

PEĆINA VLAKNO NA DUGOM OTOKU

Vlakno cave on Dugi otok

U već standardnom ritmu projekta EpiC Hrvatske zaklade za znanost (IP-2019-04-6115) rujan je razdoblje predviđeno za arheološka iskopavanja u pećini Vlakno na Dugom otoku. Dijelom je to nastavak prošlogodišnje kampanje (Vujević et al. 2023), no vrijeme se iskoristilo i za druge istraživačke aktivnosti s ciljem pribavljanja dodatnih informacija važnih za interpretaciju nalazišta. Konkretno uzimanje uzoraka za različite analize; geoarheološke i radiokarbonske. Možemo reći da su se ovogodišnja istraživanja odvijala u tri etape.

Prvu je činilo čišćenje zapadnog profila i uzimanje uzoraka sedimenta za geoarheološke analize, među ostalim i uzoraka kojima bi se utvrdilo prisustvo mikrotefre, tj. mikroskopskih tragova različitih vulkanskih erupcija koje su obilježile posljednje dijelove pleistocena. Iz pećine Vlakno već je poznat desetak centimetara debeo sloj NYT tefre (Vujević, Parica 2009), koji je posljedica velike vulkanske erupcije na Flegrejskim poljima u Napuljskom zaljevu koja se dogodila prije $14,9 \pm 0,4$ tisuće godina (Deino et al. 2004). Cilj je novog uzorkovanja detektirati tragove drugih erupcija koje nisu ostavile prostim okom vidljive tragove u depozitima Vlakna. Druge bi analize na osnovi sedimentologije i mikromorfologije uzoraka trebale pojasniti podrijetlo depozita i utjecaj ljudi na njihovo formiranje. Uzorkovanje je provodio Giovanni Boschian (Dipartimento di

In the already standard rhythm of the EpiC project of the Croatian Science Foundation (IP-2019-04-6115), September is the period scheduled for archaeological excavations in Vlakno cave on Dugi otok. Part of it is a continuation of last year's campaign (Vujević et al. 2023), but the time was also used for other research activities with the aim of obtaining additional information important for the interpretation of the site, specifically sampling for geoarchaeological and radiocarbon analyses. We can say that this year's research took place in three stages.



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The first stage consisted of cleaning the western profile and taking sediment samples for geoarchaeological analysis, including samples to determine the presence of microtephra, i.e. microscopic traces of various volcanic eruptions that characterized the last parts of the Pleistocene. A ten-centimeter-thick layer of NYT tephra is already known from Vlakno cave (Vujević, Parica 2009), which is the result of a large volcanic eruption on the Phlegraean fields in the Gulf of Naples that occurred 14.9 ± 0.4 thousand years ago (Deino et al. 2004). The goal of the new sampling is to detect traces of other eruptions that did not leave traces visible to the naked eye in the Vlakno deposits. Other analyses based on sedimentology and micromorphology of the samples should clarify the origin of the deposits and the influence of human activity on their formation. Sampling was carried out by Giovanni Boschian (Di-

Biologia Universita' di Pisa) uz pomoć studentice Ane Jagić (Odjel za arheologiju Sveučilište u Zadru).

Druga etapa podrazumijevala je širenje istraživačkog prostora na zapadni dio s ciljem preciznijeg utvrđivanja stratigrafije. Naime, izrazito praškast i suh sediment u površinskim slojevima utjecao je na teško izdvajanje čvrste hodne površine i zamaglio prijelaz iz Stratuma 1 u Stratum 2 na prethodno istraženim kvadratima. Naknadne devastacije prostora dodatno su utjecale na miješanje nalaza, što se pak odrazilo na varijacije u radiokarbonskim datumima. Bilo je potrebno utvrditi točan kronološki slijed različitih faza okupacije kao i dobiti preciznije objašnjenje za navedene varijacije. Novim iskopavanjima utvrđene su dvije razine u površinskom sloju (Stratum 1) od kojih bi gornja predstavljala kratkotrajne posjete povezane s držanjem stoke u nekom od recentnijih perioda, dok je druga nastala negdje u prapovijesno vrijeme, vjerojatno u ranom neolitiku, sudeći po ulomcima keramike s *impresso* ukrašom. Pa ipak, postojanje keramičkih ulomaka koji odgovaraju tradiciji brončanog doba upućuje na to da je i između definiranih faza u pećini bilo posjeta tijekom više vremenskih razdoblja koji mož-

partimento di Biologia Universita' di Pisa) with the help of student Ana Jagić (Department of Archaeology, University of Zadar).

The second stage included the expansion of the research area to the western part with the aim of determining the stratigraphy more precisely. Namely, the extremely powdery and dry sediment in the surface layers affected the difficult detection of the solid walking surface and blurred the transition from Stratum 1 to Stratum 2 in the previously investigated squares. The subsequent devastations of the area further influenced the mixing of finds, which in turn was reflected in the variations in the radiocarbon dates. It was necessary to determine the exact chronological sequence of the different phases of the occupation, as well as to obtain more precise explanation for the mentioned variations. New excavations revealed two levels in the surface layer (Stratum 1), of which the upper one would represent short-term visits connected with animal stabling in one of the more recent periods, while the other one was created sometime in prehistoric times, probably in the Early Neolithic, judging by fragments of pottery with the *impresso* decoration. And yet, the presence of pottery sherds that correspond to the Bronze Age tradition indicates that



Geoarheološko uzorkovanje (foto: M. Grgurić Srzentić)
Geoarchaeological sampling (photo: M. Grgurić Srzentić)



Čišćenje zapadnog profila (foto: M. Grgurić Srzentić)
Cleaning the western profile (photo: M. Grgurić Srzentić)

da nisu ostavili vidljivih tragova u stratigrafiji ili su isti poništeni kasnijim aktivnostima. Na jednu od takvih upućuje i ostatak suhozidne strukture koja je ostala vidljiva u zapadnom profilu. Struktura se može pratiti kako skreće prema istoku i nastavlja dalje prema područjima istraženim u prethodnim kampanjama. Očito je riječ o objektu četvrtastog tlocrta koji je na ovom dijelu pregrađivao pećinu. Ovakva konstrukcija ukopana u površinske slojeve objasnila bi možda zašto su intaktni slojevi sačuvani tek u manjem opsegu, dok je ostatak sloja poremećen.

U istraženim slojevima Stratuma 1 pronalazimo iste nalaze kao i kod Stratuma 2; ljušture puževa vinogradara, kamenice i malo faune. Uz njih rijetki litički nalazi i jedna probušena *Columbella rustica* svjedoče da su naknadne intervencije zahvatile i poremetile mezolitičke slojeve. To se poklapa s tvrdnjom da je Stratum 1 konglomerat više faza boravka iz različitih razdoblja s osnovom mezolitičkog karaktera na koju se nadovezuju nalazi iz mlađih razdoblja (Vujević, Bodružić 2012).

Radiokarbonskim analizama dobiven je i kronološki okvir za Stratum 2 koji ga smješta u usko vremensko razdoblje samog početka holocena, točni-

even between the defined phases in the cave there were visits in different periods that may not have left visible traces in the stratigraphy or were erased by later activities. The remains of the dry stone wall structure visible in the western profile suggests one of these visits. The structure can be followed turning to the east and continuing towards the areas explored in the previous campaigns. It is obviously a structure with a square floor plan, which in this part used to partition the cave. This kind of construction dug into the surface layers would perhaps explain why the intact layers were preserved only to a smaller extent, while the rest of the layer was disturbed.

In the investigated layers of Stratum 1 we find the same findings as in Stratum 2; shells of Burgundy snails (*Helix pomatia*), oysters and some fauna. Along with them, rare lithic finds and one pierced *Columbella rustica* testify that subsequent interventions affected and disturbed the Mesolithic layers. This corresponds to the claim that Stratum 1 is a conglomerate of several phases of occupation from different periods with a base of Mesolithic character, which is followed by finds from younger periods (Vujević, Bodružić 2012).

Radiocarbon analyses also provided a chronological framework for Stratum 2, which places it in



Prosijavanje depozita (foto: M. Grgurić Srzentić)
Sieving of deposits (photo: M. Grgurić Srzentić)



Iskopavanje razine Stratuma 9 (foto: M. Grgurić Srzentić)
Excavation of Stratum 9 (photo: M. Grgurić Srzentić)

the end of this phase of the stay in the cave.

The last segment of this year's research in the cave was marked by the continuation of the excavation of Stratum 9 at the level at which we stopped in the last campaign (Vujević et al. 2023). Almost identical deposits show that we are still in the same stratum, which is further corroborated by the dates that place these levels in the period 17 thousand years ago. Barely recognizable, short-lived hearths still appear in the central part, but most of the space is occupied by a layer of greasy, extremely compact and almost sterile clayey soil, which is only occasionally lost along the edges, where there is a loose layer full of calcite that crumbles from the cave walls. The composition and texture of the compacted clayey soil indicate great influence of natural processes, and the cultural remains found in the layer indicate only occasional human visits to the cave. Individual animal bones found in an almost vertical position could also support the assumption of natural processes as well as the action of water that affects sedimentation.

Compact clayey soil can hardly be excavated, and it is even more difficult to sieve. Large amounts of water were used for each sieve so that only a few small stones and even fewer archaeological finds remained in the sieve from the entire deposit. Most of them are animal bones (including larger fragments of ruminant bones, as well as bones of small rodents) with the occasional lithic finds. And yet, along with a small amount of debitage, we find typical examples of tools – backed bladelets, end-scrapers, points, fragments of retouched blades, etc. At first glance, most of them were made of raw materials of Italian origin. The entire inventory corresponds to the short-term stays of human communities for the purpose of performing specialized activities, whereby already prepared lithic inventory is brought to the site. Finds of jewelry also correspond to this situation: a pierced sea shell from the genus *Glycymeris* and a pierced sea snail of the species *Luria lurida* (Linné 1758). A small specimen of a pierced sea shell, the type of which is difficult to determine precisely due to the poor state of preservation, belongs to the genus *Glycymeris*, and in the Croatian language it is known as *čaška*. This shell is a frequent find in the Upper Palaeolith-

je u kraj 10. i početak 11. tisućljeća prije sadašnjosti.¹ Na datume se izvrsno nastavljaju oni dobiveni za otkrivene ljudske ostatke (Vujević, Bodružić 2012; Cristiani et al. 2018) koji su pokopani ili na kraju ili neposredno nakon završetka ove faze boravka u pećini.

Posljednji segment ovogodišnjih istraživanja u

a narrow period of time at the very beginning of the Holocene, more precisely at the end of the 10th and the beginning of the 11th millennium before the present.¹ These dates correspond well to the ones obtained for the discovered human remains (Vujević, Bodružić 2012; Cristiani et al. 2018) which were buried either at the end or immediately after

pećini obilježen je nastavkom iskopavanja Stratum 9 na razini na kojoj smo stali u prošloj kampanji (Vujević et al. 2023). Gotovo identični depoziti pokazuju da smo i dalje u istom stratumu, a u to se uklapaju i datumi koji ove razine smještaju u razdoblje prije 17 tis. god. Slabo izražena, kratkotrajna vatrišta i dalje se pojavljuju na središnjem dijelu, no većinu prostora zauzima sloj masne, izrazito kompaktne i gotovo sterilne glinaste zemlje koja se tek povremeno gubi uz rubove gdje

¹ Beta677951 9300 +/- 30 BP, (95,4 %) 8179-7773 cal BC (10128-9722 cal BP); Beta669609 9010 +/- 30 BP, (94,2 %) 8291-8206 cal BC (10240-10155 cal BP)

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je umjesto njega prisutan rahli sloj prepun kalci-
ta koji se trusi sa zidova pećine. Sastav i tekstura
nabijene glinaste zemlje ukazuje na veliki utjecaj
prirodnih procesa, a kulturni ostatci pronađeni u
sloju na tek povremene posjete ljudi u pećini. U
prilog prirodnim procesima kao i djelovanju vode
koja utječe na sedimentaciju mogle bi ići i pojedine
životinjske kosti koje nalazimo u gotovo okomi-
tom položaju.

Kompaktna glinasta zemlja jedva se iskopava, a
još teže prosijava. Za svako sito utrošene su velike
količine vode da bi od cijelog depozita u situ osta-
lo malo sitnog kamenja i još manje arheoloških
nalaza. Većinom je riječ o životinjskim kostima
(uključujući veće ulomke kostiju preživača, kao i
kosti malih glodavaca) uz povremeni nalaz litike.
Pa ipak, uz malu količinu lomljevine pronalazimo
školske primjere oruđa – pločice s hrptom, gre-
bala, šiljci, ulomci sječiva s obradom i sl. Na prvi
pogled većina je izrađena na sirovini talijanskog
podrijetla. Cjelokupni inventar odgovara kratko-
trajnim boravcima ljudskih zajednica radi obavlja-
nja specijaliziranih radnji, pri čemu se na lokalitet
donosi već pripremljeni litički inventar. U ovakvo
stanje uklapaju se i nalazi nakita: probušena mor-
ska školjka iz roda *Glycymeris* i probušeni morski
puž vrste *Luria lurida* (Linné 1758). Mali primjerak
probušene morske školjke, čiju je vrstu teško toč-
no odrediti zbog lošeg stanja očuvanosti, pripada
rodu *Glycymeris*, a u hrvatskom jeziku poznate
su pod nazivom čaška. Ova školjka čest je nalaz
gornjopaleolitičkih slojeva Vlakna te se uklapa
u opću sliku ukrašavanja onodobnih populacija
ovih prostora. Međutim, morski puž *Luria lurida*,
u lokalnom govoru poznat kao zupka ili kauri,
vrlo je važan nalaz. Kao ukras korišten je još od
razdoblja gornjeg paleolitika pa sve do današnjih
dana kada ga možemo vidjeti, primjerice, kao
ures svečanih nošnji dalmatinskog zaleđa. Iako je
ovaj morski pužić, prije svega cijenjen zbog svoje
ljepote, rado korišten kao ukras još od vremena
naših predaka, u arheološkom je kontekstu izni-
mno rijedak i vrijedan nalaz. Primjerak iz Vlakna
s rezom i perforacijom na vrhu koji sugerira da se
vezivao i vjerojatno nosio kao privjesak trenutač-
no je najstariji i jedini nalaz ovog morskog puža
iz razdoblja gornjeg paleolitika na području istoč-
nog Jadrana.

Pećina Vlakno (foto: M. Grgurić Srzentić)
Vlakno cave (photo: M. Grgurić Srzentić)

ic layers of Vlakno and fits into the general picture
of the decoration of the populations of these areas
at that time. However, the sea snail *Luria lurida*, lo-
cally known as *zupka* or *kauri*, is a very important
find. It has been used as an ornament since the
Upper Palaeolithic until today, when we can see
it, for example, as an ornament in the ceremoni-
al folk costumes of the Dalmatian hinterland. Al-
though this sea snail, primarily valued for its beau-
ty, has been used as an ornament since the time
of our ancestors, in an archaeological context it is
an extremely rare and valuable find. The specimen
from Vlakno with a cut and perforation on the top,
which suggests that it was tied and probably worn



Do kraja kampanje uspjeli smo dosegnuti razinu
sljedećeg stratuma (Stratum 10). Već na prvi po-
gled depoziti su u potpunosti drukčiji. Rahli sloj
prepun je nalaza i tragova gareži, što je sasvim
suprotno od stanja u slojevima iznad. U arheološ-
kom skupu nalaza većinom je riječ o usitnjenim
ulomcima životinjskih kostiju (od kojih velik po-
stotak ima na sebi tragove gorenja). Veća je i za-
stupljenost litičkih izrađevina uz veću prisutnost
tehnoloških kategorija što se poklapa sa slojevi-
ma iz probne sonde. U litičkom skupu možemo
istaknuti veću prosječnu veličinu oruđa i veći po-
stotak iskorištenosti lomljevine u odnosu na pret-
hodne stratume. Šiljci, grebala, pločice/sječiva s

as a pendant, is currently the oldest and only find
of this sea snail from the Upper Palaeolithic period
in the area of the eastern Adriatic.

By the end of the campaign, we managed to reach
the level of the next stratum (Stratum 10). At first
glance, the deposits are completely different. The
loose layer is full of finds and traces of soot, which
is quite the opposite of the condition in the layers
above. In the archaeological group of finds, there
are mostly crushed fragments of animal bones (a
large percentage of which show traces of burning).
There is also a larger share of lithic artifacts with a
greater presence of technological categories, which
corresponds to the layers from the trial trench. In





..... Litički nalazi iz Stratuma 9 (foto: M. Grgurić Srzentić)

..... Lithic artifacts from Stratum 9 (photo: M. Grgurić Srzentić)

obradom ili tragovima upotrebe i pločice s hrp-
tom pokazuju da smo još uvijek u epigravetijenu,
ali s inventarom koji bi više odgovarao njegovoj ra-
noj fazi. U ovaj prijelaz uklapaju se i radiokarbonski
datumi koji smještaju gornju razinu Stratuma 10 u
razdoblje prije 17,5 tisuća godina.

the lithic assemblage, we can highlight the larger
average size of the tools and the higher percentage
of use of debitage compared to the previous strata.
Points, endscrapers, bladelets/blades with retouch
or traces of use and backed bladelets show that we
are still in the Epigravettian, but with an inventory
that would be more suitable for its early phase. The
radiocarbon dates that place the upper level of Stra-
tum 10 in the period 17.5 thousand years ago also
correspond to this transition.

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