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Reframing European Prehistory-Paleolithic Engineering and a New Class of Subterranean Architecture in Ravne 3

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Introduction

The paleolithic chronology of ravne 3: Breaking the time barrier

My findings in Ravne 3 place the earliest known human subterranean construction well before the Neolithic, into the Upper Paleolithic—an era previously understood to lack this level of engineering. Using Uranium-Thorium (U-Th) dating of stalagmites that overgrew a dry-stone wall (Wall No. 1), we established a minimum age of 19,000 ± 1,000 years. Even more striking, a separate radiocarbon assay on speleothem calcite yielded an age of 26,200 ± 250 years BP.

This wall—constructed entirely from unbonded river cobbles—lay buried beneath these calcite layers, providing irrefutable stratigraphic proof of its antiquity. The implications are profound: a human-built structure, sealed by untouched geological processes for more than twenty millennia, makes Ravne 3 arguably the oldest verified subterranean architectural site in Europe.

Beyond the dates, the morphology of the tunnel and wall strongly suggests intentional design. The tunnel maintains a consistent microclimate and elevation, while the wall exhibits structural awareness—such as inward sloping (battering), lateral support and clear alignment with the broader tunnel system. These characteristics do not occur in natural collapses or random accumulations. They speak instead of engineering purpose.

A new architectural typology: Subterranean river-pebble walls

While dry-stone architecture is well-documented across the surface landscapes of the Mediterranean and Central Europe, the Ravne 3 system revealed something entirely unprecedented: a new class of subterranean dry-stone structures composed exclusively of unbonded river pebbles, carefully arranged without mortar. These features are unique—not only in form but also in their functional context. Unlike typical defensive walls, these structures served as tunnel blockages, reinforcements and passage closures, embedded deep within a labyrinthine underground setting.

This discovery was formally introduced in my article, "A New Class of Subterranean Dry-Stone Structures: River-Pebble Walls in the Ravne Tunnel Complex, Bosnia-Herzegovina", published in the Journal of Environment and Biological Science (2025). That study documented over sixty such walls throughout tunnels Ravne, Ravne 3, Ravne 4 and Ravne 6—each constructed without mortar and often positioned at critical structural junctures within the tunnel network.

These walls, measuring up to several meters in length and over one meter in height, show deliberate selection and placement of unshaped cobbles from local alluvial sources.

Further support for the antiquity and anthropogenic origin of these structures came in the form of high-precision dating, which I presented in "Europe's Oldest Subterranean Structure? New Chronological and Structural Insights from Dry-Stone Wall in the Ravne 3 Tunnel Complex, Visoko, Bosnia-Herzegovina", published in the Journal of Interdisciplinary History and Human Societies (2025). There, we established a Uranium-Thorium date of 19,000 ± 1,000 years BP and a radiocarbon date of 26,200 ± 250 years BP for the stalagmites sealing Wall No. 1—firmly anchoring this architectural feature in the Upper Paleolithic.

The foundational geological and stratigraphic framework for these walls was detailed in "Archaeological Stratigraphy and Environmental Analysis of the Ravne 3 Tunnel Complex", published in Acta Scientific Environmental Science (2025). That study integrated radiometric dating, sediment analysis and microclimatic measurements, placing the tunnel system in a broader geomorphological and cultural context while confirming the intentional sealing and reuse of tunnel segments across multiple historical layers.

Collectively, these three publications establish a compelling case for recognizing a new typology in prehistoric European architecture: subterranean dry-stone structures using fluvial cobbles to seal, mark

and reinforce passageways—not as random debris, but as intentional, functionally integrated constructions.

Reuse, stratigraphy and multiperiod occupation

While the Paleolithic dating establishes the deepest temporal layer of activity in Ravne 3, my broader excavation strategy uncovered multiple occupational phases. The stratigraphy, analyzed in Acta Scientific Environmental Science, reveals ceramic fragments from Roman and medieval periods, metal tools and various construction episodes. Radiocarbon samples from charred organic remains in association with some of the longest walls date reuse phases as late as the 4th century CE.

This episodic pattern of use and reuse points to a continuum of awareness and occupation, where ancient engineering was rediscovered, repurposed and extended across millennia.

Stratigraphic integrity has been maintained by rigorous excavation methods and comprehensive mapping, aided by LiDAR, GPR and GPS geodetic surveys.

In this context, Ravne 3 cannot be viewed simply as a Paleolithic relic. It is a palimpsest of human activity—initially carved, structured and sealed in prehistory, but periodically rediscovered and integrated into later cultural landscapes.

Environmental consistency and energetic stability

The tunnel's interior conditions have also proven exceptional. Measured temperature (approx. 12.5°C), high relative humidity (~95%) and elevated ionization levels all suggest an unusually stable environment. These microclimatic conditions contribute to both the preservation of speleothems and the energetic qualities observed by visitors and researchers alike.

Although not the focus of structural interpretation, these environmental findings reinforce the tunnel's intentional design or at least its deliberate selection by ancient populations. Such preservation-enhancing qualities imply a recognition—perhaps even reverence—of the underground space.

Toward a paradigm shift in European archaeology

The implications of these discoveries are not marginal; they demand a paradigm shift. The presence of structured dry-stone walls dated securely to the Upper Paleolithic places the Ravne 3 Tunnel Complex outside the existing chronological typologies of European subterranean architecture. The wall predates the Menga dolmen (5,000 BCE), the Denmark cellar (4,000 BCE) and every other known underground construction on the continent.

In parallel, European cave art—such as the 32,000-year-old depictions in Chauvet Cave or even the 64,000-year-old markings attributed to Neanderthals in Spain—has already forced archaeologists to revise notions of Paleolithic symbolic behavior. I suggest that Ravne 3 offers a spatial and architectural complement to this cognitive revolution.

The tunnel builders were not simply mobile foragers; they were engineers capable of deliberate planning, environmental manipulation and symbolic or functional enclosure within deep earth structures.

Conclusion

My work in Ravne 3—through stratigraphy, dating, typological analysis and environmental studies—has opened new interpretive horizons. The tunnel complex represents not only Europe's earliest subterranean architectural effort but also a rare continuity between deep prehistory and later historical epochs.

These findings are not isolated curiosities. They are proof of forgotten capabilities. They represent evidence of intentional design at a time when such complexity was believed impossible.

It is my hope that this new classification of subterranean dry-stone walls and the profound antiquity revealed in Ravne 3, will inspire a reevaluation of human prehistory—not as a linear ascent from simple to complex, but as a landscape punctuated by deep and sometimes hidden episodes of brilliance.