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ARHEOLOŠKA ISTRAŽIVANJA U LIMSKOM KANALU 2014. I 2015. LOKALITETI ROMUALDOVA PEĆINA I ABRI KONTIJA 002, PEĆINA KOD ROVINJSKOG SELA, LIM 001 I PODVODNI PREGLED LIMSKOG KANALA

ARCHAEOLOGICAL INVESTIGATION OF THE LIM CHANNEL IN 2014 AND 2015 AT ROMUALD'S CAVE, ABRI KONTIJA 002, PEĆINA CAVE NEAR ROVINJSKO SELO, LIM 001 AND AN UNDERWATER SURVEY OF THE LIM CHANNEL

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Rad donosi rezultate arheoloških istraživanja provedenih tijekom 2014. i 2015. godine na četiri lokaliteta na području Limskog kanala u Istri. Istraživanja su dio projekta Hrvatske zaklade za znanost "Arheološka istraživanja kasnog pleistocena i ranog holocena na prostoru Limskog kanala" (ARCHAEOLIM). Terenski rad proveden je na četiri lokaliteta: Romualdovoj pećini, Abri Kontija 002, Pećini kod Rovinjskog Sela i Lim 001. Nadalje, tijekom 2015. godine proveden je i podvodni terenski pregled dijela Limskog kanala te geoarheološka uzorkovanja i geofizička mjerenja.

KLJUČNE RIJEČI: *paleolitik, mezolitik, Istra, Hrvatska, Archaeolim*

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This paper presents the results of archaeological investigation conducted in the course of 2014 and 2015 at four sites in the Lim Channel area in Istria County. The investigation is part of the Croatian Science Foundation's Archaeological Investigations into the Late Pleistocene and Early Holocene of the Lim Channel project (ARCHAEOLIM). The fieldwork was conducted at four locations: Romuald's Cave, Abri Kontija 002, Pećina Cave near Rovinjsko Selo and Lim 001. Also conducted in 2015 was an underwater field survey of a part of Lim Channel, geoarchaeological sampling and geophysical measurement.

KEY WORDS: *Palaeolithic, Mesolithic, Istria, Croatia, Archaeolim*

UVOD

U razdoblju od 3. do 28. srpnja 2014. te 29. lipnja do 8. kolovoza 2015. godine u sklopu projekta Hrvatske zaklade za znanost "Arheološka istraživanja kasnog pleistocena i ranog holocena na prostoru Limskog kanala", voditelja dr. sc. Ivora Jankovića (Institut za antropologiju), provedena su arheološka istraživanja na području Limskog kanala u Istri. Godine 2014. istraživani su lokaliteti Romualdova pećina i Abri Kontija 002, a tijekom 2015. godine četiri lokaliteta na području Limskog kanala: Romualdova pećina, Abri Kontija 002, Pećina kod Rovinjskog Sela i Lim 001 (sl. 1). Nadalje, proveden je i podvodni terenski pregled dijela Limskog kanala te geoarheološka uzorkovanja i geofizička mjerenja. Navedena istraživanja dio su trogodišnjeg projekta kojim se namjerava pokušati proniknuti u pitanja vezana uz razdoblje srednjeg i gornjeg paleolitika te mezolitika na prostoru Limskog kanala, poput biološkog i kulturnog kontinuiteta/diskontinuiteta, prilagodbe na okolišne i druge čimbenike, kontakata s okolnim regijama i dr.

Sl. 1 Položaj istraživanih lokaliteta; podloga preuzeta s Google Eartha.
Fig. 1 Position of the investigated sites; data from Google Earth.

METODOLOGIJA

Iskopavanje na svim lokalitetima provođeno je manjim alatom (špahtle i dr. sitan alat) prema horizontalnoj i vertikalnoj stratigrafiji, a sav sediment prosijavan je kroz 3mm sito. Vođen je i terenski dnevnik te foto i druga dokumentacija. Nadalje, za sve važnije nalaze pronađene *in situ*, kao i uzorke za radiometrijsko datiranje i druge vrste analiza, uzimala se točna pozicija u tri dimenzije. Tijekom istraživanja u 2015. godini provedena su geofizikalna mjerenja i geoarheološka uzorkovanja. Geofizička istraživanja obavljena su uz pomoć metode

INTRODUCTION

Archaeological investigation was conducted in the Lim Channel area in Istria in the frame of the Croatian Science Foundation's *Archaeological Investigations into the Late Pleistocene and Early Holocene of the Lim Channel* project, led by Ivor Janković (of the Institute for Anthropological Research), in the period from July 3rd to 28th of 2014 and from June 29th to August 8th of 2015. The Romuald's Cave (Romualdova pećina) and Abri Kontija 002 sites were investigated in 2014, while 2015 saw the investigation of four sites in the Lim Channel area: Romuald's Cave, Abri Kontija 002, Pećina Cave near Rovinjsko Selo and Lim 001 (Fig. 1). Also conducted was an underwater field survey of a part of the Lim Channel and geoarchaeological sampling and geophysical measurement. The cited investigations are part of a three-year project that aims to delve into questions related to the period of the Middle and Upper Palaeolithic and Mesolithic in the Lim Channel area, including biological and cultural continuity/discontinuity, adaptation to environmental and other factors, contact with neighbouring regions and other issues.

METHODOLOGY

Excavation at all sites was conducted with small tools (trowels and other small tools), investigating the horizontal and vertical stratigraphy, with all sediments sifted through a 3-millimetre mesh. Field day logs were kept and photographic and other documentation was made. Furthermore, for all significant finds found *in situ*, and for samples taken for radiometric dating and other types of analysis, a precise location was taken in three dimensions. The investigation in 2015 also included geophysical measurements and geoarchaeological sampling. The geophysical investigation was conducted using the Electrical Resistance Tomography (ERT) method, which measures the electrical resistance between electrodes set at 50 centimetre intervals, which allows for insight into the depth of the profile, i.e. sediment. Based on the results of the geophysical investigation it is possible to create significantly better plans for future investigations, and at the same time to gain insight into possible changes and disturbances (such as previous trenches, holes, subsequently deposited sediment and the like), which cannot be observed prior to an investigation.

Geological sampling was also conducted in the course of the investigations. All lithographic units were described in line with standard methods (Catt 1991). Monolithic (7 by 10 mm) samples of sediment were collected from each stratigraphic unit, or one sample each from groups from the same units. Loose sediment was taken with a metal

Electrical resistence tomography (ERT), kojom se mjeri električni otpor između elektroda postavljenih na 50 cm udaljenosti, što omogućava uvid u dubinu profila, odnosno sedimenta. Na temelju rezultata geofizičkih istraživanja moguće je puno kvalitetnije isplanirati buduća istraživanja, a ponekad i steći uvid u eventualne promjene i poremećenost (poput ranijih sondi, rupa, naknadno nanesenog sedimenta i sl.) koju nije moguće uočiti prije početka istraživanja.

Nadalje, tijekom istraživanja provedena su i geoarheološka uzorkovanja. Sve litografske jedinice opisane su po standardnim metodama (Catt 1991). Prikupljeni su monolitni (7x10 mm) uzorci sedimenata svake stratigrafske jedinice ili pak po jedan uzorak iz grupe istih jedinica. Rastresiti sedimenti uzeti su metalnom kutijom, dok su izrazito rastresiti sedimenti s vrlo velikom količinom vapnenačkog kršja gipsani (veličine do 20 cm). Mikromorfološke analize sedimenata pomoći će u interpretaciji taložnih procesa i uvjeta u okolišu koji su ih kontrolirali, kao i rasvjetljavanju na koji su se način ljudi i životinje koristili špiljom. Kod podvodnih istraživanja prvi korak bio je pregled dijela Limskog kanala uz pomoć sonara (side-scan sonar) kako bi se utvrdila morfologija njegova podvodnog dijela i time pomoglo određivanju potencijalno zanimljivih lokacija za ronjenje. Usporedba rezultata podvodne morfologije dna te bočnih strana kanala, u kombinaciji s vizualnim pregledom nadmorske, kopnene morfologije kanala, omogućila je bolji plan ronjenja. Prilikom navedenog pregleda uvidjeli smo da je podvodna morfologija sjeverne strana kanala potencijalno zanimljivija od južne - pad je puno strmiji, a na liticama nad kanalom locirano je i više pećina, pripećaka i pukotina. Na temelju pregleda kanala sonarom odabrano je nekoliko lokacija od potencijalnog interesa za ronjenje tijekom ovogodišnjih istraživanja.

Analiza ljudskih kosturnih ostataka (*Homo sapiens sapiens*) iz Sonde 3 u Romualdovoj pećini uključivala je standardne bioarheološke analize. Provedena je anatomska determinacija te, kada je to bilo moguće, procjena spola i starosti, evidentirane patološke promjene, kao i minimalni broj prisutnih jedinki (Buikstra i Ubelaker 1994; Lovejoy 1985; Scheuer i Black 2004; Bass 1995; White i Folkens 2005). Preliminarne faunalne analize provedene su prema standardima struke i najčešće uključivale taksonomsku determinaciju, broj i dob jedinki te tragove ljudskog djelovanja (Von den Driesch 1976, Serjeantson 1996).

box, while very loose sediment with a high proportion of fine-grained limestone rock fragments were cast in plaster (up to 20 cm). The micro-morphological analysis of the sediments will help us in the interpretation of deposition processes and the environmental conditions that controlled them, and to shed light on the way humans and animals used caves. In the underwater investigation the first step involved a survey of a part of the Lim Channel using side-scan sonar with the aim of establishing the morphology of its submarine area - thereby assisting the determination of locations potentially interesting for dives. A comparison of the results of the morphology of the seabed, including the sides of the channel, in combination with a visual survey of the dry land morphology of the channel, allowed for a better diving plan. In the course of this survey we observed that the submarine morphology of the northern side of the channel is of potentially greater interest than the south side - the incline is much greater and there are a number of caves, abris and fissures in the cliffs above the channel. Based on the sonar survey of the channel a number of locations were selected of potential interest for dives in the course of this year's investigations.

The analysis of human skeletal remains (*Homo sapiens sapiens*) from Trench 3 in Romuald's Cave included standard bioarchaeological analysis. Anatomic identification was carried out and, when possible, an assessment of the gender and age was made, pathological changes were registered and the minimum number of individuals present estimated (Buikstra and Ubelaker 1994; Lovejoy 1985; Scheuer and Black 2004, Bass 1995, White and Folkens 2005). A preliminary faunal analysis was carried out in line with the standards of the profession, usually including a taxonomical identification, the number and age of individuals and traces of human activity (Von den Driesch 1976 Serjeantson 1996).

SITE: ROMUALD'S CAVE (CADASTRAL MUNICIPALITY OF SOŠIĆI, CADASTRAL PLOT NO. 312/1, LIM-DRAGA)

Location and Description of the Site

Romuald's Cave is located on the eastern slopes overlooking Lim Channel. It has, since the end of the nineteenth century, been studied by a number of researchers (see: Battaglia 1926; Gnirs 1925; Komšo 2003; Komšo 2008a). The investigations conducted by academician (Croatian Academy of Sciences and Arts member) M. Malez are significant - he registered various lithic tools at the site, dated to the Upper Palaeolithic period (Malez 1987). A small-scale reexcavation was

LOKALITET: ROMUALDOVA PEĆINA (KO SOŠIĆI, K.Č. 312/1, K.Č. LIM-DRAGA)

Smještaj i opis nalazišta

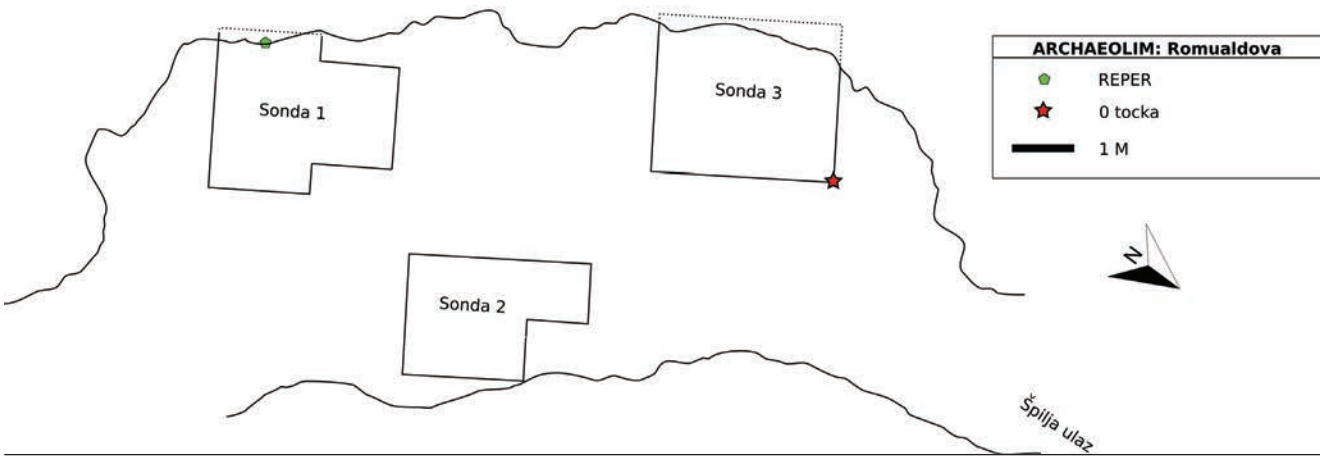
Romualdova pećina smještena je na istočnim obroncima Limskog kanala. Počevši od kraja 19. st. istraživalo ju je više znanstvenika (vidi: Battaglia 1926; Gnirs 1925; Komšo 2003; 2008a). Od veće važnosti su istraživanja akademika M. Maleza, koji je na lokalitetu zabilježio razna kamena oruđa, datirana u razdoblje gornjeg paleolitika (Malez 1987). Tijekom 2007. godine provedeno je manje revizijsko iskopavanje pod vodstvom D. Komše, u cilju prikupljanja uzoraka za razne analize i apsolutne datacije (Komšo 2008). Postavljena je manja sonda (1,5x1,5 m) i tom prilikom napravljena revizija ranije stratigrafije. U sondi su pronađeni tragovi prapovijesne keramike, kostiju i nekoliko kamenih artefakata. Lokalitet se pokazao vrlo zanimljivim za daljnja sustavna istraživanja. Kao dio spomenutog projekta Hrvatske zaklade za znanost, u srpnju 2014. započeta su manja sondažna istraživanja ovog lokaliteta. Tijekom istraživanja uzeti su uzorci za radiokarbonsko datiranje slojeva, očišćena ranija sonda iz istraživanja M. Maleza (sl. 2, sonda 2) s ciljem korelacije stratigrafskog slijeda te postavljena nova sonda (sl. 2, sonda 3) u prednjoj pećinskoj dvorani. Pronađeni su nalazi iz razdoblja pleistocena (fauna i kamena oruđa) i holocena (keramika, faunalni nalazi te ljudski kosturni ostaci iz brončanog i željeznog doba) (Janković et al. 2015a, b i c; Janković 2015).

conducted in 2007 under the leadership of D. Komšo with the objective of collecting samples for various analyses and absolute datings (Komšo 2008). A small trench was excavated (1.5 by 1.5 m) and a review made of the earlier stratigraphy. Traces of prehistoric pottery, bones and several lithic artefacts were found in the trench. The site proved to be of great interest in terms of the need for further systematic investigation. Small-scale test pit excavation at the site was launched in July of 2014 in the frame of the cited project spearheaded by the Croatian Science Foundation. Samples were taken in the course of the investigation for radiocarbon dating of the layers; an earlier trench from the investigation conducted by M. Malez was cleaned (Fig. 2, Trench 2) with the objective of correlating the stratigraphic sequence and excavating a new trench (Fig. 2, Trench 3) in the front hall of the cave. Finds were discovered from the Pleistocene period (fauna and stone tools) and the Holocene (pottery, faunal finds and human skeletal remains from the Bronze and Iron Ages) (Janković et al. 2015a, b and c; Janković 2015).

Stratigraphy

Surface layer: a combination of jumbled material from earlier investigations (Malez?) and recent deposits, given that the cave is visited by tourists and that protective handrails have been installed around the existing (earlier) trenches. Some recent and some prehistoric finds (small potsherds) were found in this layer. The layer is not intact.

Layer 1 / Layer 2: correspond to layers 1 and 2 from D. Komšo's investigation, but there is no visible difference that would justify the division of the layer and it can be considered a single unit - the layer transition should be



Sl. 2 Položaj sondi u Romualdovoj pećini; tloris J. C. M. Ahern.
Fig. 2 The position of the trenches at Romuald's Cave; ground plan view by J. C. M. Ahern.

Stratigrafija

Površinski sloj: spoj nabacanog materijala iz ranijih istraživanja (Malez?) i recentnih nanosa, budući da pećinu posjećuju turisti te da su u njoj postavljeni i zaštitni rukohvati oko postojećih (ranijih) sondi. Unutar sloja pronađeno je nešto recentnih, no i prapovijesnih nalaza (manji fragmenti keramike). Sloj nije intaktan.

Sloj 1/sloj 2: odgovara sloju 1 i 2 iz istraživanja D. Komše, no nema vidljivije razlike koja bi opravdala podjelu slojeva te se može smatrati jednom cjelinom, a promjenu sloja valja uzeti tek kao horizontalni reper. Sloj također predstavlja mješavinu nabacanog materijala iz ranijih istraživanja, no dijelom je i intaktan. Sadrži manji broj litičkih nalaza, prapovijesnu keramiku te životinjske i ljudske kosturne ostatke. Boja prema Munsell tablici 7.5YR 3/4 dark brown. Rahli sediment.

Sloj 3: mjestimično prisutan tanak prosloj sivkaste boje, koji možda predstavlja nepotpunu formaciju sige. Bez nalaza.

Sloj 4: kompaktan, rahli sloj uz nešto erodiranog kamenja. U njemu je vidljiva životinjska aktivnost (jazavac). Boja prema Munsell tablici 7.5YR 3/4 dark brown, što odgovara opisu iz istraživanja sloja 4 prema D. Komši. Nalazi keramike, životinjskih kostiju i tragovi gara. U dijelu sonde prisutno nešto većeg kamenja.

Sloj 5: ne razlikuje se puno od sloja 4, djelomično je malo rahliji te sadrži nešto većih, srednjih i manjih stijena. Također prisutni tragovi životinjske aktivnosti. Boja po Munsell tablici 7.5YR 3/4 dark brown. Razlike sloja 4 i 5 treba shvatiti kao horizontalan reper koji omogućava korelaciju s ranijim istraživanjima. Nalaze je moguće tretirati kao cjelinu (sloj 4/5). Nalazi keramike, litike i životinjskih kostiju.

Sloj 5a: javlja se ispod sloja 5. Radi se o tvrđem, siltasto-pjeskastom do glinastom sedimentu (Munsell 7.5YR 3/4 dark brown) u sklopu i ispod kojeg se javlja sloj kamenja srednjih do većih dimenzija (prosječnog promjera većeg od 10 cm). Kamenje je gotovo popločilo kraj sloja 5a (odnosno početak sloja 6). Po opisima ranijih istraživanja D. Komše, to bi odgovaralo situaciji početka slojeva gornjeg paleolitika, odnosno kraja holocenskih i početka pleistocenskih slojeva u Romualdovoj pećini. Odlučili smo se za prelazak na označavanje stratigrafije prema stratigrafskim jedinicama (SJ) umjesto prema slojevima.

SJ 6: početak sloja odlikuje se površinom koja je ravnomjerno prekrivena kamenjem. Tvrd i kompaktan sediment, Munsell 7.5YR 3/4 dark brown (wet). U sedimentu su česti sitni fragmenti ugljena. Glinasti silt. Skelet se sastoji najvećim dijelom od srednje velikih klasta.

seen solely as a horizontal reference point. This layer is also a mixture of jumbled material from earlier investigations, but is partially intact. It contained a small number of lithic finds, prehistoric pottery and animal and human skeletal remains. The colour as per the Munsell table is 7.5 YR 3/4 dark brown. Loose sediment.

Layer 3: Sporadic thin greyish interbedding, that may be an incomplete dripstone formation. No finds.

Layer 4: A compact, loose layer with some eroded stone. We see animal (badger) activity in it. The colour as per the Munsell table is 7.5YR 3/4 dark brown, which is consistent with the description from the investigation of layer 4 according to D. Komšo. Finds of pottery, animal bones and traces of soot. Some large stones present in part of the trench.

Layer 5: Not significantly different from layer 4, more loose in parts and containing some large, medium and small-grained stones. Traces of animal activity also present. The colour as per the Munsell table is 7.5 YR 3/4 dark brown. The difference between layers 4 and 5 should be seen as a horizontal reference point that allows for a correlation with earlier investigations. The finds can be treated as a single unit (layer 4/5). Finds of pottery, stone tools and animal bones.

Layer 5a: Appears below layer 5. This is a harder, silty-sandy to clayey sediment (Munsell 7.5YR 3/4 dark brown) within and beneath which we see a layer of stones of medium to large size (average diameter of the larger rocks is 10 cm). The stones have almost paved the end of layer 5a (i.e. the start of layer 6). Based on the descriptions of the earlier investigations by D. Komšo, this would correspond with the situation of the start of the Upper Palaeolithic layers, i.e. the end of the Holocene and start of the Pleistocene layers in Romuald's Cave. We have opted to transition to designating the stratigraphy by stratigraphic units (SU) rather than by layers.

SU 6: The start of the layer is characterised by a surface uniformly covered with stones. Hard and compact sediment, Munsell 7.5YR 3/4 dark brown (wet). Minute fragments of charcoal in the sediment. Clayey silt. The skeletal soil consists mostly of medium-grained clasts.

SU 7: Loose sediment with a large quantity of small-grained stones. Munsell 5YR 3/3 dark reddish brown. Sandy silt loam. At the surface of SU 7 we see very sporadic stones, 10 cm or greater in diameter.

SU 8: A redder, somewhat lighter toned, more homogenous and softer sediment, but very loose when scraped and not separating into aggregates like SU 7. 7.5 YR 3/4 dark brown, with reddish blotches, silt loam. Mixed sporadically at the surface with the sediment of SU 7 and not always precisely divisible from that layer.

SJ 7: rastresiti sediment s većom količinom sitnog kamenja. Munsell 5YR 3/3 dark reddish brown. Sandy silt loam. Na površini SJ 7 rijetko je kamenje veličine 10 cm ili veće.

SJ 8: sediment koji je crveniji, nešto svjetliji, homogeniji i mekši, ali prilikom struganja vrlo rastresit i ne razdvaja se na agregate kao SJ 7. 7.5YR 3/4 dark brown, s crvenkastim mrljicama, silt loam. Međutim, mjestimično se na površini miješa sa sedimentom SJ 7 i nije ga uvijek moguće precizno razdvojiti. SJ 7 je imao i puno više sitnog kamenja.

SJ 9: pjeskovit i žućkast sediment. Munsell 7.5YR 4/4 brown, sandy silt loam.

SJ 10: prisutan u kvadrantu A1 u razini SJ 9 i u ostalim kvadrantima. Sediment je kompaktan, razdvaja se na agregate srednje veličine (do cca 5 cm), pojavljuje se mikrougljen. 7.5YR 3/3 dark brown, silt loam. Unutar sedimenta SJ 10 pronalaze se mišji zubi i kosti, vjerojatno povezano s bioturbacijom u profilu, mali kanalići koji se nastavljaju iz prethodnog sloja.

SJ 11: crvenkastomeđi relativno rahli sediment s mnogo sitnog kamenja, "erodiranog". U kvadrantu A3 je debljine od 1 mm do nekoliko cm, a mjestimično se vide mrlje žućkasto-narančastog sedimenta.

SJ 12: tanak prosloj u kvadrantu A1. Kompaktan i tvrd, siltast sloj, s malo vapnenačkog klasta. Munsell 7.5YR 3/3 dark brown.

SJ 13: siltast prosloj debljine oko 5 cm unutar kvadranta A1, tamniji od SJ 12. Munsell 7.5YR 2.5/3 very dark brown.

SJ 14: Munsell 10YR 3/6 dark yellowish brown, sandy silt loam; sediment je homogen, dosta rahli prilikom struganja, s mnogo uglatog kamenja (sitnog i srednje veličine, nekoliko cm).

Rezultati

Tijekom istraživanja u 2014. godini u Romualdovoj pećini očistili smo postojeću sondu (sonda 2, sl. 2) te je utvrđeno da je pri spuštanju stratigrafije u sondi iskopavanje obavljeno nejednako te je uz rubove sonde preostalo i netaknutog sedimenta, posebice u nižim stratigrafskim jedinicama (slojevi 9-14 prema stratigrafskoj podjeli D. Komše), u kojima su pronađene životinjske kosti i nalazi litike. Te su kosti vrlo fragmentirane, a na pleistocensku starost nalaza upućuje i taksonomska pripadnost, odnosno prisustvo životinja kao što su špiljski medvjed (*Ursus spelaeus*), konj (*Equus ferus*) i alpski kozorog (*Capra ibex*). Prisutan je i obični jelen (*Cervus elaphus*) te canid srednje veličine, najvjerojatnije vuk (*Canis lupus*), iako je moguće da se radi i divljem psu (*Cuon alpinus*), što će se razjasniti kasnijim analizama, kao i taksonomska pripadnost pronađenih ostataka ptice (*Aves sp. ident.*). Litički materijal

SU 7 also contains much more small-grained stone.

SU 9: Sandy and yellowish sediment. Munsell 7.5YR 4/4 brown, sandy silt loam.

SU 10: Present in quadrant A1 at the level of SU 9 and in other quadrants. The sediment is compact, separating into an aggregate of medium sized grains (up to approx. 5 cm), with micro-particles of charcoal. 7.5YR 3/3 dark brown, silt loam. Within the sediment of SU 10 we see mouse teeth and bones, likely related to bioturbation in the profile with small canals continuing in from the previous layer.

SU 11: Reddish-brown relatively loose sediment with an abundance of small-grained stone; "eroded". In quadrant A3 it has a thickness of 1 mm to several centimetres, with sporadic blotches of yellowish-orange sediment.

SU 12: Thin interbedding in quadrant A1. Compact and hard, silty layer, with a small quantity of limestone clasts. Munsell 7.5YR 3/3 dark brown.

SU 13: Silty interbedding with a thickness of approximately 5 cm within quadrant A1, darker than SU 12. Munsell 7.5YR 2.5/3 very dark brown.

SU 14: Munsell 10YR 3/6 dark yellowish brown, sandy silt loam; the sediment is homogenous, quite loose when scraped, with an abundance of angular stones (small and medium-grained, several cm).

Results

In the course of the investigation in 2014 at Romuald's Cave we cleaned the existing trench (Trench 2, Fig. 2) and it was determined that in the stratigraphic descent in the trench the excavation was not uniform and that untouched sediment remains along the edges of the trench, especially in the lower stratigraphic units (layers 9 through 14 according to D. Komšo's stratigraphic division), in which animal bones and stone tools were found. These bones are highly fragmented, with a Pleistocene age indicated by the taxonomical attribution, i.e. the presence of animals such as the cave bear (*Ursus spelaeus*), the horse (*Equus ferus*) and the Alpine ibex (*Capra ibex*). We also see the red deer (*Cervus elaphus*) and a medium sized canid, likely a wolf (*Canis lupus*), although this may be a dhole (Asiatic wild dog) (*Cuon alpinus*), which will be elucidated in subsequent analyses, as will the taxonomical provenance of the discovered bird remains (*Aves sp. ident.*). The lithic material in layers 11 through 13 can be typologically attributed to the Middle Palaeolithic period, i.e. the Mousterian culture. Finds were set aside in the course of the investigation for the radiocarbon dating of layers, with the results obtained for the Middle Palaeolithic sequence being an age of

iz slojeva 11-13 tipološki je moguće pripisati razdoblju srednjeg paleolitika, odnosno musterijenskoj kulturi. Tijekom istraživanja odvojeni su nalazi za radiokarbonsko datiranje slojeva te su za srednjopaleolitičku sekvencu dobiveni rezultati od preko 48.000 godina starosti. To su zasad jedini pouzdani rezultati radiokarbonskog datiranja za srednji paleolitik na prostoru Istre i uopće najstariji pokazatelji ljudskog prisustva na tom prostoru (s izuzetkom mogućeg oruđa iz donjeg paleolitika s nalazišta Šandalja I, za koje ne postoje rezultati apsolutne datacije). Na temelju tipoloških odlika nalaza te rezultata apsolutne datacije, moguće je pretpostaviti da su za akumulaciju arheološkog materijala slojeva 11-13 sonde E u Romualdovoj pećini odgovorni neandertalci.

Osim čišćenja postojeće sonde postavljena je i nova sonda (sonda 3, sl. 2) u jugozapadnom dijelu ulazne dvorane pećine. Tijekom istraživanja u 2014. godini u ovoj sondi su istraženi stratigrafski slojevi 1 do 5, koje je na temelju arheoloških nalaza (keramika) te faunalnih nalaza moguće pripisati holocenu. Keramički nalazi iz sonde 3 okvirno se mogu datirati u završno razdoblje srednjeg brončanog doba Istre, u kasno brončano doba te početno starije željezno doba. No, bez više jasnih stratigrafskih i apsolutno kronološki potkrijepljenih uporišta nije moguće dati konačnu prosudbu o vremenskim okvirima korištenja pećine. Primjerice, neki od indikativnih oblika, poput koljenastih ručki ili potkovičastih plastičnih rebara, prisutni su na prostoru Istre i šire regije još od ranog brončanog doba, dok se neki elementi vezuju i uz kasnije faze starijega željeznog doba.

Od tehnika ukrašavanja prisutno je žlijebljenje (koncentrični krugovi po stijenkama posude), urezivanje (vertikalne isprekidane linije, zarezi po rubovima), kaneliranje, ubadanje, ukrašavanje otiskom prstiju (najčešće

over 48,000 years. These are for now the only reliable results of radiocarbon dating for the Middle Palaeolithic in Istria and, in general, the oldest indicators of human presence in the area (with the exception of possible tools from the Lower Palaeolithic from the Šandalja I site, for which we have no absolute dating results). On the basis of typological characteristics and the results of absolute dating, we can hypothesise that the accumulation of archaeological material in layers 11 through 13 in Trench E at Romuald's Cave are of Neanderthal provenance.

Along with the cleaning of the existing trench a new trench was excavated (Trench 3, Fig. 2) in the southwest part of the cave's entrance hall. In the course of the investigations of 2014, stratigraphic layers 1 through 5 were investigated in this trench, which is, based on archaeological finds (pottery) and faunal finds, attributable to the Holocene. The finds of pottery in Trench 3 can be approximately dated to the final period of the Middle Bronze Age in Istria, to the Late Bronze Age and the early Old Iron Age. Without clearer corroborated substantiation in terms of the stratigraphy and absolute chronology, however, we cannot offer a final assessment of the time frame of the cave's use. Some of the indicative forms, for example, such as flat-top handles or horseshoe-shaped plastic ribs, have been present in Istria and the broader region since the Early Bronze Age, while some elements are related to later phases of the Old Iron Age.

Among the decoration techniques we see grooving (concentric circles on the walls of vessels), incision (discontinuous vertical lines, short incisions along edges), fluting, punctation, finger impression decoration (usually along the edges of pots and on relief bands on the walls of vessels) and plastic applications (in the form

Sl. 3 Iskopavanja u sondi 3 u Romualdovoj pećini (foto: I. Janković).
Fig. 3 Excavation of Trench 3 at Romuald's Cave (photo by: I. Janković).

Sl. 4 Geofizikalna mjerenja u Romualdovoj pećini (foto: I. Janković).
Fig. 4 Geophysical measurements at Romuald's Cave (photo by: I. Janković).

po rubovima lonaca te na reljefnoj traci po stijenci posude) i plastičnim aplikacijama (u obliku potkove, cik-cak linija ili dugmeta) te pseudovrpčasti ornament. Faunalni nalazi iz sonde 3 uglavnom pripadaju sljedećim vrstama: jazavac (*Meles meles*), zec ili/i kunić (*Lepus europeus / Oryctolagus cunilicus*), lisica (*Vulpes vulpes*) i domaća ovca (*Ovis aries*). Prisustvo domaće ovce ukazuje na razdoblje ne ranije od neolitika. Većina nalaza ne pokazuje tragove ljudske aktivnosti i modifikacije, a ostaci su relativno homogeni kroz čitavu sekvencu. Najvjerojatnije se radi o prirodnoj akumulaciji sedimenata, uz tragove aktivnosti jazavca. U sondi su pronađeni i ljudski kosturni ostaci. Na temelju malobrojnih ostataka kosturnog materijala (zubi, kranijalni i postkranijalni ostaci) moguće je utvrditi prisustvo najmanje dviju osoba, jedne odrasle (vjerojatno starije od 35 godina, moguće muškog spola) te djeteta (vjerojatno mlađeg od 5 godina). Temeljeno na stratigrafskom položaju ljudskih kosturnih ostataka, prisutnim kosturnim elementima te stanju očuvanosti, spomenute nalaze vjerojatno možemo pripisati istom razdoblju. Manji fragment distalne goljenične kosti poslan je na radiometrijsko datiranje s korištenjem AMS metode s rezultatom od 3150±46 godina prije sadašnjosti (vidi Janković i sur. 2015a).

Tijekom ovogodišnjih istraživanja Romualdove pećine nastavljena su ispitivanja u sondi 3 (sl. 3) u jugozapadnom dijelu ulazne dvorane pećine, postavljenoj tijekom prošlogodišnjih istraživanja. Nadalje, provedena su i geoarheološka uzorkovanja te geofizikalna mjerenja (sl. 4). Istraženi su preostali holocenski slojevi 4 i 5. U slojevima je, kao i tijekom prošle godine, pronađena prapovijesna keramika, životinjske kosti, tragovi gorenja te jedno ljudsko rebro (odrasla osoba). Nakon toga su nastavljena istraživanja prema stratigrafskim jedinicama (sloj 6 nadalje), u kojima nije zamijećeno remećenje stratigrafije kao u gornjoj sekvenci. Najvjerojatnije se radi o pleistocenskim slojevima te je zbog preciznijeg uvida u stratigrafiju odlučeno prijeći na sistem stratigrafskih jedinica (SJ), koje će se naknadno pokušati korelirati sa stratigrafijom opisanom u ranijim istraživanjima. Ovogodišnja istraživanja zaustavljena su na površini SJ 15 (sloj 10 prema D. Komši).

LOKALITET: ABRI KONTIJA 002 (KO GRADINA, K.Č. 940/2, K.Č. STRAN)

Smještaj i opis nalazišta

Abri Kontija 002 manji je pripećak na sjevernoj strani Limskog kanala, otkriven 2007. godine kada su pod vodstvom D. Komše u njoj postavljene dvije manje sonde, dimenzija 40x40 cm (Komšo 2008b). U sondama

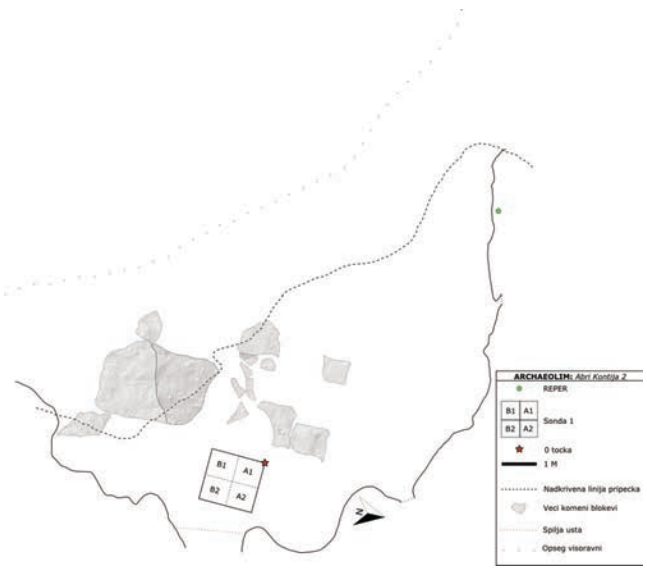
of horseshoes, zigzag lines or knobs) and pseudo-strap ornaments. Faunal finds from Trench 3 are largely from the following species: badger (*Meles meles*), hare and/or rabbit (*Lepus europeus / Oryctolagus cunilicus*), fox (*Vulpes vulpes*) and the domesticated sheep (*Ovis aries*). The presence of domesticated sheep indicates a period not earlier than the Neolithic. The majority of finds do not show traces of human activity and modification, and the remains are relatively homogenous throughout the entire sequence. This is most likely a natural accumulation of sediment, with traces of badger activity. Human skeletal remains were also found in the trench. On the basis of the few remains of skeletal material (teeth, cranial and post-cranial remains) we can ascertain the presence of at least two individuals, one adult (likely above the age of 35, perhaps a male) and a child (likely under the age of 5). Based on the stratigraphic position of the human skeletal remains, the presence of skeletal elements and the state of preservation, we can likely attribute the cited finds to the same period. A small fragment of the distal tibia bone was sent for radiometric dating using the AMS method, yielding a result of 3150±46 years before the present (see Janković et al. 2015a).

Exploration of Trench 3 (Fig. 3) in the southwest part of the cave's entrance hall, opened during last year's investigations, continued in the course of this year's investigation at Romuald's Cave. Geoarchaeological samples were collected and geophysical measurements taken (Fig. 4). The remaining Holocene layers 4 and 5 were investigated. As in the previous year, prehistoric pottery, animal bones, traces of burning and one (adult) human rib were found in the layers. This was followed by continued investigation per stratigraphic units (from layer 6 on), in which disturbances of the stratigraphy was not observed as it had been in the upper sequence. These are most likely Pleistocene layers - for greater precision in our insight into the stratigraphy it was decided to transition to a system of stratigraphic units (SU), which we will later correlate with the stratigraphy as it is described in earlier investigation campaigns. This year's investigation was halted at the surface of SU 15 (layer 10 according to D. Komšo).

SITE: ABRI KONTIJA 002 (KO GRADINA, CADASTRAL PLOT NO. 940/2, STRAN)

Location and Description of the Site

Abri Kontija 002 is a small abri on the north side of Lim Channel, discovered in 2007, when, under the leadership of D. Komšo, two small 40 by 40 cm trenches were opened in it (Komšo 2008b). Found in the trenches



Sl. 5 Tloris lokaliteta Abri Kontija s položajem sonde (tloris: J. C. M. Ahern i I. Janković).
Fig. 5 Ground plan view of the Abri Kontija site with trench positions indicated (ground plan view by: J. C. M. Ahern and I. Janković).

Sl. 6 Geofizikalna mjerenja na lokalitetu Abri Kontija (foto: I. Janković).
Fig. 6 Geophysical measurements at the Abri Kontija site (photo by: I. Janković).

su zabilježeni nalazi 20-ak kamenih izrađevina i jedan morski puž. Time je ukazano na potencijalnu važnost ovog lokaliteta te da je ondje nužno provesti manje sondažno istraživanje, s ciljem utvrđivanja stratigrafske i kronološke situacije.

U sklopu spomenutog projekta Hrvatske zaklade za znanost, tijekom srpnja 2014. godine na lokalitetu je postavljena manja sonda (1,5 x 1,5 m) (sl. 5). Pronađeni su brojni nalazi pleistocenske faune, tragovi gorenja te brojni litički nalazi u stratigrafskim slojevima/jedinicama 1-4 (vidi Janković i sur., u tisku). Tijekom istraživanja u 2015. godini nastavljeno je ispitivanje stratigrafskih jedinica u sondi iz prethodne godine, a provedena su

were some twenty stone artefacts and one sea snail. This indicates the possible significance of this site and that a small-scale test pit excavation should be done here with the objective of determining the stratigraphic and chronological situation.

A small trench (1.5 by 1.5 m) (Fig. 5) was opened at this site in July of 2014 in the frame of the above-mentioned Croatian Science Foundation project. Numerous discoveries were made of Pleistocene fauna, traces of burning and numerous lithic finds in stratigraphic layers/units 1 through 4 (see Janković et al., in print). The exploration of stratigraphic units in the previous year's trenches was continued in the course of the 2015 investigations, along with geoarchaeological sampling and geophysical measurements (Fig. 6).

Stratigraphy

Layer 1: The surface layer is composed of recent refuse, sheep dung and very fine dust of a grey colour that varies from Munsell 10YR 4/4 dark yellowish brown to 10YR 3/3 dark brown.

Layer 2.1: More compact than layer 1, loose, containing an abundance of sharp edged small-grained and medium-grained stones (diameter up to 10 cm). Sporadic traces of burning, animal bones, small flakes and two bladelets. Munsell 7.5 4/4 brown colour.

Layer 2.2: Same composition as the previous layer. 10YR 5/4 yellowish brown colour.

Layer 2.3: Consists of a few small agglomerations of very sharp stones in which there is almost no sediment. The layer contains several animal bones and a few lithic finds.

F1: A darker blotch present in a part of the trench (quadrants A1 and B1) containing several bones and a small trace of charcoal. The colour varies from Munsell 10YR 4/3 brown to 10YR 4/4 dark yellowish brown.

Layer 3: Less sharp fine-grained rock fragments and more sediment than in layer 2.3. A somewhat darker, sandy-silty, loose layer with about 20 per cent less stones. Munsell 10YR 5/4 yellowish brown colour.

F2: A darker blotch with traces of burning and a small quantity of charcoal.

Layer 4: Munsell 10YR 5/3 brown colour. Relatively dry sediment. Numerous lithic and bone finds.

Layer 4/5: Mixed sediment of layers 4 and 5, lighter than 4, but darker and moister than 5. Many small to medium-sized (7 to 8 cm) pieces of dripstone present in layer 4/5 in quadrant A1. The colour varies from Munsell 10YR 5/3 brown to Munsell 10YR5/4 yellowish brown. An abundance of finds, dominated by stone tools.

F3: A dark area of burning/heating. Munsell 10YR 4/2 dark greyish brown colour. Mostly sterile.

i geoarheološka uzorkovanja te geofizikalna mjerenja (sl. 6).

Stratigrafija

Sloj 1: površinski sloj sastavljen od recentnog smeća, izmeta ovaca i vrlo fine prašine sivkaste boje koja varira od Munsell 10YR 4/4 dark yellowish brown do 10YR 3/3 dark brown.

Sloj 2.1: kompaktniji od sloja 1, rahli, sadrži puno sitnog kamenja i kamenja srednje veličine (do 10 cm promjera) oštrih rubova. Sporadični tragovi gorenja, životinjske kosti, manji odbojci i dva manja sječiva. Boja Munsell 7.5 4/4 brown.

Sloj 2.2: istog sastava kao i prethodni sloj. Boja 10YR 5/4 yellowish brown.

Sloj 2.3: radi se o nekoliko manjih nakupina vrlo oštrog kamenja u kojem sedimenta gotovo nema. Sloj sadrži nekoliko životinjskih kostiju i par litičkih nalaza.

F1: tamnija mrlja prisutna u dijelu sonde (kvadranti A1 i B1) koja sadrži nekoliko kostiju, manji trag ugljena. Boja varira od Munsell 10YR 4/3 brown do 10YR 4/4 dark yellowish brown.

Sloj 3: manje oštrog kršja i više sedimenta nego u sloju 2.3. Nešto tamnije boje, pjeskasto-siltast, rahli sloj s prisustvom oko 20 % manjeg kamenja. Munsell 10YR 5/4 yellowish brown.

F2: tamnija mrlja s tragovima gorenja te malo ugljena.

Sloj 4: Munsell 10YR 5/3 brown. Relativno suh sediment. Brojni nalazi litike i kostiju.

Sloj 4/5: pomiješan sediment sloja 4 i 5, svjetliji od 4, ali tamniji i vlažniji od 5. U sloju 4/5 u kvadrantu A1 bilo je prisutno mnogo sitnih do srednjih (7-8 cm) komadića sige. Boja varira od Munsell 10YR 5/3 brown do Munsell 10YR 5/4 yellowish brown. Velik broj nalaza, dominiraju nalazi litike.

F3: tamno područje gorenja/grijanja. Munsell 10YR 4/2 dark greyish brown. Uglavnom sterilno.

F4: Munsell 7.5YR 4/4 brown, veća koncentracija (80%) kamenja, sediment je pjeskast i suši od sloja 6.

Sloj 5: svjetlosmeđi, pjeskoviti sloj. Ograničena leća unutar sloja 4. Prisutnost komadića sige nastavila se u sloju 5 u kvadrantu A2. U kvadrantu A2, sloju 5 prisutno je mnogo spaljenih kostiju i komadića ugljena. Munsell 10YR 5/4 yellowish brown. Dominiraju nalazi litike.

Sloj 6: tamnije područje (Munsell 10YR 4/3, brown). Veća koncentracija crvenog okera (komadi između 1-5 mm) te ugljena.

Sloj 7: pjeskasta zemlja (kao s površine) i puna kamenja (Munsell YR 5/3 brown). Nalazi litike.

F4: Munsell 7.5YR 4/4 brown colour, a large concentration (80%) of stones, the sediment is sandy and drier than layer 6.

Layer 5: A light brown, sandy layer. Limited lenses within layer 4. The presence of pieces of dripstone continues in layer 5 in quadrant A2. In quadrant A2, layer 5 we see an abundance of burned bone and bits of charcoal. Munsell 10YR 5/4 yellowish brown colour. Dominated by lithic finds.

Layer 6: A darker area (Munsell 10YR 4/3, brown). A large concentration of red ochre (pieces from 1 to 5 mm) and charcoal.

Layer 7: Sandy soil (like at the surface) and an abundance of stones (Munsell YR 5/3 brown colour). Lithic finds.

Results

In the course of the 2014 season, over eight working days, layers were excavated to a depth of some fifty centimetres with the mapping of 42 faunal finds and seven lithic finds, while during the 2015 season, over a period of 30 working days, excavations to a depth of about 60 centimetres saw the mapping of 167 faunal and 421 lithic finds. This speaks of an exceptionally rich and continually inhabited site, with the potential of becoming a key site for the study of the Late Pleistocene in this area. A great number of finds were discovered during the 2015 investigation season (562 finds were mapped and over 5,000 other finds collected). The most numerous are lithic finds and animal bones (Figs. 7 and 8), with traces of burning, bits of charcoal and ochre and fish bones also found. The preliminary analysis of the lithic finds indicates the later stages of the Upper Palaeolithic. The samples that were sent for dating using the radioactive carbon method did not, unfortunately, contain sufficient collagen for an analysis to be conducted. Additional samples have been sent for age determination and the intention is to also conduct an analysis applying other age determination methods.

The faunal finds are highly fragmented and contain a large number of pieces of long mammal bones. We see the remains of the hare (*Lepus sp.*), bear (*Ursus sp.*), goat (*Capra ibex*), horse (*Equus sp.*), alpine marmot (*Marmota marmota*) and red deer (*Cervus elaphus*). Multiple finds were also made of as yet undetermined bird species and fish bones. The most numerous finds are of horses and goats. Traces of cutting and burning were observed on the faunal finds. Based on this we can conclude that at least part of the accumulation of faunal finds are the result of human activity.

Sl. 7 Nalaz litike s lokaliteta Abri Kontija (foto: I. Janković).
Fig. 7 Lithic find at the Abri Kontija site (photo by: I. Janković).

Sl. 8 Nalaz životinjske mandibule in situ *na lokalitetu Abri Kontija (foto: I. Janković).*
Fig. 8 Find of an animal mandible in situ *at the Abri Kontija site (photo by: I. Janković).*

Rezultati

Tijekom sezone 2014. u osam radnih dana iskopani su slojevi do dubine od pedesetak centimetara i mapirana 42 nalaza faune i 7 nalaza litike, dok je tijekom sezone 2015. tijekom 30 radnih dana iskopano do dubine od otprilike šezdesetak cm te mapirano 167 faunalnih i 421 nalaz litike. To govori o izuzetno bogatom i kontinuirano naseljenom nalazištu, s potencijalom da postane ključni lokalitet za proučavanje kasnog pleistocena na ovom području. Tijekom sezone istraživanja 2015. godine pronađen je jako velik broj nalaza (mapirana su 562 nalaza, a sakupljeno više od 5000 dodatnih nalaza). Najbrojniji su nalazi litike i životinjskih kostiju (sl. 7 i 8), a pronađeni su tragovi gorenja, komadići ugljena i okera te riblje kosti. Preliminarna analiza litičkih nalaza ukazuje na kasnije etape gornjeg paleolitika. Uzorci koji su poslani na datiranje metodom radioaktivnog ugljika nažalost nisu sadržavali dovoljno kolagena da bi analiza mogla biti provedena. U svrhu određivanja starosti poslani su dodatni uzorci, a namjera je i provođenje analiza drugim metodama određivanja starosti.

Faunalni nalazi vrlo su fragmentirani i sadrže veći broj djelića dugih kostiju sisavaca. Prisutni su ostaci zeca (*Lepus sp.*), medvjeda (*Ursus sp.*), koze (*Capra ibex*), konja (*Equus sp.*), svisca (*Marmota marmota*) i jelena (*Cervus elaphus*). Pronađeno je i više ostataka još neodređenih vrsta ptica, kao i riblje kosti. Najbrojniji ostaci pripadaju konjima i kozama. Na faunalnim nalazima primijećeni su tragovi rezanja i gorenja. Na temelju toga moguće je zaključiti da je barem dio akumulacije faunalnih nalaza rezultat ljudske aktivnosti.

LIM 001 (KO GRADINA, CADASTRAL PLOT NO. 940/32)

Location and Description of the Site

This is a small abri at the foot of some large rocks to the west of a local restaurant, at the head of Lim Channel. The entrance has a maximum height of two metres and a length of eight metres (Komšo 2008a). There is some sediment preserved in the abri thanks to the collapsed rock that has halted erosion. In 2008 D. Komšo opened a small 1 by 1 metre test pit at the site, investigated to a depth of 30 cm. The sediment is very hard and brecciated and could not be excavated in the customary method, but was instead gathered as a whole and taken to the laboratory for wet sieving and dissolution. Archaeological finds were discovered in the sediment, including lithic finds such as trapezes, perforated sea snails (*C. rustica*), fish bones and a large quantity of sea shells. Based on the typological characteristics of the lithic finds D. Komšo has approximately dated the site to the Late Mesolithic (Komšo 2008a).

The investigation of the site in 2015 ran from the 29th of July to the 7th of August. A 1 by 1 metre trench was opened with an additional subdivision into 50 x 50 cm quadrants (A1, A2, B1, B2). It is to the east of an earlier trench from the investigation conducted by D. Komšo and continues directly from its eastern profile (edge) (Fig. 9). The trench was designated as Trench 2. The surface layer was cleaned and the initial depth taken (the recent layer, dust, organic material, some sea shells etc.). All of the collected sediment was sieved through a 3 mm

LIM 001 (KO GRADINA, K.Č. 940/32)

Smještaj i opis nalazišta

Mali pripećak u podnožju velikih stijena zapadno od restorana, na kraju Limskog kanala. Ulaz je maksimalne visine 2 m, dužine 8 m (Komšo 2008a). U pripećku se očuvalo nešto sedimenta zahvaljujući urušenom kamenju koje je zaustavilo eroziju. Godine 2008. D. Komšo je na lokalitetu postavio manju probnu sondu dimenzija 1 x 1 m, istraženu do dubine od 30 cm. Sediment je vrlo tvrd i zabrečan te se nije moglo iskopavati uobičajenom metodologijom već je kompletno skupljen i odnesen u laboratorij na mokro sijanje i otapanje. U sedimentu su pronađeni litički nalazi, uključujući trapeze, probušeni morski pužići (*C. rustica*), riblje kosti te veća količina morskih školjaka. Na temelju tipoloških odlika litičkih nalaza, D. Komšo je nalazište okvirno datirao u kasni mezolitik (Komšo 2008a).

Istraživanja lokaliteta u 2015. godini trajala su od 29. srpnja do 7. kolovoza. Postavljena je sonda dimenzija 1x1 metar, a dodatnom podjelom na kvadrante 50 x 50 cm (A1, A2, B1, B2) nalazila se istočno od ranije sonde iz istraživanja D. Komše i direktno se nastavljala na njen istočni profil (rub) (sl. 9). Sonda je nazvana sonda 2. Očišćen je površinski sloj i uzete početne dubine (recentni sloj, prašina, organski materijal, nešto školjaka, itd). Sav sakupljeni sediment prosijan je kroz sito propusnosti 3 mm, a nalazi skupljeni u zajedničku vrećicu označenu kao površinski sloj. Nakon čišćenja površinskog sloja odlučeno je da će se iskopavanje provoditi po kvadrantima A1, A2, B1, B2, a sav materijal stavljati u zasebne vrećice. Iskopavanje će se obaviti po arbitrarnim slojevima (AS), otprilike dubine 5 cm, i označavati brojem, prema kvadrantu. Označit će se i početne (tj. krajnje) dubine svakog arbitrarnog sloja, ne bi li se dobila bolja preciznost.

Sl. 9 Iskopavanja na lokalitetu Lim 001 (foto: I. Janković).
Fig. 9 Excavation at the Lim 001 site (photo by: I. Janković).

mesh and the finds placed in a bag designated as from the surface layer. Following the cleaning of the surface layer it was decided that excavation would proceed by quadrant (A1, A2, B1, B2) and that all collected material would be separately bagged. The excavation would be done by arbitrary layers (AL) of a depth of approximately 5 cm and numbered by quadrant. The starting (i.e. end) depth of each layer was registered to provide for greater precision. In the event of the appearance of natural layers, these were later correlated to the arbitrary layers. All material was sieved through a 3 mm mesh and then placed in wet sieving and flotation bags. The analysis of the collected sediment and the preliminary analysis of finds are ongoing.

Stratigraphy

Surface layer: Greyish powdery layer containing recent refuse and seashell fragments and several lithic finds. Munsell: 10YR 4/2 dark greyish brown - 20 YR 5/2 greyish brown.

AL1: A very hard, brecciated layer. The sediment has to be broken up with a hammer and cannot be excavated by scraping. It will therefore be taken for dissolution. Various sea shells visible in the sediment. Munsell: 10 YR 6/2 light brownish grey.

AL2 to AL7: The colour and sediment characteristics are the same as for AL1.

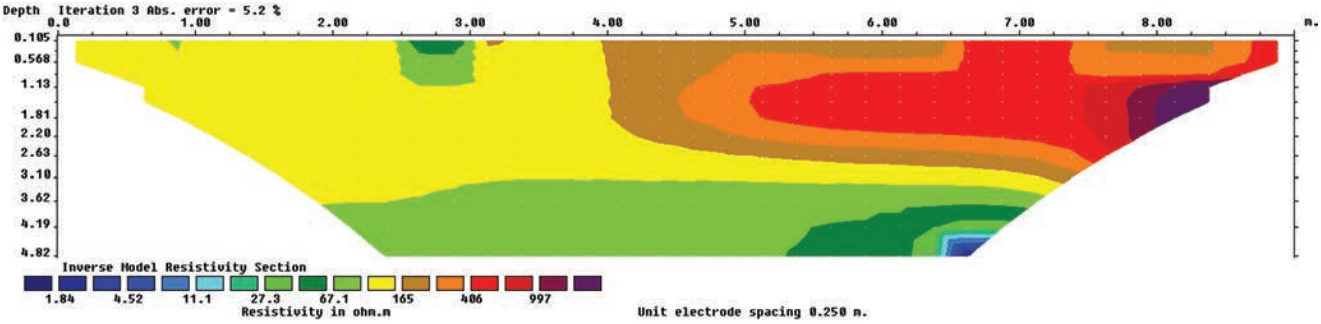
AL8: A new layer with characteristics differing from those of the pervious ALs; this is likely the very top of a new layer and the characteristics of previous ALs and the new layer (AL9) are present. Grey-brown sediment with stones of up to 10 cm (about 20%). Quadrant A1 is looser, and quadrant A2 somewhat more compact (breccia remains). Munsell: 7.5YR 6/1 grey.

AL9: Orange-brown, very loose sediment with 10 to 20% small-grained stones (under 5 cm diameter). Munsell: 7.5YR 6/4 (light brown).

AL10 to AS13: Same characteristics as AL9.

PEĆINA CAVE NEAR ROVINJSKO SELO (CADASTRAL MUNICIPALITY OF ROVINJSKO SELO, CADASTRAL PLOT NO. 446/285)

Pećina Cave near Rovinjsko Selo is located on the southern slope above Lim Channel, below the Kamenjača location. There is a large covered triangular plateau facing the entrance, covering 13 by 10 metres and with an overhead clearance of four metres. The entrance to the cave has a clearance of 130 centimetres and a width of 4.5 metres. In 2007 D. Komšo opened a test



Sl. 10 Rezultati geofizikalnih mjerenja na lokalitetu Pećina kod Rovinjskog Sela.
Fig. 10 The results of geophysical measurements taken at the Pećina Cave site near Rovinjsko Selo.

Ako se dođe do prirodnih slojeva, naknadno će se korelirati s onima arbitrarnim. Sav materijal prosijava se kroz 3 mm sito, a zatim sprema u vrećice za mokro sijanje i flotiranje. Obrada sakupljenog sedimenta i preliminarna obrada nalaza je u tijeku.

Stratigrafija

Površinski sloj: - sivkasti prašnjavi sloj koji sadrži recentno smeće i fragmente školjaka te nekoliko litičkih nalaza. Munsell: 10YR 4/2 dark greyish brown - 20YR 5/2 grayish brown.

AS1: vrlo tvrd, zabrečan sloj. Sediment se mora lomiti čekićem i ne može se iskopavati struganjem. Zato će se nositi na otapanje. Vidljive razne školjke u sedimentu. Munsell: 10YR 6/2 light brownish gray.

AS2 do AS7: karakteristike boje i sedimenta iste kao za AS1.

AS 8: novi sloj čije su karakteristike različite od onih u ranijih AS, odnosno vjerojatno se radi o samom vrhu novog sloja pa su prisutne karakteristike starijih AS i novog sloja (AS 9). Sivo-smeđi sediment s kamenjem veličine do 10 cm (oko 20% udjela). U kvadrantu A1 je rahliji, a u kvadrantu A2 nešto kompaktniji (ostatak breče). Munsell: 7.5YR 6/1 gray.

AS 9: narančasto-smeđi, vrlo rahli sediment s 10-20% manjeg kamenja (manje od 5 cm). Munsell: 7.5YR 6/4 (light brown).

AS 10 - AS 13: jednake karakteristike kao AS 9.

PEĆINA KOD ROVINJSKOG SELA (KO ROVINJSKO SELO, K.Č. 446/285)

Pećina kod Rovinjskog Sela smještena je na južnim obroncima Limskog kanala, pod lokacijom Kamenjača. Pred ulazom ima veći natkriveni plato trokutastog oblika, dimenzija 13 x 10 metara i visine 4 metra. Ulaz u pećinu visok je 130 centimetara i širok 4,5 metara. Na platou je 2007. godine D. Komšo postavio probnu sondu površine pit covering 2.25 square metres. Flint artefacts were found, along with faunal finds and the shells of land and marine molluscs, with one fire pit registered at the bottom of the Mesolithic layer. A total of 52 flint artefacts were collected, of which nine tools and two cores. The collected finds indicate a site that is to be approximately dated to the Mesolithic period or to the very end of the Upper Palaeolithic (Komšo 2008b).

Geophysical measurements (Fig. 10) were also taken in the course of this year's investigation (from 13 to 24 July) with the aim of gaining better insight into the quantity of sediment at individual areas of the site and possible disturbances of the stratigraphy and, based on the outcomes, to improve the planning of trenches in the following investigation season.

UNDERWATER FIELD SURVEY

An underwater field survey of Lim Channel was planned for years two and three of the project, bearing in mind that the sea level varied in the course of the

Sl. 11 Položaj podvodnih lokacija u Limskom kanalu (podloga preuzeta s Google Eartha).
Fig. 11 Position of the underwater locations in the Lim Channel (data from Google Earth).

2,25 m2. Prikupljeni su nalazi kremenih izrađevina, faune te ljuštura kopnenih i morskih mekušaca, a na dnu mezolitičkoga sloja zabilježeno je i jedno vatrište. Ukupno su prikupljene 52 kremene izrađevine, od čega devet oruđa i dvije jezgre. Prikupljeni nalazi upućuju na to da je riječ o nalazištu, okvirno datiranom u razdoblje mezolitika ili u sam kraj gornjega paleolitika (Komšo 2008b).

Tijekom ovogodišnjih istraživanja (od 13. do 24. srpnja) provedena su geofizikalna mjerenja (sl. 10) kako bi se stekao bolji uvid u količinu sedimenta na pojedinim dijelovima nalazišta i eventualni poremećaj stratigrafije te na temelju rezultata moglo bolje planirati postavljanje sonde u idućoj sezoni istraživanja.

PODVODNI TERENSKI PREGLED

U drugoj i trećoj godini projekta predviđen je i podvodni terenski pregled Limskog kanala, jer je tijekom pleistocena morska razina varirala pa je kanal povremeno bio dijelom kopna. Cilj podvodnog pregleda jest utvrditi postojanje eventualnih pećina i drugih mogućih lokacija i tragova ljudskog boravka koji se danas nalaze pod morskom razinom. Nadalje, ako se utvrde lokacije od interesa (primjerice pećine), cilj je ustanoviti jesu li očuvani slojevi iz pleistocena i/ili ranog holocena. Tijekom terenskih istraživanja u 2015. godini prema radnom planu obavljen je podvodni terenski pregled Limskog kanala u trajanju od tjedan dana (od 20. do 25. srpnja). Tijekom ovogodišnjih istraživanja proveden je podvodni pregled i ronjenje na pet lokacija (sl. 11).

Lokacija 1

Pregled podvodne špilje s izvorom, odnosno dijela ulaznog kanala. Ulaz se nalazi plitko, na dubini od 1 m. Ulazni kanal je horizontalan i uzak (dimenzija od 50 - 150 cm) te se ronilac pri ulasku morao provlačiti. Ulazni kanal istražen je do 40 metara dužine. Nisu pronađeni arheološki ostaci. Riječ je o aktivnom izvoru pa je temperatura mora osjetno niža. Budući da se kanal nastavlja, u planu je daljnje istraživanje.

Lokacija 2

Lokacija 2 nalazi se ispod pripećaka i lokaliteta Abri Kontija 002. Radi se o djelomično nasutoj litici sa strmim padom te je za očekivati da je dio arheološkog materijala s lokaliteta Abri Kontija 002 ispiranjem i osipanjem završio na obroncima i dnu kanala. Tijekom pregleda lokacije nisu pronađeni arheološki nalazi, no u budućnosti bi valjalo nastaviti pregled. Nadalje, na istoj lokaciji uočena su dva pripećka, jedan na oko 1,5

Pleistocene and that the channel was once part of the dry land mass. The objective of the underwater survey is to establish the possible presence of presently submerged caves and other locations and traces of human habitation. If locations of interest are found (caves, for example), the objective is to determine whether Pleistocene and/or early Holocene layers have been preserved. In line with the work plan a one-week (from 20 to 25 July) underwater field survey of Lim Channel was conducted in the course of the field investigations in 2015. An underwater survey and dives at five locations were conducted in the course of this year's investigations (Fig. 11).

Location 1

A survey of a submarine cave with spring, i.e. part of an entrance canal. The entrance is in shallow water, at a depth of one metre. The entrance canal is horizontal and narrow (50 to 150 cm) and the diver was compelled to wriggle through. The entrance canal was investigated to a length of 40 metres. Archaeological remains were not found. This is an active spring, making the local water temperature palpably lower. Given that the canal continues on the plan is to continue its investigation.

Location 2

Location 2 is located below the abri and Abri Kontija 002 site. This is a partially rubble covered cliff with a sheer incline and it is to be expected that part of the archaeological material from the Abri Kontija 002 site has been washed down or slid down the slope and to the bottom of the channel. Archaeological finds were not made in the course of the survey of the location, but it should be continued in the future. Two abris were also observed at the same location, one about 1.5 metre above the current sea level, from which the sediment has been washed out by the sea (waves), and the other about one metres below sea level, in which some sediment is present. A small-scale excavation (10 by 10 cm, to a depth of 15 cm) into the sediment did not yield archaeological finds.

In the course of the survey of the location we followed the descent of the terrain from the surface to the bottom of the channel at a depth of about 16 metres. The total length of the surveyed terrain of the channel at Location 2 is 160 metres.

Location 3

A cave was observed in the cliff above location 3. The climb and survey of the cave did not reveal any

metara iznad današnje razine mora, u kojem je sediment ispran djelovanjem mora i valova, i drugi oko 1 metar ispod razine mora, u kojem je prisutno nešto sedimenta. U sedimentu smo napravili manji iskop (10x10 cm, do dubine 15 cm) no nisu pronađeni arheološki nalazi.

Tijekom pregleda lokacije pratili smo pad terena od površine pa do dna kanala na otprilike 16 metara dubine. Ukupna dužina pregledanog terena kanala na lokaciji 1 je 160 metara.

Lokacija 3

Nad lokacijom 3 na litici je uočena špilja. Nakon penjanja i pregleda špilje, koja je manjih dimenzija, nije uočen arheološki materijal, najvjerojatnije zato što je sav sediment ispran. Evidentno je korištenje špilje u recentno doba (smeće, dijelovi kupaće i ronilačke opreme te izmet ovaca). Uron i podvodni pregled pratio je pad tla pod kutom oko 40-50 stupnjeva prema dnu kanala te je pregledan sipar i krš, u kojem su pronađeni arheološki nalazi koji pripadaju novovjekovnom brodolomu te nalazi dijelova posuda iz prapovijesnog razdoblja na dubini od 16 metara.

Ukupna dužina pregledane trase na lokaciji 3 iznosi 730 metara, a dubina 3 do 25 metara, odnosno dno kanala. Lokacija je potencijalno zanimljiva za istraživanje mlađih arheoloških i povijesnih razdoblja.

Lokacija 4

Smještena je istočno od tzv. "piratske pećine" na sjevernoj strani Limskog kanala. Tijekom pregleda lokacije pratili smo pad terena od površine pa do horizontalnog dijela kanala (dna) na 20 metara dubine. Ukupna dužina pregledanog terena kanala na lokaciji 4 je 175 metara. Prilikom urona pronađeni su nalazi novovjekovne keramike (najvjerojatnije mjesto brodoloma iz 18. - 19. st.), kao i one prapovijesne. Uočen je i ulaz u pećinu otprilike 1,5 metara iznad razine mora. Ulaz je nizak (otprilike 1 m visine i oko 3 m širine), a ulazni kanal gotovo je potpuno ispunjen sedimentom. U idućem razdoblju valjalo bi pećinu speleološki istražiti i u njoj postaviti probne arheološke sonde

Lokacija 5

Razlog odabira lokacije 5 bile su usmene informacije o postojanju velike pećine na tom dijelu Limskog kanala. Pregled smo počeli na mjestu koje je prema pričanjima odgovaralo navodnoj lokaciji pećine (manja uvala u kojoj je na istočnoj strani locirana manja pećina, čiji vrh ulaza nadvisuje današnju razinu mora za oko 2 metra, a seže 4 metra u dubinu). Pećina je duboka otprilike 5

archaeological material, most likely due to the fact that all the sediment has been washed out. There are evident signs of the recent use of the cave (refuse, parts of swimming wear and diving equipment and sheep dung). The dive and underwater survey followed the downward incline of the terrain of about 40 to 50 degrees to the bottom of the channel, and there was a survey of the talus slope and rubble in which archaeological finds were discovered from a post-medieval shipwreck, and finds of potsherds from the prehistoric period at a depth of 16 metres.

The total length of the surveyed route at location 3 is 730 metres, with a depth of from 3 to 25 metres, i.e. the bottom of the channel. The location is of potential interest in the investigation of more recent archaeological and historical periods.

Location 4

Located to the east of what is referred to as the "pirate cave" on the north side of Lim Channel. In the course of the survey of the location we followed the downward slope of the terrain from the surface to the horizontal part of the channel (bottom) at a depth of 20 metres. The total length of the surveyed terrain of the channel at location 4 is 175 metres. Finds of post-medieval (likely the site of an eighteenth/nineteenth century shipwreck) and prehistoric pottery were made during the dive. The entrance to a cave about 1.5 metres above sea level was observed. The entrance is low (about one metre high and about 3 metres wide), with the entrance canal almost entirely filled with sediment. This cave should be speleologically investigated in the following period and archaeological test pits opened in it.

Location 5

The selection of location 5 was motivated by oral information of the existence of a large cave in this part of Lim Channel. The survey began at the place the oral information alleges to be the location of the cave (a small cove with a small cave on the eastern side, with the apex of the opening clearing the present sea level by about two metres and descending four metres under water). The cave is about five metres deep and does not contain significant accumulations of sediment, and no passage was found that would indicate its further spread. Given that the sea was very rough on the dive day at location 5 - making diving near the rocks difficult and dangerous - it would be desirable that a second dive be made at the location. To the west side of the cove, some ten metres from the above-cited cave, another cave canal

metara i ne sadrži značajne nakupine sedimenta, a nije pronađen nikakav prolaz koji bi ukazivao na to da se širi dublje. Budući da je na dan ronjenja na lokaciji 5 more bilo vrlo nemirno pa je ronjenje uz same stijene bilo otežano i opasno, bilo bi poželjno ponoviti uron na toj lokaciji. Na zapadnoj strani uvale, desetak metara od spomenute pećine, nad samom morskom površinom lociran je još jedan pećinski kanal, ispred kojeg je uočen zasigan sediment. Kanal se pruža svega nekoliko metara u dubinu, no nije jasno radi li se o zasiganom zatrpanom dijelu kanala ili živoj stijeni. Zbog spomenutih otežanih uvjeta ronjenja nismo ulazili u nj. Prilikom podvodnog pregleda ostatka uvale uočeno je prisustvo grota, koje najvjerojatnije pripadaju sigama i zasiganom sedimentu, te je na osnovu toga moguće pretpostaviti da je uvala nastala urušavanjem većeg pećinskog objekta.

Tijekom podvodnog pregleda lokacije 5, istočno od spomenute uvale pronađeno je nekoliko pripećaka i manjih pećina, od kojih tri sadrže nešto sedimenta. Sve tri nalaze se relativno blizu, unutar pedesetak metara udaljenosti, i na dubini između 4 i 8 metara. Tijekom idućih istraživanja valja postaviti manje sonde ili iskope, ne bi li se utvrdila dubina sedimenta i eventualno prisustvo arheološkog materijala.

Još jedna manja pećina locirana je na dubljem i strmijem dijelu lokacije 5, zapadnije od navedenih i na dubini od oko 14 metara. U njoj nije bilo sedimenata, a morfologija stijene te prisustvo većih kamenih blokova i stijenja na strmom siparu podno pećine ukazuju na to da se vrlo vjerojatno radilo o većem objektu čiji se prednji dio urušio. U budućim istraživanjima bilo bi zanimljivo podrobnije pregledati dno kanala pod objektom, ne bi li se utvrdilo postojanje eventualnog arheološkog materijala koji je bio ispran iz pećine. Ukupna dužina pregledanog terena kanala na lokaciji 5 je 1225 metara, a dubina urona do 22 metra.

ZAKLJUČNA RAZMATRANJA

Tijekom prve dvije godine projekta "Arheološka istraživanja kasnog pleistocena i ranog holocena na prostoru Limskog kanala", koji financira Hrvatska zaklada za znanost, provedena su arheološka istraživanja na četiri lokaliteta na području Limskog kanala: Romualdovoj pećini, Abri Kontiji 002, Pećini kod Rovinjskog Sela i Limu 001. Na tim su lokalitetima provedena i geoarheološka uzorkovanja te geofizička mjerenja. Nadalje, proveden je i podvodni terenski pregled dijela Limskog kanala. Tijekom istraživanja otkriven je vrijedan arheološki materijal. U Romualdovoj pećini pronađeni su ostaci koji ukazuju na boravak ljudi u razdoblju željeznog doba, brončanog doba te

was observed just above the sea surface, in front of which dripstone covered sediment was observed. The canal stretches only a few metres in depth, but it is unclear whether this is a dripstone covered collapsed section of a canal or bedrock. We did not enter it during this dive on account of the already noted rough sea. Rocks were observed during the underwater survey of the rest of the cove, likely from dripstone and dripstone cemented sediment, based on which we can hypothesise that the cove was created in the collapse of a large cave structure.

Several abris and small caves were found in the course of the survey of location 5 to the east of the above-mentioned cove, three of which contained some sediment. All three are relatively nearby, under fifty metres away, at a depth of four to eight metres. Small trenches should be opened in the course of upcoming investigations to determine the depth of the sediment and the possible presence of archaeological material.

Another small cave was located at a deeper and steeper part of location 5, more to the west than those cited above and at a depth of about 14 metres. There was no sediment in it, and the morphology of the rock and presence of large boulders and stones on a steep talus slope beneath the cave indicate that this was once a larger structure the front part of which has since collapsed. In future investigation it would be interesting to undertake a more detailed survey of the bottom of the channel below this structure with the aim of discovering any possible archaeological material washed out of the cave. The total length of the surveyed channel terrain at location 5 was 1,225 metres, with a dive depth of up to 22 metres.

CONCLUSION

Archaeological investigations were conducted at four locations - Romuald's Cave, Abri Kontija 002, Pećina Cave near Rovinjsko Selo and Lim 001 - in the course of the first two years of the *Archaeological Investigations into the Late Pleistocene and Early Holocene of the Lim Channel* project, financed by the Croatian Science Foundation. Also conducted at these sites were geoarchaeological sampling and geophysical measurement. The campaigns also included an underwater field survey of a part of Lim Channel. Valuable archaeological material was discovered in the course of the investigations. Remains were found at Romuald's Cave that indicate human habitation in the Iron Age, Bronze Age and Palaeolithic period. Radioactive carbon dating of human skeletal material from this site yielded results of 3150±46 years before the present (Janković et al. 2015). Also found at the site were faunal finds characteristic of the Pleistocene,

paleolitika. Metodom radioaktivnog ugljika za ljudski kosturni materijal otkriven na ovom lokalitetu dobiveni su rezultati od 3150±46 godina prije sadašnjosti (Janković i sur. 2015). Nadalje, na lokalitetu su pronađeni faunalni nalazi karakteristični za razdoblje pleistocena, kao i oruđa koja tipološki možemo pripisati starijem kamenom dobu. Od posebne su važnosti musterijenska oruđa iz slojeva datiranih metodom radioaktivnog ugljika na preko 40.000 godina prije sadašnjosti. U tijeku su detaljne analize nalaza, koje će u budućnosti pružiti nove spoznaje o najranijim razdobljima ljudskog boravka na području Limskog kanala i obližnjih regija.

Na lokalitetu Abri Kontija 002 pronađena je jako velika količina kamenog oruđa i artefakata koje na temelju tipoloških karakteristika, kao i prisustva pleistocenske faune, možemo pripisati gornjem paleolitiku. Vrlo je važno spomenuti da je ljudska aktivnost na ovom nalazištu prisutna i vrlo intenzivna u svim stratigrafskim jedinicama, što govori o određenom kontinuitetu boravka i korištenja nalazišta. Analize materijala, uzoraka za apsolutnu dataciju, geofizikalnih mjerenja i geoarheoloških uzoraka su tijeku.

Na lokalitetu Lim 001 postavljena je manja sonda u kojoj je otkriven materijal koji na temelju tipoloških odlika najvjerojatnije valja pripisati mezolitiku. Provedena su geofizikalna mjerenja i uzeti uzorci za radiometrijsko datiranje.

Na lokalitetu Pećina kod Rovinjskog Sela provedena su detaljna geofizikalna mjerenja.

Osim istraživanja na četiri navedena lokaliteta, tijekom druge godine projekta provedena su i podvodna terenska istraživanja dijela Limskog kanala. Tijekom pregleda ustanovljeno je nekoliko lokacija od mogućeg interesa (manje pećine i pripećci) te pronađen materijal iz kasnijih prapovijesnih razdoblja (keramika koju najvjerojatnije valja pripisati obližnjim gradinskim naseljima) i novovjekovna keramika.

Prve dvije godine terenskih istraživanja rezultirale su nalazima brojnih arheoloških ostataka iz prapovijesnih razdoblja. U trećoj godini projekta nastavit će se istraživanja na sva četiri lokaliteta, kao i podvodni terenski pregled Limskog kanala te provesti detaljne analize sakupljenog materijala i uzoraka.

ZAHVALE

Projekt "Arheološka istraživanja kasnog pleistocena i ranog holocena na prostoru Limskog kanala, Istra"(Arhaeological investigations into the Late Pleistocene and Early Holocene of the Lim Channel, Istria), br. 7789 financiran je sredstvima Hrvatske zaklade za znanost. Značajnu podršku i pomoć pružili

and tools that can typologically be attributed to the Old Stone Age. Particularly noteworthy are Mousterian culture tools from layers dated by the radioactive carbon method to over 40 thousand years before the present. Detailed analysis of the finds is ongoing, and will provide new insight into the earliest periods of human habitation in the Lim Channel area and the neighbouring regions.

A very large quantity of stone tools and artefacts were discovered at the Abri Kontija 002 site that are attributable, based on their typological characteristics and the presence of Pleistocene fauna, to the Upper Palaeolithic. It is very noteworthy that human activity at this site is present and very intensive through all the stratigraphic units, which speaks to a level of continuity in habitation and the use of the site. The analysis of materials, of samples taken for absolute dating, of the geophysical measurements and of the geoarchaeological samples is ongoing.

A small trench was opened at the Lim 001 site. The typological characteristics of the material discovered attribute it most likely to the Mesolithic period. Geophysical measurements were made and samples taken for radiometric dating.

Detailed geophysical measurements were taken at the Pećina Cave site near Rovinjsko Selo.

Along with the investigations at all four of the cited sites the second year of the project also saw an underwater field survey of a part of Lim Channel. It was established during this survey that there are a number of locations of potential interest (small caves and abris) and pottery was found of prehistoric (most likely attributable to nearby hillfort settlements) and post-medieval provenance.

The first two years of the field investigation resulted in finds of numerous archaeological remains from prehistoric periods. Year three of the project will see continued investigation at all four sites and of the underwater field survey of Lim Channel, along with a detailed analysis of the collected materials and samples.

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