ŠPILJA KOPAČINA NA BRAČU: NOVI AMS ^{14}C DATUMI I NJIHOVO ZNAČENJE ZA TUMAČENJE KULTURNE STRATIGRAFIJE NALAZIŠTA TE METODOLOGIJE ISKOPAVANJA (1978. – 1993.)

KOPAČINA CAVE ON THE ISLAND OF BRAČ: NEW AMS ^{14}C DATES AND THEIR SIGNIFICANCE FOR THE INTERPRETATION OF THE SITE'S CULTURAL STRATIGRAPHY AND EXCAVATION METHODOLOGY (1978–1993)

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U radu predstavljamo dva nova AMS ^{14}C datuma dobivena datiranjem koštanih artefakata iz špilje Kopačine (otok Brač), koji predstavljaju važan doprinos razumijevanju kronologije ovoga nalazišta. Dobiveni datumi uspoređeni su s ranijim rezultatima radiokarbonskog datiranja te kritički razmotreni u odnosu na postojeće interpretacije kulturne stratigrafije. Rezultati upućuju na određeni stupanj miješanja slojeva, ponajprije kao posljedicu arbitrarnog sustava iskopavanja provedenog tijekom ranijih kampanja, što ističe potrebu za oprezom pri korištenju rezultatima dosad provedenih kvantitativnih analiza litičke i faunske građe. U širem kontekstu istočnojadranskog mezolitika, novi datumi dodatno dovode u pitanje hipotezu o postojanju pouzdano definiranih mezolitičkih horizonata u Kopačini te potvrđuju važnost revizijskih istraživanja temeljenih na suvremenim metodološkim standardima, uključujući precizno dokumentiranje stratigrafije i integriranu analizu različitih kategorija materijalne kulture.

Key words:
Kopačina Cave, Brač, Late Upper Palaeolithic, Epigravettian, AMS ^{14}C, stratigraphy, excavation methodology

This paper presents two new AMS ^{14}C dates obtained by dating bone artefacts from Kopačina Cave (island of Brač), which constitute an important contribution to understanding the chronology of this site. The obtained dates are compared with earlier radiocarbon dating results and critically assessed in relation to existing interpretations of the cultural stratigraphy. The results indicate a certain degree of stratigraphic mixing, primarily a consequence of the arbitrary excavation system applied during earlier field campaigns; this highlights the need for caution when using the results of quantitative

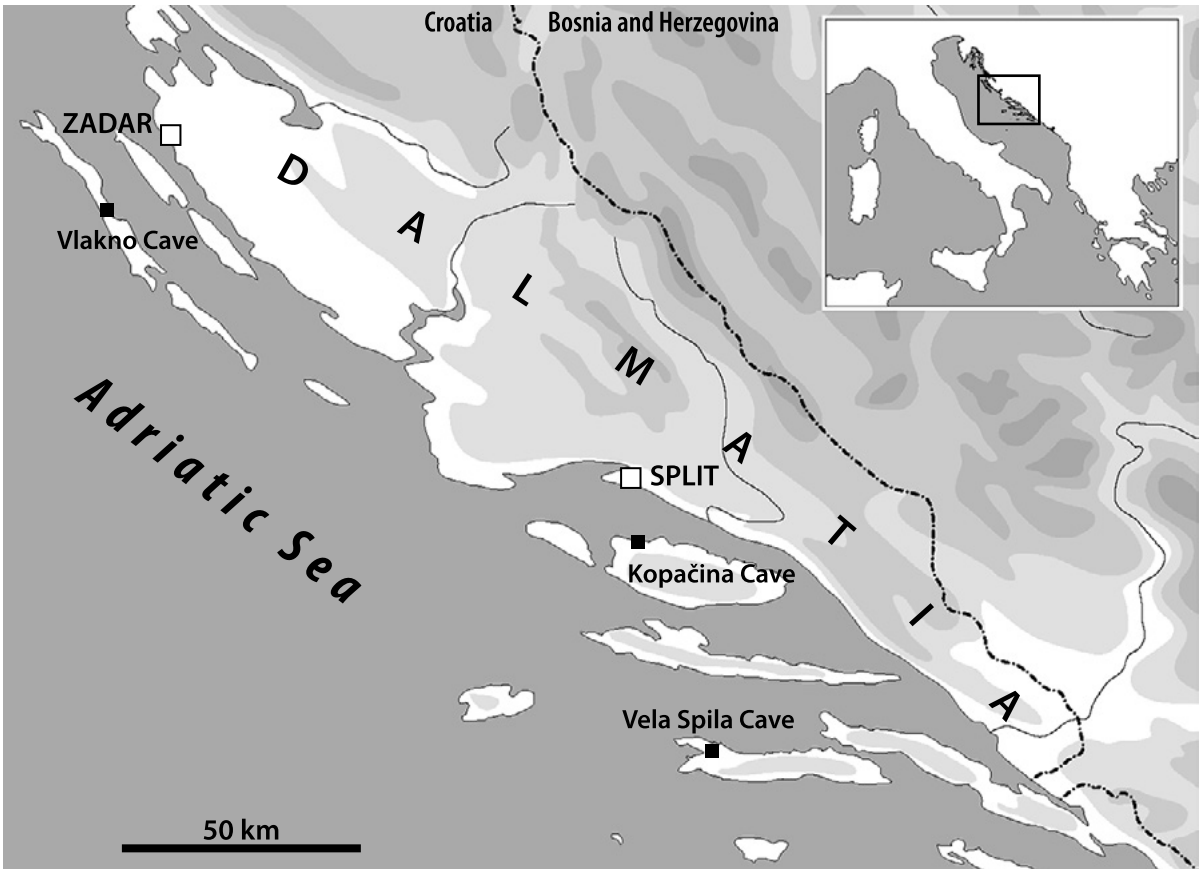
analyses of lithic and faunal assemblages conducted to date. Within the broader context of the eastern Adriatic Mesolithic, the new dates further call into question the hypothesis of the existence of reliably defined Mesolithic horizons at Kopačina and confirm the importance of revisionary research based on modern methodological standards, including precise stratigraphic documentation and the integrated analysis of different categories of material culture.

UVOD

Špilja Kopačina smještena je između Supetra i Donjeg Humca, u sjeverozapadnom dijelu otoka Brača (43°22' N i 16°32' E) na nadmorskoj visini od 220 m s ulazom orijentiranim prema zapadu (karta 1). Špilja se sastoji od ulaznog dijela, obasjanog dnevnim svjetlom tijekom većeg dijela dana, te unutarnjeg, koji je prije uklanjanja sedimenata iz ulaznog dijela bio zatvoren i u potpunom mraku. Ulazna je dvorana nepravilno ovalnog oblika i zauzima površinu od približno 55 m^2. Strop špilje danas prekriva oko 40 m^2 ulazne dvorane, definirane prema današnjoj liniji kapanja, dok je u prošlosti vjerojatno prekrivao cijeli ulazni dio. Ulaz u špilju širok je oko 10 m, a visok 3,5 m. Stjenovito dno blago se spušta prema unutrašnjosti špilje, prema sjeveru i istoku. Oko 6 m od ulaza (prema istoku) špilja se sužava na približno 5 m širine te vodi u unutarnju dvoranu

INTRODUCTION

Kopačina Cave is located between Supetar and Donji Humac, in the north-western part of the island of Brač (43°22' N, 16°32' E), at an elevation of 220 m a.s.l., with its entrance facing westwards (Map 1). The cave consists of an entrance chamber, illuminated by daylight for most of the day, and an inner chamber which, prior to the removal of sediment from the entrance area, was blocked and completely dark. The entrance chamber is irregularly oval in shape, with an area of approximately 55 m². Today, the cave ceiling covers about 40 m² of the entrance chamber, defined by the present drip line, whereas in the past it probably covered the entire area. The cave entrance is approximately 10 m wide and 3.5 m high. The rocky floor slopes gently down towards the interior of the cave, to the north and east. Approximately six metres from the entrance (towards the east), the cave narrows to about 5 m in width and



Karta 1. *Položaj špilje Kopačine i nalazišta spomenutih u tekstu* (izradio: N. Vukosavljević; karta: S. Forenbaher)
Map 1 *Location of the Kopačina cave and the sites mentioned in the text* (made by N. Vukosavljević; map: S. Forenbaher)

Slika 1. *Špilja Kopačina: 1. pogled na prednji dio špilje; 2. pogled iz unutarnje dvorane prema ulazu* (izradio: M. Vuković; snimio: N. Vukosavljević 2006. godine)
Figure 1 *Kopačina Cave: 1. view of the front part of the cave; 2. view from the inner hall towards the entrance* (made by M. Vuković; photo by N. Vukosavljević in 2006)

široku oko 7 m (sjever – jug) i duboku oko 6 m (istok – zapad) (sl. 1). Pri prvom otkriću unutarnja dvorana bila je gotovo posve ispunjena sedimentima pa je pristup bio moguć tek puzanjem.[1]

Špilja Kopačina u arheološku je literaturu ušla krajem 19. stoljeća nakon probnih iskopavanja F. Bulića i J. Szombathyja u kojima su pronađeni prapovijesni nalazi (ulomci lončarije, kameni artefakti, ostaci faune i malakofaune).[2] Naknadna probna istraživanja krajem 50-ih godina 20. stoljeća navela su voditelja istraživanja D. Vrsalovića na zaključak da su u špilji prisutni prapovijesni ostaci koji se mogu datirati u rasponu od mezolitika do brončanog doba.[3] Dugogodišnja sustavna iskopavanja u Kopačini vodio je B. Čečuk od 1978. do 1993. Rezultati su najvećim dijelom objavljeni u obliku sažetih godišnjih izvještaja,[4] uz jedan opsežniji rad, ali bez detaljne analize arheološke građe.[5] Revizijska istraživanja provodila su se od 2006. do 2010. i od 2014. do 2018. (voditelj D. Kliškić), ponajprije u predšpiljskom prostoru, gdje su najprije prosijani i uklonjeni sedimenti od ranijih iskopavanja kako bi se došlo do intaktnih slojeva.[6] Arheološka građa iz intaktnih slojeva još nije sustavno objavljena ni valorizirana.

DOSADAŠNJE SPOZNAJE O ŠPILJI KOPAČINI

Metodologija iskopavanja, radiokarbonsko datiranje i kulturna stratigrafija

Zbog poteškoća u prepoznavanju i razgraničavanju slojeva kasnoga gornjeg paleolitika od onih mezolitičke starosti, sustavna su se

1 MIRACLE 1995: 68.
2 BULIĆ 1891.
3 VRSALOVIĆ 1960.
4 VUKOSAVLJEVIĆ *et al*. 2011. U radu su citirani svi radovi o Kopačini autora B. Čečuka.
5 ČEČUK 1996.
6 KLIŠKIĆ 2007; 2008; 2009; 2010; 2011; 2015; 2016; 2017; 2018; 2019.

leads into an inner chamber measuring roughly 7 m (north–south) by 6 m (east–west) (Fig. 1). At the time of its initial discovery, the inner chamber was almost completely filled with sediment, and access was possible only by crawling.[1]

Kopačina Cave entered the archaeological literature at the end of the 19th century following trial excavations conducted by F. Bulić and J. Szombathy, during which prehistoric finds were discovered (pottery fragments, stone artefacts, faunal and malacofaunal remains).[2] Subsequent trial investigations conducted in the late 1950s led the excavation director, D. Vrsalović, to conclude that the cave contained prehistoric remains datable to a period spanning the Mesolithic to the Bronze Age.[3] Long-term systematic excavations at Kopačina were conducted by B. Čečuk from 1978 to 1993. The results were published largely in the form of concise annual reports,[4] accompanied by one more extensive paper, but without a detailed analysis of the archaeological assemblage.[5] Revisionary research was carried out in 2006–2010 and 2014–2018 (directed by D. Kliškić), primarily in the cave entrance area, where sediment from earlier excavations was first excavated and sieved, in order to reach intact layers.[6] The archaeological material from these intact layers has not yet been systematically published or evaluated.

PREVIOUS RESEARCH ON KOPAČINA CAVE

Excavation methodology, radiocarbon dating and cultural stratigraphy

Due to difficulties in recognising Late Upper Palaeolithic layers and distinguishing them

1 MIRACLE 1995: 68.
2 BULIĆ 1891.
3 VRSALOVIĆ 1960.
4 VUKOSAVLJEVIĆ *et al.* 2011. Cited in this paper are all publications on Kopačina authored by B. Čečuk.
5 ČEČUK 1996.
6 KLIŠKIĆ 2007; 2008; 2009; 2010; 2011; 2015; 2016; 2017; 2018; 2019.

iskopavanja provodila arbitrarno, u slojevima debljine 15 do 20 cm, pri čemu su dubine bilježene u odnosu na tadašnju hodnu površinu špilje.[7] Povremeno su arbitrarni otkopni slojevi bili znatno deblji (i do nekoliko desetaka centimetara), što je razvidno iz oznaka dubine na vrećicama s litičkom građom.[8] Kombinacija nagnute matične stijene i na nju nataloženih slojeva te arbitrarnog iskopavanja zasigurno je dovela do miješanja arheoloških slojeva različite starosti.[9] Iskopani sedimenti tijekom istraživanja nisu prosijavani. Opseg problema proizašlog iz neprosijavanja sedimenata najbolje ilustriraju rezultati revizijskih istraživanja u predšpiljskom prostoru Kopačine. Naime, u sedimentima koji potječu iz ranijih iskopavanja, a deponirani su na mjestu postavljanja sonde 1, recentnim iskopavanjem i sustavnim prosijavanjem prikupljene su tisuće kamenih artefakata ukupne mase > 35 kg te vrlo brojni ostaci faune.[10] Za usporedbu ćemo navesti da ukupna masa litičkog skupa nalaza iz iskopavanja provedenih od 1978. do 1993. iznosi nešto manje od 69 kg.[11] Ovaj diskrepantni omjer snažno upućuje na to da su prethodne kvantifikacije litičke industrije i izvedeni zaključci bili metodološki uvjetovani.[12]

Stratigrafija špilje Kopačine podijeljena je na tri velike cjeline: kasni gornji paleolitik, mezolitik i brončano doba (ovo potonje potvrđeno samo u unutarnjoj dvorani).[13] Maksimalna debljina naslaga dosegnuta je u prednjem dijelu (≈ 360 cm), a u unutarnjoj dvorani oko 270 cm. Dosad su bila dostupna četiri radiokarbonska datuma napravljena na različitim uzorcima s različitih dubina, pri čemu za dva uzorka dubina nije poznata (tab. 1). Dva su datirana uzorka kasnogornjopaleolitičke starosti (Z-2403, Z-2404), jedan je

7 ČEČUK 1996.
8 VUKOSAVLJEVIĆ *et al.* 2011: 11, bilj. 17.
9 MIRACLE 1995: 71.
10 KLIŠKIĆ 2008: 444.
11 VUKOSAVLJEVIĆ *et al.* 2011: 13, tab. 2.
12 VUKOSAVLJEVIĆ *et al.* 2011; VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017.
13 ČEČUK 1996.

from those of the Mesolithic, systematic excavations were conducted in 15–20 cm arbitrary spits, with depths recorded in relation to the cave floor as it existed at the time.[7] Occasionally, these arbitrary excavation units were considerably thicker (up to several tens of centimetres), as evidenced by depth labels on bags containing lithic artefacts.[8] The combination of a sloping bedrock surface, overlying sedimentary deposits, and arbitrary excavation practices undoubtedly resulted in the mixing of archaeological layers of different ages.[9] Sediments excavated during the investigations were not sieved. The scale of the problem resulting from the lack of sieving is best illustrated by the results of revisionary research conducted in the cave entrance area. Specifically, sediment originating from earlier excavations and deposited at the location of Trench 1 has yielded, through recent excavation and systematic sieving, thousands of stone artefacts with a total mass exceeding 35 kg, as well as very numerous faunal remains.[10] By comparison, the total mass of the lithic assemblage recovered during excavations conducted between 1978 and 1993 amounts to slightly less than 69 kg.[11] This discrepant ratio strongly suggests that previous quantifications of the lithic industry and the conclusions derived from them were methodologically conditioned.[12]

The stratigraphy of Kopačina Cave is divided into three major units: the Late Upper Palaeolithic, the Mesolithic and the Bronze Age (the latter confirmed only in the inner chamber).[13] The maximum thickness of the deposits was recorded in the entrance chamber (≈360 cm), while in the inner chamber it reaches approximately 270 cm. To date, four radiocarbon dates obtained from different samples and different depths have been available, with the depth for two of the samples

7 ČEČUK 1996.
8 VUKOSAVLJEVIĆ *et al.* 2011: 11, n. 17.
9 MIRACLE 1995: 71.
10 KLIŠKIĆ 2008: 444.
11 VUKOSAVLJEVIĆ *et al.* 2011: 13, Tab. 2.
12 VUKOSAVLJEVIĆ *et al.* 2011; VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017.
13 ČEČUK 1996.

mezolitičke (Z-778), a jedan kasnoneolitičke starosti (Z-776). Uzimajući u obzir rezultate radiokarbonskog datiranja i dubine na kojima su pronađeni uzorci (Z-2403, Z-2404), Vukosavljević i suradnici zaključili su da su u Kopačini pouzdano prisutni kasnogornjopaleolitički/epigravetijenski te brončanodobni slojevi, dok mezolitički nisu uvjerljivo potvrđeni.[14] Glavni prijašnji argument za mezolitičku atribuciju bio je ranoholocenski datum (Z-778) na kućicama kopnenih puževa (*Helix* sp.), no pouzdanost takvih datuma vrlo je upitna.[15] Revizijska istraživanja u Kopačini koja su provedena 2000-tih navela su D. Kliškića na zaključak da otkriveni kameni artefakti, prije svega zbog svojeg mikrolitičkog karaktera i geometrijskih formi, kao i koštani artefakti nedvojbeno pripadaju mezolitiku.[16] Za čvrst zaključak nužna je potpora radiokarbonskim datumima te detaljnim tehnološkim i tipološkim analizama. Ovdje bismo željeli naglasiti da ne isključujemo mogućnost da su u revizijskim istraživanjima otkriveni ostaci mezolitičke starosti na nalazištu, ali trenutačno raspoloživi podaci navode na suzdržani oprez i realnu mogućnost da je i u

unknown (Tab. 1). Two of the dated samples are from the Late Upper Palaeolithic (Z-2403, Z-2404), one is Mesolithic (Z-778), and one is from the Late Neolithic (Z-776). Taking into account the radiocarbon results and the depths at which the samples Z-2403 and Z-2404 were recovered, Vukosavljević et al. concluded that Late Upper Palaeolithic / Epigravettian and Bronze Age layers are reliably present at Kopačina, whereas Mesolithic layers have not been convincingly confirmed.[14] The main previous argument for a Mesolithic attribution was an Early Holocene date (Z-778) obtained from terrestrial snail shells (*Helix* sp.); however, the reliability of such dates is highly questionable.[15] Revisionary research carried out at Kopačina in the 2000s led D. Kliškić to conclude that the uncovered stone artefacts – primarily due to their microlithic character and geometric forms – as well as the bone artefacts, undoubtedly belong to the Mesolithic.[16] A firm conclusion, however, requires support from radiocarbon dates and detailed technological and typological analyses. Here we would like to emphasise that we do not exclude the possibility that remains from the Mesolithic were uncovered during the revisionary research at the site, but the currently

Table 1 *Stari radiokarbonski datumi iz Kopačine. Rezultati kalibrirani uz pomoć OxCal v4.4.4* (Bronk Ramsey 2009) *i kalibracijske krivulje IntCal20* (Reimer et al. 2020)
tablica 1. *Old radiocarbon dates from Kopacina cave. Results calibrated using OxCal v4.4.4* (Bronk Ramsey 2009) *and IntCal20 calibration curve* (Reimer et al. 2020)

Lab. oznaka / Lab. No.	Materijal / Material	Dubina (cm) / Depth (cm)	Nekal. ps / Uncal. bp	SD	Kal. PS / Cal BP (1 σ)	Kal. PS / Cal BP (2 σ)	Referenca / Reference
Z-2403	životinjska kost / animal bone	140-160	13160	310	16250 - 15320	16890 - 14910	Obelić et al. 1994; Miracle 1995
Z-2404	životinjska kost / animal bone	20-40	11980	270	14250 - 13490	14920 - 13330	Obelić et al. 1994; Miracle 1995
Z-778	ljuštura kopnenog puža Helix sp. / landsnail shell Helix sp.	nepoznato / unknown	9160	100	10490 - 10230	10650 - 10160	Miracle 1995; Čečuk 1996
Z-776	travertin / travertine	nepoznato / unknown	5340	65	6270 - 6000	6290 - 5940	Miracle 1995

14 VUKOSAVLJEVIĆ *et al.* 2011: 40–41.
15 VUKOSAVLJEVIĆ *et al.* 2011: 12, 40.
16 KLIŠKIĆ 2009: 649; 2010: 678; 2011: 732; 2015: 665.

14 VUKOSAVLJEVIĆ *et al.* 2011: 40-41.
15 VUKOSAVLJEVIĆ *et al.* 2011: 12, 40.
16 KLIŠKIĆ 2009: 649; 2010: 678; 2011: 732; 2015: 665.

ovom slučaju ipak riječ o nalazima kasnogornjopaleolitičke starosti.

Litička industrija i strategije nabave kamene sirovine

Višegodišnjim sustavnim istraživanjima B. Čečuka otkriven je veliki litički skup nalaza.[17] Tehno-tipološke i petrografske analize litičke industrije napravljene su u nekoliko navrata.[18] Prva sustavna tehno-tipološka analiza čiji je cilj bio uključiti u analizu sve raspoložive nalaze obuhvatila je nešto više od 12 000 artefakata. Analizirani su litički nalazi iz prednjeg i stražnjeg dijela špilje. Skup je podijeljen u dvije litičke faze prema tipološkim kriterijima: stariju (300 do 140 cm) s većom učestalošću zakrivljenih šiljaka s hrptom i mlađu (140 do 0 cm) s većom učestalošću pločica s hrptom.[19] Osim spomenutih tipova oruđa, u skupu nalaza zabilježeni su i brojni drugi tipovi, kao što su različita grebala, kružni segmenti, dubila, svrdla itd.[20] Zabilježeni tipovi oruđa uobičajeni su za istočnojadranske epigravetijenske skupove nalaza.[21] Preliminarna petrografska analiza razlikovala je više vrsta rožnjaka i radiolarita te naznačila njihova potencijalna ležišta.[22] U kasnijim radovima detaljno je analiziran litički skup nalaza iz prednjeg dijela špilje, kad su obuhvaćeni samo nalazi iz vrećica koje imaju raspon dubine od 20 cm, dok su ostali nalazi isključeni.[23] Kako bi se

[17] Ranije u tekstu spomenuli smo da je u kasnijim istraživanjima otkriven znatan broj litičkih artefakata koje se propustilo prikupiti u istraživanjima koja je vodio B. Čečuk.

[18] VUKOSAVLJEVIĆ *et al.* 2011; VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017; PERHOČ 2020. Analize kamene sirovine rezultat su višegodišnjega terenskog i laboratorijskog istraživanja Z. Perhoča. Vidi i PERHOČ 2009a; 2009b; VUKOSAVLJEVIĆ, PERHOČ, RADIĆ 2022.

[19] VUKOSAVLJEVIĆ *et al*. 2011.

[20] VUKOSAVLJEVIĆ *et al.* 2011: 17, tab. 4 i 6.

[21] e.g. VUJEVIĆ, DILBER 2018; VUKOSAVLJEVIĆ, PERHOČ, RADIĆ 2022; VUKOSAVLJEVIĆ 2023; ARBUTINA, BODRUŽIĆ, VUJEVIĆ 2025.

[22] VUKOSAVLJEVIĆ *et al*. 2011.

[23] VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017. Analizirane su vrećice sa sljedećim oznakama dubine: 0–20, 20–40, 40–60, 60–80, 80–100, 100–120, 120–140,

available data call for cautious restraint and point to a realistic possibility that these finds may, in fact, also be from the Late Upper Palaeolithic.

Lithic industry and raw material procurement strategies

Long-term systematic excavations conducted by B. Čečuk uncovered a large lithic assemblage.[17] Techno-typological and petrographic analyses of the lithic industry were carried out on several occasions.[18] The first systematic techno-typological analysis, aimed at including all available finds, encompassed slightly more than 12,000 artefacts. Lithic finds from both the outer and inner parts of the cave were analysed. Based on typological criteria, the assemblage was divided into two lithic phases: an older (300–140 cm), characterised by a higher frequency of curved backed points, and a more recent (140–0 cm), with a higher frequency of backed bladelets.[19] In addition to these tool types, the assemblage also includes numerous others, such as various scrapers, circular segments, burins, drills, etc.[20] The recorded tool types are typical of eastern Adriatic Epigravettian assemblages.[21] A preliminary petrographic analysis distinguished several types of chert and radiolarite and indicated their potential source areas.[22] In later studies, the lithic assemblage from the entrance chamber was analysed in detail; only finds from bags with a depth range of 20 cm were included, while all other material was excluded.[23] In order to gain

[17] Earlier in the text, we noted that later research uncovered a significant number of lithic artefacts that had not been collected during the excavations directed by B. Čečuk.

[18] VUKOSAVLJEVIĆ *et al.* 2011; VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017; PERHOČ 2020. The analyses of stone raw materials are the result of many years of field and laboratory research conducted by Z. Perhoč. S. also PERHOČ 2009a; 2009b; VUKOSAVLJEVIĆ, PERHOČ, RADIĆ 2022.

[19] VUKOSAVLJEVIĆ *et al.* 2011.

[20] VUKOSAVLJEVIĆ *et al.* 2011: 17, Tabs. 4 and 6.

[21] e.g. VUJEVIĆ, DILBER 2018; VUKOSAVLJEVIĆ, PERHOČ, RADIĆ 2022; VUKOSAVLJEVIĆ 2023; ARBUTINA, BODRUŽIĆ, VUJEVIĆ 2025.

[22] VUKOSAVLJEVIĆ *et al.* 2011.

[23] VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017. Bags bearing the following depth labels were analysed: 0-20, 20-40, 40-60, 60-80, 80-100, 100-120, 120–140,

dobio što bolji uvid u moguće dijakronijske promjene, cjelokupni stratigrafski slijed podijeljen je u četiri faze (Kopačina I–IV, gdje je faza Kopačina I najstarija) na temelju raspoloživih radiokarbonskih datuma i vertikalne distribucije kamenih artefakata. Ukupno je analizirano 8092 artefakta.[24] Litička industrija bazirana je na proizvodnji odbojaka, s tim da treba napomenuti da je postotak iskorištenih pločica i sječiva za proizvodnju oruđa uvijek viši od postotka iskorištenih odbojaka, osim u fazi Kopačina IV. Među jezgrama dominiraju one s jednom udarnom plohom, a znatan je udio i bipolarnih jezgara.[25] Petrografskom analizom definirano je pet vrsta sirovine: radiolariti, rožnjaci iz donjoeocenskih vapnenaca, rožnjaci iz srednjoeocenskih vapnenaca, rožnjaci iz gornjokrednih vapnenaca i crni rožnjaci. Kombinacija terenskih istraživanja i petrografskih analiza arheoloških i geoloških uzoraka omogućila je povezivanje sirovine od koje su izrađeni kameni artefakti s mogućim ležištima. Kvantitativno su uočena dva trenda: (1) postupni porast udjela regionalnih sirovina i (2) pad udjela izvanregionalnih sirovina kroz vrijeme, pri čemu je udio lokalnih sirovina relativno stabilan. Navedeni trendovi mogu ukazivati na veća eksploatacijska područja ili kontakte s udaljenijim područjima, a moguće i na viši stupanj mobilnosti u ranijim fazama.[26]

Strategije preživljavanja

U zooarheološkoj analizi faunskih skupova nalaza otkrivenih od 1982. do 1988. definirane su četiri biostratigrafske jedinice označene kao biozone A–D. Biozona A obuhvatila je dubine od 0 do 40 cm, biozona B od 40 do 110 cm, biozona C od 110 do 160 cm i na kraju biozona D od 160 do 240 cm.[27]

a clearer insight into possible diachronic changes, the entire stratigraphic sequence was divided into four phases (Kopačina I–IV, where Kopačina I represents the oldest phase), based on available radiocarbon dates and the vertical distribution of stone artefacts. In total, 8,092 artefacts were analysed.[24] The lithic industry was based on flake production; however, it should be noted that the proportion of utilised bladelets and blades used for tool production is consistently higher than that of utilised flakes, except in the Kopačina IV phase. Among the cores, single-platform cores predominate, while bipolar cores also represent a significant proportion.[25] Petrographic analysis defined five raw-material types: radiolarites, cherts from Lower Eocene limestones, cherts from Middle Eocene limestones, cherts from Upper Cretaceous limestones and black cherts. The combination of field surveys and petrographic analyses of archaeological and geological samples made it possible to link the raw materials used for the manufacture of stone artefacts to potential source areas. Quantitatively, two trends were observed: (1) a gradual increase in the proportion of regional raw materials and (2) a decrease in the proportion of extra-regional raw materials over time, while the proportion of local raw materials remains relatively stable. These trends may indicate larger exploitation territories or contacts with more distant areas and, possibly, a higher degree of mobility in the earlier phases.[26]

Subsistence strategies

In the zooarchaeological analysis of faunal assemblages recovered between 1982 and 1988, four biostratigraphic units (designated as biozones A–D) were defined. Biozone A represents depths of 0–40 cm, Biozone B 40–110 cm, Biozone C 110–160 cm, and Biozone D 160–240 cm.[27]

140–160, 160–180, 180–200, 200–220, 220–240, 240–260, 260–280 i 280–300 cm.

24 VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017.

25 VUKOSAVLJEVIĆ, PERHOČ 2017: 169–170.

26 VUKOSAVLJEVIĆ, PERHOČ 2017: 180, sl. 16; 182.

27 MIRACLE 1995: 143, tab. 4.10; 1996.

140-160, 160-180, 180-200, 200-220, 220-240, 240-260, 260-280 and 280-300 cm.

24 VUKOSAVLJEVIĆ 2012; VUKOSAVLJEVIĆ, PERHOČ 2017.

25 VUKOSAVLJEVIĆ, PERHOČ 2017: 169-170.

26 VUKOSAVLJEVIĆ, PERHOČ 2017: 180, Fig. 16; 182.

27 MIRACLE 1995: 143, Table 4.10; 1996.

Jelen predstavlja glavnu lovinu u sve četiri biozone, a slijedi ga *Equus hydruntinus*. P. T. Miracle uočio je dvije velike vremenske promjene u analiziranom skupu nalaza. Prva predstavlja znatan pad učestalosti ostataka zeca od biozone D do biozone C te znatan porast učestalosti jelena od biozone B do biozone A.[28] Među ostalom lovinom prisutni su i tur, divlja svinja, divokoza/kozorog, zec i mesojedi s niskom učestalošću. Ptica i riba gotovo da i nema.[29]

U faunskom skupu nalaza iz Kopačine nijedna vrsta velikih sisavaca ne predstavlja jasan pokazatelj određenih paleoekoloških uvjeta, već njihova prisutnost upućuje na postojanje različitih okoliša. Vrste prilagođene hladnim klimatskim uvjetima nisu zabilježene.[30]

Osobni ukrasi, koštana industrija i ljudski ostaci

Osobni ukrasi otkriveni su u sustavnim iskopavanjima B. Čečuka, ali nisu analizirani i publicirani.[31] P. T. Miracle navodi da je pri obradi faunskog skupa nalaza iz vrećica s ostacima faune izdvojio različite artefakte među kojima su i probušene morske ljušture.[32] U kratkim izvještajima povezanima s revizijskim istraživanjima D. Kliškić donosi fotografije osobnih ukrasa na kojima se jasno prepoznaju perle izrađene od ljuštura morskih puževa *Columbella rustica*,[33] *Tritia* sp.,[34] morskog školjkaša (moguće *Glycimeris* sp.),[35] ali i onih izrađenih od životinjskih zuba, vjerojatno jelenskih.[36] Riječ je o osobnim ukrasima kakvi su otkriveni na brojnim kasnogornjopaleolitičkim i mezo-

[28] Mjereno kao % MNE. MIRACLE 1995: 148; 1996: 52.
[29] MIRACLE 1995: 148; 1996: 50–52.
[30] MIRACLE 1995: 146–148.
[31] ČEČUK 1996: 18. U radu se samo usputno navodi da je otkriveno tridesetak školjaka, od kojih su neke i probušene, na temelju čega zaključujemo da je riječ o osobnim ukrasima.
[32] MIRACLE 1995: 78.
[33] KLIŠKIĆ 2010: 679; 2017: 876; 2018: 871.
[34] KLIŠKIĆ 2018: 871.
[35] KLIŠKIĆ 2011: 732.
[36] KLIŠKIĆ 2009: 649; KLIŠKIĆ 2010: 678; 2016: 793.

Red deer constitute the primary prey species in all four biozones, followed by *Equus hydruntinus*. P. T. Miracle identified two major diachronic changes in the analysed assemblage. The first is a marked decline in the frequency of hare remains from Biozone D to Biozone C, and a significant increase in the frequency of red deer from Biozone B to Biozone A.[28] Other hunted taxa include aurochs, wild boar, chamois/ibex, hare, and carnivores, the latter with low frequencies. Birds and fish are virtually absent.[29]

In the faunal assemblage from Kopačina, no species of large mammal constitutes a clear indicator of specific palaeoecological conditions; rather, their presence points to the existence of diverse environments. Species adapted to cold climatic conditions are not recorded.[30]

Personal ornaments, bone industry and human remains

Personal ornaments were discovered during the systematic excavations conducted by B. Čečuk, but they were neither analysed nor published.[31] P. T. Miracle noted that, during the analysis of the faunal assemblage, he separated various artefacts from bags containing faunal remains, including perforated marine shells.[32] In brief reports related to the revisionary research, D. Kliškić presents photographs of personal ornaments in which beads made from the shells of marine gastropods *Columbella rustica*[33] and *Tritia* sp.,[34] a marine bivalve (possibly *Glycymeris* sp.),[35] as well as beads made from animal teeth, probably red deer, can be clearly identified.[36] These are personal ornaments of a type documented at numerous Late Upper

[28] Measured as % MNE. MIRACLE 1995: 148; 1996: 52.
[29] MIRACLE 1995: 148; 1996: 50-52.
[30] MIRACLE 1995: 146-148.
[31] ČEČUK 1996: 18. The paper only briefly notes that around thirty shells were discovered, some of which are perforated, on the basis of which it is concluded that they represent personal ornaments.
[32] MIRACLE 1995: 78.
[33] KLIŠKIĆ 2010: 679; 2017: 876; 2018: 871.
[34] KLIŠKIĆ 2018: 871.
[35] KLIŠKIĆ 2011: 732.
[36] KLIŠKIĆ 2009: 649; KLIŠKIĆ 2010: 678; 2016: 793.

litičkim nalazištima istočnojadranske obale.[37] Osim usputnih navoda, skup nalaza osobnih ukrasa iz revizijskih istraživanja Kopačine nije analiziran i publiciran.

Koštani artefakti, jednako kao i osobni ukrasi usputno se navode u literaturi, ali nisu analizirani i objavljeni. B. Čečuk navodi i donosi fotografije koštanih artefakata, ali bez podataka o mjestu nalaza, odnosno dubini.[38] Među koštanim artefaktima navodi i jedan primjerak s urezima.[39] Dodatni primjerci koštane industrije pronađeni su među ostacima faune sisavaca.[40] D. Kliškić navodi koštane artefakte pronađene u revizijskim iskopavanjima te donosi jednu ilustraciju na kojoj se mogu jasno prepoznati.[41]

Ljudski ostaci otkriveni u špilji Kopačini malobrojni su. Nekoliko fragmenata kranijalnih i postkranijalnih dijelova ljudskog kostura zabilježeno je u sloju na dubini od 170 do 190 cm.[42] Osim ove osnovne informacije, o navedenim nalazima nisu dostupni dodatni podaci. Ako se potvrdi njihova paleolitička starost, špilja Kopačina svrstala bi se među rijetka gornjopaleolitička nalazišta na istočnojadranskoj obali na kojima su pronađeni ljudski kosturni ostaci.[43]

NOVI AMS ^{14}C DATUMI

Za AMS ^{14}C datiranje odabrana su dva koštana artefakta pronađena u iskopavanjima B. Čečuka (sl. 2). Odabrani su među grupom koštanih artefakata pohranjenih na Odsjeku za arheologiju Filozofskog fakulteta Sveučilišta u Zagrebu jer su jedini imali oznaku du-

37 KOMŠO, VUKOSAVLJEVIĆ 2011; CRISTIANI, FARBSTEIN, MIRACLE 2014; VUKOSAVLJEVIĆ, KARAVANIĆ 2015; CVITKUŠIĆ, RADOVIĆ, VUJEVIĆ 2018; BORIĆ, CRISTIANI 2019; CVITKUŠIĆ, VUJEVIĆ 2021; CVITKUŠIĆ, CRISTIANI, VUJEVIĆ 2024; CVITKUŠIĆ *et al.* 2024.

38 ČEČUK 1996: 18; 22, sl. 8.

39 ČEČUK 1996: 25–26.

40 MIRACLE 1995: 78.

41 KLIŠKIĆ 2010: 679.

42 ČEČUK 1996: 26.

43 MIRACLE 2005: 26; JANKOVIĆ *et al.* 2011; 2012; BORIĆ *et al.* 2024.

Palaeolithic and Mesolithic sites along the eastern Adriatic coast.[37] With the exception of these cursory mentions, the assemblage of personal ornaments recovered during the revisionary research at Kopačina has not been analysed or published.

Bone artefacts, like personal ornaments, are mentioned only in passing in the literature and have not been analysed or published. B. Čečuk referred to and illustrated bone artefacts, but without information on their findspots or depths.[38] Among the bone artefacts, he also mentioned a single specimen bearing incisions.[39] Additional examples of bone industry were identified among mammalian faunal remains.[40] D. Kliškić reported bone artefacts recovered during the revisionary excavations and provides an illustration in which they can be clearly recognised.[41]

Human remains recovered from Kopačina Cave are scarce. Several fragments of cranial and postcranial elements of the human skeleton were recorded in a layer at depths between 170 and 190 cm.[42] Beyond this basic information, no additional data on these finds are available. If they are confirmed to be from the Palaeolithic, Kopačina Cave would rank among the rare Upper Palaeolithic sites along the eastern Adriatic coast at which human skeletal remains have been discovered.[43]

NEW AMS ^{14}C DATES

Two bone artefacts recovered during the excavations conducted by B. Čečuk were selected for AMS ^{14}C dating (Fig. 2). They were chosen from a group of bone artefacts curated at the Department of Archaeology, Faculty of Humanities

37 KOMŠO, VUKOSAVLJEVIĆ 2011; CRISTIANI, FARBSTEIN, MIRACLE 2014; VUKOSAVLJEVIĆ, KARAVANIĆ 2015; CVITKUŠIĆ, RADOVIĆ, VUJEVIĆ 2018; BORIĆ, CRISTIANI 2019; CVITKUŠIĆ, VUJEVIĆ 2021; CVITKUŠIĆ, CRISTIANI, VUJEVIĆ 2024; CVITKUŠIĆ *et al.* 2024.

38 ČEČUK 1996: 18; 22, Fig. 8.

39 ČEČUK 1996: 25-26.

40 MIRACLE 1995: 78.

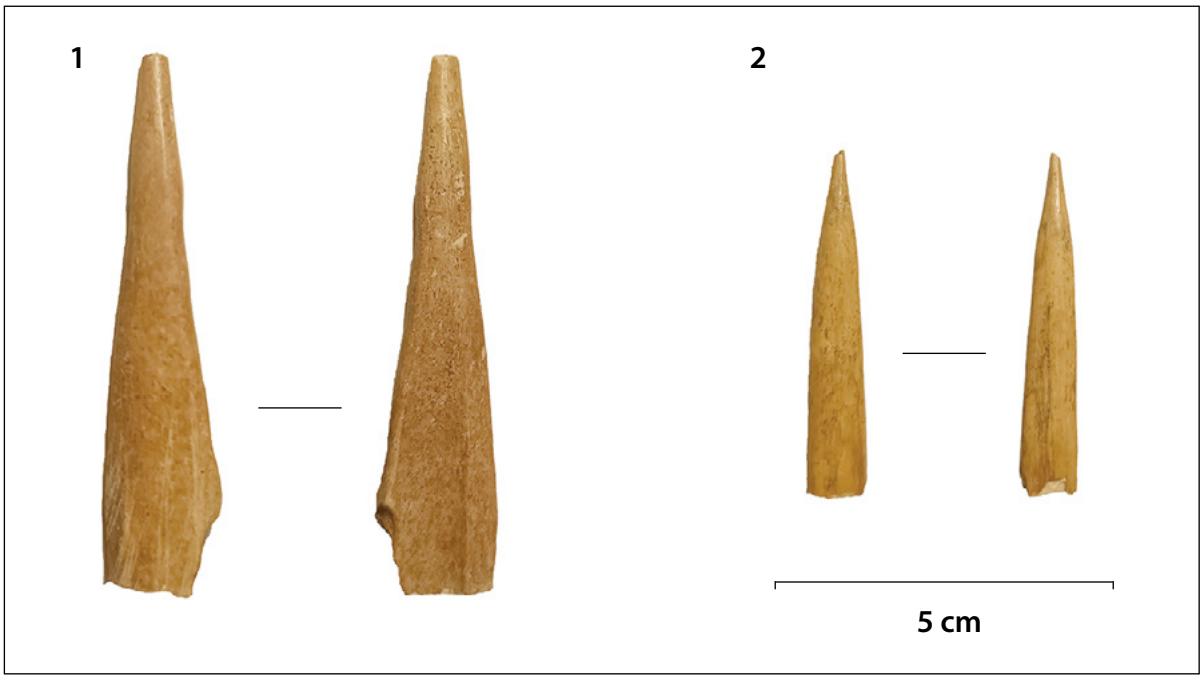
41 KLIŠKIĆ 2010: 679.

42 ČEČUK 1996: 26.

43 MIRACLE 2005: 26; JANKOVIĆ *et al.* 2011; 2012; BORIĆ *et al.* 2024.

Tablica 2. *Rezultati AMS 14C datiranja koštanih šiljaka iz Kopačine. Rezultati kalibrirani uz pomoć OxCal v4.4.4* (Bronk Ramsey 20
Table 2 *Results of AMS 14C dating of bone spikes from Kopacina. Results calibrated using OxCal v4.4.4* (Bronk Ramsey 2009) *and Int*

Lab. oznaka / Lab. No.	Materijal / Material	Dubina / Depth (cm)	Oznaka uzorka / Sample code	Nekal. ps / Uncal. bp	SD	Kal. PS / Cal BP (1 σ)	Kal. PS / Cal BP (2 σ)
OxA-X-3341-9	bone point	20-40	KOP-1	11821	49	13760 - 13600	13790 - 13520
OxA-45468	bone point	140-160	KOP-7	11896	65	13810 - 13600	14020 - 13530



Slika 2. *Datirani koštani šiljci: 1. koštani šiljak KOP-1; 2. koštani šiljak KOP-7* (izradio M. Vuković; snimio: N. Vukosavljević)
Figure 2 *Dated bone spikes: 1. bone point KOP-1; 2. bone point KOP-7* (made by M. Vuković; photo by: N. Vukosavljević)

bine na kojoj su pronađeni. Uzorak KOP-1 nosi oznaku dubine 20 do 40 cm, dok uzorak KOP-7 nosi oznaku dubine 140 do 160 cm (tab. 2).

Zbog znatne modifikacije originalnih kostiju od kojih su artefakti izrađeni nije bilo moguće napraviti taksonomsku identifikaciju klasičnom morfološkom analizom. Nedestruktivnom ZooMS analizom koštani artefakt KOP-1 određen je samo na razini porodice *Cervidae*, dok je artefakt KOP-7 identificiran kao *Cervus elaphus*.[44] Ranije smo u tekstu naveli da su ostaci jelena najbrojniji u faunskom skupu nalaza kroz cijelu stratigrafiju.

Oba uzorka datirana su u Istraživačkom laand Social Sciences, University of Zagreb, as they were the only specimens bearing depth labels indicating their find context. Sample KOP-1 carries a depth label of 20–40 cm, while sample KOP-7 is labelled 140–160 cm (Tab. 2).

Due to the substantial modification of the original bones from which the artefacts were manufactured, taxonomic identification using standard morphological analysis was not possible. Non-destructive ZooMS analysis identified bone artefact KOP-1 only at the family level (Cervidae), whereas artefact KOP-7 was identified as *Cervus elaphus*.[44] As noted earlier in the text, red deer remains are the most numerous within the faunal assemblage through-

[44] VIDAS *et al.* 2024.

[44] VIDAS *et al.* 2024.

09) *i kalibracijske krivulje IntCal20* (Reimer et al. 2020)
tCal20 calibration curve (Reimer et al. 2020)

Iskorišteno / Used (mg)	Prinos / Yield (mg)	% Prinosa / %Yield	Karbonatni višak / Excess	%C	δ13C	δ15N	C:N	Referenca / Reference
805	21.37	2.7	19.12	41.5	-20.9	3.3	3.5	Ovaj članak / This paper
499	6.13	1.2	3.82	43.8	-20.6	3.6	3.4	Ovaj članak / This paper

boratoriju za arheologiju i povijest umjetnosti Oxford Radiocarbon Accelerator Unit, gdje su podvrgnuti standardnoj predobradi i AMS mjerenju prema postupcima koji se primjenjuju u laboratoriju ORAU.[45]

Uzorak KOP-1 (OxA-X-3341-9) dao je radiokarbonsku starost od 11 821 ± 49 ps [13 760 – 13 600 cal PS (1σ); 13 790 – 13 520 cal BP (2σ)].[46] Kemijski pokazatelji upućuju na zadovoljavajuću atomsku ravnotežu (C : N = 3,5; %C = 41,5) te umjerenu količinu izdvojenog kolagena (2,7 %), no vrijednost je karbonatnog viška povišena (19,1), dok je izotopna vrijednost dušika δ^{15}N niska (+3,3 ‰). Kombinacija povišenoga karbonatnog viška i niskog δ^{15}N ukazuje na ostatke kontaminacije i/ili ograničeno očuvanje kolagena (tab. 2).[47] Ovaj rezultat stoga treba tumačiti s oprezom u kronološkim analizama, osobito u slučajevima kad bi predstavljao jedini kronološki reper.

Uzorak KOP-7 (OxA-45468) dao je radiokarbonsku starost od 11 896 ± 65 ps [13 810 – 13 600 kal. PS (1σ); 14 020 – 13 530 cal PS (2σ)]. Kemijski pokazatelji upućuju na dobro očuvan kolagen (C : N = 3,4; %C = 43,8; karbonatni višak = 3,8), dok je prinos kolagena (1,2 %) nizak, ali iznad prihvatljivoga minimalnog praga. Izotopne vrijednosti (δ^{13}C = –20,6 ‰; δ^{15}N = +3,6 ‰) uklapaju se u očekivani kopneni raspon, iako je vrijed-

45 BRONK RAMSEY *et al.* 2002; BROCK *et al.* 2010.

46 Svi radiokarbonski datumi u radu kalibrirani su s pomoću programa OxCal v4.4.4 (BRONK RAMSEY 2009; mrežna stranica OxCal, pristupljeno 22. listopada 2025.) i kalibracijske krivulje IntCal20 (REIMER *et al.* 2020).

47 AMBROSE 1990; VAN KLINKEN 1999; BROCK *et al.* 2010; HIGHAM, DOUKA 2021.

out the entire stratigraphic sequence.

Both samples were dated at the Oxford Radiocarbon Accelerator Unit, Research Laboratory for Archaeology and the History of Art, where they underwent standard pretreatment and AMS measurement following procedures routinely applied at the ORAU laboratory.[45]

Sample KOP-1 (OxA-X-3341-9) yielded a radiocarbon age of 11,821 ± 49 BP [13,760–13,600 cal BP (1σ); 13,790–13,520 cal BP (2σ)].[46] Chemical indicators suggest a satisfactory atomic balance (C:N = 3.5; %C = 41.5) and a moderate collagen yield (2.7%), although the carbonate excess is elevated (19.1), while the nitrogen isotope value δ^{15}N is low (+3.3‰). The combination of elevated carbonate excess and low δ^{15}N indicates residual contamination and/or limited collagen preservation (Tab. 2).[47] This result should therefore be interpreted with caution in chronological analyses, particularly in cases where it would represent the sole chronological reference.

Sample KOP-7 (OxA-45468) yielded a radiocarbon age of 11,896 ± 65 BP [13,810–13,600 cal BP (1σ); 14,020–13,530 cal BP (2σ)]. Chemical indicators point to well-preserved collagen (C:N = 3.4; %C = 43.8; carbonate excess = 3.8), while the collagen yield (1.2%) is low but above the acceptable minimum threshold. The isotopic values (δ^{13}C = –20.6‰; δ^{15}N = +3.6‰) fall within the expected terrestrial range, although the nitrogen value is slightly

45 BRONK RAMSEY *et al.* 2002; BROCK *et al.* 2010.

46 All radiocarbon dates presented in this paper were calibrated using OxCal v4.4.4 (BRONK RAMSEY 2009; OxCal website – access date: 22 October 2025) and the IntCal20 calibration curve (REIMER *et al.* 2020).

47 AMBROSE 1990; VAN KLINKEN 1999; BROCK *et al.* 2010; HIGHAM, DOUKA 2021.

nost dušika blago snižena (tab. 2).[48] Ukupno gledano, ovaj se rezultat smatra pouzdanim za kronološku interpretaciju.

RASPRAVA I ZAKLJUČAK

Iako potječu s osjetno različitih dubina, oba datuma upućuju na vrlo sličnu starost (tab. 2). To je u suprotnosti s očekivanjem stratigrafske progresije starosti, pa je najrealnije objašnjenje miješanje arheoloških konteksta uslijed arbitrarnog iskopavanja slojeva i/ili vertikalnih migracija kostiju. S obzirom na razliku u dubini, vjerojatnija je prva opcija.

Uzimajući u obzir starost uzoraka OxA-X-3341-9 i Z-2404, čini se da rezultat datiranog uzorka Z-2403 koji je stariji od dva prethodno navedena odgovara njegovu stratigrafskom položaju, odnosno sloju koji je stariji od onih iz kojih potječu uzorci OxA-X-3341-9 i Z-2404.

Iako rezultat datiranja za uzorak OxA-X-3341-9 (KOP-1) treba uzeti s određenom dozom opreza, njegova podudarnost sa životinjskom kosti Z-2404 s iste dubine (20 do 40 cm) podupire interpretaciju da vršni dijelovi stratigrafije u Kopačini pripadaju kasnom gornjem paleolitiku, a ne mezolitiku.

Novi AMS ^{14}C datumi također pokazuju da su ranije postavljene stratigrafske podjele (biozone ili litičke faze) vjerojatno uključivale materijal različite starosti, što nalaže oprez pri tumačenju dijakronijskih promjena.

Sve do otkrića kasnogornjopaleolitičkih slojeva u Veloj spili,[49] špilja Kopačina bila je jedino poznato kasnogornjopaleolitičko nalazište u Dalmaciji i zbog toga zasigurno ima važno mjesto u povijesti istraživanja paleolitika. Ipak, zbog metodoloških ograničenja starijih istraživanja, njezina interpretativna težina danas je manja. Novi AMS ^{14}C datumi potvrdili su ranija opažanja o vjerojatnom miješanju ar-

[48] *Idem.*
[49] ČEČUK, RADIĆ 2002; 2005.

reduced (Tab. 2).[48] Overall, this result is considered reliable for chronological interpretation.

DISCUSSION AND CONCLUSION

Although they derive from markedly different depths, both dates indicate very similar ages (Tab. 2). This runs counter to expectations of stratigraphic age progression, and the most plausible explanation is mixing of archaeological contexts resulting from arbitrary excavation of layers and/or vertical migration of bones. Given the difference in depth, the former explanation appears more likely.

Taking into account the ages of samples OxA-X-3341-9 and Z-2404, it appears that the dated result for sample Z-2403, which is older than the two previously mentioned samples, corresponds well to its stratigraphic position, that is, to a layer older than those from which samples OxA-X-3341-9 and Z-2404 originate.

Although the dating result for sample OxA-X-3341-9 (KOP-1) should be treated with a degree of caution, its correspondence with animal bone Z-2404 from the same depth (20–40 cm) supports the interpretation that the uppermost parts of the stratigraphy at Kopačina belong to the Late Upper Palaeolithic rather than to the Mesolithic.

The new AMS ^{14}C dates further indicate that previously established stratigraphic divisions (biozones or lithic phases) probably included material of different ages, which calls for caution in the interpretation of diachronic changes.

Until the discovery of Late Upper Palaeolithic layers at Vela Spila,[49] Kopačina Cave was the only known Late Upper Palaeolithic site in Dalmatia and therefore undoubtedly occupies an important place in the history of Palaeolithic research. However, due to the methodological limitations of earlier investigations, its interpretative significance is today reduced. The new AMS ^{14}C dates

[48] *Idem.*
[49] ČEČUK, RADIĆ 2002; 2005.

heoloških slojeva različite starosti u arbitrarno iskopavanim slojevima te su dodatno osnažili drugačije tumačenje kulturne stratigrafije, prema kojemu u Kopačini nisu zabilježeni mezolitički slojevi. Nadamo se da će rezultati revizijskih iskopavanja Kopačine donijeti pouzdane podatke o istraženim arheološkim kontekstima te time ispraviti nedostatke ranijih istraživanja, a možda i korigirati zaključke iznesene u ovom radu. Za suvremene spoznaje o kasnom gornjem paleolitiku u Dalmaciji danas su znatno važnija recentna istraživanja špilje Vlakno na Dugom otoku[50] i Vele spile na Korčuli[51] jer su provedena suvremenim metodama koje pružaju robusnije kronološke i kontekstualne podatke za kasni gornji paleolitik istočnog Jadrana.

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[50] VUJEVIĆ, BODRUŽIĆ 2021; VITEZOVIĆ, VUJEVIĆ, RADOVIĆ 2024.

[51] DEAN *et al.* 2020; VUKOSAVLJEVIĆ, PERHOČ, RADIĆ 2022.

have confirmed earlier observations regarding the probable mixing of archaeological layers of different ages within arbitrarily excavated spits and have further strengthened an alternative interpretation of the cultural stratigraphy, according to which no Mesolithic layers have been recorded at Kopačina. We hope that the results of the revisionary excavations at Kopačina will provide reliable data on the investigated archaeological contexts and thus remedy the shortcomings of earlier research, and possibly also revise the conclusions presented in this paper. For current understanding of the Late Upper Palaeolithic in Dalmatia, recent research at Vlakno Cave on Dugi Otok[50] and at Vela Spila on Korčula[51] is considerably more important, as these sites have been investigated using modern methods that provide more robust chronological and contextual data for the Late Upper Palaeolithic of the eastern Adriatic.

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[50] VUJEVIĆ, BODRUŽIĆ 2021; VITEZOVIĆ, VUJEVIĆ, RADOVIĆ 2024.

[51] DEAN *et al.* 2020; VUKOSAVLJEVIĆ, PERHOČ, RADIĆ 2022.

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