PEĆINA VLAKNO NA DUGOM OTOKU

foto / photo: D. Vujević

Vlakno cave on Dugi otok

Pećina Vlakno jedan je od rijetkih sustavno istraženih lokaliteta iz gornjeg paleolitika i mezolitika u Hrvatskoj. Smjestila se na središnjem dijelu Dugog otoka nasuprot otoku Ravi gotovo uz samu današnju obalu. Njezin gotovo neprekinuti stratigrafski slijed daje uvid u prilagodbu zajednica na izrazite klimatske promjene nakon vrhunca zadnjega ledenog doba.

Iako je projekt *Epic* završio, tijekom rujna 2024. godine istraživanja su se nastavila, ovaj put u sklopu projekta Ministarstva kulture i medija Republike Hrvatske. Ovogodišnja istraživanja odvijala su se u više etapa koje su većinom usmjerene na zaštitu profila. Fokus istraživanja prebačen je s arheoloških iskopavanja na samu zaštitu. Do sada je pećina zaštićena od vanjskih utjecaja zatvaranjem ulaza, a unutarnji je prostor ograđen. Arheološki profili za sada su dosta stabilni, no pojavio se problem na južnom profilu istraživačkog prostora na čije stanje utječu dva faktora. Prvi je velika količina ljuštura puževa u gornjim slojevima koja umanjuje kompaktnost profila. Drugi je faktor otkriće relativno uske jazbine na prelasku u sam profil koja je ukopana gotovo do 3 metra dubine i zapunjena rahlim sedimentom i puževim kućicama. Samim tim je i donji dio južnog profila postao relativno nestabilan. Godine 2017. provedeni su prvi radovi na rješavanju ovog problema. Otvoreni su novi kvadrati na južnom dijelu koji su istraženi do razine slojeva s puževima. Uklanjanjem dijela depozita smanjen je pritisak na ostatak profila, što je omogućilo sigurna iskopavanja na ostatku prostora za neko vrijeme.

U ovogodišnjoj kampanji započeta je zaštita ostatka južnog profila. Na već započetom proširenju do kraja se uklonio sloj s ljušturama puževa, čime je osigurana potpuna stabilnost gornjeg dijela profila. Posljedica ovakvog načina zaštite jesu arheološka iskopavanja vrlo malog opsega koja su se iskoristila za prikupljanje uzoraka za multidisciplinarne analize. Isto je dobiveno čišćenjem cijeloga južnog profila. Analize bi na osnovi sedimentologije i mikromorfologije uzoraka trebale pojasniti podrijetlo depozita i utjecaj ljudi na njihovo formiranje. Analiza uzoraka obavlja se u suradnji sa stručnjacima s *Universita di Pisa* (Giovanni Boschian) i *Istituto nazionale di Geofisica e Vulcanologia*, Pisa (Alessio di Roberto). Čišćenje južnog profila bilo je potrebno i radi ravnanja dijelova profila

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Vlakno cave is one of the few systematically investigated Upper Paleolithic and Mesolithic sites in Croatia. It is located in the central part of Dugi otok, opposite the island of Rava, very close to the present-day coast. Its almost uninterrupted stratigraphic sequence provides insight into the adaptation of communities to the extreme climate changes after the peak of the last ice age.

Although the Epic project ended, research continued in September 2024, this time as part of a project by the Ministry of Culture and Media of the Republic of Croatia. This year's research took place in several stages, mostly focused on protecting the profiles. The focus of the research was shifted from archaeological excavations to protection. So far, the cave has been protected from external influences by closing the entrance, and the interior is enclosed. The archaeological profiles are quite stable for now, but a problem has arisen on the southern profile of the research area, the condition of which is influenced by two factors. The first of these factors is the large quantity of snail shells in the upper layers, which reduces the compactness of the profile. The second factor is the discovery of a relatively narrow burrow at the transition into the profile, which is dug to a depth of almost 3 meters and filled with loose sediment and snail shells. As a result, the lower part of the southern profile has become relatively unstable. In 2017, the first works were carried out to solve this problem. New squares were opened in the southern part, which were explored down to the level of the layers with snails. Removing part of the deposit reduced the pressure on the rest of the profile, which allowed safe excavations in the remaining area for some time.

This year's campaign began with the protection of the rest of the southern profile. The layer of snail shells was completely removed at the previously started expansion, ensuring complete stability of the upper part of the profile. The consequence of this method of protection is a very small-scale archaeological excavation that was used to collect samples for multidisciplinary analyses. The same was obtained by cleaning the entire southern profile. Analyses based on sedimentology and micromorphology of the samples should clarify the origin of the deposits and the influence of humans on their formation. The analysis of the samples is

Južni profil (*foto: D. Vujević*)
Southern profile (*photo: D. Vujević*)

Iskopavanje (*foto: M. Bodružić*)
Excavation (*photo: M. Bodružić*)

da se u sljedećoj kampanji može postaviti metalna konstrukcija koja će u budućnosti štititi profil od daljnjeg propadanja.

Posljednja je faza ovogodišnjih istraživanja u pećini obilježena iskopavanjem gornjih razina Stratuma 10. U protekloj smo kampanji u malom opsegu istražili jedan od slojeva koji pripada navedenom stratumu (Vujević, Cvitkušić 2024), a nastavak pokazuje ono što je bilo primjetno još od istraživanja ovih razina u probnim iskopavanjima. Već na prvi pogled depoziti su u potpunosti drukčiji od slojeva neposredno iznad, točnije onih koji pripadaju mlađem Stratumu 9. Za razliku od Stratuma 9 koji karakteriziraju izrazito kompaktni slojevi glinaste zemlje uz sporadične tragove ljudskih aktivnosti i nalaze, već na prelasku u Stratum 1o primjećuje se promjena u boji, teksturi i konzistenciji sloja. Depozit se sastoji od nekonsolidiranih rastresitih naslaga uglavnom silta. Definirane su tri razine (faze) hodnih površina, a svakom dominira tamni depozit s velikom količinom kršja i gareži, uz primjetne ostatke manjeg vatrišta, najčešće na središnjem dijelu istraživačkog prostora. Odstupanje od navedenoga primjetno je tek u kvadratima koji dodiruju zidove pećine, gdje slojevi postaju sve masniji i kompaktniji, a na mjestima i zasigani.

Rahli slojevi Stratuma 10 prepuni su nalaza i tragova gareži. U arheološkom skupu nalaza većinom je riječ o usitnjenim ulomcima životinjskih kostiju, od kojih velik postotak ima na sebi tragove gorenja. Općenito u taksonomskom sastavu ovih naslaga prevladavaju ostatci jelena, a ostatci velikih bovida, vjerojatno pragoveda i ekvida, vjerojatno divljih europskih magaraca zastupljeni su u manjem broju.

Veća je i zastupljenost litičkih izrađevina uz veću prisutnost tehnoloških kategorija što se poklapa sa slojevima iz probne sonde. Među litičkim artefaktima prevladavaju pločice. Slijede ih sječiva dok su odbojci znatno rjeđi. Zabilježen je i ulomak jezgre te nekoliko tehničkih komada poput krijestastog sječiva i dotjerujućih odbojaka. Sirovinski sastav sličan je ranijim slojevima, uz veći broj artefakata od lokalnih gornjokredskih rožnjaka, ali i jako visok udio regionalnih i transregionalnih sirovina poput rožnjaka tipa *Scaglia Rossa*, *Scaglia variegata*, kao i radiolariti i dr.

U litičkom skupu prevladavaju alatke s hrptom, osobito šiljci, a sječiva s obradom i strugala također dolaze do izražaja. Ostali tipovi, poput transforma-

being carried out in cooperation with experts from the *Universita di Pisa* (Giovanni Boschian) and the *Istituto nazionale di Geofisica e Vulcanologia*, Pisa (Alessio di Roberto). The cleaning of the southern profile was also necessary to level parts of the profile so that in the next campaign a metal structure can be installed that will protect the profile from further deterioration.

The last phase of this year's research in the cave was marked by the excavation of the upper levels of stratum 10. In the previous campaign, we explored one of the layers belonging to the aforementioned stratum on a small scale (Vujević, Cvitkušić 2024), and the continuation shows what has been noticeable since the investigation of these levels in trial excavations. At first glance, the deposits are completely different from the layers immediately above, more precisely those belonging to the younger stratum 9. Unlike stratum 9, which is characterized by extremely compact layers of clay soil with sporadic traces of human activity and finds, a change in the color, texture and consistency of the layer is already noticeable when moving into stratum 10. The deposit consists of unconsolidated loose deposits, mainly silt. Three levels (phases) of walking surfaces have been defined, and each is dominated by a dark deposit with a large amount of karst and soot, with noticeable remains of a small hearth, in the central part of the research area. Deviation from the above is noticeable only in the squares that touch the cave walls, where the layers become increasingly thicker and more compact, and in places even covered with dripstone.

The loose layers of stratum 10 are full of finds and traces of soot. The archaeological assemblage of finds consists mostly of crushed fragments of animal bones, a large percentage of which have traces of burning. In general, the taxonomic composition of these deposits is dominated by the remains of deer, while the remains of large bovids, probably aurochs, and equids, most likely wild European donkeys, are represented in smaller numbers.

Lithic artifacts are well represented including technological categories, which corresponds to the layers from the trial trench. Bladelets predominate among lithic artifacts. They are followed by blades, while flakes are less common. A core fragment and several technical pieces such as a crested blade and core rejuvenation flakes were also

Stratum 10 (*foto: D. Vujević*)
Stratum 10 (*photo: D. Vujević*)

cijskih alatki znatno su rjeđi. Pronalazak gravetica i pločica s hrptom jasno upućuje na to da je i dalje riječ o epigravetijenskoj kulturi, ali s inventarom koji bi više odgovarao ranoj fazi. Radiokarbonski datumi smještaju najmlađu razinu Stratuma 10 u razdoblje prije 17,5 tisuća godina (Vujević, Cvitkušić 2024), na sam početak kasne faze epigravetijena koja prema Ruizu-Redondu i suradnicima počinje između 17,5 i 17,2 tis. kal. god. pr. sad. (Ruiz-Redondo et al. 2022). Uz primjetnu promjenu u zastupljenosti tipoloških kategorija, kao odliku Stratuma 10 možemo istaknuti veću prosječnu veličinu oruđa, posebno šiljaka, te veći postotak iskorištenosti lomljevine u odnosu na prethodne stratume, tj. povećanje postotka obrađenih predmeta. Uz litičke, nađena je i mala količina koštanih artefakata, a većinom je riječ o ubadalima.

Kameni šiljak (*foto A. Jagić*)
Stone point (*photo: A. Jagić*)

recorded. The raw material composition is similar to the earlier layers, with a larger number of artifacts from local Upper Cretaceous chert, but also a very high proportion of regional and transregional raw materials such as chert of the *Scaglia Rossa, Scaglia variegata* types, as well as radiolarites, etc.

The lithic assemblage is dominated by backed tools, especially points. Blades with retouch and scrapers are also prominent. Other types, such as transformation tools, are less common. The presence of micro-Gravettes and backed bladelets clearly indicates that this is still the Epigravettian culture, but with an inventory that would be more appropriate for the early phase. Radiocarbon dates place the youngest level of stratum 10 in the period 17.5 thousand years ago (Vujević, Cvitkušić 2024), at the very beginning of the late Epigravettian phase, which according to Ruiz-Redondo and associates begins between 17.5 and 17.2 thousand cal. yr. BC. (Ruiz-Redondo et al. 2022). In addition to a noticeable change in the presence of typological categories, as a characteristic of stratum 10 we can emphasize the larger average size of tools, especially points, and the higher percentage of used debitage compared to previous strata, i.e. the increase in the percentage of retouched items. In addition to the lithic tools, a small number of bone artifacts were also found, most of which are piercing tools.

Čišćenje površine Stratuma 10 (*foto: D. Vujević*)
Stratum 10 surface cleaning (*photo: D. Vujević*)

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