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# PRAPOVIJESNA KERAMIKA IZ UNUTRAŠNJEG DIJELA PUPIĆINE PEĆI (ISKOPAVANJE 2001. GODINE)

## PREHISTORIC POTTERY FROM THE INTERIOR SECTION OF PUPIĆINA CAVE (2001 EXCAVATION)

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*U ovom radu predstavljamo rezultate obrade keramičkog materijala iz unutrašnjeg dijela špilje Pupićine peći, koji je istražen 2001. godine. Odredili smo četiri prapovijesne kronološke faze, koje su pripadale srednjem neolitiku, kasnom neolitiku/ranom eneolitiku, kasnom eneolitiku/ranom brončanom dobu te srednjem brončanom dobu. Zadnja faza je rimska/srednjovjekovna. Materijal iz srednjoneolitičke i srednjobrončanodobne faze vrlo je sličan onom iz vanjskog dijela špilje, što ukazuje na istovremeno naseljavanje cijele špilje u tim razdobljima. Pojava eneolitičkih slojeva, koji nisu zabilježeni u prednjem dijelu špilje, pokazuje da se ona upotrebljavala i u to vrijeme.*

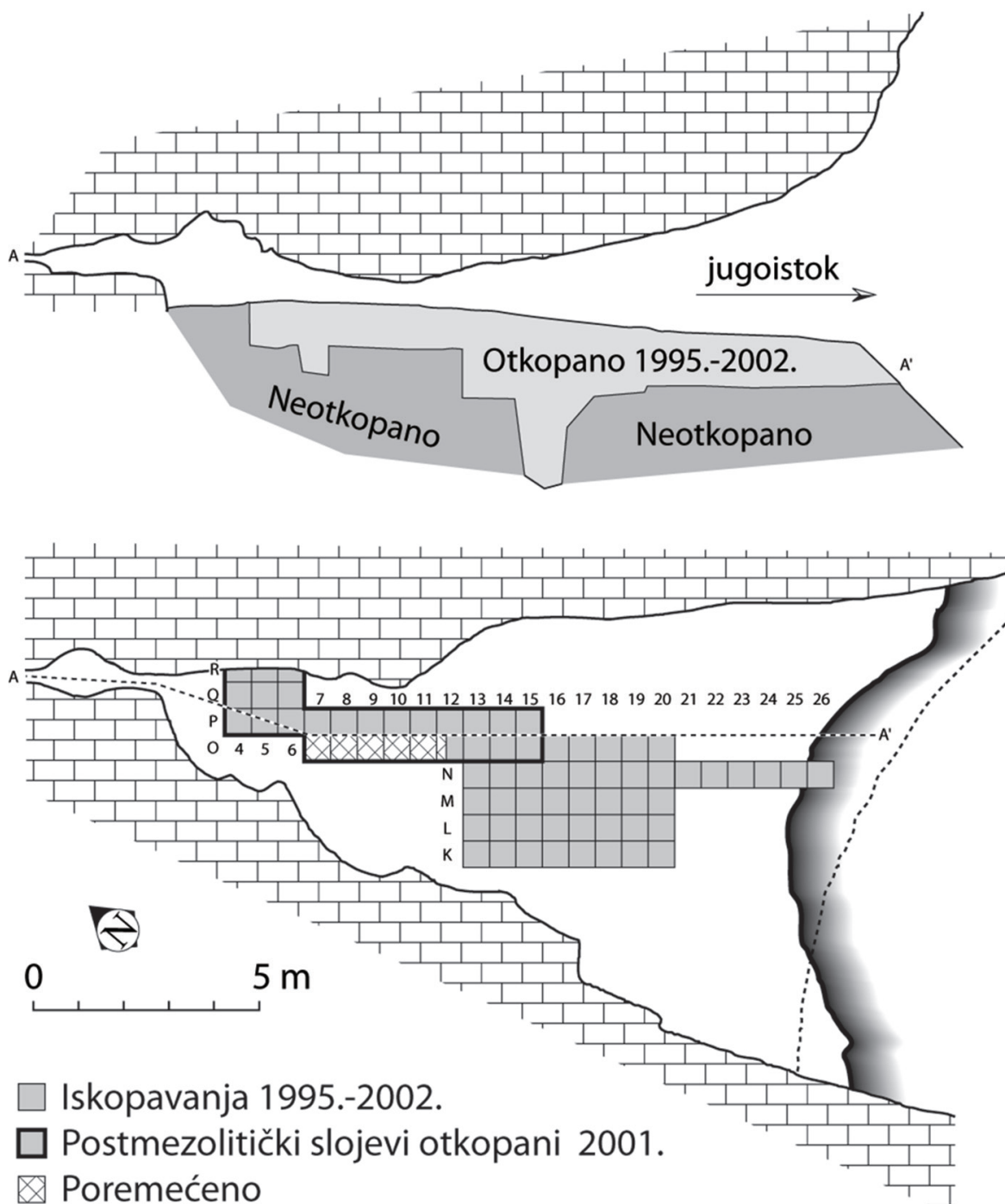
*In this work we present the results of the analysis of pottery assemblages from the interior section of Pupićina Cave, which was excavated in 2001. We determined four prehistoric chronological phases that belonged to the Middle Neolithic, Late Neolithic/Early Eneolithic, Late Eneolithic/Early Bronze Age and the Middle Bronze Age. The last phase is Roman/Medieval. The material from the Middle Neolithic and Middle Bronze Age phase is very similar to the material from the outer section of the cave, which points to the simultaneous settlement of the entire cave in these periods. The appearance of Eneolithic layers that were not recorded in the fore section of the cave shows that it was also in use during that period.*

**KLJUČNE RIJEČI:** keramika, špilja, Istra, neolitik, eneolitik, brončano doba

**KEYWORDS:** pottery, cave, Istria, Neolithic, Eneolithic, Bronze Age

Špilja Pupićina peć nalazi se u sjeveroistočnoj Istri, na zapadnim padinama planine Učke, na oko 220 m nadmorske visine. Ulaz širok 19 m okrenut je prema jugu i ima oblik polukružnog svoda, najveće visine 7 m. Strop se spušta prema unutrašnjosti špilje, a hodnik se postupno sužuje (slika 1). Nakon dvadesetak metara strop se ponovo uzdiže, čineći manju unutarnju dvoranu

Pupićina Cave is located in northeastern Istria, on the western slopes of the Učka Mountain, at an altitude of about 220 meters above sea level. The 19 m wide entrance faces the south and looks like a semi-circular vault, with a maximum height of 7 m. The ceiling drops towards the interior of the cave, and the passage gradually narrows (Figure 1). After twenty meters or so the ceiling



Sl. 1 Tlocrt i presjek Pupićine peći s naznačenim dijelom istraženim 2001. godine iz kojeg potječu keramički nalazi predstavljeni u ovom radu  
Fig 1 Ground plan and cross-section of Pupićina Cave, with the marked section that was explored in 2001, from which the pottery finds presented in this work originated.

u koju se za neolitika moglo ući uspravno hodajući, no već za srednjeg vijeka zbog nataloženih naslaga moglo se ući samo pužući (Miracle i Forenbaher 2006b, 69).

Sustavna iskopavanja u špilji provedena su od 1995. do 2002. u sklopu projekta istraživanja klimatskih i kulturnih promjena na sjevernom Jadranu između 13000. i 6000. god. pr. Kr., a rezultati kampanja od 1995. do 1999. objavljeni su u knjizi *Pretpovijesni stočari sjeverne Istre* (Miracle i Forenbaher 2006a). Ovdje obrađujemo nalaze iz iskopavanja 2001. godine, kada je istraživana unutarnja dvorana špilje i dio prostora na prijelazu iz unutarnjeg u vanjski dio špilje (slika 1).

Prilikom iskopavanja špilja je podijeljena na kvadrate veličine 1x1 m. Osnovna jedinica pri iskopavanju i dokumentaciji bio je poseban “broj vrećice”, dodijeljen svakom iskopanom kontekstu unutar svakog kvadrata (Miracle i Forenbaher 2006b, 68, 69, 72). Dubina sonde u unutarnjoj dvorani dosegla je 170 cm (Miracle et al. 2002, 71).

## PODJELA NA FAZE

Keramičke nalaze iz 53 različita konteksta podijelili smo u šest grupa na temelju stratigrafskih odnosa konteksta (slika 2) te kronološki odredivih dijagnostičkih

again rises, forming thus a smaller interior chamber that could be entered walking upright during the Neolithic; however, already in the Middle Ages it was possible to enter it only by crawling, due to the accumulated sediments (Miracle and Forenbaher 2006b, 69).

Systematic explorations of the cave were carried out in the period from 1995 to 2002, within the framework of a project researching climatic and cultural changes on the Northern Adriatic between 13000 and 6000 BC, and the results of the excavation seasons from 1995 to 1999 were published in a book titled *Prehistoric Herders of Northern Istria* (Miracle and Forenbaher 2006a). Here we present the finds from the excavation in 2001, when the interior section of the cave was explored together with part of the area at the transition from the interior to the exterior section of the cave (Figure 1).

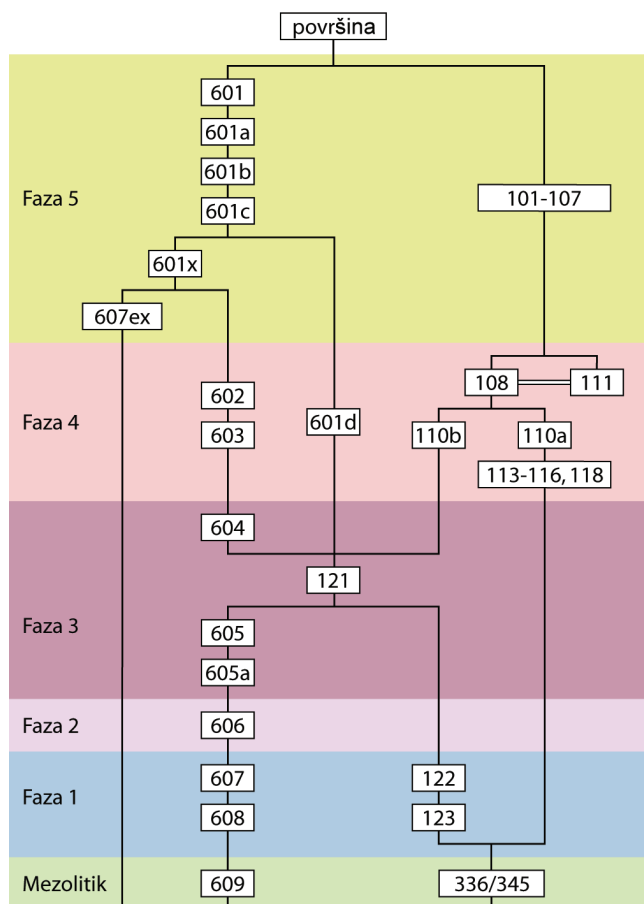
The cave was divided into squares measuring 1x1 m during the excavation. The basic unit for excavation and documentation purposes was a special “bag number” that was assigned to every excavated context within every square (Miracle and Forenbaher 2006b, 68, 69, 72). The depth of the trench in the interior chamber reached 170 cm (Miracle et al. 2002, 71).

## PHASING

We divided the pottery finds from 53 different contexts into six groups on the basis of stratigraphic relations of contexts (Figure 2), and temporally sensitive diagnostic shards. Five groups can be ascribed to specific chronological phases, whereas the sixth group is made up of finds from disturbed contexts. Five fragments of non-diagnostic pottery come from Mesolithic contexts and we regard them as residual finds that have been removed from further discussion.

### Phase 1 (Middle Neolithic)

Attributed to the first phase were contexts 607 and 608 from the interior chamber, and 122 and 123 from the area at the transition towards the exterior section of the cave (Figure 2). In the interior chamber the sediment is mostly made up of reddish-brown, yellow-brown and brown, loose, argillaceous earth, lenses of ashes, and a small amount of stones. Contexts 607 and 608 probably represent the remains of a series of hearths. Contexts 122 and 123 in the transitional area of the cave are made up of orange-brown argillaceous earth. They too contain lenses of ash and include some stones. From all the chronologically definable pottery shards, 95% of them were attributed to the Neolithic period, whereas only a few shards belong to later periods, all of which makes this the most securely defined chronological phase (Figure



Sl. 2 Stratigrafski dijagram (iskopavanje 2001.)

Fig. 2 Stratigraphic diagram (excavation 2001).

ulomaka. Pet grupa može se pripisati određenim kronološkim fazama, dok šestu grupu čine nalazi iz poremećenih konteksta. Iz mezolitičkih konteksta potječe pet ulomaka nedijagnostičke keramike koje smatramo zaostalom nalazima te smo ih isključili iz daljnje rasprave.

#### Faza 1 (srednji neolitik)

Prvoj fazi pripisani su konteksti 607 i 608 iz unutarnje dvorane te 122 i 123 iz prijelaznog prostora prema vanjskom dijelu špilje (slika 2). U unutarnjoj dvorani sediment se sastoji uglavnom od crvenkastosmeđe, žutosmeđe i smeđe rastresite i glinaste zemlje, leća pepela i malo kamenja. Konteksti 607 i 608 vjerojatno predstavljaju ostatke niza ognjišta. U prijelaznom dijelu špilje konteksti 122 i 123 sastoje se od narančastosmeđe glinaste zemlje. I oni su prožeti lećama pepela te sadrže nešto kamenja. Od kronološki odredivih ulomaka keramike, 95% pripisano je neolitiku dok samo nekoliko ulomaka pripada kasnijim razdobljima, stoga je ovo najčvršće kronološki definirana faza (slika 3). Dva ulomka spajaju se s ulomcima iz faze 2, što ukazuje na neznatno miješanje između ove dvije faze.

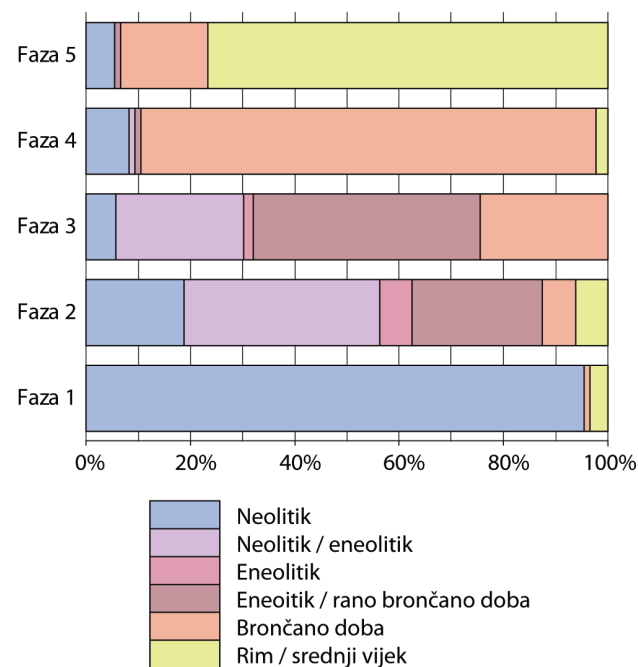
Dva radiokarbonska datuma iz dva različita ognjišta unutar konteksta 608 (OxA-18128:  $6606 \pm 36$  BP, kalibrirani raspon od  $2\sigma$ : 5620.-5480. pr. Kr. i OxA-18119:  $6516 \pm 36$  BP, kalibrirani raspon od  $2\sigma$ : 5530.-5390. pr. Kr.) smještaju ovu fazu u vrijeme srednjeg neolitika (Forenbaher i Kaiser 1999; Forenbaher i Miracle, u tisku). Tipološki i kronološki, faza 1 odgovara horizontima I i H iz vanjske dvorane špilje (Miracle i Forenbaher 2006b: 80-91).

#### Faza 2 (kasni neolitik/rani eneolitik)

Drugoj fazi pripisan je kontekst 606 iz unutarnje dvorane špilje (slika 2). Sediment se sastoji od sivosmeđe i crvenosmeđe glinaste zemlje s dosta kamenja (do 30%). Zbog nedostatka jasne diferencijacije unutar sloja, dijelom je arbitrarno iskopan (Miracle 2003, 28). Od malobrojnih kronološki odredivih ulomaka keramike, više od dvije trećine ih se može pripisati eneolitiku ili kasnom neolitiku (slika 3). Prema tome, ova je faza znatno manje čvrsto definirana od prethodne.

Jedini radiokarbonski datum, iz konteksta 606 (OxA-18719:  $5077 \pm 30$  BP, kalibrirani raspon od  $2\sigma$ : 3960.-3790. pr. Kr.), smješta ovu fazu između poznatih datuma za kasni neolitik i rani eneolitik na istočnom Jadranu (Forenbaher i Kaiser 1999; Forenbaher i Miracle, u tisku). Faza 2 ne može se izjednačiti niti s jednim od horizonata iz vanjskog dijela špilje.

3). Two fragments conjoin with fragments from Phase 2, which points to a small degree of mixing between these two phases.



Sl. 3 Učestalost vremenski odredivih ulomaka po fazama  
Fig. 3 Frequency of temporally sensitive fragments by phases.

Two radiocarbon dates from two different hearths within context 608 (OxA-18128:  $6606 \pm 36$  BP, calibrated  $2\sigma$  range: 5620-5480 BC and OxA-18119:  $6516 \pm 36$  BP, calibrated  $2\sigma$  range: 5530-5390 BC), place this phase into the Middle Neolithic period (Forenbaher and Kaiser 1999; Forenbaher and Miracle, in print). Typologically and chronologically, Phase 1 corresponds to Horizons I and H from the exterior chamber of the cave (Miracle and Forenbaher 2006b: 80-91).

#### Phase 2 (Late Neolithic/Early Eneolithic)

Context 606 from the interior chamber of the cave (Figure 2) was ascribed to the second phase. The sediment is made up of grey-brown and red-brown argillaceous earth containing a large amount of stones (up to 30%). Due to a lack of clear differentiation within the layer, it was in part arbitrarily excavated (Miracle 2003, 28). From the small number of chronologically definable pottery fragments, more than two thirds can be ascribed to the Eneolithic or Late Neolithic periods (Figure 3). It follows that this phase is significantly less well defined in comparison with the previous one.

The only radiocarbon date from context 606 (OxA-18719:  $5077 \pm 30$  BP, calibrated  $2\sigma$  range: 3960-3790 BC), places this phase between the known dates for the Late Neolithic and Early Eneolithic on the Eastern



*Faza 3 (kasni eneolitik /rano brončano doba)*

Trećoj fazi pripisani su konteksti 604 i 605 iz unutarnje dvorane i 121 iz prijelaznog prostora (slika 2). Sediment u unutarnjoj dvorani špilje sastoji se od tamnosmeđe, crvenosmeđe, sivosmeđe i žute glinaste i djelomično rastresite zemlje s malo kamenja. Njegov manji dio otkopan je arbitrarno, a kontekst 604 djelomično je poremećen (Miracle 2003, 28). Kontekst 121 sastoji se od žute do crvenosmeđe glinaste i rastresite zemlje s pepelom te sadrži 5-10% kamenja. Gotovo polovica kronološki odredivih ulomaka može se pripisati kasnom eneolitiku ili ranom brončanom dobu (slika 3), no zbog velikog broja tipološki ranijih i kasnijih ulomaka ova je faza najmanje čvrsto definirana.

Jedini radiokarbonski datum, iz konteksta 605 (OxA-18180: 3963 ± 27 BP, kalibrirani raspon od 2 σ: 2570.-2340. pr. Kr.), odgovara vremenu kasnog eneolitika ili ranog brončanog doba (Forenbaher i Kaiser 1999; Forenbaher i Miracle, u tisku). Kao ni prethodna, ni faza 3 ne može se izjednačiti niti s jednim od horizonata iz vanjskog dijela špilje.

*Faza 4 (srednje brončano doba)*

Četvrtoj fazi pripisani su konteksti 601d, 602 i 603 iz unutarnje dvorane te 108, 110a, 110b, 111, 113-116 i 118 iz prijelaznog prostora (slika 2). Sedimenti u unutarnjoj dvorani sastoje se od tamnosmeđe rastresite zemlje te tamnosmeđe i crvenosmeđe glinaste zemlje i pepela. Kontekst 601d sadrži dosta kamenja (5-15%), dok su konteksti 602 i 603 djelomično poremećeni djelovanjem životinja i kasnijom ljudskom aktivnošću. Kontekst 110a sastoji se uglavnom od kamenja (>80%) te nešto svjetlosmeđe rastresite zemlje. Kontekst 110b sastoji se od tamnosmeđe i sivosmeđe glinaste zemlje s nešto kamenja. Prvi predstavlja brončanodobni kulturni sloj, a drugi jamu iz istog razdoblja. Ostali konteksti su glinasti s nešto pepela, djelomično poremećeni životinjskim i ljudskim djelovanjem. Od kronološki odredivih ulomaka lončarije 87% može se pripisati brončanom dobu, i to uglavnom srednjem brončanom dobu. Ostatak pretežno čine tipološki raniji (uglavnom neolitički) ulomci koje smatramo zaostalim nalazima (slika 3). Stoga se za ovu fazu može reći da je čvrsto definirana.

Po tipološkim obilježjima lončarije, faza 4 odgovara horizontima F, E i D iz vanjskog dijela špilje, koji se ondje datiraju oko druge trećine 2. tisućljeća pr. Kr. (Miracle i Forenbaher 2006b: 93-98).

*Faza 5*

Petoj fazi pripisani su svi konteksti iz grupe 601 (osim 601d) iz unutarnje dvorane te konteksti 101-107 iz

Adriatic (Forenbaher and Kaiser 1999; Forenbaher and Miracle, in print). Phase 2 cannot be equated with any of the horizons from the exterior section of the cave.

*Phase 3 (Late Eneolithic/Early Bronze Age)*

Contexts 604 and 605 from the interior chamber and 121 from the transitional area (Figure 2) were ascribed to the third phase. The sediment in the interior chamber of the cave consists of dark brown, red-brown, grey-brown and yellow argillaceous and partially loose earth containing a small amount of stones. Its lesser part was excavated arbitrarily, while context 604 was partially disturbed (Miracle 2003, 28). Context 121 is made up of yellow to red-brown argillaceous, loose earth with ashes and contains 5-10% of stones. Almost half of the chronologically definable fragments can be ascribed to the Late Eneolithic or the Early Bronze Age (Figure 3); however, due to the large number of typologically earlier and later fragments, this phase is the most loosely defined.

The only radiocarbon date from context 605 (OxA-18180: 3963 ± 27 BP, calibrated 2 σ range: 2570-2340 BC), corresponds to the period of the Late Eneolithic or the Early Bronze Age (Forenbaher and Kaiser 1999; Forenbaher and Miracle, in print). As was the case with the previous one, Phase 3 cannot be equated with any of the horizons from the exterior section of the cave.

*Phase 4 (Middle Bronze Age)*

To the fourth phase we can ascribe contexts 601d, 602 and 603 from the interior chamber, and 108, 110a, 110b, 111, 113-116 and 118 from the transitional area (Figure 2). The sediments in the interior chamber consist of dark brown loose earth, as well as dark brown and red-brown argillaceous earth and ashes. Context 601d contains a rather large amount of stones (5-15%), while contexts 602 and 603 are partially disturbed due to animal activity and later human activity. Context 110a is mainly made up of stones (>80%) and some loose, light brown earth. Context 110b consists of dark brown and grey-brown argillaceous earth with some stones. The former represents a Bronze Age culture layer, the latter a pit from the same period. The rest of the contexts are argillaceous with some ashes, partially disturbed with animal and human activity. Of the chronologically sensitive pottery fragments, 87% can be ascribed to the Bronze Age, mostly to the Middle Bronze Age. The remainder is mostly made up of typologically earlier (mostly Neolithic) fragments that we regard as residual finds (Figure 3). Based on this we can say that this phase is well defined.

According to typological characteristics of pottery, Phase 4 corresponds to Horizons F, E and D from the exterior section of the cave, where they are dated around

prijelaznog prostora. Nalaze se neposredno ispod današnje površine i uglavnom predstavljaju mješavinu kulturnih slojeva s guanom te su dijelom poremećeni djelovanjem životinja i biljaka. Oko tri četvrtine kronološki odredivih ulomaka lončarije pripada rimskom ili srednjovjekovnom razdoblju (slika 3), dok ostatak čine brončanodobni i neolitički zaostali nalazi. Faza 5 odgovara horizontu A iz vanjskog dijela špilje (Miracle i Forenbaher 2006b: 101-103).

#### Faza X

Faza X ne predstavlja kronološku fazu, nego obuhvaća sav materijal iz poremećenih konteksta. Ovu grupu keramičkih nalaza čini 341 ulomak od kojih je 21 kronološki odrediv: šest ih pripisujemo neolitiku, jedan neolitiku ili eneolitiku, šest srednjem brončanom dobu, četiri brončanom ili željeznom dobu te četiri rimskom ili srednjovjekovnom razdoblju.

### METODOLOGIJA OBRADJE KERAMIKE

U ovom radu koristili smo metodologiju upotrijebljenu pri obradi keramike iz vanjskog dijela Pupićine peći (Forenbaher i Kaiser 2006), Vele peći (Forenbaher, Rajić Šikanjić, Miracle 2008) i Grapčeve špilje (Forenbaher i Kaiser 2008), uz određene modifikacije.

Skup nalaza keramike sastoji se od ukupno 4.749 ulomaka ukupne težine veće od 75 kg (tablica 1). Sve ulomke oboda, dna i ručki, sve ukrašene ulomke te karakteristično oblikovane dijelove vratova i ramena posuda (ukupno njih 843) izdvojili smo kao dijagnostičke. Za svaki dijagnostički ulomak bilježili smo niz nominalnih varijabli, koje opisuju dio posude,

the second third of the 2<sup>nd</sup> millennium BC (Miracle and Forenbaher 2006b: 93-98).

#### Phase 5

All contexts from group 601 (except 601d) from the interior chamber, as well as contexts 101-107 from the transitional area, are ascribed to Phase 5. They are located immediately below the present-day surface, representing mainly a mixture of culture layers with guano, and they were partially disturbed by animal and plant activity. Approximately three quarters of chronologically sensitive pottery fragments belongs to the Roman or medieval period (Figure 3), while the rest are Bronze Age and Neolithic residual finds. Phase 5 corresponds to Horizon A from the exterior section of the cave (Miracle and Forenbaher 2006b: 101-103).

#### Phase X

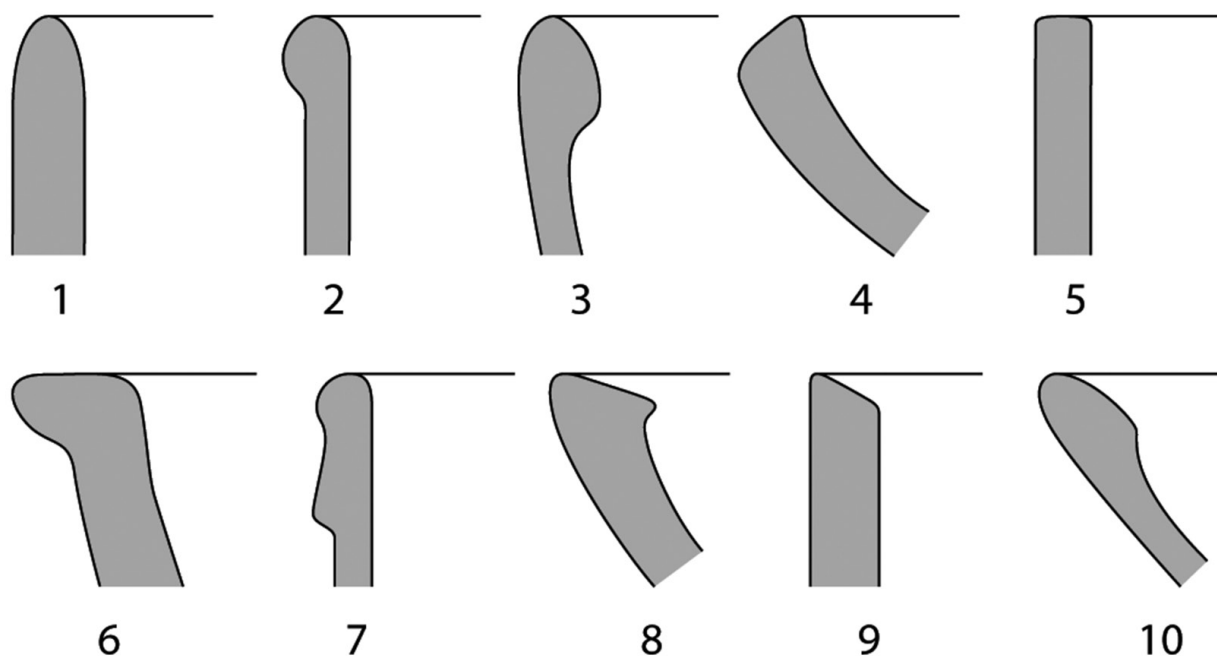
Phase X does not represent a chronological phase; it encompasses all the material from disturbed contexts. This group of pottery finds is made up of 341 fragments, 21 of which are chronologically sensitive: six are ascribed to the Neolithic, one to either Neolithic or Eneolithic, six to the Middle Bronze Age, four either to the Bronze or Iron Age, and four to the Roman or medieval period.

### POTTERY ANALYSIS METHODOLOGY

In this work we employed the methodology used for the analysis of pottery from the exterior section of Pupićina Cave (Forenbaher and Kaiser 2006), Vela Cave (Forenbaher, Rajić Šikanjić, Miracle 2008) and Grapčeva Cave (Forenbaher and Kaiser 2008), with certain modifications.

Tablica 1 Broj, težina, razlomljenost i udio dijagnostičkih ulomaka keramike po fazama  
Table 1 Number, weight, fragmentation, and frequency of diagnostic shards by phase.

faza / Phase	Ulomci ukupno / Total fragments			Dijagnostički ulomci / Diagnostic fragments	
	n / No.	težina (g) / Weight (g)	razlomljenost (ulomak/kg) / Fragmentation (fragments/kg)	n / No.	%
1	647	8251,2	78,41	164	25,35
2	369	4591,5	80,37	49	13,28
3	1566	21681,0	72,23	196	12,52
4	1225	25079,2	48,85	232	18,94
5	596	10469,8	56,93	142	23,83
x	341	5303,9	64,29	41	12,02
mezolitik / Mesolithic	5	47,3	105,71	0	0,00
ukupno / Total	4749	75423,9	62,96	843	17,24



Sl. 4. Oblici oboda: 1 jednostavan zaobljen, 2 zadebljan izvana, 3 zadebljan iznutra, 4 koso zasječen izvana, 5 jednostavan zaravnjen, 6 zaravnjen i zadebljan izvana, 7 trakasto zadebljan, 8 širok zaravnjen, 9 zakošen, 10 širok i zadebljan iznutra

Fig. 4 Rim shapes: 1 simple rounded, 2 externally thickened, 3 internally thickened, 4 externally bevelled, 5 simple flat, 6 flat and externally thickened, 7 massive externally thickened, 8 wide flat, 9 internally bevelled, 10 wide and internally thickened.

oblik posude, tehniku i motiv ukrašavanja, obradu površine i prisutnost rupa za krpanje posude, te numeričke varijable koje se odnose na veličinu posude i debljinu stijenki.

Od dijelova posuda razlikovali smo ulomke oboda, dna i noga, trbuha, vratova, ramena i ručki. Ulomke trbuha smatrali smo dijagnostičkim ako su ukrašeni ili imaju rupu za popravak, a ulomke vratova i ramena ako ukazuju na određeni oblik posude. Razlikovali smo deset različitih tipova oboda po oblikovanju usne (slika 4, tablica 2). Za svaki obod bilježili smo i nagib, odnosno je li obod izvučen, uspravan ili uvučen. Nadalje, razlikovali smo dva tipa dna i dva tipa noge (slika 5). Nagib stijenke neposredno iznad dna bilježili smo kao manji od 45°, oko 45° i veći od 45°.

Razlikovali smo sedam tipova ručki (tablica 3), dok smo drške bilježili unutar šire kategorije plastičnih aplikacija. Za svaku ručku bilježili smo orijentaciju (horizontalna ili vertikalna) te, kad je to bilo moguće, njezin smještaj na posudi. Za ostale dijelove posuda bilježili smo određene specifičnosti, kao što su bikoničan trbuh ili istaknuto rame.

Zbog velike razlomljenosti materijala, oblik posude određen je gotovo uvijek na temelju ulomaka, najčešće po obliku i nagibu oboda, a ponekad i po oblikovanju vrata ili ramena posude. Pojedine oblike razlikovali smo i po veličini.

The pottery assemblage consists of a total of 4,749 fragments with a total weight in excess of 75 kg (Table 1). All fragments representing rims, bases and handles, all decorated fragments, as well as characteristically shaped neck and shoulder sections of vessels (a total of 843), were singled out as diagnostic. For every diagnostic fragment we noted a series of nominal variables that describe a section of the vessel, its form, the technique and motif employed for decoration, surface treatment and presence of mending holes, and the numerical variables that refer to the size of the vessel and the thickness of its walls.

As far as vessel parts go, we differentiated between fragments of rims, bases and pedestals, bodies, necks, shoulders and handles. We regarded body fragments as diagnostic when they were decorated, or when they were equipped with a mending hole, and the same was the case for neck and shoulder fragments if they implied a certain vessel shape. We distinguished ten different types of rims depending on the form of the lip (Figure 4, Table 2). For every rim we also recorded its slant, and its shape, i.e., if it is everted, upright or restricted. Furthermore, we differentiated between two types of base and two types of pedestal (Figure 5). The slant of the wall immediately above the base was recorded as less than 45°, around 45°, and larger than 45°.

We also distinguished between seven types of handles (Table 3), while lug handles were placed within a broader

Tablica 2 Tipovi oboda po fazama  
Table 2 Rim types by phase.

faza / Phase	obodi / Rims	jednostavni zaobljeni / Simple rounded	zadebljani izvana / Externally thickened	zadebljani iznutra / Internally thickened	koso zasječeni izvana / Externally bevelled	jednostavni zaravnjeni / Simple flat	zaravnjeni i zadebljani izvana / Flat and externally thickened	trakasto zadebljani / Massive externally thickened	široki zaravnjeni / Wide flat	zakošeni / Internally bevelled	široki i zadebljani iznutra / Wide and internally thickened
	n / No.	%	%	%	%	%	%	%	%	%	%
1	88	82,95	3,41	2,27	1,14	9,09	0,00	0,00	0,00	0,00	0,00
2	22	50,00	13,64	9,09	0,00	18,18	9,09	0,00	0,00	0,00	0,00
3	124	54,84	5,65	4,03	0,00	20,97	2,42	2,42	3,23	4,84	0,00
4	136	63,24	1,47	4,41	0,00	17,65	1,47	0,00	1,47	0,74	7,35

Zabilježili smo šest osnovnih tehnika ukrašavanja: urezivanje, utiskivanje, apliciranje, žlijebljenje, brazdasto urezivanje i slikanje te kombinacije apliciranja i utiskivanja, urezivanja i utiskivanja, urezivanja i žlijebljenja, kao i brazdastog urezivanja i utiskivanja. Bilježili smo ukrasne motive, a kad je to bilo moguće i položaj ukrasa na posudi.

Po obradi površine razlikovali smo glačane, ovlaš glačane i neglačane ulomke te ulomke izrazito grube površine. Uz to smo bilježili prevlačenje metlicom, barbotin i premaz. Prve četiri kategorije određene su iskustveno, a klasificiranje pojedinog ulomka često je ovisilo i o njegovoj očuvanosti.

Promjere oboda i dna posuda procjenjivali smo po zakrivljenosti ulomaka, uz pomoć kružne šablone s točnošću od 1 cm. Samo u dva slučaja, kod cijelih posuda, mogli smo zabilježiti obje spomenute varijable. Debljinu stijenke mjerili smo pomičnim mjerilom s točnošću od 0,1 mm, izbjegavajući izrazito zadebljana ili tanka mjesta.

### KERAMIKA FAZE 1 (SREDNJI NEOLITIK)

Grupa nalaza ove faze sastoji se od 647 ulomaka, ukupne težine više od 8 kg. Ulomci su uglavnom mali, a indeks razlomljenosti posuda je 78 ulomaka po kilogramu (tablica 1). Većinu od 164 dijagnostička ulomka čine

category of plastic appliqué. For every handle we marked its orientation (horizontal or vertical), and whenever this was possible, its location on the vessel. We also recorded information that was specific for other vessel parts, like a carinated body or an emphasized shoulder.

The shape of a vessel was almost always determined based on fragments, most often in accordance with the shape and slant of the rim, and sometimes based on the form of the neck or shoulder of a vessel. This had to be done due to high fragmentation of the material. Certain forms were also differentiated based on size.

We recorded six basic decorative techniques: incision, impression, appliqué, wide incision, furrowed incision and painting, as well as combinations thereof, such as appliqué and impression, incision and impression, incision and channeling and furrowed incision and impression. We also recorded decorative motifs, and whenever it was possible, the location of the decoration on the vessel.

As far as surface treatment goes, we differentiated amongst burnished, casually burnished and non-burnished fragments, as well as those with a distinctly coarse surface. We also recorded brushed surfaces, barbotine and slip. The first four categories were determined based on experience, while the classification of individual fragments often depended on their degree of preservation. The diameters of rims and bases were judged based on the curvature of the fragment, with the help of a circular template with



obodi i ukrašeni trbusi, dok su ručke/ušice i dna rijetki.

Prevladavaju jednostavni zaobljeni obodi. Uz njih se u manjem broju pojavljuju izvana ili iznutra zadebljani obodi, oni izvana koso zasječeni te jednostavni zaravnjeni obodi (slika 4, tablica 2). Nagib je bilo moguće odrediti za nešto više od polovice oboda. Većina njih uspravna je ili uvučena, što ukazuje na više ili manje zatvoren oblik većine posuda.

Mali broj prepoznatljivih ulomaka dna navodi na zaključak da su dna posuda često bila zaobljena, a takve ulomke teško je razlikovati od ulomaka trbuha. Među očitim ulomcima dna najbrojnije su niske noge (T.1, 11), slijede ravna dna, a prisutno je i ravno profilirano dno (slika 5). Nagibi stijenke neposredno iznad dna upućuju na kuglaste oblike posuda. Niske noge najučestaliji su tip dna u srednjem neolitiku na području tršćanskog i slovenskog Krasa (primjerice, Barfield 1972; Bagolini et al. 1993; Biagi et al. 1993, sl. 4; Gilli i Montagnari Kokelj 1993; 1996; Leben 1967; Turk et al. 1993; Visentini 1993), a brojne su i u Dalmaciji (Batović 1979; Brusić 2008, 55; Korošec 1959, T. 48, 95). U prednjem dijelu Pupičine peći niske noge također su najučestalije, a slijede visoke noge i ravna dna (Forenbaher i Kaiser 2006, 176).

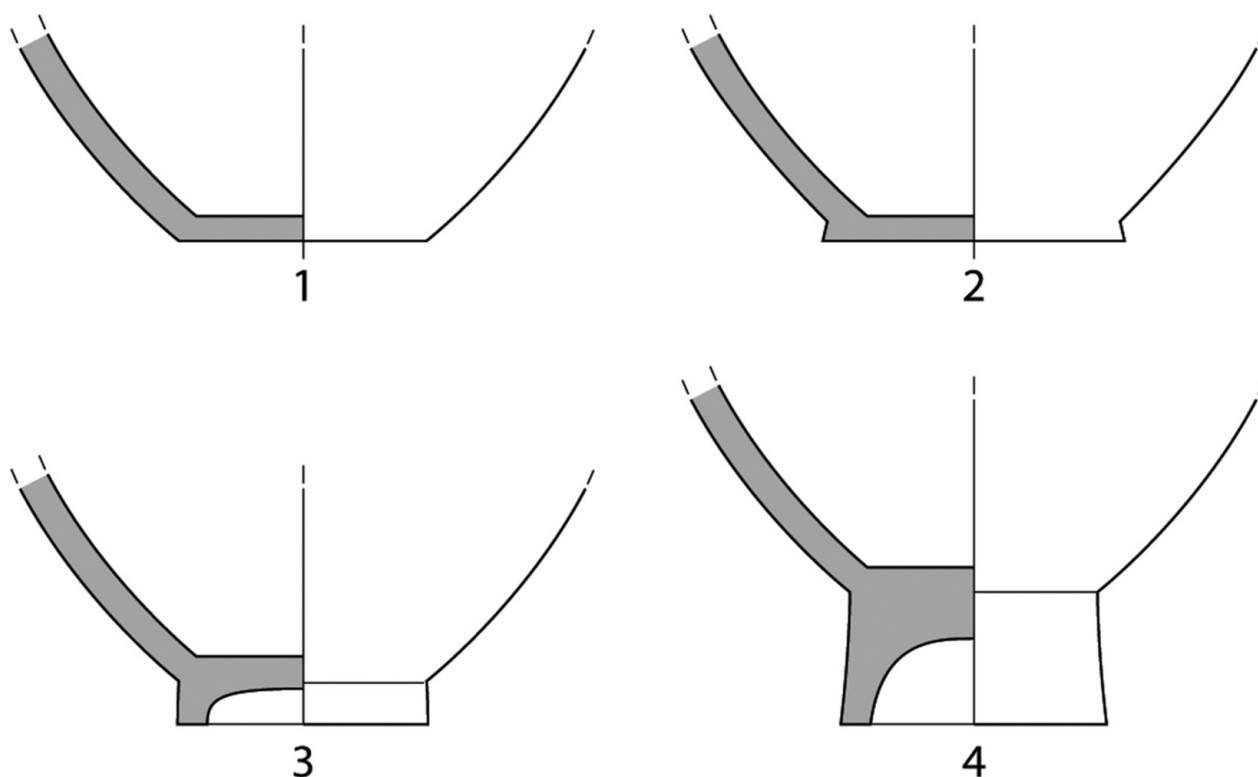
an accuracy of 1 cm. Only in two cases involving whole vessels were we in a position to record both mentioned variables. Wall thickness was measured with vernier callipers with an accuracy of 0.1 mm, avoiding distinctly thick or thin spots.

### PHASE 1 POTTERY (MIDDLE NEOLITHIC)

The assemblage from this phase includes 647 fragments with a total weight in excess of 8 kg. Small-sized fragments are prevalent and the fragmentation index is 78 fragments per kilogram (Table 1). Out of the 164 diagnostic fragments, the majority are rims and decorated body shards, whereas handles/perforated lugs and bases are rare.

Simple, rounded rims are prevalent. Appearing along them, but in smaller numbers, are internally or externally thickened, bevelled rims, and simple flat ones (Figure 4, Table 2). We were able to determine the slant on more than half of the rims. The great majority of them are upright or restricted, which indicates a more or less closed shape of the majority of the vessels.

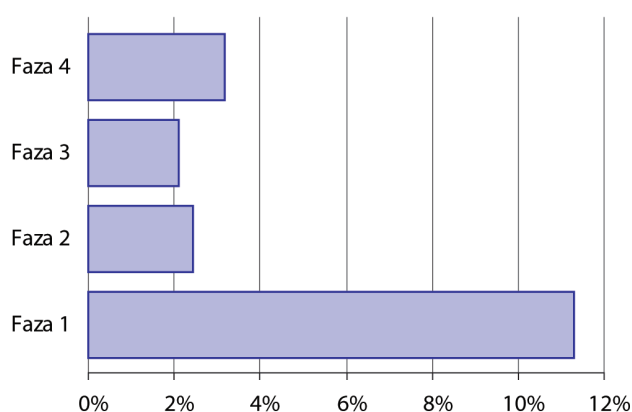
The small number of base fragments that are recognizable as such, leads us to the conclusion that



Sl. 5 Oblici dna: 1 ravno, 2 ravno profilirano, 3 niska noga, 4 visoka noga  
Fig. 5 Base shapes: 1 flat, 2 prominent flat, 3 low pedestal, 4 pedestal.

U kategoriji ručki prevladavaju vertikalne ušice (T. 1. 1, 5; 2. 2), a prisutna je samo jedna prava ručka ovalnog presjeka (tablica 3). Ovakva je slika uobičajena za srednji neolitik Dalmacije i Krasa, gdje na svim lokalitetima prevladavaju ušice, a ručki gotovo da i nema (primjerice, Batović 1979; Barfield 1999; Korošec 1959, T. 93).

Ukrašeno je 11,3% od ukupnog broja ulomaka, što je triput više nego u bilo kojoj drugoj fazi (slika 6). Najčešće je ukrašavanje urezivanjem (54 ulomka), zatim apliciranjem (14 ulomaka), a prisutno je i žlijebljenje, utiskivanje prsta te slikanje. Među urezanim motivima pojavljuju se šrafirani trokuti i rombovi (T. 1. 6; 2. 2, 3), spirale (T. 1. 1, 2) i kratke kose linije na gornjoj



Sl. 6 Učestalost ukrašenih ulomaka po fazama  
Fig. 6 Frequency of decorated fragments by phase.

bases were often rounded, which makes it difficult to differentiate such fragments from body fragments. Amongst base fragments that can be identified, the most numerous shapes are low pedestal (T.1, 11), followed by simple flat bases, and a prominent flat base (Figure 5). The slant of the wall immediately above the base indicates globular vessel shapes. Low pedestal is the most frequent type of base in the Middle Neolithic period on the territory of the Trieste and Slovenian Karst (e.g., Barfield 1972; Bagolini et al. 1993; Biagi et al. 1993, Fig. 4; Gilli and Montagnari Kokelj 1993; 1996; Leben 1967; Turk et al. 1993; Visentini 1993), and it also frequently occurs in Dalmatia (Batović 1979; Brusić 2008, 55; Korošec 1959, T. 48, 95). In the fore section of Pupičina Cave, low pedestal is likewise the most frequent type of base, followed by pedestal and simple flat bases (Forenbaher and Kaiser 2006, 176).

Vertically perforated lug handles prevail in the category of handles (T. 1. 1, 5; 2. 2), and there is only a single genuine handle with an oval cross-section (Table 3). This is quite a common state of affairs for the Middle Neolithic in Dalmatia and the Karst region, where on all sites perforated lugs prevail, and there are almost no handles (e.g., Batović 1979; Barfield 1999; Korošec 1959, T. 93).

From the total number of fragments only 11.3% are decorated, which is three times as much as in any other phase (Figure 6). The most frequent type of decoration is incision (54 fragments), followed by appliqué (14

Tablica 3 Tipovi ručki po fazama  
Table 3 Handle types by phase.

Faza / Phase	Ručke / Handles								
	n / No.	Ušice / Perforated lug handles	Ručke / All other handles	Trakaste / Strap handles	Ovalnog presjeka / Handles with an oval cross-section	Koljenaste s pločicom / Flat-top handles	Tunelaste / Tunnel-handles	Poligonalnog presjeka / Handles with a polygonal cross-section	Neodređenog tipa / Unspecified type
		%	%	%	%	%	%	%	%
1	11	90,9	9,1	0,0	100,0	0,0	0,0	0,0	0,0
2	3	0,0	100,0	100,0	0,0	0,0	0,0	0,0	0,0
3	19	5,3	94,7	77,7	11,1	5,6	5,6	0,0	0,0
4	32	0,0	100,0	46,9	15,7	15,6	0,0	6,3	15,6

strani oboda. Na samo jednom ulomku u urezima se sačuvala inkrustacija.

Dva ulomka ukrašena su urezivanjem i kljunastim aplikama (T. 2. 3). Javljaju se i jezičci, koji se ponekad opisuju kao drške (Bertoldi 1996; Gilli i Montagnari Kokelj 1993; 1996; Montagnari Kokelj i Crismani 1997), bradavice (T. 1. 8; 2. 1) i nizovi bradavica. Žljebovi se u nekim slučajevima javljaju u obliku visećih polukrugova (T. 1. 3) ili zrakastog motiva u kombinaciji s nizom bradavica (T. 1. 4). Na dva ulomka sačuvani su tragovi crvene boje (slika 7), što nije uobičajeno za srednji neolitik ovog prostora (Barfield 1999, 47-49; Cannarella i Cremonesi 1967, 296; Leben 1967, 56-58; Montagnari Kokelj i Crismani 1997, 81; Petrić 1979, 215; Zlatunić 2007, 331).



Sl. 7 Ulomak s tragovima crvene boje iz srednjoneolitičke faze  
Fig. 7 A fragment with traces of red color from the Middle Neolithic phase.

Gotovo svi spomenuti načini ukrašavanja uobičajeni su u srednjem neolitu Istre i Krasa (primjerice Bačić 1976, T. 14; Barfield 1999; Gilli i Montagnari Kokelj 1993; 1996; Komšo 2005, 214; 2005a, 229; 2006, 235; Komšo i Miracle 2004, 151; Leben 1967, T.20; Pessina 2006, 296; Pessina i Rottoli 1996, sl. 6; Snoj 1992, T.1;), kao i Dalmacije (Batović 1959, sl. 12; 1963, T. 10; 1979, sl. 25; Brusić 2008, T.45, 49, 58, 59, 68, 95; Korošec 1959: T. 33, 34, 41, 43-45; 1960, 18; Korošec i Korošec 1974, T. 9, 12, 13, 15, 26; Novak 1968, T. 1-10).

Površina većine ulomaka nije glačana, a slijede glačani i metlicom prevučeni (T. 1, 5; 2. 3) ulomci te pojedinačni ulomci s premazom ili izrazito grubom površinom. Ističe se nekoliko fino glačanih ulomaka

(fragments), and there is also wide incision, finger impression and painting. Amongst incised motifs there appear hatched triangles and lozenges (T. 1. 6; 2. 2, 3), spirals (T. 1. 1, 2) and short oblique lines on the upper side of the rim. Only a single fragment has a preserved incrustation filling the incisions.

Two fragments were decorated with incisions and beak-shaped appliqué elements (T. 2. 3). There are also elongated applications that are at times described as lug handles (Bertoldi 1996; Gilli and Montagnari Kokelj 1993; 1996; Montagnari Kokelj and Crismani 1997), nubs (T. 1. 8; 2. 1) and rows of nubs. Channels in some cases appear in the form of hanging semi-circles (T. 1. 3), or a radial motif in combination with a series of nubs (T. 1. 4). There are traces of red color on two fragments (Figure 7), which is not at all common for the Middle Neolithic in this region (Barfield 1999, 47-49; Cannarella and Cremonesi 1967, 296; Leben 1967, 56-58; Montagnari Kokelj and Crismani 1997, 81; Petrić 1979, 215; Zlatunić 2007, 331).

Almost all the mentioned modes of decoration are common for the Middle Neolithic period in Istria and the Karst region (e.g., Bačić 1976, T. 14; Barfield 1999; Gilli and Montagnari Kokelj 1993; 1996; Komšo 2005, 214; 2005a, 229; 2006, 235; Komšo and Miracle 2004, 151; Leben 1967, T.20; Pessina 2006, 296; Pessina and Rottoli 1996, Fig. 6; Snoj 1992, T.1;), as well as in Dalmatia (Batović 1959, Fig. 12; 1963, T. 10; 1979, Fig. 25; Brusić 2008, T.45, 49, 58, 59, 68, 95; Korošec 1959: T. 33, 34, 41, 43-45; 1960, 18; Korošec and Korošec 1974, T. 9, 12, 13, 15, 26; Novak 1968, T. 1-10).

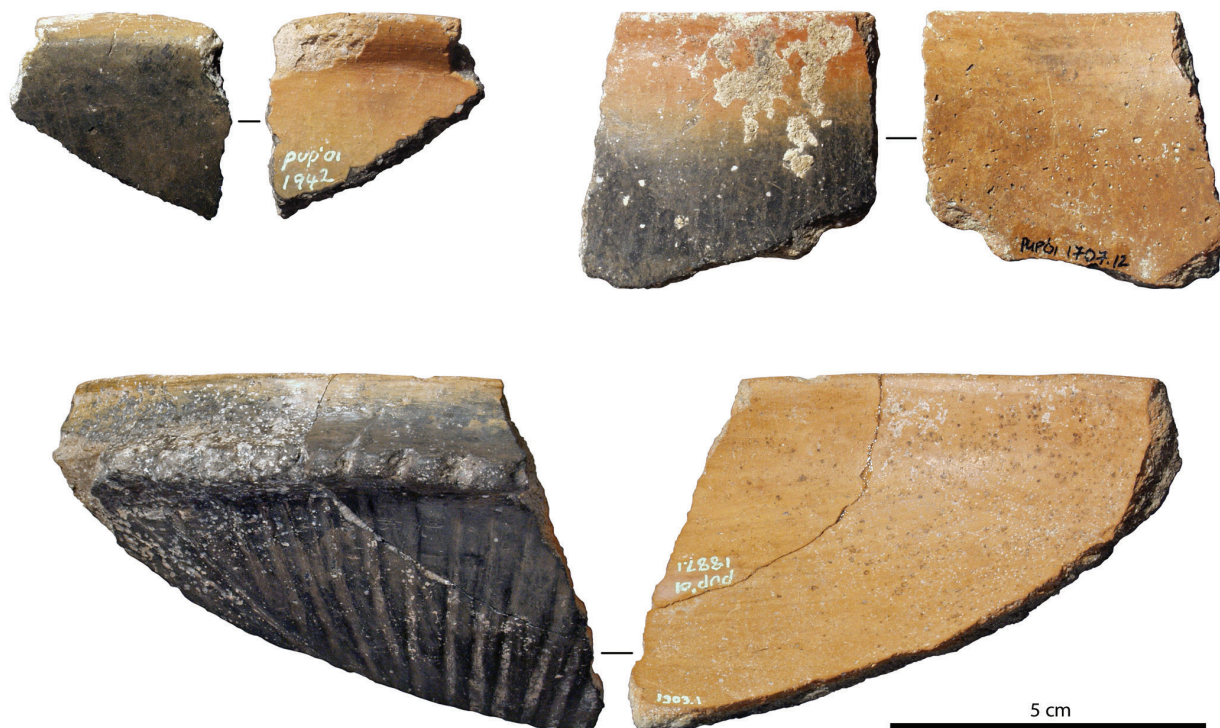
The surface of the majority of the fragments is not burnished, followed by burnished and brushed (T. 1, 5; 2. 3) fragments, and individual fragments that were either slipped or have a distinctly coarse surface. There are several highly burnished fragments whose surface is black on the exterior, whereas on the interior and along the outer side of the rim it is reddish-brown (Figure 8). Their bichrome quality probably stems from a carefully controlled firing process whose ultimate goal was just such an effect. A similar occurrence was recorded in the Middle Neolithic phase of Vela Spila on the island of Korčula (Čečuk and Radić 2005, 112, T. 37, 8), as well as in Spila near Nakovana on the Pelješac Peninsula.

#### Vessel shapes

According to the shape and slant of the rim fragments, we differentiate eight different vessel shapes (Figure 9), mostly mid-sized bowls and plates (Figure 10) having relatively thin walls (Figure 11).

1.a. OPEN BOWLS (shape MN 1.1 after Forenbaher and Kaiser 2006, 173-174) are represented with six fragments.





Sl. 8 Vanjska (lijevo) i unutrašnja (desno) površina dvobojno pečenih ulomaka iz srednjoneolitičke faze  
 Fig. 8 The outer (left) and the inner (right) surface of bichrome fired fragments from the Middle Neolithic phase.

čija je površina izvana crna, a iznutra i uz vanjsku stranu oboda crvenkastosmeđa (slika 8). Njihova dvobojnost vjerojatno je posljedica pažljivo kontroliranog postupka pečenja kojim se željelo postići upravo takav efekt. Slična pojava zabilježena je u srednjoneolitičkoj fazi Vele spile na Korčuli (Čečuk i Radić 2005, 112, T. 37, 8) kao i u Spili kod Nakovane na Pelješcu.

#### Oblici posuda

Po obliku i nagibu ulomaka oboda razlikujemo osam različitih oblika posuda (slika 9), uglavnom zdjela i plitica srednjih dimenzija (slika 10) i relativno tankih stijenki (slika 11).

1.a. OTVORENE ZDJELE (oblik MN 1.1 po Forenbaher i Kaiser 2006, 173-174) zastupljene su sa šest ulomaka. Bile su srednjih veličina, promjera oboda 14-32 cm, ponekad ukrašene žlijebljenjem (T. 1. 3).

1.b.1. POLUKUGLASTE ZDJELE USPRAVNOG ILI BLAGO UVUČENOG OBODA (varijanta oblika MN 1.2 po Forenbaher i Kaiser 2006, 174) zastupljene su s 30 ulomaka, što ih čini najbrojnijim oblikom ove faze. Profil im se od uspravnog ili blago uvučenog oboda konveksno zakrivljuje prema dnu (T. 2. 1, 2). Jedan primjerak imao je bikonično naznačen trbuh (T. 1. 1). Promjer oboda varira od 8 do 30 cm. Ponekad su ukrašene apliciranjem ili urezivanjem.

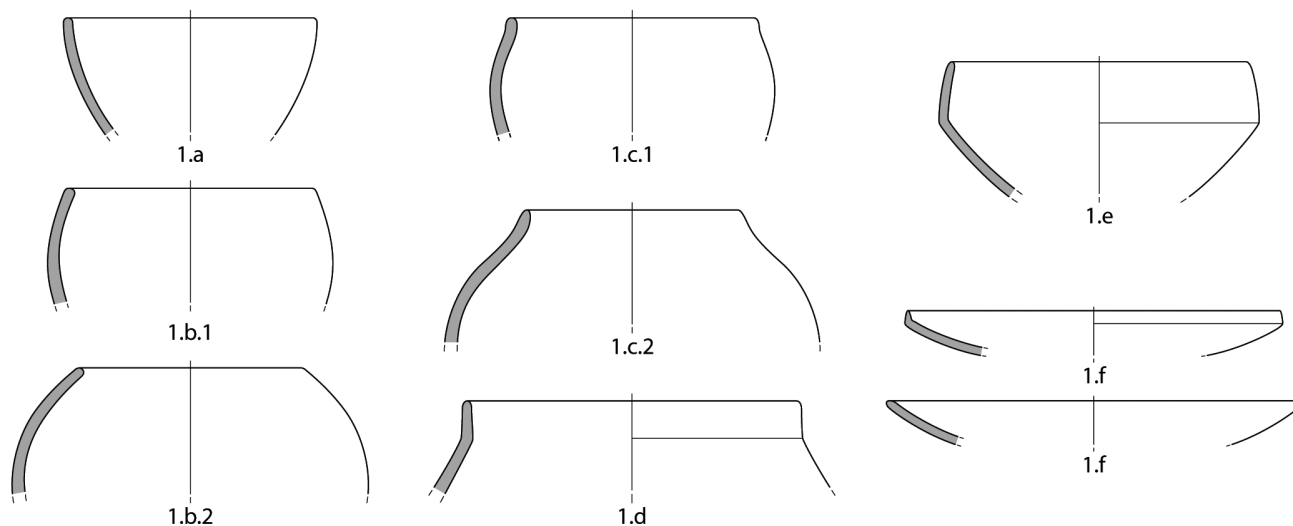
They were mid-sized, with a diameter measuring 14-32 cm, sometimes decorated with wide incision (T. 1. 3).

1.b.1. SLIGHTLY RESTRICTED BOWLS (a variant of shape MN 1.2 after Forenbaher and Kaiser 2006, 174) are represented with 30 fragments and are thus the most numerous shape of this phase. From the upright or slightly restricted rim, their profile curves in a convex manner towards the base (T. 2. 1, 2). A single specimen had a carinated body (T. 1. 1). The diameter of the rim varies from 8 to 30 cm. Sometimes they are decorated with appliqué elements or by incision.

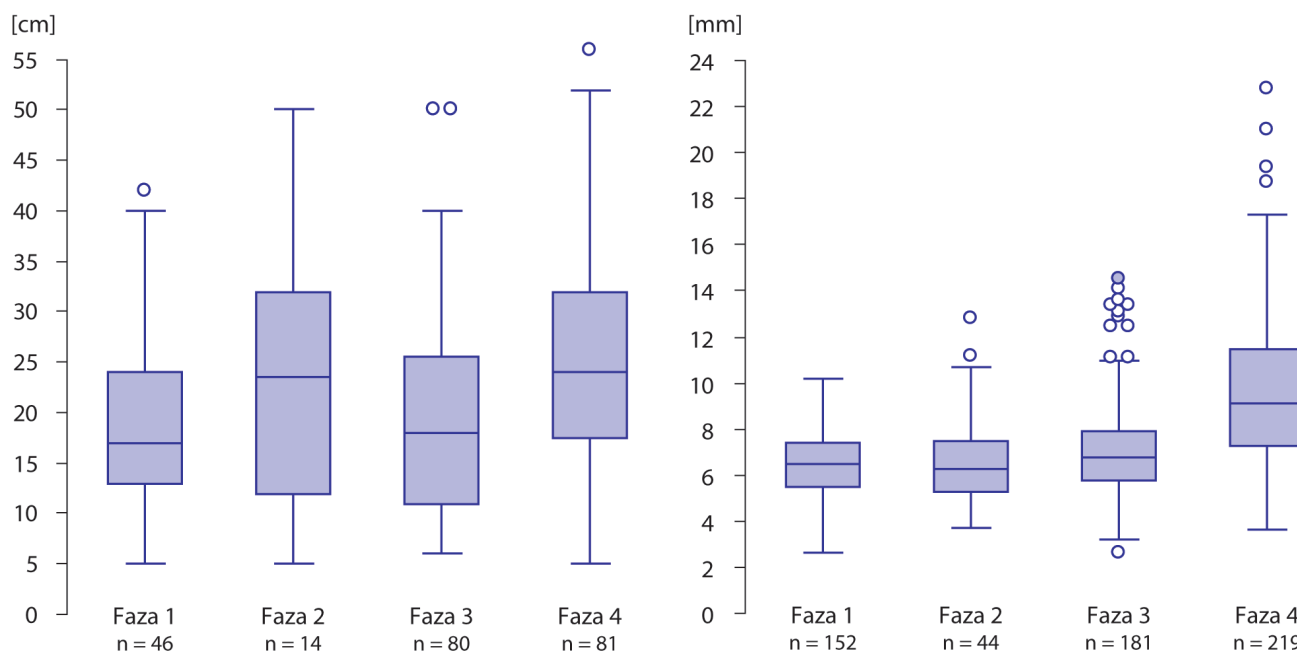
1.b.2. RESTRICTED BOWLS (a variant of shape MN 1.3 after Forenbaher and Kaiser 2006, 174) are represented with three mid-sized specimens. In contrast to the previous shape, these bowls always feature a rim that is substantially restricted.

1.c.1. SLIGHTLY RESTRICTED BOWLS WITH RECURVING PROFILE (a variant of shape MN 1.2 after Forenbaher and Kaiser 2006, 174) are represented with two fragments that probably belong to the same vessel. These bowls are very similar in shape to 1.b.1, except that at the top they have a slightly recurving profile.

1.c.2. RESTRICTED BOWLS WITH RECURVING PROFILE (a variant of shape MN 1.3 after Forenbaher and Kaiser 2006, 174) are represented with but a single specimen. In contrast to the previous shape, the rim of this bowl is markedly restricted.



Sl. 9 Oblici posuda iz faze 1  
Fig. 9 Vessel shapes from Phase 1.



Sl. 10 Box plot dijagrami za promjere oboda posuda po fazama  
Fig. 10 Box plot diagrams for rim diameters of vessels by phase.

Sl. 11 Box plot dijagrami za debljine stijenki posuda po fazama  
Fig. 11 Box plot diagrams for wall thicknesses of vessels by phase.

1.b.2. POLUKUGLASTE ZDJELE UVUČENOG OBODA (varijanta oblika MN 1.3 po Forenbaher i Kaiser 2006, 174) zastupljene su s tri primjerka srednje veličine. Za razliku od prethodnog oblika, kod ovih je zdjela obod uvijek znatno uvučen.

1.c.1. ZDJELE S-PROFILA USPRAVNOG ILI BLAGO UVUČENOG OBODA (varijanta oblika MN 1.2 po Forenbaher i Kaiser 2006, 174) zastupljene su s dva ulomka koji vjerojatno pripadaju istoj posudi. Vrlo su slične obliku 1.b.1, osim što pri vrhu imaju profil u obliku blagoga slova S.

1.d. VESSELS WITH A SHORT CYLINDRICAL NECK are represented with two fragments, one of which belonged to a large vessel with a rim diameter of 42 cm. Jars or bowls of this type had a low cylindrical neck that was clearly set out from the body whose shape remains unknown.

1.e. CARINATED BOWLS are represented with three fragments that belong to two mid-sized or large vessels. They are marked with a distinct carinated profile. One of the vessels was decorated (T. 1. 4).



1.c.2. ZDJELE S-PROFILA UVUČENOG OBODA (varijanta oblika MN 1.3 po Forenbaher i Kaiser 2006, 174) zastupljene su samo s jednim primjerkom. Za razliku od prethodnog oblika, obod ove zdjele znatno je uvučen.

1.d. POSUDE NISKOG CILINDRIČNOG VRATA zastupljene su s dva ulomka od kojih je jedan pripadao velikoj posudi s promjerom oboda od 42 cm. Lonci ili zdjele ovog tipa imali su niski cilindrični vrat, jasno izdvojen od tijela čiji nam je oblik ostao nepoznat.

1.e. BIKONIČNE ZDJELE zastupljene su s tri ulomka koji pripadaju dvjema srednjim ili velikim posudama. Obilježuje ih izraziti dvostožasti lom profila. Jedna od posuda bila je ukrašena (T. 1. 4).

1.f. PLITICE (TANJURI) zastupljeni su s tri primjerka. Radi se o plitkim, širokim posudama srednje veličine. Jedna od njih bikoničnog je oblika i uvučenog oboda (oblik MN 2.1 po Forenbaher i Kaiser 2006, 175).

Analogije svim navedenim oblicima nalazimo ponajprije na području tršćanskog i slovenskog Krasa (primjerice Barfield 1974; 1999; Bertoldi 1996; Biagi et al. 1993; Cannarella i Redivo 1981; Gilli i Montagnari Kokelj 1993; 1994; 1996; Leben 1967; Montagnari Kokelj i Crismani 1996; 1997; Pessina i Rottoli 1996; Petrić 1979; Stacul 1972; Turk et. al. 1992; 1993; Visentini 1993), a bilježimo ih i u Dalmaciji, gdje su manje učestale, osim za zdjele S-profila i bikonične zdjele (primjerice Batović 1963; 1973; 1979; Brusić 2008; Čečuk i Radić 2005; Forenbaher i Vranjican 1985; Korošec 1959; Korošec i Korošec 1974; Marijanović 2005).

#### *Ostali keramički nalazi*

1.g. PRŠLJEN. Ulomak stožastog pršljena s rupom u sredini spaja se s ulomkom prikupljenim iz konteksta koji pripada sljedećoj fazi (T. 2. 6). Po obliku nije moguće zaključiti kojoj bi fazi trebao pripadati. U prednjem dijelu Pupićine peći zabilježen je sličan primjerak, nažalost u poremećenom sloju (Forenbaher i Kaiser 2006, T. 5.9, 11).

1.h. FIGURICA. Ulomak plosnate, po svoj prilici antropomorfne figurice od koje su sačuvane noge i donji dio trupa (slika 12) (T. 1. 10). Koljena su savinuta, bedra razmaknuta, a stopala razdvojena. Oko bokova i bedara urezivanjem je naznačena jednostavna traka. Nema eksplicitnih naznaka spola.

#### *Rasprava*

Po svojim općim obilježjima keramika ove faze pripada srednjem neolitiku. Ovakvo vremensko opredjeljenje podupiru dva radiokarbonska datuma koji upućuju na

1.f. PLATES are represented with three specimens. These are shallow, wide, mid-sized vessels. One of them is carinated and has a restricted rim (shape MN 2.1 after Forenbaher and Kaiser 2006, 175).

Analogies for all the mentioned shapes are to be found first and foremost in the region of the Trieste and Slovenian Karst (e.g., Barfield 1974; 1999; Bertoldi 1996; Biagi et al. 1993; Cannarella and Redivo 1981; Gilli and Montagnari Kokelj 1993; 1994; 1996; Leben 1967; Montagnari Kokelj and Crismani 1996; 1997; Pessina and Rottoli 1996; Petrić 1979; Stacul 1972; Turk et. al. 1992; 1993; Visentini 1993), and they were also recorded in Dalmatia, where they do not appear so frequently, except for bowls with recurving profile, and carinated bowls (e.g.: Batović 1963; 1973; 1979; Brusić 2008; Čečuk and Radić 2005; Forenbaher and Vranjican 1985; Korošec 1959; Korošec and Korošec 1974; Marijanović 2005).

#### *Other pottery finds*

1.g. WHORL. A fragment of a conical whorl with a perforation in the middle conjoins with a fragment discovered in a context that belongs to the next phase (T. 2. 6). According to its shape we are not able to conclude to which phase it should belong to. In the fore section of Pupićina Cave a similar specimen was recorded, albeit in a disturbed layer (Forenbaher and Kaiser 2006, T. 5.9, 11).

1.h. FIGURINE. A fragment of a flat, most probably anthropomorphous figurine that has its legs and lower body section preserved (Figure 12)(T. 1. 10). The knees are bent, the thighs open, the feet separated. Around the hips and thighs a simple band was incised. There are no explicit indications of sex.



Sl. 12 Keramička figurica iz srednjoneolitičke faze  
Fig. 12 A ceramic figurine from the Middle Neolithic phase.

#### *Discussion*

According to its general characteristics, pottery from this phase belongs to the Middle Neolithic. Such a temporal determination is corroborated by two radiocarbon dates that indicate a relatively early period within the Middle

relativno rano vrijeme unutar srednjeg neolitika. Po svojim stilskim obilježjima može se pripisati danilskoj kulturi, odnosno njezinoj regionalnoj danilsko-vlaškoj varijanti (Forenbaher i Kaiser 2006, 198–202). Najbliže sličnosti mogu se pronaći u keramičkoj produkciji s prostora tršćanskog i slovenskog Krasa, a tek zatim i na dalmatinskom prostoru. Polukuglaste zdjele, bikonične posude, plitki i bikonični tanjuri, posude na niskim i visokim nogama, ritoni te ukrašavanje urezanim geometrijskim motivima općenita su obilježja svojstvena cjelokupnom području istočne obale Jadrana (Barfield 1972, 202–204; Batović 1973, 76–78; Biagi 1995, 12–13; Čečuk i Radić 2005; Forenbaher i Kaiser 2006, 200), dok je najuočljivija razlika u gotovo potpunom nedostatku ukrašavanja slikanjem na području Istre i Krasa (Barfield 1972, 202–204; Batović 1973, 78; Pessina 2006, 297). Rijetki oslikani ulomci s tog područja više nalikuju hvarskoj nego danilskoj keramici (Barfield 1999, 47–49; Cannarella i Cremonesi 1967, 296; Leben 1967, 56–58; Montagnari Kokelj i Crismani 1997, 81; Petrić 1979, 215). Razlikuje se i učestalost pojedinih oblika posuda i ukrasnih motiva. Otvorene zdjele, zdjele uspravnih i blago uvučenih oboda, posude na niskoj i visokoj nozi te ukrašavanje urezanim trokutima češće se pojavljuju u Istri i na Krasu, dok su u Dalmaciji učestaliji zatvoreniji i zvonasti oblici, iako se i jedni i drugi mogu pojaviti na cijelom prostoru (Forenbaher i Kaiser 2006, 200–202). Pojedini segmenti ovdje opisanog materijala (polukuglaste zdjele uspravnog ili uvučenog oboda, bikonične zdjele) pojavljuju se i u Bosni, u istovremenoj kakanjskoj kulturi (Benac 1979, sl. 21; Gilli i Montagnari Kokelj 1994, 183; Montagnari Kokelj i Crismani 1997, 80–81).

Brojni keramički oblici i obilježja (polukuglaste zdjele i zdjele S-profila uspravnog ili uvučenog oboda, bikonične zdjele, otvorene zdjele, urezani i žlijebljeni geometrijski motivi) traju i za kasnog neolitika, koji je na istočnoj jadranskoj obali obilježen hvarskom kulturom (Forenbaher i Kaiser 2008, sl. 11; Gilli i Montagnari Kokelj 1994, 183; 1996, 115–116; Montagnari Kokelj i Crismani 1997, 80–81; Novak 1955). Zbog toga ne čudi da su neki od datuma za vlašku varijantu danilske kulture iz špilja tršćanskog Krasa istovremeni s kasnim neolitikom Dalmacije (Forenbaher i Kaiser 2008, 21; Montagnari Kokelj i Crismani 1997, 85).

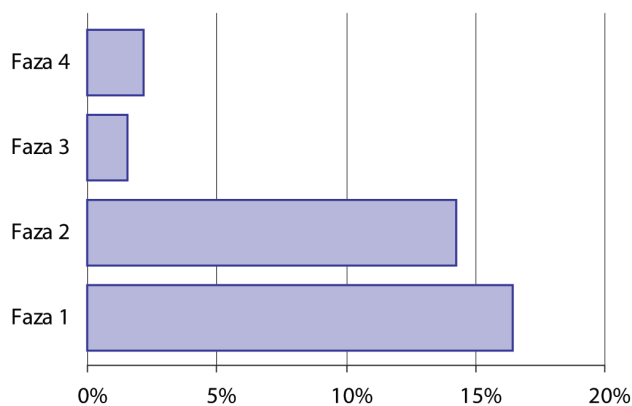
Iz oblika i veličine posuda naslućuje se ponešto o aktivnostima koje su se odvijale u špilji. Prevladavaju polukuglaste zdjele srednje veličine, uspravnog ili blago uvučenog oboda, a u malom broju javljaju se i tanjuri. Većina tih posuda vjerojatno je bila povezana s pripremanjem i konzumacijom hrane (Forenbaher i

Neolithic. According to its stylistic characteristics, we can attribute it to the Danilo-Vlaška regional variant of the Danilo culture (Forenbaher and Kaiser 2006, 198–202). The closest similarities are to be found in pottery produced in the region of the Trieste and Slovenian Karst, and to a lesser extent in Dalmatia. Slightly restricted bowls, carinated vessels, shallow and biconical plates, vessels on pedestals, rhytons, and decoration with incised geometrical motifs, are general characteristics that are typical for the entire territory of the eastern Adriatic coast (Barfield 1972, 202–204; Batović 1973, 76–78; Biagi 1995, 12–13; Čečuk and Radić 2005; Forenbaher and Kaiser 2006, 200), while the most obvious difference is the almost complete lack of decoration by painting in the region of Istria and the Karst (Barfield 1972, 202–204; Batović 1973, 78; Pessina 2006, 297). The rare painted fragments from this territory resemble Hvar pottery more than Danilo pottery (Barfield 1999, 47–49; Cannarella and Cremonesi 1967, 296; Leben 1967, 56–58; Montagnari Kokelj and Crismani 1997, 81; Petrić 1979, 215). There is also a difference in the frequency of individual vessel shapes and decorative motifs. Open bowls, slightly restricted bowls, pedestalled vessels, as well as decoration with incised triangles, are more often found in Istria and the Karst, whereas in Dalmatia, the restricted shapes and bell-shaped vessels appear more frequently, even though both of them can appear throughout the region (Forenbaher and Kaiser 2006, 200–202). Certain segments of the here described material (slightly restricted bowls, carinated bowls) also appear in Bosnia, in the contemporary Kakanj culture (Benac 1979, Fig. 21; Gilli and Montagnari Kokelj 1994, 183; Montagnari Kokelj and Crismani 1997, 80–81).

Numerous pottery shapes as well as other characteristics (slightly restricted bowls and recurving profile bowls with an upright or restricted rim, carinated bowls, open bowls, incised and widely incised geometrical motifs) continue during the Late Neolithic that was on the eastern Adriatic coast marked by the Hvar culture (Forenbaher and Kaiser 2008, Fig. 11; Gilli and Montagnari Kokelj 1994, 183; 1996, 115–116; Montagnari Kokelj and Crismani 1997, 80–81; Novak 1955). It is therefore not surprising that some of the dates for the Vlaška variant of Danilo culture from the caves of the Trieste Karst are concurrent with the Late Neolithic of Dalmatia (Forenbaher and Kaiser 2008, 21; Montagnari Kokelj and Crismani 1997, 85).

The shapes and size of the vessels provide an insight into the activities that went on in the cave. Mid-sized slightly restricted bowls with an upright or slightly restricted rim are prevalent, plates appearing only in smaller numbers. The majority of these vessels were probably used for the preparation and consumption of food (Forenbaher and Kaiser 2006, 182). Judging by their size, these vessels

Kaiser 2006, 182). Po svojoj veličini bile su prikladne za pripremanje obroka za više osoba ili za zajedničku konzumaciju. Neke su posude imale ušice (T. 1. 1, 5, 9; 2. 2) pa su se mogle vješati iznad ognjišta, dok su plastične bradavice mogle poslužiti za lakše i sigurnije rukovanje. Površina posuda je relativno često bila prije sušenja prevučena metlicom ili nekim sličnim predmetom (slika 13) (T. 1. 5; 2. 3). One s tako obrađenom površinom česte su za neolitika i eneolitika na ovom području (Komšo 2003, 45), a funkcionalno najvjerojatnije imaju veze s kuhanjem jer posude hrapave površine bolje apsorbiraju toplinu i sigurnije leže u ruci (Forenbaher i Kaiser 2006, 182). Jedan ulomak ima rupu probušenu zbog krpanja (T. 1. 7) pa zaključujemo da se posude ponekad upotrebljavalo i nakon što je bilo oštećeno, ako ga se moglo popraviti.



Sl. 13 Učestalost metličastog prevlačenja površine po fazama  
Fig. 13 Frequency of brushed surface pottery by phase.

Osim posuda, ovoj fazi pripadaju još dva keramička predmeta, pršljen i figurica. Pršljen je vjerojatno služio kao zamašnjak za vreteno pa predstavlja dio opreme za predenje vlakana, no nismo sigurni pripada li ovoj ili sljedećoj fazi. Antropomorfnim figuricama u literaturi se najčešće, iako ne i uvijek, pridaje kulturna uloga. Nakon što su odigrale svoju ulogu, kakva god ona bila, često se lome (slučajno ili namjerno) i odbacuju zajedno s ulomcima posuda i drugim otpadom nastalim u svakodnevnim aktivnostima. Iz takvog je konteksta prikupljena i naša figurica. Neolitičke antropomorfne figurice vrlo su rijetke u Dalmaciji (Batović 1979, 574; Brusić 2008, 57; Marijanović 2005, 45–46; Moore et al. 2007, 29) dok u Istri i na Krasu do sada nije objavljen nijedan primjerak. Ne pojavljuju se često ni na suprotnoj obali Jadrana, u neolitiku Italije. Rijetkost i raznolikost figurica možda bi se mogla objasniti pretpostavljenom upotrebom u obredima povezanim s rijetkim situacijama u životu pojedinca, kao što su rođenje, inicijacija ili liječenje bolesti (Robb 2007, 48).

were suitable for the preparation of meals for several individuals, or for the joint consumption of food. Some of the vessels were equipped with perforated lugs (T. 1. 1, 5, 9; 2. 2) that allowed them to be hung over the fireplace, while nubs could have been useful for an easier and safer handling. The surface of these vessels was relatively often brushed before drying, with the help of a brush or some similar object (Figure 13)(T. 1. 5; 2. 3). Vessels whose surface was treated in this manner often appear in this region during the Neolithic and Eneolithic period (Komšo 2003, 45), and they may have been used for cooking, because vessels with a coarse surface absorb heat better and are easier to handle (Forenbaher and Kaiser 2006, 182). One of the fragments has a hole that was made for mending purposes (T. 1. 7), and we can therefore conclude that some vessels were at times used after they were damaged, if it was at all possible to repair them.

Except for vessels, two more ceramic objects are included in this phase, a whorl and a figurine. The whorl was most likely used as a driving-wheel of a spindle, and it thus represents some of the equipment used for spinning yarn; however, we are not certain if it belongs to this or the next phase. In literature, anthropomorphic figurines were most often, although not always, associated with cult. After they served their purpose, whatever that might have been, they were often broken (accidentally or on purpose) and discarded together with vessel fragments and other waste resulting from daily activities. Our figurine comes from such a context. Neolithic anthropomorphic figurines are very rare in Dalmatia (Batović 1979, 574; Brusić 2008, 57; Marijanović 2005, 45–46; Moore et al. 2007, 29), and not a single specimen was reported in Istria and the Karst to date. On the opposite coast of the Adriatic, they are likewise scarce during the Italian Neolithic. The rarity and diversity of figurines could perhaps be explained by their presumed use in rituals connected to rare occasions in the life of an individual, as is birth, initiation or the cure of an illness (Robb 2007, 48).

## PHASE 2 POTTERY (LATE NEOLITHIC/EARLY ENEOLITHIC)

The group of finds from this phase includes 369 fragments with a total weight of approximately 4.5 kg. Small-sized fragments are prevalent, as was the case in the previous phase, and the fragmentation index is 80 fragments per kilogram (Table 1). Out of 49 diagnostic fragments, the majority represents rims, followed by decorated body shards and bases, as well as several handles and characteristically shaped shoulders.

Simple, rounded rims are still prevalent. Appearing alongside them are internally thickened rims, simple flat



## KERAMIKA FAZE 2 (KASNI NEOLITIK/RANI ENEOLITIK)

Grupa nalaza ove faze sastoji se od 369 ulomaka, ukupne težine oko 4,5 kg. Ulomci su podjednako mali kao i u prethodnoj fazi, s indeksom razlomljenosti od 80 ulomaka po kilogramu (tablica 1). Većinu od 49 dijagnostičkih ulomaka čine obodi, a slijede ukrašeni trbusi i dna te nekoliko ručki i karakteristično oblikovanih ramena.

Jednostavni zaobljeni obodi i dalje prevladavaju. Uz njih se pojavljuju izvana ili iznutra zadebljani obodi, jednostavni zaravnjeni obodi te zaravnjeni i izvana zadebljani obodi (slika 4, tablica 2). Najviše je uspravnih oboda.

Prisutna su dva oblika dna, ravno i ravno profilirano (slika 5). Sudeći po nešto strmijim nagibima stijenki neposredno iznad dna, eneolitičke posude bile su uže i dublje od neolitičkih, no mali uzorak ne dozvoljava donošenje sigurnijeg zaključka. Sve tri ručke iz ove faze su trakaste, jedna od njih je vertikalna (T. 2. 12), dok ostalima ne znamo orijentaciju (tablica 3).

Ukrašeno je samo devet ulomaka, odnosno 2,4% od njihovog ukupnog broja. Najčešća tehnika ukrašavanja je urezivanje. Među motivima ističu se kratke paralelne linije na obodu, složeni motiv koji podsjeća na pet očiju ili zrna (T. 2. 10) te kombinacija vodoravne linije i niza kratkih paralelnih ureza na ramenu posude (T. 2. 9). Neki od urezanih geometrijskih motiva pojavljuju se na ulomcima zaostalim iz prethodne srednjoneolitičke faze (T. 2. 13). Bilježimo i utiskivanje prsta (T. 2. 11), plastično rebro te njihovu kombinaciju.

Površina većine ulomaka nije bila glačana. Učestalost metličasto prevučeni ulomaka tek je malo manja nego u prethodnoj fazi (slika 13), no taj način obrade površine mnogo je naglašenije izveden nego u prethodnoj fazi, kao da je napravljen zbog ukrasa (T. 2. 8). Uz to bilježimo još i ovlaš glačane ulomke te ulomke s premazom. Tri ulomka bila su sekundarno probušena zbog krpanja.

### *Oblici posuda*

U ovoj fazi razlikujemo osam oblika posuda (slika 14). Uz pet oblika poznatih već iz prethodne faze, pojavljuju se i tri nova. Dimenzije posuda u prosjeku su nešto veće i znatno varijabilnije nego u prethodnoj fazi (slika 10), no uzorak je razmjerno malen pa možda nije reprezentativan. Prosječna debljina stijenki posuda neznatno je veća od one u prethodnoj fazi (slika 11).

2.a. OTVORENE ZDJELE odgovaraju obliku 1.a iz prethodne faze. Zastupljene su s tri ulomka posuda srednje veličine.

rims, and flat and externally thickened rims (Figure 4, Table 2). The great majority of them are upright rims.

Two base shapes are present, a simple flat base, and a prominent flat base (Figure 5). Judging by a somewhat steeper slant of the walls immediately above the base, Eneolithic vessels were narrower and deeper in comparison with Neolithic ones; however, the small sample does not permit any reliable conclusions. All three handles from this phase are strap handles, one of them is vertical (T. 2. 12), while the orientation of the others is not known (Table 3).

Only nine fragments were decorated, which makes 2.4% out of the total number. The most common decorative technique is incision. Most prominent amongst the motifs are short parallel lines on the rim, a complex motif that is reminiscent of five eyes or grains (T. 2. 10), and the combination of a horizontal line with a series of short, parallel incisions on the shoulder of the vessel (T. 2. 9). Some of the incised geometrical motifs appear on residual fragments from the previous Middle Neolithic phase (T. 2. 13). We also recorded finger impressions (T. 2. 11), a plastic rib and the combination thereof.

The surface of the majority of the fragments was not burnished. The frequency of brushed fragments is a bit smaller in comparison with the previous phase (Figure 13); however, this mode of surface treatment was executed in a much more emphasized manner than in the previous phase, as if its purpose were primarily decorative (T. 2. 8). Alongside this we also recorded casually burnished vessels, and slipped vessels. Three fragments featured a secondary perforation for mending purposes.

### *Vessel shapes*

In this phase we differentiate eight vessel shapes (Figure 14). Along with the five shapes known from the previous phase, three new ones appear. On average, vessel dimensions are somewhat bigger and considerably more variable than in the previous phase (Figure 10); however, the sample is relatively small and it might therefore not be representative. The average vessel wall thickness is slightly greater as compared with the previous phase (Figure 11).

2.a. OPEN BOWLS correspond to shape 1.a from the previous phase, they are represented with three fragments of moderate size vessels.

2.b. SLIGHTLY RESTRICTED BOWLS correspond to shape 1.b.1 from the previous phase. In this phase they are represented with a single fragment of a small vessel. The shape is much more frequent in the Neolithic period, but it also appears in transitional layers from the Neolithic to the Eneolithic, in caves of the Trieste Karst (Barfield

2.b. POLUKUGLASTE ZDJELE USPRAVNOG ILI BLAGO UVUČENOG OBODA odgovaraju obliku 1.b.1 iz prethodne faze. U ovoj fazi zastupljene su samo s jednim ulomkom male posude. Oblik je mnogo češći u neolitiku, no pojavljuje se i u slojevima prijelaza neolitika u eneolitik u špiljama tršćanskog Krasa (Barfield 1999, sl. 3; Cannarella i Cremonesi 1967, sl. 4; Gilli i Montagnari Kokelj 1993, sl. 31, 32; 1994, sl. 14, 15, 26, 28, 30, 33, 34), pa i kasnije.

2.c. ZDJELE S-PROFILA USPRAVNOG ILI BLAGO UVUČENOG OBODA odgovaraju obliku 1.c.1 iz prethodne faze. Zastupljene su s četiri ulomka, od kojih je jedan pripadao zdjeli promjera 30 cm. Sudeći po objavljenim nalazima, zdjele ovog oblika češće se pojavljuju na prijelazu neolitika u eneolitik nego za ranijeg neolitičkog razdoblja (Cannarella i Cremonesi 1967, sl. 4; Gilli i Montagnari Kokelj 1993, sl. 32; 1994, sl. 14, 15, 26, 30, 32; Turk et al. 1993, T. 2; Vitasović 1999, T. 4, 8).

2.d. POSUDE NISKOG CILINDRIČNOG VRATA (T. 2. 7) odgovaraju obliku 1.d iz prethodne faze. Zastupljene su s tri ulomka posuda vrlo različitih veličina (promjeri oboda 8, 32 i 50 cm). Na drugim nalazištima ovakve posude obilježuju razdoblje prijelaza na eneolitik i sam eneolitik (Čečuk i Radić 2005, T. 80, 82; Forenbaher i Vranjican 1985, T. 3B; Gilli i Montagnari Kokelj 1994, sl. 13, 26; Marijanović 2005, 72; Montagnari Kokelj i Crismani 1993, sl. 9; Novak 1955; Turk et al. 1993, sl. 5, 6; Vitasović 1999, sl. 7, T. 3, 5, 7).

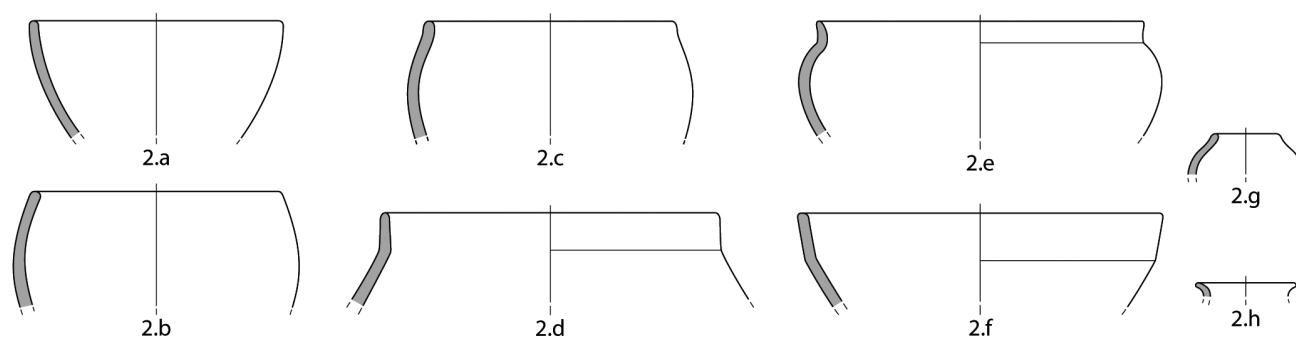
2.e. ZDJELE KRATKOG VRATA predstavljaju novost u ovoj fazi. Zastupljene su sa šest ulomaka srednjih i velikih posuda. Obilježuje ih konveksno zakrivljen profil tijela i kratak (uspravan ili blago razgrnut) vrat. Neke su bile ukrašene ureznom vodoravnom linijom koja odvaja vrat od trbuha te nizom okomitih ureza ispod nje (T. 2. 9). Ovaj oblik zdjele karakterističan je za razdoblje kasnog neolitika i eneolitika (Batović 1973, T. 11; Čečuk i Radić 2001, T. 6; 2005, T. 51; Marijanović

1999, Fig. 3; Cannarella and Cremonesi 1967, Fig. 4; Gilli and Montagnari Kokelj 1993, Fig. 31, 32; 1994, Fig. 14, 15, 26, 28, 30, 33, 34), and also later.

2.c. SLIGHTLY RESTRICTED BOWLS WITH RECURVING PROFILE, correspond to shape 1.c.1 from the previous phase. They are represented with four fragments, out of which a single one belonged to a bowl with a 30 cm diameter. Judging by the published finds, bowls of this type appear more frequently at the transition of the Neolithic to the Eneolithic than during the earlier Neolithic period (Cannarella and Cremonesi 1967, Fig. 4; Gilli and Montagnari Kokelj 1993, Fig. 32; 1994, Fig. 14, 15, 26, 30, 32; Turk et al. 1993, T. 2; Vitasović 1999, T. 4, 8).

2.d. VESSELS WITH A SHORT CYLINDRICAL NECK (T. 2. 7), correspond to shape 1.d from the previous phase. They are represented with three fragments of vessels varying greatly in size (rim diameters of 8, 32 and 50 cm). On other sites, vessels like this mark the transitional period to the Eneolithic, and the Eneolithic itself (Čečuk and Radić 2005, T. 80, 82; Forenbaher and Vranjican 1985, T. 3B; Gilli and Montagnari Kokelj 1994, Fig. 13, 26; Marijanović 2005, 72; Montagnari Kokelj and Crismani 1993, Fig. 9; Novak 1955; Turk et al. 1993, Fig. 5, 6; Vitasović 1999, Fig. 7, T. 3, 5, 7).

2.e. BOWLS WITH A SHORT NECK, represent a novelty in this phase. They are represented with six fragments of moderate to large vessels. They are characterized by a body profile that curves in a convex manner, and a short (upright or slightly everted) neck. Some of them were decorated with an incised horizontal line that divides the neck from the belly, and a series of vertical incisions below it (T. 2. 9). This bowl-shape is characteristic for the Late Neolithic and Eneolithic period (Batović 1973, T. 11; Čečuk and Radić 2001, T. 6; 2005, T. 51; Marijanović 2005, 66; Novak 1955; 1968, T. 12; 1974, T. 1; Snoj 1992, T. 2).



Sl. 14 Oblici posuda iz faze 2  
Fig. 14 Vessel shapes from Phase 2.



2005, 66; Novak 1955; 1968, T. 12; 1974, T. 1; Snoj 1992, T. 2).

2.f. DUBOKA BIKONIČNA ZDJELA pojavljuje se samo u ovoj fazi i zastupljena je samo jednim primjerkom, promjera oboda 31 cm (T. 2. 8). Površina posude obrađena je izrazitim metličastim prevlačenjem. Bliske analogije iz Istre ili Dalmacije nisu nam poznate.

2.g. ŠALICA S-PROFILA UVUČENOG OBODA zapravo je minijaturna verzija oblika 1.c.2 iz prethodne faze. Zastupljena je jednim primjerkom, promjera oboda 5 cm.

2.h. ŠALICA RAZGRNUTOG OBODA predstavlja novost u ovoj fazi. Zastupljena je jednim primjerkom, promjera oboda 6 cm. Posude razgrnutog oboda karakteristične su za kasnija razdoblja, dok su u ranom eneolitiku rijetke (Dimitrijević 1979, T. 48: 9).

#### *Ostali keramički nalazi*

Iz stratigrafskog konteksta ove faze potječe ulomak stožastog pršljena (T. 2. 6) koji se spaja s ulomkom iz faze 1 i ondje je opisan.

#### *Rasprava*

Iz faze 2 prikupljena je najmanja grupa nalaza. Zaključke donosimo na temelju samo 49 dijagnostičkih ulomaka pa ih stoga treba primiti s oprezom.

Malo više od polovice posuda prepoznatljivog oblika pripada tipovima koji su prisutni već od prethodne srednjoneolitičke faze, no u ovoj se fazi pojavljuju u ponešto izmijenjenim omjerima (slika 15). Otvorene zdjele javljaju se podjednako često kao i u prethodnoj fazi, polukuglaste zdjele gotovo posve nestaju, a učestalost zdjela S-profila višestruko raste. Nešto manje od polovice posuda pripada novim oblicima. Najčešći od njih je zdjela kratkog vrata, a relativno su česte i posude niskog cilindričnog vrata, što je oblik karakterističan za kasni neolitik i eneolitik Dalmacije, Istre i Krasa.

Raznolikost oblika i veličina posuda ukazuje na različite namjene tih posuda, od pripremanja i konzumacije hrane, kako individualne, tako i zajedničke, do čuvanja namirnica u velikim posudama. Već smo spomenuli da su za kuhanje posebno pogodne posude hrapave i metlicom prevučene površine, kakve su ovdje prilično brojne. Neke su imale i male trakaste ručke (tablica 3) koje su olakšavale rukovanje. Sekundarno probušeni ulomci brojniji su nego u ostalim fazama te pokazuju da su se i u ovoj fazi oštećene posude popravljale i zadržavale u upotrebi.

Ukrašavanje urezivanjem prevladava i ovdje, no posude su općenito mnogo manje ukrašene nego u

2.f. DEEP CARINATED BOWLS appear only in this phase. They are represented with a single fragment with a rim diameter of 31 cm (T. 2. 8). The surface of the vessel is brushed. Close analogies from either Istria or Dalmatia are not known to us.

2.g. RESTRICTED CUP WITH RECURVING PROFILE. This is in fact a miniature version of shape 1.c.2 from the previous phase. It is represented with but a single specimen with a rim diameter of 5 cm.

2.h. CUP WITH EVERTED RIM. This is a novelty in this phase. It is represented with a single specimen whose rim diameter measures 6 cm. Vessels with everted rim are characteristic for later periods, whereas in the Early Eneolithic they appear only rarely (Dimitrijević 1979, T. 48: 9).

#### *Other pottery finds*

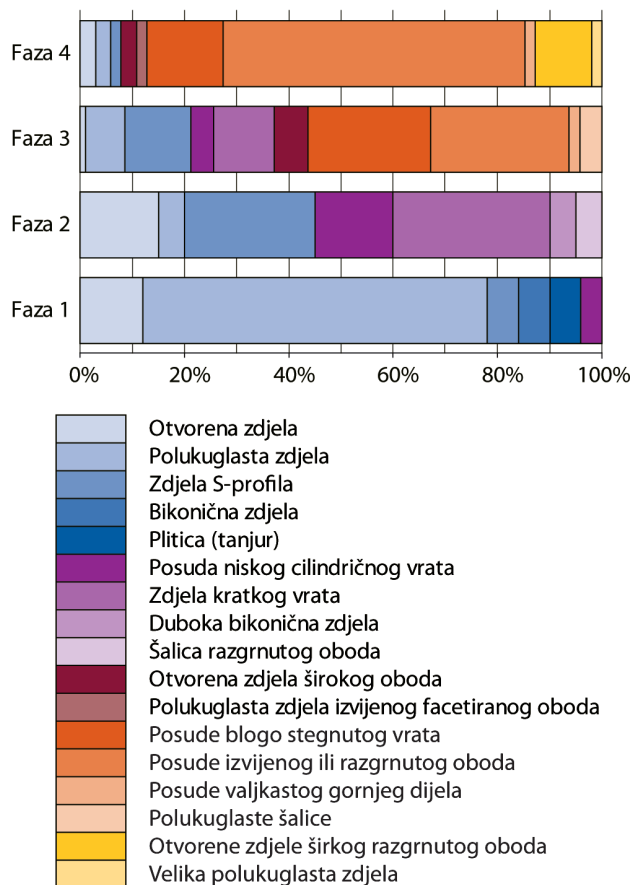
A fragment of a conical whorl (T. 2. 6) stems from the stratigraphic context of this phase; it conjoins with a previously described fragment from phase 1.

#### *Discussion*

The smallest group of finds was collected from Phase 2. We are drawing conclusions from a mere 49 diagnostic fragments, and they should therefore be taken with a certain degree of caution.

A little more than half of the vessels of a recognizable shape belong to types that were present already in the previous Middle Neolithic phase, but in this phase they appear in somewhat different frequencies (Figure 15). Open bowls appear just as often as in the previous phase, slightly restricted bowls disappear almost completely, and the frequency of bowls with recurving profile grows manifold. A little less than half of all the vessels belong to new types. The most common amongst these are bowls with a short neck, and vessels with a short cylindrical neck are also relatively common, which represents a shape that is characteristic for the Late Neolithic and Eneolithic of Dalmatia, Istria and the Karst region.

Diverse shapes and sizes indicate different purposes these vessels were used for, ranging from the preparation and consumption of food, be it on an individual or group basis, to the storage of foodstuffs in larger vessels. We have already mentioned that vessels with a brushed, coarse surface are particularly well suited for cooking. Such vessels appear here in rather substantial numbers. Some of them were also equipped with small strap handles (Table 3) that facilitated handling. Fragments featuring secondary perforations are more numerous when compared with



Sl. 15 Učestalost oblika posuda po fazama  
Fig. 15 Frequency of vessel shapes by phase.

prethodnoj fazi (slika 6). Njihova površina uglavnom je neglačana, tek ponekad ovlaš glačana ili glačana, a bilježimo i jedan ulomak s premazom. Posebno je zanimljiv velik broj posuda s metličasto prevučenom površinom (slika 13).

Takozvana “metličasta keramika” pojavljuje se u Istri i na Krasu od neolitika do brončanog doba. To je gruba keramika homogene strukture, crvene, smeđe ili sive boje, često s primjesama malih zrna kvarca (Buršić-Matijašić 1994, 247), s karakteristično obrađenom površinom koja izgleda kao da je bila prevučena metlicom dok je još bila vlažna. Osim na mnogim istarskim nalazištima (Buršić-Matijašić 1994; Čuka 2009, 20; Komšo 2003, 45; Percan et al. 2008, 347; Težak-Gregl 2009, 182; Zlatunić 2006, 270), zabilježena je u špiljama tršćanskog i slovenskog Krasa (Barfield 1999, sl. 3, 12; Gilli i Montagnari Kokelj 1994, sl. 14, 15, 28-32; Turk et al. 1993, T. 4), na Kvarneru (Miroslavljević 1959, 164; 1968, T. 29; 1974, 66, sl. 1) i u Lici (Drechsler-Bižić 1984, T. I). Različiti autori uglavnom je smatraju eneolitičkom, no ne slažu se oko njene preciznije datacije. Petrić (1979, 233-236), Čović

other phases, which shows that damaged vessels were repaired in this phase as well, in order to be able to use them further down the line.

Here too, decoration by incision is prevalent, but vessels are in general a lot less decorated than in the previous phase (Figure 6). Their surface is mostly not burnished, only sometimes it is casually burnished, or burnished, and we also recorded a slipped fragment. The large number of vessels with a brushed surface is especially interesting (Figure 13).

So-called “brushed pottery” appears in Istria and in the Karst region from the Neolithic period to the Bronze Age. This is coarse ware with a homogeneous structure, red, brown or grey in color, often tempered with quartzite grit (Buršić-Matijašić 1994, 247), with a characteristically treated surface that appears to be brushed while it was still humid. Except on many Istrian sites (Buršić-Matijašić 1994; Čuka 2009, 20; Komšo 2003, 45; Percan et al. 2008, 347; Težak-Gregl 2009, 182; Zlatunić 2006, 270), it was also recorded in caves of the Trieste and Slovenian Karst (Barfield 1999, Fig. 3, 12; Gilli and Montagnari Kokelj 1994, Fig. 14, 15, 28-32; Turk et al. 1993, T. 4), in Kvarner Bay (Miroslavljević 1959, 164; 1968, T. 29; 1974, 66, Fig. 1), and in Lika (Drechsler-Bižić 1984, T. I). Different authors ascribe it mostly to the Eneolithic period, but disagree about a more precise dating. Petrić (1979, 233-236), Čović (1983, 120) and Govedarica (1989, 71) ascribe it to the Late Eneolithic and Early Bronze Age, because in several caves (Srbani, Cingarela and Podosojna) it was discovered together with pottery from the Ljubljana culture, and in the settlement of Javorika-Gromače together with bronze daggers that were defined into the Br A1 phase of the Early Bronze Age. In contrast to this, Leben (1973, 148), Gilli and Montagnari Kokelj (1994, 189), Turk et al. (1993), and Barfield (1999, 59) ascribe brushed pottery to the Neolithic/Eneolithic or Early Eneolithic, similar to Bačić (1956, 335; 1972, 34; 1978, 168), who ascribes it to the Late Neolithic or Early Eneolithic, or simply to the Eneolithic. Their conclusions are based on finds from caves in Istria and the Karst region, where brushed pottery occurs only sporadically, often in layers that are older than the layers containing Ljubljana or Cetina culture pottery. Vitasović (1999, 30-31) likewise agrees with such a dating on the basis of finds unearthed in the settlement of Javorika-Gromače. Buršić-Matijašić (1994, 251, 255-256) is of the opinion that brushed pottery is primarily an Eneolithic phenomenon connected with the Late Hvar, Nakovana and Ljubljana culture, and that it is also characteristic for concurrent cultures in Italy, Austria and Hungary.

Such varied opinions are above all the consequence of the state of research, the excavation techniques, and the incomplete publication of a large number of sites.

(1983, 120) i Govedarica (1989, 71) pripisuju je kasnom eneolitiku i ranom brončanom dobu jer je u nekoliko špilja (Srbani, Cingarella i Podosojna) pronađena zajedno s keramikom ljubljanske kulture, a u naselju Javorika-Gromače zajedno s brončanim bodežima opredijeljenim u Br A1 stupanj ranog brončanog doba. Za razliku od toga, Leben (1973, 148), Gilli i Montagnari Kokelj (1994, 189), Turk et al. (1993) te Barfield (1999, 59) metličastu keramiku pripisuju neolitiku/eneolitiku ili ranom eneolitiku, slično kao i Bačić (1956, 335; 1972, 34; 1978, 168), koji je smješta u kasni neolitik ili rani eneolitik, ili jednostavno u eneolitik. Njihovi zaključci temelje se na nalazima iz špilja Istre i Krasa, gdje se metličasta keramika pojavljuje samo sporadično, često u slojevima starijim od slojeva s keramikom ljubljanske ili cetinske kulture. S takvom datacijom slaže se i Vitasović (1999, 30-31), na temelju nalaza iz naselja Javorika-Gromače. Buršić-Matijašić (1994, 251, 255-256) mišljenja je da je metličasto prevlačenje prvenstveno eneolitička pojava, povezana s kasnom hvarskom, nakovanskom i ljubljanskom kulturom, a karakteristična je i za istovremene kulture u Italiji, Austriji i Mađarskoj.

Ovakva različita mišljenja prije svega su posljedica stanja istraženosti, načina istraživanja te nepotpunog objavljivanja velikog broja nalazišta. Mnoga nalazišta istraživana su prilično davno, često bez bilježenja pouzdanih stratigrafskih podataka. Po svemu sudeći, metličasta keramika pojavljuje se od neolitika do brončanog doba i ne može se pripisati isključivo nekom užem razdoblju. Čini se da je nešto češća u eneolitiku, no dodatni problem predstavlja činjenica da eneolitički keramički stil na području Istre tek treba jasno definirati.

U Pupićinoj peći metličastu keramiku iz faze 2 prilično je lako razlikovati od one iz faze 1. Kasnoneolitički/ranoeneolitički primjerci kao da su napravljeni oštrim potezima grube metlice koja je prilično ohrapavila površinu, dok je na srednjoneolitičkim primjercima obrada površine znatno nježnija (izvedena mekom metlicom ili možda krpom) pa je ponekad jedva vidljiva. Valja naglasiti da je metličasta keramika na ovom nalazištu vrlo rijetka nakon faze 2 (kasni neolitik/rani eneolitik), što se kosi s tezom da je ona obilježje kasnog eneolitika i ranog brončanog doba.

U prednjem dijelu Pupićine peći pronađen je ulomak bikonične zdjele ukrašen kaneliranjem na ramenu (Forenbaher i Kaiser 2006, 186, T. 5.9: 1). Njegov oblik i način ukrašavanja karakteristični su za eneolitičku nakovansku kulturu (Petrić 1976; Forenbaher 2000). Slični nalazi zabilježeni su u Istri u naselju Javorika-Gromače i špiljama Jačmica, Novačka i Oporovina (Težak-Gregl 2009, 181, 182). Među našim materijalom

Many sites have been explored quite some time ago, often without any records concerning reliable stratigraphic information. All things considered, it seems that brushed pottery was present in the period from the Neolithic to the Bronze Age, and that it can not be attributed exclusively to a specific period of time. It seems that it appears more often in the Eneolithic, but an additional problem is that the Eneolithic pottery style on the territory of Istria has yet to be clearly defined.

In Pupićina Cave it is relatively easy to distinguish brushed pottery from phase 2 from that of Phase 1. Late Neolithic/Early Eneolithic specimens seem to have been made by sharp strokes of a coarse brush that roughened the surface quite a bit, whereas on Middle Neolithic specimens the treatment of the surface is much more delicate (executed with a soft brush or perhaps a rag), so much so that at times it is barely visible. It should be pointed out that after Phase 2 (Late Neolithic/Early Eneolithic), brushed pottery is very rare on this site, which contradicts the assumption that it is a characteristic of the Late Eneolithic and the Early Bronze Age.

A fragment of a carinated bowl was recovered from the fore section of Pupićina Cave, which was decorated by channeling on the shoulder (Forenbaher and Kaiser 2006, 186, T. 5.9: 1). Its shape and mode of decoration are characteristic for the Eneolithic Nakovana culture (Petrić 1976; Forenbaher 2000). Similar finds were recorded in Istria at the Javorika-Gromače settlement, and in the Jačmica, Novačka and Oporovina caves (Težak-Gregl 2009, 181, 182). Amongst our material from Phase 2 there are no such fragments; however, in the disturbed context 605+606, a fragment of a carinated bowl with a cylindrical neck was discovered, which has traces of channels on the shoulder (T. 2. 5), and which may be attributed to Nakovana culture. Characteristics of Nakovana culture in Istria would be carinated vessels with a cylindrical neck, short-necked vessels, vessels with a low cylindrical neck, channeled decoration (Petrić 1979, 219-221, T. 14, 15), and considerable similarity with the Late Hvar culture (Dimitrijević 1979, T. 48; Težak-Gregl 2009, 181). All of this is present in the material recovered from Pupićina Cave.

With respect to the modest quantity of pottery finds, Phase 2 cannot be ascribed to a particular culture with certainty, but we can nonetheless ascribe it to the Late Neolithic or Early Eneolithic period on the basis of the general stylistic features of this pottery. The stratigraphic position of the context from which the pottery was taken, together with the sole radiocarbon date at our disposal, support such an attribution.

iz faze 2 nema takvih ulomaka, no u poremećenom kontekstu 605+606 pronađen je ulomak bikonične zdjele s cilindričnim vratom i tragovima kanelira na ramenu (T. 2. 5) koji bi se mogao pripisati nakovanskoj kulturi. Obilježja nakovanske kulture na istarskom području bile bi bikonične posude s cilindričnim vratom, posude s kratkim vratom, one s niskim cilindričnim vratom, zatim ukrašavanje kaneliranjem (Petrić 1979, 219–221, T. 14, 15) te dosta sličnosti s kasnom hvarskom kulturom (Dimitrijević 1979, T. 48; Težak–Gregl 2009, 181). Sve to prisutno je u materijalu iz Pupićine peći.

S obzirom na skromnu količinu keramičkih nalaza, fazu 2 ne možemo sa sigurnošću pripisati određenoj kulturi, no možemo je po općim stilskim obilježjima keramike vremenski smjestiti u kasni neolitik ili rani eneolitik. Stratigrafski položaj konteksta iz kojeg je keramika prikupljena, kao i jedini raspoloživi radiokarbonski datum, podupiru takvo opredjeljenje.

### **KERAMIKA FAZE 3 (KASNI ENEOLITIK/RANO BRONČANO DOBA)**

Grupa nalaza ove faze sastoji se od 1.566 ulomaka, ukupne težine veće od 20 kg. Ulomci su u prosjeku neznatno veći nego u prethodnoj fazi, s indeksom razlomljenosti od oko 72 ulomka po kilogramu (tablica 1). Kao dijagnostičke izdvojili smo 196 ulomaka.

Zabilježili smo osam tipova oboda, što znači da je njihova raznolikost veća nego u prošlim fazama. Kao i ranije, najbrojniji su jednostavni zaobljeni obodi, slijede jednostavni zaravnjeni obodi, a javljaju se oni izvana ili iznutra zadebljani, zaravnjeni i izvana zadebljani, trakasto zadebljani, široki zaravnjeni te zakošeni obodi (slika 4, tablica 2). Podjednako su zastupljeni uspravni i izvučeni oblici.

Dna su najčešće ravna, slijede ravna profilirana dna, a pojavljuje se i posuda na niskoj nozi (T. 3. 6) (slika 5). Sudeći po pretežno strmim nagibima stijenki neposredno iznad dna, mnoge posude bile su relativno duboke i uske. Na dva ulomka dna vide se otisci podloge od tkanine ili pletene slame na kojoj su se posude sušile (T. 3. 7).

Među 19 ulomka iz kategorije ručki prevladavaju trakaste ručke (T. 3. 8; 4. 3), od kojih je jedna sedlastog presjeka. Bilježimo i ručke ovalnog presjeka, koje nadvisuju obod i završavaju na njemu (T. 4. 1, 2), koljenastu ručku s pločicom i tunelastu ručku te samo jednu horizontalnu ušicu (T. 4. 9) (tablica 3).

Udio ukrašenih ulomaka (2,1%) manji je nego u bilo kojoj drugoj fazi. Najčešća tehnika ukrašavanja i dalje je urezivanje. Čest ukras je vodoravna urezana linija na vrhu ramena (T. 3. 2), ponekad popraćena

### **PHASE 3 POTTERY (LATE ENEOLITHIC/EARLY BRONZE AGE)**

The assemblage from this phase includes 1,566 fragments with a total weight in excess of 20 kg. On the average these fragments are slightly bigger in comparison with the previous phase, the fragmentation index is approximately 72 fragments per kilogram (Table 1). A total of 196 fragments have been singled out as diagnostic fragments.

We recorded eight types of rims, which makes this phase more diverse in comparison to the previous ones. As was already the case, simple, rounded rims are still prevalent, followed by simple rims, externally or internally thickened, flat and externally thickened, massive externally thickened, wide and flat, and bevelled rims (Figure 4, Table 2). Upright and everted shapes are equally represented.

Flat bases prevail, followed by prominent flat bases, and there is also a vessel on a low pedestal (T. 3. 6) (Figure 5). Judging by the mostly steep slants of the walls immediately above the base, we can conclude that many vessels were relatively deep and narrow. Visible on two base fragments are impressions made by cloth or braided straw on which the vessels were put to dry (T. 3. 7).

Prevalent amongst the 19 handle fragments are strap handles (T. 3. 8; 4. 3), one of which has a saddle-shaped cross-section. We also recorded handles with an oval cross-section, which overtop the rim and end on it (T. 4. 1, 2), a flat-top handle, a tunnel-handle as well as a single horizontally perforated lug handle (T. 4. 9) (Table 3).

The frequency of decorated fragments (2.1%) is lower than in any other phase. The most common decorative technique remains incision. A frequent decoration is an incised horizontal line on top of the shoulder (T. 3. 2), which is at times accompanied with small impressions or short oblique incisions, and then there is also the hatched triangle motif (T. 4. 12). Incisions are followed by finger impressions (T. 3. 5; 4. 8), punctate impression (T. 4. 4, 10), and appliqué. The appliqué elements can be in the shape of a rib, a horseshoe (T. 3. 9), a nub (T. 3. 10), or a lug handle. Four fragments were decorated with a combination of techniques: appliqué and impression (T. 3. 4), incision and impression, incision and wide incision (T. 4. 6), and furrowed incision and impression (T. 4. 11). Furrowed incision also appears as an independent decoration (T. 4. 7). A single fragment is decorated with triangles executed by impression, featuring the “barbed wire” motif (T. 4. 5) (Harrison 1980: 26).

The last two techniques were popular in the Late Eneolithic and the Early Bronze Age within Ljubljana and Early Cetina culture (Buršič–Matijašić 2003, 60; Čuka 2009, T. 3, Čečuk and Radić 2001, Fig. 24, 25, T.



ubodima ili kratkim poprečnim urezima, a pojavljuje se i motiv šrafiranih trokuta (T. 4. 12). Za urezivanjem slijedi utiskivanje prsta (T. 3. 5; 4. 8), ubadanje (T. 4. 4, 10) i apliciranje. Aplikacije mogu imati oblik rebra, potkove (T. 3. 9), bradavice (T. 3. 10) ili jezičaste drške. Četiri ulomka ukrašena su kombinacijom tehnika: apliciranjem i utiskivanjem (T. 3. 4), urezivanjem i utiskivanjem, urezivanjem i žlijebljenjem (T. 4. 6) te brazdastim urezivanjem i utiskivanjem (T. 4. 11). Brazdasto urezivanje pojavljuje se i kao samostalan ukras (T. 4. 7). Jedan ulomak ukrašen je trokutima izvedenim tehnikom utiskivanja "motiva bodljikave žice" (T. 4. 5) (Harrison 1980: 26).

Zadnje dvije tehnike popularne su u kasnom eneolitiku i ranom brončanom dobu u sklopu ljubljanske i rane cetinske kulture (Buršić-Matijašić 2003, 60; Čuka 2009, T. 3, Čečuk i Radić 2001, sl. 24, 25, T. 8; 2005, sl. 41, T. 87, 91, 94; Gilli i Montagnari Kokelj 1993, 35, 38, 47; 1996, sl. 34; Korošec i Korošec 1974; Leben 1967, T.1; Marović i Čović 1983, T. 30, 34; Mihovilić 2001, sl. 40; Milošević i Govedarica 1986, T. 2-5, 7-10; Montagnari Kokelj i Crismani 1997, Sl. 10, 13, 15), a slični načini ukrašavanja pojavljuju se u tom razdoblju na zvonastim peharima širom zapadne i srednje Europe (Nicolis 2001). Istoj grupi nalaza može se pripisati ulomak male posude tankih stijenki iz prednjeg dijela Pupićeve peći, ukrašene češljastim utiskivanjem na način uobičajen za ranu cetinsku kulturu (Forenbaher i Kaiser 2006, 186, T. 5.9, 2). Ovako izvedeni geometrijski motivi često su bili ispunjeni bijelom inkrustacijom (Buršić-Matijašić 2003, 59).

Udio neglačanih ulomaka veći je nego u bilo kojoj drugoj fazi. Za njima slijede znatno malobrojniji ovlaš glačani ulomci, dok su ulomci s izrazito grubom površinom rijetki. Valja naglasiti da samo tri ulomka (1,5%) imaju metličasto prevučenu površinu (T. 3. 4) (slika 13). U prethodnoj raspravi spomenuli smo da pojedini autori smatraju metličastu keramiku glavnim obilježjem prijelaza kasnog eneolitika u brončano doba. Na ovom lokalitetu to očito nije tako.

#### *Oblici posuda*

U ovoj fazi razlikujemo dvanaest oblika posuda (slika 16). Sedam od njih poznajemo iz prethodnih faza, dok pet novih već uvelike podsjeća na one kasnije brončanodobne. Promjeri oboda u prosjeku su bliski onima iz faze 1 (slika 10), no pri tome treba imati na umu da je posuda stegnutog vrata znatno veća od polukuglaste ili otvorene zdjele istog promjera oboda. Debljine stijenki ne razlikuju se bitno od onih u prethodnim fazama, iako raste broj izrazito debelih ulomaka (slika 11).

8; 2005, Fig. 41, T. 87, 91, 94; Gilli and Montagnari Kokelj 1993, 35, 38, 47; 1996, Fig. 34; Korošec and Korošec 1974; Leben 1967, T.1; Marović and Čović 1983, T. 30, 34; Mihovilić 2001, Fig. 40; Milošević and Govedarica 1986, T. 2-5, 7-10; Montagnari Kokelj and Crismani 1997, Fig. 10, 13, 15), and similar decoration appears in this period on bell beakers throughout western and central Europe (Nicolis 2001). A fragment of a small vessel with thin walls from the fore section of Pupićina Cave, decorated by comb impression in the manner typical for the Early Cetina culture, may be added to the same group of finds (Forenbaher and Kaiser 2006, 186, T. 5.9, 2). Thus executed geometrical motifs were often filled with a white incrustation (Buršić-Matijašić 2003, 59).

The frequency of non-burnished fragments is higher than in any other phase. Casually burnished fragments follow, albeit in considerably smaller numbers, whereas fragments with a distinctly coarse surface are rare. It should be pointed out that only three fragments (1.5%) have a brushed surface (T. 3. 4) (Figure 13). In the previous discussion we mentioned that some authors believe that brushed pottery is the main characteristic of the transitional period from the Late Eneolithic to the Bronze Age. On this site that is obviously not the case.

#### *Vessel shapes*

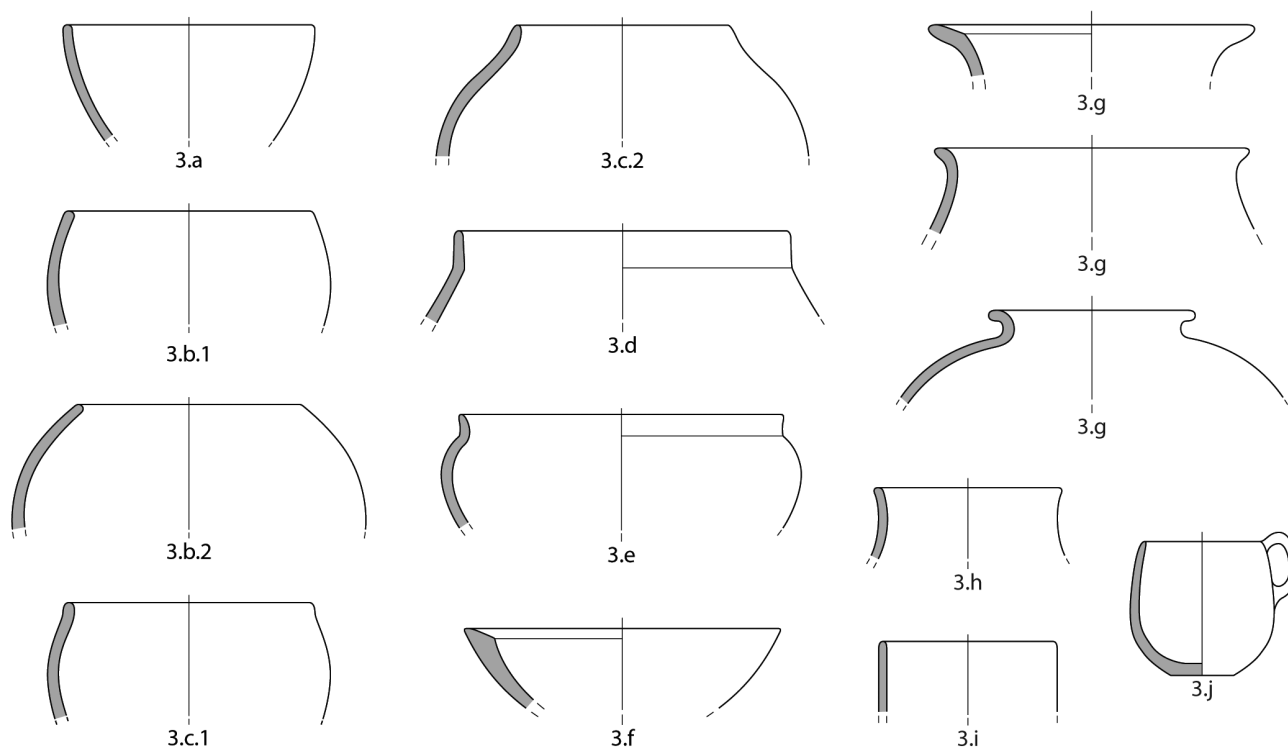
In this phase we differentiate twelve vessel shapes (Figure 16). Seven of these are familiar to us from previous phases, while the five new ones resemble the later ones from the Bronze Age. Rim diameters are on average similar to those from Phase 1 (Figure 10); however, one should not forget that a vessel with a constricted neck is considerably larger than a hemispherical or open bowl with the same rim diameter. Wall thickness does not differ much in comparison with previous phases, even though the number of considerably thicker fragments is on the increase (Figure 11).

3.a. OPEN BOWLS correspond to the Neolithic shape 1.a from the previous phase. They are represented with but a single mid-sized fragment.

3.b.1. SLIGHTLY RESTRICTED BOWLS correspond to the Neolithic shape 1.b.1. They are represented with six fragments of mid-sized vessels, some of which were decorated with incision and wide incision.

3.b.2. RESTRICTED BOWLS correspond to the Neolithic shape 1.b.2. They are represented here with a single fragment of a mid-sized vessel. Three other fragments belonging to smaller or mid-sized bowls (type 3.b.1 or 3.b.2) cannot be classified more closely.





Sl. 16 Oblici posuda iz faze 3  
Fig. 16 Vessel shapes from Phase 3.

3.a. OTVORENA ZDJELA odgovara neolitičkom obliku 1.a iz prethodne faze. Zastupljena je samo jednim ulomkom posude srednje veličine.

3.b.1. POLUKUGLASTE ZDJELE USPRAVNOG ILI BLAGO UVUČENOG OBODA odgovaraju neolitičkom obliku 1.b.1. Zastupljene su sa šest ulomaka posuda srednje veličine, od kojih su neke bile ukrašene urezivanjem i žlijebljenjem.

3.b.2. POLUKUGLASTA ZDJELA UVUČENOG OBODA odgovara neolitičkom obliku 1.b.2, a ovdje je zastupljena jednim ulomkom posude srednje veličine. Još tri ulomka manjih ili srednje velikih polukuglastih zdjela (tipa 3.b.1 ili 3.b.2) ne mogu se pobliže opredijeliti.

3.c.1. ZDJELE S-PROFILA USPRAVNOG ILI BLAGO UVUČENOG OBODA odgovaraju neolitičkom obliku 1.c.1. Zastupljene su s deset ulomaka posuda promjera oboda od 11 do 40 cm te su ponekad ukrašene utiskivanjem.

3.c.2. ZDJELE S-PROFILA UVUČENOG OBODA odgovaraju neolitičkom obliku 1.c.2. Zastupljene su dvama ulomcima poteklim od jedne omanje i jedne velike posude.

3.d. POSUDE NISKOG CILINDRIČNOG VRATA odgovaraju neolitičkom obliku 1.d, a ovdje su zastupljene s četiri ulomka posuda većih zdjela.

3.c.1. SLIGHTLY RESTRICTED BOWLS WITH RECURVING PROFILE, correspond to the Neolithic shape 1.c.1. They are represented with ten fragments of vessels with a rim diameter ranging from 11 to 40 cm. Sometimes they are decorated with impressions.

3.c.2. RESTRICTED BOWLS RECURVING PROFILE, correspond to the Neolithic shape 1.c.2. They are represented with two fragments that come from one smaller and one larger vessel.

3.d. VESSELS WITH A SHORT CYLINDRICAL NECK, correspond to the Neolithic shape 1.d. Here they are represented with four fragments of larger vessels.

3.e. BOWLS WITH A SHORT NECK, correspond to shape 2.e from the previous phase. They are represented with 11 fragments (9 rims and two shoulder-and-body fragments) of mid-sized and large vessels, some of which were decorated with a horizontal line on the shoulder (T. 3. 2), and vertical incisions underneath it.

3.f. OPEN BOWLS WITH A WIDE RIM, differ from open bowls of the 3.a type in that they have wide, flat rims. They are represented with six fragments of both small and large vessels (diameters of 10, 13, 30 and 50 cm). Only a single one was decorated with triangles that were

3.e. ZDJELE KRATKOG VRATA odgovaraju obliku 2.e iz prethodne faze. Zastupljene su s 11 ulomaka (9 oboda i 2 ulomka ramena i trbuha) srednjih i velikih posuda, od kojih su neke bile ukrašene vodoravnom linijom na ramenu (T. 3. 2) i okomitim urezima ispod nje.

3.f. OTVORENE ZDJELE ŠIROKOG OBODA razlikuju se od otvorenih zdjela tipa 3.a po svojim širokim, zaravnjenim obodima. Zastupljene su sa šest ulomaka malih i velikih posuda (promjera 10, 13, 30 i 50 cm). Samo je jedna od njih bila ukrašena trokutima izvedenim tehnikom utiskivanja "motiva bodljikave žice" po širokom obodu i ispod oboda s vanjske strane (T. 4. 5).

Ovakve su zdjele jedno od obilježja po kojem se izdvaja kasni eneolitik i prijelaz na rano brončano doba. Česte su na području Istre, Krasa i Dalmacije u ljubljanskoj i cetinskoj kulturi (Barfield 1999, sl. 12; Batović 1973, T. 22; Čečuk i Radić 2001, T. 8; 2005, T. 87; Čović 1983, sl. 10; Gilli i Montagnari Kokelj 1993, sl. 50; 1996, sl. 41, 42; Korošec 1973, T. 5; Leben 1967, T. 1; Marović 1991, sl. 2, 19, 32, 39, 62, 77; Marović i Čović 1983, sl. 14, 15, T. 30; Mihovilić 2001, T. 110, sl. 40; Milošević i Govedarica 1986, T. 1, 7, 10, 11; Petrić 1980, sl. 1). Često su po obodu i ispod njega ukrašene motivima izvedenim utiskivanjem nazubljenog kotačića ili češlja, "motivom bodljikave žice", urezivanjem ili brazdastim urezivanjem.

3.g. POSUDE IZVIJENOG ILI RAZGRNUTOG OBODA obilježava stegnut vrat i više ili manje razgrnut obod, pri čemu stupanj stegnutosti vrata, kao i nagib izvijenog ili razgrnutog oboda mogu znatno varirati. Ova široko definirana kategorija ujedno je i najzastupljenija, s ukupno 25 ulomaka posuda različitih veličina i prilično raznolikih oblika (T. 3. 3, 9; 4. 4). Njihov donji dio u većini slučajeva nam nije poznat te se ne može utvrditi radi li se o zdjelama, loncima ili vrčevima, dok bismo neke manje primjerke mogli svrstati među šalice. Mogu imati ručke, ponekad su ukrašene apliciranjem, ubadanjem ili urezivanjem, a u četiri primjerka razgrnuti obod bio je facetiran. Jedan ulomak sekundarno je probušen radi krpanja.

Posude izvijenog ili razgrnutog oboda vrlo su brojne potkraj eneolitika i tijekom brončanog doba. Javljaju se u obliku lonaca, zdjela, vrčeva i šalica i ponekad imaju jednu ili više ručki (Barfield 1999, sl. 15; Buršić-Matijašić 2003, 58; Cannarella i Pitti 1981, sl. 5; Gilli i Montagnari Kokelj 1993, sl. 34, 43, 45; 1994, sl. 34; 1996, sl. 34, 37; Montagnari Kokelj i Crismani 1997, sl. 11, 12; Forenbaher i Kaiser 2008, sl. 17).

executed by "barbed wire" impression on the wide rim and underneath it on the outer side (T. 4. 5).

Such bowls represent one of the characteristics that define the Late Eneolithic and the transition to the Early Bronze Age. They are common on the territory of Istria, the Karst and Dalmatia in contexts of the Ljubljana and Cetina culture (Barfield 1999, Fig. 12; Batović 1973, T. 22; Čečuk and Radić 2001, T. 8; 2005, T. 87; Čović 1983, Fig. 10; Gilli and Montagnari Kokelj 1993, Fig. 50; 1996, Fig. 41, 42; Korošec 1973, T. 5; Leben 1967, T. 1; Marović 1991, Fig. 2, 19, 32, 39, 62, 77; Marović and Čović 1983, Fig. 14, 15, T. 30; Mihovilić 2001, T. 110, Fig. 40; Milošević and Govedarica 1986, T. 1, 7, 10, 11; Petrić 1980, Fig. 1). They are often decorated on the rim and underneath it with comb-impressed or wheel-impressed motifs, and with the "barbed wire motif", as well as with incisions and furrowed incisions.

3.g. VESSELS WITH AN EVERTED OR FLANGED RIM are characterized by a constricted neck, and the more or less everted rim. The degree of constriction of the neck, as well as the slant of the everted or flanged rim, can both vary considerably. This broadly defined category is at the same time the most represented one, with 25 fragments of vessels of different size and shape (T. 3. 3, 9; 4. 4). The appearance of their lower section is in most cases unknown to us and we are therefore not able to determine whether they represent bowls, jars or jugs, while some smaller specimens could be classified as cups. They can be equipped with handles, and are sometimes decorated with appliqué, punctate decoration or incision; there are four specimens with a faceted flanged rim. A single fragment has a secondary perforation used for mending.

Vessels with an everted or flanged rim are very common towards the end of the Eneolithic and during the Bronze Age. They appear in the shape of jars, bowls, jugs and cups, and are at times equipped with one or more handles (Barfield 1999, Fig. 15; Buršić-Matijašić 2003, 58; Cannarella and Pitti 1981, Fig. 5; Gilli and Montagnari Kokelj 1993, Fig. 34, 43, 45; 1994, Fig. 34; 1996, Fig. 34, 37; Montagnari Kokelj and Crismani 1997, Fig. 11, 12; Forenbaher and Kaiser 2008, Fig. 17).

3.h. VESSELS WITH A SLIGHTLY CONSTRICTED NECK are likewise very common and are represented with 22 fragments of small and mid-sized vessels. The shape of the lower section of these vessels is likewise unknown to us, but their common feature is a slightly concave upper section that in contrast to the previous 3.g type does not end with a conspicuously everted rim. Some of these vessels had massive externally thickened rims (T. 3. 1)(Figure 4), which is a feature that appears only in this



Sl. 17 Polukuglaste šalice iz faze 3 (kasni eneolitik/rano brončano doba)  
Fig. 17 Hemispherical cups from Phase 3 (Late Eneolithic/Early Bronze Age).

3.h. POSUDE BLAGO STEGNUTOG VRATA također su vrlo česte, zastupljene s 22 ulomka posuda malih i srednjih dimenzija. Ni ovdje nam nije poznat oblik donjih dijelova posuda, no zajedničko im je obilježje blago konkavno profiliran gornji dio, koji, za razliku od prethodnog tipa 3.g, ne završava značajnije izvijenim obodom. Neke od ovih posuda imale su trakasto zadebljane obode (T. 3. 1) (slika 4) kakvi se pojavljuju samo u ovom razdoblju (tablica 2), a neke su bile ukrašene utiskivanjem i apliciranjem (T. 3. 4).

3.i. POSUDE VALJKASTOG GORNJEG DIJELA imaju jednostavan, valjkasto oblikovan gornji dio koji završava uspravnim obodom, dok nam oblik donjeg dijela ovih posuda nije poznat. Zastupljene su dvama ulomcima (jedan veličine šalice, drugi od posude srednje veličine). Ne može se isključiti mogućnost da se radi o ulomcima duljih cilindričnih vratova trbušastih posuda.

period (Table 2), and still others were decorated with impression and appliqué elements (T. 3. 4).

3.i. VESSELS WITH A CYLINDRICAL UPPER SECTION have a simple cylindrical upper part that terminates with an upright rim, while the shape of the lower section of these vessels is unknown to us. They are represented with two fragments (one has the size of a cup, the other is from a mid-sized vessel). We cannot rule out the possibility that we are dealing with fragments of globular vessels with a long cylindrical neck.

3.j. HEMISPHERICAL CUPS have a flat base, and a profile rounded in a convex manner, which ends with an upright rim. They are represented with four specimens. Two undecorated cups, both of them 7 cm high, were almost entirely preserved (Figure 17). One of them has an oval cross-section handle that ends on the rim (T. 4. 1), whereas the other had two such handles, one of which was broken off (T. 4. 2).

#### Discussion

The largest pottery assemblage belongs to Phase 3. Approximately a third of the vessels of a recognizable shape still belong to Neolithic and Eneolithic types known from previous phases (around 25% from Phase 1, and around 10% from Phase 2), and which continue to appear in similar proportions as in the previous phase (Figure 15). Almost half of the vessels have novel shapes. Their common characteristics are a rounded body, a more or less constricted neck, and a rim that is at least slightly everted or flanged. The appearance of open bowls with a wide rim (T. 4. 5) represents an important novelty.

As far as size is concerned, the vessels range from small cups to deep bowls and large jars. Many of these vessels were equipped with handles whose number and diversity are on the increase (T. 3. 8; 4. 1, 2, 3, 9)(Table 3). A multitude of different shapes and sizes of these vessels indicates different usage contexts. The coarsely manufactured larger vessels with a constricted neck could have been used for cooking, while the consumption of food and beverages could have taken place either on an individual basis (cups and small vessels) or on a group basis (larger bowls). Large jars, especially those with a constricted neck, were suitable for the storage of foodstuffs.

Although pottery from this phase is the least decorated one, there is great variety when it comes to decorative techniques and motifs. Incision is still prevalent but the frequency of impression and appliqué is on the increase. Furrowed incision and “barbed wire” impression represent rare albeit important novelties.



3.j. POLUKUGLASTE ŠALICE imaju ravno dno i konveksno zakrivljen profil koji završava uspravnim obodom. Zastupljene su s četiri primjerka. Dvije neukrašene šalice, obje visoke oko 7 cm, sačuvane su gotovo u cijelosti (slika 17). Jedna ima ručku ovalnog presjeka koja završava na obodu (T. 4. 1), dok je druga imala dvije takve ručke od kojih je jedna odlomljena (T. 4. 2).

### Rasprava

Fazi 3 pripada najveća grupa keramičkih nalaza. Oko trećine posuda prepoznatljivog oblika još uvijek pripada neolitičkim i eneolitičkim tipovima prisutnim već od ranije (oko 25% od faze 1 te oko 10% od faze 2) koji se nastavljaju pojavljivati u sličnim omjerima kao u prethodnoj fazi (slika 15). Skoro polovica posuda pripada novim oblicima, čija su zajednička obilježja zaobljeno tijelo, manje ili više stegnut vrat te barem malo izvučen, izvijen ili razgrnut obod. Značajnu novost predstavlja pojava otvorenih zdjela širokog oboda (T. 4. 5).

Raspon veličina posuda kreće se od malih šalica do dubokih zdjela i velikih lonaca. Mnoge od njih su imale ručke čiji broj i raznolikost raste (T. 3. 8; 4. 1, 2, 3, 9) (tablica 3). Mnoštvo različitih oblika i veličina posuda ukazuje na različite kontekste upotrebe. Veće i grublje posude stegnutog vrata mogle su se upotrebljavati za kuhanje, dok je konzumacija hrane i pića mogla biti individualna (šalice i male posudice) ili zajednička (veće zdjele). Veliki lonci, naročito oni stegnutog vrata, pogodni su za čuvanje namirnica.

Iako je keramika ove faze najmanje ukrašena, tehnike i motivi ukrašavanja su najraznovrsniji. I dalje prevladava urezivanje, no učestalost utiskivanja i apliciranja se povećava. Rijetke, ali značajne novosti su brazdasto urezivanje i utiskivanje "motiva bodljikave žice".

Vrlo raznolika i često oprečna mišljenja različitih autora svjedoče o za sada još uvijek nepremostivim problemima definiranja kasnog eneolitika i ranog brončanog doba u Istri, a i na cijeloj istočnoj jadranskoj obali (Batović 1973; Dimitrijević 1967; 1979; 1979a; Govedarica 1988-1989; Korošec 1959; 1973; Marović i Čović 1983; Milošević i Govedarica 1986; Mirosavljević 1974; Petrić 1979). Nejasni odnosi ljubljanske kulture, cetinske kulture i metličaste keramike (Della Casa 1995; Gilli i Montagnari Kokelj 1993; Govedarica 1988-1989; Marijanović 1991) proizlaze prije svega iz stanja istraženosti tih područja. Mnoga nalazišta istraživana su davno, često nedostaju pouzdani stratigrafski podaci, a radiokarbonski datumi su malobrojni i nepouzdati (Forenbaher i Kaiser 1999). Zbog toga se ne može sa sigurnošću tvrditi čak niti to da je ljubljanska (ranocetinska) keramika doista ranija od klasične cetinske

The very varied and often contradictory opinions presented by different authors testify of the currently insurmountable problems when it comes to the definition of the Late Eneolithic and Early Bronze Age not only in Istria but on the entire eastern Adriatic coast (Batović 1973; Dimitrijević 1967; 1979; 1979a; Govedarica 1988-1989; Korošec 1959; 1973; Marović and Čović 1983; Milošević and Govedarica 1986; Mirosavljević 1974; Petrić 1979). The muddled relationship among the Ljubljana culture, the Cetina culture and brushed pottery (Della Casa 1995; Gilli and Montagnari Kokelj 1993; Govedarica 1988-1989; Marijanović 1991) stem primarily from the state of research of these regions. Many of the sites were explored a long time ago, reliable stratigraphic information is often not available, and radiocarbon dates are few and unreliable (Forenbaher and Kaiser 1999). These are the reasons why it is not even possible to claim with certainty that Ljubljana (Early Cetina) pottery is earlier than classic Cetina or brushed pottery. On the contrary, it is ever more apparent that these styles often appear together (Della Casa 1995; Gilli and Montagnari Kokelj 1993; Govedarica 1988-1989; Marijanović 1991; Milošević and Govedarica 1986). The typical, decorated Ljubljana and Cetina pottery finds are, as a rule, very few in number in relation to other pottery, as if though they represent a specific manner of vessel decoration intended for particular purposes. In order to define an archaeological culture in the traditional sense, it would at least be necessary to systematically analyze the entire pottery assemblage, something that was never done on any major site to date.

Phase 3 pottery from the interior section of Pupičina Cave displays general characteristics of the Eneolithic, the Ljubljana and Cetina culture, and the Istrian Early bronze Age. A single radiocarbon date puts it around the middle of the 3<sup>rd</sup> millennium BC, which corresponds to the transitional period from the Eneolithic to the Early Bronze Age, but we do not know how long this phase actually lasted. It may represent a longer period of accumulation of finds that feature characteristics of different cultures that were not contemporaneous. On the other hand, it may represent a relatively short period, when different ceramographic styles were in use simultaneously, which different authors regard as different cultures.

### PHASE 4 POTTERY (MIDDLE BRONZE AGE)

The assemblage from this phase includes 1,225 fragments with a total weight in excess of 25 kg. The fragments are rather large in comparison with other phases, with



ili pak metličaste keramike. Dapače, sve više izgleda da se ulomci tih stilova često pojavljuju zajedno (Della Casa 1995; Gilli i Montagnari Kokelj 1993; Govedarica 1988–1989; Marijanović 1991; Milošević i Govedarica 1986). Tipični ukrašeni ljubljanski i cetinski nalazi u pravilu su malobrojni u odnosu na ostalu keramiku, kao da se radi o specifičnom stilu ukrašavanja posuda namijenjenih određenoj svrsi. Za definiranje arheološke kulture u tradicionalnom smislu trebalo bi u najmanju ruku sustavno proanalizirati cjelokupni keramički materijal, što za sada nije učinjeno niti na jednom značajnijem nalazištu.

Keramika faze 3 unutrašnjeg dijela Pupićine peći pokazuje opća obilježja eneolitika, ljubljanske i cetinske kulture te istarskog ranog brončanog doba. Jedini radiokarbonski datum smješta je oko sredine 3. tisućljeća pr. Kr. što bi odgovaralo vremenu prijelaza iz eneolitika u rano brončano doba, no ne znamo koliko je ova faza trajala. Ona možda predstavlja duže razdoblje akumuliranja nalaza s obilježjima različitih kultura koje nisu bile istovremene. S druge strane, možda predstavlja jedan relativno kratki vremenski odsječak kada su istovremeno bili u upotrebi različiti keramografski stilovi koje različiti autori smatraju različitim kulturama.

#### **KERAMIKA FAZE 4 (SREDNJE BRONČANO DOBA)**

Grupa nalaza ove faze sastoji se od 1.225 ulomaka, ukupne težine veće od 25 kg. Ulomci su prilično veliki u usporedbi s ostalim fazama, s indeksom razlomljenosti od oko 49 ulomaka po kilogramu (tablica 1). Kao dijagnostičke izdvojili smo 232 ulomka.

Zabilježili smo osam tipova oboda. Kao i u fazi 3, prevladavaju jednostavni zaobljeni obodi, a slijede oni zaravnjeni. Treći po zastupljenosti su široki, iznutra zadebljani obodi koji se prvi put pojavljuju u ovoj fazi. Mnogi tipovi oboda koji su u ranijim fazama bili relativno česti ili karakteristični (izvana zadebljani, široki zaravnjeni, zakošeni i trakasto zadebljani) sada su rijetki ili se uopće ne pojavljuju (slika 4, tablica 2). Izrazito prevladavaju izvučeni oblici.

Prisutna su samo dva tipa dna, ravno i ravno profilirano (T. 5. 9) (slika 5). Nagibi stijenki neposredno iznad dna najčešće nisu strmi, što ukazuje na široke oblike posuda.

Ručke su još češće i brojnije nego u prethodnoj fazi. Gotovo polovica od 35 ulomaka potječe od trakastih ručki, a dobro su zastupljene ručke ovalnog presjeka (T. 4. 14) i koljenaste ručke s pločicom (T. 5. 8). Od dvije ručke poligonalnog presjeka jedna je vertikalna (T. 5. 7), a druga horizontalna (T. 5. 4). Još pet ulomaka

a fragmentation index of approximately 49 fragments per kilogram (Table 1). There are 232 fragments that we classified as diagnostic.

We recorded eight types of rims. As was the case in Phase 3, simple, rounded rims are prevalent, followed by flat rims. Wide and internally thickened rims appear in this phase for the first time. Many rim types that were in earlier phases relatively numerous or characteristic (externally thickened, wide flat, bevelled and massive externally thickened), now become rare or else they do not appear at all (Figure 4, Table 2). Everted shapes distinctly prevail.

Only two types of base are present, simple flat and prominent flat (T. 5. 9) (Figure 5). The slant of the wall immediately above the base is in the majority of cases not steep, which implies that the vessels were wide in shape.

Handles appear more often and are more numerous than in the previous phase. Almost half of the 35 fragments represent strap handles, and there are quite a few handles with an oval cross-section (T. 4. 14), as well as flat-top ones (T. 5. 8). Of the two handles with a polygonal cross-section, one is vertical (T. 5. 7), and the other is horizontal (T. 5. 4). Another five handle fragments remain typologically undefined. Two of these were vertical, and one horizontal (Table 3). There are no perforated lug handles, and we included the three probable lug handles (T. 5. 5, 6) amongst appliqué decorative elements.

In the Middle Bronze Age vessels were often equipped with handles, and these types of handles are common in the region of Istria, the Karst, Kvarner Bay and Dalmatia (Bursić-Matijašić 1994, Fig. 4; 1997, 117–120; 1997a, 28, T.5; 1998, 65–76, T. 14; 2003, 68; 2010, T. 2; Čović 1983; 1983a; Leben 1967; Forenbaher and Kaiser 2006, 189; Forenbaher 1987, 87; Forenbaher and Vranjican 1985, 11–12; Gilli and Montagnari Kokelj 1993, Fig. 61; Guštin and Sakara Sučević 2003, 96; Hänsel et al. 1997, 87; Kos 2005, T.1; Mihovilić 1995, 31; 1997, 43–44; 2001, 42–43; Montagnari Kokelj and Crismani 1997, Fig. 49).

Only a slightly larger proportion of fragments (3.2%) were decorated in comparison with Phase 3 (Figure 6). In contrast to every previous phase where incision prevailed, in this phase almost half of the decorated fragments were decorated with appliqué elements. Different bands and ribs (T. 5. 2) were applied, as well as horseshoe-shaped, crescent and linguiform elements (T. 5. 5, 6). Five fragments were decorated with a combination of appliqué and impression, with the plastic band with finger impressions motif. Linear and semi-circular motifs executed in the wide incision technique follow (T. 4. 13, 15). Four fragments are decorated with an incised line or a star-shaped motif (T. 4. 16), but we

ručki tipološki je neodredivo, no dvije od njih bile su vertikalne, a jedna horizontalna (tablica 3). Ušica nema, a tri vjerojatne jezičaste drške (T. 5. 5, 6) svrstali smo među aplicirane ukrase.

U srednjem brončanom dobu posude su često imale ručke, a ovi tipovi ručki uobičajeni su na području Istre, Krasa, Kvarnera i Dalmacije (Buršić-Matijašić 1994, sl. 4; 1997, 117-120; 1997a, 28, T.5; 1998, 65-76, T. 14; 2003, 68; 2010, T. 2; Čović 1983; 1983a; Leben 1967; Forenbaher i Kaiser 2006, 189; Forenbaher 1987, 87; Forenbaher i Vranjican 1985, 11-12; Gilli i Montagnari Kokelj 1993, sl. 61; Guštin i Sakara Sučević 2003, 96; Hänsel et al. 1997, 87; Kos 2005, T.1; Mihovilić 1995, 31; 1997, 43-44; 2001, 42-43; Montagnari Kokelj i Crismani 1997, sl. 49).

Ukrašeno je samo nešto malo više ulomaka (3,2%) nego u fazi 3 (slika 6). Za razliku od svih prethodnih faza, u kojima je prevladavalo urezivanje, sada je gotovo polovina svih ukrašenih ulomaka ukrašena apliciranjem. Apliciraju se različite trake i rebra (T. 5. 2), polumjesečaste ili potkovaste aplikacije te jezičci (T. 5. 5, 6). Pet ulomaka ukrašeno je kombinacijom apliciranja i utiskivanja, motivom plastične trake s otiscima prstiju. Slijede pravocrtni i polukružni motivi izvedeni žlijebljenjem (T. 4. 13, 15). Urezanim linijama ili zvjezdastim motivom (T. 4. 16) ukrašena su četiri ulomka, no barem jedan od njih (onaj sa šrafiranim geometrijskim likom) smatramo zaostalom neolitičkim nalazom.

I u ovoj fazi prevladavaju ulomci neglačane površine, no glačani i ovlaš glačani ulomci učestaliji su nego u ostalim fazama. Slična situacija zabilježena je i u prednjem dijelu špilje (Forenbaher i Kaiser 2006, 192). Prisutni su i malobrojni ulomci izrazito grube i metlicom prevučene površine (T. 5. 1) (slika 13). Jedan ulomak iz ove faze ima rupu probušenu zbog krpanja posude.

#### *Oblici posuda*

U ovoj fazi razlikujemo deset oblika posuda (slika 18). Sedam od njih poznajemo iz ranijih faza. Samo jedan od tri nova oblika (otvorena zdjela širokog razgrnutog oboda) relativno je dobro zastupljen. Sudeći po promjerima oboda, posude su u prosjeku veće nego u prethodnim fazama, ali su i znatno različitih veličina, od malih šalica do posuda s promjerom oboda većim od pola metra (slika 10). Uz to osjetno se povećava prosječna debljina i raznolikost debljine stijenke, kao posljedica sve većeg broja vrlo debelih ulomaka posuda (slika 11).

4.a. OTVORENE ZDJELE odgovaraju neolitičkom obliku 1.a. Zastupljene su s tri ulomka posuda srednje veličine.

regard at least one of them (the one with the hatched geometrical figure) a Neolithic find.

Fragments with a non-burnished surface are prevalent in this phase as well; however, burnished and casually burnished fragments are nonetheless more numerous than in the other phases. A similar situation was also recorded in the fore section of the cave (Forenbaher and Kaiser 2006, 192). There is a small number of fragments with a coarse brushed surface (T. 5. 1) (Figure 13). A single fragment from this phase has a mending hole.

#### *Vessel shapes*

In this phase we differentiate ten vessel shapes (Figure 18). Seven of these are known from earlier phases. Out of the three new shapes, only one (open bowl with a wide everted rim) is relatively well represented. Judging by rim diameter, vessels are bigger on the average as compared with previous phases, but they also vary considerably in size, from small cups, to vessels with a rim diameter in excess of half a meter (Figure 10). Alongside this we also recorded a marked increase in the average wall thickness, as well as its variability, as a consequence of an ever larger number of very thick vessel fragments (Figure 11).

4.a. OPEN BOWLS correspond to the Neolithic shape 1.a. They are represented with three fragments of mid-sized vessels. Vessels of this type are rare in the Bronze Age and could have been equipped with horizontal handles (Buršić-Matijašić 1996, Fig. 3; 1997, T. 6. 79, 80, 83-86, T. 7. 92).

4.b. SLIGHTLY RESTRICTED BOWLS correspond to the Neolithic shape 1.b.1. They are represented with three fragments of mid-sized vessels.

4.c. SLIGHTLY RESTRICTED BOWLS WITH RECURVING PROFILE, correspond to the Neolithic shape 1.c.1. They are represented with two fragments of mid-sized vessels. One of them is burnished and fired in a bichrome manner, and is very reminiscent of such Middle Neolithic fragments described in Phase 1 (Figure 8).

4.d.1. OPEN BOWLS WITH A WIDE RIM, correspond to the Late Eneolithic/Early Bronze Age shape 3.f. They are represented with three fragments of undecorated mid-sized and larger vessels.

4.d.2. OPEN BOWL WITH AN EVERTED FACETTED RIM - it differs from the previous shape in that it has a profile curved in a distinctly convex manner, and a slightly everted rim that is on the inner side separated from the body of the vessel by a marked edge. It is represented with two fragments that belonged to the same vessel with a rim diameter of 28 cm.

Posude ovog tipa rijetke su u brončanom dobu te mogu imati horizontalne ručke (Buršić-Matijašić 1996, sl. 3; 1997, T.6. 79, 80, 83-86, T. 7. 92).

4.b. POLUKUGLASTE ZDJELE USPRAVNOG ILI BLAGO UVUČENOG OBODA odgovaraju neolitičkom obliku 1.b.1. Zastupljene su s tri ulomka posuda srednje veličine.

4.c. ZDJELE S-PROFILA USPRAVNOG ILI BLAGO UVUČENOG OBODA odgovaraju neolitičkom obliku 1.c.1. Zastupljene su s dva ulomka posuda srednje veličine. Jedan od njih je glačan i dvobojno pečen te izrazito nalikuje takvim srednjoneolitičkim ulomcima opisanim u sklopu faze 1 (slika 8).

4.d.1. OTVORENE ZDJELE ŠIROKOG OBODA odgovaraju kasnoeneolitičkom/ranobrončanom obliku 3.f. Zastupljene su s tri ulomka neukrašenih zdjela srednjih i većih dimenzija.

4.d.2. POLUKUGLASTA ZDJELA IZVIJENOG FACETIRANOG OBODA razlikuje se od prethodnog oblika izrazito konveksno zakrivljenim profilom te blago izvijenim obodom koji je s unutrašnje strane bridom izdvojen od tijela posude. Zastupljena je s dva ulomka koji su pripadali istoj zdjeli promjera oboda 28 cm.

4.e. OTVORENE ZDJELE ŠIROKOG RAZGRNUTOG OBODA predstavljaju značajnu novost ove faze. Otvorenije su od tipa 4.d.1, a obod im je u pravilu zakošen i široko zadebljan s unutrašnje strane. Zastupljene su s 11 ulomaka srednjih i vrlo velikih posuda.

4.f. VELIKA POLUKUGLASTA ZDJELA razlikuje se od neolitičkih polukuglastih zdjela uspravnog ili blago uvučenog oboda (1.b.1) jedino veličinom, izrazito debelim stijenkama i jezičastom aplikom u obliku jezičca, kakvih u srednjem neolitu nema. Zastupljena je s dva ulomka koji su pripadali istoj velikoj zdjeli promjera oboda 36 cm.

4.g. POSUDE IZVIJENOG ILI RAZGRNUTOG OBODA odgovaraju široko definiranoj kategoriji 3.g iz prethodne faze te obuhvaćaju oblike BA 1.1.1, BA 1.2 i BA 2.1.1. po Forenbaheru i Kaiseru (2006, 188-189, sl. 5.13). Prepoznatljivi su samo gornji dijelovi posuda, koje bi s podjednakom vjerojatnošću mogle biti lonci, zdjele ili vrčevi, dok bi one najmanje mogle biti i šalice. Zajedničko im je obilježje stegnut vrat i više ili manje razgrnut obod (T. 4. 13, 14). Trećina ulomaka oboda bila je facetirana (T. 5. 2). Posude su ponekad imale ručke, a rijetki primjerci bili su ukrašeni žlijebljenjem ili plastičnim rebrom. Raznolikost oblika još je veća nego u prethodnoj fazi. Iako se radi o najbolje zastupljenoj grupi oblika (ukupno 59 ulomaka), ovu kategoriju nismo podijelili na podtipove, ne samo

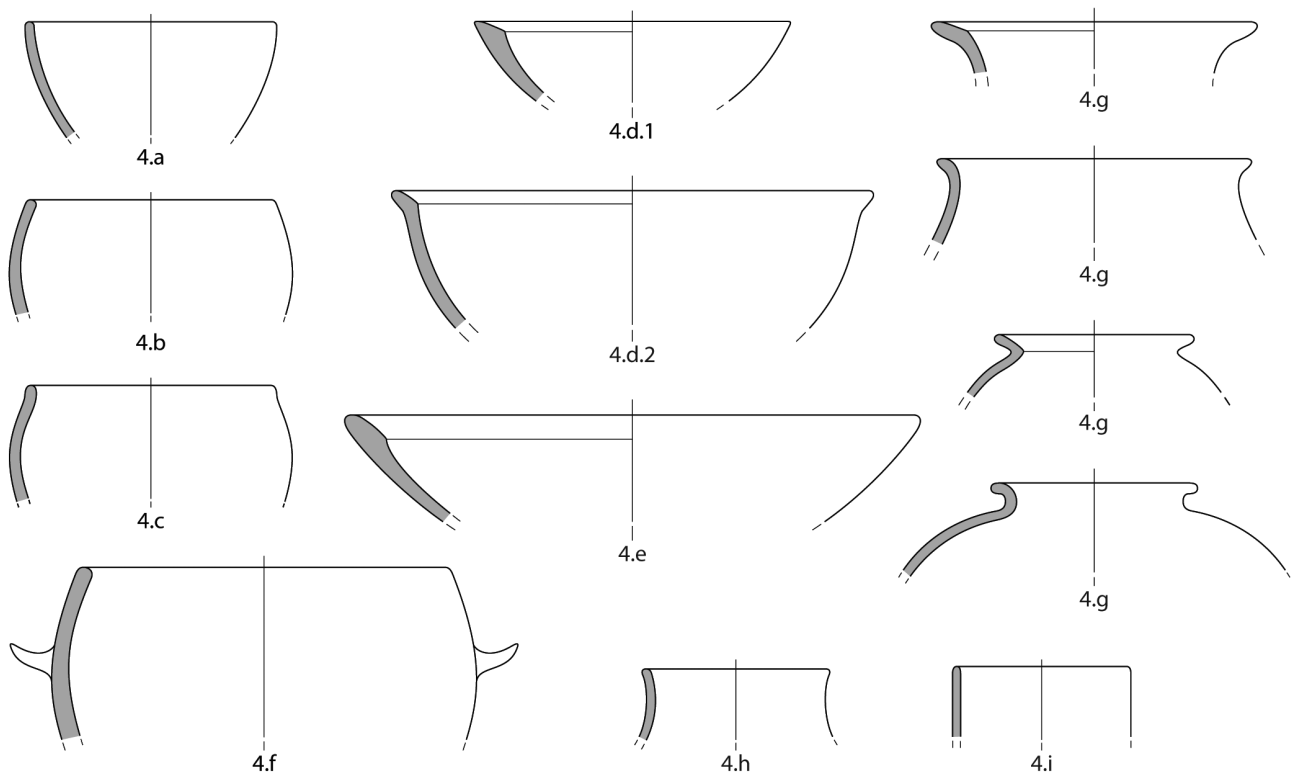
4.e. OPEN BOWLS WITH A WIDE FLANGED RIM, represent a significant novelty of this phase. They are more open in comparison with type 4.d.1, and their rim is, as a rule, bevelled, wide and internally thickened. These vessels are represented with 11 fragments of mid-sized and large vessels.

4.f. A LARGE SLIGHTLY RESTRICTED BOWL differs from Neolithic slightly restricted bowls (1.b.1) only in size, on account of its distinctly thick walls, and the appliqué decoration of the kind that are absent in the Middle Neolithic. It is represented with two fragments that both belonged to the same large vessel whose rim diameter measured 36 cm.

4.g. VESSELS WITH AN EVERTED OR FLANGED RIM, correspond to the broadly defined 3.g. category from the previous phase, and encompass shapes BA 1.1.1, BA 1.2 and BA 2.1.1. after Forenbaher and Kaiser (2006, 188-189, Fig. 5.13). Only the upper sections of these vessels are recognizable, which may be either jars, bowls or jugs, or in the case of those smallest ones even cups. Their common features include a constricted neck and a more or less everted rim (T. 4. 13, 14). A third of the rim fragments were faceted (T. 5. 2). These vessels were at times equipped with handles, and rare specimens were decorated with wide incision or a plastic appliqué rib. The diversity of shapes is greater than in the previous phase. Even though this is the best represented group as far as shapes are concerned (a total of 59 fragments), we did not divide this category to sub-types. The reason for this is the great fragmentation of the material, and because it is almost impossible to draw a clear line between all the different variants of this shape.

Vessels with an everted or flanged rim are common on the Bronze Age sites in Istria (Buršić-Matijašić 1997, 117-120; 1998, 65-76; Čović 1983, Fig. 16; Guštin and Sakara Sučević 2003, 96-97; Hänsel et al. 1997, 83), northern Dalmatia (Forenbaher and Vranjican 1985, 11-12), and the Trieste and Slovenian Karst (Gilli and Montagnari Kokelj 1993; Montagnari Kokelj and Crismani 1997; Svoljšak 1989, T.1, 4; Turk et al. 1992).

4.h. VESSELS WITH A SLIGHTLY CONSTRICTED NECK, correspond to shape 3.h from the previous phase, and are quite common in this phase. They were sometimes equipped with handles, or decorated with appliqué elements and wide incision (T. 5. 1). They are represented with 15 fragments of vessels varying greatly in size, ranging from small vessels (cups?) with a rim diameter of 8 cm, to very large vessels whose rim diameter measures



Sl. 18 Oblici posuda iz faze 4  
Fig. 18 Vessel shapes from Phase 4.

zbog velike razlomljenosti materijala nego i zato što je gotovo nemoguće povući jasne granice među različitim varijantama oblika.

Posude izvijenog ili razgrnutog oboda uobičajene su na brončanodobnim lokalitetima Istre (Buršić-Matijašić 1997, 117-120; 1998, 65-76; Čović 1983, sl. 16; Guštin i Sakara Sučević 2003, 96-97; Hänsel et al. 1997, 83), sjeverne Dalmacije (Forenbaher i Vranjican 1985, 11-12) te tršćanskog i slovenskog Krasa (Gilli i Montagnari Kokelj 1993; Montagnari Kokelj i Crismani 1997; Svolsjak 1989, T.1, 4; Turk et al. 1992).

4.h. POSUDE BLAGO STEGNUTOG VRATA odgovaraju obliku 3.h iz prethodne faze te su prilično česte i u ovoj fazi. Ponekad su imale ručke ili su bile ukrašene apliciranjem odnosno žlijebljenjem (T. 5. 1). Zastupljene su s 15 ulomaka posuda vrlo različitih veličina, od posudica (šalica?) promjera oboda 8 cm do veoma velikih posuda promjera oboda 56 cm. Neki od tih ulomaka možda potječu od vratova posuda sličnih obliku BA 2.1.2 po Forenbaheru i Kaiseru (2006, 190).

4.i. POSUDE VALJKASTOG GORNJEG DIJELA odgovaraju obliku 3.i iz prethodne faze. Zastupljene su s dva ulomka posuda srednje veličine.

56 cm. It is possible that some of these fragments perhaps stem from necks of vessels that are similar in shape to BA 2.1.2 after Forenbaher and Kaiser (2006, 190).

4.i. VESSELS WITH A CYLINDRICAL UPPER SECTION, correspond to shape 3.i. from the previous phase. They are represented with two fragments of mid-sized vessels.

#### Other pottery finds

4.j. PORTABLE HEARTH (TRIPODS) are represented with five fragments. These objects consisted of a smoothed, horizontal, circular surface standing on three triangular legs. Only two of the four surface fragments (with a thickness ranging from 12 to 23 mm) have both faces preserved, and one of them even features a section of the rounded rim. The fifth fragment represents a large part of the non-burnished triangular leg (T. 5. 3). It can not be determined whether all of these fragments belonged to a single portable hearth, or to several of them.

Tripod-shaped portable hearths appear quite often in the Middle Bronze Age in Istria, the Karst and Kvarner, whereas in Dalmatia they were not recorded (Buršić-Matijašić 1996, Fig. 4; 1997a, T. 3; 1998, 79; Čović 1983,



*Ostali keramički nalazi*

4.j. PRIJENOSNA OGNJIŠTA (TRONOŠCI) zastupljena su s pet ulomaka. Sastojala su se od zaglađene vodoravne kružne plohe izdignute na tri trokutaste noge. Samo dva od četiri ulomka plohe (debljine od 12 do 23 mm) sačuvala su oba lica, a jedan od njih i dio jednostavno zaobljenog oboda. Peti je ulomak većeg dijela neglačane trokutaste noge (T. 5. 3). Ne može se utvrditi jesu li svi oni pripadali jednom prijenosnom ognjištu ili ih je bilo više.

Prijenosna ognjišta u obliku tronošca česta su pojava u srednjem brončanom dobu u Istri, na Krasu i Kvarneru, dok u Dalmaciji nisu zabilježena (Buršić-Matijašić 1996, sl. 4; 1997a, T. 3; 1998, 79; Čović 1983, 127; Guštin i Sakara Sučević 2003, 98; Hänsel i Teržan 1999, 95; Hänsel et al. 1997, 87; Kos 2005a, 220; Mihovilić 1995, 32-34).

4.k. VALJKASTI PREDMET koji oblikom podsjeća na masivnu nogu danilskog ritona (Korošec 1959, T. 19. 3, 7) prikupljen je iz brončanodobnog konteksta faze 4. Površina mu je glačana i ukrašena urezanim zvjezdastim (solarnim?) motivom (T. 4. 16). Nisu nam poznate brončanodobne analogije za ovaj predmet. Nije isključeno da se radi o zaostalom neolitičkom nalazu, no slične zvjezdaste motive ne nalazimo niti na istočnojadranskoj neolitičkoj keramici.

*Rasprava*

Samo 7% posuda prepoznatljivih oblika iz faze 4 pripada neolitičkim tipovima prisutnim već od faze 1 (slika 15). Pretpostavljamo da se uglavnom radi o zaostalim nalazima iz ranijih faza. Nadalje, samo 5% posuda su otvorene zdjele širokog ili facetiranog oboda, karakteristične za kraj eneolitika i početak brončanog doba te prisutne od prethodne faze 3. Sve ostale posude karakterističnih su brončanodobnih oblika, od kojih mnoge također poznajemo već od prethodne faze 3.

Među njima apsolutno prevladavaju posude zaobljenog tijela, manje ili više stegnutog vrata te barem malo izvučenog, izvijenog ili razgrnutog oboda. Značajnu novost predstavlja pojava otvorenih zdjela širokog razgrnutog oboda te znatno učestalije facetiranje oboda. Raspon veličina posuda veći je nego u bilo kojoj drugoj fazi. Sudeći po mjerljivim promjerima oboda, raspodjela posuda po veličini je kontinuirana. Pojavljuju se brojne velike posude, no zbog sačuvanosti samo gornjeg dijela obično se ne može utvrditi radi li se o loncima ili zdjelama. Takve su se posude mogle upotrebljavati za čuvanje namirnica ili za pripremu hrane za više ljudi, dok su manje zdjele i šalice vjerojatno služile za individualnu

127; Guštin and Sakara Sučević 2003, 98; Hänsel and Teržan 1999, 95; Hänsel et al. 1997, 87; Kos 2005a, 220; Mihovilić 1995, 32-34).

4.k. A CYLINDRICAL OBJECT resembling by its shape a massive leg of a Danilo rhyton (Korošec 1959, T. 19. 3, 7), was recovered from a Bronze Age context of Phase 4. Its surface was burnished and decorated with an incised star-like (solar?) motif (T. 4. 16). We are not aware of any Bronze Age analogies for this object. We cannot rule out the possibility that it is a residual Neolithic find, but similar star-like motifs are not to be found on eastern Adriatic Neolithic pottery.

*Discussion*

Only 7% of vessels of a recognizable form from Phase 4 belong to Neolithic types that were present already from Phase 1 (Figure 15). We assume that these are mainly residual finds from previous phases. Furthermore, only 5% of vessels are open bowls with wide or faceted rims, which are characteristic for the end of the Eneolithic and the beginning of the Bronze Age, and which were present from the previous Phase 3. All other vessels feature characteristic Bronze Age shapes, and many amongst these are known to us already from the previous Phase 3.

Absolutely prevalent amongst them are vessels with a rounded body, a more or less constricted neck, and at least a slightly everted or flanged rim. A significant novelty is the appearance of open bowls with a wide flanged rim, and the much more frequent faceting of rims. The size-range of vessels exceeds that of any other phase. Judging by measurable rim diameters, the distribution of vessels according to size is continuous. Numerous large vessels appear; however, since only the upper section was preserved it is usually not possible to determine whether they represent jars or bowls. Such vessels could have been used for the storage of provisions, or for the preparation of food for groups of people, while the smaller bowls and cups were probably used for individual consumption of food or beverages. The great diversity of vessel shapes indicates the different activities and events for which these vessels were used. The great number of differently shaped, oriented and positioned handles (Table 3) probably also served many purposes (for lifting, handling, hanging, pouring). The variety of these vessels perhaps reflects the complexity and diversity of customs and rituals associated with food and drink, which is one of the general characteristics of the Late Bronze Age (Sherratt 1998; Kristiansen 1998).

konzumaciju jela ili pića. Velika raznolikost oblika posuda ukazuje na različite aktivnosti i prigode u kojima se posude upotrebljavalo. Brojne različito oblikovane, različito orijentirane i pozicionirane ručke (tablica 3) također su vjerojatno imale niz namjena (za podizanje, nošenje, vješanje, izlijevanje). Raznolikost posuda možda odražava složenost i raznolikost običaja i obreda vezanih uz jelo i piće, što je jedno od općih obilježja kasnog brončanog doba (Sherratt 1998; Kristiansen 1998).

Među rijetkim ukrasima prevladavaju oni izvedeni apliciranjem, a slijedi žlijebljenje. Obje spomenute tehnike uobičajene su na drugim brončanodobnim lokalitetima Istre i Krasa. Donekle iznenađuje da nema plastičnih bradavica (osim jednog primjerka iz poremećenog konteksta), jer se one inače često pojavljuju na istovremenim istarskim gradinama, a ima ih i u prednjem dijelu Pupićine peći (Forenbaher i Kaiser 2006, 192).

Pojedina obilježja keramičkog posuda ove faze, primjerice, posude zaobljenog tijela, stegnutog vrata i izvijenog oboda, koljenaste ručke, ručke ovalnog presjeka koje nadvisuju obod i završavaju na njemu te potkovasta plastična rebra, pojavljuju se već od ranog brončanog doba (Buršić-Matijašić 2007, 595; Čović 1983, 126-127; Mihovilić 1997, 43). Druga, kao što su masivne horizontalne ručke, razgrnuti obodi ili plastične trake s otiscima prsta, traju i za kasnog brončanog doba (Forenbaher et al. 2008). Po većini svojih obilježja, keramika faze 4 vrlo je bliska srednjobrončanodobnoj keramici s istarskih gradina Monkodonje (Buršić-Matijašić 1998), Vrčina (Buršić-Matijašić 1997), Gradca-Turana (Mihovilić 1997) i drugih (Kos 2005; Mihovilić 2007-2008; Čović 1983a) te keramici iz špilje Laganiši (Komšo 2004, 154) i Ljubićeve pećine (Percan et al. 2008, 347). Analogije za pojedina obilježja nalazimo i na području Kvarnera (Miroslavljević 1959, 167; 1974), Like (Drechsler-Bižić 1983) i Dalmacije (Forenbaher i Kaiser 2008; Forenbaher i Vranjican 1985; Marjanović 2005) te na gradinama i u špiljama Krasa (Maselli Scotti 1989; Gilli i Montagnari Kokelj 1993; 1996; Leben 1967; Montagnari Kokelj i Crismani 1997).

Po tipološkim obilježjima keramike, faza 4 odgovara horizontima F, E i D u prednjem dijelu Pupićine peći, gdje je radiokarbonski datirana u sredinu 2. tisućljeća pr. Kr. (Forenbaher i Kaiser 2006, 186-193) te fazi 4 susjedne Vele peći (Forenbaher et al. 2008, 21-29).

Prevalent amongst the rare decorations are those executed with appliqué, followed by wide incision. These two decorative techniques are common on other Bronze Age sites in Istria and the Karst. The absence of nubs is somewhat surprising (except for one specimen from a disturbed context), because they often appear on contemporary Istrian hillforts, and they are also present in the fore section of Pupićina Cave (Forenbaher and Kaiser 2006, 192).

Certain characteristics of pottery vessels from this phase, e.g., vessels with a rounded body, a constricted neck and everted rim, flat-top handles, handles with an oval cross-section that top the rim and end on it, and horseshoe-shaped plastic ribs, appear already from the Early Bronze Age (Buršić-Matijašić 2007, 595; Čović 1983, 126-127; Mihovilić 1997, 43). Other characteristic features such as massive horizontal handles, flanged rims or plastic bands with finger impressions, continue during the Late Bronze Age (Forenbaher et al. 2008). If we were to judge by the majority of its characteristics, Phase 4 pottery is very similar to Middle Bronze Age pottery from the Istrian hillforts of Monkodonja (Buršić-Matijašić 1998), Vrčin (Buršić-Matijašić 1997), Gradec-Turan (Mihovilić 1997) and others (Kos 2005; Mihovilić 2007-2008; Čović 1983a), as well as to pottery from Laganiši Cave (Komšo 2004, 154) and Ljubićeva Cave (Percan et al. 2008, 347). Analogies for certain characteristics can also be found in the area of the Kvarner Bay (Miroslavljević 1959, 167; 1974), in Lika (Drechsler-Bižić 1983) and Dalmatia (Forenbaher and Kaiser 2008; Forenbaher and Vranjican 1985; Marjanović 2005), as well as in hillforts and caves from the Karst (Maselli Scotti 1989; Gilli and Montagnari Kokelj 1993; 1996; Leben 1967; Montagnari Kokelj and Crismani 1997).

In accordance with the typological characteristics of the pottery, Phase 4 corresponds to horizons F, E and D in the fore section of Pupićina Cave, where it has been dated by radiocarbon to the middle of the 2<sup>nd</sup> millennium BC (Forenbaher and Kaiser 2006, 186-193), and to Phase 4 of the neighboring Vela Cave (Forenbaher et al. 2008, 21-29).

## DIJAKRONIČKE PROMJENE U OBLIKOVANJU I UKRAŠAVANJU KERAMIKE

Na ovom mjestu ukratko ćemo usporediti grupe keramičkih nalaza iz četiri prapovijesne faze unutarnjeg dijela Pupićine peći. Faze 1, 3 i 4 zabilježene su u unutarnjoj dvorani i na prijelazu iz unutarnjeg u vanjski dio špilje. Pritom većina nalaza iz faze 4 (srednje brončano doba) potječe iz prostora na prijelazu iz unutarnjeg u vanjski dio, dok je faza 2 (kasni neolitik/rani eneolitik) zabilježena samo u unutarnjem dijelu špilje.

Najveća grupa nalaza pripada fazi 3 (kasni eneolitik/rano brončano doba), a najmanja fazi 2 (kasni neolitik/rani eneolitik). Najčvršće je određena faza 1 (srednji neolitik), koja sadrži gotovo isključivo neolitičke dijagnostičke ulomke. Faza 4 (srednje brončano doba) sadrži oko 90% brončanodobnih dijagnostičkih ulomaka te je također smatramo čvrsto određenom. Faze 2 i 3 (kasni neolitik/rani eneolitik i kasni eneolitik/rano brončano doba) sadrže prilično raznorodnu keramiku koja bi mogla pripadati različitim razdobljima. Te su faze relativno široko vremenski određene po svojem stratigrafskom položaju, radiokarbonskim datumima i karakterističnim elementima oblikovanja i ukrašavanja posuda.

### *Promjene oblika posuda*

Određeni oblici posuda obilježavaju pojedine faze, odnosno vremenska razdoblja (slika 15). U srednjoneolitičkoj fazi 1 izrazito prevladavaju polukuglaste zdjele. Otvorene zdjele, zdjele S-profila, bikonične zdjele i plitice manje su brojne, no podjednako karakteristične za to razdoblje. Posude niskog cilindričnog vrata možda bismo mogli smatrati umetnutim nalazima, budući da su učestalije u idućoj fazi. U fazi 2 nastavlja se pojavljivati većina neolitičkih oblika, među kojima sada prevladavaju zdjele S-profila. Razmjerno su česte već spomenute posude niskog cilindričnog vrata, a među novim oblicima najbolje su zastupljene zdjele kratkog vrata. Oba ta oblika obično se smatraju karakterističnima za eneolitik. U fazi 3 nastavlja se smanjivati broj posuda neolitičkih oblika. Ukupna raznolikost ipak raste, zbog pojave niza novih oblika među kojima su najbolje zastupljene posude zaobljenog tijela, stegnutog vrata i izvijenog oboda. Uz njih se pojavljuju i malobrojne otvorene zdjele širokog oboda, koje se obično smatraju karakterističnim za vrijeme prijelaza iz eneolitika u brončano doba. Velika raznolikost oblika nastavlja se u srednjobrončanodobnoj

## DIACHRONIC CHANGES IN THE SHAPING AND DECORATION OF POTTERY

At this point we shall briefly compare the pottery assemblages from the four prehistoric phases of the interior section of Pupićina Cave. Phases 1, 3 and 4 were recorded in the interior chamber and at the transition from the interior to the exterior section of the cave. The majority of finds from Phase 4 (Middle Bronze Age) come from the area at the transition from the interior to the exterior section, whereas Phase 2 (Late Neolithic/Early Eneolithic) was recorded solely in the interior section of the cave.

The largest group of finds belongs to Phase 3 (Late Eneolithic/Early Bronze Age), and the smallest to Phase 2 (Late Neolithic/Early Eneolithic). Phase 1 (Middle Neolithic) was most reliably determined, as it contains almost exclusively Neolithic diagnostic shards. Phase 4 (Middle Bronze Age) contains approximately 90% of Bronze Age diagnostic shards and we, consequently, likewise regard it as reliably determined. Phases 2 and 3 (Late Neolithic/Early Eneolithic and Late Eneolithic/Early Bronze Age) contain rather diverse pottery that could belong to various periods. These phases were ascribed to relatively broad time spans on the basis of their stratigraphic position, radiocarbon dates and characteristic elements of vessel shape and decoration.

### *Changes in vessel shapes*

Certain vessel shapes are characteristic for specific phases and periods of time (Figure 15). Hemispherical bowls are clearly prevalent in Middle Neolithic Phase 1. Open bowls, bowls with a recurving profile, carinated bowls and plates are less numerous but nonetheless equally characteristic for this period. Perhaps we could regard vessels with a low cylindrical neck as intrusive finds because they appear more frequently in the next phase. The majority of Neolithic shapes continue to appear in Phase 2, amongst which bowls with recurving profile are now prevalent. The already mentioned vessels with a low cylindrical neck are relatively frequent, and bowls with a short neck are most numerous amongst the new shapes. Both of these shapes are usually regarded as characteristic for the Eneolithic. In Phase 3, the number of vessels of Neolithic shape continues to decrease. Diversity on the whole is nonetheless growing, mainly due to the appearance of a whole series of new shapes, best represented amongst which are vessels with a rounded body, a constricted neck and an everted rim. Appearing alongside them in small numbers are open bowls with a wide rim, which are normally regarded as characteristic for the period of transition from the Eneolithic to the

fazi 4, gdje posve dominiraju različite varijante posuda zaobljenog tijela, stegnutog vrata i izvijenog oboda, uz koje sada dolaze i zdjele širokog razgrnutog oboda. Većinu relativno rijetkih ulomaka posuda neolitičkih oblika u kontekstima faze 4 smatramo zaostalim nalazima.

Dijelovi koji su dodavani tijelu posude radi lakšeg rukovanja svode se u fazi 1 na prilično rijetke ušice, obično (iako ne i uvijek) vertikalno probušene. Prvi malobrojni ulomci ručki pojavljuju se u fazi 2. Ručke postaju znatno uobičajenije u fazi 3, dok su u fazi 4 vrlo brojne i raznoliko oblikovane.

Prosječna debljina stijenki posuda postupno se povećava od najranije do najkasnije faze. Taj je porast u fazi 2 zanemarivo malen, nešto je zamjetniji u fazi 3 i napokon je očit u fazi 4 (slika 11). Prosječni promjer oboda posuda ukazuje na sličan trend s minimumom u fazi 1 i maksimumom u fazi 4, pri čemu se odstupanje u fazi 2 vjerojatno može objasniti nepouzdanosću podataka zbog malog uzorka (slika 10). Iz toga zaključujemo da za srednjeg neolitika prevladavaju posude srednje veličine, dok su kasnije (naročito za srednjeg brončanog doba) prisutne posude vrlo različitih veličina, od šalica pogodnih za individualnu konzumaciju hrane i pića (ponekad u obrednom kontekstu) do velikih lonaca i zdjela različitih oblika, u kojima su se mogle pripremati i čuvati različite vrste namirnica. Zbog ograničenog broja mjerljivih promjera oboda nismo uspjeli jasno razlikovati različite kategorije posuda po veličini.

#### *Promjene obrade površine i načina ukrašavanja*

Neglačano posuđe prevladava kroz sve četiri faze, a naročito dominira u fazi 3, dok najviše glačanih ulomaka ima u srednjobrončanodobnoj fazi 4. U prve dvije faze oko 15% ulomaka ima metličasto prevučenu površinu, no razlikuje se način obrade. U fazi 1 vlažna površina posude bila je nježno prevučena mekom metlicom ili možda krpom, dok je u fazi 2 korištena oštija metlica koja je ostavila dublji trag. U zadnje dvije faze metličasto prevučeni ulomci vrlo su rijetki (slika 13).

Neolitičke posude iz faze 1 mnogo su češće ukrašene od posuda iz kasnijih faza (slika 6). Najčešće su ukrašene urezanim geometrijskim motivima. Urezivanje prevladava kroz prve tri faze, a tek u fazi 4 (srednje brončano doba) zamjenjuje ga apliciranje kao dominantna tehnika ukrašavanja. Vrlo rijetki sekundarno probušeni ulomci svjedoče o tome da su se oštećene posude barem ponekad nastojale osposobiti za daljnje korištenje. Najviše takvih rupa za krpanje je u fazi 2, gdje su zabilježene na oko 1% od svih ulomaka.

Bronze Age. The great diversity of shapes continues in Middle Bronze Age Phase 4, where the different variants of vessels with a rounded body, a constricted neck and an everted rim are utterly dominant and are now joined by bowls with a wide flanged rim. We regard the majority of the relatively rare fragments of vessels of Neolithic shapes in the contexts of Phase 4 as residual finds.

In Phase 1, the parts that were added to the body of a vessel to facilitate handling are restricted to the relatively rare lugs that were usually (but not always) vertically perforated. The first scarce handle fragments appear in Phase 2. Handles become much more common in Phase 3, whereas in Phase 4 they are very numerous and diversely shaped.

The average vessel wall thickness gradually increases from the earliest to the latest phase. In Phase 2 this increase is negligible, in Phase 3 it is somewhat bigger, and in Phase 4 it is quite distinct (Figure 11). The average vessel rim diameter shows a similar trend, with a minimum in Phase 1 and a maximum in Phase 4; the discrepancy in Phase 2 can probably be explained away with the unreliability of data due to the small sample (Figure 10). From this we conclude that during the Middle Neolithic period mid-sized vessels prevail, whereas afterwards (especially during the Middle Bronze Age) we are witnessing vessels of varying dimensions, from cups appropriate for individual consumption of food and beverages (sometimes in a ritual context), to large jars and bowls of different shapes, which were used for the preparation and storage of different kinds of foodstuffs. Due to the limited number of measurable rim diameters, we were not able to distinguish clearly between different categories of vessels according to size.

#### *Changes in surface treatment and manner of decoration*

Non-burnished vessels are predominant throughout all four phases, and especially in Phase 3, while Middle Bronze Age Phase 4 boasts the largest number of burnished fragments. In the first two phases, approximately 15% of the fragments has a brushed surface, however, the mode of treatment differs. In Phase 1 the wet vessel surface was gently scrubbed with a soft brush or perhaps rag, whereas in Phase 2 a rougher brush was used, leaving a deeper trace. Brushed pottery is very rare in the last two phases (Figure 13).

Neolithic vessels from Phase 1 are much more frequently decorated in comparison with vessels from later phases (Figure 6). Most often they are decorated with incised geometrical motifs. Incision prevails throughout the first three phases, and it is only in Phase 4 (Middle Bronze Age) that appliqué substitutes it as a dominant decoration technique. The exceedingly rare



## USPOREDBA S VANJSKIM DIJELOM PUPIĆINE PEĆI

Ako usporedimo situaciju u unutrašnjosti špilje s onom u njenom vanjskom dijelu, primijetiti ćemo da su neka prapovijesna razdoblja zastupljena na čitavom istraženom prostoru nalazišta, a druga nisu. Srednji neolitik dobro je zastupljen u svim istraženim prostorima. Povrh njega, u vanjskom djelu špilje bilo je moguće izdvojiti razmjerno skromnu, ali ipak jasnu fazu kasnog neolitika (Forenbaher i Kaiser 2006, 182-186) koja u unutrašnjosti nije zabilježena, iako bi pojedini nalazi iz faze 2 mogli pripadati tom razdoblju. Za razliku od toga, u unutarnjem dijelu izdvojili smo fazu 2 (kasni neolitik/rani eneolitik) i fazu 3 (kasni eneolitik/rano brončano doba), obje obilježene keramičkim nalazima kakvi u vanjskom dijelu špilje gotovo posve nedostaju. Moguće je da su ljudi u tim razdobljima radije boravili u unutrašnjosti špilje, no nedostatak odgovarajućih slojeva u njenom vanjskom dijelu mogao bi se objasniti i naknadnim uklanjanjem taložine (Miracle i Forenbaher 2006c, 459), možda s namjerom da se koristi kao gnojivo (Komšo 2003, 46).

Srednje brončano doba prisutno je, kao i srednji neolitik, u svim dijelovima nalazišta. U prednjem dijelu špilje povrh njega slijedi vrlo skromna željeznodobna faza (Forenbaher i Kaiser 2006, 193) kakva u unutrašnjosti nije zabilježena, iako bismo pojedine nalaze s površine i iz poremećenih konteksta mogli pripisati tom razdoblju. Ljudi su špilju nastavili povremeno posjećivati sve do srednjeg vijeka, kada je zbog nakupljanja taložine i podizanja razine tla bilo teško, no ne i nemoguće, ući u njezin unutarnji dio. O tim posjetima svjedoči manji broj nalaza prikupljenih iz svih istraženih prostora nalazišta.

Za izravnu usporedbu keramike iz unutarnje dvorane i vanjskog dijela špilje ostaju nam, prema tome, srednjoneolitička i srednjobrončanodobna faza.

### *Srednji neolitik*

Faza 1 unutarnjeg dijela Pupićine peći može se izjednačiti s horizontima I i H vanjskog dijela špilje (Forenbaher i Kaiser 2006, 172-182). U oba slučaja ti su slojevi pripisani srednjem neolitu, odnosno danilsko-vlaškoj kulturi. Sličnost srednjoneolitičkih nalaza iz oba dijela špilje je velika, što je i za očekivati jer su, sudeći po ukupno šest radiokarbonskih datuma (Miracle i Forenbaher 2006b, 76), srednjoneolitički slojevi na čitavom nalazištu velikim dijelom istovremeni.

U vanjskom dijelu špilje ulomci su u prosjeku neznatno manji nego u unutarnjoj dvorani. Zastupljenost

secondarily perforated fragments bear witness to the fact that damaged vessels were at least on certain occasions mended for further use. Phase 2 boasts the greatest number of such perforations, where they were recorded on approximately 1% of all fragments.

## A COMPARISON WITH THE EXTERIOR SECTION OF PUPIĆINA CAVE

If we compare the situation in the interior of the cave with that in its exterior section, we notice that some prehistoric periods are represented on the entire area that was explored, while others are not. The Middle Neolithic is well represented throughout the cave, in all excavated sections. Above, in the exterior section of the cave it was possible to define a relatively modest but nonetheless clear phase of the Late Neolithic (Forenbaher and Kaiser 2006, 182-186), which was not recorded in the interior, even though certain finds from Phase 2 may belong to this period. In contrast to this, in the interior section of the cave we defined Phase 2 (Late Neolithic/Early Eneolithic) and Phase 3 (Late Eneolithic/Early Bronze Age), both of them marked by pottery finds that in the exterior section of the cave are almost entirely absent. It could be, perhaps, that people in those periods preferred to spend time in the interior of the cave, but the absence of corresponding layers in its exterior section could also be explained by the subsequent removal of the sediment (Miracle and Forenbaher 2006c, 459), perhaps in order to use it as fertilizer (Komšo 2003, 46).

As was the case with Middle Neolithic, the Middle Bronze Age is present in all parts of the site. Overlying it in the fore section of the cave is a very modest Iron Age phase (Forenbaher and Kaiser 2006, 193) that was not recorded in the interior section, even though we could ascribe to this period some of the surface finds, as well as those from disturbed contexts. People continued to visit the cave occasionally all the way to the Middle Ages, when it became difficult but not impossible to enter its interior section due to accumulation of sediment and rise of the ground level. A small number of finds that were recovered from all explored parts of the site testify of those visits.

It follows that, for a direct comparison of pottery from the interior chamber and exterior section of the cave, we are left with the Middle Neolithic and Middle Bronze Age Phase.

### *Middle Neolithic*

We synchronized Phase 1 of the interior section of Pupićina Cave with horizons I and H of the exterior section of the cave (Forenbaher and Kaiser 2006, 172-182). In both cases these layers are ascribed to the Middle

i učestalost pojedinih oblika posuda ponešto se razlikuje. U oba prostora prevladavaju različite varijante polukuglastih zdjela, no u vanjskom dijelu špilje takve zdjele češće imaju znatno uvučen obod. U vanjskom dijelu nedostaju bikonične posude, jednostavne plitice bez bikoničnog loma i posude s cilindričnim vratom, a u unutrašnjosti kuglaste zdjele, no valja napomenuti da ti oblici nisu česti ni u jednom dijelu lokaliteta. Posude na nozi i posude s ušicama općenito su prisutne, dok ručki nema. Od posebnih oblika u vanjskom su dijelu pronađeni dijelovi ritona i cjedila, a u unutarnjem figurica i pršljen.

Relativna zastupljenost glačanih i neglačanih ulomaka posuda gotovo je jednaka, a prevlačenje metlicom nešto je češće u unutrašnjosti špilje. U svim istraženim prostorima prevladava ukrašavanje urezanim geometrijskim motivima, no u unutarnjoj dvorani nešto je veća raznolikost tehnika koje uključuju žlijebljenje i (vjerojatno) slikanje. Posude se ne razlikuju značajno ni veličinom, a prosječne vrijednosti promjera oboda i debljina stijenki u unutarnjoj dvorani naročito su bliske onima iz mlađeg srednjoneolitičkog horizonta H u vanjskom dijelu špilje.

Sudeći po keramičkim nalazima, ista grupa ljudi koristila je u vrijeme srednjeg neolitika cijeli prostor špilje za iste ili slične djelatnosti. Možda su čitav taj prostor koristili istovremeno, ili su ponekad boravili u unutarnjem, a ponekad u vanjskom dijelu špilje. Sami keramički nalazi ne ukazuju ni na kakvu diferencijaciju u korištenju pojedinih dijelova prostora unutar špilje.

#### *Srednje brončano doba*

Fazu 4 unutarnjeg dijela Pupićine peći izjednačili smo s horizontima F, E i D vanjskog dijela špilje (Forenbaher i Kaiser 2006, 186–193). U oba slučaja ti su slojevi pripisani srednjem brončanom dobu. Većina nalaza iz tog razdoblja prikupljena je iz vanjskog dijela špilje i iz prostora na prijelazu iz vanjskog u unutarnji dio, dok iz same unutarnje dvorane potječe relativno malen broj ulomaka.

Kao i u neolitiku, tako i u ovom razdoblju keramika iz svih dijelova špilje očekivano pokazuje veliku sličnost. Razlomljenost nalaza i u ovom je slučaju neznatno veća u vanjskom dijelu špilje, možda zbog veće izloženosti ostataka mehaničkom oštećivanju nakon odlaganja. U svim istraženim prostorima prevladavaju različiti oblici posuda zaobljenog tijela, stegnutog vrata i izvijenog oboda, pojavljuju se brojne ručke (najčešće trakaste) i relativno velik broj glačanih ili ovlaš glačanih ulomaka, a među rijetkim ukrasima prevladava apliciranje. Ukrasni motivi ponešto se razlikuju: dok su u vanjskom dijelu

Neolithic, and the Danilo–Vlaška culture. The similarity of Middle Neolithic finds from both sections of the cave is indeed remarkable. That was to be expected, since Middle Neolithic layers appear to be contemporaneous across much of the site judging by the six radiocarbon dates (Miracle and Forenbaher 2006b).

The fragments in the exterior section of the cave are slightly smaller on average when compared with the interior chamber. The representation and frequency of individual vessel shapes differs a little. Prevalent in both sections are different variants of hemispherical bowls; however, in the exterior section of the cave such bowls more often have a markedly restricted rim. Missing in the exterior section are carinated vessels, simple plates without a carinated break on the body, and vessels with a cylindrical neck, and in the interior this is the case with spherical bowls, but it should be mentioned that these shapes do not appear frequently in any part of the site. Pedestalled vessels, and vessels with perforated lugs, are universally present, while handles are absent. As far as special shapes are concerned, fragments of a rhyton and strainer were recovered from the exterior section, while a figurine and a whorl were recovered from the interior.

The relative frequency of burnished and non-burnished vessel fragments is almost identical, while brushed pottery occurs slightly more often in the interior of the cave. Prevalent in all explored sections is decoration with incised geometrical motifs; however, in the interior chamber the diversity of techniques is slightly bigger, including wide incision and (probably) painting. The vessels do not vary a great deal as far as size is concerned either, and average values for rim diameters and wall thickness in the interior chamber are particularly close to those from the younger Middle Neolithic horizon H in the exterior section of the cave.

Judging by pottery finds, the same group of people used the entire area of the cave for identical or similar activities in the period of the Middle Neolithic. Perhaps they used the entire area simultaneously, or else they sometimes lived in the interior chamber, and sometimes in the exterior section of the cave. The pottery finds themselves do not imply any differentiation in the use of specific areas within the cave.

#### *Middle Bronze Age*

We synchronized Phase 4 of the interior section of Pupićina Cave with horizons F, E and D of the exterior section of the cave (Forenbaher and Kaiser 2006, 186–193). In both cases these layers were ascribed to the Middle Bronze Age. The majority of finds from this period was collected in the exterior section of the cave, and in the area at the transition from the exterior into the

najčešće bradavice okružene žljebovima, u unutrašnjosti prevladavaju rebra i trake, a bradavica nema. Sudeći po sličnim prosječnim vrijednostima i standardnom raspršenju promjera oboda i debljina stijenki, veličine posuda u oba dijela nalazišta također su slične.

U srednjem brončanom dobu vjerojatno se upotrebljavao cijeli raspoloživi prostor, kao i u neolitiku, iako izgleda da se unutarnja dvorana koristila manje od ostalih dijelova špilje. Nakupljanjem taložine i podizanjem razine tla unutarnji prostor postajao je sve skućeniji i mračniji pa time i manje ugodan za boravak. Srednjobrončanodobni konteksti sačuvani su u vanjskom dijelu špilje isključivo kao ispuna jama. Za razliku od toga, u unutrašnjem dijelu postojao je osim ispune jedne jame i kulturni sloj. Odsutnost brončanodobnog kulturnog sloja u vanjskom dijelu Pupićine peći pokušala se objasniti namjernim uklanjanjem tog sloja, koji je dijelom završio u ispuni jama (Miracle i Forenbaher 2006c, 459), a dijelom je mogao biti iznesen iz špilje i upotrijebljen kao gnojivo (Komšo 2003, 46).

## ZAKLJUČAK

Analiza keramičkih nalaza prikupljenih iskopavanjem 2001. godine iz unutrašnjosti Pupićine peći omogućila nam je da taj dio nalazišta podijelimo na faze i time olakšamo provođenje specijalističkih analiza drugih, kronološki manje osjetljivih kategorija arheološke građe. Sami po sebi, keramički nalazi ne ukazuju na specifičnu namjenu ili posebnu ulogu unutarnjih prostora špilje. Saznanja koja proizlaze iz novih nalaza ne kose se s već predloženim interpretacijama funkcije ovog nalazišta tijekom srednjeg neolitika i srednjeg brončanog doba.

Po tim tumačenjima, Pupićina peć koristila se relativno intenzivno u srednjem neolitiku kao sezonsko boravište transhumantnih pastira i njihovih stada (Miracle i Forenbaher 2006c, 472-474). Morala je biti povezana sa životom u selima, no srednjoneolitička naselja na otvorenom u Istri su nam još uvijek vrlo slabo poznata. Znatno je teže precizno dokučiti njezinu funkciju za srednjeg brončanog doba, no špilja je i tada bila korištena za držanje stoke te je neminovno bila uključena u širi sustav naseljavanja, koji nam je za to razdoblje znatno bolje poznat (Miracle i Forenbaher 2006c, 476-479). Zbog toga ne čudi da formalne analogije srednjobrončanodobnoj keramici iz Pupićine peći pronalazimo uglavnom na gradinama. Nedaleko od špilje nalazi se gradina Stara Vranja, koja je vjerojatno bila naseljena u brončanom dobu (Buršić-Matijašić 2007, 423). Njezini stanovnici mogli su u Pupićinoj peći obavljati poslove koje nisu mogli ili nisu željeli

interior section, whereas only a relatively small number of fragments came from the interior chamber itself.

As was the case in the Neolithic, and as was expected, pottery from all sections of the cave shows a great deal of similarity in this period as well. The fragmentation of the finds is in this case likewise slightly larger in the exterior section of the cave, perhaps because the remains were more exposed to mechanical damage after deposition. Prevalent in all explored areas are different shapes of vessels with a rounded body, a constricted neck and everted rim. Numerous handles also appear (most often strap handles), as well as a relatively large number of burnished or casually burnished fragments, and amongst the rare decorations, appliqué prevails. Decorative motifs differ somewhat: while nubs encircled by a channel are the most common decoration in the exterior section, ribs and straps prevail in the interior, while nubs are absent. Judging by similar average values, and standard deviations of rim diameters and wall thicknesses, vessel sizes were also similar in both sections of the site.

The entire available area was probably in use in the Middle Bronze Age, as was the case in the Neolithic, although it seems that the interior chamber was less used in comparison with the rest of the cave. The interior chamber gradually became smaller and darker due to sedimentation and lifting of the ground level, which made it less attractive for living. The Middle Bronze Age contexts were preserved in the exterior section of the cave exclusively as pit fill. In contrast with this, the interior section preserved a cultural layer in addition to the fill of a single pit. A possible explanation for the absence of a Bronze Age cultural layer in the exterior section of Pupićina Cave may be its intentional removal. Part of it may have ended up as fill in the pits (Miracle and Forenbaher 2006c, 459), and part of it could have been taken out of the cave to be used as fertilizer (Komšo 2003, 46).

## CONCLUSION

The analysis of pottery finds recovered during the excavation in 2001, which was conducted in the interior of Pupićina Cave, enabled us to divide this part of the site into phases, thus allowing specialist analyses of other, chronologically less sensitive categories of archaeological evidence. The pottery finds by themselves do not indicate any specific purpose or special role of the interior areas of the cave. The findings obtained as a result of new finds do not contradict the already suggested interpretations of the function of this site during the Middle Neolithic and the Middle Bronze Age.

In accordance with these explanations, Pupićina Cave was used rather intensively during the Middle Neolithic

obavljati na samoj gradini, a za koje je upravo špilja pružala naročito povoljne uvjete.

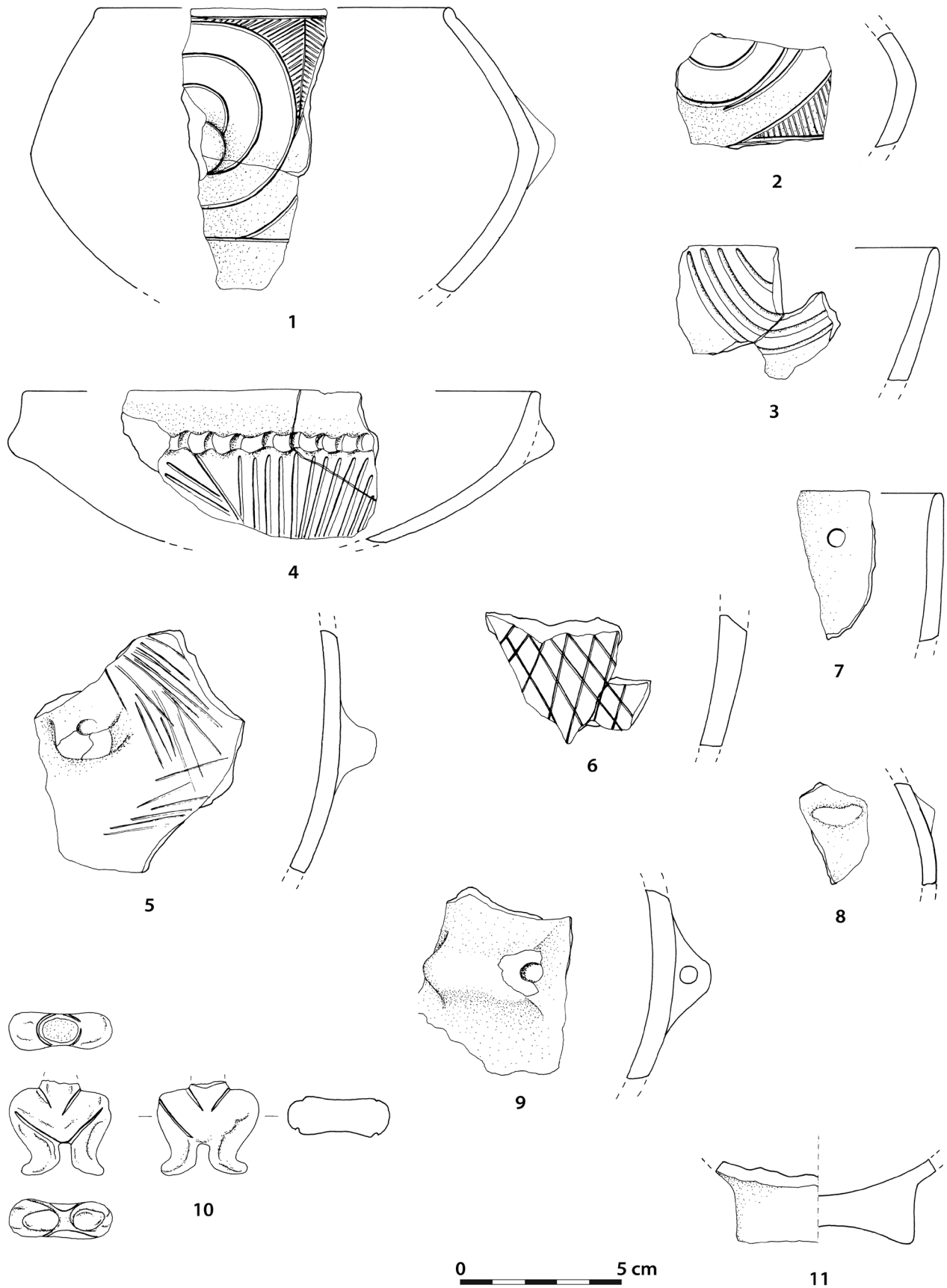
Najvažnija novost proizašla iz naših analiza jest spoznaja da je Pupićina peć bila korištena i za eneolitika. Na temelju istraživanja u prednjem dijelu špilje takva se mogućnost mogla tek maglovito naslutiti. Zbog gotovo potpune odsutnosti eneolitičke arheološke građe, Miracle i Forenbaher (2006c, 458–459) pretpostavili su prekid ljudskog boravka na lokalitetu između kasnog neolitika i brončanog doba, u trajanju od oko 2.500 godina. Sada je jasno da su ljudi koristili Pupićinu peć i za eneolitika, iako vjerojatno ne odveć intenzivno, a niti kontinuirano tijekom čitavog tog razdoblja.

as a seasonal dwelling-place of transhumant herders and their herds (Miracle and Forenbaher 2006c, 472–474). The cave must have been related to life in villages, but we still know very little about Istrian Middle Neolithic open-air settlements. It is much harder to precisely define its function during the Middle Bronze Age, but the cave was also used for the keeping of animals at that time, and as such it was surely included into the broader system of settlement, which is much better known to us for this period (Miracle and Forenbaher 2006c, 476–479). It is therefore not surprising that we encounter formal analogies for Middle Bronze Age pottery from Pupićina Cave mainly on hillforts. Located not far away from the cave is the Stara Vranja hillfort that was probably inhabited in the Bronze Age (Buršić-Matijašić 2007, 423). Its inhabitants could have used Pupićina Cave for activities that they did not want, or could not perform on the hillfort itself, and for which the cave offered ideal conditions.

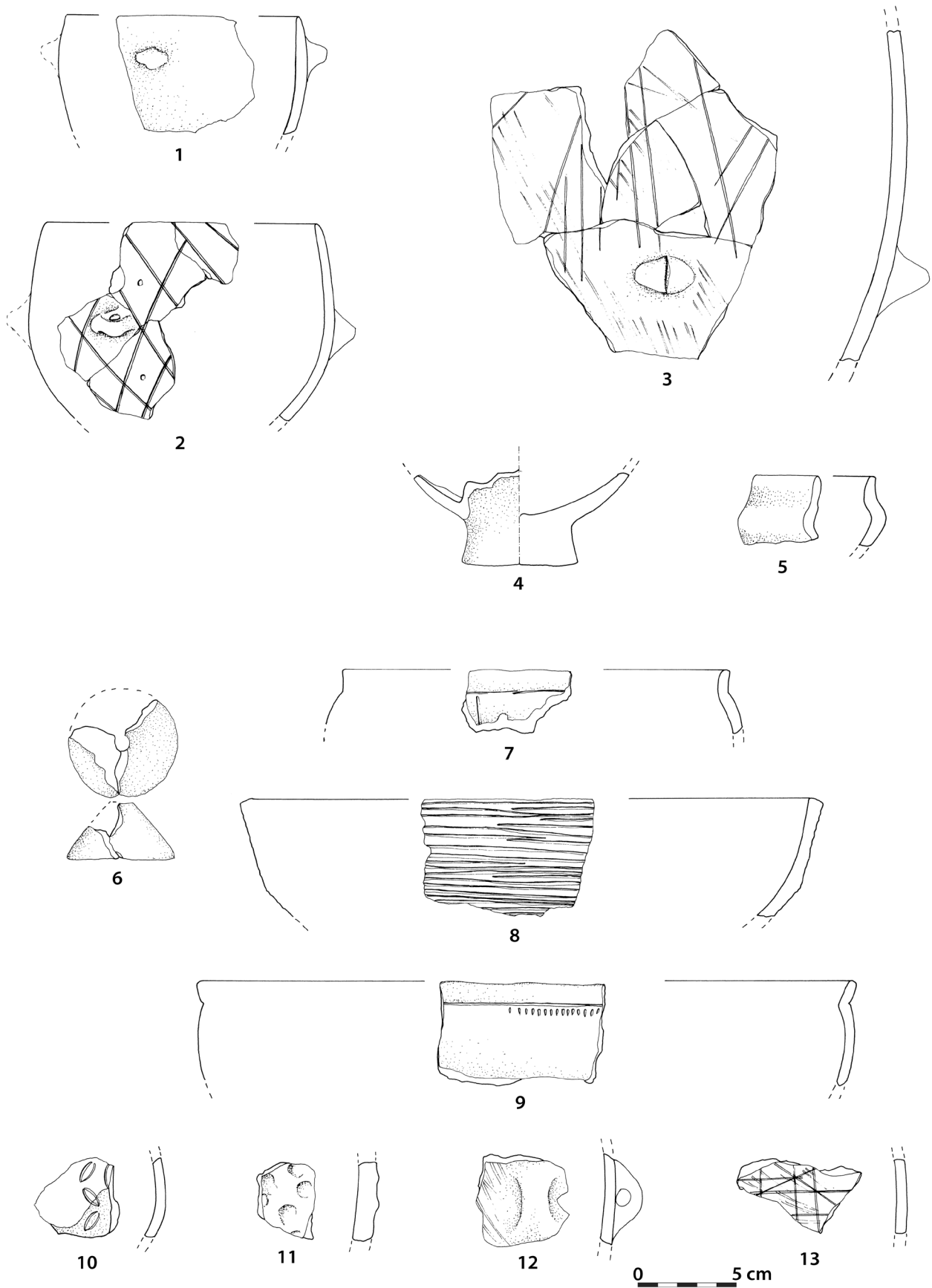
The most important news to come out of our analyses was the recognition that Pupićina Cave was in use also during the Eneolithic. Based on excavations in the fore section of the cave, such a possibility could only be faintly suspected. Due to an almost complete absence of Eneolithic archaeological materials, Miracle and Forenbaher (2006c, 458–459) assumed an interruption of human habitation on this site between the Late Neolithic and the Bronze Age, which lasted for approximately 2,500 years. It is now clear that Pupićina Cave was inhabited by humans in the Eneolithic period as well, although probably not very intensively and not continuously during this entire period.



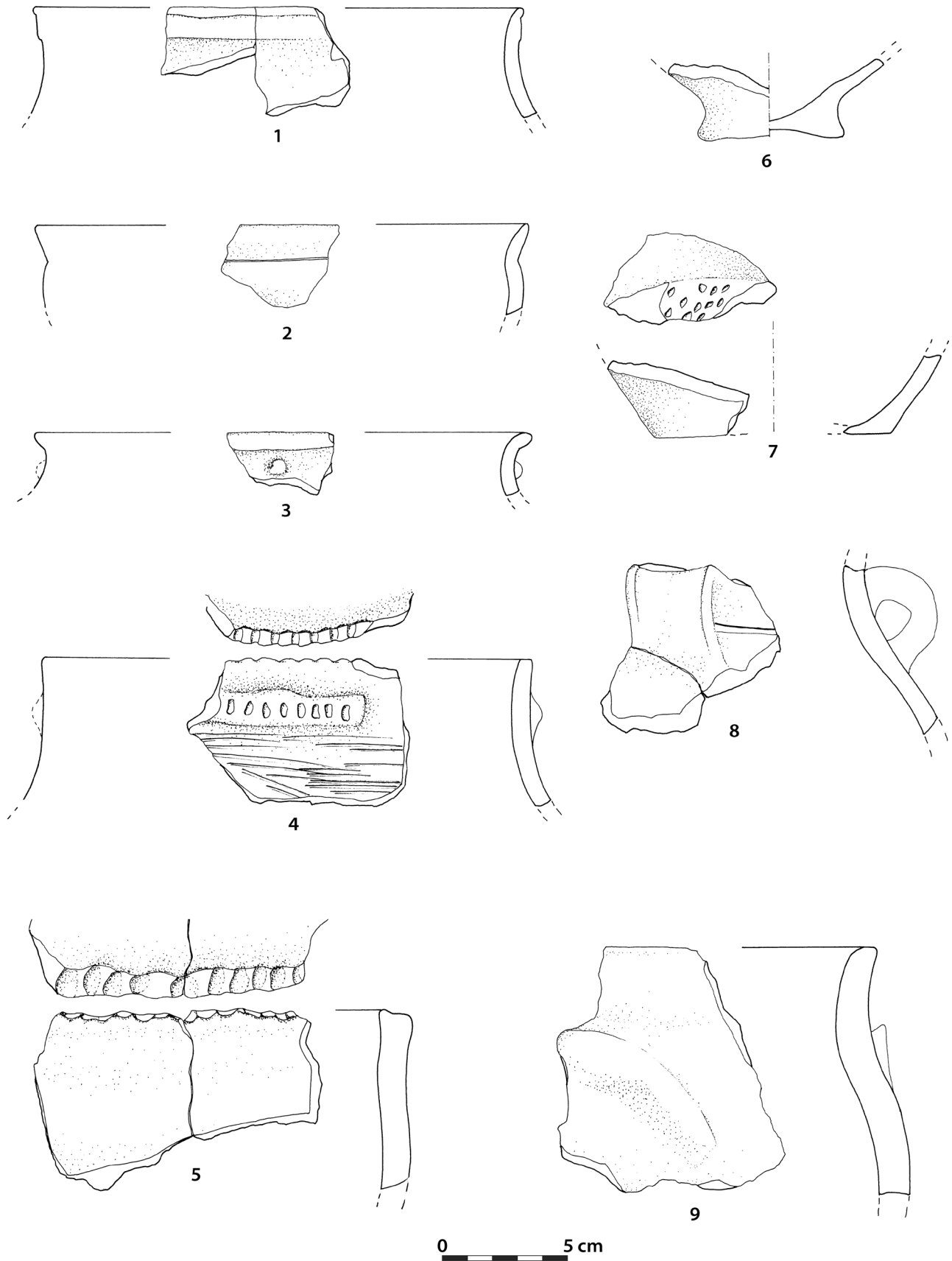
T. 1 Faza 1 (1-11)  
Pl. 1 Phase 1 (1-11).



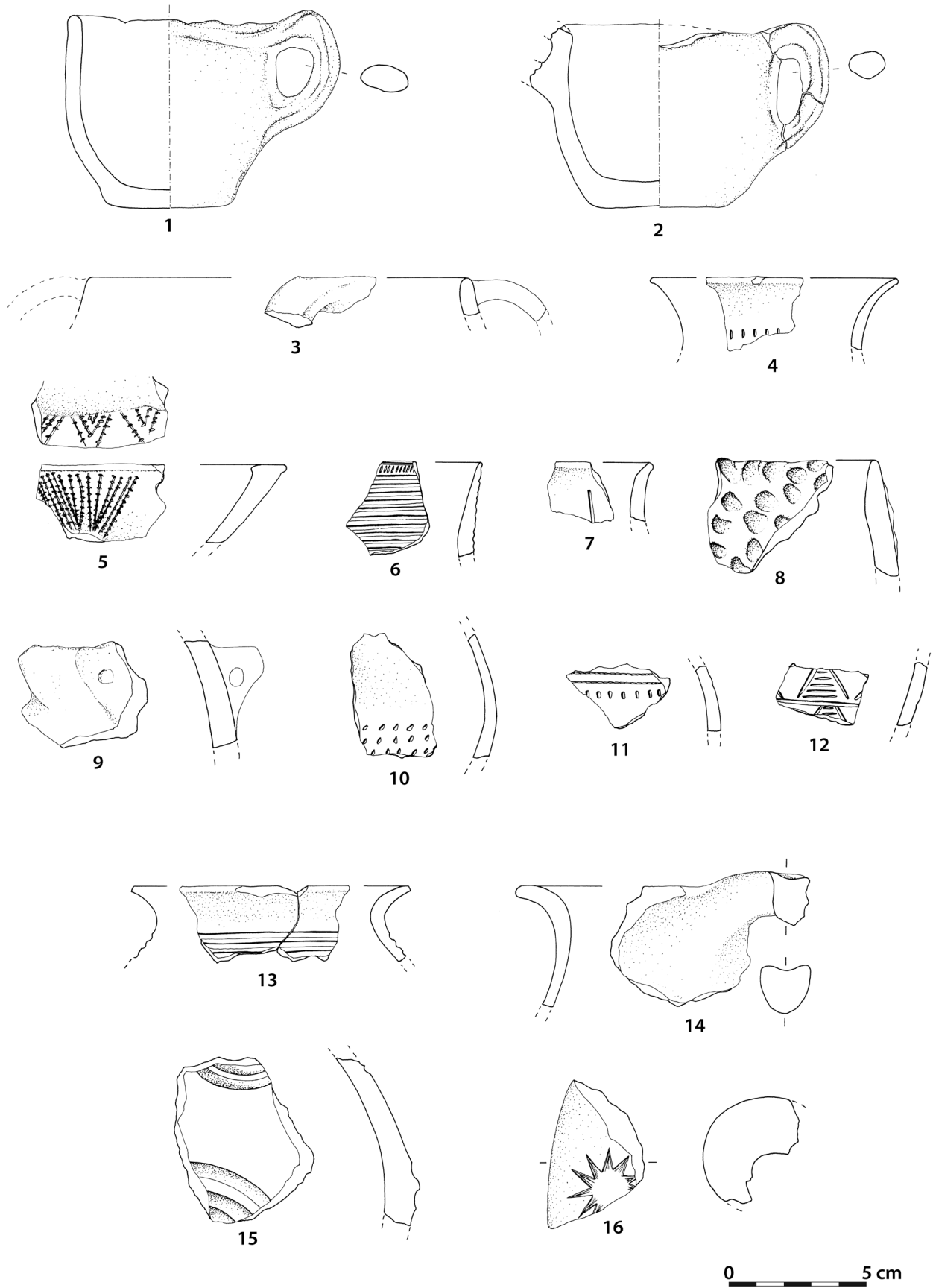
T. 2 Faza 1 (1-3), poremećeni konteksti (4-5), faza 2 (6-13)  
Pl. 2 Phase 1 (1-3), disturbed contexts (4-5), Phase 2 (6-13).



T. 3 Faza 3 (1-9)  
Pl. 3 Phase 3 (1-9).

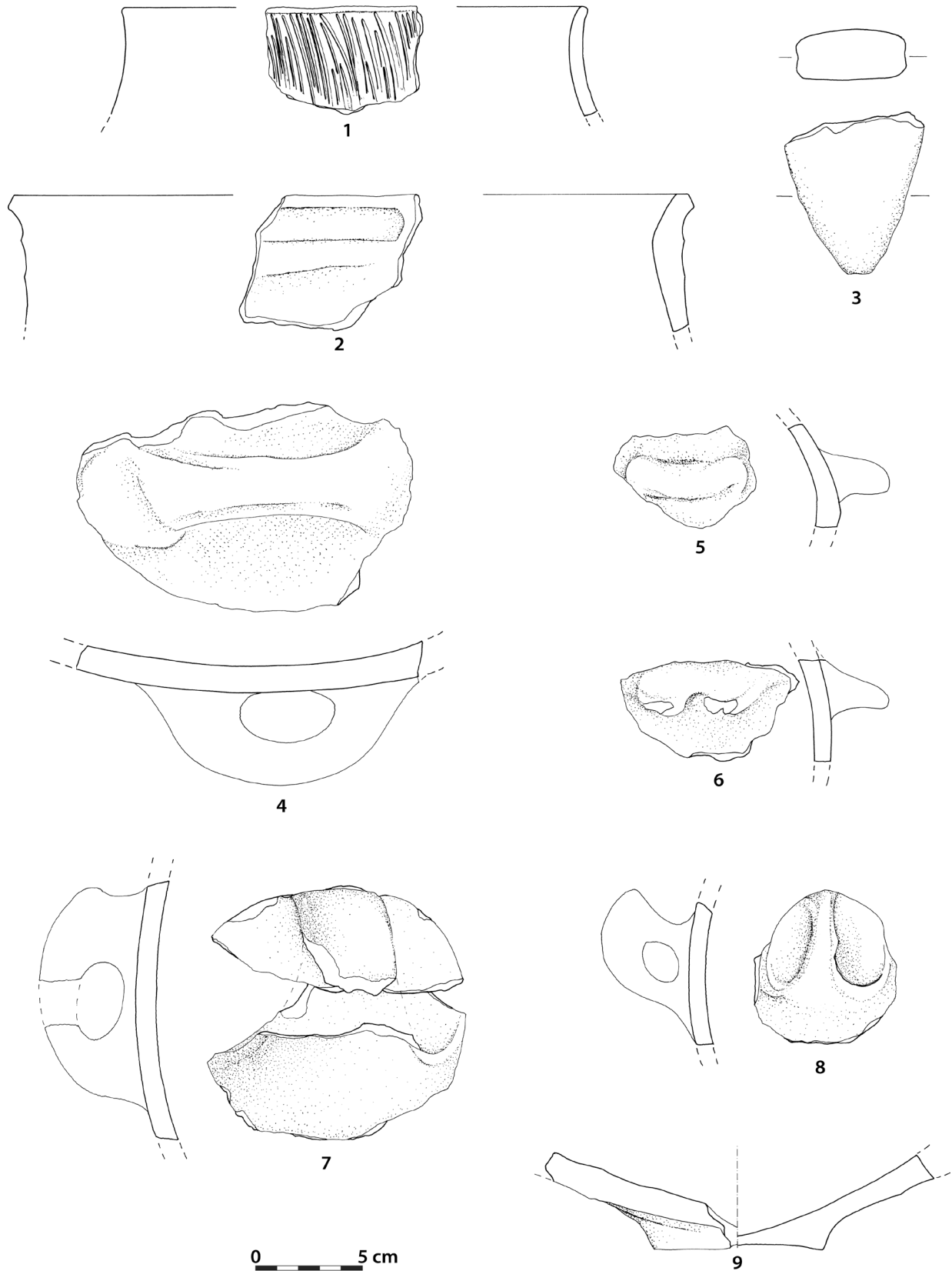


T. 4 Faza 3 (1-12), faza 4 (13-16)  
Pl. 4 Phase 3 (1-12), Phase 4 (13-16).





T. 5 Faza 4 (1-9)  
Pl. 5 Phase 4 (1-9).



(crteži: Ana Grabundžija)  
(Drawings by Ana Grabundžija)

## LITERATURA / LITERATURE

- BAČIĆ, B. 1956. Arheološko iskopavanje spilje Cingarele kod Momjana. *Jadranski zbornik* I, 323-364.
- BAČIĆ, B. 1972. Pradišelski rt, Pavičina, Istra – eneolitsko naselje. *Arheološki pregled* 14, 32-34.
- BAČIĆ, B. 1976. Limska gradina (Istra) – neolitski lokalitet. *Arheološki pregled* 18, 34-37.
- BAČIĆ, B. 1978. Trogrla pećina. Rezultati arheološkog istraživanja 1974. godine. *Jadranski zbornik* X (1976-1978), 163-175.
- BAGOLINI, B., CARUGATI M. G., FERRARI A., PESSINA A., 1993. Fagnigola Bosco Mantova (Azzano Decimo – Pordenone) Notizie preliminari sull'intervento 1991. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* VII, 47-64.
- BARFIELD, L. H. 1972. The first Neolithic cultures of north-eastern Italy. U: *Die Anfänge des Neolithikums vom Orient bis Nordeuropa*, Teil VII, Westliches Mittelmeergebiet und Britische Inseln, H. Schwabedissen (ed.). Böhlau Verlag, Köln-Wien, 182-217.
- BARFIELD, L. H. 1999. The Moser collection in the Naturhistorisches Museum, Vienna. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* XI (1997-1998), 19-62.
- BATOVIĆ, Š. 1959. Neolitsko naselje u Smilčiću. *Diadora* 1, 5-25.
- BATOVIĆ, Š. 1963. Neolitsko naselje Smilčić. *Radovi Instituta JAZU u Zadru* 10(2), 89-138.
- BATOVIĆ, Š. 1973. Odnos jadranskog primorja prema području jugoistočnih Alpa u neolitu i eneolitu. *Arheološki vestnik* 24, 62-127.
- BATOVIĆ, Š. 1979. Jadranska zona. U: *Praistorija jugoslavenskih zemalja II, Neolitsko doba*, M. Garašanin (ed.), Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 473-634.
- BENAC, A. 1979. Prelazna zona. U: *Praistorija jugoslavenskih zemalja II, Neolitsko doba*, M. Garašanin (ed.). Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 363-472.
- BERTOLDI, F. 1996. Il Riparo di Monrupino nel Carso Triestino. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* IX, 137-170.
- BIAGI, P. 1995. North-eastern Italy in the Seventh Millenium BP, a bridge between the Balkans and the West? U: *The Vinča Culture, its Role and Cultural Connection*. Timisoara, The Museum of the Banat, 9-22.
- BIAGI, P., STARNINI E., VOYTEK, B. 1993. The Late Mesolithic and Early Neolithic Settlement of Northern Italy, Recent Considerations. *Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji* XXI, 45-67.
- BRUSIĆ, Z. 2008. *Pokrovnik - naselje iz neolitika*. Šibenik, Muzej grada Šibenika.
- BURŠIĆ-MATIJAŠIĆ, K. 1994. La ceramica a striature in Istria, *Atti della XIX riunione scientifica IIPP*, Firenze 1994, 247-260.
- BURŠIĆ-MATIJAŠIĆ, K. 1996. La ceramica del Castelliere di Monte Orcino in Istria. *Proceedings of the XII Congress, International Union of Prehistoric and protohistoric Sciences*, Forlì - Italia, 1996, 343-350.
- BURŠIĆ-MATIJAŠIĆ, K. 1997. Ceramica del castelliere di Monte Orcino in Istria. *Histria archaeologica* 28, 108-134.
- BURŠIĆ-MATIJAŠIĆ, K. 1997.a Maklavun - brončanodobni tumul. *Arheološka istraživanja u Istri*. Izdanja Hrvatskog arheološkog društva 18/1997, Zagreb, 21-38.
- BURŠIĆ-MATIJAŠIĆ, K. 1998. *Gradina Monkodonja*. Monografije i katalogi, 9, Pula.
- BURŠIĆ-MATIJAŠIĆ K., 2003. Rano naseljavanje južne Istre – Pećinovac kod Okreti. *Histria antiqua* 11, 58-68.
- BURŠIĆ-MATIJAŠIĆ, K. 2007. *Gradine Istre*. Povijest prije povijesti. Povijest Istre IV, Pula.
- BURŠIĆ-MATIJAŠIĆ, K. 2010. Bale i keramički materijal iz palače Soardo-Bembo (istraživanje 2000-2003.) *Opuscula archaeologica* 34, 7-35.
- CANNARELLA, D., CREMONESI, G. 1967. Gli scavi nella Grotta Azzurra di Samatorza nel Carso triestino. *Rivista di Scienze Preistoriche* XXI(2), 281-330.
- CANNARELLA, D., PITTI, C. 1981. Gli scavi nella Caverna Caterina sul Carso triestino. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* IV, 11-32.

- CANNARELLA, D., REDIVO, B. 1981. La Grotta della Tartaruga (Livelli a ceramica - nota preliminare). *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia IV*, 47-71.
- ČEČUK, B., RADIC, D. 2001. Vela špilja - preliminarni rezultati dosadašnjih istraživanja. *Arheološka istraživanja na području otoka Korčule i Lastova*. Izdanja Hrvatskog arheološkog društva 20/2001, Zagreb, 75-118.
- ČEČUK, B., RADIC, D. 2005. *Vela špilja, višeslojno pretpovijesno nalazište Vela Luka - otok Korčula*. Vela Luka, Centar za kulturu.
- ČOVIĆ, B. 1983. Regionalne grupe ranog bronzanog doba. U: *Praistorija jugoslavenskih zemalja IV, Bronzano doba*, B. Čović (ed.). Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 114-190.
- ČOVIĆ, B. 1983.a. Srednje bronzano doba u Istri. U: *Praistorija jugoslavenskih zemalja IV, Bronzano doba*, B. Čović (ed.). Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 233-241.
- ČUKA, M. 2009. Tipološka obrada odabranih ulomaka prapovijesne keramike iz Pećine ispod sela Srbani, *Histria archaeologica* 40/2009, 13-44.
- DELLA CASA, P. 1995. The Cetina group and the transition from Copper to Bronze age in Dalmatia. *Antiquity* 69, 556-576.
- DIMITRIJEVIĆ, S. 1967. Die Ljubljana-Kultur, Problem des Substrats, der Genese und der regionalen Typologie. *Archaeologia Jugoslavica* 8, 1-27.
- DIMITRIJEVIĆ, S. 1979. Problem eneolita na istočnoj jadranskoj obali. U: *Praistorija jugoslavenskih zemalja III, Eneolitsko doba*, N. Tasić (ed.). Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 367-379.
- DIMITRIJEVIĆ, S. 1979.a. Vučedolska kultura i vučedolski kulturni kompleks. U: *Praistorija jugoslavenskih zemalja III, Eneolitsko doba*, N. Tasić (ed.). Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 267-342.
- DRECHSLER-BIŽIĆ, R. 1983. Srednje brončano doba u Lici i Bosni. U: *Praistorija jugoslavenskih zemalja IV, Bronzano doba*, B. Čović (ed.). Akademija nauka i umjetnosti Bosne i Hercegovine, Sarajevo, 242-270.
- DRECHSLER-BIŽIĆ, R. 1984. Brončano doba u pećinama Like. Zbornik radova, Deveti jugoslavenski speleološki kongres, Zagreb, Hrvatski geološki savez, 623-639.
- FORENBAHER, S., KAISER, T. 1999. Grapčeva spilja i apsolutno datiranje istočnojadranskog neolitika. *Vjesnik za arheologiju i historiju dalmatinsku* 92, 9-34.
- FORENBAHER, S. 2000. "Nakovana Culture", state of research. *Opuscula archaeologica* 23-24, 373-385.
- FORENBAHER, S., VRANJICAN, P. 1985. Vaganačka pećina. *Opuscula archaeologica* 10, 1-21.
- FORENBAHER, S., KAISER, T. 2006. The Pottery of Pupićina Cave/Lončarija Pupićine peći. U: P. T. Miracle, S. Forenbaher (eds.) *Pretpovijesni stočari sjeverne Istre, arheologija Pupićine peći, sv. 1*, 163-223. Monografije i katalogi 14. Pula, Arheološki muzej Istre.
- FORENBAHER, S., KAISER, T. 2008. *Grapčeva špilja. (Pretpovijesni stan, tor i obredno mjesto)*. Split, Književni krug.
- FORENBAHER, S., RAJIĆ ŠIKANJIĆ, P., MIRACLE, P. T. 2008. Lončarija iz Vele peći kod Vranje (Istra). *Histria archaeologica* 37/2006, 5-46.
- FORENBAHER, S., MIRACLE, P. T. u tisku. The Chronological Significance of Neolithic Pottery Styles in the Eastern Adriatic Region. *Archaeometry*.
- GILLI, E., MONTAGNARI KOKELJ, E. 1992 (1993). La Grotta dei Ciclami nel Carso Triestino (materiali degli scavi 1959-1961). *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia VII*, 65-162.
- GILLI, E., MONTAGNARI KOKELJ, E. 1993 (1994). La Grotta delle Gallerie nel Carso Triestino. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia VIII*, 121-194, Trieste.
- GILLI, E., MONTAGNARI KOKELJ, E. 1996. La Grotta degli Zingari nel Carso Triestino (materiali degli scavi 1961-1965). *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia IX*, 63-126.
- GOVEDARICA, B. 1988-1989. O kulturnom i hronološkom položaju nalaza ljubljanske kulture na jadranskom području. *Arheološki vestnik* 39-40 (1988-1989), 401-412.
- GOVEDARICA, B. 1989. Problem ranog bronzanog doba istarskog poluostrva i Problem datacije arhaičnog horizonta kastelijera. U: *Rano bronzano doba na području istočnog Jadrana*. Sarajevo, Akademija nauka i umjetnosti Bosne i Hercegovine, 71-86.
- GUŠTIN, M., SAKARA SUČEVIĆ M. 2003. Sveti Ivan kraj Umaga, *Histria antiqua* 11, 95-100.

- HARRISON, R. J. 1980. *The Beaker Folk, Copper Age archaeology in Western Europe*. London, Thames and Hudson.
- HÄNSEL, B., MIHOVILIĆ, K., TERŽAN, B. 1997. Monkodonja – utvrđeno protourbano naselje starijeg i srednjeg brončanog doba kod Rovinja u Istri. *Histria archaeologica* 28/1997, 37–107.
- HÄNSEL, B., TERŽAN, B. 1999. Brončanodobna kupolasta grobnica mikenskog tipa u Istri, *Histria archaeologica* 30, 70–109.
- KOMŠO, D. 2003. Pećine Istre – mjesta življenja od prapovijesti do srednjeg vijeka. *Histria antiqua* 11, 41–54.
- KOMŠO et al. 2004. Novačka pećina. *Hrvatski arheološki godišnjak* 1/2004.
- KOMŠO, D. 2005. Kargadur (Ližnjan). *Hrvatski arheološki godišnjak* 2/2005.
- KOMŠO, D. 2005.a Pećina Laganiši. *Hrvatski arheološki godišnjak* 2/2005.
- KOMŠO, D. 2006. Kargadur (Ližnjan). *Hrvatski arheološki godišnjak* 3/2006.
- KOMŠO, D., MIRACLE, P. T. 2004. Pećina Jačmica. *Hrvatski arheološki godišnjak* 1/2004.
- KOROŠEC, J. 1959. *Neolitska naseobina u Danilu Bitinju*. Zagreb, Jugoslavenska akademija znanosti i umjetnosti.
- KOROŠEC, J. 1960. Neolit na Krasu in v Slovenskom Primorju. *Zgodovinski časopis* 14, 5–34.
- KOROŠEC, J., KOROŠEC, P. 1974. Bribir i njegova okolica u prapovijesno doba. *Diadora* 7, 5–27.
- KOROŠEC, P. 1973. Eneolitik Slovenije. *Arheološki vestnik - Acta archaeologica* 24, 167–195.
- KOS, V. 2005. Kunci (Gračišće). *Hrvatski arheološki godišnjak* 2/2005.
- KOS, V., 2005.a Gradina Kunci, prilozi poznavanju gradinskih naselja Istre. *Histria archaeologica* 36/2005, 47–60.
- KRISTIANSEN, K., 1998. *Europe Before History*. Cambridge, Cambridge University Press.
- LEBEN, F. 1967. Stratigrafija in časovna uvrstitev jamskih najdb na tržaškem krasu. *Arheološki vestnik* XVIII, 43–109.
- LEBEN, F. 1973. Opredelitev neolitske ine neolitske keramike iz jamskih najdišč jugovzhodnega alpskega prostora. *Arheološki vestnik* XXIV, 145–160.
- MARIJANOVIĆ, B. 1991. Ljubljanska kultura na istočnoj jadranskoj obali. *Vjesnik za arheologiju i historiju dalmatinsku* 84, 215–245.
- MARIJANOVIĆ, B. 2005. *Gudnja, višeslojno prapovijesno nalazište*. Dubrovnik, Dubrovački muzeji – Arheološki muzej.
- MAROVIĆ, I. 1991. Istraživanje kamenih gomila cetinske kulture u srednjoj Dalmaciji. *Vjesnik za arheologiju i historiju dalmatinsku* 84, 15–214.
- MAROVIĆ, I., ČOVIĆ, B. 1983. Cetinska kultura. U: *Praistorija jugoslavenskih zemalja IV, Bronzano doba*, B. Čović (ed.). Sarajevo, Akademija nauka i umjetnosti Bosne i Hercegovine, 191–232.
- MASELLI SCOTTI, F. 1989. Considerazioni su recenti scavi al castelliere di Elleri e confronti con abitati coevi del Carso triestino. *Arheološki vestnik* 39–40 (1988–1989), 509–518.
- MIHOVILIĆ, K. 1995. Školjić (Funtana) i tragovi prapovijesnih obalnih i otočnih lokaliteta Istre. *Histria archaeologica* 26, 28–57.
- MIHOVILIĆ, K. 1997. Fortifikacija gradine Gradac-Turan iznad Koromačna. Arheološka istraživanja u Istri. *Izdanja Hrvatskog arheološkog društva* 18/1997, Zagreb, 39–59.
- MIHOVILIĆ, K. 2001. *Nezakcij, prapovijesni nalazi 1900–1953.*, Monografije i katalozi, 11, Pula.
- MIHOVILIĆ K. 2007–2008. Gropi – Stari Guran, Analiza prapovijesne keramike. *Histria archaeologica* 38–39, 37–79.
- MILOŠEVIĆ, A., GOVEDARICA, B. 1986. Otišić, Vlake – praistorijsko nalazište u vrtači I. *Godišnjak, Centar za balkanološka ispitivanja* 24(22), 51–71.
- MIRACLE, P. T. 2003. Excavations at Pupičina cave, Preliminar Results of the 1999, 2001 and 2002 Field Seasons, *Histria archaeologica* 34, 6–39.
- MIRACLE, P. T., FORENBAHER, S. 2006.a (eds.) *Pretpovijesni stočari sjeverne Istre, arheologija Pupičine peći, sv. 1*. Monografije i katalozi, 14, Pula.
- MIRACLE, P. T., FORENBAHER, S. 2006.b Excavations at Pupičina Cave/Iskopavanja u Pupičinoj peći. U: P. T. Miracle i S. Forenbaher (eds.) *Pretpovijesni stočari sjeverne Istre, arheologija Pupičine peći, sv. 1*, 63–122. Monografije i katalozi, 14, Pula.



- MIRACLE, P. T., FORENBAHER, S. 2006.c Changing Activities and Environments at Pupićina Cave/Promjene aktivnosti i krajolika oko Pupićine peći. U: P. T. Miracle, S. Forenbaher (eds.) *Pretpovijesni stočari sjeverne Istre, arheologija Pupićine peći*, sv. 1, 455-481. Monografije i katalozi, 14, Pula.
- MIRACLE, P. T., KOMŠO, D., TKALČEC, T. 2002. Arheološko istraživanje Pupićine i Vele peći kraj Vranje u Istri godine 2001. *Obavijesti Hrvatskog arheološkog društva* 34 (1), 71-74.
- MIROSAVLJEVIĆ, V. 1959. Jamina sredi, prilog prethistorijskoj kulturi na otoku Cresu. *Arheološki radovi i rasprave* I, 131-174.
- MIROSAVLJEVIĆ, V. 1968. Vela spilja, prethistorijsko nalazište na otoku Lošinju. *Arheološki radovi i rasprave* VI, 27-60.
- MIROSAVLJEVIĆ, V. 1974. Gradine i gradinski sistemi u prethistorijsko i protohistorijsko doba, I dio, otoci Cres i Lošinj. *Arheološki radovi i rasprave* VII, 259-297.
- MONTAGNARI KOKELJ, E., CRISMANI, A. 1997. La Grotta del Mitreo nel Carso Triestino. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* X, 7-98.
- MOORE, A., MENĐUŠIĆ, M., SMITH, J., PODRUG, E. 2007. Project "Early Farming in Dalmatia", Danilo Bitinj 2004-2005. *Vjesnik Arheološkog muzeja u Zagrebu* (3. serija) 40, 15-34.
- NICOLIS, F. 2001. (ed.) *Bell Beakers Today, Pottery, People, Culture, Symbols in Prehistoric Europe*. Trento, provincia Autonoma di Trento, Servizio Beni Culturali.
- NOVAK, G. 1955. *Prethistorijski Hvar, Grapčeva špilja*, Zagreb.
- NOVAK, G. 1968. Markova spilja na otoku Hvaru IV. *Arheološki radovi i rasprave* VI, 61-179.
- PERCAN et al. 2008. Ljubičeva pećina (Marčana). *Hrvatski arheološki godišnjak* 5/2008.
- PESSINA, A. 2006. Nuovi dati sugli aspetti culturale del Primo Neolitico in Friuli e sui rapporti con l'Adriatico orientale. U: *Preistoria dell'Italia Settentrionale (Studi in ricordo di Bernadrino Bagolini)*. Atti del convegno Udine 2005. A. Pessina i P. Visentini (eds.), Edizioni del Museo Friuliano di Storia Naturale, Udine, 279-301.
- PESSINA, A., ROTTOLI, M. 1996. New evidence on the earliest farming cultures in northern Italy, archaeological and paleobotanical data. *Poročilo o raziskovanju paleolitika, neolitika in eneolitika v Sloveniji* XXIII, 77-103.
- PETRIĆ, N. 1976. Prethistorijske kulture Pelješca. *Pelješki zbornik* 1, 295-313.
- PETRIĆ, N. 1979. Inroduzione alla preistoria dell'Istria. *Atti Centro di ricerche storiche (Rovigno)* 9, 187-248.
- PETRIĆ, N. 1980. Prilozi pretpovijesti Istre. *Jadranski zbornik* 10 (1976-1978), 441-469.
- ROBB, J. 2007. *The Early Mediterranean Village, Agency, Material Culture and Social Change in Neolithic Italy*. Cambridge University Press.
- SHERRATT, A. G. 1998. The Emergence of Elites, Earlier Bronze Age Europe, 2500-1300 BC. U: Cunliffe, B. (ed.). *Prehistoric Europe, an Illustrated History*. Oxford, Oxford University Press, 244-276.
- SNOJ, D. 1992. Sermin. *Varstvo spomenikov* 34, 91-106.
- STACUL, G. 1972. Scavo nella Grotta del Mitreo presso San Giovanni al Timavo. *Atti dei Civici Musei di Storia ed Arte di Trieste* 7, 35-60.
- SVOLJŠAK, D. 1989. Posočje v bronasti dobi. *Arheološki vestnik* 39-40 (1988-1989), 367-386.
- TEŽAK-GREGL, T. 2009. Problem eneolitika u Istri. *Histria antiqua* 18/1, 179-185.
- TURK, I., BAVDEK, A., PERKO, V., CULIBERG M., ŠERCELJ, A., DIRJEC, J., PAVLIN, P. 1992. Acijev spodmol pri Petrinjah, Slovenija. *Poročilo o raziskovanju paleolita, neolita in eneolita v Sloveniji* XX, 27-48.
- TURK, I., MODRIJAN Z., PRUS, T., CUIBERG M., ŠERCELJ A., PERKO V., DIRJEC, J., PAVLIN, P. 1993. Podmol pri Kastelcu – novo večplastno arheološko najdišče na Krasu, Slovenija. *Arheološki vestnik* 44, 45-96.
- VISENTINI, P. 1993. I livelli neolitico e delle età dei metalli della Grotta dell'ansa di San Pelagio nel Carso Triestino. *Atti della Societa per la Preistoria e Protostoria della Regione Friuli-Venezia Giulia* VII, 163-208.
- VITASOVIĆ, A. 1999. Gromače – neolitičko/eneolitičko naselje na Brijunima. *Histria archaeologica* 30, 5-67.
- ZLATUNIĆ, R. 2006. Sv. Mihovil (Bale). *Hrvatski arheološki godišnjak* 3/2006.
- ZLATUNIĆ, R. 2007. Sv. Mihovil (Bale). *Hrvatski arheološki godišnjak* 4/2007.