

TERENSKA ISTRAŽIVANJA NA NALAZIŠTIMA LJUBIĆEVA PEĆINA I ABRI KONTIJA 002 U OKVIRU PROJEKTA PREHISTRIA TIJEKOM 2021.

FIELD RESEARCH AT THE SITES OF LJUBIĆEVA PEĆINA AND ABRI KONTIJA 002 AS A PART OF THE PREHISTRIA PROJECT DURING 2021

Ivor Janković

Centar za primijenjenu bioantropologiju
Institut za antropologiju
Gajeva 32
HR – 10000 Zagreb
ivor.jankovic@inantro.hr

James C. M. Ahern

Department of Anthropology
University of Wyoming
1000 E. University Ave.
Laramie, WY 82071
JAhern@uwyo.edu

Rory Becker

Department of Anthropology and Sociology
Eastern Oregon University
La Grande, OR-97850-2807
rbecker@eou.edu

Darko Komšo

Arheološki Muzej Istre u Puli
Carrarina 3
HR – 52100 Pula
darko.komso@ami-pula.hr

Siniša Radović

Zavod za paleontologiju i geologiju kvartara
Hrvatska akademija znanosti i umjetnosti
Ante Kovačića 5
HR – 10000 Zagreb
sradovic@hazu.hr

Maja Čuka

Arheološki muzej Istre u Puli
Carrarina 3
HR – 52100 Pula
maja.cuka@ami-pula.hr

Ivor Janković

Centre for Applied Bioanthropology
Institute for Anthropological Research
Gajeva 32
HR – 10000 Zagreb
ivor.jankovic@inantro.hr

James C. M. Ahern

Department of Anthropology
University of Wyoming
1000 E. University Ave.
Laramie, WY 82071
JAhern@uwyo.edu

Rory Becker

Department of Anthropology and Sociology
Eastern Oregon University
La Grande, OR-97850-2807
rbecker@eou.edu

Darko Komšo

Archaeological Museum of Istria
Carrarina 3
HR – 52100 Pula
darko.komso@ami-pula.hr

Siniša Radović

Institute for Quaternary Paleontology and Geology
Croatian Academy of Sciences and Arts
Ante Kovačića 5
HR – 10000 Zagreb
sradovic@hazu.hr

Maja Čuka

Archaeological Museum of Istria
Carrarina 3
HR – 52100 Pula
maja.cuka@ami-pula.hr

Nikola Vukosavljević

Odsjek za arheologiju
 Filozofski fakultet Sveučilišta u Zagrebu
 Ivana Lučića 3
 HR – 10000 Zagreb
 nvukosav@ffzg.hr

Lia Vidas

Centar za primijenjenu bioantropologiju
 Institut za antropologiju
 Gajeva 32
 HR – 10000 Zagreb
 lia.vidas@inantro.hr

Katarina Gerometta

Sveučilište Jurja Dobrile
 Zagrebačka 30
 HR – 52100 Pula
 katarina.gerometta@unipu.hr

Mario Novak

Centar za primijenjenu bioantropologiju
 Institut za antropologiju
 Gajeva 32
 HR – 10000 Zagreb
 mario.novak@inantro.hr

Nikola Vukosavljević

Department of Archaeology
 Faculty of Philosophy and Social Sciences
 University of Zagreb
 Ivana Lučića 3
 HR – 10000 Zagreb
 nvukosav@ffzg.hr

Lia Vidas

Centre for Applied Bioanthropology
 Institute for Anthropological Research
 Gajeva 32
 HR – 10000 Zagreb
 lia.vidas@inantro.hr

Katarina Gerometta

Juraj Dobrila University
 Zagrebačka 30
 HR – 52100 Pula
 katarina.gerometta@unipu.hr

Mario Novak

Centre for Applied Bioanthropology
 Institute for Anthropological Research
 Gajeva 32
 HR – 10000 Zagreb
 mario.novak@inantro.hr

UDK / UDC: 902.2(497.571)»6325/637»

10.52064/vamz.55.2.1

Prethodno priopćenje / Preliminary report

Rad donosi rezultate arheoloških istraživanja provedenih u sklopu projekta Hrvatske zaklade za znanost pod nazivom „Prapovijesni lovci i sakupljači u Istri i obližnjim regijama: obrasci života tijekom kasnog pleistocena (PREHISTRIA)“ u sezoni 2021. kada su provedena sustavna istraživanja Ljubićeve pećine kraj Marčane, te Abri Kontije 002 u Limskom kanalu. U Ljubićevoj pećini proširena je postojeća sonda u manjoj pećinskoj dvorani te su u njoj otkriveni arheološki nalazi (keramika, litički nalazi, ljudski i životinjski ostaci) iz različitih prapovijesnih razdoblja (brončano doba, eneolitik, neolitik i paleolitik). Nadalje, provedena su i manja sustavna istraživanja u postojećoj arheološkoj sondi na lokalitetu Abri Kontija 002. Otkriveni su brojni litički i faunski nalazi iz razdoblja gornjeg paleolitika. Na oba lokaliteta uzeti su uzorci za radiometrijsko datiranje, analize sedimentne DNA, geoarheološke, arheobotaničke i analize sirovinskog materijala, ZooMS te druge vrste analiza. Analize ova dva nalazišta omogućit će bolje razumijevanje gornjopaleolitičkih obrazaca ponašanja i korištenja resursa tijekom posljednjeg glacialnog maksimuma i kasnog glacijala na prostoru Istre.

Ključne riječi:

gornji paleolitik, pleistocen, neolitik, prapovijesna arheologija, Istra, kasni glacijal, PREHISTRIA

The paper presents the results of archaeological research carried out as part of the Croatian Science Foundation project entitled 'Prehistoric hunter-gatherers in Istria and adjacent regions: patterns of Late Pleistocene lifestyle (PREHISTRIA)' in the 2021 season, when systematic research was carried out in Ljubićeve Pećina, near Marčana, and Abri Kontija 002, in the Lim Channel. In Ljubićeve Pećina, the existing trench in the smaller cave chamber was expanded, and archaeological finds (ceramics, lithic finds, human and animal remains) from various prehistoric periods (Bronze Age, Eneolithic, Neolithic and Palaeolithic) were discovered in it. Further, smaller systematic excavations were carried out in the existing archaeological trench at the Abri Kontija 002 site. Numerous lithic and faunal finds dating to the Upper Palaeolithic period were discovered. At both sites, samples were taken for radiometric dating, sediment DNA analysis, geoarchaeological, archaeobotanical and raw-material analyses, ZooMS and other types of analysis. The comparison of these two sites will enable a better understanding of Upper Palaeolithic patterns of behaviour and resource use during the last glacial maximum and the Late Glacial in the area of Istria.

Key words:

Upper Palaeolithic, Neolithic, Pleistocene, Prehistoric archaeology, Istria, Late Glacial, PREHISTRIA

Uvod

U razdoblju od 20. lipnja do 30. srpnja 2021. godine provedena su terenska istraživanja dva lokaliteta na području Istre: Ljubičeve pećine kod Marčane te pripečka Abri Kontija 002 u Limskom zaljevu. Navedena istraživanja planirana su projektom Hrvatske zaklade za znanost pod nazivom „Prapovijesni lovci i sakupljači u Istri i obližnjim regijama: obrasci života tijekom kasnog pleistocena (PREHISTRIA)“ (IP-2019-04-7821). Ranija istraživanja na oba nalazišta potvrdila su postojanje slojeva iz gornjeg paleolitika, što je od posebnog interesa za navedeni projekt, kojem su glavni ciljevi prikupiti građu za bolje razumijevanje obrazaca ponašanja i korištenja resursa u vremenu posljednjeg glacialnog maksimuma i kasnog glacijala. Od posebne je važnosti što će usporedba nalaza iz epigravetijenskih slojeva Ljubičeve pećine s onima iz Abri Kontije 002 pružiti uvid u dijakronijske promjene tijekom gornjeg paleolitika i time omogućiti bolji temelj za usporedbe s arheološkom građom tog prostora otkrivenom u ranijim istraživanjima (e.g. Šandalja II, Romualdova pećina, Nugljanska peć, Pupičina peć, Vešanska peć i drugo).² Nadalje, uspostava kvalitetne baze podataka za navedeno razdoblje na području Istre, poslužit će kao temelj usporedbi s talijanskim lokalitetima (npr. Grotta del Broion, Riparo Broion, Grotta Fumane, Fosso Mergaoni, Ponte di Pietra, Baracche, Grotta Paina, Grotta Trene, Grotta Clusantin, Grotta Rio Secco i Riparo Tagliente),² kao i s lokalitetima Dalmacije i zaleđa.³

Ranija istraživanja Ljubičeve pećine i Abri Kontija 002

Raniji terenski pregled i sustavna istraživanja koja su slijedila pokazala su značaj oba lokaliteta za proučavanje prapovijesti na tlu Istre. U Ljubičevoj pećini kod Marčane (Karta 1) arheološki tragovi govore u prilog njenog korištenja u različitim prapovijesnim, kao i kasnijim razdobljima. Pećina je većih dimenzija, s ulazom na dnu kraške vrtače i sastoji se od dvije prostorije (jedne veće te manje dvorane s lijeve strane od ulaza) i veće dvorane na donjoj etaži. Etaže su spojene s dvije vertikale. Iako je u ranijim istraživanjima dio materijala pronađen i na donjoj etaži (kao rezultat ispiranja sedimenata iz gornje etaže), u sklopu projekta PREHISTRIA koncentrirali smo se na iskopavanje u sondi smještenoj u manjoj dvorani gornje etaže (Sl. 1).

Prva sustavna istraživanja ovog lokaliteta provedena su između 2008. i 2011. godine,⁴ kada je sakupljena arheološka građa iz vremena kasnog gornjeg paleolitika, neolitika i brončanog doba. Na temelju rezultata radiometrijske datacije dijela slojeva, tijekom pleistocena moguće je razlikovati barem dvije epizode ljudskog korištenja nalazišta, i to između 13330 i 13120 cal BP (11350 ± 50 uncal bp, GrA 40926) odnosno 16120 i 15670 cal BP (13,230 ± 70

Introduction

In the period from 20 June to 30 July 2021, field research was carried out at two localities in the territory of Istria: Ljubičeva Pećina, near the town of Marčana, and Abri Kontija 002, in the Lim Channel. The aforementioned research is part of a Croatian Science Foundation project entitled 'Prehistoric hunter-gatherers in Istria and adjacent regions: patterns of Late Pleistocene lifestyle (PREHISTRIA)' (IP-2019-04-7821). Earlier research at both sites confirmed the presence of layers dating to the Upper Palaeolithic, which is of particular interest for this project, whose main goals are to collect materials for a better understanding of behaviour patterns and resource use during the time of the last glacial maximum and the Late Glacial period. It is of particular importance that the comparison of the finds from the Epigravettian layers of Ljubičeva Pećina with those from Abri Kontija 002 will provide insight into diachronic changes during the Upper Palaeolithic and thus provide a better basis for comparisons with the archaeological material discovered in the region during earlier research (e.g. Šandalja II, Romuald's Cave, Nugljanska peć, Pupičina peć, Vešanska peć, etc.).¹ Furthermore, the establishment of a better database for this period in the area of Istria will serve as a basis for comparisons with Italian localities (e.g. Grotta del Broion, Riparo Broion, Grotta Fumane, Fosso Mergaoni, Ponte di Pietra, Baracche, Grotta Paina, Grotta Trene, Grotta Clusantin, Grotta Rio Secco and Riparo Tagliente),² as well as with sites in Dalmatia and the hinterland.³

Earlier investigations at Ljubičeva Pećina and Abri Kontija 002

The earlier field survey and systematic research that followed showed the importance of both sites for the study of prehistory in Istria. At Ljubičeva Pećina, near Marčana (map 1), archaeological remains document its use during various prehistoric periods, as well as later. The cave is spacious, with an entrance at the bottom of a karst sinkhole, and consists of two chambers (one larger and one smaller to the left of the entrance), and a large hall on the lower level of the cave. The two levels are connected by two vertical shafts. Although, in earlier research, some of the material was also found on the lower level of the site (as a result of the washing-out of sediments from the upper floor), as part of the PREHISTRIA project we concentrated on the excavation in the trench located in the smaller side chamber on the upper level (Fig. 1).

The first systematic investigations of this site were conducted between 2008 and 2011,⁴ when archaeological remains from the late Upper Palaeolithic, Neolithic and Bronze Age were found. On the basis of the results of the radiometric dating of part of the layers, it is possible to distinguish at least two episodes of

1 Komšo, Pellegatti 2007; Karavanić *et al.* 2013; Vukosavljević, Karavanić 2017; Janković *et al.* 2017a; 2017b i tamo navedena literatura.

2 Peresani *et al.* 2021.

3 Whallon 1999; Vukosavljević *et al.* 2011; 2014; Vukosavljević, Karavanić 2015; Šošić-Klindžić *et al.* 2015; Vukosavljević, Perhoč 2017; Vujević, Dilber 2018.

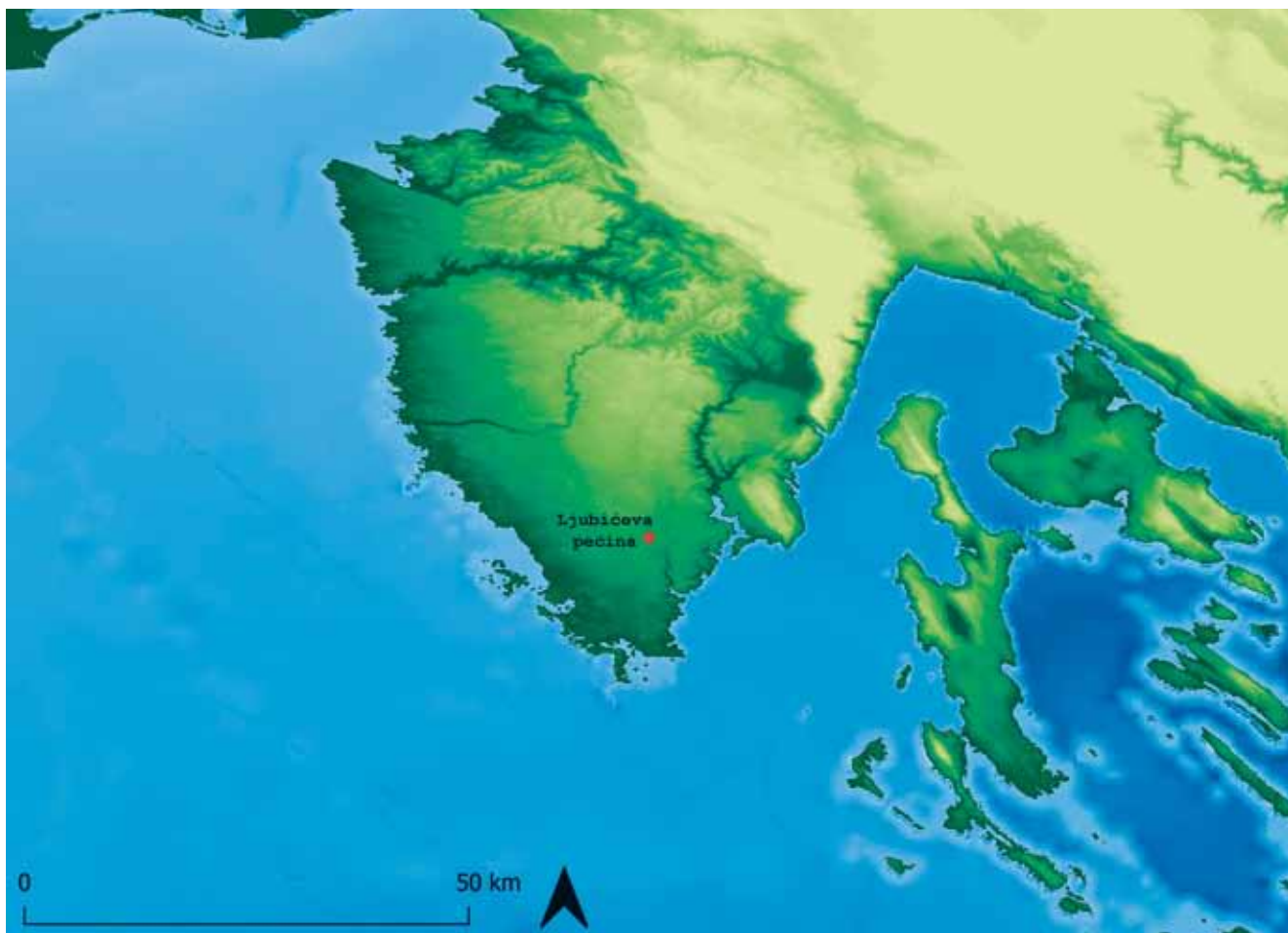
4 Percan, Komšo, Bekić 2009; Percan 2009; 2010; 2011.

1 Komšo, Pellegatti 2007; Karavanić *et al.* 2013; Vukosavljević, Karavanić 2017; Janković *et al.* 2017a; 2017b and the literature cited therein.

2 Peresani *et al.* 2021.

3 Whallon 1999; Vukosavljević *et al.* 2011; 2014; Vukosavljević, Karavanić 2015; Šošić-Klindžić *et al.* 2015; Vukosavljević, Perhoč 2017; Vujević, Dilber 2018.

4 Percan, Komšo, Bekić 2009; Percan 2009; 2010; 2011.



KARTA 1. Položaj Ljubičeve pećine (izradila L. Vidas).

MAP 1. Location of Ljubičeva Pećina (made by L. Vidas).

uncal bp, Beta-249371).⁵ Preliminarna obrada litičkih nalaza u skladu je s rezultatima datacije i upućuje na razdoblje kasnog epigravetijena⁶ koje se datira između cca 17500 i 11700 cal BP.⁷ Nova sustavna istraživanja dijela lokaliteta (u sondi B u manjoj pećinskoj dvorani na gornjoj etaži nalazišta) provedena su u 2020. godini, a prethodilo im je lasersko skeniranje i uzimanje geofizikalnih podataka.⁸ Tijekom sezone 2020. godine istraženi su slojevi koje je moguće pripisati Horizontu A (površinski sloj koji sadrži recentne, kao i nalaze brončanodobne keramike), Horizontu B (nalazi keramike, ljudskih kosturnih ostataka, faunskih nalaza i litike koje je moguće pripisati raznim fazama neolitika), a u dijelu sonde pronađeni su i nalazi iz vremena pleistocena (faunski nalazi, litika).⁹

human use of the site during the Pleistocene, between 13,330 and 13,120 cal BP (11,350 ± 50 uncal bp, GrA 40926) and between 16,120 and 15,670 cal BP (13,230 ± 70 uncal bp, Beta-249371).⁵ The preliminary analysis of the lithic finds is in accordance with the dating results and points to the Late Epigravettian period,⁶ which is dated between approx. 17,500 and 11,700 cal BP.⁷ New systematic investigations of part of the site (in trench B in the smaller cave chamber on the upper level of the site) were carried out in 2020 and were preceded by laser scanning and geophysical data collection.⁸ During the 2020 season, layers that can be attributed to Horizon A (surface layer containing finds of both recent and Bronze Age ceramics) and Horizon B (finds of ceramics, human skeletal remains, faunal finds and lithics that can be attributed to various phases of the Neolithic), and findings dating to the Pleistocene (faunal remains, lithics) were found in part of the trench.⁹

5 Percan, Komšo, Bekić 2009; Simonet 2013; Datumi su kalibrirani pomoću OxCal 4.4 (Bronk Ramsey 2009) i kalibracijske krivulje IntCal 20 (Reimer et al. 2020).

6 Simonet 2013.

7 Ruiz-Redondo et al. 2022.

8 Janković et al. 2019; Percan et al. 2020.

9 Percan et al. 2020.

5 Percan, Komšo, Bekić 2009; Simonet 2013; The dates were calibrated using OxCal 4.4 (Bronk Ramsey 2009) and the IntCal 20 calibration curve (Reimer et al. 2020).

6 Simonet 2013.

7 Ruiz-Redondo et al. 2022.

8 Janković et al. 2019; Percan et al. 2020.

9 Percan et al. 2020.



SLIKA 1. Sonda B u manjoj pećinskoj dvorani Ljubičeve pećine (snimio J. Ahern).

FIGURE 1. Trench B in the smaller cave chamber at Ljubičeva Pećina (photo by J. Ahern).

Pripečak Abri Kontija 002 otkriven je prilikom terenskog pregleda 2007. godine,¹⁰ a sustavna istraživanja započinju u sklopu projekta ARCHAOLIM Hrvatske zaklade za znanost između 2014. i 2017. godine uz nastavak istraživanja manjeg obima u 2018. godini.¹¹ Tijekom istraživanja potvrđeno je da materijal pripada vremenu gornjeg paleolitika, a rezultati datacije slojeva ukazuju na relativno brzu sedimentaciju. Pronađen materijal uključuje brojne ostatke pleistocenske faune, litičke industrije, tragova gorenja, komadiće okera i druge nalaze.¹² U sklopu projekta PREHISTRIA odlučeno je nastaviti sustavna istraživanja ovog nalazišta, uz uzimanje ciljanih uzoraka (npr. sedimentna DNA, ZooMS i dr.), u svrhu prikupljanja materijala za bolju kronološku usporedbu razvoja gornjeg paleolitika u regiji, budući da su nalazi iz Abri Kontija 002 stariji od paleolitičkih nalaza iz Ljubičeve pećine za više od desetak tisuća godina.

The site of Abri Kontija 002 was discovered during a field survey in 2007,¹⁰ and systematic research began as part of the ARCHAOLIM project of the Croatian Science Foundation between 2014 and 2017, with the continuation of smaller-scale research in 2018.¹¹ During the research, it was confirmed that the material dates to the Upper Palaeolithic, and the dating results indicate relatively rapid sedimentation of strata. The material found includes numerous remains of Pleistocene fauna, lithic industry, traces of burning, pieces of ochre and other findings.¹² As part of the PREHISTRIA project, it was decided to continue the systematic research of this site, with specific aims of collecting targeted samples (e.g. sedimentary DNA, ZooMS etc.), in order to obtain material for a better chronological comparison of the development of the Upper Palaeolithic in the region, since the findings from Abri Kontija 002 are older than the Palaeolithic finds from Ljubičeva Pećina by more than ten thousand years.

10 Komšo 2008.

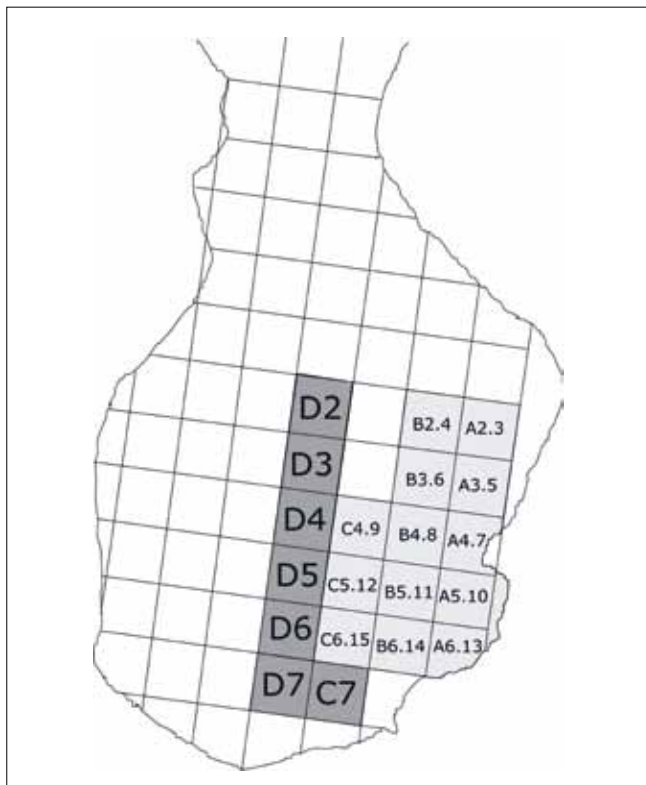
11 Janković *et al.* 2016; 2017a; 2017b.

12 Janković *et al.* 2016; 2017a; 2017b.

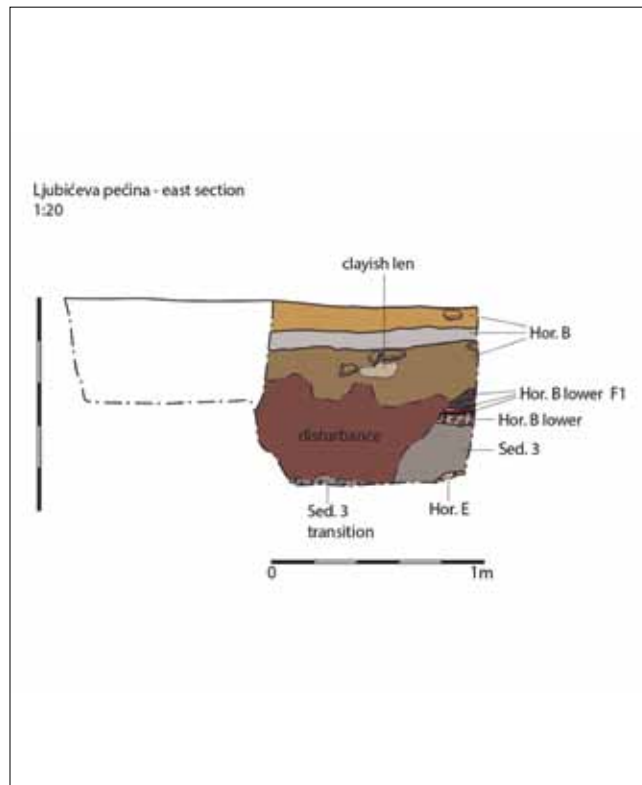
10 Komšo 2008.

11 Janković *et al.* 2016; 2017a; 2017b.

12 Janković *et al.* 2016; 2017a; 2017b.



SLIKA 2. Sonda B, prikaz mrežišta i istraživanih kvadranta (izradio J. Ahern).
FIGURE 2. Trench B, view of the grid and excavated quadrants (made by J. Ahern).



SLIKA 3. Stratigrafski profil u Sondi B Ljubičeve pećine (istočni profil, kvadrant D7) (izradio D. Maršanić).

FIGURE 3. Stratigraphic profile in Trench B of Ljubičeva Pećina (eastern profile, quadrant D7) (made by D. Maršanić).

Istraživanje Ljubičeve Pećine u sezoni 2021.

Tijekom istraživanja Ljubičeve pećine u 2021. godini nastavljeno je iskopavanje u sondi B (Sl.2). Istraživani su kvadranti C7 i D7 u kojima su istraženi Horizont A, Horizont B, Horizont Bd i Horizont Bd/F1 iz razdoblja holocena, te Sediment 3 iz razdoblja pleistocena (Sl. 3; Tab.1, Tab. 2).

Horizontu A, kao što je to bio slučaj i tijekom prošlogodišnjih istraživanja,¹³ moguće je pripisati recentne nalaze, kao i nalaze prapovijesne keramike. Radi se o relativno plitkom sloju koji nije intaktan te starost nalaza možemo odrediti samo na temelju karakteristika keramike. Iako većina keramičkih nalaza pripada tzv. gruboj keramici koja nije dobar kronološki pokazatelj,¹⁴ nalazi poput dijela tijela posude ukrašene kosim plastičnim rebrom iz Horizonta A (Slika 4.1) na temelju analogija s nalazima iz Monkodonje¹⁵ moguće je pripisati brončanom dobu, kao i fragmente rubova posuda s naglašenim prijelazom iz vrata u trbuh s tragovima plitke horizontalne kanelure (Sl. 4.2) pronađene u ispuni nastaloj životinjskom aktivnošću unutar dijela horizonta B.

Excavations at Ljubičeva Pećina in the 2021 season

During the research at Ljubičeva Pećina in 2021, excavations continued in Trench B (Fig. 2). Quadrants C7 and D7 were investigated, in which Horizon A, Horizon B, Horizon Bd and Horizon Bd/F1 of the Holocene period, and Sediment 3 of the Pleistocene period, were excavated (Fig. 3; Tab. 1, Tab. 2).

Material from Horizon A, as was the case during last year's research,¹³ can be attributed to recent times, but also contains pre-historic pottery. It is a relatively shallow layer that is not intact, and the ages of the finds can only be determined on the basis of characteristics of the pottery. Although the majority of ceramic finds belong to so-called coarse ceramics, which are not a good chronological indicator,¹⁴ finds such as part of the body of a vessel decorated with an oblique plastic rib from Horizon A (Figure 4.1), on the basis of analogies with finds from the site of Monkodonja,¹⁵ can be attributed to the Bronze Age. The same is true for the fragments of vessel rims with a pronounced transition from the neck to the body with traces of a shallow horizontal groove (Fig. 4.2) found in the fill created by animal activity within part of horizon B.

13 Percan et al. 2020.

14 Hulina, Forenbacher, Miracle 2011; Čuka 2014.

15 Hellmuth Kramberger 2017, Sl. 233.

13 Percan et al. 2020.

14 Hulina, Forenbacher, Miracle 2011; Čuka 2014.

15 Hellmuth Kramberger 2017, Fig. 233.

Stratigrafija / Stratigraphy	Opis / Description	Arheološki nalazi / Archaeological finds
Horizont / Horizon A	Poremećeni površinski sloj / Disturbed top layer	Prapovijesna keramika (brončano doba), životinjske kosti, litika, jedan ljudski zub / Prehistoric pottery (Bronze Age), faunal remains, lithics, human tooth
Horizont / Horizon B, Bd	Glinast sediment / Clayish sediment, Munsell 10YR4/4, 7.5YR4/3-4/4, 7.5YR5/3-5/4, 5YR 3/3, 7.5YR3/2	Prapovijesna keramika (eneolitik, kasni/srednji neolitik), životinjske i ljudske kosti, litika / Prehistoric pottery (Eneolithic, late/middle Neolithic), faunal and human remains, lithics
Horizont / Horizon Bd/F1	Struktura sedimenta kao kod Horizonta B, puno intenzivniji tragovi gorenja / Structure of the sediment same as Horizon B, more intense burning traces, Munsell 7.5YR4/3 - 5YR4/6	Prapovijesna keramika (kasni/srednji/rani neolitik), životinjske kosti, litika / Prehistoric pottery (late/middle/early Neolithic), animal remains, lithics
Sediment 3	Glinast do pjeskovit sediment sa dosta kršja / Clayish to sandy sediment with lot of rubble, Munsell 10YR5/3, 10YR4/2, 5YR2.5/1	Litika, životinjske kosti, oker (kasni gornji paleolitik) / Lithics, animal remains, ochre (late Upper Palaeolithic)
Sediment 3 transition	Karakteristike kao sediment 3 ali dijelom crveniji i pjeskovitiji / Characteristics of the structure of the sediment same as Sediment 3, partially more red and sandy, Munsell 10YR2/1 - 7.5YR7/8	Litika, životinjske kosti, oker (kasni gornji paleolitik) / Lithics, animal remains, ochre (late Upper Palaeolithic)

TABLICA 1. Stratigrafija, karakteristike slojeva i vrste arheoloških nalaza iz Ljubičeve pećine.

TABLE 1. Stratigraphy, characteristics of layers and types of archaeological finds from Ljubičeva Pećina.

Stratigrafija / Stratigraphy	Keramika / Pottery	Kosti / Bones	Litika / Lithics
Horizont / Horizon A	78	158	5
Horizont / Horizon B	233	252	14
Horizont / Horizon Bd	266	399	10
Horizont / Horizon Bd/F1	75	300	23
Sediment 3	0	3177	359
Sediment 3 transition	0	346	11
Ukupno / Total	652	4632	422

TABLICA 2. Broj nalaza koštanih ostataka, keramike i litičkih nalaza iz stratigrafskih jedinica Horizont A, Horizont B, Bd, Bd/F1 i Sediment 3 iz Sonde B. U kategoriji kosti ubrojani su i dentalni nalazi.

TABLE 2. Number of bone remains, ceramics and lithic finds from stratigraphic units Horizon A, Horizon B, Bd, Bd/F1 and Sediment 3 from Trench B. The bone category also includes dental finds.

Horizont B najbogatiji je keramičkim nalazima od kojih većina pripada razdoblju neolitika uz prisustvo nekoliko fragmenata koji ukazuju na prisustvo ranog, te kasnog eneolitika. Zbog karakteristika sedimenta ovaj horizont nije pri istraživanju bilo moguće detaljno podijeliti na više razina, no gruba podjela razlikuje gornji (Horizont B) i donji dio (Horizont Bd), te dio koji je sadržavao intenzivne tragove gorenja (vatrište) koji je označen kao Horizont Bd/F1. U većem dijelu oba istraživana kvadranta vidljive su bioturbacije, odnosno prokopani kanali nastali životinjskom aktivnošću što je predstavljalo velik problem prilikom

Horizont B is the richest in ceramic finds, most of which belong to the Neolithic period, with the presence of several fragments that indicate human presence in the early and late Eneolithic. Due to the characteristics of the sediment, it was not possible to divide this horizon into distinct levels during the field work, but a rough division distinguishes the upper part (Horizont B) from the lower (Horizont Bd) and the part that contained intense traces of burning (fireplace), which is marked as Horizont Bd/F1. Bioturbations (i.e. channels created by animal activity, which represented a major problem during the research) are visible in most

SLIKA 4. Keramički nalazi iz Horizonta A i Horizonta B (snimio M. Čuka).

FIGURE 4. Ceramic finds from Horizon A and Horizon B (photo by M. Čuka).



istraživanja. Usprkos problemima uzrokovanim bioturbacijom, otvaranje novih kvadranta u sondi B omogućilo je nešto bolji uvid u stratigrafiju (Sl. 3). Na temelju dijagnostičkih ulomaka, moguće je zaključiti da su ljudi pećinu posjećivali u gotovo svim razdobljima neolitika, te početkom eneolitika. Samom kraju eneolitika, odnosno prijelazu na brončano doba valja pripisati fragment posude ukrašen ureznom cik-cak trakom koja je ispunjena horizontalnim žlijebljenim linijama (Sl. 4.3), što je tipično za tzv. Jadranski tip ljubljanske kulture.¹⁶ Rani eneolitički elementi vidljivi su na fragmentima poput bikoničnog ramena crne polirane posude (Sl. 4.4) na čijem je ramenu vidljiv niz okomitih širokih kanelura za koji paralele nalazimo u ranom eneolitiku istočne obale Jadrana te je obilježen pojavom kanelirane keramike, u literaturi najčešće nazvane nakovanski tip (npr. na nalazištima kao što su Jačmica, Zambratija te Vela Spila).¹⁷ Pored navedenog ulomka, u rano eneolitičke fragmente spadali bi i dio naglašenog koničnog trbuha posude crne boje ukrašen uskim okomitim urezima na kojima se nadovezuju kapljičasti utisci (Sl. 4.5) te dio trbuha posude crvene boje (Sl. 4.6) sličnog motiva i izrade ukrasa.

Donji dio Horizonta B (Bd i Bd/F1) najbogatiji je keramičkim nalazima. Prijelazu iz srednjeg u kasni neolitik pripadaju nalazi na kojima je moguće prepoznati pojedinačne hvarske elemente, poput ulomka dijela oboda crne zdjele koji prelazi u kratak vrat i bikonično rame sa urezima vodoravnih traka ispunjenih motivom meandra (Sl. 5.1), kao i dijelu posude sivo crne boje sa urezom horizontalne trake ispunjenom nizom kosih linija (Sl. 5.2). Istom

of both investigated quadrants. Despite the problems caused by bioturbation, the opening of new quadrants in Trench B allowed slightly better insight into the stratigraphy (Fig. 3). On the basis of the diagnostic fragments, it is possible to conclude that people visited the cave in almost all periods during the Neolithic and at the beginning of the Eneolithic. The very end of the Eneolithic, that is, the transition to the Bronze Age, is documented by a vessel fragment decorated with an incised zigzag band filled with horizontal grooved lines (Fig. 4.3), which is typical of the so-called Adriatic type of the Ljubljana culture.¹⁶ Early Eneolithic elements are noted on fragments such as the biconical shoulder of a polished black vessel (Fig. 4.4), on the shoulder of which a series of wide vertical grooves is visible, parallels for which can be found in the early Eneolithic of the eastern coast of the Adriatic, marked by the appearance of grooved ceramics, most often called the 'anvil' type in the literature (e.g. at sites such as Jačmica, Zambratija and Vela Spila).¹⁷ In addition to the fragment mentioned, the Early Eneolithic fragments also include part of the accentuated conical body of a black vessel decorated with narrow vertical incisions on which droplet impressions are connected (Fig. 4.5), and part of the belly of a red vessel (Fig. 4.6) with a similar motif and decoration.

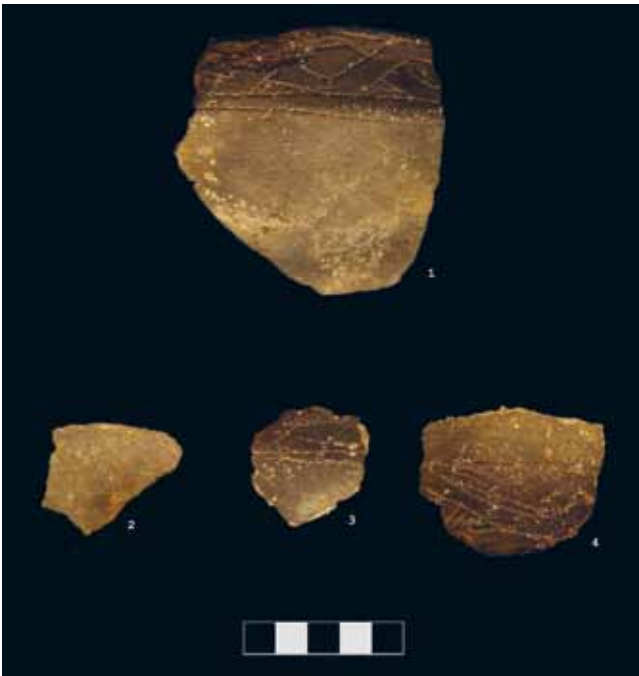
The lower part of Horizon B (Bd/F1) is the richest in ceramic finds. The transition from the Middle to the Late Neolithic is documented by finds that bear characteristic elements of the so-called Hvar culture, namely a fragment of part of the rim of a

16 Govedarica, 1989.

17 Jerbić Percan 2011; Koncani, Uhač, Čuka 2015; Čečuk, Radić 2005.

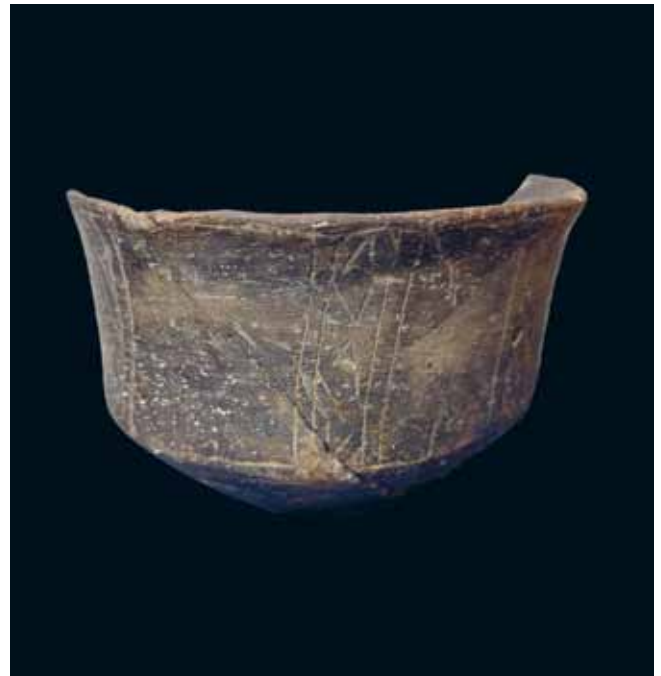
16 Govedarica, 1989.

17 Jerbić Percan 2011; Koncani, Uhač, Čuka 2015; Čečuk, Radić 2005.



SLIKA 5. Keramički nalazi iz Horizonta B (snimio M. Čuka).

FIGURE 5. Ceramic finds from Horizon B (photo by M. Čuka).



SLIKA 6. Zvonasta zdjela na nozi iz Horizonta B (snimio M. Čuka).

FIGURE 6. A bell-shaped bowl on a leg from Horizon B (photo by M. Čuka).

kulturnom miljeu valja pripisati i nalaz gotovo u potpunosti očuvanje zvonaste zdjele na nozi (Sl. 6), izrađene od glačane, redukcijски pečene keramike, ukrašene tehnikom urezivanja i motivom niza okomito postavljenih urezanih paralelnih traka koje se na donjem dijelu trbuha nastavljaju na dvostruku vodoravnu liniju. Okomite trake ispunjene su spiralnim, geometrijskim i zvjezdastim motivima. Sam oblik zdjele uobičajen je za danilsku keramiku gdje se javlja i sa visokom šupljom nogom, ali i sa običnim niskim dnom.¹⁸ Međutim, sama kompozicija ukrasa (uključujući i motive i koncept podjele na ukrašene stupce i prazna polja) je za sada jedinstvena te je nepoznata, kako u Dalmaciji, tako i u širim regijama. Prema obliku navedena zdjela bi se kronološki svrstala u vrijeme danilske kulture, ali prema samom konceptu ukrasa odgovarala bi kasnom neolitiku. Sličan nalaz pronađen je u Ljubićevoj pećini i tijekom ranijih istraživanja.¹⁹ Istom razdoblju pripadaju i fragmenti ulomaka crne keramike (Sl. 5.3 i 5.4) koji su također ukrašeni vodoravnim, urezanim trakama koje su ispunjene nevjeste izvedenim, gotovo stiliziranim meandrom. Sama kompozicija i izvedba ukrasa više podsjeća na keramiku kasnijeg neolitika, iako zbog brojnih nepoznanica unutar srednjeg i kasnog neolitika Istre, ne možemo isključiti mogućnost da je riječ o autohtonom izričaju srednjeg neolitika koji je mogao nastati pod utjecajem danilske keramike.

Od srednjoneolitičkih ulomaka zabilježeno je nekoliko ulomaka keramike koji su ukrašeni tipičnim motivima za danilsku kulturu srednjeg neolitika na istočnoj obali Jadrana, poput ulomka dije-

black bowl that turns into a short neck and a biconical shoulder with incisions of horizontal bands filled with a meander motif (Fig. 5.1), as well as part of a grey-black bowl with an incision of a horizontal strip filled with a series of oblique lines (Fig. 5.2). The same cultural milieu is represented by an almost completely preserved bell-shaped bowl on a foot (Fig. 6), made of polished, reduction-fired ceramics, decorated with an incising technique and with the motif of a series of vertically-placed incised parallel bands that continue on the lower part of the body to a double horizontal line. The vertical strips are filled with spiral, geometric and star motifs. The shape of the bowl itself is common in so-called Danilo ceramics, where it is presented in both variants: with a high hollow leg, as well as with a plain low bottom.¹⁸ However, the composition of the decoration itself (including motifs and the concept of division into decorated columns and empty fields) is quite unique and not thus far documented in the region, or even in the wider area of Dalmatia and farther on. On the basis of its shape, the bowl can be chronologically classified in the timeframe of the Danilo culture, but its ornamental elements correspond more closely with the late Neolithic. A similar find was made in Ljubićeva Pećina during earlier research.¹⁹ Fragments of black pottery (Figs 5.3 and 5.4) also belong to the same period, and are also decorated with horizontal, incised bands that are filled with a clumsily executed, almost stylized meander. The very composition and performance of the decoration is more reminiscent of pottery dating to the later phases of the Neolithic – although, as there are many unknowns still regarding the mid-

18 npr. Batović 1979; Korošec 1958; 1964.

19 Percan 2009: 362.

18 e.g. Batović 1979; Korošec 1958; 1964.

19 Percan 2009: 362.

SLIKA 7. Keramički nalazi iz Horizonta B (snimio M. Čuka).

FIGURE 7. Ceramic finds from Horizon B (photo by M. Čuka).



la tijela posude ukrašenog s urezanom horizontalnom linijom na koju se vezuje ukras u obliku visećih V linija koji je pronađen unutar Horizonta Bd/F1. Ukras je bio ispunjen crvenom inkrustacijom koja je mjestimično ostala očuvana (Sl. 7.1), za koji je analogije moguće pronaći u materijalu Vele spile.²⁰ U srednjeneolitičke ulomke spadao bi i ulomak oboda kuglaste zdjele crne boje pronađen u donjem dijelu horizonta B. Ulomak je ukrašen s fino napravljenim motivom uglate verzije spirale čije zavojnice imaju oblik slova R (Sl. 7.2), kvalitetne je fakture te je dosta gusto i bogato ispunjen ukrasom. Prema obliku posude kao i prema načinu ukrašavanja riječ je o tipičnom danilskom kulturnom izričaju, a analogiju možemo naći na nalazištu Bribir-Krivače.²¹ Najprepoznatljiviji motiv ukrašavanja za danilsku kulturu svakako je motiv spirale. Ulomci keramike koji na sebi imaju motiv spirale zabilježeni su u horizontu Bd/F1 (Sl. 7.3 i 7.4), kao i unutar donjeg dijela horizonta B (Sl. 7.5 i 7.6). Motivi spirale na navedenim ulomcima su izvedeni prilično nevjeste te bi se prema načinu izvedbe ipak svrstali na prijelaz iz srednjeg u kasni neolitik Istre, a analogije možemo pronaći na nalazištu Kargadur,²² Sv. Mihovilu kod Bala,²³ Jačmici,²⁴ Limskoj gradini i Pradišelu,²⁵ ali i šire u Smilčiću,²⁶ Bribiru-Krivače²⁷ i slično.

Od ukupne dijagnostičke keramičke građe samo jedan ulomak se može izdvojiti kao rano neolitički nalaz ukrašen impresso ukrasom, a pronađen je unutar kvadranta D7 u horizontu Bd/F1. Riječ je o dijelu tijela posude svijetlo smeđe boje, kvalitetne fakture,

dle and late Neolithic of Istria, we cannot rule out the possibility that it is an autochthonous expression of the local Middle Neolithic that could have been created under the influence of Danilo ceramics.

Of the Middle Neolithic finds, several pottery sherds were recorded, decorated with motifs typical of the Danilo culture of the Middle Neolithic on the eastern coast of the Adriatic. One of these is a fragment of part of the body of a vessel, decorated with an incised horizontal line and a decoration in the form of hanging V lines, that was found within Horizon Bd/F1. The decoration was filled with red incrustation that was partially preserved (Fig. 7.1), to which analogies can be found in the material from Vela Spila.²⁰ Middle Neolithic sherds include the rim fragment of a black spherical bowl found in the lower part of Horizon B. The sherd is decorated with a finely-made motif of an angular version of a spiral whose coils have the shape of the letter R (Fig. 7.2). It has a quality texture and is quite dense and richly filled with decoration. According to the shape of the vessel, as well as its decoration, it is a typical Danilo cultural expression, and we can find analogies to it at the site of Bribir-Krivače.²¹ The most recognizable decoration motif for the Danilo culture is certainly the spiral motif. Fragments of pottery with a spiral motif were recorded in Horizon Bd/F1 (Fig. 7.3 and 7.4), as well as within the lower part of horizon B (Fig. 7.5 and 7.6). The spiral motifs on the above-mentioned fragments are performed rather unskillfully, and, according to the method of execution, can still be classified as representing the transition from the middle to the late Neolithic of Istria. Analogies to this can be found at the sites of

20 Čečuk, Radić 2005.

21 Korošec, 1974.

22 Komšo 2005.

23 Zlatunić 2007.

24 Jerbić-Percan 2011.

25 Mihovilić 1986.

26 Batović 1970.

27 Korošec 1974.

20 Čečuk, Radić 2005.

21 Korošec 1974.



SLIKA 8. Litički nalazi iz Horizonta B. S lijeva na desno: prizmatično sječivo, proksimalni fragment prizmatičnog sječiva, mala glačana sjekira (snimila L. Vidas).

FIGURE 8. Lithic finds from Horizon B. From left to right: prismatic blade, proximal fragment of prismatic blade, small polished ax (photo by L. Vidas).

gotovo bez primjesa unutar stijenke, glačane površine, ukrašen s tzv. cik cak ukrasom izvedenim utiskivanjem ruba školjke koji je tipičan za rani neolitik istočne jadranske obale, a samim tim i Istre (Sl. 7.7). Pošto se radi o manjem ulomku, sam tip posude je nemoguće utvrditi, ali zbog svoje kvalitetne fature i glačane površine svrstao bi se u mlađu fazu ranog neolitika, točnije treći stupanj koji je poznat na većini nalazišta s obje jadranske obale. Analogije navedenom ulomku se mogu pronaći na području Istre na nalazištima Kargadur kod Ližnjana,²⁸ Sv. Mihovilu kod Bala,²⁹ Vižuli,³⁰ no i dalje u Veloj spili,³¹ Smilčiču³² i Crnom vrilo.³³

Osim keramičkih nalaza, u navedenim slojevima pronađeno je i nešto litičkih nalaza (Sl. 8), od kojih valja istaknuti prizmatična sječiva kao i lijepu glačanu sjekiricu manjih dimenzija.

Rezultati arheozooloških analiza su preliminarni ali indikativni. Među brojnim životinjskim ostacima sakupljenim unutar horizonta B prevladavaju kosti i zubi domaćih životinja. Najbrojniji su ostaci malih domaćih preživača (*Ovis*, *Capra*) te domaćeg goveda (*Bos taurus*) a u nešto manjem broju i koštani ostaci domaćih svinja (*Sus domesticus*). Od drugih taksona sa svega nekoliko kostiju evidentirani su pas (*Canis familiaris*) i manji kanid, vjerojatno lisica (*Vulpes vulpes*), te neodređene ptice (*Aves*) i sitni glodavci (*Rodentia*). Nisu vidljive značajnije razlike u taksonomskoj zastupljenosti domaćih vrsta životinja između gornjeg i donjeg dijela horizonta B (Bd), ali su u donjem kosti znatno više razlomljene i općenito teže odredive. Konačno, unutar vatrišta (Bd/F1) prevladavaju još sitniji koštani ulomci dok je većina materijala djelomično ili potpuno spaljena.

28 Komšo 2005.
29 Zlatunić 2007.
30 Mihovilić 1986.
31 Čečuk, Radić 2005.
32 Batović 1973.
33 Marijanović 2009.

Kargadur,²² Sv. Mihovil near Bal,²³ Jačmica,²⁴ Limska Gradina and Pradišelj,²⁵ but also more widely in Smilčič,²⁶ Bribir-Krivače,²⁷ and so on.

Of the total assemblage of diagnostic pottery, only one fragment, bearing the impression decoration that was found in quadrant D7 of Horizon Bd/F1, can be singled out as representing the early Neolithic. It is part of the body of a bowl, light brown in colour, of quality texture, almost without admixture inside the wall, polished surface, and decorated with the so-called zigzag decoration made by stamping the edge of a shell, which is typical of the early Neolithic of the eastern Adriatic coast and Istria (Fig. 7.7). As the fragment is quite small, it is impossible to determine the type of the vessel itself; but, due to its high-quality texture and polished surface, it would belong to the later phase of the early Neolithic, more precisely the third stage, which is known from most sites on both Adriatic coasts. Analogies to it can be found in the area of Istria, at the sites of Kargadur near Ližnjan,²⁸ Sv. Mihovil near Bal,²⁹ and Vižula,³⁰ but also in Vela Spila,³¹ Smilčič,³² and Crno Vrilo.³³

In addition to the ceramic finds, some lithic finds were also discovered in the aforementioned layers (Fig. 8), of which prismatic blades and a nice small polished axe should be mentioned.

The results of the archaeozoological analyses are preliminary, but informative. Among the numerous animal remains collected within Horizon B, the bones and teeth of domestic animals are dominant. The most numerous are the remains of small domestic ruminants (*Ovis*, *Capra*) and domestic cattle (*Bos taurus*) and, in slightly smaller number, of domestic pigs (*Sus domesticus*). Among other taxa represented by only a few bones, a dog (*Canis familiaris*) and a smaller canid, probably a fox (*Vulpes vulpes*), as well as unspecified birds (*Aves*) and small rodents (*Rodentia*) were recorded. There are no significant differences in the taxonomic representation of domestic animal species between the upper and lower parts of horizon B (B/d); but, in the lower one, bones are much more fragmented and generally more difficult to determine. Finally, inside the hearth (Bd/F1) even smaller bone fragments predominate, and most of the material is partially or completely burned.

22 Komšo 2005.
23 Zlatunić 2007.
24 Jerbić-Percan 2011.
25 Mihovilić 1986.
26 Batović 1970.
27 Korošec 1974.
28 Komšo 2005.
29 Zlatunić 2007.
30 Mihovilić 1986.
31 Čečuk, Radić 2005.
32 Batović 1973.
33 Marijanović 2009.



SLIKA 9. Sljepoočna i lakatna kost čovjeka iz Horizonta B Ljubičeve pećine (snimila L. Vidas).

FIGURE 9. Human temporal bone and ulna from Horizon B of Ljubičeva Pećina (photo by L. Vidas).

Nalaz / Find	Stratigrafija / Stratigraphy	Kvadrant / Quadrant
Desni / right P ⁴	Horizont / Horizon A	D7
Desni / right I ¹	Horizont / Horizon B	C7
Lijevi / left d ²	Horizont / Horizon B	C7
Lijevi / left dc ¹	Horizont / Horizon B	C7
Dio lijeve sljepoočne kosti / Partial left temporal bone	Horizont / Horizon B	C7
Proksimalni dio lijeve lakatne kosti / Proximal left ulna	Horizont / Horizon B	D7

TABLICA 3. Ljudski kosturni ostaci iz istraživanja u sezoni 2021.

Uz nalaze keramike te faunalne nalaze, u Horizontu B je pronađeno je pet ljudskih ostataka: tri zuba, proksimalni dio lakatne kosti te lijeva sljepoočna kost (Tab 3; Sl. 9). Na temelju preliminarne analize ljudskih kosturnih ostataka moguće je zaključiti da se radi o ostacima najmanje tri osobe, jedne odrasle i dvije mlade jedinke. Temeljeno na stupnjevima rasta i razvoja, moguće je da mliječni sjekutić pripada istoj jedinki kao i sljepoočna kost, odnosno osobi staroj između rođenja i 18 mjeseci u trenutku smrti.³⁴ Mliječni očajnik najvjerojatnije je moguće pripisati nešto starijoj jedinki, budući da je korijen potpuno formiran. Desni prvi gornji sjekutić, kao i proksimalni dio lijeve lakatne kosti pripadaju odrasloj osobi, no nije moguće utvrditi da li se radi o istoj jedinki. Zanimljivi su i tragovi grizenja vidljivi na dijelu lakatne kosti koji su nastali postmortalno.

34 Gustavson, Koch 1974; Liversdige, Herdeg, Rösing 1998.

In addition to pottery and faunal finds, five human remains were found in Horizon B: three teeth, the proximal part of an ulna and a left temporal bone (Tab. 3; Fig. 9). According to the preliminary analysis of the human skeletal remains, they belong to at least three people: one adult and two young individuals. On the basis of the stages of growth and development, it is possible that the deciduous incisor belongs to the same individual as the temporal bone, that is, to a person aged between birth and 18 months at the time of death.³⁴ The deciduous canine can most likely be attributed to a slightly older individual, as the root is fully formed. The right first upper incisor and the proximal part of the left ulna each belong to an adult, but it is not possible to determine whether it is the same individual. Also interesting are the gnawing marks visible on part of the ulna, which were created post mortem.

TABLICA 3. Human skeletal remains from the 2021 field season.

In addition to the Holocene stratigraphic units (Horizon B, Bd, Bd/F1), during the 2021 field season, in quadrant D7, Sediment 3 was also investigated, which, on the basis of the characteristics of the fauna and lithics, and the lack of pottery, can be attributed to the Upper Pleistocene, i.e. the period of the late Upper Palaeolithic (which is in agreement with the previously-discovered finds from Ljubičeva Pećina).³⁵ During the 2021 season, this layer was excavated only in quadrant D7 and not in its entirety, due to the presence of bioturbations. The sediment is dark brown to dark grey (10YR4/2 dark greyish brown, 10YR5/3 brown). Its texture varies between sand and clay loam and contains a significant amount of rubble. Although it is a layer about ten centimetres thick, the large amount of rubble can be attributed to traces of human activity. Findings of animal bones, stone tools and sherds, charcoal and pieces of ochre, and the apparent lack of ceramic findings, indicate the Pleistocene age of the layer. Also, on the basis of the characteristics of the sediment and the findings, it is possible that it is an Epigravettian cultural horizon, which in ear-

34 Gustavson, Koch 1974; Liversdige, Herdeg, Rösing 1998.

35 Percan et al. 2020.



SLIKA 10. Litički nalazi iz Sedimenta 3. S lijeva na desno: grebalo na odbojku, noktoliko/kratko grebalo, pločica s hrptom, prizmatična jezgra za pločice s dvije nasuprotne udarne plohe, marginalno strmo retuširano sječivo, obostrano obrađeno sječivo (snimila L. Vidas).

FIGURE 10. Lithic finds from Sediment 3. From left to right: endscraper on flake, thumbnail/short endscraper, backed bladelet, prismatic core for bladelets with two opposite striking platforms, marginally backed blade, bilaterally retouched blade (photo by L. Vidas).

Osim holocenskih stratigrafskih jedinica (Horizont B, Bd, Bd/F1), tijekom istraživanja u 2021. godini, u kvadrantu D7 istražen je i Sediment 3, koji na temelju karakteristika faunske te litičke građe i nedostatka keramike možemo pripisati gornjem pleistocenu, odnosno razdoblju kasnog gornjeg paleolitika (što je u suglasju s ranije otkrivenim nalazima iz Ljubičeve pećine).³⁵ Tijekom sezone 2021., ovaj je sediment istražen samo u kvadrantu D7 i to ne u njegovoj cijelosti zbog prisutnosti bioturbacija. Radi se o sedimentu tamnosmeđe do tamnosive boje (10YR4/2 dark greyish brown, 10YR5/3 brown). Tekstura mu varira između pijeska i glinaste ilovače te sadrži značajnu količinu kršja. Iako se radi o sloju debljine desetak centimetara, velika količina navedenog kršja može se pripisati tragovima ljudskih aktivnosti. Nalazi životinjskih kostiju, kamenog oruđa i lomljevine, ugljena i komadića okera, a očiti nedostatak keramičkih nalaza, ukazuju na pleistocensku starost sloja. Također, na temelju karakteristika sedimenta i nalaza, moguće je da se radi o epigravetijenskom kulturnom horizontu koji je u ranijim istraživanjima bio imenovan kao horizont C³⁶ ili *niveau 4*.³⁷ Nažalost, zbog spomenutih bioturbacija, sloj je intaktan na vrlo maloj površini, ali velika količina nalaza ukazuje na značajnu ulogu gornjopaleolitičkih ljudskih zajednica u deponiranju sedimenta u ovom dijelu špilje.

Pri dnu ovog sloja javlja se sediment koji je bojom (7.5YR5/6 strong brown) sličan sloju koji je tijekom ranijih istraživanja određen kao Horizont E. Međutim, teksturom je sličniji sedimentu 3 te je iz tog razloga imenovan kao Sediment 3 transition. Također, sadržavao je veće fragmente životinjskih kostiju te malobrojne litičke nalaze, dok je Horizont E gotovo sterilan.

Litički nalazi stratigrafske jedinice Sediment 3 uglavnom su manjih dimenzija i pripadaju lomljevine. Od karakterističnih nalaza (Sl. 10) valja spomenuti one poput noktolikog grebala, grebala na

lier research was named Horizon C³⁶ or *niveau 4*.³⁷ Unfortunately, due to the aforementioned bioturbations, the layer is intact on a very small surface. However, the large quantity of finds indicates the significant role of Upper Palaeolithic human communities in depositing sediments in this part of the cave.

At the bottom of this layer there is a sediment that is similar in colour (7.5YR5/6 strong brown) to the layer that was defined as Horizon E during previous research. However, its texture is more similar to sediment 3, and for this reason it is named as Sediment 3 transition. It also contained larger fragments of animal bones and a few lithic finds, while Horizon E is almost sterile.

The lithic finds of the Sediment 3 stratigraphic unit are mostly smaller in size and belong to debitage. Of the characteristic findings (Fig. 10), we should mention those such as a thumbnail endscraper, an endscraper on the flake, a perforator and, especially, backed bladelets, which are a very common type in the Epigravettian context. The association of thumbnail/short endscrapers and backed bladelets is characteristic of the late Epigravettian, and it is possible to draw parallels with sites such as Šandalja II, Pupičina peć, Vlakno, Kopačina, Badanj, Crvena stijena, and so on.³⁸

Most animal remains found come from the Pleistocene sediment 3 and represent by far the largest set of finds collected in this research campaign (Tab. 2). The taxonomic composition is significantly different in comparison with the upper deposits. Domestic species are completely absent, and taxa are represented by aurochs (*Bos primigenius*), red deer (*Cervus elaphus*), wild horse (*Equus ferus*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*) and wolf (*Canis lupus*), with a smaller number of unspecified small rodents (*Rodentia*). The results of the preliminary tapho-

35 Percan et al. 2020.

36 Percan, Komšo, Bekić 2009.

37 Simonet 2013.

36 Percan, Komšo, Bekić 2009.

37 Simonet 2013.

38 Whallon 1999; 2007; Mihailović 1999; 2009; Komšo, Pellegatti 2007; Vukosavljević et al. 2011; 2014; Karavanić et al. 2013; Vukosavljević, Perhoč 2017; Vujić, Dilber 2018.

odbojku, svrdla, te posebice pločice s hrptom što je vrlo čest tip u epigravetijenskom kontekstu. Asocijacija noktolikih, odnosno kratkih, grebala i pločica s hrptom karakteristična je za kasni epigravetijen i moguće je povući paralele s nalazištima poput Šandalje II, Pupićeine peći, Vlakna, Kopačine, Badnja, Crvene stijene i slično.³⁸

Unutar pleistocenskog sedimenta 3 pronađeno je najviše životinjskih ostataka, što predstavlja daleko najbrojniji skup nalaza sakupljen u ovoj istraživačkoj kampanji (Tab. 2). Taksonomski sastav je bitno drukčiji u odnosu na gornje naslage. U potpunosti nedostaju domaće vrste, a zastupljeni su pragovedo (*Bos primigenius*), jelen (*Cervus elaphus*), divlji konj (*Equus ferus*), srna (*Capreolus capreolus*), divlja svinja (*Sus scrofa*) i vuk (*Canis lupus*), uz manji broj neodređenih sitnih glodavaca (*Rodentia*). Rezultati preliminarnе tafonomске analize ukazuju na izrazitu razlomljenost koštanog materijala pri čemu prevladavaju ulomci dijafiza dugih kostiju i tijela rebara, dok su ostali anatomske elementi (primjerice zubi) izrazito podzastupljeni ili u potpunosti nedostaju. Spomenuta razlomljenost nedvojbeno je utjecala i na taksonomsku odredivost što će se naknadno provjeriti putem biomolekularnih analiza. Općenito koštani ulomci su relativno manjih dimenzija, a tragovi namjernog razbijanja kostiju ukazuju na vjerojatni ljudski faktor ove tafonomске modifikacije. Manji broj kostiju pokazuje jasne tragove gorenja nastalih prilikom pripreme hrane, ali je na većem broju ostataka vidljiva mrljasta diskoloracija koja je možda rezultat blaže mineralizacije. Velik broj kostiju djelomično je prekriven tankom koricom kalcijevog karbonata koja prekriva moguće tragove drugih antropogenih tragova uključujući i tragove mesarenja pa zasad nije moguće detaljnije analizirati načine akumuliranja životinjskih ostataka i tretiranja njihovih trupala. Zanimljiv je nalaz perforiranog očnjaka jelena (Sl. 11) za koji je paralele moguće pronaći u nalazima iz Šandalje II, Pupićeine peći, Nugljanske peći, Romualdove pećine, Vlakna na Dugom otoku³⁹ te Vele spile i Badnja.⁴⁰

Na kraju, vrijedi spomenuti rijetke tragove zvjerovnog grizenja koji ukazuju da su špiljski prostor uz ljude povremeno koristile i zvijeri, o čemu uz izolirani nalaz vučjeg zuba (Sl. 11) svjedoče i ostaci velikih zvijeri poput špiljske hijene (*Crocota crocuta spelaea*) koji su otkriveni u ranijim iskopavanjima.⁴¹



SLIKA 11. Izolirani lijevi donji kutnjak (M1) vuka (*Canis lupus*) (lijevo) i perforirani gornji očnjak jelena (*Cervus elaphus*) (desno) (snimila L. Vidas).

FIGURE 11. Isolated left lower molar (M1) of a wolf (*Canis lupus*) (left) and perforated upper canine of deer (*Cervus elaphus*) (right) (photo by L. Vidas).

nomik analysis indicate a marked fragmentation of the bone material, where fragments of the diaphyses of long bones and ribs predominate, while other anatomical elements (for example, teeth) are extremely underrepresented or completely missing. The aforementioned fragmentation undoubtedly affected the taxonomic determinability, which will be verified later by means of biomolecular analyses. In general, bone fragments are relatively smaller in size, and traces of deliberate bone-breaking indicate a probable human factor in this taphonomic modification. A smaller number of bones show clear traces of burning caused during food preparation, but a larger number of remains show spotty discoloration, which may be the result of milder mineralization. A large number of bones are partially covered by a thin crust of calcium carbonate that covers possible traces of other anthropogenic traces, including traces of butchery, so it is currently not possible to analyse in detail the ways of accumulating animal remains and treating their carcasses. One interesting find is the perforated canine of a deer (Fig. 11), to which parallels can be found in finds from Šandalja II, Pupićeina peć, Nugljanska peć, Romuald's Cave, Vlakno on the island of Dugi Otok,³⁹ and Vela Spila and Badanj.⁴⁰

Finally, it is worth mentioning the rare traces of animal bites that indicate that the cave was occasionally used by animals as well as humans, which is evidenced by the isolated finding of a wolf's tooth (Fig. 12) and the remains of large animals, such as the cave hyena (*Crocota crocuta spelaea*), that were discovered in earlier excavations.⁴¹

38 Whallon 1999; 2007; Mihailović 1999; 2009; Komšo, Pellegatti 2007; Vukosavljević et al. 2011; 2014; Karavanić et al. 2013; Vukosavljević, Perhoč 2017; Vujević, Dilber 2018.

39 Cvitkušić 2017.

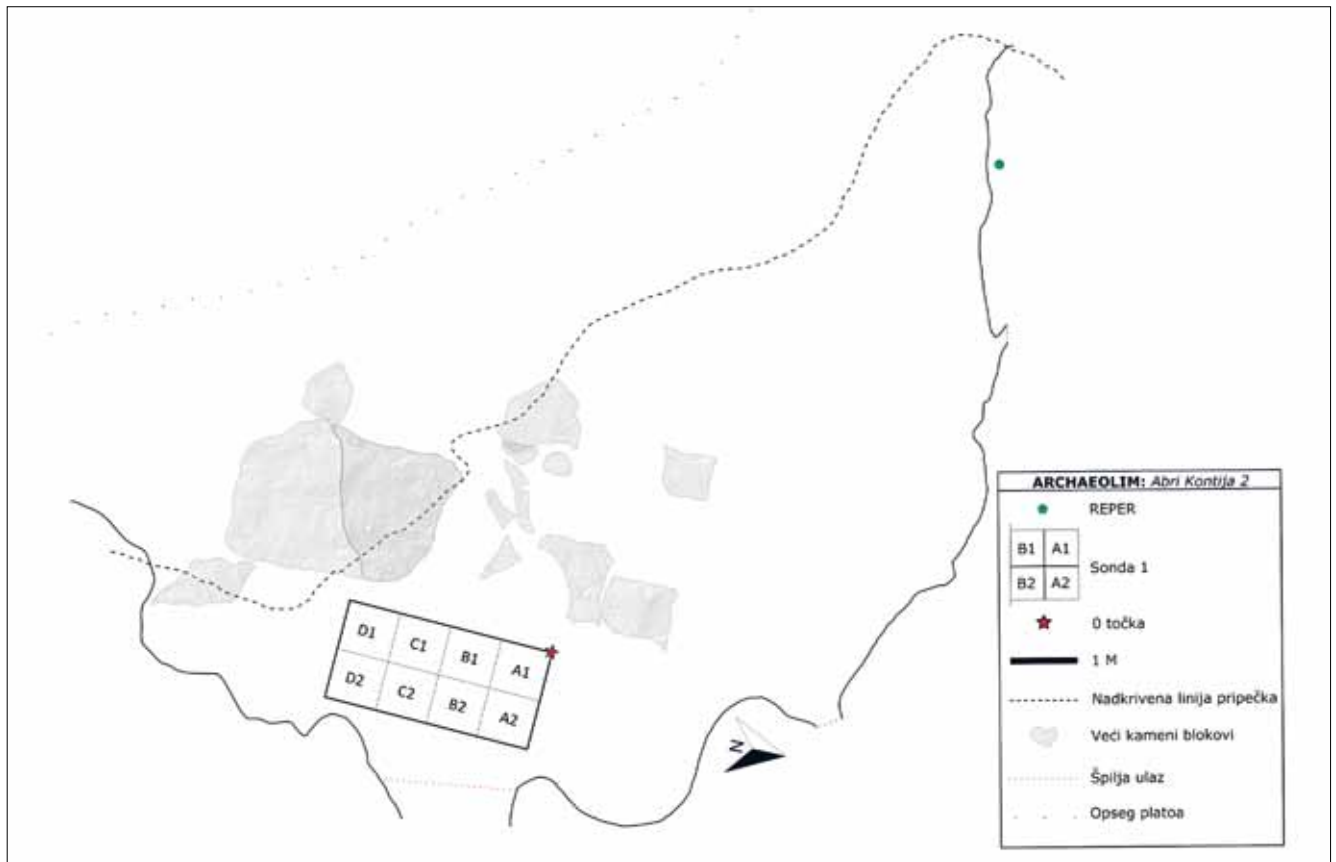
40 Cristiani et al. 2014; Borić, Cristiani 2019.

41 Radović, neobjavljeni podaci.

39 Cvitkušić 2017.

40 Cristiani et al. 2014; Borić, Cristiani 2019.

41 Radović, unpublished data.



SLIKA 12. Položaj sonde na lokalitetu Abri Kontija 002 (izradio J. Ahern).

FIGURE 12. Position of the trench at the Abri Kontija 002 site (made by J. Ahern).

Istraživanje lokaliteta Abri Kontija u sezoni 2021.

Istraživanja na lokalitetu Abri Kontija 002 tijekom 2021. godine bila su manjeg opsega i usmjerena na nastavak iskopavanja u kvadrantima C i D u postojećoj sondi u kojima je istražen sloj 7.1. (Sl. 12, 13). Radi se o relativno suhom, pjeskovitom do siltastom sedimentu koji sadrži veću količinu kršja (oko 40%) promjera od 1-10 cm. Boja sedimenta prema Munsell Soil Color Charts varira od 10YR4/3 brown do 5.5YR5/3 brown.

Iako su istraživanja trajala samo sedam radnih dana, pri čemu su dva bila posvećena otvaranju i zatvaranju sonde, zaštiti te crtanju profila, tijekom terenskog rada pronađen je i mapiran velik broj nalaza (Tab. 4). To govori u prilog i ranijim zaključcima o velikom intenzitetu korištenja nalazišta u razdoblju gornjeg paleolitika. Kao i ranijih sezona, pronađeni su brojni nalazi životinjskih kostiju, litičkih nalaza, fragmenata okera i tragovi gorenja.

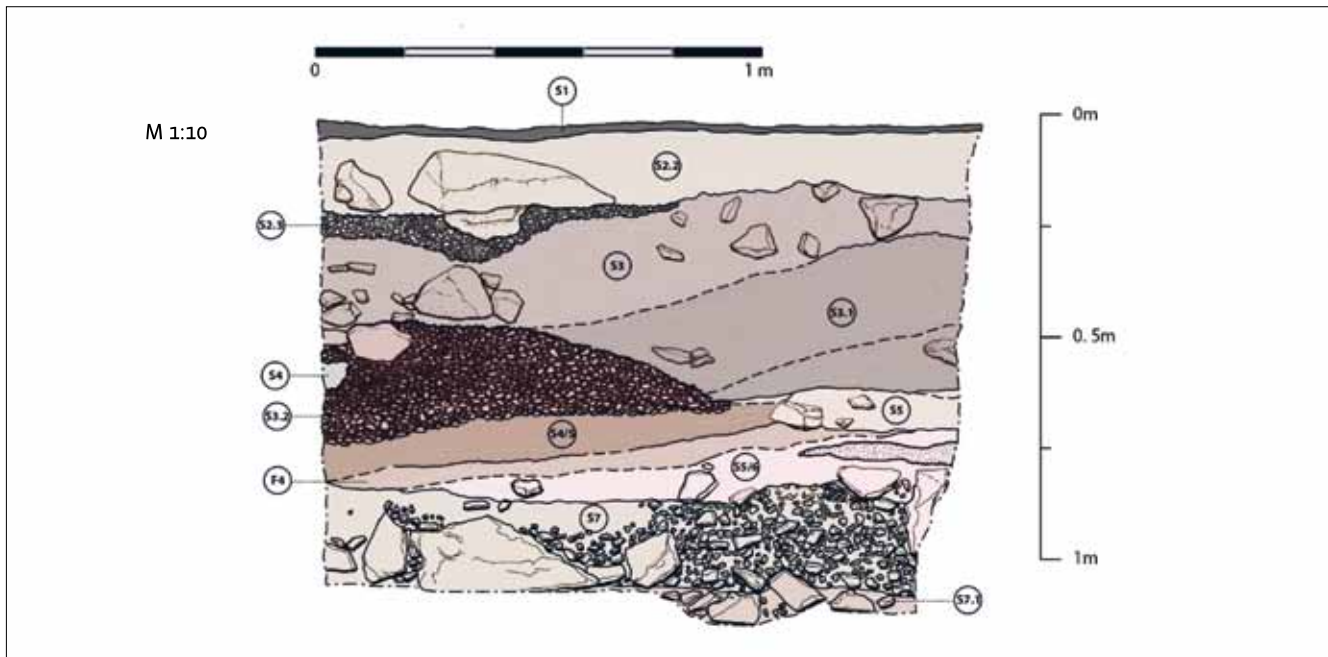
Iako relativno brojni životinjski nalazi su nažalost izuzetno razlomljeni i loše očuvani pa nije bilo moguće odrediti sa sigurnošću niti jedan takson. Prevladavaju ulomci dijafiza dugih kostiju i rebra životinja veličine manjih i srednjih unglata, a sporadični tragovi rezanja i spaljenih kostiju samo svjedoče o ljudskim aktivnostima.

Research on the Abri Kontija site in the 2021 season

Excavation at the Abri Kontija 002 site in the 2021 season was on a smaller scope and was aimed at continuing the research on layer 7.1 in quadrants C and D in the existing trench (Figs 12, 13). The sediment is relatively dry, sandy to silty, and contains a large amount of rubble (about 40%) with a diameter of 1–10 cm. The colour of the sediment, according to the Munsell Soil Color Charts, varies from 10YR4/3 brown to 5.5YR5/3 brown.

Although the research lasted only seven working days, two of which were dedicated to opening and closing the trench, protecting it and drawing the profiles, a large number of finds were discovered and mapped (Tab. 4). This supports the earlier conclusions about the high intensity of use of the site during the Upper Palaeolithic period. As in previous seasons, numerous animal bones, lithic finds, ochre fragments and traces of burning were found.

Although relatively numerous, the animal remains are unfortunately extremely fragmented and poorly preserved. Therefore it was not possible to determine with certainty even a single taxon. Fragments of diaphyses of long bones and ribs of animals the size of small and medium ungulates prevail, and sporadic traces of cutting and burnt bones only testify to human activities.



SLIKA 13. Stratigrafski profil sonde na lokalitetu Abri Kontija 002 (jugoistočni profil) (izradio D. Maršanić).

FIGURE 13. Stratigraphic profile of the trench at the Abri Kontija 002 site (south-east profile) (made by D. Maršanić).

Stratigrafija / Stratigraphy	Kosti / Bones	Litika / Lithics
Sloj / Layer 7.1	250	100
UKUPNO NALAZA / TOTAL	350	

TABLICA 4. Litički i koštani nalazi iz istraživanja lokaliteta Abri Kontija 002 u sezoni 2021. U kategoriji kosti ubrojani su i dentalni nalazi.

TABLE 4. Lithic and bone finds from the research of the Abri Kontija 002 site in 2021 season. The bone category also includes dental finds.

Nadalje, uzeti su i uzorci za analizu sedimentne DNA, kao i uzorci za provođenje ZooMS analiza. Dio sedimenta iz sloja je flotiran kako bi se ustanovilo eventualno prisustvo organskog materijala koji je bio previše sitan da bi se mogao prikupiti tijekom istraživanja.

Od litičkih nalaza valja spomenuti udubak (Sl.14, br. 1), nalaze pločica i sječiva (Sl.14, br. 2, 3 i 4), zatim jezgru za pločice s jednom udarnom plohom (Sl.14, br. 5) te obrađeno sječivo (Sl.14, br. 6). Prisutnost jezgre i lomljevine dobar je pokazatelj litičke proizvodnje na nalazištu od različite sirovine jako dobre kvalitete.

Zaključna razmatranja

Ovogodišnja istraživanja lokaliteta Ljubičeva pećina i Abri Kontija 002 dio su terenskih istraživanja u sklopu projekta PREHISTRIA. Na oba lokaliteta pronađena je vrijedna arheološka građa na temelju koje će biti moguće dobiti detaljniji uvid u strategije preživljavanja i druge aspekte života prapovijesnih zajednica tog prostora. U Ljubičevoj pećini pronađena je građa iz različitih prapovijesnih razdoblja (od gornjeg paleolitika do brončanog

Furthermore, samples for sediment DNA analysis, as well as for ZooMS analyses, were taken during excavations. Part of the sediment from the layer was sampled with flotation to determine the possible presence of organic material that was too small to be collected during the excavation.

Of the lithic finds from this year's research, it is worth mentioning a notch (Fig. 14, no. 1), the finds of blades and bladelets (Fig. 14, nos 2, 3 and 4), then a single-platform bladelet core (Fig. 14, no. 5) and a retouched blade (Fig. 14, no. 6). The presence of cores and debitage is a good indicator of lithic production at the site from different raw materials of very good quality.

Concluding remarks

This year's research at the sites of Ljubičeva Pećina and Abri Kontija 002 is part of the field research of the PREHISTRIA project. Valuable archaeological material was found on both sites, on the basis of which it will be possible to gain more detailed insight into survival strategies and other aspects of the life of the prehistoric communities of that area. Materials from various prehistoric periods (from the Upper Palaeolithic to the Bronze



SLIKA 14. Litički nalazi iz sloja 7.1 (Abri Kontija 002). S lijeva na desno: udubak, sječivo, pločica, pločica, jezgra za pločice, sječivo s obradom (snimila L. Vidas).

FIGURE 14. Lithic finds from layer 7.1 (Abri Kontija 002). From left to right: notch, blade, bladelet, bladelet, bladelet core, retouched blade (photo by L. Vidas).

doba). Iako je naglasak projekta PREHISTRIA na razdoblju kasnog pleistocena, nalazi koje je moguće pripisati srednjem/kasnom neolitiku i ranom eneolitiku od izuzetnog su značaja, budući da je to razdoblje na području Istre zasada vrlo slabo istraženo i definirano. Što se tiče nalaza iz razdoblja pleistocena, u Ljubićevoj pećini pronađeni su faunski i litički nalazi koji će pružiti puno detaljniju sliku o načinu života, korištenju resursa (npr. odabir plijena) te kontaktnim zonama. Nadalje, osim klasičnih arheoloških i zooarheoloških analiza građe, uzeti su uzorci i za provođenje paleoproteomskih analiza (ZooMS), analize kamene sirovine, geoarheoloških analiza, analize sedimentne DNA te radiometrijsko datiranje. Iako su istraživanja lokaliteta Abri Kontija 002 u sezoni 2021. trajala samo tjedan dana, pronađena je velika količina arheološke građe, posebice litičkih i faunskih nalaza iz razdoblja kasnog pleistocena. Kao i u Ljubićevoj pećini, sakupljeni su uzorci za provođenje paleoproteomskih analiza (ZooMS), analize sirovinskog (litičkog) materijala, geoarheoloških analiza, analize sedimentne DNA te radiometrijsko datiranje.

Zahvale

Arheološka istraživanja u Ljubićevoj pećini i Abri Kontija 002 u sezoni 2021. financirana su projektom Hrvatske zaklade za znanost „Prapovijesni lovci i sakupljači u Istri i obližnjim regijama: obrasci života tijekom kasnog pleistocena (PREHISTRIA) (IP-2019-04-7821). Crteže statigrafskih profila sa istraživanja izradio je Dario Maršanić na čemu mu se zahvaljujemo. Terenski rad posvećen je ranijem istraživaču Ljubićeve pećine, tragično preminulom prijatelju i kolegi Tihomiru Percanu.

Age) were found in Ljubićeva Pećina. Although the emphasis of the PREHISTRIA project is on the late Pleistocene period, findings that can be attributed to the Middle/Late Neolithic and Early Eneolithic are of exceptional importance, since this period in the area of Istria has so far been poorly researched and defined. As for the finds from the Pleistocene period, faunal and lithic finds were found in Ljubićeva Pećina, which will provide a much more detailed picture of the way of life, the use of resources (e.g. selection of prey) and contact zones. Furthermore, in addition to classical archaeological and zooarchaeological analyses of the material, samples were also taken for conducting palaeoproteomic analyses (ZooMS), lithic raw-material analyses, geoarchaeological analyses, sedimentary DNA analyses and radiometric dating. Although the research at the Abri Kontija 002 site in the 2021 season lasted only one week, a large amount of archaeological material was found, especially lithic and faunal finds from the late Pleistocene period. As in Ljubićeva Pećina, samples were collected for palaeoproteomic analyses (ZooMS), analyses of raw (lithic) material, geoarchaeological analyses, sedimentary DNA analyses and radiometric dating.

Acknowledgements

Archaeological research in Ljubićeva Pećina and Abri Kontija 002 in the 2021 season was financed by the Croatian Science Foundation's project 'Prehistoric hunter-gatherers in Istria and adjacent regions: patterns of Late Pleistocene lifestyle a (PREHISTRIA)' (IP-2019-04-7821). Drawings of statigraphic profiles from the research were made by Dario Maršanić, for which we thank him. The fieldwork is continued in honour of our late friend and colleague, Tihomir Percan.

BIBLIOGRAFIJA

BIBLIOGRAPHY

- Batović 1970 – Š. Batović, Odnos danilske i hvarske kulturne skupine, *Diadora* 5, 1970, 5–31.
- Batović 1973 – Š. Batović, Odnos Jadranskog primorja prema području jugoistočnih Alpa u neolitu i eneolitu, *Arheološki vestnik* 24, 1973, 62–127.
- Batović 1979 – Š. Batović, Jadranska zona, in Benac, A. (ed.) *Praistorija jugoslavenskih zemalja 2, Neolitsko doba*, Akademija nauka i umjetnosti Bosne i Hercegovine, 1979, 473–634.
- Borić, Cristiani 2019 – D. Borić, E. Cristiani, Taking Beads Seriously: Prehistoric Forager Ornamental Traditions in Southeastern Europe, *PaleoAnthropology* 2019, 208–239. doi:10.4207/PA.2019.ART132
- Bronk Ramsey 2009 – C. Bronk Ramsey, Bayesian analysis of radiocarbon dates, *Radiocarbon* 51/1, 2009, 337–360.
- Cristiani, Farbstein, Miracle 2014 – E. Cristiani, R. Farbstein, P. Miracle, Ornamental traditions in the Eastern Adriatic: The Upper Palaeolithic and Mesolithic personal adornments from Vela Spila (Croatia), *Journal of Anthropological Archaeology* 36, 2014, 21–31.
- Cvitkušić 2017 – B. Cvitkušić, Upper Palaeolithic and Mesolithic Ornamental Traditions in the Eastern Adriatic Coast and Hinterland, *Collegium antropologicum* 41, 2017, 45–60.
- Cvitkušić, Radović, Vujević 2018 – B. Cvitkušić, S. Radović, D. Vujević, Changes in ornamental traditions and subsistence strategies during the Palaeolithic-Mesolithic transition in Vlakno cave, *Quaternary international* 494, 2018, 180–192.
- Čečuk, Radić 2005 – B. Čečuk, D. Radić, *Vela spila. Višeslojno pretpovijesno nalazište – Vela Luka, otok Korčula*, Centar za kulturu Vela Luka, 2005.
- Govedarica 1989 – B. Govedarica, *Rano bronzano doba na području istočnog Jadrana / L'âge du bronze ancien dans la région de l'Adria de l'est*, Djela 67/7, Centar za balkanološka ispitivanja, 1989.
- Gustafson, Koch 1974 – G. Gustafson, G. Koch, Age estimation up to 16 years of age based on dental development, *Odontologisk Revy* 25, 1974, 297–306.
- Janković et al. 2017a – I. Janković, D. Komšo, J. C. M. Ahern, R. Becker, K. Gerometta, J. Weinstock, A. Barbir, N. Vukosavljević, B. Cvitkušić, K. Zubčić, S. Mihelić, F. H. Smith, New Research on the Late Pleistocene and Early Holocene in the Lim Channel, Istria, *Antiquity* 91/359 e4, 2017, 1–7.
- Janković et al. (eds.) 2017b – I. Janković, D. Komšo, S. Mihelić, J. C. M. Ahern, *Projekt ARCHAEO LIM. Arheološka istraživanja kasnog pleistocena i ranog holocena na prostoru Limskeg kanala / The ARCHAEO LIM Project. Archaeological investigations into the Late Pleistocene and Early Holocene of the Lim Channel*, Arheološki muzej u Zagrebu, Arheološki muzej Istre, Institut za antropologiju, 2017.
- Janković et al. 2019 – I. Janković, J. C. M. Ahern, R. Becker, T. Percan, D. Komšo, Ljubičeva pećina: Lasersko skeniranje i geofizikalna mjerenja u sezoni 2019. / Ljubičeva pećina: Laser scanning and geophysical work in the 2019 season, *Histria Archaeologica* 49, 2019, 5–11.
- Jerbić Percan 2011 – K. Jerbić Percan, Prapovijesna keramika iz pećine Jačmice, *Histria archaeologica* 42, 2011, 5–87.
- Koncani Uhač, Čuka 2015 – I. Koncani Uhač, M. Čuka, Doprinis poznavanju podmorskog eneolitičkog nalazišta u uvali Zambratija, *Histria archaeologica* 46, 2015, 25–73.
- Komšo 2005 – D. Komšo, Kargadur, *Hrvatski arheološki godišnjak* 2/2005, 2005, 212–214.
- Komšo 2008 – D. Komšo, Limski kanal, *Hrvatski arheološki godišnjak* 4/2007, 2008, 264–268.
- Liversidge, Herdeg, Rösing 1998 – H. M. Liversidge, B. Herdeg, F. W. Rösing, Dental age estimation of non-adults. A review of methods and principles, *Dental anthropology*, 1998, 419–442.
- Korošec 1958 – J. Korošec, *Neolitska naseobina u Danilu Bitinju*, Jugoslavenska akademija znanosti i umjetnosti, 1958.
- Korošec 1964 – J. Korošec, *Danilo in danilska kultura*, Univerza v Ljubljani, 1964.
- Marijanović 2009 – B. Marijanović, *Crno vrilo 1*, Sveučilište u Zadru, 2009.
- Mihailović 1999 – D. Mihailović, The Upper Palaeolithic and Mesolithic stone industries of Montenegro, in Bailey, G. N., Adam, E., Panagopoulou, E., Perlès, C., Zachos, K. (eds.), *The Palaeolithic Archaeology of Greece and adjacent areas*, Proceedings of the ICOPAG Conference, Ioannina 1994, British School at Athens Studies 3, The British School at Athens, 1999, 343–356.
- Mihailović 2009 – D. Mihailović, *Upper Palaeolithic and Mesolithic chipped stone industries from Crvena stijena*, Prehistoric settlements in caves and rockshelters of Serbia and Montenegro Fascicule 2, University of Belgrade, Faculty of Philosophy, Center for Archaeological Research, 2009.
- Mihovilić 1986 – K. Mihovilić, Pregled prahistorije Istre od starijeg neolitika do početka romanizacije, *Izdanja Hrvatskog arheološkog društva* 11, 1986, 49–63.
- Percan 2009 – T. Percan, Ljubičeva pećina, *Hrvatski arheološki godišnjak* 6/2009, 2009, 374–375.
- Percan 2010 – T. Percan, Ljubičeva pećina, *Hrvatski arheološki godišnjak* 7/2009, 2010, 392–395.
- Percan 2011 – T. Percan, Ljubičeva pećina, *Hrvatski arheološki godišnjak* 8/2009, 2011, 360–362.
- Percan, Komšo, Bekić 2009 – T. Percan, D. Komšo, L. Bekić, Ljubičeva pećina, *Hrvatski arheološki godišnjak* 5/2008, 2009, 344–347.
- Percan et al. 2020 – T. Percan, J. C. M. Ahern, D. Komšo, S. Radović, M. Novak, K. Gerometta, L. Vidas, I. Janković, Istraživanja u Ljubičevoj pećini kraj Marčane u sezoni 2020, *Annales Instituti Archaeologici* 16, 2020, 219–228.
- Peresani et al. 2021 – M. Peresani, G. Monegato, C. Ravazzi, S. Bertola, D. Margaritora, M. Breda, A. Fontana, F. Fontana, I. Janković, I. Karavanić, D. Komšo, P. Mozzi, R. Pini, G. Furlanetto, M. G. A. De Amicis, Z. Perhoč, C. Posth, L. Ronchi, S. Rossato, N. Vukosavljević, A. Zerboni, Hunter-gatherers across the Great Adriatic-Po Region during the Last Glacial Maximum: environmental and cultural dynamics, *Quaternary International* 581–582, 2021, 128–163.
- Reimer et al. 2020 – P. Reimer, W. Austin, E. Bard, A. Bayliss, P. Blackwell, C. Bronk Ramsey, M. Butzin, H. Cheng, R. Edwards, M. Friedrich, P. Grootes, T. Guilderson, I. Hajdas, T. Heaton, A. Hogg, K. Hughen, B. Kromer, S. Manning, R. Muscheler, J. Palmer, C. Pearson, J. van der Plicht, R. Reimer, D. Richards, E. Scott, J. Southon, C. Turney, L. Wacker, F. Adolphi, U. Büntgen, M. Capano, S. Fahrni, A. Fogtman-Schulz, R. Friedrich, P. Köhler, S. Kudsk, F. Miyake, J. Olsen, F. Reinig, M. Sakamoto, A. Sookdeo, S. Talamo, The IntCal20 Northern Hemisphere radiocarbon age calibration curve (0–55 cal kBP), *Radiocarbon* 62/4, 2020, 725–757.
- Ruiz-Redondo et al. 2022 – A. Ruiz-Redondo, N. Vukosavljević, A. Tomasso, M. Peresani, W. Davies, M. Vander Linden, Mid and Late Upper Palaeolithic in the Adriatic Basin: Chronology, transitions and human adaptations to a changing landscape, *Quaternary Science Reviews* 276, 2022, doi:10.1016/j.quascirev.2021.107319
- Simonet 2013 – A. Simonet, Premier bilan des fouilles effectuées dans la Grotte de Ljubić (2008-2011) (mission archéologique Monaco-Croatie), *Bulletin du Musée d'anthropologie préhistorique de Monaco* 53, 2013, 93–102.
- Šošić Klindžić et al. 2015 – R. Šošić Klindžić, S. Radović, T. Težak-Gregl, M. Šlaus, Z. Perhoč, R. Altherr, M. Hulina, K. Gerometta, G. Boschian, N. Vukosavljević, J. C. M. Ahern, I. Janković, M. Richards, I. Karavanić, Late Upper Paleolithic, Early Mesolithic and Early Neolithic from the cave site Zemunica near Bisko (Dalmatia, Croatia), *Eurasian Prehistory* 12/1-2, 2015, 3–46.
- Vujević, Dilber 2018 – D. Vujević, S. Dilber, Izvor – špilja Ričina u Buškome jezeru. Prvi tragovi paleolitika na području zapadne Hercegovine / The Ričina spring cave in Buško Jezero. The first traces of the Palaeolithic in the western Herzegovina region, *Prilozi Instituta za arheologiju u Zagrebu* 35, 2018, 5–27.
- Vukosavljević, Karavanić (eds.) 2015 – N. Vukosavljević, I. Karavanić, *Arheologija špilje Zale. Od paleolitičkih lovaca skupljača do rimskih osvajača*, Katedra Čakavskog sabora Modruše, 2015.

Vukosavljević, Karavanić 2017 – N. Vukosavljević, I. Karavanić, Epigravettian shouldered points in the Eastern Adriatic and its hinterland: Reconsidering their chronological position, *Acta Archaeologica Carpathica* 52, 2017, 5–21.

Vukosavljević, Perhoč 2017 – N. Vukosavljević, Z. Perhoč, Lithic raw material procurement of the Late Epigravettian hunter-gatherers from Kopačina cave (island of Brač, Dalmatia, Croatia), *Quaternary International* 450, 2017, 164–185.

Vukosavljević et al. 2011 – N. Vukosavljević, Z. Perhoč, B. Čečuk, I. Karavanić, Kasnoglacialna industrija lomljenog kamena pećine Kopačine, *Vjesnik za arheologiju i povijest dalmatinsku* 104, 2011, 7–54.

Vukosavljević, Perhoč, Altherr 2014 – N. Vukosavljević, Z. Perhoč, R. Altherr, Prijelaz iz pleistocena u holocen u pećini Vlakno na Dugom otoku (Dalmacija, Hrvatska) – litička perspektiva / Pleistocene-Holocene transition in the Vlakno Cave on the island of Dugi otok (Dalmatia, Croatia) – lithic perspective, *Prilozi Instituta za arheologiju u Zagrebu* 31, 2014, 5–72.

Whallon 1999 – R. Whallon, The lithic tool assemblages at Badanj within their regional context, in Bailey, G. N., Adam, E., Panagopoulou, E., Perlès, C., Zachos, K. (eds.), *The Palaeolithic Archaeology of Greece and adjacent areas*, Proceedings of the ICOPAG Conference, Ioannina 1994, British School at Athens Studies 3, The British School at Athens, 1999, 330–342.

Whallon 2007 – R. Whallon, Spatial distribution and activities in Epigravettian Level 6 at the site of Badanj, Bosnia and Herzegovina, *Glasnik Srpskog arheološkog društva* 23, 2007, 9–26.

Zlatunić 2007 – R. Zlatunić, More recent archaeological research on the prehistorical site of St. Michael-Bale, *Histria Antiqua* 15, 2007, 457–472.