Cijepani litički materijal s ranoneolitičkog nalazišta Zadubravlje

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Chipped stone assemblage from the Early Neolithic site of Zadubravlje

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U radu se donose rezultati litičke analize cijepanih rukotvorina s lokaliteta starčevačke kulture Zadubravlje. Prozivodnja poluproizvoda za izradu alatki (odbojaka, sječiva i pločica) odvijala se na samom lokalitetu, uglavnom na površini, premda je jama 19 vjerojatno bila radni prostor. Ustanovljen je postupak neizravnog odbijanja sječiva. Među alatkama prevladavaju komadići s djelomičnom obradom i oni s obrađenim jednim rubom, a u malom postotku prisutni su i geometrijski oblici.

Ključne riječi: litička analiza, rani neolitik, starčevačka kultura, Zadubravlje, Slavonija, Hrvatska

The paper presents the results of the lithic analysis of chipped stone artefacts from a Starčevo culture site at Zadubravlje. Blanks for tool production (flakes, blades and bladelets) were produced at the site itself, mostly on the surface, although pit 19 probably functioned as a working area. It was established that the blades were produced by indirect percussion. Predominant tools are pieces with partial retouch and those with one retouched edge. Geometric forms are also present, although in small percentage.

Key words: lithic analysis, Early Neolithic, Starčevo culture, Zadubravlje, Slavonia, Croatia

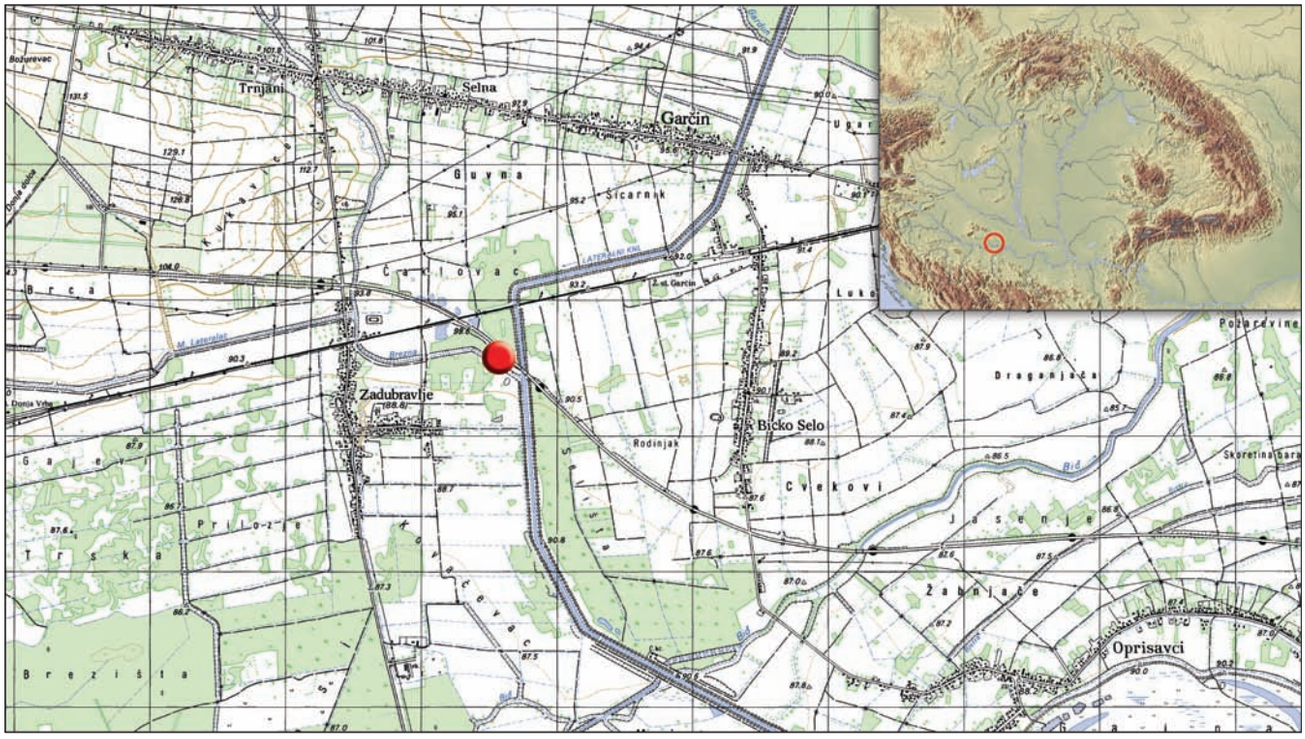
1. UVOD

Analiziranje litičkih nalaza nije važno i potrebno samo za razumijevanje paleolitika i mezolitika, već i za kasnija razdoblja, gdje se ti nalazi također pojavljuju. Premda postoje mnogobrojne studije litičkog materijala iz razdoblja neolitika u središnjoj Europi, kod nas je ta praksa još prilično rijetka. Zadubravlje je jedno od važnih neolitičkih nalazišta u Slavoniji, koje je dalo dosta litičkog materijala.

Pri rekognosciranju uz južnu trasu Autoceste Zagreb-Be-

1. INTRODUCTION

The analysis of lithic finds is not only important and necessary for understanding the Paleolithic and Mesolithic, but also for later periods, when they also appear. Even though a number of studies have focused on the lithic material from the Neolithic of Central Europe, this still remains a relatively rare practise in Croatia. Zadubravlje ranks among the most important Neolithic sites in Slavonia, which yielded a lot of lithic finds.



Sl. 1 Karta s položajem nalazišta
Fig. 1 Map with the marked position of the site

ograd (dionica Slavonski Brod-Velika Kopanica) na zemljištu "Dužine-Čaklovac" kod Zadubravlja, godine 1988. otkriveno je naselje starčevačke kulture (Minichreiter 1993b, 39, 49). Zaštitno arheološko istraživanje provedeno je 1989. i 1990. godine, a istražena površina iznosila je 6200 m^2 (Minichreiter 1992, 5). U ovom radu po prvi put donosimo rezultate preliminarne analize cijepanog litičkog materijala iz Zadubravlja. Uza standardnu analizu lomljevine, odnosno litičkih proizvoda i tipova alatki, načinjena je petrografska i preliminarna spacijalna analiza pa je ovaj rad ujedno i prva kvantitativna analiza cjelokupnoga cijepanoga litičkog materijala s jednoga ranoneolitičkog nalazišta u Hrvatskoj.

2. SMJEŠTAJ I ZNAČAJKE NALAZIŠTA

Slavonski Brod nalazi se u središnjem dijelu slavonske Posavine, na mjestu gdje se Sava najviše približila južnim izdancima Dilj-gore (sl. 1). Suženi prostor savske nizine kod Broda ima značajke prirodnoga koridora. Brodskoj okolici pripada i ugodan brdski kraj, šumovit predio diljskog prigorja (Marković 1994, 11). Brodsko je Posavlje na sjeveru omeđeno Dilj-gorom i njezinim južnim izdankom Brdom, dok na južnoj strani to područje zatvaraju planine Motajica, Markovac i Vučjak (Rubić 1953, 6). Glavni morfološki dio brodskog Posavlja je aluvijalna ravnica kroz koju je Sava sa svojim pritocima često mijenjala tok i korito (Rubić 1953, 7). Već od najranijeg neolitika na ovom prostoru smještaju se brojna naselja. Tada su već male visinske razlike značile puno pri odabiru pogodnog položaja za smještaj naselja. Ipak, svojim današnjim tokom Sava se nalazi desetak kilometara južnije od starčevačkog naselja kod Zadubravlja, koje je smješteno 17 km istočno od Slavonskog Broda. Položaj Dužine nalazi se oko dva kilometra istočno od Zadubravlja, na valovitom zemljištu uz lateralni kanal kojim je nekada tekao potok Brezna (Minichreiter 1990, 24; 1993a, 49).

Nositelji starčevačke kulture naselja su uspostavljali na

A 1988 survey along the southern route of the Zagreb-Belgrade highway (the Slavonski Brod-Velika Kopanica section) led to the discovery Starčevo culture settlement (Minichreiter 1993b, 39, 49) at the ''Dužine-Čaklovac'' plot near Zadubravlje. Salvage archaeological excavations were carried out in 1989 and 1990, covering a surface of 6200 m^2 (Minichreiter 1992, 5). We present here for the first time the results of the preliminary lithic analysis of the chipped stone material from Zadubravlje. In addition to the standard analysis of the assemblage, that is, debitage and tool types, we carried out a petrographic and preliminary spatial analysis, which renders this paper at the same time the first quantitative analysis of the entire chipped lithic material from an Early Neolithic site in Croatia.

2. THE POSITION AND CHARACTERISTICS OF THE SITE

Slavonski Brod is situated in the central part of the Slavonian Posavina region, at the point where the Sava comes closest to the southern spurs of the Dilj-Gora Mountain (Fig. 1). The Sava Plain in the area of Slavonski Brod is rather narrow and bears traits of a natural corridor. The pleasant hilly wood-covered area of the hills of the Dilj-Gora Mountain also lies in the vicinity of Slavonski Brod (Marković 1994: 11). The Posavina region around Slavonski Brod is bounded on the north by the Dilj-Gora and its southern spur – Brdo, while on the south this area is bounded by the Motajica, Markovac and Vučjak Mountains (Rubić 1953, 6). The principal morphological feature of the Brodsko Posavlje region is the alluvial plain of the Sava river, which, together with its tributaries frequently changed its course and bed (Rubić 1953, 7). Numerous settlements were formed in this area from the earliest period of the Neolithic, when even small differences in the altitude meant a lot in the selection of a suitable position to found a settlement. The present course

visokim terasama uz veće riječne tokove (Erdut, Vinkovci, Sarvaš, Vukovar, Slavonski Brod), na niskim brežuljcima uz dolinu s vodotocima (Bukovlje, Kneževi Vinogradi, Pepelane, Podgorač) ili na blago povišenim terenima u ravnici uz manji vodotok (Gornja Vrba, Lipovac, Vrpolje, Zadubravlje). Naselja nikad nisu izolirana, odnosno daleko jedna od drugih (Minichreiter 1992, 37).

Istočni dio istraženog dijela naselja u Zadubravlju sadržavao je brojne rupe za manje kolce - vjerojatno se radilo o nadzemnim objektima, veliko ognjište te nekoliko jama ispunjenih pepelom. Prema središtu naselja smjestila se skupina od nekoliko jama bogatih cijepanim kamenim izrađevinama. Jama 19 bila je središnji radni prostor, i najveća od spomenute tri jame, dok su manje bile smještene sjeverno (jama 20) i istočno (jama 21) od nje. Kornelija Minichreiter zbog velikog broja nalaza cijepanoga litičkog materijala, a tek nekoliko ulomaka keramike, determinira objekt kao radionicu litičkih izrađevina (Minichreiter 1992, 31; 1993b, 97, 104). U središnjem dijelu naselja bile su smještene tri zemunice s pomoćnim jamama i ograđenim prostorima te kružno ograđen centralni prostor. Zemunica broj 6, najistočnija je u tom središnjem dijelu, ali nalazila se u pravcu sjeverno od jama broj 19 i 20. Sjeveroistočni prostor zemunice sadržavao je veću količinu kamenih izrađevina. Najveća zemunica (broj 10) ujedno je i zauzimala središnje mjesto u naselju. Isticala se i bogatstvom nalaza – velike količine keramike, cijepanih i glačanih kamenih izrađevina, žrvnjeva te životinjskih kostiju. Zapadno od zemunice, u ograđenom prostoru nalazio se još jedan radni prostor, na što upućuju brojni nalazi utega i veći ulomci žrvnjeva (Minichreiter 1992, 31). Najsjevernija od tri središnje zemunice (zemunica 9) sadržavala je čak četiri peći – dvije cilindrične i dvije kalotaste. S vanjske strane ograde koja se produžavala iz ove zemunice nalazio se bunar (Minichreiter 1990, 24; 1992, 32; 1993b, 97).

U zapadnom dijelu naselja nalazili su se objekti potrebni za proces izrade keramike. Riječ je o jamama za vađenje gline te nekoliko peći (Minichreiter 1992, 35; 1993b, 97).

Istraženi objekti pokazuju sve značajke dobro organiziranog naselja s izdvojenim, namjenskim prostorima za izradu keramičkog posuđa i kamenih alatki, za tkanje, pripremu hrane i ostalo (Minichreiter 1992, 2001).

Rezultati radiokarbonske analize pokazali su vremenski raspon objekata iz naselja kod Zadubravlja od 6610 do 5300 cal. BC (Minichreiter, Krajcar-Bronić 2006, 13). Rezultati datiranja su kalibrirani korištenjem OxCal programa za kalibraciju (Krajcar-Bronić, Minichreiter, Obelić, Horvatinčić, 2004, 8). Datirani su uzorci ugljena iz pet objekata (bunar, jama 6, jama 9, jama 10, jama 12). Prema rezultatima datiranja, objekt 11 je najstariji (Z-2924, 7620±140 BP, 6610-6340 cal BC, 57,2%;), te značajnije odstupa od ostalih datiranih uzoraka (Krajcar-Bronić, Minichreiter, Obelić, Horvatinčić, 2004). S obzirom na činjenicu da je dobiveni rezultat nekoliko stoljeća stariji od najranijeg neolitika u Podunavlju te da potječe iz bunara, ne smije se zanemariti mogućnost pogreške kao i moguća velika starost drveta, čiji je uzorak datiran (Boucquet-Appel, Naji, Vander Linden, Kozłowski 2009, 808). Bunar bi možda mogao pripadati nekome drugom naselju, s obzirom na svoj položaj u istraženom prostoru (Minichreiter, Krajcar-Bronić 2006). Svi su ostali rezultati u rasponu 5930-5040 cal BC: jama 6; Z-2921, 6710±115, cal BC 5720-5530 (68,2%); jama 9; Z-2922 6705±95 BP, cal BC 5720-5530 (68,2%); jama 10; Z-2923, 6995±115 BP, cal BC 5930-5740 (55,5%); i jama 12; Z-2925, 6260±130 BP, cal BC 5370-5040 (68,2%). Jame 6, 9 i 10 detaljnije su obrađene u ovome radu zbog veće koncentracije litičkih rukotvorina, a rezultati datiranja tih jama

of the Sava runs around ten kilometres south of the Starčevo settlement at Zadubravlje, situated 17 km east of Slavonski Brod. The Dužine site lies around two kilometres east of Zadubravlje, at an undulating terrain next to a lateral canal that was once the bed of the Brezna stream (Minichreiter 1990, 24; 1993a, 49).

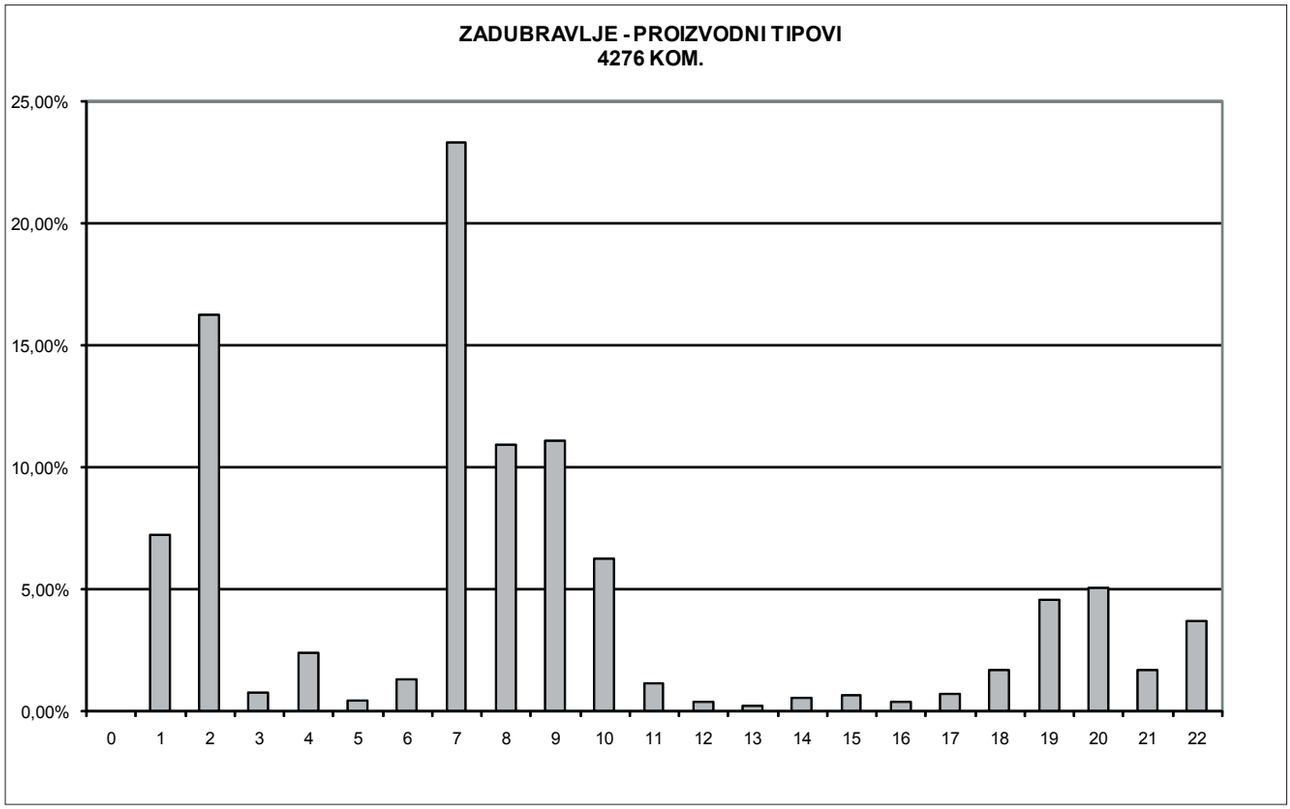
The bearers of the Starčevo culture established their settlements on elevated terraces along major rivers (Erdut, Vinkovci, Sarvaš, Vukovar, Slavonski Brod), on low hills bordering a plain with watercourses (Bukovlje, Kneževi Vinogradi, Pepelane, Podgorač) or on gently elevated terrains in the plain adjacent to a minor watercourse (Gornja Vrba, Lipovac, Vrpolje, Zadubravlje). The settlements were never isolated, that is, standing far from each other (Minichreiter 1992, 37).

The eastern part of the investigated portion of the settlement at Zadubravlje contained numerous smaller holes, probably post holes for above-ground structures, a large hearth and several pits filled with ash. A cluster of several pits with rich assemblages of stone artefacts occupied an area near the centre of the settlement. Pit 19, the largest of the three mentioned pits, was the central working area, while the smaller pits lay north (pit 20) and east (pit 21) of it. Due to the large quantity of chipped lithic finds and only few ceramic fragments, Kornelija Minichreiter interpreted the structure as a workshop for lithic artefacts (Minichreiter 1992, 31; 1993b, 97, 104). An area delimited by a circular fence serving as the central zone, together with three pit-houses with accessory pits and fenced areas, occupied the centre of the settlement. Pit-house 6 was the easternmost structure in that central part, but it lay north of pits 19 and 20. The northeastern zone of the pit-house yielded a large quantity of stone artefacts. The largest pit-house (no. 10) at the same time occupied the central position in the settlement. It stood out also by the wealth of the finds – large quantities of ceramics, chipped and polished stone artefacts, grindstones and animal bones. Numerous finds of weights and large fragments of grindstones point to the existence of another working area in the fenced zone west of the pit-house (Minichreiter 1992, 31). The northernmost of the three central pit-houses (pit-house 9) contained as much as four ovens – two circular ones and two dome-shaped ones. At the outer side of the fence that led from this pit-house there was a well (Minichreiter 1990, 24; 1992, 32; 1993b, 97).

The western part of the settlement housed features that had a role in the production of ceramics, such as clay-extraction pits and several kilns (Minichreiter 1992, 35; 1993b, 97).

The investigated structures and features exhibit traits of a well-organized settlement with areas designated for the production of ceramic vessels and stone tools, weaving, food preparation and other activities (Minichreiter 1992, 2001).

The results of radiocarbon analysis revealed that the time span of the structures in the settlement at Zadubravlje was between 6610 and 5300 cal. BC (Minichreiter, Krajcar-Bronić 2006, 13). The results were calibrated using the OxCal calibration program (Krajcar-Bronić, Minichreiter, Obelić, Horvatinčić, 2004, 8). Charcoal samples from five features were dated (the well, pit 6, pit 9, pit 10, pit 12). The dating results show that feature 11 was the earliest (Z-2924, 7620±140 BP, 6610-6340 cal BC, 57,2%;), and that it was considerably older than the other dated samples (Krajcar-Bronić, Minichreiter, Obelić, Horvatinčić, 2004). In view of the fact that the obtained result predates the earliest Neolithic in the



Sl. 2 Grafički prikaz zastupljenosti proizvodnih tipova. 1 prvotni odbojak, 2 drugotni odbojak, 3 prvotno sječivo, 4 drugotno sječivo, 5 prvotna pločica, 6 drugotna pločica, 7 odbojak, 8 odbojčić, 9 sječivo, 10 pločica, 11 jezgra za odbojke, 12 jezgra za sječiva, 13 jezgra za pločice, 14 miješana jezgra, 15 ulomci jezgara, 16 krijestasti odbojci, sječiva ili pločice, 17 dotjerujući obojci jezgre, 18 odbojci od retuša, 19 krhotina s okorinom, 20 krhotina, 21 okrhak, 22 neodredivi ulomci

Fig. 2 Frequency chart of production types. 1 primary flake, 2 secondary flake, 3 primary blade, 4 secondary blade, 5 primary bladelet, 6 secondary bladelet, 7 flake, 8 small flake, 9 blade, 10 bladelet, 11 flake core, 12 blade core, 13 bladelet core, 14 mixed core, 15 core fragments, 16 crested flakes, blades or bladelets, 17 platform rejuvenation flakes, 18 retouching flakes, 19 chunk with cortex, 20 chunk, 21 chip, 22 indeterminate pieces

su u rasponu 5930-5530 cal BC (Minichreiter, Krajcar-Bronić 2004), što predstavlja "srednje vrijednosti" u dosta velikom vremenskom rasponu, dobivenom apsolutnim datiranjem uzoraka iz Zadubravlja.

Iako K. Minichreiter (Minichreiter 1992) svrstava lokalitet u ranu pretklasičnu fazu starčevačke kulture, prema rezultatima apsolutnog datiranja obuhvaćeno je gotovo čitavo vrijeme trajanja starčevačke kulture (vidjeti Krajcar-Bronić, Minichreiter, Obelić, Horvatinčić, 2004). Slična se situacija ponavlja i na obližnjem lokalitetu Galovo. Spomenuti rezultati svakako ukazuju na problem relativne kronologije. Rezultati novijih istraživanja također pokazuju određeni stupanj diskrepancije između relativne kronologije prema ukrasima na keramici te rezultata apsolutnog datiranja (Balen i sur., u tisku), pa u ovom trenutku nije moguća sigurna korelacija relativne i apsolutne kronologije.

U brodskom Posavlju još je nekoliko naselja atribuiranih ovom stupnju, odnosno pretklasičnoj fazi starčevačke kulture. To su: Igrač u Bukovlju, Marukićeva ulica u Slavonskom Brodu te Glože u Starim Perkovcima (Minichreiter 1992, 35), ali ona nisu apsolutno datirana.

3. LITIČKA ANALIZA

3. 1. Metode

Cjelokupni litički materijal je definiran prema 22 proizvodna tipa te nultom tipu (gomolj ili oblutak) koji nije zastupljen, kao što je to učinjeno za cijepani litički materijal

Danubian Basin by several centuries, and that it comes from a well, one should not neglect the possibility of an error as well as the possible great antiquity of the wood that yielded the sample for dating (Boucquet-Appel, Naji, Vander Linden, Kozłowski 2009, 808). The well may have belonged to another settlement, considering its position in the investigated area (Minichreiter, Krajcar-Bronić 2006). All the other results show the time frame between 5930 and 5040 cal BC: pit 6; Z-2921, 6710±115, cal BC 5720-5530 (68,2%); pit 9; Z-2922 6705±95 BP, cal BC 5720-5530 (68,2%); pit 10; Z-2923, 6995±115 BP, cal BC 5930-5740 (55,5%); and pit 12; Z-2925, 6260±130 BP, cal BC 5370-5040 (68,2%). Pits 6, 9 and 10 were analysed separately in this paper due to the large concentration of lithic artefacts, and the dating results for these pits show a time frame between 5930 and 5530 cal BC (Minichreiter, Krajcar-Bronić 2004), representing the ''middle values'' in a fairly long time frame, obtained by absolute dating of the samples from Zadubravlje.

Even though K. Minichreiter (Minichreiter 1992) attributed the site to the early pre-classical phase of the Starčevo culture, the absolute dating results span the entire duration of the Starčevo culture (see Krajcar-Bronić, Minichreiter, Obelić, Horvatinčić, 2004). The neighbouring Galovo site exhibits a similar situation. The mentioned results certainly point to the problems with relative chronology. The results of recent investigations likewise exhibit certain discrepancies between the relative chronology based on decorative patterns on ceramic vessels and the results of absolute dat-

ZADUBRAVLJE - PROIZVODNI TIPOVI / TECHNOLOGICAL TYPES			
	KOM/QUANTITY	%	TIP/CATEGORY
0	0	0,00%	gomolj ili oblutak
1	309	7,23%	prvotni odbojak/primary decortication flake
2	693	16,21%	drugotni odbojak/secondary decortication flake
3	32	0,75%	prvotno sječivo/primary decortication blade
4	102	2,39%	drugotno sječivo/secondary decortication blade
5	17	0,40%	prvotna pločica/primary decortication bladelet
6	54	1,26%	drugotna pločica/secondary decortication bladelet
7	995	23,27%	odbojak/flake
8	465	10,87%	odbojčić/small flake
9	474	11,09%	sječivo/blade
10	265	6,20%	pločica/bladelet
11	47	1,10%	jezgra za odbojke/flake core
12	14	0,33%	jezgra za sječiva/blade core
13	8	0,19%	jezgra za pločice/bladelet core
14	23	0,54%	kombinirana jezgra/mixed core
15	26	0,61%	ulomci jezgara/core fragments
16	16	0,37%	krijestasti odbojci, sječiva ili pločice/crested flakes, blades and bladelets
17	28	0,65%	dotjerujući obojci jezgre/core rejuvenation flakes
18	71	1,66%	odbojci od retuša/retouch flakes
19	195	4,56%	krhotina s okorinom/corticated chunk
20	215	5,03%	krhotina/chunk
21	70	1,64%	okrhak/shatter
22	157	3,67%	neodredivi ulomci/unidentifiable fragments
	4276	100%	ukupno/total

Tab. 1 Zastupljenost proizvodnih tipova
Tab. 1 Frequency of production types

s nalazišta Slavča kod Nove Gradiške, uz modifikaciju izvorne liste tehnoloških tipova dodavanjem kategorije krhotina s okorinom (T. 1), za detaljno objašnjenje pojedinih tipova vidjeti Šošić, Karavanić (2004, 23-25). Tipovi su navedeni redom koji obuhvaća četiri faze: nulta faza (tip 0) – sabiranje i testiranje sirovine; prva faza (tipovi od 1 do 6) – prethodna obrada, odnosno skidanje okorine i oblikovanje sirovine u jezgre za izradu različitih proizvoda (odbojaka, sječiva, pločica); druga faza (tipovi od 7 do 17) – središnja proizvodna faza, odbijanje odbojaka i/ili sječiva, pločica; treća faza (tip 18) – završno oblikovanje alatki, postizanje dodatne obradbe i oblika. Međutim, ukoliko je jezgra bila pripravljena za odbijanje na takav način da je određena količina okorine ostala na njoj, dio drugotnih odbojaka može pripadati drugoj, a ne prvoj fazi proizvodnog procesa. Tipovi 19, 20, 21 i 22 mogu biti dio bilo koje faze. Oni označavaju slučajno i neplanski odbijene, tj. otkrhnute komade, zatim komade raspucale prirodnim putem kao i ulomke koji se ne mogu svrstati u određeni tip zbog fragmentiranosti. Za pojedini tip uzimani su u obzir cjeloviti komadi i svi fragmenti, a budući da mnoštvo nalaza čine ulomci, a ne cjelovite rukotvorine, nekadašnji stvarni broj rukotvorina zasigurno donekle odudara od ukupno izraženog broja litičkih nalaza. Treba napomenuti da prilikom iskopavanja nije provođeno prosijavanje pa zbog toga brojnost nekih kategorija, kao što su odbojci od obrade i alatke malih dimenzija (geometrijski oblici), valja uzeti s rezervom.

Na osnovi učestalosti alatki određena je osnovna tiing (Balen et al., in press), which renders the correlation of relative and absolute chronologies insecure at present.

Several other settlements within the Brodsko Posavlje region have been attributed to this, pre-classical phase of the Starčevo culture: Igrač in Bukovlje, the Marukićeva Street in Slavonski Brod, and Glože in Stari Perkovci (Minichreiter 1992, 35). However, none of these sites have been dated by absolute methods.

3. LITHIC ANALYSIS

3. 1. Methods

The entire lithic material has been defined according to 22 production types and the zero type (nodule or pebble), which is not present here, on the model of the analysis of the chipped lithic material from the Slavča site near Nova Gradiška. The only modification to the original list of technological types consists in the addition of a new category – chunks with cortex (Pl. 1), for a detailed description of specific types see Šošić, Karavanić (2004, 23-25). The types were listed in a sequence encompassing four phases: the zero phase (type 0) – collection and testing of the raw material; the first phase (types 1 to 6) – preliminary processing, that is, removal of the cortex and the shaping of the raw material into cores for making various products (flakes, blades, bladelets); the second phase (types 7 to 17) – central production phase, removal of flakes and/or blades, bladelets; third phase (type 18) – final shaping of tools and retouching. However, in cases when a core prepared for flaking still preserved some cortex on the surface, a part of the secondary

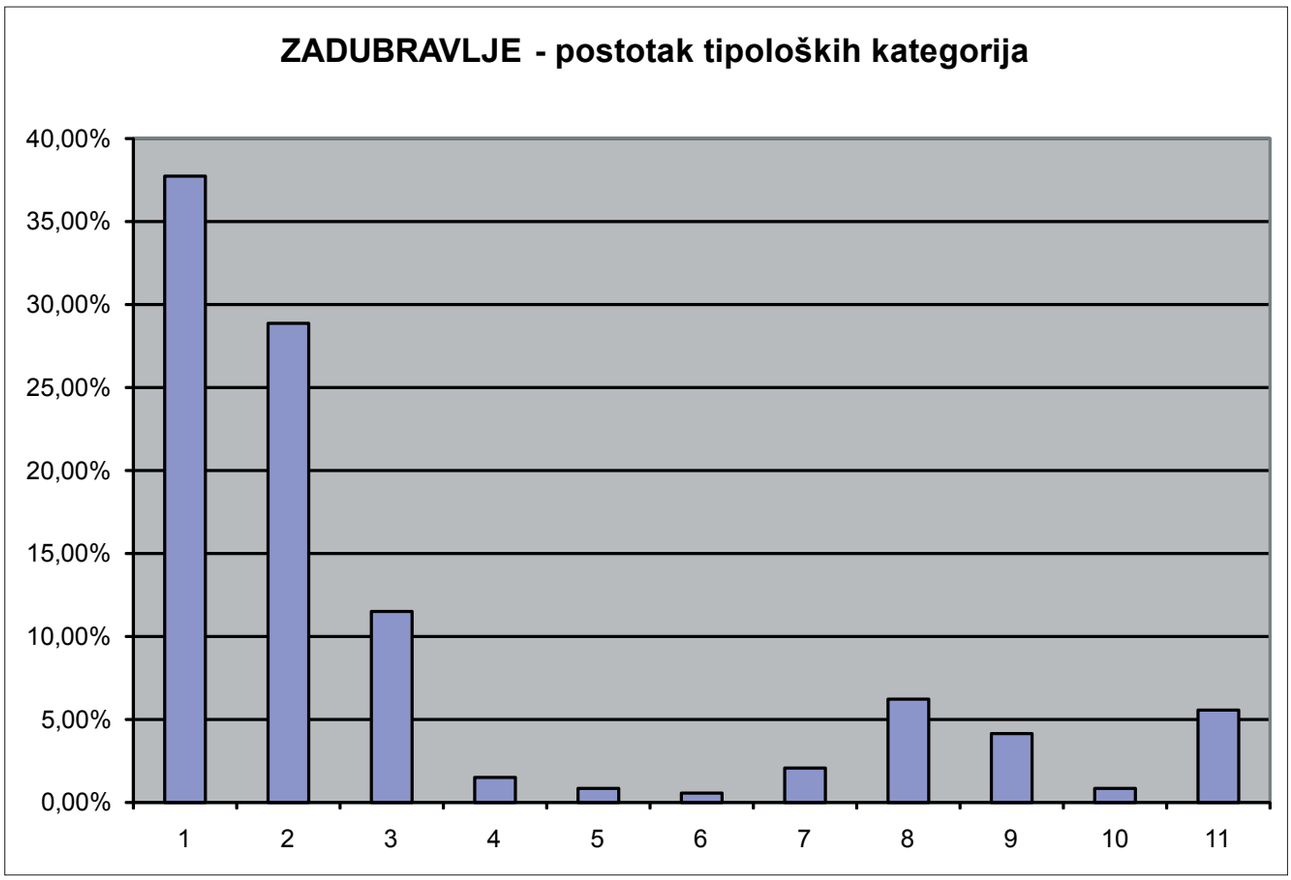
ZADUBRAVLJE - TIPOVI ALATKI / TYPOLOGY			
	TIP / TYPE	KOMADA / QUANTITY	%
1	komadić s djelomičnom obradom / partially retouched pieces	128	37,76%
2	komadić s obrađenim jednim rubom / piece with one retouched edge	98	28,91%
3	komadić s obrađena dva ruba / piece with two retouched edges	39	11,50%
4	grebalo / endscraper	5	1,47%
5	svrdlo / drill	3	0,88%
6	dubilo / burin	2	0,59%
7	geometrijski oblici / geometric microliths	7	2,06%
8	zarubak / truncation	21	6,19%
9	udubak / notch	14	4,13%
10	nazubak / denticulate	3	0,88%
11	razno / divers	19	5,60%
	ukupno / total	339	100,00%

Tab. 2 Zastupljenost tipova alatki
Tab. 2 Frequency of tool types

pologija (T. 2). Pritom komadić s djelomičnom obradom znači alatku čija obrada ne prelazi 50% njezina ruba. Kod komadića s obrađenim jednim ili dva ruba, obrada se mora protezati na više od 50% ruba ili rubova. Nazivi ostalih tipova su standardni.

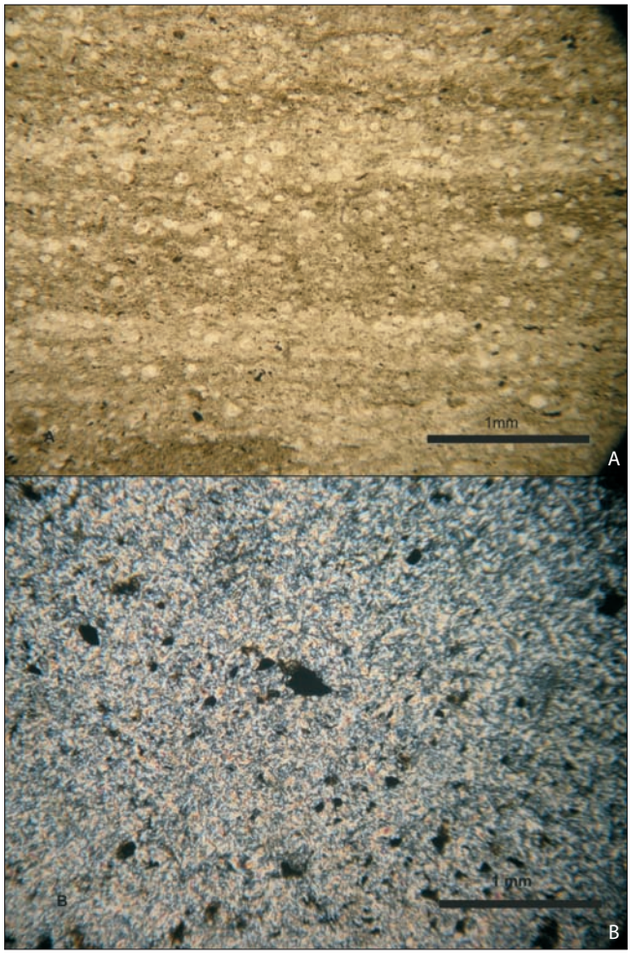
Provedene su dvije mikroskopske analize uzoraka artefakata sa Zadubravlja, prva u Geološkom institutu u Zagrebu, a druga u Mineraloško-petrografskom zavodu

flakes might belong to the second instead of the first phase of the operational sequence. Types 19, 20, 21 and 22 can belong to any phase. They mark pieces that were flaked or chipped by accident and without a plan, pieces that broke off due to natural causes as well as pieces too fragmented to be attributed to a specific type. All completely preserved pieces and fragments were considered and attributed to a corresponding type. However, due to the fact that the ma-



Sl. 3 Grafički prikaz zastupljenosti tipoloških kategorija. 1. komadić s djelomičnom obradom, 2. komadić s obrađenim jednim rubom, 3. komadić s obradom na dva ruba, 4. grebalo, 5. svrdlo, 6. dubilo, 7. geometrijski oblici, 8. zarubak, 9. udubak, 10. nazubak, 11. razno

Fig. 3 Frequency chart of tool types. 1 piece with partial retouch, 2 piece with one retouched edge, 3 piece with two retouched edges, 4 endscraper, 5 drill, 6 burin, 7 geometric forms, 8 truncated blade, 9 notch, 10 denticulate, 11 various



Sl. 4 Mikrofotografije uzoraka rožnjaka. A uzorak kategorije 2, B uzorak kategorije 9

Fig. 4 Microphotographs of chert samples. A sample of category 2, B sample of category 9

Prirodoslovno-matematičkog fakulteta Sveučilišta u Zagrebu, a na cjelokupnom materijalu je izvršena osnovna podjela sirovine na osnovi makroskopskih značajki, odnosno boje i izgleda površine. Prema tim značajkama određeno je 10 osnovnih kategorija, i "goreno", "okorina" te "razno". Za određivanje boje kategorija korišten je Rock Color Chart, Geological Society of America.

Kategorija 1 su rožnjaci crvene boje, s nijansama mliječnobijele i žućkaste, koja se pojavljuje na nekim komadima u tragovima, a na nekima zauzima i 50% površine (boje po Rock-Color Chart 10 R 5/4 *pale reddish brown* i 10YR 6/2 *pale yellowish brown*). Kategoriju 2 čine rožnjaci pretežno zelene boje (od svijetlo do tamnozelene), no pojavljuju se i sive te smeđe varijacije, također od svjetlijih do tamnijih nijansi (boje po Rock-Color Chart 5GY 2/1 *greenish black*, 5YR 4/1 *brownish gray* i 5GY 4/1 *dark greenish grey*). Površina je uglavnom glatka i sjajna, no ima i mat površine. Kategorija 3 su rožnjaci također crvene boje, ali znatno tamnije nijanse, bez primjesa drugih boja (boja po Rock-Color Chart 5YR 4/4 *moderate brown*). Kategorija 4 su rožnjaci žuto-smeđe boje, glatke i sjajne strukture (boja po Rock-Color Chart 10YR6/6 *dark yellowish orange*). Kategorija 5 su raznobojni rožnjaci zrnate strukture i sjajne površine (boja po Rock-Color Chart 5YR 7/2 *grayish orange pink*). Kategorija 6 je bijeli kvarc (boja po Rock-Color Chart 5Y8/1 *yellowish gray*). Kategorija 7 su rožnjaci tamnosive boje i mat strukture (boja po Rock-Color

jority of finds were in a fragmented condition and not complete, the original number of artefacts is surely different to some extent from the total expressed number of lithic finds. It has to be mentioned that the sediment was not sieved during the excavations, and therefore the numbers in certain categories, such as production flakes and small tools (geometric forms), ought to be considered with caution.

The basic typology was determined based on the frequency of tools (Pl. 2). The term ''partially retouched piece'' refers to a tool retouched on less than 50% of its edge. Pieces with retouch on one or two edges must have more than 50% of its edge(s) retouched. For all other types we used the standard designations.

Two macroscopic analyses of artefact samples from Zadubravlje were carried out, the first one at the Institute of Geology in Zagreb, and the other at the Institute of Mineralogy and Petrology of the Faculty of Science of the University in Zagreb. The raw material within the entire assemblage was sorted based on macroscopic features, that is, colour and surface appearance into 10 basic categories, and three additional ones – ''burned'', ''cortex'' and ''various''. The determination of colours was carried out based on the Rock Color Chart issued by the Geological Society of America.

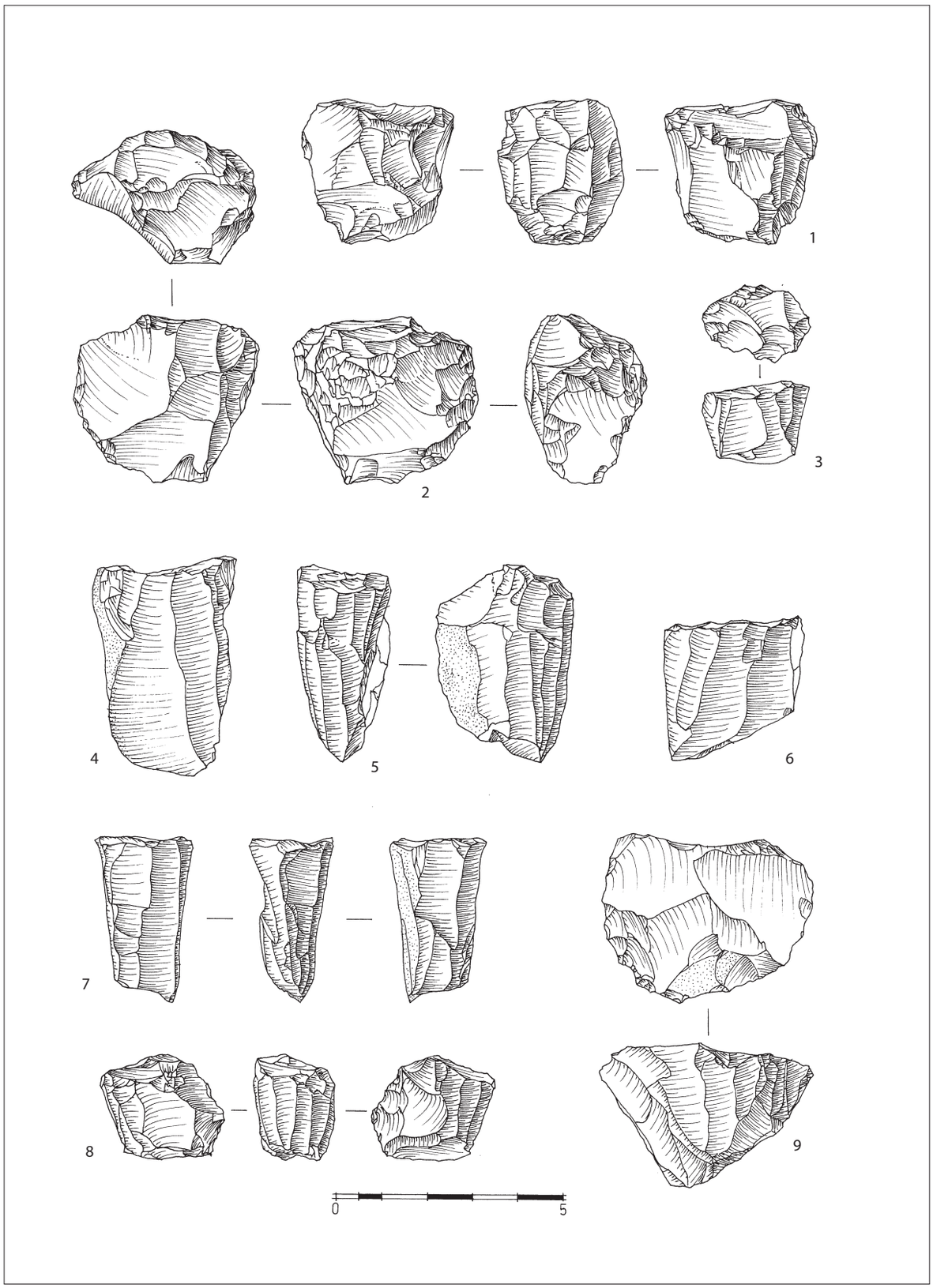
Category 1 are red cherts, with milky white and yellowish shades, which appear on several pieces in traces, while on other they occupy up to 50% of the surface (colours by the Rock-Color Chart 10 R 5/4 *pale reddish brown* and 10YR 6/2 *pale yellowish brown*). Category 2 comprises cherts that are predominantly green (ranging from light to dark green), but also those of grey and brown hues, likewise ranging from lighter to darker shades (colours by Rock-Color Chart 5GY 2/1 *greenish black*, 5YR 4/1 *brownish gray* and 5GY 4/1 *dark greenish grey*). The surface is mostly smooth and shiny, but occasionally also matt. Category 3 consists of cherts that are also red, but of a far darker shade, without a tinge of any other colour (Rock-Color Chart 5YR 4/4 *moderate brown*). Category 4 are yellow-brown cherts of smooth and shiny texture (Rock-Color Chart 10YR6/6 *dark yellowish orange*). Category 5 comprises grainy cherts of a shiny surface in various colours (Rock-Color Chart 5YR 7/2 *grayish orange pink*). Category 6 is white quartz (Rock-Color Chart 5Y 8/1 *yellowish gray*). Category 7 are dark grey cherts of matt texture (Rock-Color Chart N4 *medium dark gray*). Category 8 are matt-surface cherts in brown-orange shades (Rock-Color Chart 5YR 5/6 *light brown*). Category 9 are yellowish cherts of grainy texture and a matt surface (Rock-Color Chart 10YR 5/4 *moderate yellowish brown*). Category 10 are light grey cherts of a matt surface and shiny texture (Rock-Color Chart N7 *light gray*). ''Burned'' pieces are those that due to burning lost the distinctive features that would have allowed a precise attribution, ''cortex'' refers to the pieces that also cannot be sorted with any greater accuracy, while ''various'' groups material different from all the mentioned categories.

Data on the spatial distribution of lithic artefacts were presented with regard to the amount of artefacts in the main stratigraphic units (pits, houses).

3. 2. The results of the lithic analysis

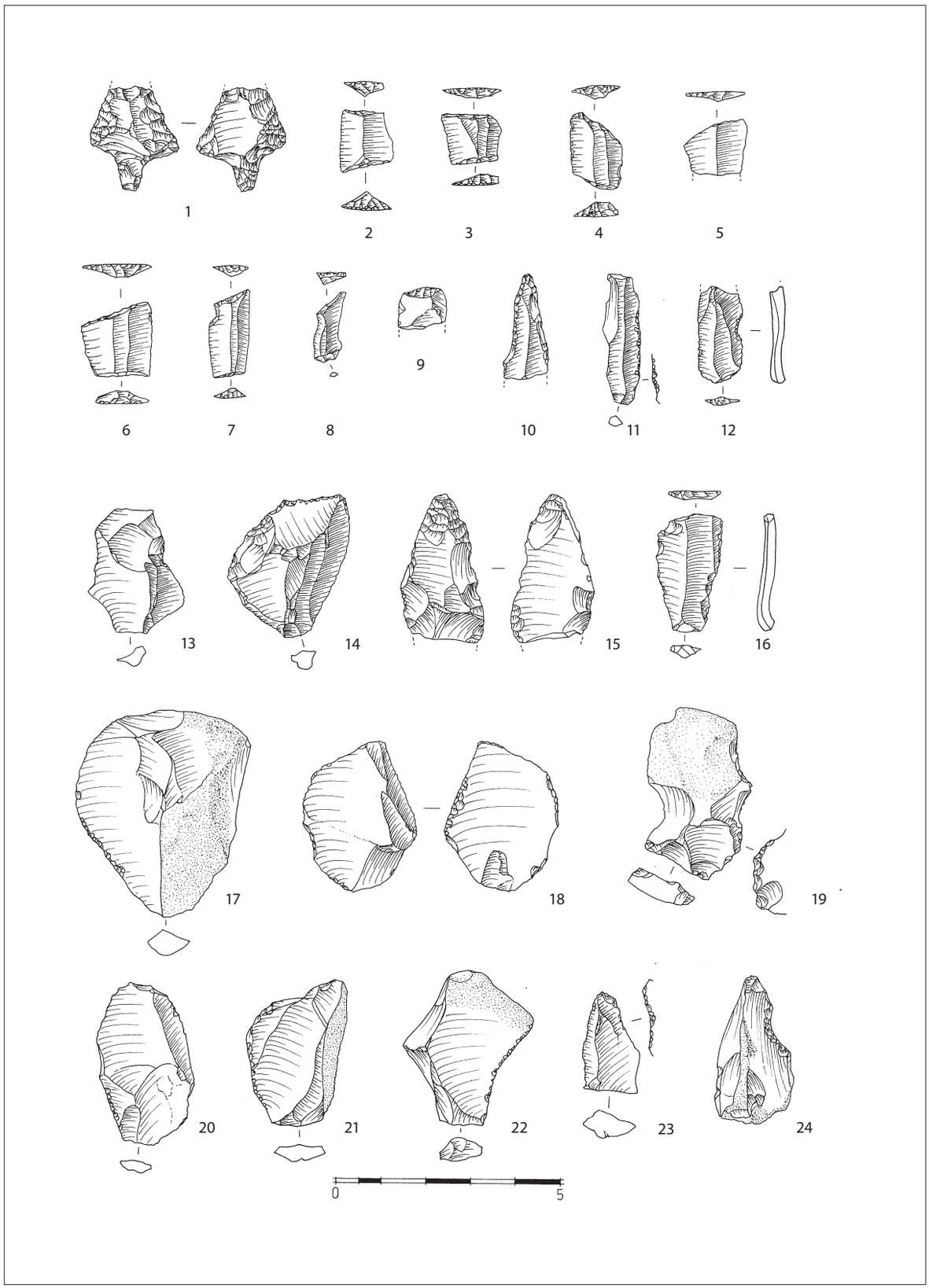
3.2.1. Debitage

Because we are dealing with a single-layer site of the Starčevo culture (Minichreiter 1992), the entire lithic material of all the stratigraphic units was primarily treated as an assemblage, and subsequently a part of the stratigraphic units were analyzed separately. The site yielded a total of 4276 chipped lithic artefacts. Of those, 339 pieces or 7,92% were tools. The most common finds were flakes (23,27%),



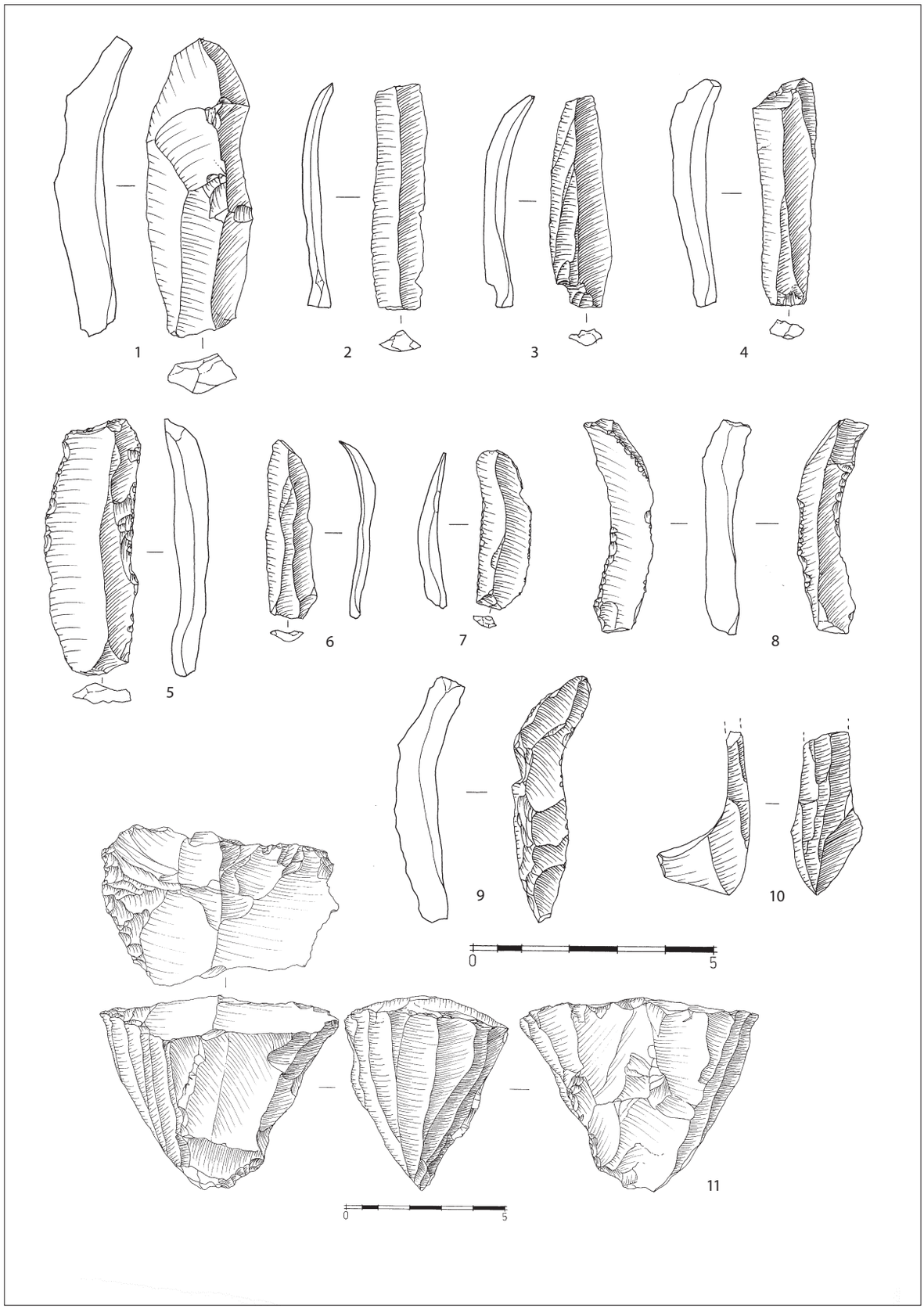
Sl. 5 Izdvojeni primjerci litičkog materijala: 1 miješana jezgra, 2 jezgra za odbojke, 3 miješana jezgra, 4 jezgra za sječiva, 5 jezgra za sječiva, 6 jezgra za sječiva, 7 miješana jezgra, 8 jezgra za pločice, 9 jezgra za sječiva. Mjerilo je u cm (Crtež: Marta Perkić)

Fig. 5 Selected lithic artefacts: 1 mixed core, 2 flake core, 3 mixed core, 4 blade core, 5 blade core, 6 blade core, 7 mixed core, 8 bladelet core, 9 blade core. Scale in cm (Drawing: Marta Perkić)



Sl. 6 Izdvojeni primjerci litičkog materijala: 1 strelica, 2-8 trapezi, 9 grebalo, 10 svrdlo, 11 komadić s obradom, 12 i 16 zarubak, 13 – 15 komadić s obradom, 17-23 komadić s obradom, 24 udubak. Mjerilo je u cm (Crtež: Marta Perkić)

Fig. 6 Selected lithic specimens: 1 arrowhead, 2-8 trapezes, 9 endscraper, 10 drill, 11 retouched piece, 12 and 16 truncated blade, 13-15 retouched piece 17-23 retouched piece, 24 notch. Scale in cm (Drawing: Marta Perkić)



Sl. 7 Izdvojeni primjerci litičkog materijala: 1-4, 6 sječiva proizvedena tehnikom indirektnog odbijanja, 5, 7, 8 – komadić s obradom, 9 krijestasto sječivo, 10 prebačeno sječivo, 11 jezgra za sječiva. Mjerilo je u cm (Crtež: Marta Perkić)

Fig. 7 Selected lithic artefacts: 1-4, 6 blades made by indirect percussion, 5, 7, 8 retouched piece, 9 crested blade, 10 overshot blade, 11 blade core. Scale in cm (Drawing: Marta Perkić)

Chart N4 *medium dark gray*). Kategorija 8 su rožnjaci mat površine, smeđe-narančastih nijansi (boja po Rock-Color Chart 5YR 5/6 *light brown*). Kategorija 9 su žućkasti rožnjaci zrnate strukture i mat površine (boja po Rock-Color Chart 10YR 5/4 *moderate yellowish brown*). Kategorija 10 su svijetlosivi rožnjaci mat površine i sjajne strukture (boja po Rock-Color Chart N7 *light gray*). "Goreno" se odnosi na komade koji su u procesu gorenja izgubili značajke prema kojima se mogu preciznije razvrstati, "okorina" su primjerci koji se također ne mogu točnije razvrstati, a "razno" je za materijal različit od svih navedenih kategorija.

Podaci o prostornoj distribuciji litičkih rukotvorina izneseni su s obzirom na količinu rukotvorina u glavnim stratigrafskim jedinicama (jame, kuće).

3. 2. Rezultati litičke analize

3.2.1. Lomljevina

Budući da se radi o jednoslojnom nalazištu starčevačke kulture (Minichreiter 1992), cjelokupan je litički materijal svih stratigrafskih jedinica ponajprije tretiran kao cjelina, a kasnije je dio stratigrafskih jedinica analiziran zasebno. Na lokalitetu je pronađeno ukupno 4276 cijepanih litičkih artefakata. Od te količine, 339 komada odnosno 7,92% su alatke. Najviše je odbojaka (23,27%), potom drugotnih odbojaka (16,21%) te sječiva (11,09%) i odbojčića (10,87%), tj. odbojaka koji su manji od 2 cm (T. 1; sl. 2). Ni jedna druga kategorija nije zastupljena s više od 10%, ali ukupna zastupljenost krhotina sa i bez okorine i okrhaka iznosi 11,23%. Zastupljene su sve kategorije, osim nulte. To znači da je sva sirovina, prije nego je donesen na nalazište, bila obrađivana ili su svi krupniji komadi bili potpuno razbijeni na lokalitetu pa nisu prisutni ostaci blokova, oblutaka ili nodula. Zastupljenost svih ostalih kategorija svjedoči o prisutnosti svih faza proizvodnje na samom nalazištu. Okorinski materijal potvrđuje početnu fazu proizvodnje a, premda rijetka, zastupljenost svih vrsta jezgara te odbojaka, sječiva i pločica, upućuje na to da su osim odbojaka na samom nalazištu proizvođena sječiva i pločice (T. 1). Proizvodnja odbojaka vidno prevladava, a sječiva je gotovo duplo više od svih kategorija pločica. Na osnovi značajki sječiva (široki plohak), naglašen bulbus, karakteristična zakrivljenost – (sl. 7, 1-8), dokazano je da je barem dio njih proizveden postupkom neizravnog odbijanja (usmeno priopćenje J. Pelegrina). Jezgara je ukupno 92 komada, odnosno 2,76%. Najviše ih je za odbojke (47 komada, sl. 5, 2), a potom miješanih jezgara (23 komada, sl. 5, 1, 3, 7). Jezgara za sječiva (sl. 5, 6, 9, sl. 7, 11) ima 14, a za pločice 8 komada (sl. 5, 8). Dio jezgara za sječiva je stožastog oblika (sl. 5, 9, sl. 7, 11), što je karakteristično za razdoblje ranog neolitika. Mali broj jezgara u skupu nalaza nikako ne umanjuje ostale dokaze o odvijanju svih faza proizvodnje na lokalitetu. Možda je postojao prostor u kojem su se pohranjivale jezgre koje su još bile za upotrebu u dijelu nalazišta koji nije istražen. Prisutnost krijestastih odbojaka i sječiva (sl. 7, 9) te prebačenog sječiva koje je produkt pogreške u proizvodnji (sl. 7, 10), pruža dodatni dokaz da se na samom lokalitetu odvijala proizvodnja sječiva (T. 1, sl. 2). Zastupljenost ulomaka od obrade, koji svjedoče o završnoj fazi proizvodnje – završnom oblikovanju alatke, niska je. Međutim, tu treba uzeti u obzir da sediment nije prosijavan te se može pretpostaviti gubitak većeg broja tih vrlo sitnih proizvoda.

3.2.2. Tipologija

Od alatki (T. 2; sl. 3) najviše ima komadića s djelomičnom obradom (128 komada, 37,76%), a potom slijede komadići s obrađenim jednim rubom (98 komada, 28,91%) te komadići s obrađena dva ruba (39 komada, 11,50%) (sl. 6, 11, 13-15,

followed by secondary flakes (16,21%), blades (11,09%) and small flakes (10,87%), i.e. those smaller than 2 cm (Pl. 1; Fig. 2). None of the other categories were represented by more than 10%, although the total percentage of chunks with and without cortex, combined with chips, amounts to 11,23%. All the categories with the exception of the zero category are present. This means that all the raw material was processed before it was taken to the site, or that all the more sizeable pieces were completely broken on the site and therefore no remains of blocks, pebbles or nodules were found. The presence of all the other categories bears testimony to the presence of all the production phases at the site itself. The material with cortex confirms the initial production phase, while the presence, albeit rare, of all core types as well as flakes, blades and bladelets, indicates that not only flakes but also blades and bladelets were produced at the site itself (Pl. 1). The production of flakes evidently predominates, while blades are almost twice as common as bladelets of all categories. Based on the characteristics of the blades (wide platform), prominent bulb, characteristic curvature – (Fig. 7, 1-8), it was ascertained that at least part of the blades were produced by indirect percussion (personal communication by J. Pelegrin). There is a total of 92 cores or 2,76%. The most common are flake cores (47 pieces), followed by mixed cores (23 pieces, Fig. 5: 1, 2, 3, 6, 7, 8). There are 14 blade cores (Fig. 5: 4, 5, 9; Fig. 7: 11), while 8 cores were used for bladelets production (Fig. 5: 8). Part of the cores for blades were conical (Fig. 5: 9; Fig. 7: 11), a characteristic of the Early Neolithic. The fact that there were few cores within the assemblage lessens in no way whatsoever the other evidence suggesting that all phases of production were carried out at the site. Perhaps there was an area in the yet uninvestigated part of the site where cores that were still usable were stored. The presence of crested flakes and blades (Fig. 7: 9) and an overshot blade resulting from an error in the production (Fig. 7: 10) is more proof that blades were produced at the site itself (Pl. 1, Fig. 2). The presence of retouching flakes, bearing testimony to the final production phase – the final shaping of a tool, is low. However, here one has to bear in mind that the sediment had not been sieved, and that many of those tiny pieces were presumably lost.

3.2.2. Typology

The most common type of tools (Pl. 2; Fig. 3) are partially retouched pieces (128 pieces, 37,76%), followed by pieces with one retouched edge (98 pieces, 28,91%) and pieces with two retouched edges (39 pieces, 11,50%) (Fig. 6: 11, 13-15, 17-24). There were 21 truncated blades (6,19%), (Fig. 6: 12, 16), 14 notches (4,13%) (Fig. 6: 25), as well as 14 pieces in the category various. Other tools (end scrapers (Fig. 6: 9), drills (Fig. 6: 10), burins, denticulates) are very rare (a total of 8 pieces, 2,95%). There are also very few geometric forms, invariably trapezes, a total of 7 pieces, that is 2,06% (Fig. 6: 2-8). Their presence is traditionally connected with the Mesolithic influence, but it must be mentioned that trapezes at this site were not produced by the microburin technique, and the lack of knowledge on the Mesolithic substrate in eastern Croatia renders any comparison impossible. An arrowhead was also found, which is a rarity among early Neolithic assemblages (Fig. 6: 1). Most tools were made on flakes (28,02% on flakes, 16,22% on secondary flakes), and a considerable number were made on blades (27,43% on blades and 5,90% on secondary blades). The significant number of tools on blades makes it evident that the production of blades played an important role within the entire produc-

17-24). Zarubak je zastupljen s 21 komadom (6,19%), (sl. 6, 12, 16), zatim slijedi udubak (14 komada 4,13%) (sl. 6, 24), koliko broji i kategorija razno. Ostale alatke (grebala (sl. 6, 9) svrdla (sl. 6, 10), dubila, nazupci) vrlo su rijetke (ukupno 8 komada, 2,95%). Malobrojni su i geometrijski oblici, ukupno 7 komada, odnosno 2,06%, (sl. 6, 2-8), a svi su trapezi. Njihova prisutnost se tradicionalno veže uz utjecaje mezolitika, no treba napomenuti kako za proizvodnju trapeza na ovom lokalitetu nije korištena tehnika mikrodubila, a zbog nepoznavanja mezolitičke podloge na prostoru istočne Hrvatske nije moguća usporedba. Pronađena je i jedna strelica, što je u ranoneolitičkim skupovima nalaza rijetkost (sl. 6, 1). Najviše je alatki načinjeno na odbojcima (28,02% na odbojcima, 16,22% na drugotnim odbojcima), a značajan je i broj alatki na sječivima (27,43 % na sječivima i 5,90 % na drugotnim sječivima). Brojnost alatki načinjenih na sječivima svjedoči kako je postupak izrade sječiva u cjelokupnoj proizvodnji bio vrlo važan. Na pločicama je načinjeno 8,85% alatki. Na alatkama je, osim dodatne obrade nastale uobičajenim postupcima udaranja po rubu rukotvorine, česta samo sitna tj. marginalna obrada koja je mogla nastati uporabom samog predmeta.

3.2.3. Sirovine

Sav je materijal prema makroskopskim značajkama kao što su boja, struktura, sjajna ili mat površina, raspoređen u 10 osnovnih kategorija (vidjeti poglavlje o metodi), i kategorije okorina, goreno i razno. Najbrojnija je kategorija "1", koju čini 2793 artefakata, odnosno 65,32%. U kategoriji 3 ima 439 rukotvorina, odnosno 10,27%, dok su sve ostale kategorije zastupljene s manje od 10% (T. 3). Postotak težine pojedinih kategorija ne odstupa značajnije od postotka količine te kategorije. Iz deset uzoraka načinjeni su preparati i mikroskopski analizirani u Hrvatskom geološkom institutu u Zagrebu 2001. godine. Ustanovljeno je da svi uzorci pripadaju različitim varijetetima iste stijene, koja je određena kao rožnjak (usmeno priopćenje M. Šparice).

Nedavno je za petrografsku analizu u Mineraloško-petrografskom zavodu Prirodoslovno-matematičkog fakulteta u Zagrebu iz postojećih 10 osnovnih kategorija izdvojeno 29 uzoraka, koji su makroskopski pregledani. Od toga je izrađeno 16 preparata za potrebe mineraloško-petrografske analize pomoću polarizacijskog mikroskopa. Makroskopskim pregledom ustanovljena je prevladavajuća prisutnost rožnjaka (od 29 uzoraka, 28 su rožnjaci). Samo jedan uzorak predstavlja kvarc bjelutak (kvarc hidrotermalnih žila, bijele boje - uzorak kategorije 9. Na temelju boje i izgleda površine rožnjaci su podijeljeni u tri skupine. Rožnjaci sjajne, glatke površine, bez makroskopski uočljivih čestica, oštrobridnoga i školjkastog loma, tamnije obojeni (tamnosivi, smeđi, smećkasto-crvenkasti, crni) su najzastupljeniji (2 komada uzoraka kategorije 1, 5 komada uzoraka kategorije 2, 2 komada uzoraka kategorije 3, 2 komada uzoraka kategorije 4, po jedan komad uzoraka kategorije 6 i 8 te po 2 komada uzoraka kategorije 7 i 10). Zatim slijede svjetlije obojeni rožnjaci (svijetlosivi), koje još karakterizira i točkasta površina bez izraženog sjaja, tj. mat površina (1 komad uzorka kategorije 7, 2 komada uzoraka kategorije 1, 2 komada uzoraka kategorije 9 i po jedan komad uzoraka kategorija 5 i 10) te tamnije obojeni rožnjaci zrnatog izgleda, bez sjaja (2 komada uzoraka kategorije 8 i 2 komada uzoraka kategorije 5).

Mikroskopski pregled omogućuje diferencijaciju s obzirom na vrstu čestica, strukturne značajke te na prisutnost stratifikacije. Mikroskopskim pregledom izdvojeni su radiolarijski rožnjaci (vidljivi ostaci radiolarija) i rekristalizirani rožnjaci (nema vidljivih ostataka primarnih čestica). Radiotion. 8,85% of tools were made on bladelets. In addition to the usual method of retouch by striking the edge of an artefact, the tools frequently exhibit only tiny, i.e. marginal retouching that may have been result of the use of the artefact itself.

3.2.3. Raw materials

The entire assemblage was classified into 10 basic categories (we refer the reader to the chapter on the method) according to macroscopic features such as colour, fabric, shiny or matt surface, with the addition of three more categories – cortex, burned and various. The most common is category 1, consisting of 2793 artefacts or 65,32%. Category 3 comprises 439 artefacts or 10,27%, while each of the other categoriy contain less than 10% (Pl. 3). The weight percentage of individual categories shows no significant discrepancy from the quantity percentage of that category. Ten samples were used for preparations, which were analyzed under a microscope in the Croatian Institute of Geology in Zagreb in 2001. It was established that all the samples belong to various variants of the same rock, determined as chert (personal communication by M. Šparica).

Recently 29 samples from 10 basic categories were submitted to the Institute for Mineralogy and Petrology of the Faculty of Science in Zagreb for a petrographic analysis. These samples were analyzed microscopically, and 16 preparations were made for a mineralogical-petrographic analysis with a polarizing microscope. Macroscopic analysis ascertained that chert predominated (28 out of 29 samples were cherts). Only one sample belongs to white quartz (hydrothermal vein quartz, of white colour) – a sample of category 9. Based on colour and surface appearance the cherts were divided into three groups. Cherts of a shiny, smooth surface, without macroscopically discernible particles, of hackly and conchoidal fracture, with darker shades (dark grey, brown, brownish-reddish, black) are the most common (2 pieces of samples of category 1, 5 pieces of samples of category 2, 2 pieces of samples of category 3, 2 pieces of samples of category 4, one each in categories 6 and 8 and two each in categories 7 and 10). These are followed by cherts of lighter colours (light grey), additionally characterized by the dotted surface without evident luster, i.e. matt surface (1 piece of sample of category 7, 2 pieces in category 1, 2 pieces of samples of category 8 and one piece each of samples of categories 5 and 10) as well as darker cherts of grainy appearance, lusterless (2 pieces of samples of category 8 and two pieces of samples of category 5).

Microscopic examination allowed differentiation with regard to the particle type, structural features and presence of stratigraphy, and led to the separation of radiolarite cherts (visible remains of radiolaria) and recrystallized chert (lacking visible remains of primary particles). Radiolarite cherts (Figure 4.A) predominate (samples of categories 1, 3, 4, 5, 6, 7, 8). They can be massive or with a pronounced stratification. Stratification results from the alternation of densely packed (grainy) laminae and those with several matrices. It can be made more evident by the presence of lenses and pockets of small-grained, brownish material (silicified carbonate sediment) and various concentrations of dotted dispersed opaque matter (most likely of organic origin). The matrix consists of small-crystalline to cryptocrystalline quartz. Radiolaria are recrystallized into small-crystalline quartz or chalcedony. Chalcedony appears also as a fill in some voids. Silicified limestone fossils (plankton foraminifera) occasionally appear in addition to radiolaria.

larijski rožnjaci (slika 4.A) prevladavaju (uzorci kategorija 1, 3, 4, 5, 6, 7, 8). Oni mogu biti masivni ili s izraženom stratifikacijom. Stratifikacija je rezultat izmjene gušće pakiranih (zrnatih) lamina i lamina s više matriksa. Ona može biti naglašena i pojavom leća i proslojaka sitnozrnatog, smeđasto obojenog materijala (silicificirani karbonatni sediment) te različitom koncentracijom točkasto raspršene opake tvari (najvjerojatnije organska materija). Matriks je izgrađen od sitnokristaliničnoga do kriptokristaliničnoga kvarca. Radiolarije su rekristalizirane u sitnokristalinični kvarc ili kalcedon. Kalcedon se pojavljuje i kao ispuna pojedinih pukotina. Uz radiolarije, mjestimično se pojavljuju i silicificirani vapnenački fosili (planktonske foraminifere). U pojedinim uzorcima zamijećena je plastična deformacija laminacije u obliku povijanja lamina te tragovi bioturbacije (rovanja) organizama. Rekristalizirani rožnjaci (uzorci 2, 8, 9) imaju homogenu, jednoličnu sitnokristalinični građu, bez vidljivih ostataka primarne strukture i sastojaka (rekristalizacija je uništila primarnu građu) (slika 4B).

Razlike u boji uočene makroskopski rezultat su različitog udjela i očuvanosti organske materije i eventualne prisutnosti nekih drugih raspršenih obojenih minerala (npr. hematita).

Prema M. Šparici (usmeno priopćenje), rožnjaci udruženi s drugim stijenama nalaze se na površini u slavonskim planinama Papuku i Psunju, a u većim ih količinama susrećemo u srednjobosanskim planinama. Mišljenja smo kako je dio materijala iz Zadubravlja prikupljen u okolici, a dio donesen iz drugih područja. Najbrojnija kategorija sirovinskog materijala (crveni rožnjaci nazvani kategorija 1), nije prisutna u neposrednoj okolici lokaliteta. Pretpostavke o sirovinskom materijalu, dakako, valja provjeriti prikupljanjem uzoraka na terenu, njihovom petrografskom i kemijskom analizom te usporedbom s arheološkim materijalom.

3.2.4. Prostorna distribucija

U 4 objekta (jama 6, 9, 10 i 19) pronađeno je ukupno 3435 litičkih rukotvorina, što je 80,33% od ukupnog broja (T. 4). U jami 19 pronađeno je 1220 cijepanih litičkih rukotvorina, u jami 10 bilo ih je 901, u jami 9 otkriveno ih je 761, a jama 6 sadržavala je 553 litičke rukotvorine. U jami s najviše litičkih rukotvorina (jama 19) najbrojniji proizvodni tip su odbojci (21,80%). Svi odbojci (sa i bez okorine te odbojčići) zastupljeni su s 56,15%. Sječiva sa i bez okorine je 8,69%, pločica 8,36%, dok su krhotine zastupljene s 14,84%. Jezgara za sječiva nema, dok su jezgre za odbojke i pločice minimalno zastupljene. Alatki je svega 42 komada, što čini 3,44%. Više od 500 rukotvorina pronađeno je i u jamama 6, 9 i 10. U jami 6 najviše je odbojaka (54,06%). U to su ubrojeni odbojci sa i bez okorine te odbojčići. Sječiva je ukupno 11,75%. Pronađene su jezgre za odbojke (5 komada), sječiva (2 komada) i pločice (1 komad). Krhotina je ukupno 10,13%. Alatki ima 38 komada, odnosno 6,87%. U jami 9, (761 komad), najbrojnija kategorija su također odbojci. Svi tipovi odbojaka zajedno su zastupljeni sa 61,5%. Najviše je drugotnih odbojaka i odbojaka bez okorine (svaka kategorija po 20,5%). Sječiva ima 13, 76%, a pločica 12, 08%. Prisutne su i jezgre, u malom broju. Sedam je jezgara za odbojke te po jedna za pločice i sječiva. Krhotina je ukupno 6,7%. Broj od 77 komada (10, 16%) u jami 9 čak je viši od udjela alatki u cjelokupnom skupu nalaza. U jami 10 pronađen je 901 komad litičkih rukotvorina. Alatki je 92 komada, što je 10% od broja rukotvorina u jami. U jami 10 također su prevladavajući proizvodi odbojci. Ukupno ih je 55,06%. Sječiva je u postotku nešto

kategorija	kom.	%	težina/g	%
1	2793	65,32%	5793,9	69,56%
2	222	5,19%	448,8	5,39%
3	439	10,27%	921,6	11,06%
4	35	0,82%	56,7	0,68%
5	93	2,17%	314,6	3,78%
6	6	0,14%	5,8	0,07%
7	68	1,59%	179,8	2,16%
8	59	1,38%	76,2	0,91%
9	8	0,19%	10,2	0,12%
10	25	0,58%	35,6	0,43%
goreno	174	4,07%	269,1	3,23%
okorina	6	0,14%	5,4	0,06%
razno	348	8,14%	803,6	9,65%
ukupno	4276	100,00%	8329,5	100,00%

Tab. 3 Zastupljenost i težina kategorija sirovinskog materijala
Tab. 3 Frequency and weight of categories of raw materials

Some samples exhibited plastic deformation of the lamination in the form of bent laminae as well as traces of bioturbation (boring) of organisms. Recrystallized cherts (samples 2, 8, 9) have a homogeneous, uniform small-crystalline structure, without visible remains of the primary structure and constituents (primary structure was destroyed by recrystallization) (Figure 4B).

Macroscopically detected differences in colour are the result of the different proportion and preservation of organic matter and the possible presence of certain other dispersed coloured minerals (e.g. hematite).

In M. Šparica's opinion (personal communication), cherts combined with other rocks appear on the surface in the Slavonian Mountains of Papuk and Psunj, and are also encountered in large quantities in mountains in central Bosnia. We believe that part of the material from Zadubravlje was collected in the neighbourhood, while another part was brought from other areas. The most common category of raw material (red cherts termed category 1) does not appear in the immediate vicinity of the site. Assumptions on the raw materials should, of course, be verified by collecting samples in the field, analyzing them petrographically and chemically and finally comparing them with the archaeological material.

3.2.4. Spatial distribution

Four structures (pits 6, 9, 10 and 19) yielded a total of 3435 lithic artefacts, making up 80,33% of the total number (Pl. 4). Pit 19 yielded 1220 chipped lithic artefacts, pit 10 contained 901, pit 9 contained 761, while pit 6 yielded 553 lithic artefacts. In the pit with the most lithic artefacts (pit 19) flakes were the most common production type (21,80%). All the flakes (with and without cortex as well as small flakes) made up 56,15%. There were 8,69% blades with and without cortex, 8,36% bladelets, while chunks made up 14,84%. There were no cores for blades, and there were only very few cores for flakes and bladelets. There were only 42 tools, or 3,44%. More than 500 artefacts were found in pits 6, 9 and 10. Pit 6 contained mostly flakes (54,06%), including those with and without cortex as well as small flakes. The percentage of blades was 11,75%. Cores for flakes (5 pieces), blades (2 pieces) and bladelets (1 piece) were found. There was a total of 10,13% chunks. There were 38 tools, or 6,87%. In pit 9 (761 piece) flakes also predominate. All types

jama	komada	alatki
6	553	38
9	761	77
10	901	92
19	1220	42

Tab. 4 Broj komada i alatki u jamama s više od 500 litičkih komada

Tab. 4 Number of all lithic finds and tools in pits with more than 500 lithic pieces

više nego u ostalim objektima, ukupno ih je 20, 87%. Sječiva bez okorine ima 17,76%. Pločica ima ukupno 8,98%. Jezgre su zastupljene s ukupno 3,22%, od čega je najviše jezgara za odbojke (2,22%), dok nedostaju jezgre za sječiva.

4. Interpretacija

Na lokalitetu Zadubravlje pronađen je značajan broj cijepanih kamenih artefakata. Sa sigurnošću se može ustvrditi da su se na lokalitetu odvijale prva i druga faza proizvodnje odbojaka, sječiva i pločica, što je potvrđeno prisutnošću jezgara te artefakata s okorinom. Nulta kategorija, odnosno gomolji i obluci, nije zabilježena, što znači da se sirovina testirala, a možda i pripravljala u pre-jezgre prije nego je donesena u naselje, ili da su svi donekle veći komadi prerađeni u jezgre. Relativno mali broj krhotina u ukupnom skupu nalaza govori o vještini izrađivača alatki te o kvaliteti sirovine. Zasigurno je barem dio sječiva proizveden neizravnim odbijanjem (preko dlijeta), što je za sada najranije ustanovljena primjena tog postupka na području Hrvatske. Primjena tog postupka je dokazana na području Hrvatske, ali za razdoblje sopotske kulture (Šošić, Karavanić 2004). Najmanje je bila zastupljena proizvodnja pločica i najmanje je i alatki načinjeno na tim proizvodima. U Srbiji i Mađarskoj su u ranom neolitiku zabilježeni lokaliteti s većim udjelom pločica i alatki na pločicama, što se zajedno s trapezima smatra utjecajem mezolitika, odnosno balkansko-dunavskog epigravetijena (Šarić 1999, 254). Na do sada obrađenim lokalitetima starčevačke kulture na području istočne Hrvatske nije zabilježen znatniji udio pločica u skupu nalaza (Šošić 2007, Bunčić 2009).

Skupovi nalaza iz objekata 6, 9, 10 i 19 mogu se okarakterizirati kao "radionički skup nalaza". Radionički skup nalaza je termin koji se koristi za skupove nalaza koji broje više od 500 rukotvorina u jednom objektu (Balcer 1995, 75), a može označavati materijal koji je izravno vezan uz radni prostor, kao i materijal koji potječe iz radnog prostora. Često se materijal iz radnog prostora koji se nalazio na površini pomete u jamu, pri čemu o postojanju radnog prostora na površini ne ostaju nikakvi tragovi (Balcer 1995, 78). Za pretpostaviti je da je mnogo praktičnije bilo smjestiti radni prostor izvan, a ne unutar ukopanih jama. Lomljevina nastala tijekom proizvodnje u radionici, zbog oštrih bridova opasna je i za ljude i za stoku te se vjerojatno uklanjala s hodne površine i pohranjivala u napuštene, djelomično zapunjene ili za tu svrhu iskopane objekte. Radionički otpad vjerojatno je bio prenošen na tkaninama ili životinjskim kožama koje su bile rasprostrte tijekom rada (Balcer 1995, 78). Zbog toga što su gotovo sve jame imale svoju pretpostavljenu drugu funkciju te zbog dosta visokog postotka alatki u jamama, izglednije je da jame nisu bile lokacije na kojima se odvijala litička proizvodnja, već je otpad iz obližnjega radnog prostora, koji je vjerojatno bio na površini, pometen u te objekte. To se ne

of flakes combined make up 61,5%. Secondary flakes and flakes without cortex predominate with 20,5% in each category. There were 13,76% blades, 12,08% bladelets. Cores were also present, but few. There were seven cores for flakes and one each for bladelets and blades. Chunks made up 6,7%. A total of 77 pieces (10,16%) in pit 9 in fact surpasses the proportion of tools in the entire assemblage. Pit 10 yielded 901 lithic artefacts, of which 92 were tools, or 10% of the total number of artefacts in the pit. Like in other pits, here also flakes predominate, with 55,06%. The proportion of blades at 20,87% is slightly higher in comparison with other structures. Blades without cortex make up 17,76%. Bladelets represent 8,98%, while cores make up 3,22%. Of those, cores for flakes are the most common (2,22%), while cores for blades are missing altogether.

4. Interpretation

The Zadubravlje site yielded a considerable number of chipped stone artefacts. It can be asserted that the first and second phases of production of flakes, blades and bladelets took place at the site, as corroborated by the presence of cores and artefacts with cortex. The zero category, that is nodules and pebbles, was not documented, which means that the raw material was tested and perhaps also prepared into pre-cores before it was brought to the settlement, or that all the more sizeable pieces were processed into cores. The relatively small number of chunks within the assemblage speaks of the skill of the tool makers and of the quality of the raw material. At least part of the blades were certainly produced by indirect percussion (involving the use of a chisel), so far the earliest documented application of that method in the territory of Croatia. This method had already been documented in Croatia, but for the Sopot culture period (Šošić, Karavanić 2004). The production of bladelets was the least common and tools on those products are the fewest. Certain Early Neolithic sites in Serbia and Hungary yielded assemblages where the proportion of bladelets and tools on bladelets is higher, which together with trapezes is considered as reflecting the influence of the Mesolithic, and the Epigravettian of the Balkans and the Danube Basin. (Šarić 1999, 254). The proportions of bladelets within the so far analyzed assemblages from the sites of the Starčevo culture in eastern Croatia are in general not strikingly high (Šošić 2007, Bunčić 2009).

The assemblages from structures 6, 9, 10 and 19 can be characterized as ''workshop assemblages'', the term used for assemblages numbering more than 500 artefacts within a single structure (Balcer 1995, 75). It can denote the material directly connected with the working area, as well as that originating from the working area. It is often the case that the material from the working area that was on the surface is swept down into a pit, erasing all traces of the existence of a working area on the surface (Balcer 1995, 78). It can be assumed that it was considerably more practical to locate a working area outside, instead of within the pits dug into the soil. Due to its sharp edges, which rendered it dangerous for people and cattle, the debitage resulting from the production in the workshop was probably removed from the walking surface and stored into abandoned, partially filled up features that may have been dug specifically for that purpose. Workshop refuse was probably transported on cloth or animal hides spread over the floor while working (Balcer 1995, 78). As it is assumed that almost all the pits had another function and in view of the relatively high percentage of tools within the pits, it is more likely that the pits were not the places where lithic production took place, but that

odnosi na jamu 19 koja je mogla biti radni prostor (Minichreiter 1992, 31; 1993b, 97, 104).

Prema J. K. Kozłowski and S. K. Kozłowski (1983, 275), industrija cijepanoga litičkog materijala u starčevačkom se kompleksu manifestira na dva načina prema zastupljenosti alatki:

1) puno sječiva s obradom i grebala (primjerice, rane faze Anzabegova, Divostin, Golokut);

2) materijal u kojem prevladavaju mikroliti i geometrijski oblici (primjerice Cuina Turcului i Ostrovul Golu u Rumunjskoj te Mehtelek u Mađarskoj).

Toj podjeli treba dodati još jednu skupinu, a to su skupovi nalaza s prevladavajućim sječivima (kako poluproizvodima, tako i alatkama), pri čemu nedostaju široka i dugačka standardizirana sječiva, koja su karakteristična za rani neolitik središnjeg Balkana (Kozłowski, Kozłowski 1983, 275). Litički skup nalaza iz Zadubravlja pripadao bi toj skupini, a istoj skupini vjerojatno pripada i lokalitet Galovo. Za sada su objavljeni rezultati litičke analize materijala iz dva objekta s tog nalazišta, zemunice 15 (Šošić 2007) i zemunice SJ 291 (Bunčić 2009). Na tom je lokalitetu dominantni poluproizvod za izradu alatki sječivo.

Uz odbojke su sječiva u Zadubravlju glavni poluproizvod za proizvodnju alatki, a geometrijskih oblika ima vrlo malo, kao i alatki na pločicama. Među alatkama prevladavajuća su kategorija jednostavne alatke s djelomičnom ili cjelovitom obradom na jednom ili dva ruba. Velik udio "nestandardiziranih" alatki, koje nemaju određenu formu, karakterističan je za zajednice koje prakticiraju sjedilački način života (Andrefsky 1994, 22). Dominantne alatke na nalazištu Zadubravlje pripadaju upravo toj vrsti. Te su alatke proizvedene, korištene i odbačene u relativno kratkom vremenskom razmaku. Na starčevačkim lokalitetima u Srbiji također se primjećuje određena standardizacija koja se očituje u smanjenom broju tipova oruđa u odnosu na prethodna razdoblja. Najvažnije alatke postaju sječiva, najčešće kao dijelovi kompozitnih alatki, a često poprimaju i karakter višenamjenskog oruđa (Šarić 1999, 255-256).

Rijetki su geometrijski oblici, a riječ je uglavnom o trapezima (sl. 7, 2-8). Za pretpostaviti je da je njihova zastupljenost bila veća, a zbog svojih vrlo malih dimenzija nisu mogli biti uočeni i prikupljeni jer sediment nije prosijavan i ispiran. Predstavlja li njihova zastupljenost vezu s mezolitikom, nije za sada moguće utvrditi zbog potpunog nedostatka podataka o razdoblju mezolitika u istočnoj Slavoniji.

5. Zaključak

Rezultati preliminarne analize cijepanih litičkih rukotvorina s lokaliteta donose spoznaje o određenim aktivnostima, vezanim uz proizvodnju cijepanih kamenih rukotvorina u starčevačkom naselju Zadubravlje. Proizvodnja poluproizvoda za izradu alatki (odbojaka, sječiva i pločica) odvijala se na samom lokalitetu, uglavnom na površini, a otpadni je materijal potom pometen u jame. Sječiva su se (barem djelomično) proizvodila postupkom indirektnog odbijanja, što je do sada najranije potvrđena upotreba tog postupka na prostoru Hrvatske. Od alatki najčešće su one s djelomičnom obradbom ili obrađenim jednim rubom, a obrada često sitna tj. marginalna, ponekad je vjerojatno nastala samom uporabom alatki. Nema većeg broja nalaza koji bi upućivali na mezolitičku tradiciju. Dio sirovina vjerojatno je prikupljen u okolici nalazišta, dok je veći dio materijala donesen iz drugih područja, što je jedno od važnih pitanja koja trebaju riješiti buduća istraživanja.

the refuse from the neighbouring working area, probably located on the surface, was swept down into these features. This does not apply to pit 19, which may have been a working area (Minichreiter 1992, 31; 1993b, 97, 104).

According to J. K. Kozłowski and S. K. Kozłowski (1983, 275), the chipped lithic industry in the Starčevo complex is manifested in two ways with regard to the presence of tools:

1) many retouched blades and end scrapers (for instance, early phases of Anzabegovo, Divostin, Golokut);

2) material with predominating microliths and geometric forms (for instance, Cuina Turcului and Ostrovul Golu in Romania and Mehtelek in Hungary)

Another group has to be added to this division – assemblages where blades predominate (as semi-products as well as tools), but without wide and long standardized blades, characteristic for the Early Neolithic of the central Balkans (Kozłowski, Kozłowski 1983, 275). The lithic assemblage from Zadubravlje would belong to this group, and the same probably holds true for the Galovo site. The results of the lithic analysis on the material from two structures from that site – pit-house 15 (Šošić 2007) and pit-house SU 291 (Bunčić 2009) have been published until now. Blades are the predominant semi-products for tool production at that site. Together with flakes, blades are the main semi-product for tool production at Zadubravlje, while geometric forms are very rare, same as the tools on bladelets. The prevailing category among tools are simple tools with partial or full retouch on one or two edges. The high proportion of ''non-standardized'' tools, lacking any specific form, is characteristic for communities practicing the sedentary way of life (Andrefsky 1994, 22). The dominant tools at the Zadubravlje site belong precisely to that type. These tools were produced, used and discarded within a relatively short time span. The Starčevo sites in Serbia likewise exhibit a certain standardization, manifest in the smaller number of tool types in comparison to the previous periods. Blades become the most important tools, mostly as parts of composite tools, and often acquire the character of a multi-functional tool (Šarić 1999, 255-256).

Geometric forms are rare, and consist mostly of trapezes (Fig. 7, 2-8). Their proportion was presumably higher, only due to their small size they were probably missed in the excavation as the sediment was not dry- and wet-sieved. Whether their presence speaks of a connection with the Mesolithic remains to be seen, as the utter lack of information on the Mesolithic in eastern Slavonia makes it impossible to ascertain this at present.

5. Conclusion

The results of the preliminary analysis of chipped lithic artefacts from the site provide an understanding of certain activities pertaining to the production of chipped lithic artefacts in the Starčevo settlement in Zadubravlje. The production of semi-products for making tools (flakes, blades and bladelets) took place at the site itself, mostly on the surface, while refuse material was then swept into the pits. Blades were (at least partly) made by indirect percussion, which is so far the earliest documented use of that method in Croatia. The most common tools are those with partial retouch or with one retouched edge. Often minute, that is, marginal retouch was occasionally probably result the actual use of the tool. There are not many finds that would point to a tradition from the Mesolithic. Part of the raw materials were probably collected in the neighbourhood of

Daljnje analize starčevačkih cijepanih litičkih rukotvorina i traganje za izvorima sirovina omogućit će nam donošenje konkretnijih i utemeljenih zaključaka o procesima proizvodnje i mehanizmima pribavljanja sirovina tijekom ranog neolitika na području Hrvatske i susjednim prostorima.

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the site, while the majority was brought from other areas, location of which is one of the major issues to be solved by future investigations.

Further analyses of the Starčevo chipped lithic artefacts and the search for the raw material sources will enable us to reach more specific and well-founded conclusions on the production process and the mechanisms of acquiring raw materials during the Early Neolithic in Croatia and the neighbouring areas.

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