

PEĆINA U ŽDRILU KOD ROVANJSKE



Cave in Ždrilo
near Rovanjaska



Pećina u Ždrilu kod Rovanjske kompleksan je speleološki objekt smješten na istočnoj strani Novigradskog ždrila, morskog tjesnaca koji spaja Novigradsko more na jugu s Velebit-skim kanalom na sjeveru. Novigradsko ždrilo danas predstavlja geomorfološki fenomen potpuno okrštenog kanjona koji svoju genezu duguje djelovanju rijeke Zrmanje tijekom kasnog pleistocena, dok se vrijeme njegova potapanja zbog podizanja razine mora datira oko 9 200 godina prije sadašnjosti (Hasan et al. 2020: 16). Do pećine vodi prvo makadamski put, a potom pješćaka staza s istoka, iz uvale Rovanjske, koja se posljednjih 50-ak metara spušta strmom padinom kanjona do prostranog ulaza okrenutog prema sjeverozapadu ispred kojeg se nalazi manji zemlja-

Cave in Ždrilo near Rovanjska is a complex speleological structure located on the eastern side of Novigradsko ždrilo, a sea strait that connects Novigradsko more in the south with Velebit-ski kanal in the north. Today, Novigradsko ždrilo represents the geomorphological phenomenon of a completely karstified canyon, which owes its genesis to the action of the Zrmanja river during the late Pleistocene, while the time of its submergence due to rising sea levels dates back to around 9,200 years before the present (Hasan et al. 2020: 16). A macadam road leads to the cave, and then a footpath from the east, from Rovanjska bay, which descends the steep slope of the canyon for the last 50 meters to a spacious entrance facing northwest, in front



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of which is a small earthen plateau. The entrance leads to the spacious first hall, which branches into several side channels. The total length of all branches of the structures is about 93 meters.

In professional literature, the cave has long been known as an Early Neolithic site (Batović 1979: 484). However, the first archaeological research was only carried out in 2021 as part of the *Epigravettian Communities of Northern Dalmatia* project (HRZZ IP-2019-04-6115). On that occasion, two trial trenches were excavated, at the entrance and in the left side channel. The entrance trench gave better results; the upper part of the stratigraphic sequence (the first 30 cm) can be dated to younger prehistoric periods, while the rest of the sequence could be attributed to the Upper Palaeolithic based on the few finds, primarily lithics. The cultural layers could be traced to a depth of 1.2 meters, and the oldest documented layer contained the remains of a hearth from which a charcoal sample was collected that gave a radiocarbon date of 31490 +/- 170 uncal years before the present or 34261 to 33481 years BC (36210 – 35430 cal BP, 2σ sigma), at the very beginning of the Upper Palaeolithic.

The results of the trial trench at the entrance were the main motive for undertaking systematic research during 2023 when a larger area (20 m²) was investigated at the back of the entrance hall, more precisely at the place where the right side channel separates towards the south. The entire stratigraphic sequence can roughly be divided into three main phases: recent, Neolithic and Palaeolithic.

The surface layers were mostly composed of dried animal excrement and testify to the use of the cave for animal stabling until the recent period. Pottery from the Early Neolithic period was already present in them, as well as other prehistoric pottery, and after removal, several buried structures were defined which, based on the few finds, can be dated to late prehistoric times and antiquity. The further stratigraphic sequence consists of the characteristic sedimentary "layer-cake" facies (French *fumier*), with small finds from the Neolithic period that was layered in the southeastern part with a thickness of about 70 cm, and in the northeastern part about 30 cm. The appearance

Pogled iz pećine prema sjeverozapadu (foto: M. Dubolnić Glavan)
View from the cave to the northwest (photo: M. Dubolnić Glavan)







sadržavao je i ostatke vatrišta iz kojeg je prikupljen uzorak ugljena koji je dao radiokarbonski datum od 31490 +/- 170 uncal godina prije sadašnjosti ili 34261 do 33481 godinu pr. Kr. BC (36210 – 35430 cal BP, 2σ sigma), dakle u sam početak gornjeg paleolitika.

Rezultati probne sonde na ulaznom dijelu bili su glavni motiv za poduzimanje sustavnih istraživanja tijekom 2023. godine. Pri tom je istražena veća površina (20 m²) na stražnjem dijelu ulazne dvorane, točnije na mjestu gdje se prema jugu odvaja desni bočni kanal. Ukupno otkriveni stratigrafski slijed može se okvirno podijeliti na tri glavne faze: recentnu, neolitičku i paleolitičku.

Površinski slojevi većinom su bili sastavljeni od osušenog životinjskog izmeta i svjedoče o korištenju pećine u stočarske svrhe sve do recentnog perioda. Već u njima bila je prisutna keramika iz ranog neolitika kao i druga prapovijesna keramika, a nakon uklanjanja definirano je nekoliko ukopanih objekata koji se na osnovi malobrojnih nalaza mogu datirati u kasnu prapovijest i antiku. Daljnji stratigrafski slijed čini karakteristični sedimentni facijes „slojevite torte“ (franc. *fumier*), s pokretnim materijalom iz neolitičkog razdoblja koji se na jugoistočnom dijelu uslojavao u debljini od oko 70, a na sjeveroistočnoj oko 30 cm. Pojava ovih slojeva u pećinama obično se uzima kao pokazatelj njihova korištenja u svrhu čuvanja stoke jer nastaju depozicijom i raspadanjem mješavine životinjskog izmeta i stelje (Gerometta, Boschian 2022: 12-15). U Ždrilu, facijes slojevite torte makroskopski je karakteriziran tipičnom izmjenom sivkastih slojeva pepela debljine od 1 do 10 cm s tankim crnim slojevima reduciranog gorenja. Ovaj ritam sedimentacije povremeno je prekinut slojevima različitog sastava, ali s velikom količinom morskih školjaka (većinom dagnje i kamenice), koji svjedoče o intenzivnom iskorištavanju morskih resursa. U skladu s dubinom uslojavanja, većina neolitičkih slojeva bila je reducirana na jugoistočni dio sonde te su se nastavljali pod južni profil koji se nalazi ispod prolaza u desni bočni kanal. Prostorna disperzija ovih slojeva, kao i raspored rupa za stupove koji su dokumentirani u pojedinim fazama neolitičke okupacije govore u prilog prostornoj organizaciji ljudskih aktivnosti pri čemu bi stražnji dio dvorane bio povezan s čuvanjem stada i akumulacij otpada. Prema ulazu je intenzitet ovakvih aktivnosti bitno manji, dok na samom ulazu, barem unutar probne sonde, ovakvi slojevi nisu dokumentirani.

Cijeli stratigrafski slijed „slojevitih torti“ može se

of these layers in caves is usually taken as an indication of their use for the purpose of keeping livestock, as they are formed by the deposition and decomposition of a mixture of animal excrement and litter (Gerometta, Boschian 2022: 12-15). In Ždrilo, the “layer-cake” facies is macroscopically characterized by the typical alternation of grayish layers of ash from 1 to 10 cm thick with thin black layers of reduced burning. This rhythm of sedimentation is occasionally interrupted by layers of different composition, but with a large amount of sea shells (mostly mussels and oysters), which testify to the intensive exploitation of marine resources. In accordance with stratification depth, most of the Neolithic layers were reduced to the southeastern part of the trench and continued under the southern profile located below the passage into the right lateral channel. The spatial dispersion of these layers, as well as the arrangement of postholes documented in certain phases of Neolithic occupation, speak in favor of the spatial organization of human activities, whereby the rear part of the hall would have been connected with herd stabling and waste accumulation. Towards the entrance, the intensity of such activities is significantly lower, while at the entrance, at least within the trial trench, such layers have not been documented.

The entire stratigraphic sequence of “layered cakes” can be dated to the Early and Middle Neolithic on the basis of stylistic and typological characteristics of pottery finds. The lower part of the sequence is characterized by a typical Early Neolithic inventory of deep pots with a narrowed opening decorated with the *impresso* decorative techniques. Although sherds with the *impresso* decoration also occur in the upper part of the sequence, one must notice the dominance of hemispherical bowls with a constricted rim, which correspond more to the Middle Neolithic, but with the absence of the typical Danilo decorative style. Other small finds include bone objects (awls, bone hook, perforated tooth) and lithic material composed mostly of raw material originating from the Gargano peninsula. A preliminary examination of the animal bones showed the dominance of ovicaprids with the appearance of cattle and wild animals in the upper part of the sequence. The Neolithic phases are confirmed by three radiocarbon dates, ranging from 5800 to 4900 BC.

The Palaeolithic phase consists of several lay-

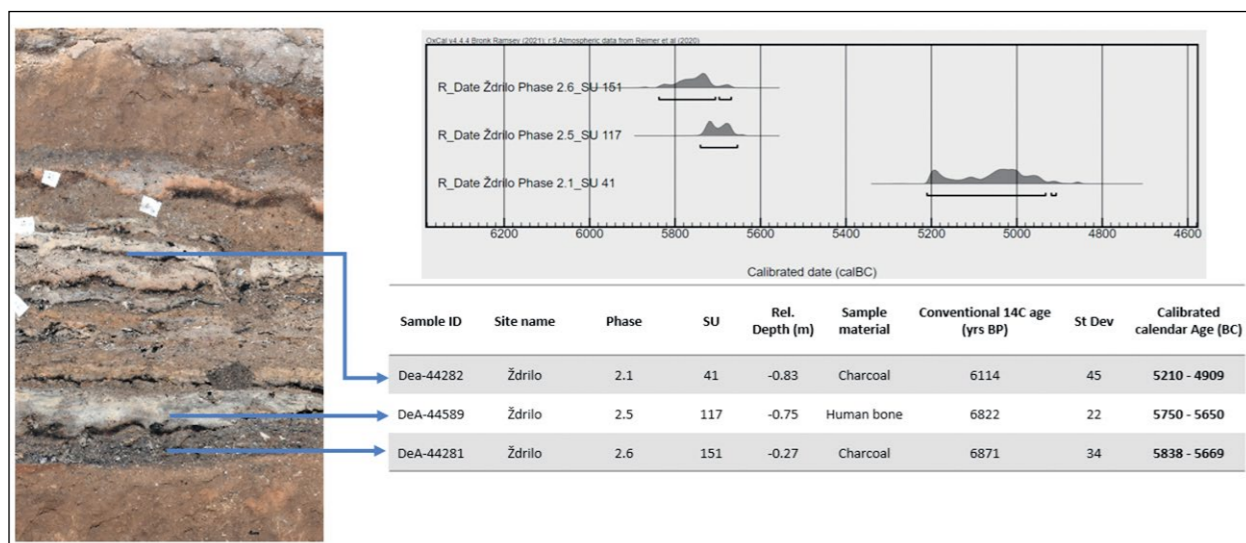


Sustavna iskopavanja, pogled iz lijevog bočnog kanala (foto: M. Grgurić Srzentić)
Systematic excavations, view from the left side channel (photo: M. Grgurić Srzentić)



Neolitički sloj 151 „in situ“ (foto: A. Karađole)
Neolithic layer 151 in situ (photo: A. Karađole)





Rezultati radiokarbonskog datiranja uzoraka iz neolitičke faze (desno) s pozicijom datiranih slojeva na segmentu jugoistočnog profila (lijevo) (izradio: M. Bodružić)
Results of radiocarbon dating of samples from the Neolithic phase (right) with the position of the dated layers on the segment of southeastern profile (left) (made by: M. Bodružić)

na osnovi stilsko-tipoloških karakteristika keramičkih nalaza datirati u rani i srednji neolitik. Donji dio slijeda karakterizira tipični ranoneolitički inventar dubokih lonaca suženog otvora ukrašenih *impresso* ukrasom javljaju i u gornjem dijelu slijeda, ipak je uočena dominacija poluloptastih zdjela stegnutog oboda, kakve više odgovaraju srednjem neolitiku, ali uz izostanak tipičnog danilskog ukrasnog stila. Od ostalih pokretnih nalaza zabilježeni su predmeti od kosti (šila, koštana udica, perforirani zub) i litički materijal sastavljen većinom od sirovinskog materijala podrijetlom s poluotoka Gargana. Preliminarni pregled životinjskih kostiju pokazao je dominaciju ovikaprda uz pojavu goveda i divljih životinja u gornjem dijelu slijeda. Neolitičke faze potvrđene su trima radiokarbonskim datumima, s rasponom trajanja od 5800 do 4900 godina pr. Kr.

Paleolitičku fazu čini nekoliko slojeva crvenkaste gline, s manjim razlikama u boji i sastavu, bez sačuvanih vatrišta. Najmlađi dio sekvencije karakterizira pojava zasiganih slojeva i nakupina kamenja, na gotovo cijeloj površini sonde, a na jednom od slojeva sigovine dokumentiran je i tanki sloj vulkanskog pepela. Preliminarna analiza pokazala je da je riječ o pepelu iz vulkanske erupcije napuljskog žutog tufa (NYT; usmeno priopćenje A. Di Roberto) datiranog oko 15 000 godina prije sadašnjosti (Deino et al. 2004: 168), kakva je zabilježena u kasnoepigravetijenskom stratigrafskom slijedu Vele špilje na Korčuli (Dean et al. 2020: 6) i pećine Vlakna na Dugom otoku (Vujević, Bodružić 2021: 6). Litički nalazi iz ovih slojeva, osobito sječiva, mogu se povezati s

ers of reddish clay, with minor differences in color and composition, without preserved hearths. The youngest part of the sequence is characterized by the appearance of dripstone cemented layers and accumulations of stones, on almost entire surface of the trench, and a thin layer of volcanic ash was also documented on one of the flowstone layers. Preliminary analysis showed that it is ash from a volcanic eruption of the Neapolitan Yellow Tuff (NYT; oral communication with A. Di Roberto) dated about 15,000 years before present (Deino et al. 2004: 168), as recorded in the late Epigravettian stratigraphic sequence of the caves Vela špilja on Korčula (Dean et al. 2020: 6) and Vlakno on Dugi otok (Vujević, Bodružić 2021: 6). Lithic finds from these layers, especially blades, can be associated with the Epigravettian technocomplex, which corresponds to the tephra chronology. In the layers below the flowstone, the lithic material corresponds to the early Upper Palaeolithic, with the appearance of few tools with Aurignacian characteristics. In addition to lithics, two specimens of pierced animal teeth were also found in them. In terms of stratigraphy, this phase would correspond to the layer with the hearth remains from the trial trench. Radiocarbon dates for this layer suggest a period that corresponds chronologically to the Aurignacian cultural complex. The oldest documented layer in the lithic inventory indicated the presence of the Levallois production process and tools that correspond more closely to the Mousterian cultural inventory in terms of typology. This preliminary relative dating of the old-

epigravetijenskim tehnokompleksom što se uklapa u kronologiju tefre. U slojevima ispod sigovine, litički materijal odgovarao bi ranom gornjem paleolitiku, s pojavom malobrojnih alatki s orinjasijenskim karakteristikama. U njima su, osim litike, pronađena i dva primjerka probušenih životinjskih zuba. Stratigrafski bi ova faza odgovarala sloju s ostatkom vatrišta iz probne sonde koji je radiokarbonski datiran u razdoblje koje kronološki odgovara orinjasijenskom kulturnom kompleksu. Najstariji dokumentirani sloj u litičkom inventaru uputio je na prisutnost levaloaškog proizvodnog postupka i oruđa koja se tipološki više uklapaju u musterijenski kulturni inventar. Ova preliminarna relativna datacija nastarijeg sloja donekle je potvrđena rezultatom radiokarbonske analize uzorka ugljena prikupljenog u ovoj kampanji koji je pokazao starost veću od 43 500 godina, ali uz nedovoljnu količinu izmjerene izotope ugljika-14 što je onemogućilo uspostavljanje donje kronološke granice, odnosno precizniju dataciju.

Zaključno, može se reći da je sustavnim iskopavanjima potvrđen znatan kulturni slijed. Neolitički slojevi predstavljaju veliki potencijal za daljnje istraživanje stočarskih praksi u ovom razdoblju. Paleolitički slijed Ždrila, iako brojčano skromnog inventara, na osnovi do sad prikupljenih radiokarbonskih datuma predstavlja jedini lokalitet na istočnoj obali Jadrana s radiokarbonski datiranim slojevima iz srednjeg i ranog gornjeg paleolitika.

er layer was confirmed to a certain extent by the radiocarbon analysis of the charcoal sample collected in this campaign, which showed an age of over 43,500 years, but with an insufficient amount of the measured carbon-14 isotope, which made it impossible to establish lower chronological border, that is a more precise dating.

In conclusion, it can be said that systematic excavations confirmed a significant cultural sequence. The Neolithic layers represent a great potential for further research into animal husbandry practices in this period. The Palaeolithic sequence of Ždrilo, although with a numerically modest inventory, represents the only site on the eastern coast of the Adriatic with radiocarbon-dated layers from the Middle and Early Upper Palaeolithic based on the radiocarbon dates collected so far.

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