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**MARIA BITIRI**



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# THE NEOLITHIC BONE INDUSTRY FROM THE SITE OF SLATINA–PARAĆIN (EXCAVATIONS OF 1962–1985)

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**Key words:** bone industry, osseous raw materials, Early Neolithic, Starčevo culture, Late Neolithic, Vinča culture, Slatina–Paraćin

**Abstract:** The site of Slatina in the vicinity of the town of Paraćin (Serbia), in the valley of Velika Morava River, was a large Neolithic settlement, with substantial remains attributed to the Late Neolithic Vinča culture. Rescue excavations were carried out between 1962 and 1964 and 1984–1985, and among other rich and diverse remains of structures and portable finds, approximately 80 artefacts from osseous raw materials were recovered. The typological repertoire included awls, heavy points, burnishing tools and used astragals, produced from bone and antler. The bone tool assemblage shares common traits with other assemblages from the Vinča culture, but also displays some of the local characteristics, in particular regarding the raw material management.

**Cuvinte-cheie:** industria materiilor dure animale, materii prime osoase, neolitic timpuriu, cultura Starčevo, neolitic târziu, cultura Vinča, Slatina–Paraćin

**Rezumat:** Situl arheologic de la Slatina, în apropierea oraşului Paraćin (Serbia), pe valea Moravei Mari este o aşezare neolitică de mari dimensiuni, cu descoperiri bogate atribuite neoliticului târziu (cultura Vinča). Cercetări de salvare s-au desfăşurat între 1962 şi 1964 şi apoi în 1984–1985, şi au dus la descoperirea, pe lângă diverse şi bogate complexe şi materiale arheologice, a ca. 80 de piese atribuite industriei materiilor dure animale. Repertoriul tipologic include vârfuri, lustruitoare şi astragale cu urme de utilizare, realizate din os şi corn. Piese sunt caracteristice culturii Vinča dar au şi câteva caracteristici locale, mai ales în ceea ce priveşte managementul materiilor prime.

## ARCHAEOLOGICAL BACKGROUND

The site of Slatina, also known as Motel Slatina, Slatina–Motel, Motel–Paraćin and Paraćin–Slatina, is situated 2 km south-east from the present-day town of Paraćin (Central Serbia), in the vicinity of the Velika Morava River, on its right bank (Fig. 1). The site was located on the western and southern slopes of the Karađorđevo (or Đurđevo) brdo Hill, partly relying to the right bank of the Crnica river. Beside the Crnica River, there were numerous smaller streams and the entire area was marshy in the past (Madas 1985, p. 42–43; 1989, p. 90–91; Vetnić 1972, p. 23).

The site was discovered during the construction of the highway Belgrade–Niš and rescue excavations were carried out on two occasions, between 1962 and 1964 and again in 1984–1985. The results of the first campaign were never published, while the campaign carried out in 1984–1985 encompassed eleven trenches of different dimensions, covering the total surface of 800 m<sup>2</sup> (Madas 1985; 1989). The excavations revealed a rich multi-layered site, with the most substantial archaeological remains attributed to the Neolithic period, alongside traces of habitation from the Late Iron Age, the Roman and the Byzantine periods. Certain archaeological traces attributed to the Starčevo culture were noted, but the major part of the cultural layers excavated at Slatina belonged to the settlement of the Late Neolithic Vinča culture. It was a large, long-living settlement; it was estimated that it covered over 10 ha and the cultural layer was up to 2.8 m thick, comprising two phases. Remains of large dwellings were uncovered, constructed in the wattle and daub technique, rectangular in plan and measuring 30–90 m<sup>2</sup> (Fig. 2).

Archaeological finds were rich and diverse and included ceramic vessels, anthropomorphic figurines, other ceramic artefacts (weights and spindle whorls), as well as osseous and lithic artefacts (Cvetković, Dodić eds. 2001; Madas 1989; Vetnić 1972), including obsidian items (Tripković, Milić 2016).



Figure 1. Map showing the position of the site of Slatina – Paraćin.



Figure 2. Architectural remains of the Vinča culture dwelling, sector II (excavations in 1985).



## MATERIALS AND METHODS

Rescue excavations carried out at the site of Slatina–Paraćin were carried out somewhat in heist, and the faunal material was not carefully collected. The material resulted from the excavations between 1962 and 1964, today stored at the Regional Museum in Jagodina, comprises only 17 artefacts and no faunal material. The material from the excavations in 1984–1985 is stored at present in the Regional Museum in Paraćin, and includes a limited amount of faunal remains and total of 64 osseous artefacts. The entire assemblage of bone tools comprises 81 artefacts (Table 1); some of the tools were recognized as artefacts and singled out during excavations, while some of them were identified by the present author among the faunal remains (some of these artefacts were included in Vitezović 2007). Two artefacts most likely belong to the Starčevo culture layers, while 79 artefacts may be attributed to the Vinča culture layers. Other data on the stratigraphy and horizontal distribution are scarce.

	Starčevo culture	Vinča culture
<b>I Pointed tools</b>		
I1A awls from long bones	1	9
I1B awls from ribs		29
I2 heavy points		4
I3 needles		4
<b>II cutting tools</b>		5
<b>III burnishing tools</b>		
III1 spatulae		2
III2 scrapers		1
III3 spatulae-awls		2
<b>IV punching tools</b>		
IV1 punches		10
IV3 hammer		1
IV4 picks		2
<b>V objects of special use</b>		1
V1 handle		1
V4 used astragals		3
<b>VIII incomplete artefacts</b>	1	5
<b>TOTAL</b>	<b>2</b>	<b>79</b>

Table 1. The typological repertoire.

The technological approach was applied and the study included analyses of raw materials, methods of manufacture, typological and morphological traits and use wear traces (see Vitezović 2016a for details and references therein). Identification and interpretation of the traces of manufacture and use follow previously published data (Campana 1989; Christidou 1999; Christidou, Legrand 2005; Legrand 2007; 2008; Legrand, Sidéra 2006; Maigrot 2003; Newcomer 1984; Peltier 1986; Semenov 1976; see also Vitezović 2016a and references therein). The typological classification follows the principles outlined by H. Camps-Fabrer and co-workers (Camps-Fabrer 1966; Camps-Fabrer ed. 1990, 1991, 1993, 1998; Patou-Mathis ed. 2002; Ramseyer ed. 2001), adapted for the prehistoric assemblages in southeastern Europe (see Vitezović 2016a and references therein).

Ratios and representation / absence of a certain raw material, technological trait or tool type in this assemblage must be taken with caution, as it may be caused by recovery methods. However, although incomplete, this assemblage provided some interesting results regarding the local characteristics of the Vinča bone tool assemblages.

### THE STARČEVO ASSEMBLAGE

Only two artefacts may be attributed to the Starčevo culture settlement given their techno-typological traits and scarce information regarding the stratigraphy. One object is a medium-sized pointed tool, produced from a sheep/goat metapodial bone, by abrasion and sawing (see Sidéra 2005 for details), resulting in a flattened aspect of the distal epiphysis. The second item is a technical piece (debris): a fragmented segment from a large long bone diaphysis, with two large holes, made by the same technique noted previously on other Starčevo culture sites (see Vitezović 2013; also Vitezović 2016b).

### THE VINČA ASSEMBLAGE– TECHNO-TYPOLOGICAL ANALYSIS

#### Raw material selection

Bones were the predominant raw material; ribs and the long bones (mainly metapodial) were the most frequent, although other skeletal elements are present in smaller amounts, such as astragal bones. Antlers follow, and mainly red deer antlers were used, but it is interesting to note the occurrence of roe deer antlers, otherwise very rarely used in the Vinča culture bone industry (see Vitezović 2017). One red deer and one roe deer antler have preserved the basal parts, showing these were shed antlers. Artefacts produced from teeth or mollusc shells were not noted, however, as mentioned above, this absence may be caused by the recovery methods.

#### Group I. Pointed tools

Medium-sized pointed tools (awls, I1) were the most common tool type (Table 1). Two subtypes were distinguished; awls produced from long bones (I1A) and awls produced from ribs (I1B). Awls from long bones were mainly made from longitudinally split metapodial bones of sheep/goats; the bone was split by grooving and later modified by burnishing with some abrasive stone tool. Usually, the epiphysis is preserved at the basal part, and both distal and proximal epiphysis are encountered (Fig. 3). At two examples, the epiphysis was removed and the basal part was cut and burnished. Just one example was more irregular in shape, with complete epiphysis at the base and obliquely cut in the distal part.



Figure 3. Awls produced from ribs (Vinča culture).

Awls made from ribs were quite frequent – they are the most common tool type in the assemblage (Fig.3); a total of 29 awls were discovered. Ribs were longitudinally split and the tools were made from one plate of the rib. At two specimens the other plate was not completely removed, but a small part was preserved at the base, perhaps suggesting a less careful, quicker tool production, or perhaps it was left to facilitate hafting; at one of the examples this part is additionally burnished. These tools were finalised by burnishing and usually the entire surfaces are covered with fine traces of burnishing with sandstone. The basal parts, when preserved, were also finely cut and burnished. Traces of repair (additional burnishing of the tip, covering the use wear traces) may be noted on several artefacts. Use wear usually consists of polished surfaces and shine, suggesting they were used to work on soft, organic materials (Christidou, Legrand 2005; Maigrot 2003; Peltier 1986).

Both these awl subtypes were widespread not only in the Vinča culture (Bačkalov 1979; Russell 1990; Vitezović 2011; 2021), but also on numerous other Neolithic sites in Europe (e.g., Beldiman 2007; Camps-Fabrer ed. 1990; Deschler-Erb *et alii* 2002; Lang 2005; Stratouli 1988). The manufacturing techniques used were those characteristic for the Vinča culture – grooving, scraping and cutting with chipped stone tools and use of abrasive stones (see Vitezović 2011; 2021). What is interesting to note is the relative frequency of awls manufactured from ribs; they were produced from an abundantly available raw material and also were manufactured relatively quickly and easily (burnishing and polishing with sandstone enables quick shaping and easy repairing of irregularities – see Semenov 1976 for more details), perhaps suggesting a high standardisation in their production.

Heavy points (I2) were produced from different raw materials – red deer antlers, segments of long bones and one was made from a large rib segment. The heavy point made from the rib was over 16 cm long; the traces of use consist of a blunted tip, deep grooves and striations on the surface, suggesting intensive use on more resilient materials. One point was made from a large segment of a large mammal long bone; the base is broken off just below the epiphysis and the tip is massive and blunt from use (Fig. 4).



Figure 4. Heavy point made from long bone (Vinča culture).

Points made from red deer antler were produced from tine tips; they usually have traces of cutting at the base and the natural tine tip is modified by cutting or burnishing. One example particularly stands out; it was made from a smaller tine segment and has the entire outer surface worked by burnishing with sandstone (Fig. 5). The tip is polished from use. It is also burnt, and the traces of use are not well preserved. The techniques for manufacturing red deer antlers are those widely spread in the Vinča culture – antler is transversally cut through several stages; the cortex was first thinned by grooving and cutting and, once the cancellous tissue was reached, the remaining portion of the antler was chopped off, cut off by one or several blows, or snapped by flexion. The cortex was thinned by a gradual removal of thin stripes – by whittling and cutting off small pieces of material – this technique is usually labelled as *débitage* by segmentation (*débitage par tronçonnage*) or cut-and-break technique (see Averbouh 2000, pp. 186; Averbouh, Pétilion 2011, pp. 41; see also Vitezović 2017).



Figure 5. Heavy point made from red deer antler (Vinča culture).

Four fine points (needles – I3) were discovered; made from unidentified small segments of long bones. They have fine, sharp tips, and were carefully made; traces of burnishing and polishing cover their entire surfaces. Also, both fine points made from long bones and heavy points made from different raw materials are commonly encountered within the Vinča culture assemblages (Bačkalov 1979; Russell 1990; Vitezović 2011; 2021).

#### Group II. Cutting tools

One chisel was discovered, made from a segment of a longitudinally split large long bone, but it is fragmented. Three fragmented tools from antlers (two from red deer and one from roe deer antler) were probably used as some sort of wedges.

#### Group III. Burnishing tools

Two spatulae made from large segments of ribs were discovered (fig 6). The ribs were longitudinally split and one plate of bone was used. The traces of manufacture are not well preserved due to intensive use; just traces of burnishing on side edges may be recognized. The outer surfaces are heavily worn and the spongy tissue on the lower surfaces is heavily abraded. The working edges are worn out and thinned from use.



Figure 6. Burnishing tools (Vinča culture).

One artefact made from a long bone segment was used as some sort of scraper or knife (Fig. 7). It was made from a longitudinally split large long bone, almost completely flat; the basal part is straight, narrow, and the object is more-or-less fan-shaped, i.e., it is wider in the distal part. At the distal end, the working edge is diagonally cut. The traces of use are quite visible; the working edge itself is worn, polished from use, also the entire surface is worn from use, and at the distal end of the mesial part on the outer surface deep striations and lines are visible.

There were also found two combined tools - spatula-awls- produced from split ribs, with one pointed working end and the other end used for burnishing and polishing. Intensive traces of use are also visible on these items; the spongy tissue is heavily abraded. Combined spatula-awls were not a frequent tool type, but they occur occasionally in other Vinča culture assemblages (Vitezović 2007; 2011).



Figure 7. Scraping tool made from long bone segment (Vinča culture).

#### IV. Punching tools

Several small punching tools were recovered, all produced from red deer antler tines. Some are fragmented, but usually they have traces of cutting at the basal part and the natural tip of the tine was modified into a working end. The same technique used for other antler tools (*débitage* by segmentation or cut-and-break technique) was applied (Averbouh 2000, p. 186; Averbouh, Pétilion 2011, p. 41; Vitezović 2017). At some of these tools may be noted traces of additional modifications – the outer surfaces of the antler were smoothed by scraping with a chipped stone tool. Also, the cutting off of small pieces of material was the technique applied at the working ends, usually circular or elliptical in shape. One object may be singled out: it was cut out from the core segment of the antler – the cortex is almost completely removed by cutting and whittling with a chipped stone tool, and the spongy tissue is exposed. The artefact resembles a thin rod, it has more-or-less a rectangular cross-section. This was most likely the result of multiple episodes of repair and probably recycling. The working end is heavily damaged from use. Traces of use on all these artefacts consist of small damages (pits, grooves, striations...) on the distal portions, and worn surfaces. However, it is not possible to determine with certainty on which materials these objects were used; they may have been used on some more resilient materials, for example, for food processing, etc. Their use as retouching tools / pressure flakers cannot be confirmed with certainty since the diagnostic use wear traces (see Patou-Mathis ed. 2002 for details) were not noted.

Two larger antler tines were most likely used as some sort of picks. The natural tips of the tines on these artefacts were modified by cutting small pieces of material (whittling). The basal part is preserved at one of them, showing traces of the same technique of *débitage* by segmentation, noted on other tine tools.

One heavy duty punching tool was found, made also from red deer antler; it was produced from the basal part of a shed antler, with a beam segment and segment of brow tine. The base of the antler was used as some sort of hammer, while it is possible that the tine itself was also used as some small punching tool. Traces of modification by a chipped stone tool are noticeable on the tine, while its distal end is blunt from use. This is the only tool from Slatina made from a basal segment of red deer antler; the remaining artefacts were produced predominantly from tines.

### Objects of special use

One fragmented artefact made from an antler segment was most likely used as some sort of handle; traces of cutting are partially preserved at both ends, while the spongy tissue in the interior was removed. Use wear traces on the outer surfaces consist of polish, worn surfaces, striations, irregular shallow grooves and other damages. Three *Bos taurus* astragals with traces of modification and use were discovered (Fig. 8). Two have perforations, while the third one displays an incomplete perforation. At one of them, the perforation is deformed from use, so it resembles a key hole, and a groove runs straight from it through the entire circumference of the artefact. At the second astragal, the perforation is broken by use, and it also has a groove that runs from it, but less prominent. All three artefacts are polished and worn from use; the prominent parts (especially the condyles) show particularly intensive wear; some parts are even flattened and the first layer of the bone is completely abraded.



Figure 8. Used astragals, some with perforations (Vinča culture).

Astragals from sheep/goats, cattle, red and roe deer and occasionally pig, unmodified, or minimally modified, sometimes with one or multiple perforations on different areas, with heavy traces of use, are characteristic for the Late Neolithic and Eneolithic in southeastern Europe (e.g., Lang 2005; Mărgărit 2017; Vitezović 2011; 2014; 2021; Vornicu 2013), and are particularly frequent in the Vinča culture. Their function is still unclear, but it seems that they were used as some sort of burnishing tools (see Meier 2013; Mărgărit 2017 for experimental results on astragals in other prehistoric contexts). The usewear traces observed on the examples from the Vinča culture suggest they were in prolonged contact with soft, organic materials, while the perforations suggest they may have had some role in processing fibres (see Vitezović 2021 and references therein for full discussion on astragals).

Also, one peculiar, more-or-less hook-shaped artefact could be mentioned, made from roe deer antler; its surfaces are poorly preserved and the basal part is damaged, so its original shape and function cannot be determined.

### Group VIII. Incomplete artefacts

Within the assemblage there are four other objects which were too fragmented to be determined typologically. It is interesting to note the presence of one shed roe deer antler with traces of cutting on the crown; this was perhaps a piece of raw material that was not completely modified into a tool. It is possible that the amount of manufacture debris is low because the faunal material was not carefully collected, so the fragments with traces of manufacture only remained unnoticed and were not recovered.

## DISCUSSION AND CONCLUDING REMARKS

The assemblage from Slatina is not very rich in terms of the total number of objects, and is partly biased due to the recovery methods, but still provides an insight into the bone technology and related economic aspects of the Neolithic communities that occupied the site. Unfortunately, the contribution of this assemblage towards the understanding of the Starčevo culture occupation is quite limited, but the assemblage attributed to the Vinča culture has some interesting traits, in particular regarding the raw material management. It is interesting to note the relatively significant ratio of ribs, used for a variety of artefacts, especially pointed tools. This may be a local preference but also may point to a relatively high standardisation and increased production, since ribs (predominantly from large mammals) are available in larger quantities than, for example, the sheep/goat metapodials. In addition, their production included the wide application of burnishing with abrasive stones, a technique that enables a relatively quick production, and at the same time removes irregularities formed by the quick, less careful débitage processing. Furthermore, the management of antlers is also interesting. There are several roe deer antler items, which were seldom used in the Vinča culture (see Vitezović 2017 for details), red deer antlers are predominantly represented by tines; just one tool was made from a basal segment; and overall large, heavy duty tools are not frequent. This perhaps shows that the red deer antlers were not abundant, but rather scarce and there was the need to be economic with the available quantities. The tool produced from the segment with a completely removed outer surfaces of the antler may be the result of several episodes of recycling and repair and suggests there was a need for economising the raw material. Significant differences in red deer antler ratios were already noted for other Vinča culture sites (see Vitezović 2017 for discussion), and perhaps Slatina falls into the group of the settlements that was not directly engaged in collecting antlers, but was obtaining them through some sort of trade and exchange.

Regarding the typological repertoire, some artefact types fall into the group of types widespread in the Vinča culture, as well as other contemporary sites in southeastern Europe, such as awls produced on metapodial bones or ribs, rib burnishing tools, etc. The presence of perforated used astragals and double-sided tools confirms these were characteristic traits of the Vinča culture bone industry.

The micro-region of the Slatina site, usually labelled as the Middle Morava valley or central Pomoravlje, was densely inhabited throughout the Neolithic period (Srejšević ed. 1989, and references therein; see also Vetnić 1974). Several Starčevo and Vinča culture sites were discovered, and in particular, the Vinča culture sites were relatively closely clustered; they covered large areas (estimated at over 10 ha for some of them) and they were long-living, often with several occupational horizons, with cultural layers up to 7 m (Garašanin 1979; Srejšević ed. 1989). Among them, the sites of Supska, in vicinity of Čuprija, and Drenovac, situated to the south of Slatina, approximately 10 km from Paraćin, in particular, should be mentioned (Garašanin 1979; Srejšević ed. 1989). Their relative chronology, as well as the mutual relations, especially economic, of these sites is still being researched. The possibility of a functional differentiation and some sort of regional specialisation among the Vinča culture settlements was already suggested elsewhere (see Vitezović, Antonović 2020, and references therein), and the somewhat particular management of osseous raw materials at Slatina may be linked with the specific aspects of the economic activities within this settlement. The presence of obsidian (see Tripković, Milić 2016) suggests this settlement was part of some wider trade and exchange network, and the bone tool assemblage suggest that activities such as processing organic raw materials were among the activities carried out within the settlement.

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The Neolithic site of Slatina was a large, long-living Vinča culture settlement, with interesting portable finds, including osseous tools. The osseous tool assemblage from Slatina shows some interesting data regarding the raw material acquisition and management and provides a certain insight into other aspects of economic organisation and craft production within the Vinča culture. Further researches in the region may provide additional information regarding the differences in the economy and possible regional specialisation in the Late Neolithic.

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