The use of mollusc shells for ornaments in the Bronze Age of the southern Carpathian basin

Selena Vitezović[a]

[a] Institute of Archaeology, Kneza Mihaila 35/IV, 11000 Belgrade, Serbia;
s.vitezovic@ai.ac.rs, selenavitezovic@gmail.com

ABSTRACT

Mollusc shells have been used for the production of ornaments since the Palaeolithic times. Some of the world's oldest decorative items were, in fact, made from shells. Their smooth surfaces, durability and bright colours, were some of the reasons why they were aesthetically attractive to numerous prehistoric communities. Ornaments made from shell often had symbolic value – they were used to display status, prestige, belonging to a group, and may be used as indicators for trade and exchange routes. However, although they were in use in the prehistoric period, they have received less attention from researchers studying periods after the Neolithic. This paper will provide an overview on the use of shells for ornaments in the Bronze Age Maros culture in the southern Carpathian basin. They have so far been analysed only within the context of burial equipment and their relation to other jewellery items, mainly metal objects. However, they may provide an additional insight into some of the symbolic aspects, cultural attitudes towards certain raw materials, as well some aspects of trade and exchange.

Key words: mollusc shells, *Columbella, Dentalium, Bivalvia*, ornaments, Bronze Age, Maros culture

INTRODUCTION

The phylum *Mollusca* is second largest phylum in the animal kingdom. Their characteristic is an exoskeleton or shell. The role of this shell is to enclose, support and protect the soft parts of the animal. The mollusc shells are composite materials, comprised of calcium carbonate, in the form of calcite or aragonite, crystallised out in an organic matrix. Because of this the material is durable and resilient (Bar-Yosef Mayer 2011; Claassen 1998; Negra, Lipparini 2004).

Shells found within archaeological contexts may provide data regarding palaeoenvironment and diet (Claassen 1998 and references therein; see also Álvarez Fernández, Carvajal Contreras 2010; Colonese et al. 2011; Szabó et al. 2014; inter al.), as well as data on some other aspects of economy. Shells could be used in numerous ways such as the production of pigments or as admixture into clay for pottery production, etc. (*e. g.,* Alberti 2008; Reese 1987; to mention just a few). Furthermore, entire or modified shells may have been used as objects in themselves, for example as containers, trumpets, gaming pieces or even money. They may have been transformed into tools, ornaments or objects of art. Shell pieces may have been part of some composite decoration, for example as inlays (Álvarez Fernández, Carvajal Contreras 2010; Bar-Yosef Mayer 2005; Çakırlar 2011; Claassen 1998, 175 – 196; Colonese et al. 2011; Mărgărit et al. 2018; Szabó et al. 2014; Taborin 1993, 321– 328, inter al.). Shells were exotic

items that often came from distant sources and they were also durable and distinctive looking. This made them particularly attractive for the production of ornamental items, not only for decoration, but also as amulets, symbols of personal or group identity, status, wealth and prestige (see Trubitt 2003, and references therein).

Some of the earliest evidence for the intentional collection and use of mollusc shells comes from the site of Qafzeh in Israel, dated to approximately 92,000 BP. Here there was evidence of valves of *Bivalvia* being used as containers. Among these there were also several *Glycymeris* sp. shells with natural perforations, strung together, some with ochre stains on them (Bar-Yosef Mayer et al. 2009). At the site of the Blombos cave in South Africa were found perforated *Nassarius kraussianus* shells, dated into 70 – 75,000 BP (d'Errico et al. 2005; Vanhaeren et al. 2013). Evidence of early use of shell beads by modern humans was also noted at the western Asian site of Skhul and the North African site of Oued Djebbana, dated to 100,000 to 135,000 years BP (Vanhaeren et al. 2006).

Since the early Upper Palaeolithic, the evidence of their consistent use is abundant across Europe and in the Near East (Bar-Yosef Mayer 2008; Cattelain 2012; Taborin 1993; 2004), and shell ornaments were present in numerous communities throughout prehistory (*e.g.,* Álvarez Fernández 2006; Bar-Yosef Mayer 2005; Bar-Yosef Mayer et al. 2017; Borrello 2004; Borrello, Micheli, 2004; Çakırlar ed. 2011; Cattelain 2012; Ifantidis, Nikolaidou 2011; Ifantidis 2019; Mărgărit et al. 2018; Mărgărit, Boroneanţ 2020; Séfériadès 2010; Szabó et al. 2014; Taborin, 1993; 2004). They continued to be used even after the introduction of new luxurious raw materials such as copper and gold (*e.g.,* Bar-Yosef Mayer 2011; Mărgărit 2008; Mărgărit, Dimache 2019; Todorova 2002; Vitezović 2017a; 2017b). However, although they were still relatively frequent in the Metal Ages, ornaments made from shells have received less attention in contrast with both the earlier periods and the contemporaneous metal ornaments (with some notable exceptions, *e.g.,* Ljuština et al. 2019; Mărgărit 2008; Mărgărit, Dimache 2019). Here will be presented the shell ornaments from two necropoles located in northern Serbia, Ostojićeo and Mokrin – the raw material selection, typological repertoire, use wear traces, as well as reconstruction of the mode of use and possible symbolic significance will be discussed.

THE ARCHAEOLOGICAL BACKGROUND

The Early Bronze Age Maros or Moriš culture was widespread in the southern Carpathian basin in the area around the confluence of Tisza (Tisa) and Maros (Moriš) rivers in north-western Serbia, south-eastern Hungary, and south-western Romania (Garašanin 1983; Tasić 1974). It is considered as one of the prehistoric cultures where metals became more frequent and where traces of social stratification may be noted (Harding 2004; Milašinović 2009; O'Shea 1996). Numerous sites were excavated, both settlement sites and necropoles, revealing rich and diverse material culture. In particular, cemeteries have attracted a lot of attention from researchers with rich burial equipment, that included ceramic vessels, copper and stone tools and weapons, as well as jewellery and clothing accessories, made from bronze, gold, osseous and lithic raw materials (Girić 1971; Milašinović 2008; 2009; O'Shea 1996; Tasić 1974).

In Serbia, two large cemeteries were excavated, Mokrin and Ostojićevo, located in the Banat region (Fig. 1). The site of Mokrin is situated 12 km from the town of Kikinda, while Ostojićevo is 24 km to the north-west from Kikinda. Both sites were excavated by the National museum from Kikinda; Mokrin in the 1960s, and Ostojićevo in the period between 1981 and 1991 (Girić 1959; Milašinović 2008; 2009). At Mokrin, 312 graves were uncovered, belonging

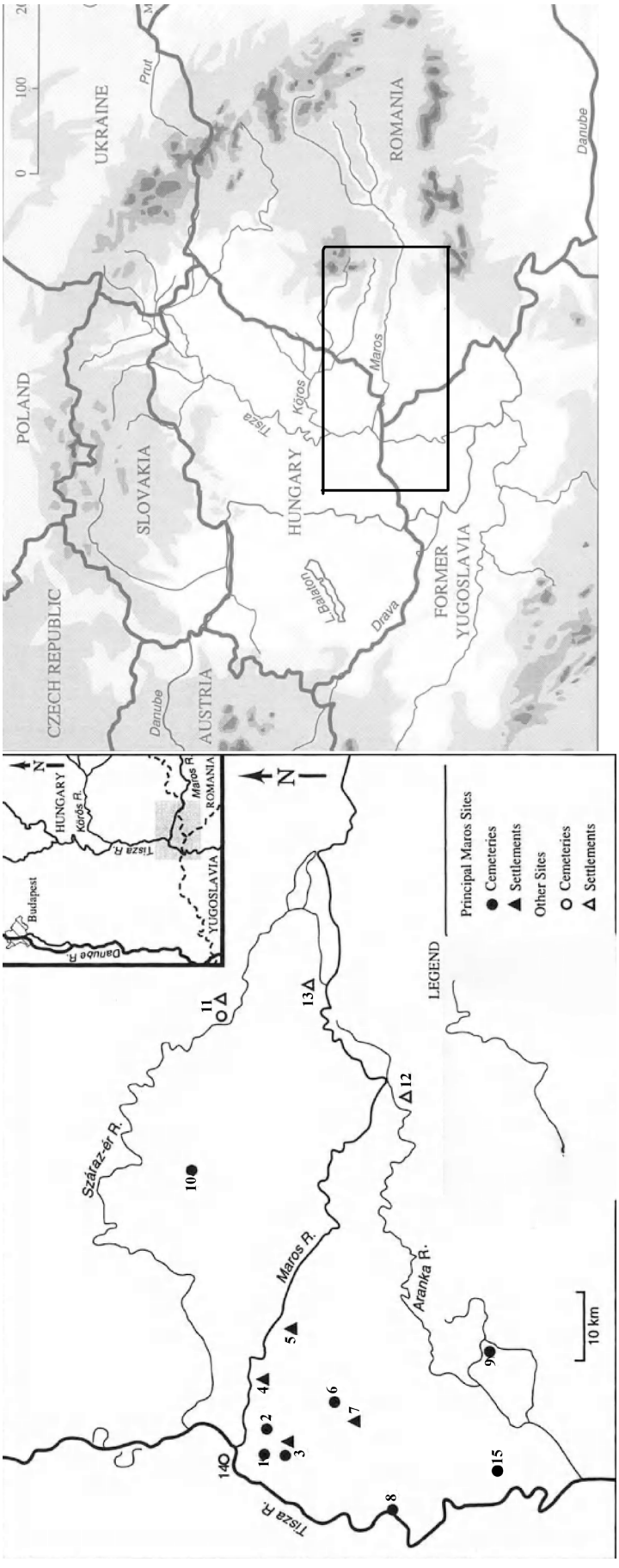

Fig. 1. *Map of the Maros culture: 1. Szöreg, 2. Deszk A, F, 3. Ósentiván, 4. Klárafalva – Hajdova, 5. Kiszombor – Új Élet, 6. Óbeba, 7. Rabe, 8. Novi Kneževac, 9. Mokrin, 10. Pitvaros, 11. Battonya, 12. Perjámos, 13. Pécska, 14. Tápé and 15. Ostojićevo (adapted after O'Shea 1996; Milašinović 2009)*

to the Maros culture (Girić 1971), and at Ostojićevo 77 graves were attributed to the Maros culture (out of 285 Early and Middle Bronze Age burials excavated at the site) (Milašinović 2008; 2009). Absolute dates obtained from the necropolis in Mokrin place it in the period between the 21st and 19th centuries BC (Forenbaher 1993: t. 1, 244; O'Shea 1996, 37; and references therein).

MATERIALS AND METHODS

Among the diverse findings in these graves, ornaments made from shells were recovered from several burials (Girić 1971; Vitezović 2017a; 2017b; 2021). They have been thus far analysed only within the context of burial equipment and their relation to other jewellery items (see O'Shea 1996). However, they have not yet been examined in detail for technological traits (manufacturing and use wear traces). Furthermore, recent study on the origin of *Columbella* shells (Ljuština et al. 2019), emphasised the need for more detailed study focused on shell ornaments.

Mokrin yielded particularly rich assemblage of shell ornaments (see Girić 1971 for details), while at the site of Ostojićevo shells were less frequent (Vitezović 2021).

All the osseous ornaments today kept in the National Museum in Kikinda were analysed by the author from the technological and typological viewpoint, with particular emphasis on the raw material selection, traces of manufacture and traces of use (see Vitezović 2016 and references therein). The species of the shells were determined by macroscopic analysis and following reference work on main biology and archaeological shells (Álvarez Fernández 2006; Bar-Yosef Mayer 2008; Borrello 2004; Borello, Micheli 2004; Dance 1992; Dimitrijević 2014; Dimitrijević, Tripković 2006; Negra, Lipparini 2004; Taborin 1993, et al.).[4] Artefacts were examined with hand lens and USB microscope with 5x-50x enlargements, and selected items from Mokrin were examined with the Scanning Electron Microscope at The Faculty of Mining and Mineralogy, University of Belgrade. The analytical criteria for the technological and functional interpretations follow previously published work (in particular, Bonnardin 2008; 2009; Cristiani et al. 2020; d'Errico 1993; Dupont et al. 2014; Francis 1982; Guzzo Falci 2015; Guzzo Falci et al. 2018; Mărgărit et al. 2018; Winnicka 2016; et al.).

SHELL ORNAMENTS FROM THE CEMETERIES OF OSTOJIĆEVO AND MOKRIN: THE TECHNO-TYPOLOGICAL AND FUNCTIONAL ANALYSES

Dentalium (Scaphopod) shells

Ornaments usually labelled as *Dentalium* beads in fact encompass diverse shells of the class *Scaphopoda*, which are marine molluscs commonly known as "tusk" or "tooth" shells. While *Dentalium* is a commonly used term, recently it was pointed that "*Scaphopod* shells" or "*Scaphopod* beads" are more appropriate terms (Kurzawska et al. 2013). *Scaphopod* shells have a shape of an elongated, usually curved, tapered tube, open at both ends. They may be smooth or sculptured, and their length is usually from 2 to 50 mm. Complete *Scaphopod* shells usually have a very narrow apex, 1 mm or less in diameter. Therefore, for use as beads shells were used that had an apex already broken or one that had been intentionally removed (see Bar-Yosef Mayer 2008; Kurzawska et al. 2013).

[4] Selected items from Mokrin were double checked with dr. Biljana Mitrović from the Natural history museum in Belgrade – see Ljuština *et al.* 2019 for details. Also, the website http://www.marinespecies.org/ was consulted.

Fig. 2. *Reconstructed necklace containing Dentalium beads (Mokrin, grave no. 215)*

Dentalium (Scaphopod) beads were recovered at both Mokrin and Ostojićevo (Figs. 2, 9 and 10). Their length is usually around 25 mm, and their width 5 – 7 mm. Their surfaces are not well preserved, therefore, it is difficult to determine whether they were fossil shells or not.[5] Also it is difficult to analyse the manufacturing and use wear traces. Their ends are smooth, therefore, it was not possible to determine whether they were used as collected or whether they had been modified (ends cut off or snapped off) (cf. Bar-Yosef Mayer 2008). Their outer surfaces are in some specimens, damaged by taphonomic agents because they have stains and concretions. However, certain smoothing and polish of the surfaces caused by use may be noted on some of the specimens.

At Ostojićevo, within burial no. 120 five *Dentalium (Scaphopod)* beads were discovered, and within burial no. 186 only two. At Mokrin, they are more frequent as one or several beads were noted in twenty-eight graves (Girić 1971). They were usually located either in the neck area (e.g., graves nos. 97, 136, 182, 215, 227), suggesting they were most likely part of a necklace, or in the waist area (e.g., graves no. 139, 228), suggesting they were decorations on the belt or some other piece of garment or something similar. These ornamental items have been interpreted as sashes by O'Shea 1996, however, it is possible that some of these beads were part of some other ornamental item. Usually, *Dentalium (Scaphopod)* shells were found along with other decorative objects such as perforated teeth, bone beads or metal ornaments, suggesting they were mixed and combined together into different jewellery types (Girić 1971).

Bivalvia shells

Among utilised *Bivalvia* shells, *Glycymeris, Cardidae* and *Unio* shells were identified with certainty, and there is also the possibility that among some poorly preserved items additional species were represented. *Bivalvia* shells were usually found to have been modified

[5] The criteria for distinguishing fossil from fresh molluscs follow Dimitrijević, Tripković 2006; cf. also Dimitrijević 2014 for the availability of fossil *Dentalium* shells in the Danube valley. However, the small sample size and poor preservation at Ostojićevo do not allow firm conclusions regarding the origins of the molluscs.

Fig. 3. *Cardium shell with perforation (Mokrin, grave no. 252)*

Fig. 4. *Glycymeris shell with perforation (Mokrin, grave no. 245)*

into applications. For example, one valve had been used and perforation was added at the apex. These shells were generally poorly preserved, with eroded surfaces and in general they were fragmented. In addition, perforations had intensive traces of wear, therefore it was not possible to reconstruct with certainty the method of manufacture. Most likely the shell surface was first abraded and then pierced. Use wear consisted of polish and sometimes the perforation was not regular, but deformed from use.

At Ostojićevo, only the *Glycymeris* shells were identified with certainty because some of the shells were too fragmented. They were not as frequent. Five were discovered within grave no. 120 and three within grave no. 230. At Mokrin, *Glycymeris* and *Cardidae* shells were found in several graves (Figs. 3 and 4) including graves nos. 69 and 155, with rich shell ornaments (seven *Cardium* shells and one gastropod shell in grave no. 69, and seven different *Bivalvia* in grave no. 155) (Fig. 8), as well as single finds or just a few shells from grave nos. 53, 73, 247 or 286 (Girić 1971). They were discovered both at the neck and waist areas of skeletons, suggesting they were part of diverse ornamental items such as necklaces, belts or sashes, etc.

Shells of freshwater mollusc *Unio* were recovered from several graves. One was found at Ostojićevo (grave no. 250), and several at Mokrin (including graves nos. 201, 205, 207, 213,

219 and 244) (Girić 1971; Vitezović 2021). Some of them did not have traces of modification, while some were not sufficiently preserved to determine whether they were intentionally perforated or not. Shells that were certainly intentionally perforated and used as ornaments are rare, but include, for example, a shell discovered in grave no. 246 at Mokrin. This shell was modified in the same manner as the marine *Bivalvia* shells. It had perforation at the apex and was slightly worn from use.

Bivalvia shells were also used for the production of discoid beads. These beads were rather small in size, and had been made from segments of different shells. Usually the perforation was made first and then the outer surfaces were smoothed and polished in order to obtain their final shape (*cf.* Francis 1982 for the reconstruction of this manufacturing method). Shell discoid beads were not very frequent. The majority of discoid beads were made from other materials. Usually, these beads were discovered near the neck area of the skeletons (Girić 1971), suggesting they were most likely combined into necklaces.

Columbella shells

Columbella is a genus of small sea snails, marine gastropod molluscs in the family *Columbellidae*. *Columbella* shells discovered at Mokrin were first interpreted as being fossil shells (Girić 1971), however, recent examination of some of them revealed that these were fresh shells, most likely all of them *Columbella rustica* (Ljuština et al. 2019). *Columbella* shells were used for beads. At the mesial part of the shell a perforation was made, usually of irregular circular shape, that could have been produced by direct or indirect percussion (see Cristiani et al. 2020 for experimental research on possible methods of making perforations). The top part of the shell could be removed and left open.

Columbella rustica shell beads were found at both Ostojićevo and Mokrin (Figs. 5 and 11). They had perforation, made by piercing in the middle of the shell, usually of irregular circular shape. The majority of them were intensively used. Besides worn perforations, surfaces also displayed polish and weathering, with prominent parts sometimes abraded (Fig. 6). At Ostojićevo, *Columbella* beads were rare. They were noted within three graves only; seven beads within grave no. 208, two in grave no. 230, and just one within grave no. 283 (Vitezović 2021). At Mokrin, they occurred in twenty-eight graves (Figs. 5, 9, 10 and 11). From some graves only a few shells were recovered, while in several they were quite numerous. For example, just one bead was found in grave no. 305, eleven were found in grave no. 38, while from grave no. 104 seventy-three shells were recovered. Individuals buried in these graves were mainly adults (21 individuals), both male (12) and female (14) (Girić 1971).

Columbella beads were used and combined with other decorative objects into composite jewellery or garments, such as head ornaments, sashes or belts, etc. For example, in grave no. 136 in the neck area were discovered one perforated animal tooth, three *Dentalium* beads and three *Columbella* beads, along with thirteen kaolin beads (Girić 1971, 106 – 107). In the graves nos. 74 and 90, they were discovered behind the back of the skeleton, along with bronze buttons (Girić 1971, 76, 84) (Fig. 11). In grave no. 129, *Columbella* beads were noted behind the skull, so they could have been either part of the necklace or head garment. In grave no. 242 were discovered remains of a belt, probably made from leather, with applications on it and buttons made from copper. Some buttons were scattered in the vicinity, along with thirteen *Columbella* beads, that were most likely part of the same belt (Girić 1971, 152 – 153).

At Mokrin, *Columbella* beads were encountered in graves that are considered rich (Girić

Fig. 5. *Columbella beads (Mokrin, grave no. 246)*

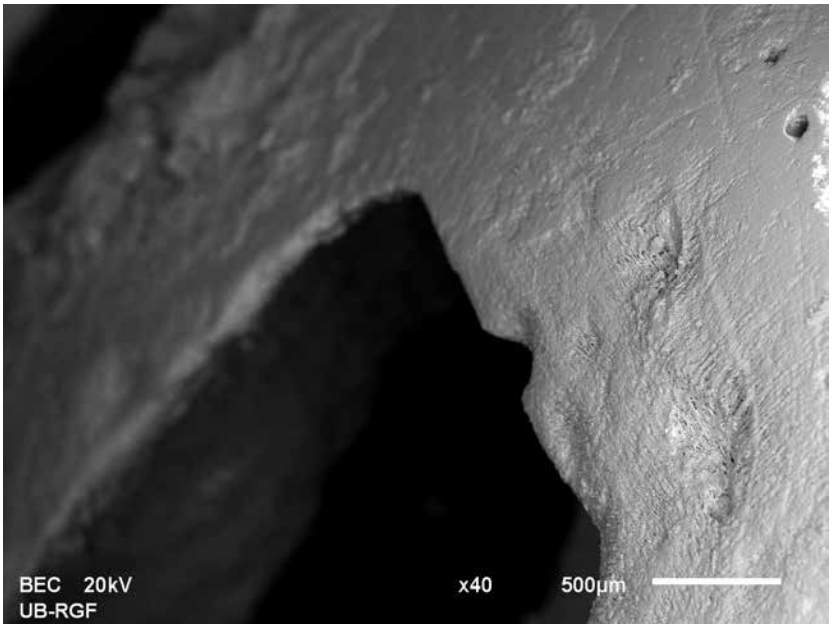

Fig. 6. *Detail of the perforation on one of the Columbella beads from Mokrin, photo taken with SEM*

1971; see also Ljuština et al. 2019). Golden ornaments were discovered within thirteen graves at Mokrin, and five of them also contained *Columbella* beads. For example, in grave no. 7, a head ornament with nine *Columbella* beads was found, along with pendants made from golden wire (Girić 1971, 40 – 41), while in grave no. 123 one *Columbella* bead was discovered, along with several ornamental items made from gold (Girić 1971, 100). The richest finding of *Columbella* beads, from grave no. 104, where in the waist area 73 shells were discovered, also included several hundred kaolin beads, over seventy perforated teeth, thirty-two bone beads, and ten salteleons made from copper; probably decoration on a belt or other clothing item (Girić 1971, 91).

It is interesting to note that one such bead was discovered at the Maros culture settlement of Pecica-Şanţul Mare in Romania (Nicodemus, Lemke 2016, Fig. 2b), showing these items were worn daily and were not restricted to funeral equipment.

Gastropoda and other shells

Besides these shells, several ornaments made from other mollusc species were also discovered. The majority of them, however, were badly preserved, and it is not possible to say more regarding their species or what type of ornament they could have been part of. Some of them were fragments of some *Gastropoda* shells and may be classified into a group of irregular beads. For example, in grave no. 245 at Mokrin, one fragmented gastropod shell was found, only its innermost segment, most likely used as some type of bead (Fig. 7). This insufficient preservation may be due to taphonomic agents, although it is possible that some of them were in fact recycled from broken pieces of other shell ornaments.

DISCUSSION

Shells used for ornaments in the Maros culture include a variety of species. They include *Dentalium* (*Scaphopod*), several different *Bivalvia*, both marine and freshwater, *Columbella*, as well as a few more species that could not be identified with certainty which occurred in small quantities. These were the shells used for ornaments in numerous other prehistoric cultures, since the Palaeolithic period (*e.g.* Álvarez Fernández 2006; Bar-Yosef Mayer 2005; Cattelain 2012; Ifantidis 2019; Taborin 1993), in more or less the same manner. *Dentalium* (*Scaphopod*)

Fig. 7. *Fragmented gastropod (Mokrin, grave no. 245)*

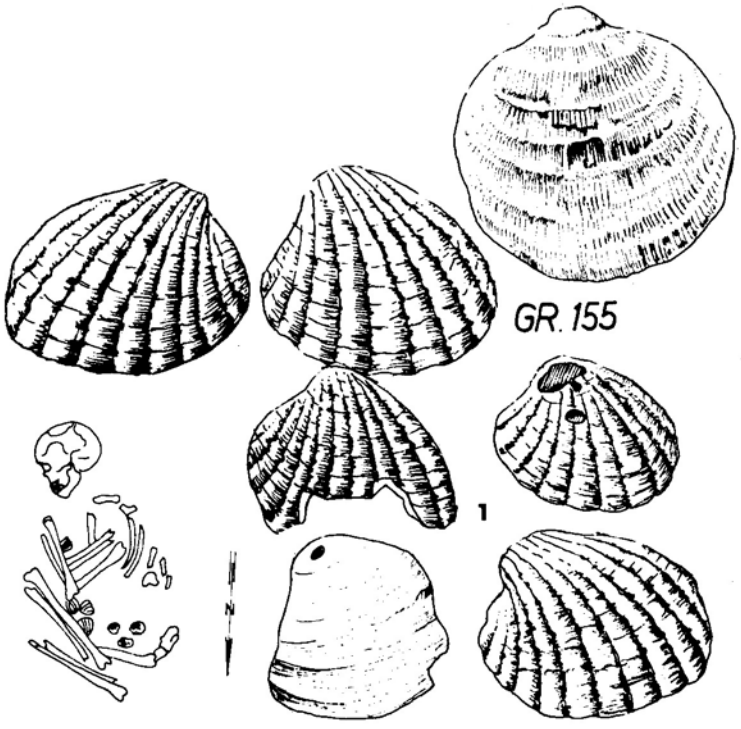

Fig. 8. *Mokrin, grave no. 155, with ornaments made from Bivalvia shells (after Girić 1971: t. 43)*

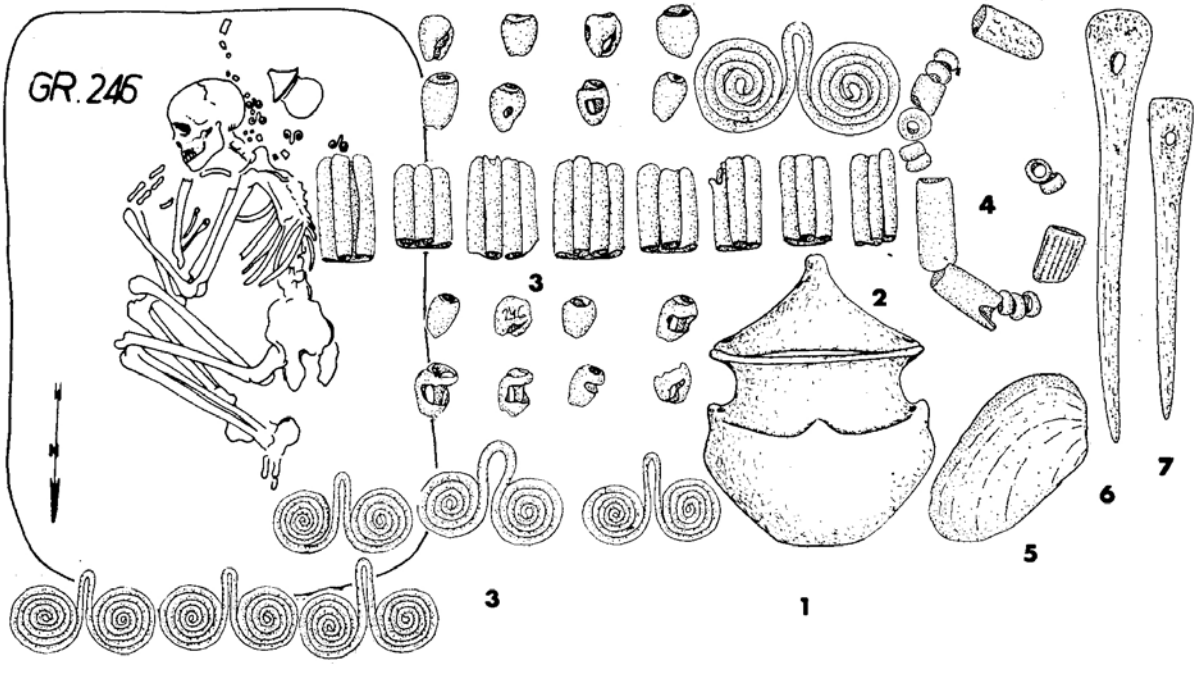

Fig. 9. *Mokrin, grave no. 246, containing Columbella and Dentalium beads (after Girić 1971: t. 66)*

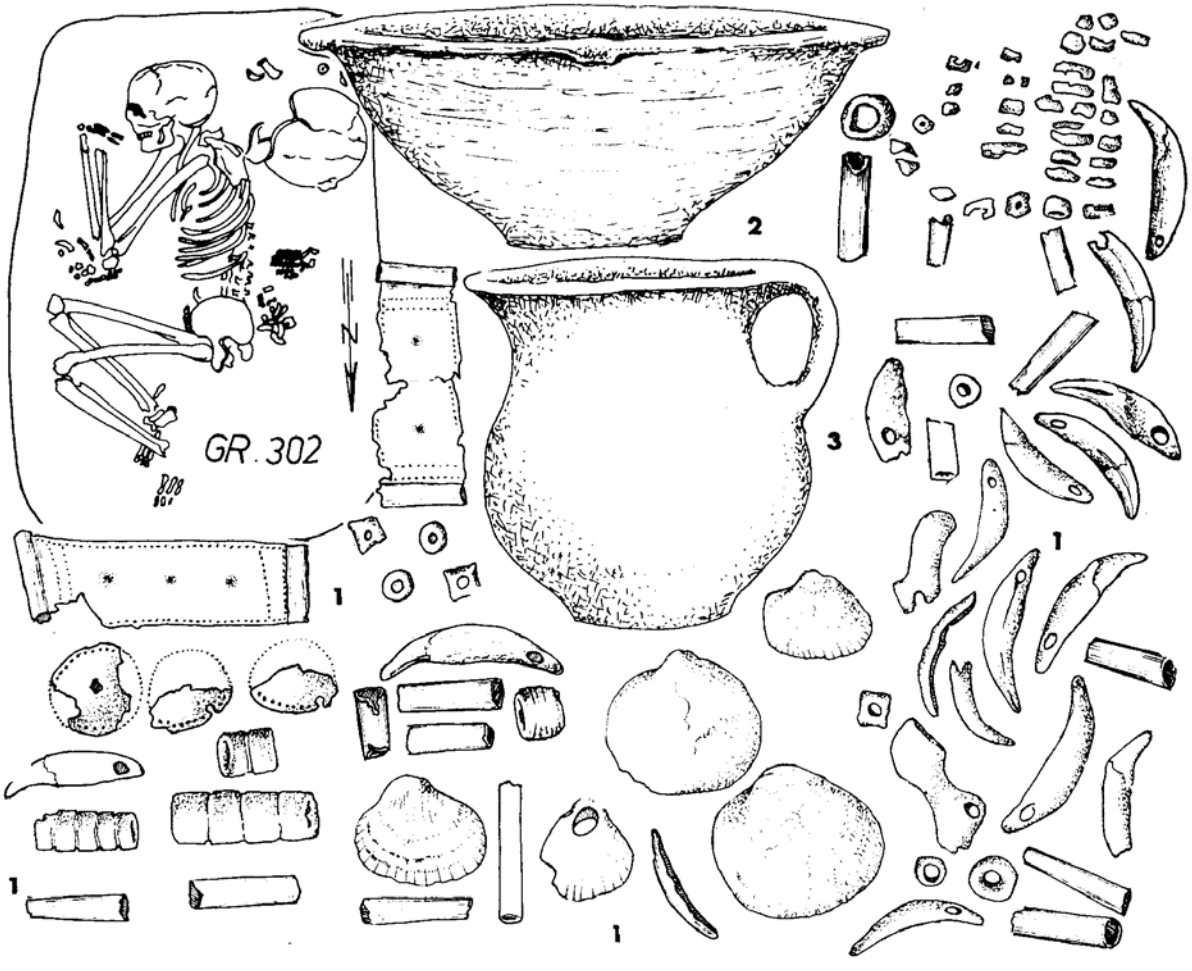

Fig. 10. *Mokrin, grave no. 302, containing Dentalium, Columbella and Cardium shells (after Girić 1971: t. 80)*

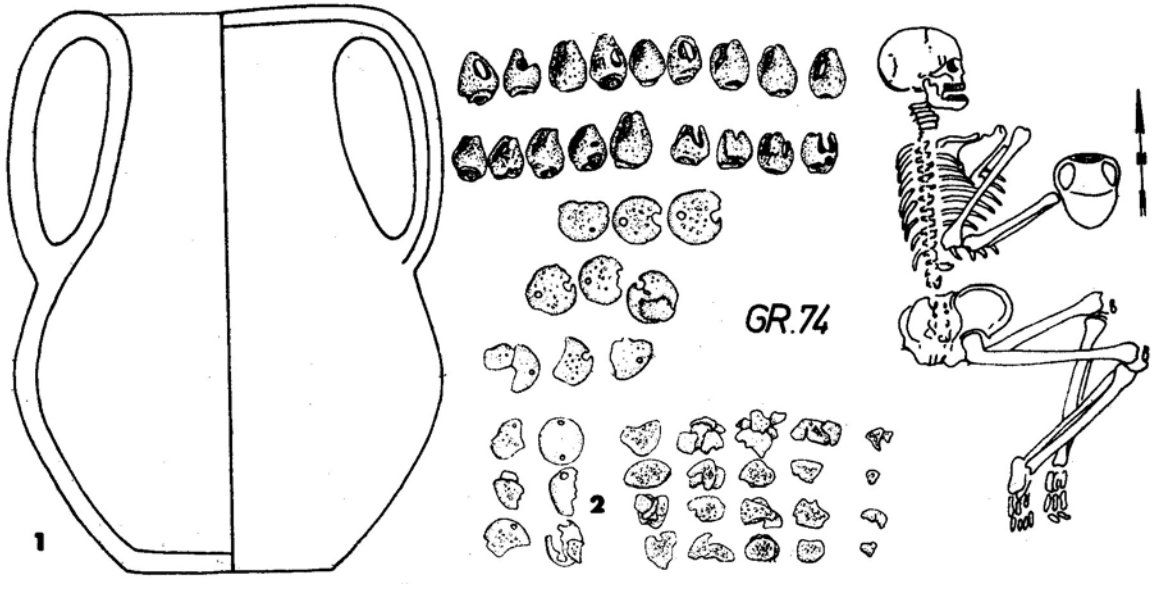

Fig. 11. *Mokrin, grave no. 74, with Columbella beads (after Girić 1971: t. 20)*

and *Columbella* were used for beads as found or with minimal modifications, while *Bivalvia* shells were modified into applications and beads.

There were several methods for acquiring shells. Freshwater shells were obtained locally, most likely directly collected by the community that used them, while marine shells were acquired through exchange. There is a possibility that some fossil shells were used, but it is difficult to determine whether they were acquired directly by Maros culture communities or whether they were part of a wider trade network.

Although there were some differences in the frequency of shell ornaments discovered at Mokrin and Ostojićevo, they did not show major differences regarding the types and modes of use, suggesting there was some common fashion and/or common symbolical meaning and value of these ornaments among Maros culture communities. Comparing with other Maros culture cemeteries, Mokrin has particularly rich and diverse shell ornaments. For example, the grave of a female no. 246 contained a head ornament with sixteen *Columbella* beads, a necklace with five *Dentalium* beads, and there was one *Unio* shell in the left hand (Girić 1971, 155 – 156) (Fig. 9). In grave no. 302, where an adult woman was buried, a head ornament consisting of thirteen *Dentalium* beads, two *Columbella* beads, seven *Cardium* shells, and other elements made from animal teeth and other raw materials was discovered (Girić 1971: 186 – 187) (Fig. 10).

At other Maros culture cemeteries, shells were rather rare. Head ornaments containing *Columbella* beads were noted within three graves at Szöreg, while at the sites of Deszk F, Ószentiván, Pitvaros or Óbéba they were not found (O'Shea 1996, 111). The items decorated with *Cardium, Columbella* and/or *Dentalium* shells, interpreted as sashes, again were the most frequent and the richest at Mokrin. At Deszk F, just one *Dentalium* and *Columbella* were found, while *Cardium* was not present, while at Szöreg three graves contained *Dentalium* ornaments (10, 2 and just one piece – the one with ten specimens of *Dentalium* also contained four *Cardium* shells), and *Columbellae* were present in two graves (O'Shea 1996, 116).

RESULTS

Shell ornaments were most often used in combination with ornaments made from other raw materials, either of animal origin, such as perforated teeth, kaoline or metal. Use wear traces were not well preserved in some of the examples. However, we should note that some specimens had quite prominent use wear traces. On beads from *Columbella* shells there were the best-preserved traces of intensive use. Their perforations were heavily worn and often deformed (Fig. 6). This suggests that the jewellery items that contained these beads were not made just for burial purposes, but were used during everyday life, and this is supported by the finds from settlements, such as one shell from the site of Pecica-Şanţul Mare (Nicodemus, Lemke 2016).

Long usage noted on the majority of the shell ornaments, suggests that they were valued, and there is also a possibility that some of the ornaments were inherited, since some of the beads were found in graves of younger individuals. For example, grave no. 247, where a young girl was buried, contained a necklace composed of *Dentalium* beads and perforated teeth, and in the hand of the buried individual was one *Cardium* shell (Girić 1971, 15 – 157). Their presence in graves with richer funerary equipment, including gold jewellery also supports the hypothesis they were valued, and probably also displayed wealth and prestige. Shells were associated with both male and female graves, but it is possible that they had played a certain role in displaying identity, perhaps that of group belonging.

CONCLUDING REMARKS

Shells were an important part of the material culture of the Maros culture communities. They were valued items, probably representing wealth and prestige, and perhaps also used to indicate group or individual identity. This was suggested by their long functioning and by their presence in graves in association with rich burial equipment, including gold. They also revealed a complex pattern of trade and exchange routes among the Bronze Age communities not only in the region of the southern Carpathian basin, but also in more distant areas.

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Използване на черупки от мекотели за орнаменти през бронзовата епоха в Южнокарпатския басейн

Селена Витезович

РЕЗЮМЕ

Черупките от мекотели са се използвали за направата на орнаменти още от палеолита; някои от най-старите декоративни елементи в света всъщност са били изработени от мидени черупки. Гладките им повърхности и блестящите цветове са някои от причините те да бъдат естетически привлекателни за много праисторически общности. Орнаментите, направени от черупки, често са имали символична стойност – те са били използвани за показване на статут, престиж, принадлежност към група и могат да бъдат индикатори за търговски и обменни маршрути. Въпреки това те са получили по-малко внимание от изследователите. В тази статия ще бъде направен преглед на използването на черупки за орнаменти в културата Марос от бронзовата епоха в Южнокарпатския басейн. Досега те са били анализирани само в контекста на погребалния инвентар и връзката им с други накити. Те обаче могат да дадат допълнителна информация за някои от символните аспекти и културното отношение към определени суровини, както и някои аспекти на търговията и обмена.

Ключови думи: черупки от мекотели, *Columbella, Dentalium, Bivalvia*, орнаменти, бронзова епоха, култура Марос