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SPONDYLUS ORNAMENTS IN THE MORTUARY ZONE AT NEOLITHIC VUKOVAR ON THE MIDDLE DANUBE

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Izvorni znanstveni rad

The AD 19th century finding of two graves with rich Spondylus shell ornaments in the town of Vukovar, Eastern Croatia, is here re-published with the aim of using the artifact biographical data embodied in the ornaments to assist in the determination of the temporal and spatial relationships of the artifacts with other Spondylus finds in the Carpathian Basin and the Balkans.

Key words: Spondylus gaederopus; exchange; Danube; Neolithic; Vukovar; burials; artifact biography

Ključne riječi: Spondylus gaederopus, razmjena, Dunav, neolitik, Vukovar, grobovi, biografija nalaza

Introduction

The opportunity to make a contribution to the Festschrift of a much-respected colleague – Ivan Mirnik – coincided with a 2011 research visit of two of the authors (JC and BG) to the museum now directed by the third (JB). Part of the new prehistory display consisted of two fascinating groups of *Spondylus* artifacts –two grave groups deriving from Vukovar.

The date given in the exhibition to the group of *Spondylus* finds was Bronze Age! Since there has been little recent research on the *Spondylus* finds from Eastern Croatia, the authors decided to re-publish the find in Ivan's Festschrift. In this short celebratory paper, we seek to make a contribution to two issues related to *Spondylus* research: (1) the biographies of the shell ornaments; and (2) the date of the Vukovar burials. We make the claim that the determination of the chronological and spatial limits of shell ornaments cannot be satisfactorily modeled without integrated use of the biographical information stored in the ornaments. It is our aim to use biographical data to clarify the temporal limits of what appear to be long-lived ornaments, as well as plot the sources of the ornaments through known regional distributions of *Spondylus* ornaments.

The context of the Vukovar find

The first of the two graves containing the *Spondylus* finds was discovered in 1895, near the railway station, near the railway lines, on the land of Gašpar Thaller (see fig. 2: grave 1). Brunšmid (1902: 63-64, fig. 20) states that the grave contained the skeleton, and more objects, of which the greater part is in the Archaeological Museum in Zagreb, and the smaller part of finds is in the Museum of Slavonia in Osijek. The finds in the Archaeological Museum in Zagreb were bought by Nikodem Vlašić in 1895. According to Brunšmid, the grave contained some metal finds: a fragment of a massive copper axe and three open rings of apparently bronze wire, and *Spondylus* finds: a *Spondylus* bracelet and beads. The beads were divided between two Museums - Zagreb and Osijek - so now in the permanent exhibitions of each of the Museums, there is one necklace of beads, which can be misleading, because it truly was a unique finding.[1] Already Brunšmid (1902: 64) raised suspicions that the metal objects did not belong to the same grave, or that they may have derived from a different context.[2]

Another group of finds, consisting of three *Spondylus* bracelets, was found in 1902 in the vineyard of Ilija Perkaćanski at the location of Lijeva bara (see fig. 2: grave 2). The Museum bought the bracelets from Nikodem Vlašić in the same year. Brunšmid wrote that it is not certain whether there were more objects except the *Spondylus* finds but only the bracelets were brought to the museum (Brunšmid 1902: 64, fig. 21).

These *Spondylus* finds have been quite differently dated, with some scholars dating them to the Copper Age (Marković 1985: 161; Majnarić-Pandžić 1994: 66). A variant on this view is that Dimitrijević thought that grave 1 could be dated to the end of the Neolithic – beginning of the Copper Age, while grave 2 was most probably Copper age in date (Dimitrijević 1979: 356-357). However, in the majority of catalogue publications, they are dated to the Bronze Age (Balen-Letunić 1993: 88-89, cat. no. 19; Balen-Letunić *et al*. 2008: 173, cat. no. 22; Demo 1996: 67, cat. no. 3). It is likely that different interpretations were caused by the mention of the bronze objects in one of the graves, although Brunšmid doubted their association in a single grave assemblage (Brunšmid 1902: 64).

It is interesting to point out that the Osijek necklace (whose beads belong to the same grave as the Zagreb beads) is attributed to the end of the Neolithic and the beginning of the Copper Age (see note 1).

[1] For the necklace in the Osijek Museum, see Biškupić 2009: 37, cat. no 81.

[2] The metal finds are not found in either of the museums' modern collections.

The town of Vukovar, located in the eastern part of Croatia, resembles the whole region in its rich record of prehistoric settlement in all periods (Bunčić 2007). In eastern Croatia, during the Neolithic, we can first trace the development of the Starčevo and later of the Sopot culture, while, in the peripheral parts of Croatia, the presence of the Vinča culture is also recorded. During the early Eneolithic continued duration of the late Sopot culture (Sopot IV), followed by the Lasinja culture (4300-3950 BC). In the Middle Eneolithic in the peripheral regions of Croatia also appeared the Bodrogkeresztur culture, as well as the Vajska Hunyadi group. The Late Eneolithic (3600/3500 – 2600/2500 BC) is marked by the successive appearance of the Baden, Kostolac and Vučedol cultures.

All of these cultures were found precisely in the area of the modern town of Vukovar and its vicinity (see fig. 2). This includes settlements of the Neolithic Starčevo and Sopot cultures, as well as late Eneolithic settlements of the Baden, Kostolac and Vučedol cultures. Also, individual finds show the presence of the Late Neolithic Vinča culture as well as the Middle Eneolithic Bodrogkeresztúr and Lasinja cultures. It is also interesting to note that Z. Marković attributed a third grave find without *Spondylus* grave goods (see fig. 2: grave 3), but published together with the two graves with *Spondylus* finds (Brunšmid 1902: 60-62, fig19) to the Middle Eneolithic Vajska-Hunyadi group (Marković 1985: 161).

This historical research creates a complex picture of mortuary and possibly other finds, in which we can establish that there are two graves with *Spondylus* grave goods from the town of Vukovar – one near the railway station and the other at Lijeva bara. These localities are some 6 km apart and clearly represent two very different burial episodes. It seems highly probable that the bronze objects referred to in the older literature were *not* associated with the *Spondylus* finds. There is an ongoing debate about the date of the Vukovar *Spondylus* finds / graves, to which we hope to be able to make a fresh contribution. We begin with the biographical approach to artifacts.

The biography of the shell finds[3]

The biographical approach to artifacts has become a standard technique in a battery of approaches which seek to bring objects and the persons who made them closer together (Skeates 1995; Fowler 2004; Jones 2007; for *Spondylus* ornaments, Chapman – Gaydarska 2006). The key insight is the use of the metaphor of the life-cycle in respect of the object – i.e., its production or birth; its use or life; and its discard or destruction or death. But what has rarely been recognized is that basic chronological attributes of a shell ornament cannot be accurately plotted without the use of artifact biographical data.

The appearance in the Danube valley of a *Spondylus* shell from a remote sea, whether the Aegean or the Adriatic, comprises only one, and rather late, stage of a shell object's life. The natural features surviving on the objects' surface have been revealed by persons who ground down the shell to the point where certain features (e.g., red colour, lines) were visible and others were not.

Turning to the biographies of the Vukovar shell ornaments, the right-valve bracelet (Fig. 3) has been selected for its impressive bulk and combination of natural features in the form of parallel lines, areas of pitting and holes, and one large perforation in the front part – perhaps produced as a result of an octopus attack on the shell (p.c. John Watson). All of the surface ex-

[3] See below for a full Catalogue; Figs. 3-7.

cept the areas of pitting have been polished. A relatively small area of the surface was covered with a grey deposit, probably made post-depositionally. A similar grey deposit found on 23 of the disc beads supports the association of the bracelet and the shell in the same grave.

All of the three complete left-valve bracelets (Figs. 4 - 6) had areas of natural lines, only parts of which were polished. Two of the these bracelets revealed areas of natural red colouring, which were polished as well as much of the remainder of the surface. There was wear on both sides of two bracelets, while the third suffered wear on the dorsal side only. Part of the wear covered either the red colour or both the red colour and the natural lines. The wear was the result of either an active use-life, with much handling, or, perhaps more likely, post-depositional wear in the grave. The cause of wear on shell ornaments is a complex matter and further research is required (cf. Chapman – Gaydarska: in prep.).

The exact number of disc beads is not certain but a total of 81 was available for study in the Museum (Fig. 7). The range of diameters of the beads is 10mm – 20mm, with peaks in the smallest size (10mm), the medium size (13mm and 15mm) and the large size (19mm) (Fig. 8/1). These disc beads are larger than all of the disc beads in the Late Copper Age Varna cemetery (Chapman – Gaydarska: in prep.) (Fig. 8/2) and larger than over half of the Orlovo beads, probably dating to the Neolithic or Copper Age of S. E. Bulgaria (Fig. 8/3) (Chapman 2010). There is no clear relationship between bead diameter and thickness (Fig. 9/1), as is also the case at Orlovo (Fig. 9/2). This is probably because of the choice of the parts of the shell for making the beads. Todorova – Vajsov (2001: Abb. 2) proposed a method of cutting many beads or appliques from a left-valve shell (here Fig. 10). There is no apparent patterning in the bead size as to diameter and thickness which would suggest cutting the disc beads from a longer, cylindrical bead.

In terms of the relationship of size, polish and natural features, there are some interesting observations about the necklace. The first positive correlation is between bead size and degree of polish – the larger the bead, the more likely that it was highly polished (Fig. 11/1). However, there is a counterfactual point about natural features, which tended to appear more often on smaller rather than larger beads (Fig. 11/2). Equally, there is a difference, which is significant at the 1% level in a X^2 test, between beads with high polish or »normal« polish in respect of the presence / absence of natural features: those beads with high polish tend to display fewer natural features. Turning to wear traces, the larger the bead, the less wear is seen (Fig. 11/3). This could mean that, if wear was produced during the life of a bead, larger beads were better maintained or that they had a shorter use-life. Finally, the likelihood that grey deposits on the beads were caused post-depositionally is supported by the finding that the extent of deposits was not related to bead size.

These observations show that each of the shell bracelets, and possibly even many of the individual beads, experienced separate, unique lives in the period up to which they were integrated in the mortuary zone at Vukovar. At this time, the biographies of each object were joined, to become more like a small »library« than a collection of objects. How do these biographies help us to date the shell ornaments?

Dating the Vukovar shell ornaments

As it is often the case with older finds of perhaps uncertain provenance, dating dwells mainly on typological ground, unless there is a possibility for absolute dating, either through coins (to please the devotee) or using the AMS 14C method. In our case, it is the production,

consumption and distribution of the right-valve and left-valve bracelets and the disc beads (Chapman – Gaydarska: in press) that may serve as a chronological indicator. On the Black Sea coast, the right-valve bracelets are known from the last centuries of the 6th millennium BC/the first centuries of the 5th millennium BC, while some later examples (5th mill BC) are rare finds in Central and West Central Europe (Siklósi – Csengeri 2011). In relative terms, this distribution falls almost entirely in the European Neolithic. The slender bracelets made of left-valve *Spondylus* shell succeed chronologically the right-valve bracelets at the Black Sea coast, showing a drastic change in preference and consumption pattern. However, the slender bracelets are more widely distributed all over Europe (Chapman – Gaydarska: in press, Figs. 1 and 3), where they are not so sensitive in terms of chronology generally attributed to both the Neolithic and the Copper Age. Broadly similar is the situation with *Spondylus* beads whose exclusive consumption in Greece in the 7th mill. BC is transformed into a common find across Europe after the second half of the 6th mill BC. In the Carpathian basin, medium-size disc beads with good matches at Vukovar, see Table 1), although not highly chronologically sensitive, definitely preceded the tiny disc beads (Siklósi – Csengeri 2011). During the 5th millennium BC, *Spondylus* objects were among the most popular prestige items exchanged, traded or enchained over vast area from the Mediterranean to the Paris basin (Séfèriadès 2009:182). The situation dramatically changes in the fourth millennium BC, when *Spondylus* is hardly visible in the archaeological record, perhaps giving way to other local or exotic materials.

Where does this leave the Vukovar objects? Textbook archaeology tells us that the latest objects should date the find. Concurring to the pattern of distribution mention above and taking the latest possible dates suggest that the end of the fourth millennium BC should be our *terminus ante quem*. This is the latest possible date for the final act of *deposition* of the objects. But this tell us nothing about *time* in which the object were in circulation, were worn and discarded, broken and exchanged; the *time* it took to accumulate the numerous beads; or, in particular, the *time* that the ornaments were curated. The perception of social time (Gell 1992) and social practices of curation and re-use (Brück 1999) have gained some substantial ground in archaeology and only space prevents us from elaborating further here. However, the Vukovar ornaments can offer a valuable insight into the occurrence of such practices in the Middle Danube. In the following paragraphs, we discuss those aspects of the finds indicating their status as long-lived and appreciated items, whose accumulation materialized both time-depth and enchained links with other people and places.

Massive right-valve bracelets are rare ornaments and the example of Vukovar is probably an »old« relic kept in certain household/s for many generations. It may have arrived in the area worn as an ornament or it may have been exchanged in an act of enchainment (Chapman 1996). The choice whether to keep, to exchange further or to discard an inalienable object responds to the tension between the processes of enchainment and accumulation (Chapman 2000). In this case, it is the desire to display over and over again that has prevailed. The latest that the bracelet may have appeared in Vukovar is the beginning of the 5th millennium BC.

The three left-valve thin bracelets may have reached their final destination in three separate events or all together with the right-valve bracelet. We cannot reconstruct the sequence of events but it is clear that high appreciation of what *Spondylus* represents – shine and lustre, deep dangerous seas, distant places and unknown yet related people – has justified a quest for more *Spondylus* items, whether by acquiring new objects or by keeping the already obtained ornaments.

This is perhaps even more valid for the beads. The medium and large-size beads may have come as a set or separately, sometimes between 5500 BC and 4500 BC. Importantly, they were not only kept in circulation but new, smaller beads were added to the collection. It is, of course, possible that all beads have come as one set at a relatively late date, *e.g.*, the last centuries of the 5th millennium, but their deposition with a right-valve bracelet that is definitely long out of circulation by then makes this possibility less likely. The creation of sets, whether in hoards, in graves or in houses is a meaningful process of relating materials, events and identities, not a mechanical combination of things. In the case of Vukovar, this implies a gradual, if not steady, accumulation of highly prestigious *Spondylus* ornaments over a relatively long period of time rather than an act of rapid deposition once the complete set was collected. We may consider an assemblage in a lengthy period of mourning by different households that have kept the objects – some for a very long time, others for only a couple of generations.

How does our study comply with the proposed Bronze Age date? Of course, *Spondylus* was known and utilized during the Bronze Age, too (Nikolaidou 1997; Veropoulidou 2011), however, it never regained its former significance in the European exchange networks of the 5th millennium BC. It is also possible that the arguments for appreciation and curation that we have put forward are equally valid for Bronze Age societies (Fowler 2004). But the time-lag of nearly 2,000 years for a massive right-valve bracelet made of material of diminishing importance to have retained its ancestral and enchained links in the living memory is not very likely. Wearing, displaying and discarding certain materials is only meaningful within a shared symbolic *habitus*, be that local or regional. Since so far there is no convincing evidence for the elite significance of *Spondylus* in the Bronze Age, we feel confident to suggest that accumulation, curation and deposition of the ornaments from Vukovar took place as a process starting at the beginning of the 5th and carrying on to the end of the 5th millennium, if not into the middle of the 4th millennium BC.

Finally, the distribution of the types of ornament found at Vukovar – right- and left-valve rings and disc beads – support a Middle Danubian derivation rather than the Adriatic source (Chapman – Gaydarska: in press). While left-valve bracelets are known from the East Adriatic in the sixth and fifth millennium BC, no disc beads are yet known from this region. By contrast, disc beads and bracelets made from both valves are known in the 6th millennium BC in Romania, Serbia and Hungary. In the last-named area, right-valve bracelets are replaced by left-valve bracelets in the fifth millennium BC, in the period of the emergence of disc beads and left-valve bracelets in Bosnia. While this complex pattern cannot provide a certain answer to the question of the sources of the Vukovar ornaments, the balance of probability is strongly in favour of the Middle Danube basin, with an ultimate origin in the Aegean via the West Pontic littoral zone, the Lower Danube valley and the Vršac gateway settlements (Chapman 1981).

Conclusions

The donation of the Vukovar *Spondylus* ornaments to the Archaeological museum in Zagreb, as well as in part to the Museum of Slavonia in Osijek, represented a significant addition to a small set of marine shell ornaments known from the Middle Danube valley. It is rare to find the juxtaposition of two different types of shell bracelet – the larger right-valve type and the more gracile left-valve type - in two graves from the same general area, together with what could well be a complete necklace of over 80, and perhaps as many as 87, disc beads, supposedly found with the right-valve bracelet.

The artifact biography approach to the Vukovar *Spondylus* is particularly appropriate because of the varied ornament types, rarely found together in the same context. This suggests that a long voyage took the ornaments (or the unworked shells) from the Aegean, via the Black Sea zone and the Lower Danube, to the Vukovar area, where a further lengthy period / process of accumulation created the store of ornaments from which the grave goods were chosen. The wear on each of the bracelets suggested a long period of handling, either en route or locally. The selection of disc beads was probably made from a variety of other necklaces, since there was a great variety in both size, degree of polish and extent of wear. Three aspects of the choice of beads were size-related: the larger the bead, the more polish, the less wear and the fewer natural features. Given the high status of the graves at Varna, it is surprising that the Vukovar disc beads exceeded all of the Varna cemetery disc beads in diameter; perhaps a reflection of the many alternative shell ornament types available at Varna.

The vast preponderance of *Spondylus* finds in the Carpathian Basin derived from the Tisza valley, supporting an exchange route linked to the Lower Danube valley via the Vršac gateway settlements. This exchange network was also tapping into the obsidian network from North East Hungary (Chapman 1981). While their location could link the Vukovar finds to the Adriatic sources, as has been proposed for all of the LBK *Spondylus* (Müller 1997), the regional distributions of the *Spondylus* ornament types makes the Lower Danube source much more likely. Equally, these regional distributions suggest that the first stage of collecting the Vukovar ornaments, the left-valve bracelet, could not have post-dated 5000 BC by many decades. The other types are consistent with an accumulation date covering many decades in the 5th millennium BC. It is possible that the ornaments were curated into the 4th millennium BC but there is surely a low probability of the curation of a very worn millennial right-valve bracelet so late into a period where shell ornaments had become rare.

This short paper has made the general point that the estimation of the chronological and spatial limits of prehistoric shell ornaments is not a straightforward matter. Unless the basic tenets of the artifact biographical approach are taken into account, it will not be possible to achieve a fine-grained chronology for prehistoric ornaments of whatever material. This is an especially relevant approach for *Spondylus* ornaments because of the long curation times attested by very worn shell ornaments. A particularly interesting conjuncture is the case of necklaces with beads of strongly contrasting wear characteristics, such as is the case at Vukovar. This is a sign of the accumulation of beads from different places and times, varying persons and social contexts to produce a collection of mini-biographies – in effect, a library of artifact statements. The Vukovar *Spondylus* finds have a profound contribution to make in this respect.

Catalogue

Grave 1 (Vukovar – Railway Station, discovered in 1895, fig. 2: grave 1):

1. Museum Inv. P-985: complete right-valve *Spondylus* ring (Fig. 3); external diameter 90 x 100mm; internal diameter 71 x 76mm; all-over polish except for areas of pitting; left side with large area with fine parallel natural lines and a distinctive pattern caused by natural holes and pitting; front with a large perforation (perhaps natural, perhaps caused by marine attack) and irregular areas of grey deposit; right side with similar irregular areas of deposit, with four small areas of pitting; back with one area of deposit and two zones with pitting.

2. Museum Inv. P-984: 87 *Spondylus* beads (Fig. 7), with varied sizes ranging from 10mm – 20mm in diameter and 1mm – 9mm in thickness (Table 1). The outer surface treatment on the visible portion of the beads varied from polish (n = 49, or 60%) to high polish (n = 32). Equally, natural features occurred on 18 of the beads (or 22%). The use of the beads led to a certain proportion being worn (n = 20, or 25%), with some wear on a further five and no wear on the majority (n = 56, or 69%).

Table 1: Size and description of *Spondylus* beads

Bead No.	Diameter (mm)	Thickness (mm)	Polish	Natural features	Deposit	Wear
1	19	7	HP		X	
2	20	6	HP			
3	19.5	6	HP			
4	19	6	HP			
5	19	6	HP		X	
6	19	5	HP			
7	19	4.5	HP	grey line		
8	18	8	HP		X	
9	15	8	HP		X	
10	15	7	HP		X	
11	17	5	HP		X	
12	15	6	HP		X	
13	15	6	HP		X	
14	13	9	P		XX	
15	13	5	HP			
16	13	4	HP			
17	13	4	HP			
18	12	8	HP		XX	
19	13	4	HP		XX	
20	13	3	HP		XX	
21	13	3	P			
22	12	6	P			
23	12	4	P			
24	11	7	HP			
25	11	4	HP			XX

Bead No.	Diameter (mm)	Thickness (mm)	Polish	Natural features	Deposit	Wear
26	12	4	P			
27	12	3.5	P			X
28	12	3	HP	multiple lines		
29	11	4	P			XX
30	11	3.5	HP			
31						
32	11	3.5	HP			X
33	10.5	4.5	P			X
34	11	3	P			XX
35	10	4	P			
36	10.5	4	P			XX
37	10.5	3	P			XX
38	10.5	3	P	lines		
39	10	4	P	brown dot		X
40	10	3.5	P	dots, perforations		XX
41	10	3.5	P	grey		
42	10	3	P	perforations		XX
43	10	3	P	perforations		XX
44	10	3	P	brown		
45	10	3	P			
46	10	3	P	perforations		
47	10	3	P			XX
48	10	3	P	lines, 1 perforation		
49	10	2.5	P			XX
50	10	2.5	P	perforations		XX
51	10	2	P			
52	10	2	P			XX
53	10	2	P	lines		XX
54	10	2	P			XX
55	10	2	P	grey		
56	10	2	P	grey		XX
57	10	2	P			XX

Bead No.	Diameter (mm)	Thickness (mm)	Polish	Natural features	Deposit	Wear
58	10	1	P	perforations		XX
59	12	3	P			XX
60	11	3	P			
61	11	3	P			
62	11	2.5	HP		X	
63	13	3	P		XX	
64	13	3	P		XX	
65	13	3	P		XX	
66	13	3	HP			
67	11	2	P			X
68	12	3	P		XX	
69	11	1.5	P		XX	
70	11	1	P			
71	13	2.5	P		XX	
72	13	2	HP			
73	14	7.5	HP			
74	13.5	7	P		XX	
75	12	3	HP		XX	
76	13.5	3	HP		XX	
77	13	2	P		XX	
78	15	5	P	perforations		XX
79	15	5	HP			
80	15.5	5	P	grey		
81	15	4	P			XX
82	17.5	5	HP		XX	

Key: **Polish**: P – polish; HP – high polish; **Deposit**: X – moderate deposit; XX – extensive deposit; **Wear**: X – moderate wear; XX – extensive wear.

Grave 2 (Vukovar – Lijeva bara, discovered in 1902, fig. 2: grave 2):

Museum Inv. P-5202: complete left-valve *Spondylus* ring (Fig. 4); external diameter 82 x 78mm; internal diameter 65 x 61mm; D-shaped cross-section; dorsal side polished, with many small areas of natural red colour exposed and a small area of natural lines; two areas worn, as well as chips removed from another part; ventral side smoothed, with one area of red colour and five worn patches.

Museum Inv. P-5202: complete left-valve *Spondylus* ring (Fig. 5); two fragments re-fitted to make a whole object (? modern break); external diameter 91 x 90mm; internal diameter 73 x 74mm; oval cross-section; dorsal area smoothed, with nine worn patches – one larger and eight smaller; ventral side polished, with one perforation, an area of pitting and a small area with deep lines; three large areas of natural lines; one chip detached, with subsequent wear on chip.

Museum Inv. P-5202: complete left-valve *Spondylus* ring (Fig. 6); external diameter 83 x 76mm; internal diameter 64 x 59mm; D-shaped cross-section; ventral side polished, with small patches of natural red colour and two zones of fine natural lines; over half of the dorsal side is worn, including wear over the red colour but not over the lines; half of the ventral side polished, with one deep line and with four areas of deposit, including over the line;

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Bibliography

Balen-Letunić, D. 1993 – Pretpovijesna zbirka. In: A. Rendić-Miočević, (ed.), *Arheološki muzej u Zagrebu, izbor iz fundusa*. Zagreb, 1993: 79-82

Balen-Letunić, D. – Bader, T. – Mirnik, I. 2008. *Dreitausend Jahre Vorgeschichte* (Exhibition Catalogue). *Eberdingen*. Kelten Museum. Hochdorf, 2008.

Biškupić, B. (ed.) 2009 – *Slavonija, Baranja i Srijem* (Exhibition Catalog). Zagreb, 2009.

Brück, J. 1999 – The nature of the upper secondary fill in the outer ditch, Trench B: the case for more rapid deposition and continued significance of the enclosure. In: A. Whittle – J. Pollard – C. Grigson (eds.), *The harmony of Symbols. The Windmill Hill causeway enclosure*. Oxford, 1999: 375-380.

Brunšmid, J. 1902 – Nahođaji bakrenoga doba iz Hrvatske i Slavonije i susjednih zemalja. *VHAD*, *n.s*., 6/1902: 32-67.

Bunčić, M. 2007 – Topografija pretpovijesnih nalazišta u Vukovaru i okolici. *VAMZ, 3.s.,* 40/2007: 35-72.

Chapman, J.

– 1981. *The Vinča culture of south east Europe. Studies in chronology, economy and society*. *BAR* I-117/1981.

– 1996. Enchainment, commodification and gender in the Balkan Neolithic and Copper Age. *Journal of European Archaeology,* 4/1996: 203-242.

– 2000. *Fragmentation in archaeology: People, places and broken objects in the prehistory of South Eastern Europe*. London, 2000.

– 2010. (ed.) - *From surface finds to past life ways: the prehistoric site of Orlovo, south east Bulgaria*. Oxford, 2010.

Chapman, J. – Gaydarska, B.

– 2006. *Parts and wholes. Fragmentation in prehistoric context*. Oxford, 2006.

– in press. *Spondylus gaederopus* / *Glycymeris* exchange networks in the European Neolithic and Chalcolithic. To appear in: C. Fowler –J . Harding – D. Hofmann (eds.), *The Oxford Handbook of Neolithic Europe*. Oxford.

– in prep. The shell ornaments. To appear in: Slavchev, V. (ed.), *The Varna Eneolithic cemetery: the final report*. Vol. II. Varna & Berlin.

Demo, Ž. 1996 – *Vukovar – Lijeva bara*. Zagreb, 1996.

Dimitrijević, S. 1979 – Sjeverna zona, u: *Praistorija jugoslavenskih zemalja* II, Sarajevo, 1979: 229-363.

Fowler, C. 2004 – *The archaeology of personhood. An anthropological approach*. London, 2004.

Gell, A. 1992 – *The anthropology of time*. Oxford, 1992.

Jones, A. 2002 – A biography of colour: colour, material histories and personhood in the early Bronze Age of Britain and Ireland. In: A. Jones – G. Macgregor (eds.), *Colouring the past. The significance of colur in archaeological research*. Oxford, 2002: 159-174.

Majnarić-Pandžić, N. 1994 – Sjaj bronce i željeza u praskozorju povijesti. In: I. Karaman (ed.), *Vukovar – vjekovni hrvatski grad na Dunavu.*Zagreb, 1994: 65–80.

Marković, Z. 1985 – Pogrebni običaji i društveno raslojavanje u neolitu, eneolitu i početku brončanog doba sjeverne Hrvatske. *PodZb*/1985: 157-167.

Müller, J. 1997 – Neolitische und chalkolitische *Spondylus*-Artefakte. Anmerkungen zu Verbreitung, Tauschgebiet und sozialer Funktion. In: C. Becker – M.-L. Dunkelmann – C. Metzner-Nebelsick – H. Peter-Röcher – M. Röder – B. Teržan (eds.), *Chronos. Beiträge zur prähistorischen Archäologie zwischen Nord- und Südosteuropa. Festschrift für Bernhard Hänsel*,Espelkamp, 1997: 91-106.

Nikolaidou, M. 1997 – Ornament production and use at Sitagroi, Northeast Greece: Symbolic and social implications of an Early Bronze Age technology. In: R. Laffineur – P. P. Betancourt (ed.), TEXNH, *Craftsmen, Craftswomen and Craftsmanship in the Aegean Bronze Age*. *Annales d'Archéologie Egéenne de l'Université de Liège & University of Texas at Austin, Liège – Austin. Aegeum*, 16/1997: 177-196.

Séfèriadès, M. 2009 – *Spondylus* and long-distance trade in Prehistoric Europe. In: D. W. Antony– J. Y. Chi (ed.), *The Lost World of Old Europe: The Danube Valley, 5000-3500 BC*. New Jersey, 2009: 178-91.

Siklósi Z. – Piroska C. 2011 – Reconsideration of *Spondylus* Usage in the Middle and Late Neolithic of the Carpathian Basin. In: F. Ifantidis – M. Nikolaidou (ed.), *Spondylus in Prehistory. New data and approaches. Contributions to the archaeology of shell technologies*. *BAR* 2216/2011: 47-62.

Skeates, R. 1995 – Animate objects: a biography of prehistoric 'axe-amulets' in the central Mediterranean region. *Proceedings of the Prehistoric Society*, 61/1995: 279-301.

Todorova, H. – Vajsov, I. – *Der kupferzeitliche Schmuck Bulgariens*. *PBF,* 20/6, 2001.

Veropoulidou, R. 2011 – *Spondylus gaederopus* tools and meals in Central Greece from the 3rd to the Early 1st millennium BCE. In: F. Ifantidis – M. Nikolaidou (ed.), *Spondylus in Prehistory. New data and approaches. Contributions to the archaeology of shell technologies*. *BAR* 2216/ 2011: 191-208.

UKRASI OD ŠKOLJKE *SPONDYLUS* U POGREBNOJ ZONI NEOLITIČKOG VUKOVARA

U radu se ponovno objavljuje nalaz dvaju grobova s bogatim prilozima nakita od školjke *Spondylus*, otkrivenih u 19. st. u Vukovaru, u istočnoj Hrvatskoj, s namjerom da se »biografije artefakata« sadržane u nalazima upotrijebe kao pomoć u određivanju vremenskih i prostornih odnosa ovih predmeta s ostalim nalazima školjke *Spondylus* u Karpatskoj kotlini i na Balkanu.

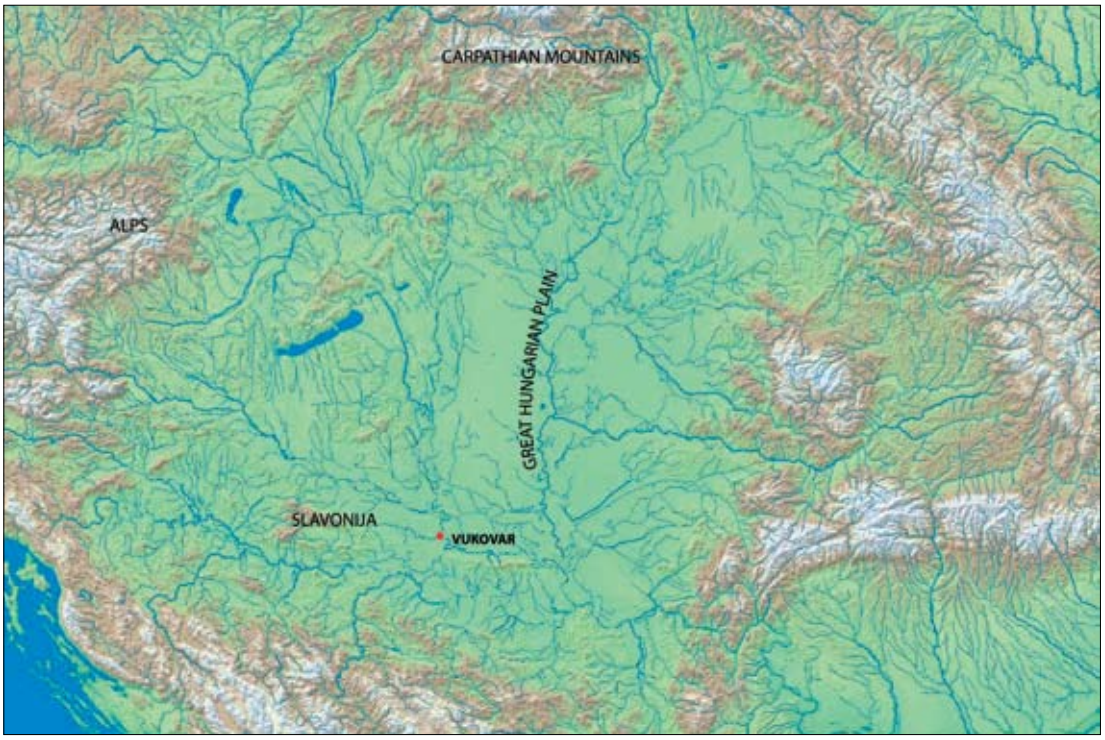

Fig. 1: Location map of Vukovar in the Carpathian – Adriatic region (source: J. Balen).

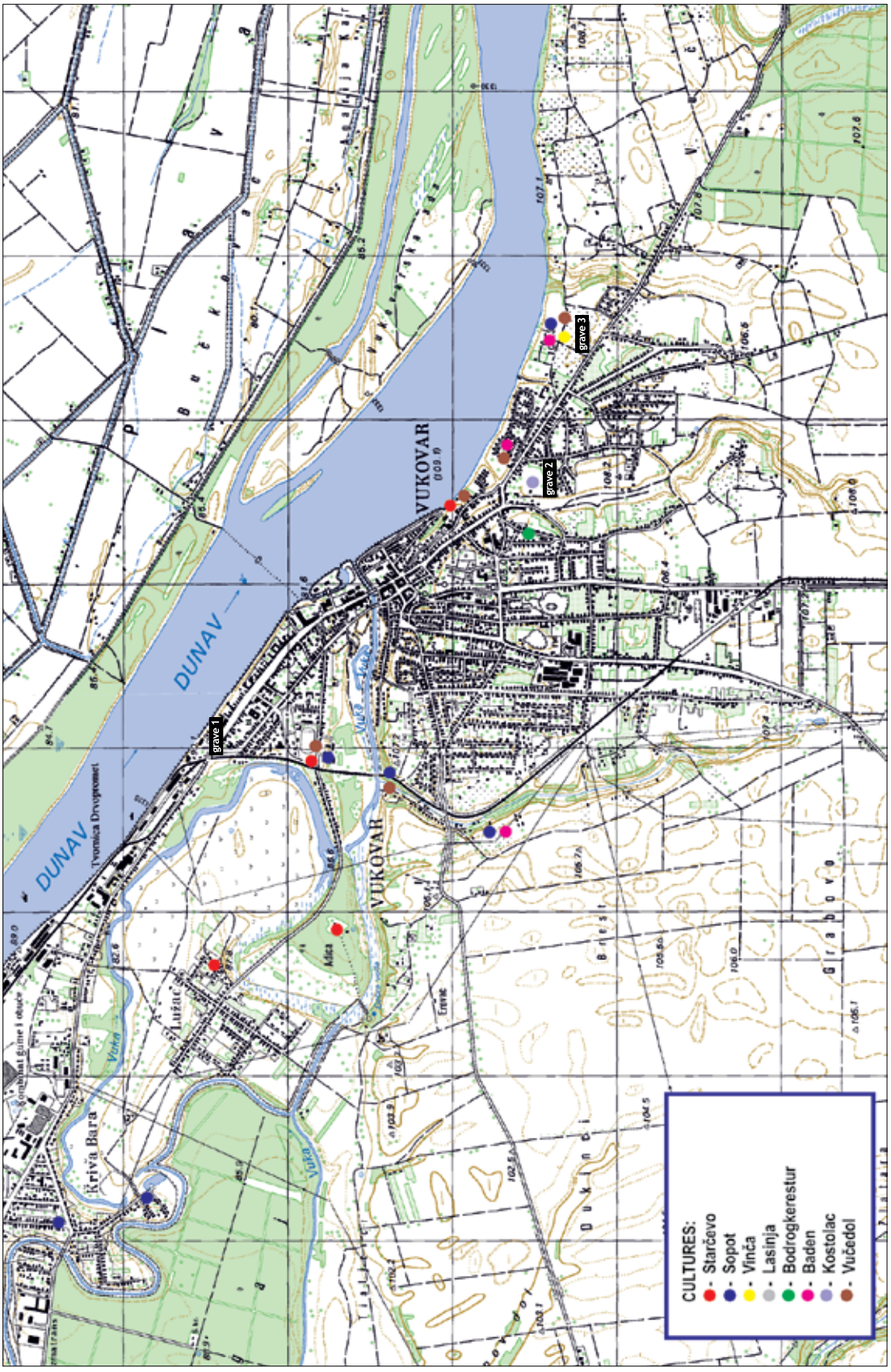

Fig. 2: Neolithic and Eneolithic finds in the town of Vukovar (source: J. Balen).

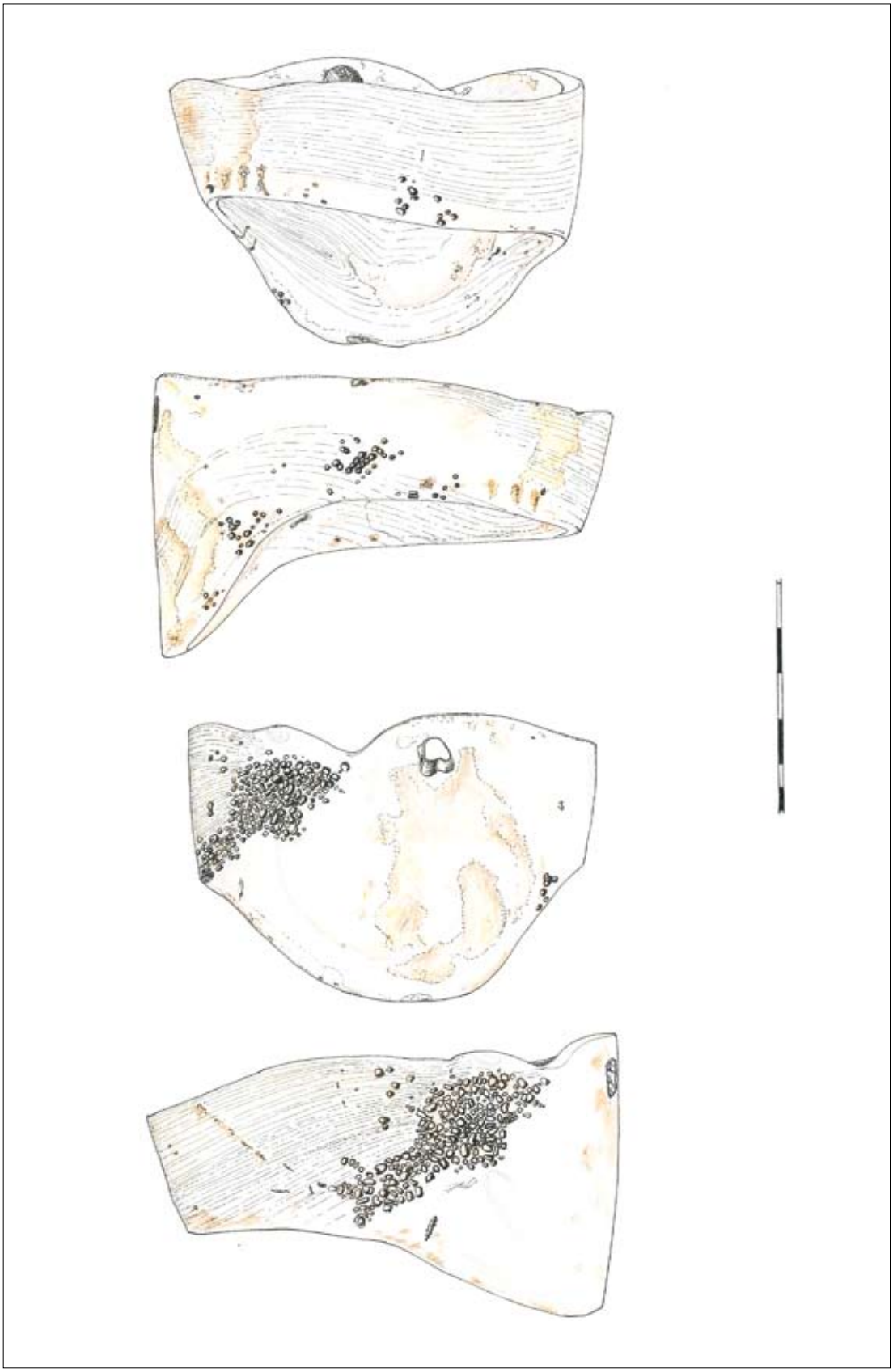

Fig. 3: Right-valve bracelet, Vukovar Grave 1 (drawing by M. Galić).

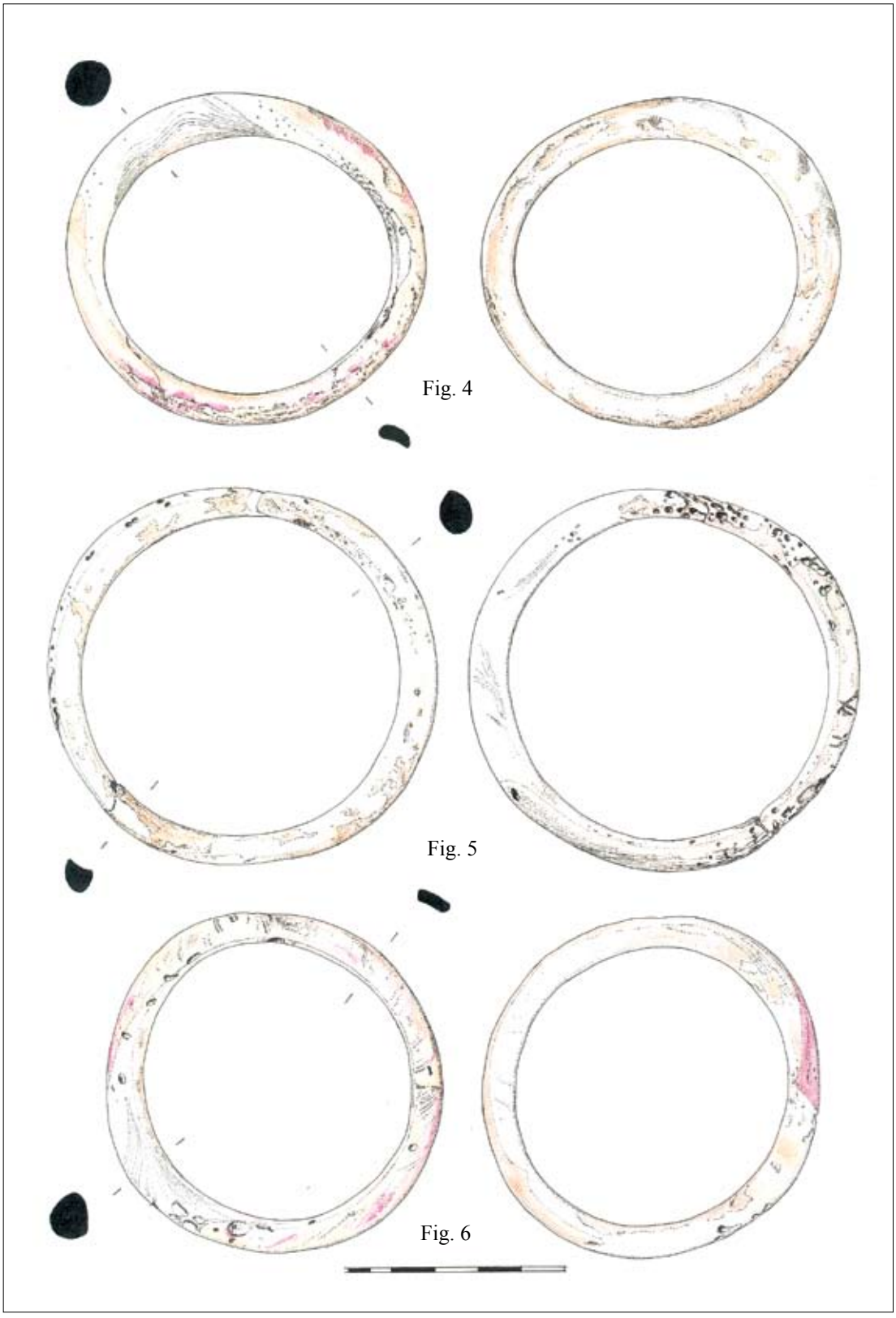

Fig. 4 - 6: Left-valve bracelet, Vukovar Grave 2: (drawing by M. Galić).

Fig. 7: Beads, Vukovar Grave 1: (drawing by M. Galić).

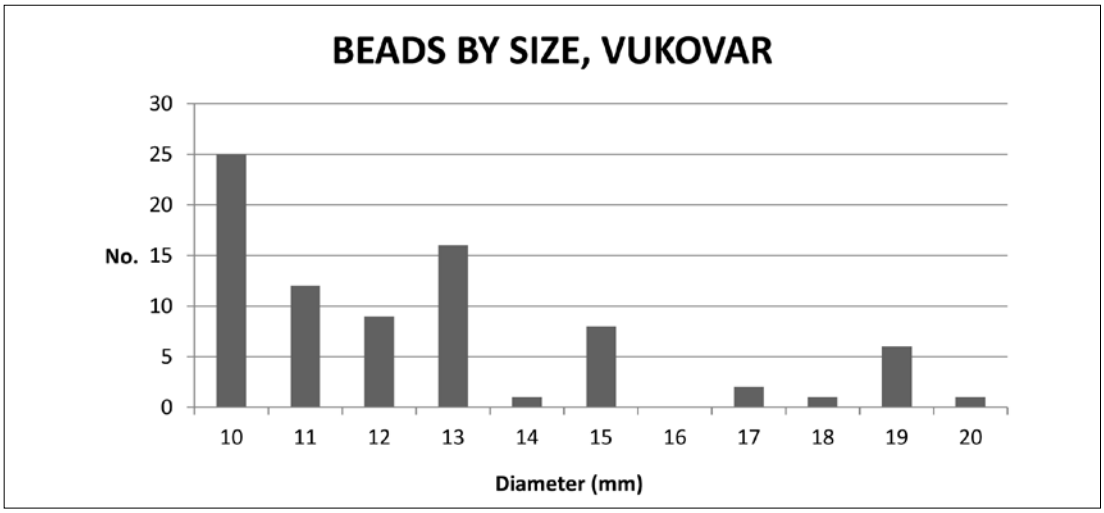

Fig. 8/1

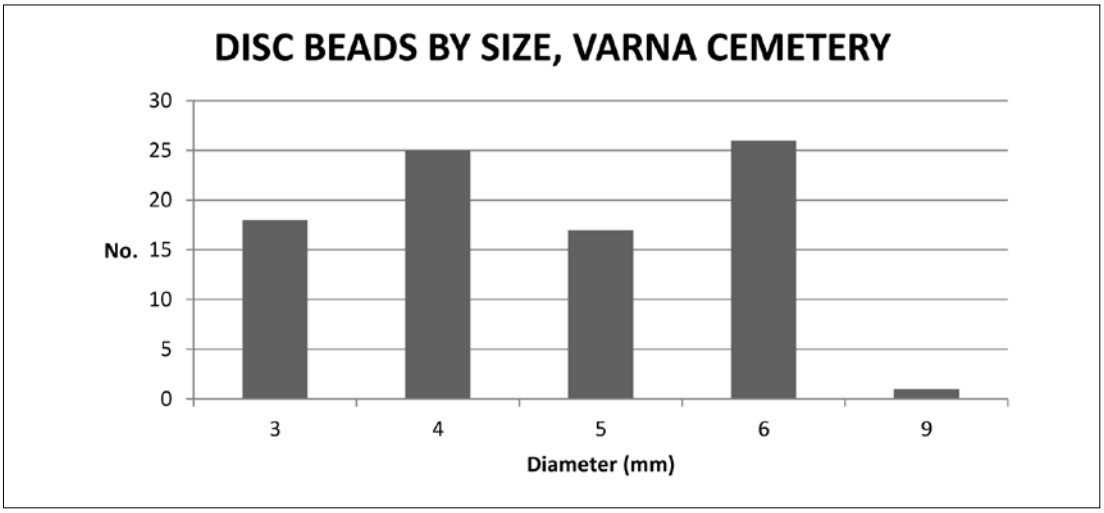

Fig. 8/2

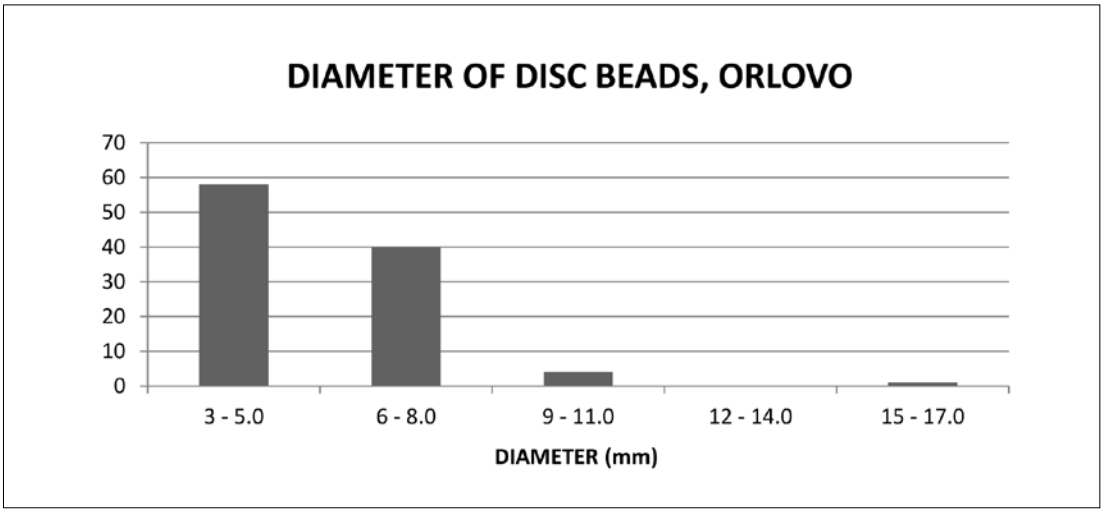

Fig. 8/3

Fig. 8/: Disc bead diameters: (1) Vukovar; (2) Varna cemetery; & (3) Orlovo surface collection (source: J. Chapman).

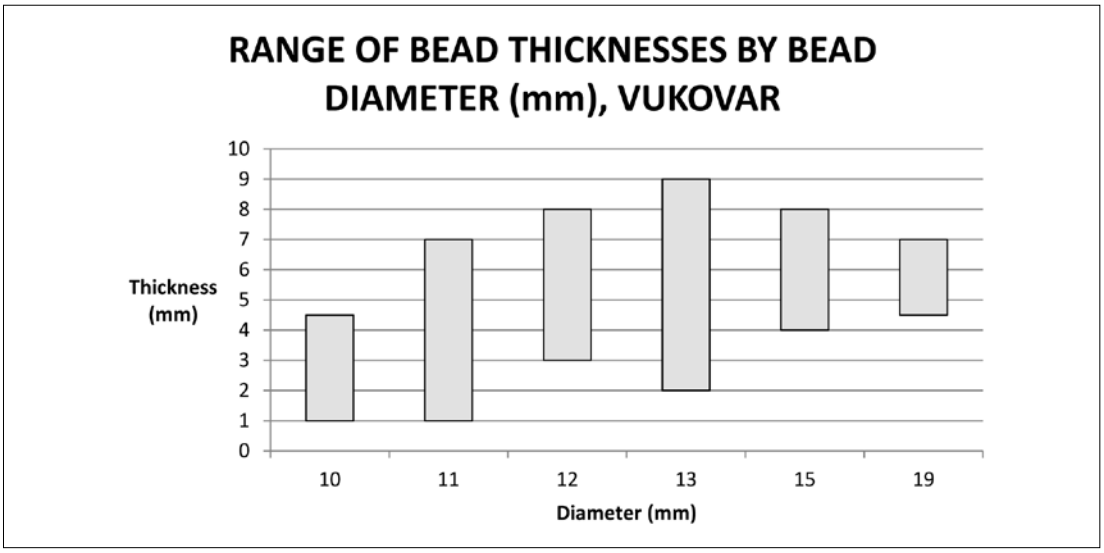

Fig. 9/1

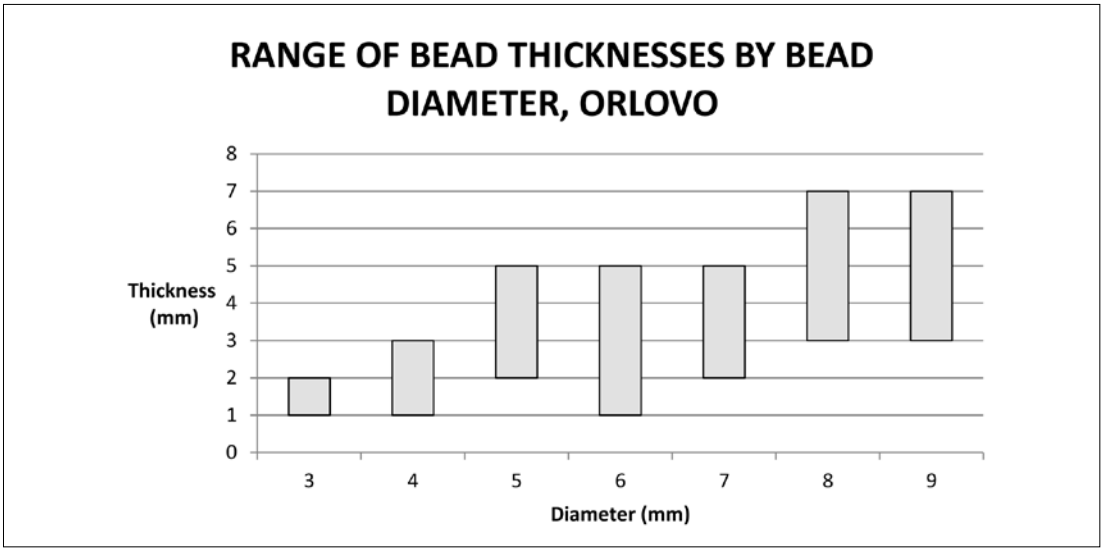

Fig. 9/2

Fig. 9: Disc bead diameter vs. thickness: (1) Vukovar; (2) Orlovo surface collection (source: J. Chapman).

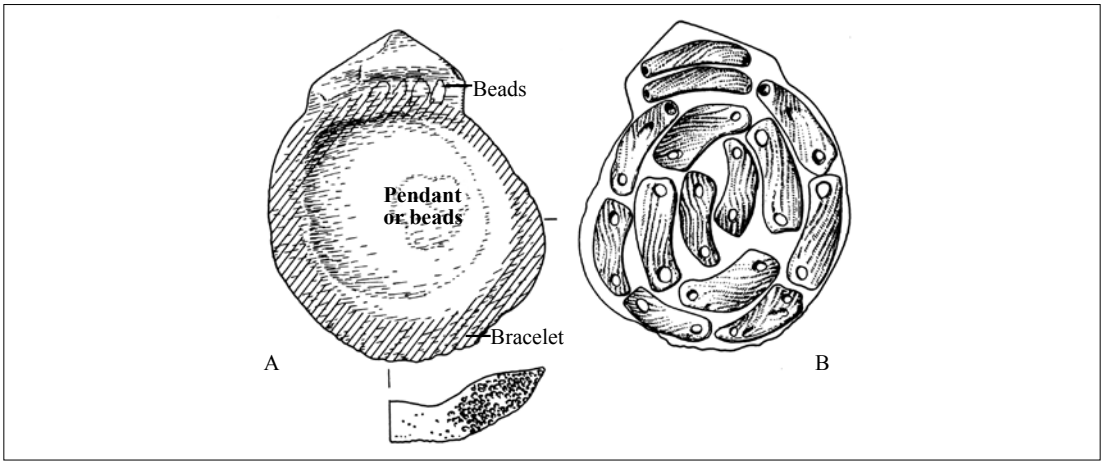

Fig. 10: Proposed reconstruction of making *Spondylus* ornaments (source: Todorova – Vajsov 2001: Abb. 2).

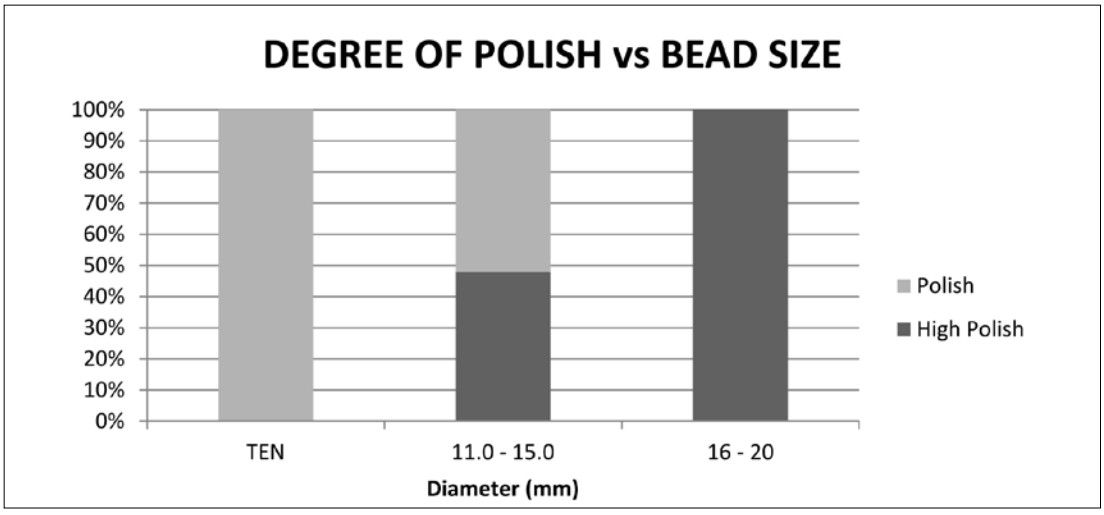

Fig. 11/1

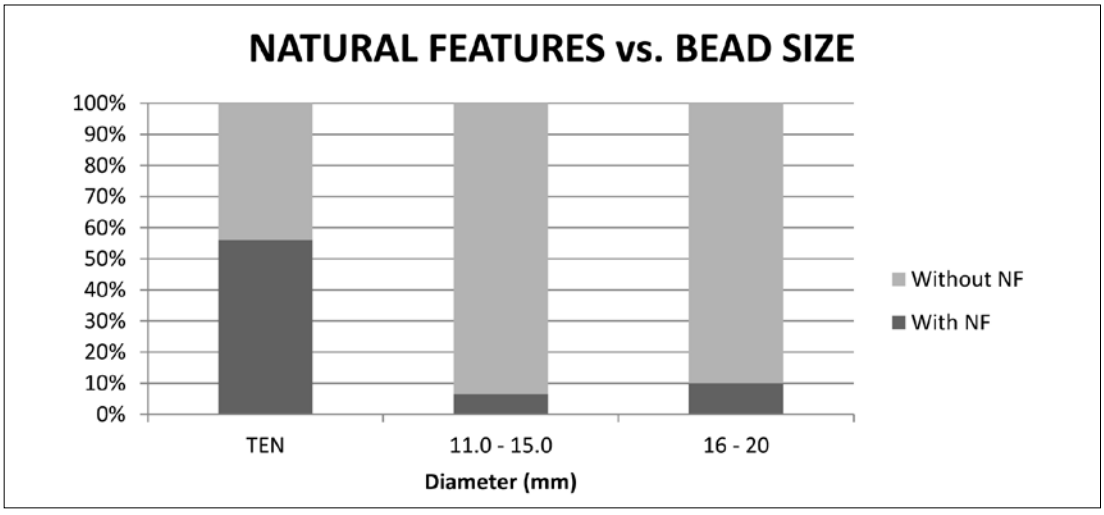

Fig. 11/2

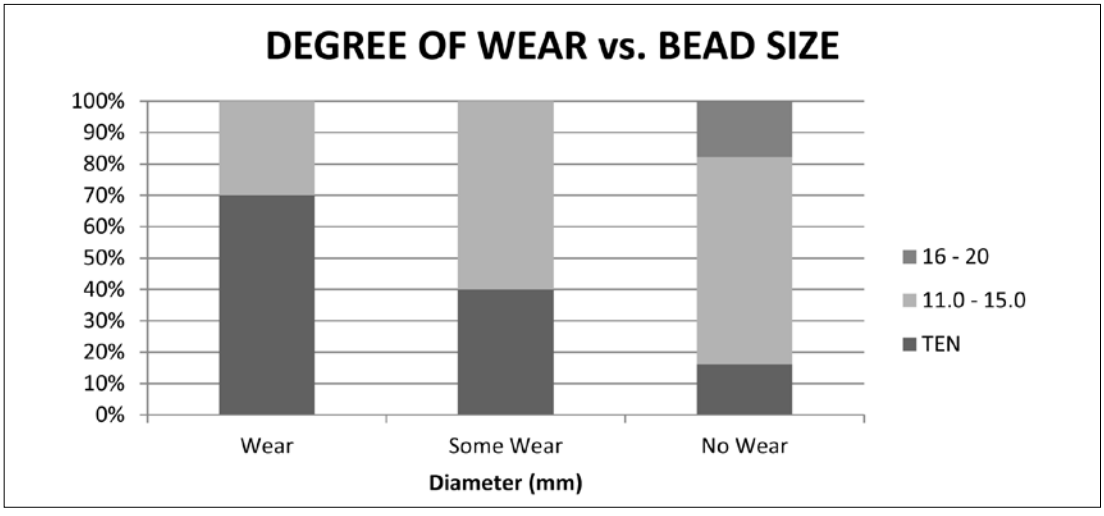

Fig. 11/3

Fig. 11: Bivariate plots, Vukovar disc beads: (1) bead size vs. polish; (2) bead size vs. number of natural features; & (3) bead size vs. extent of wear (source: J. Chapman).