidra, Gumelnița (A1 and A2 phases) and Glina (Early Bronze Age) traditions (Ștefan 2016; Băjenaru 2014).

In the Boian-Vidra occupation layer, eight intra-muros children's graves were found, mostly near dwellings, as follows: four graves were discovered in 1943, two graves in 1946, and another two graves in 1947 and 1948, respectively (Comșa 1974, Fig. 80). One of the graves found in 1946 represents our focal point, although it has only a short description at E. Comșa (1974): "… *At the other skeleton, in the neck area, many shell beads and a few made of copper sheet were found. The latter looked like short cylindrical tubes which alternated with the other beads.*"

Four radiocarbon dates from Sultana-*Malu Roșu* and Sultana-*Gheță̆rie* (Opriș, Lazăr, Ignat 2017, Tab. 1) corroborated with stratigraphic data and other indirect links (Ștefan 2014) place the Vidra phase of Boian tradition around 5000 cal BC, a period of consequential changes at the Lower Danube such as the transition to tell settlements and the rise of metallurgy.

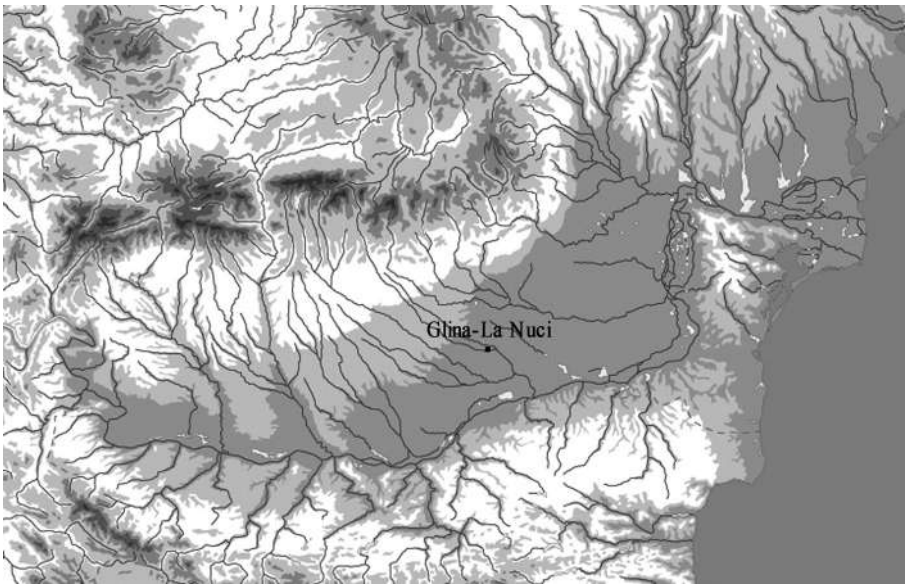

Fig. 1. The topographic position of the settlement at Glina-*La Nuci*
Fig. 1. Poziția topografică a așezării de la Glina-*La Nuci*

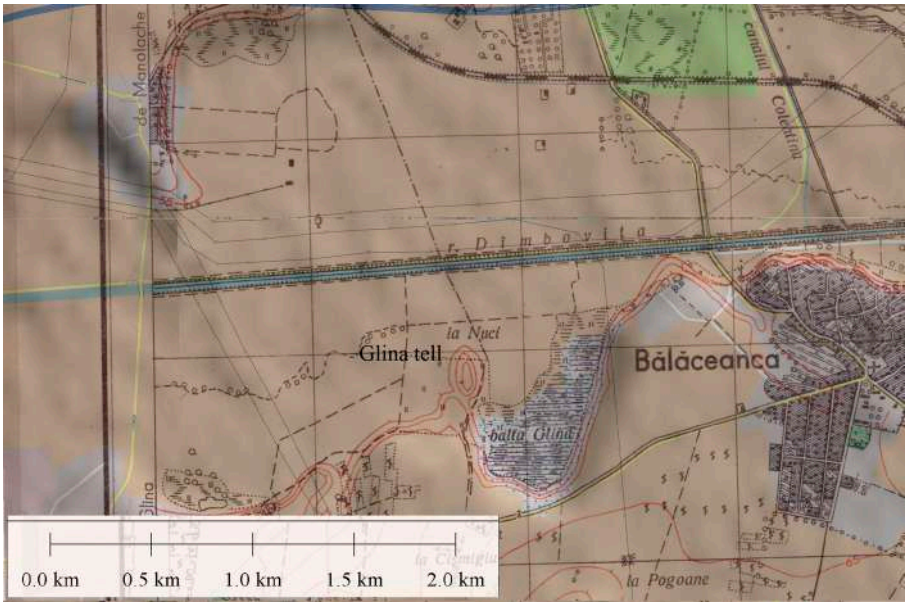

Fig. 2. The tell from Glina-*La Nuci*
Fig. 2. *Tell*-ul de la Glina-*La Nuci*

Material and methods

The inventory of Grave 6 from Glina is composed of 158 items (23 cylindrical copper beads and 135 *Spondylus*, *Dentalium*, limonite, marl and limestone). Only 21 of the 23 copper beads (**Fig. 3**) were analysed by XRF method.

Fig. 3. The copper beads
Fig. 3. Mărgelele din cupru

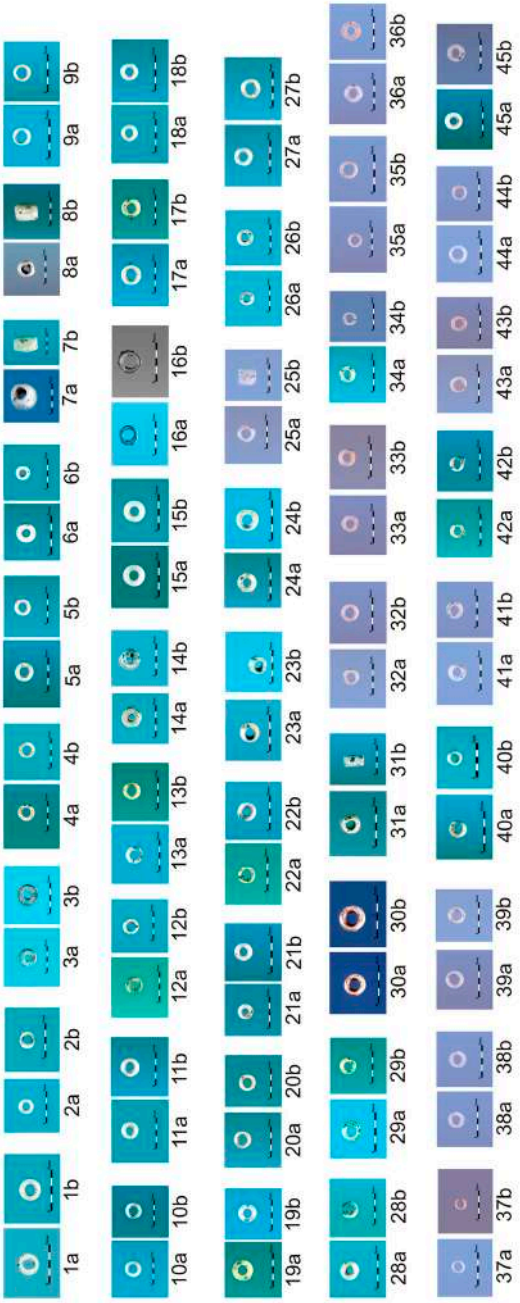

Fig. 4. The rock and shell beads
Fig. 4. Mărgelele din piatră și scoică

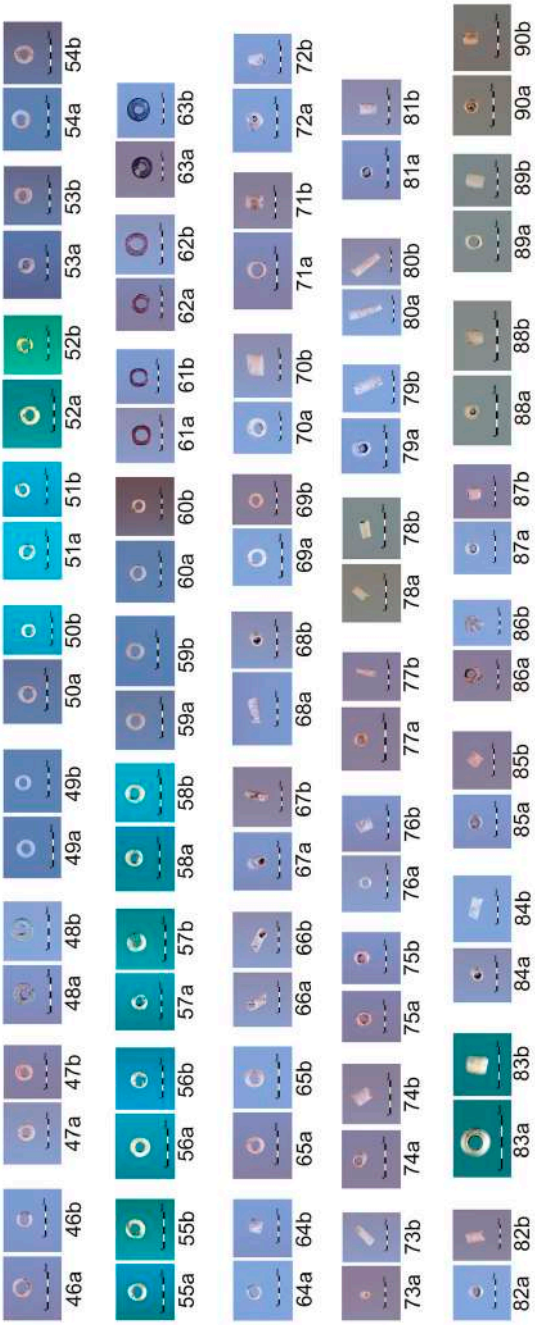

Fig. 5. The rock and shell beads
Fig. 5. Mărgelele din piatră și scoică

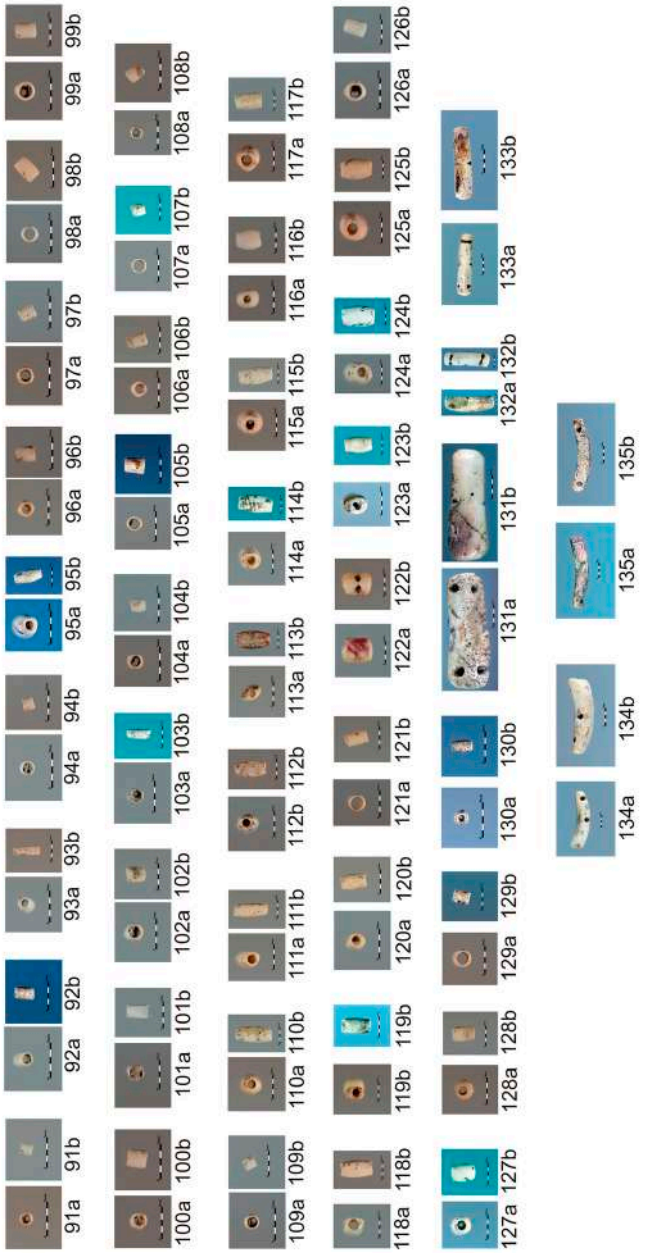

Fig. 6. The rock and shell beads
Fig. 6. Mărgelele din piatră și scoică

Fig. 7. A possible reconstruction of the necklace
Fig. 7. O posibilă reconstrucție a colierului

The analyses were carried out with a XRF portable spectrometer, InnovX Systems Alpha Series, with Wolfram anticathode, SiPIN diode and a cooling system through Peltier effect. The working parameters were: 45 kv as voltage, 30 microA as intensity and 120 s as acquisition time.

Most of the other 135 beads of the necklace are made of shells (*Spondylus* and *Dentalium*) and only six of them of other materials: three of limonite, two of marlstone and one of limestone (**Figs. 4-6**). Also, if we look at the shell beads, the *Spondylus* kind constitutes the majority, the *Dentalium* being represented only by a few items. The interesting fact we observed is that most of the *Spondylus* specimens kept the original pinkish colour of the shell. If we consider typology, we note that most of the beads are ring shaped, but also other forms are represented: cylindrical, barrel, bilobated and one bead shaped like a button (**Fig. 6/122a-b**), very similar to two artefacts from the cemetery of Popești-Vasilați (Șerbănescu 1999, Fig. 1).

We will not insist on the process of transforming the shells in actual adornments, the topic being approached already in the literature on the occasion of analysing the items from the cemeteries at Cernica (Mărgărit, Vintilă 2015) or Cernavodă (Mărgărit 2012). The striking similarity between our items and the ones mentioned above strongly suggests the existence of a network of adornments trade or travelling craftsmen.

Based on the short description of Grave 6 and on the typology of the beads we tried a possible reconstruction of the necklace as shown in **Fig. 7**.

Results

The XRF analysis of the copper beads revealed some interesting facts (**Tab. 1**). First of all, it appears that Fe, Ti and Mn were retained from the soil and As was a trace element. What striked us was the high purity of the copper (over 99% in almost all cases), which could lead us to think that ancient craftsmen looked for copper nuggets. Also, we observed two main groups containing V on one hand and Au on the other hand (and excluding each other), which can be interpreted as two different sources of raw material.

Reading	Description	Chemical element (%)								
		Ti	V	Cr	Mn	Fe	Ni	Cu	Au	As
2	**bead 1**					1.27	0.05	98.36	0.32	0.001
3	**bead 2**		0.08			0.40	0.05	99.47		0.001
4	**bead 3**				0.02	0.46	0.001	99.52		0.001
5	**bead 4**					0.62	0.06	99.26	0.06	0.001
6	**bead 5**					0.52	0.001	99.48		0.001
7	**bead 6**					0.43	0.001	99.32	0.25	0.001
8	**bead 7**		0.09	0.03		0.38	0.05	99.44		0.001
9	**bead 8**	0.10	0.10	0.03		0.34	0.001	99.43		0.001
10	**bead 9**	0.07				0.52	0.05	99.36		0.001
11	**bead 10**		0.08	0.03		0.46	0.001	99.43		0.001
12	**bead 11**			0.04		0.86	0.001	99.10		0.001
13	**bead 12**					0.59	0.001	99.41		0.001
14	**bead 13**					0.29	0.001	99.71		0.001
15	**bead 14**					0.57	0.07	99.14	0.23	0.001
16	**bead 15**				0.04	0.17	0.001	99.75		0.001
17	**bead 16**					0.27	0.001	99.73		0.001
18	**bead 17**					0.38	0.001	99.62		0.001
19	**bead 18**					0.52	0.001	99.48		0.001
20	**bead 19**				0.02	0.27	0.001	99.71		0.001
21	**bead 20**		0.09			0.32	0.001	99.42	0.17	0.001
22	**bead 21**					0.47	0.10	99.26	0.18	0.001

Tab. 1. The XRF analysis for 21 of the 23 copper beads
Tab. 1. Analiza XRF pentru 21 din cele 23 de mărgele din cupru

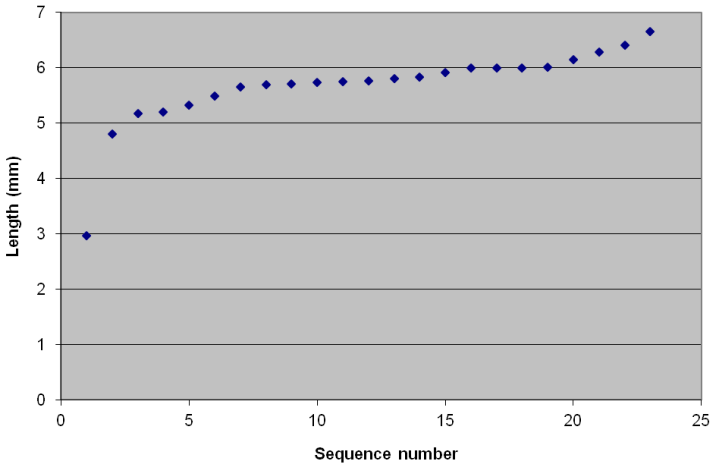

Fig. 8. The length of the copper beads
Fig. 8. Lungimea mărgelelor din cupru

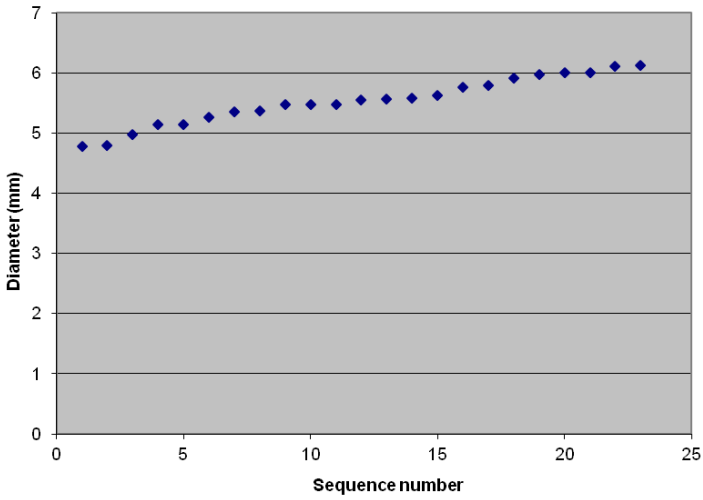

Fig. 9. The diameter of the copper beads
Fig. 9. Diametrul mărgelelor din cupru

The technique used was cold hammering. A metal sheet was obtained and then was cut into narrow slices and bent over on a cylindrical device (made of bone/antler or wood) in order to obtain circular beads. A good analogy for the production technique of our beads is represented by the ring shaped items made of gold from the Varna I cemetery (Leusch, Pernicka, Ambruster 2014, Fig. 9a-c).

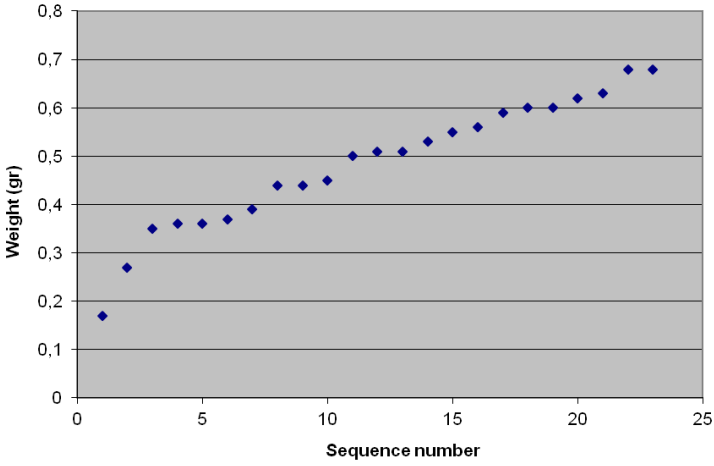

Fig. 10. The weight of the copper beads
Fig. 10. Greutatea mărgelelor din cupru

The copper beads have a length roughly between 5 and 6 mm (with one exception of 3 mm – see **Fig. 8**), a diameter also between 5 and 6 mm (**Fig. 9**) and a weight between 0.2 and 0.7 g (**Fig. 10**).

Discussion

Several Neolithic cemeteries (most of them of Boian tradition) with some interesting inventories were researched north of the Danube. For example, at Andolina (Călărași County) nine graves were excavated, two of them being very important for our discussion. Grave 1 had a volcanic tuff axe and 58 beads as inventory, 30 made of shell (24 of *Spondylus* and six of *Dentalium*) and 28 made of copper (most probably malachite in our opinion). From the 24 *Spondylus* shells, 16 were bilobate and eight trilobate in shape, forming a two rows necklace according to the author's description (Comșa 1961). The individual from grave 2 had 65 beads around the neck, four of them of *Spondylus*, a few of *Dentalium* and most of them of malachite (Comșa 1974).

Another interesting necropolis was researched at Cernica (Ilfov County). Of the 378 Neolithic graves, only 119 had inventories (ca. 31.8%) and 24 contained malachite beads (ca. 6.3%). It is interesting to note that many graves with malachite beads also contained shells as inventory: *Spondylus gaederopus*, *Dentalium, Petunculus pilosus* or *Ostrea edulis* (Comșa, Cantacuzino 2001). Since the necropolis of Cernica benefited of an anthropological analysis of the skeletons, we tried to see the distribution per gender of the graves with malachite beads (**Fig. 11**).

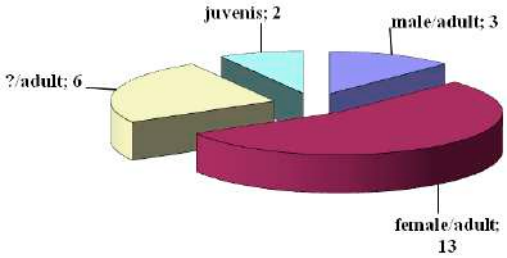

Fig. 11. The graves with malachite beads from Cernica cemetery
Fig. 11. Mormintele cu mărgele de malachit din cimitirul Cernica

Several Neolithic graves were excavated at Popeşti-Vasilaţi, Călăraşi County. Of 16 researched burials, seven had inventories (flint arrowheads, stone axes, *Spondylus* and malachite beads). Unfortunately, data for this cemetery are very scarce and we do not have any distribution per grave of the inventories (Şerbănescu 1999).

Another important necropolis was investigated at Sultana-*Valea Orbului*, Călăraşi County. Of the 250 burials excavated, 121 had inventories (48.4%) and most of them present the same triad: malachite-*Spondylus*-*Dentalium* beads (Şerbănescu 2002).

Copper (malachite?) beads were mentioned in cemeteries excavated south of the Danube, such as those at Cernavodă (Berciu 1966) or Durankulak (Todorova 2002). A very important discovery for our discussion is the workshop from Aşağı Pınar (western Turkey). In the courtyard of a house from Level 3 (dated 5080-4900 cal BC) a necklace made of malachite, rock crystals and *Spondylus* beads was found. Furthermore, a concentration of scattered unfinished lumps of malachite and beads was observed, the Neolithic community from here taking advantage of the proximity of these two important raw materials: malachite from the Strandzha slopes and shells gathered from the north Aegean and the Sea of Marmara (Ivanova 2012). The striking fact here is the synchronicity of the date of Aşağı Pınar with the Vidra phase of the Boian tradition, to which our Grave 6 belongs, but also many other graves from the cemeteries discussed above. Starting from here, we can speculate (as Ivanova also does in her important study) about a coastal trade along the shore of the Black Sea, as we have also other evidence of copper processing in this area.

Malachite and copper beads were also found in later cemeteries (Gumelniţa-Karanovo VI tradition) at Chirnogi I, Chirnogi II, Sultana-Malu Roşu II (Lazăr,

Ignat 2012). A more recent publication, which contains all the archaeological sites known around Chirnogi commune (Călărași County, southern Romania) has some interesting discoveries linked to our subject. Thus, in the place called "*Terasa rudarilor*" an Eneolithic necropolis with 16 graves was researched in 1988. For our discussion two graves are important, namely graves 10 and 30. The first grave (10) belonged to a male around 40 years old and had as inventory red ochre, a *Spondylus* bracelet, a shell bead and a copper bead. The other grave (30) also belonged to a male around 30-40 years old and contained as inventory two carnelian beads, one bead made of bone, five roundels made of greenish rock and 27 copper beads (Șerbănescu 2020, p. 37, 40, 50, 54, Fig. 4). Another Eneolithic cemetery with 58 graves was discovered in 1989 at Chirnogi, in a place called "*Șuvița Iorgulescu*". Seven graves contained copper beads as inventory, namely graves 2, 16, 17, 18, 36, 68 and 71. Four of them belonged to male individuals and the other three to females and showed no special disposition on the general plan of the necropolis (Șerbănescu 2020, p. 57, 59-61, 63, 71, 72, 77, Tab. 5). Another interesting fact to note is the presence of the flat bone figurines belonging to the same tradition, with copper ornaments. We have such items mentioned in the literature at Căscioarele, Sultana, Glina (Andreescu 2002, p. 64) or Pietrele (Hansen *et alii* 2011, Fig. 78, Abb. 84; Hansen *et alii* 2012, Abb. 53). The importance of such figurines is that they could teach us about copper/malachite ornaments and how these were worn in the Eneolithic times.

Conclusions

Although in this contribution we discussed an old excavation, we think it is a very important discovery in the context of the Early Eneolithic at the Lower Danube. So, all the facts considered why is Grave 6 from Glina-*La Nuci* so interesting?

It is one of the few graves known north of the Danube around 5000 BC with copper beads as inventory. We know from the literature that only a small percent (under 10%) of all Neolithic graves north of the Danube between 5500-4500 BC had inventories with malachite/copper beads: this could be a sign of high status. A significant part of these graves were children burials (from anthropological point of view) and this fact raises the question if access to adulthood was earlier in some Neolithic societies, as we know from the ethnographic record.

Grave 6 is not part of a cemetery, but an *intra-muros* burial, a practice well known in the (E)Neolithic, so we must ask ourselves if such graves had a greater/different importance in relation with *extra-muros* cemeteries. Also, the 158 pieces of the necklace show a variety of raw materials used (*Spondylus* and *Dentalium* shells, copper, bone, carnelian) and high technological skills (cold hammering and bending copper, cutting and abrasion of shells).

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