

Lithic Evidence for Early Technological Activity in the Visoko Region (Bosnia and Herzegovina): Archaeological Investigations, 2006-2025

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Abstract

Archaeological investigations conducted in the Visoko region of Bosnia and Herzegovina between 2006 and 2025 have produced a substantial assemblage of lithic material across multiple excavation sites and contexts. Although lithic artifacts were not the primary focus of fieldwork, they occur consistently in both surface and subsurface settings, including stratified sondes, tunnel fills, and architectural contexts. The assemblage comprises more than 1200 recorded lithic objects, including small sandstone tools, possible grinding implements, shaped stones, and artifacts with carved or modified surfaces. Several items display clear evidence of intentional shaping, smoothing, or engraving, while others are associated with features such as dry-stone walls and constructed surfaces. Tool marks observed on clay and stone within the Ravne tunnel system provide additional evidence of the use of hand tools in modifying the environment. Based on morphology and context, a significant portion of the material is consistent with early phases of human activity, including the Neolithic period. At the same time, the presence of lithic artifacts in mixed and redeposited contexts reflects later site transformations and reuse of the landscape. Taken together, the lithic record from the Visoko region indicates a sustained tradition of stone-based technology. The material provides an independent line of evidence for early human activity and contributes to a broader understanding of long-term occupation and technological practices in the area.

Keywords

Lithic Artifacts, Stone Tools, Archaeological Excavations, Ravne Tunnel System, Vratnica Tumulus, Visoko Region, Bosnia and Herzegovina, Neolithic Technology, Sandstone Artifacts, Archaeological Evidence

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1. Introduction

Archaeological research in the Visoko region of central Bosnia and Herzegovina has, over the past two decades, produced a substantial body of material evidence from both surface and subsurface contexts. Systematic investigations carried out since 2006 have focused primarily on architectural features, stratigraphy, and ceramic assemblages, while lithic artifacts have generally been treated as secondary finds within broader excavation programs. Despite this, lithic material occurs consistently across multiple sites and contexts, forming an important component of the archaeological record.

The Visoko region lies within a geomorphologically complex landscape characterized by river valleys, conglomerate formations, and elevated features, such as the Vratnica tumulus and surrounding hills (**Figure 1**). Within this landscape, a number of archaeological locations—including Vratnica, the Bosnian Pyramid of the Moon, and the Ravne underground complex—have been subject to controlled excavation and documentation (**Figures 2-4**). These investigations have revealed stratified deposits, constructed features, and material assemblages indicating repeated phases of human activity.

Particularly significant are the subsurface contexts represented by the Ravne tunnel system (**Figure 5**), a network of underground passages excavated within Quaternary conglomerate deposits. Systematic archaeological work conducted between 2006 and 2025 has documented more than three kilometers of mapped tunnels, along with architectural elements such as dry-stone walls, sealed passages, and stratified infill deposits (Osmanagich, 2026a). These features demonstrate



Figure 1. Location of the Visoko region in central Bosnia and Herzegovina. Source: Prepared by the author based on Google Maps.



Figure 2. Tumulus in the village of Vratnica, a conical artificial hill where lithic artifacts were recovered during systematic excavations (2006-2025).



Figure 3. Excavation grid at the Vratnica tumulus apex showing controlled surface investigation.

clear evidence of deliberate modification and long-term use of subterranean space. Lithic artifacts recovered from these contexts occur alongside ceramic, metal, and organic materials, indicating that stone-based tools formed part of a broader technological assemblage.



Figure 4. Archaeological excavation on the Bosnian Pyramid of the Moon, showing terraces constructed from shaped sandstone plates.



Figure 5. Underground Ravne tunnel system.

The archaeological investigations discussed in this study have been carried out under a formal institutional and legal framework by the Archaeological Park: Bosnian Pyramid of the Sun Foundation, which has coordinated annual excavation campaigns since 2006. Fieldwork has been conducted under officially approved research programs, with emphasis on stratigraphic control, precise documenta-

tion, and multidisciplinary analysis. This long-term, systematic approach has resulted in a large and well-documented dataset derived from multiple excavation sites and contexts (Osmanagich, 2026a).

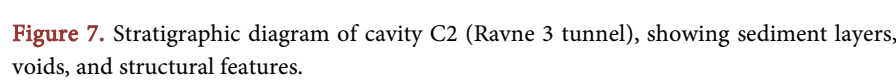
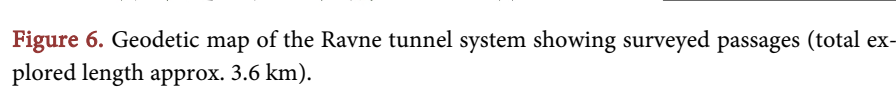
In addition to subsurface investigations, surface excavations at locations such as the Vratnica tumulus have produced lithic artifacts associated with constructed features and stratified deposits. Excavation trenches have revealed large sandstone elements, paved surfaces, and smaller, shaped objects, including tool-like forms and carved artifacts (Osmanagich, 2025). These finds provide further evidence for the use and modification of stone materials in both architectural and technological contexts.

Within the broader archaeological literature, lithic artifacts are among the most widely used indicators of early human activity, particularly in prehistoric contexts where organic materials are rarely preserved (Andrefsky, 2005; Odell, 2004). The study of lithic technology—encompassing raw material selection, tool production, and use-wear patterns—provides insight into technological capabilities, subsistence strategies, and settlement patterns (Inizan et al., 1999; Shea, 2013). Even when recovered in mixed or secondary contexts, lithic material can contribute to the identification of early occupation phases and technological traditions.

The lithic assemblage from the Visoko region, although not the primary focus of excavation, exhibits several features of archaeological significance. These include small sandstone tools, possible grinding implements, shaped stones, and artifacts displaying surface modification such as smoothing, carving, or engraving. In addition, traces of tool use—such as markings on clay and stone surfaces within the Ravne tunnels—provide indirect evidence of lithic-based technological activity. Together, these observations point to a sustained tradition of stone working and tool use within the region (Osmanagich, 2026b; Andrefsky, 2005; Odell, 2004; Perlès, 2001; Tringham & Krstić, 1990)

It is important to emphasize that the present study does not attempt a full typological or technological classification of lithic artifacts in the strict sense of lithic analysis. Rather, it presents a synthesis of lithic material recovered during broader archaeological investigations, with particular attention to distribution, context, and observable modification. In this respect, lithic artifacts are considered alongside other categories of material evidence as part of a wider archaeological dataset.

The objective of this paper is therefore to document and evaluate lithic artifacts from multiple excavation contexts in the Visoko region and to assess their significance as evidence for early technological activity. By integrating data from surface and subsurface investigations (Figure 6, Figure 7), the study aims to establish lithic material as a consistent and meaningful component of the archaeological record. In doing so, it contributes to a broader understanding of long-term human presence and technological practices in the region, complementing previous studies focused on ceramic assemblages and subterranean contexts (Osmanagich, 2026a; Osmanagich, 2026b).



The sites discussed in this study have been interpreted differently in the scientific literature. The present analysis does not address broader interpretive debates but focuses specifically on lithic material as an independent archaeological dataset.

2. Materials and Methods

The material presented in this study derives from archaeological investigations conducted between 2006 and 2025 in the Visoko region of central Bosnia and Herzegovina. Fieldwork was carried out at multiple locations, including the Vratnica tumulus, the Bosnian Pyramid of the Moon, and the Ravne underground tunnel system. These investigations were coordinated by the Archaeological Park: Bosnian Pyramid of the Sun Foundation and conducted as part of a long-term program of systematic excavation and documentation.

2.1. Excavation Contexts

Archaeological work included both surface and subsurface excavation contexts. Surface investigations were conducted using standard archaeological methods, including grid-based trenching, controlled removal of sediment layers, and systematic stratigraphic recording. At sites such as Vratnica, excavation units were defined using measured grids, enabling spatial control and documentation of artifact distribution.

Subsurface investigations were carried out within the Ravne tunnel system, where excavation involved removing sediment infill from existing passages. These contexts differ significantly from open-air sites, as the material derives from enclosed environments characterized by layered deposits, backfill, and structural modifications. Excavation within the tunnels was conducted in controlled sections, with attention to depth, sediment composition, and the presence of architectural features such as dry-stone walls and blocked passages (Osmanagich, 2026a).

2.2. Stratigraphic Recording

Stratigraphic observation and documentation were central components of the excavation methodology. Vertical profiles were cleaned and recorded to identify distinct sedimentary units based on differences in color, texture, compaction, and inclusions. In both surface and subsurface contexts, layers were defined and documented before removal, enabling relative sequencing of deposits.

Within the Ravne tunnels, stratigraphic conditions are often complex due to the presence of mixed and redeposited material. Excavation profiles show clearly defined pockets of fill intruding into consolidated conglomerate, as well as constructed features sealed behind backfill (Osmanagich, 2026b). These conditions indicate multiple phases of deposition, disturbance, and reuse, and require careful distinction between primary and secondary contexts.

2.3. Recovery of Lithic Material

Lithic artifacts were recovered from all investigated sites, although they were not the primary target of excavation. Recovery was conducted through direct observation during excavation, supplemented, in some cases, by sediment sieving. Artifacts were collected manually and recorded in relation to their stratigraphic position and, where possible, their spatial context.

The dataset includes lithic material from both stratified layers and mixed deposits. Primary contexts consist of artifacts embedded within clearly defined sedimentary units, while secondary contexts include redeposited material associated with backfill, collapse, or later disturbance. The distinction between these contexts is important for interpretation, particularly in assessing the chronological significance of individual finds.

Recovery procedures varied across excavation campaigns. In some contexts, sediment was sieved using mesh sizes ranging from approximately 5 to 10 mm, while in others recovery relied primarily on direct observation during excavation. As lithic artifacts were not the primary target of investigation, collection procedures were not fully standardized across all sites. These differences may affect the composition and representativeness of the assemblage.

2.4. Documentation and Classification

Lithic artifacts were documented using standard descriptive criteria, including:

- raw material (primarily sandstone)
- size and thickness
- morphology and overall form
- surface characteristics (e.g., smoothing, carving, abrasion)

Where present, features such as edges, grooves, perforations, or engraved motifs were recorded. Particular attention was given to evidence of modification, including shaping, polishing, or repetitive tool marks.

No formal typological classification system (e.g., scraper, blade, core) was applied across the entire assemblage. Instead, artifacts were grouped based on observable morphological and functional characteristics, such as tool-like forms, grinding implements, or shaped stones. This approach reflects the heterogeneous nature of the dataset and the absence of systematic lithic-focused excavation.

2.5. Identification of Modification and Use

Assessment of whether lithic objects were modified or used by humans was based on macroscopic observation. Indicators of intentional modification include:

- regular or repeated shaping;
- smoothed or polished surfaces;
- linear or parallel markings;
- sharp or angular edges inconsistent with natural fracture.

In addition to portable artifacts, evidence of lithic technology was also identified through the modification of in situ materials. Tool marks observed on clay

and stone surfaces within the Ravne tunnels were documented as indirect indicators of tool use. These markings, characterized by repeated impressions or linear grooves, provide evidence of the use of hand tools in excavating or shaping subterranean spaces.

2.6. Limitations

This study does not include microscopic use-wear analysis, experimental replication, or geochemical sourcing of raw materials. As a result, functional interpretations remain provisional and are based primarily on morphology and context. Similarly, chronological attribution is not based on direct dating of lithic artifacts, but on their association with stratigraphic layers and previously dated materials within the same contexts.

Given these limitations, the analysis presented here should be understood as a descriptive and contextual synthesis rather than a comprehensive technological study in the strict sense of lithic analysis.

3. Results

3.1. Distribution of Lithic Material across Sites

Lithic artifacts were recovered from all investigated locations in the Visoko region, including surface excavation sites and subsurface contexts within the Ravne tunnel system. The distribution of finds indicates that lithic material is not limited to a single area but occurs across multiple archaeological settings.

Surface contexts, particularly at the Vratnica tumulus and the Bosnian Pyramid of the Moon, produced lithic artifacts associated with shallow stratified deposits and constructed features (**Figures 2-4**). In these areas, artifacts were found within soil and clay layers, often in proximity to sandstone blocks, paved surfaces, and terrace structures. The presence of lithic material in these contexts indicates human activity related to construction, landscape modification, or associated occupation phases.

Subsurface contexts within the Ravne tunnel system (**Figures 5-9**) also yielded lithic material. Artifacts recovered from tunnel fill occur alongside ceramic fragments, organic remains, and architectural elements such as dry-stone walls. These finds demonstrate that lithic material forms part of a broader assemblage associated with repeated human activity in the underground environment.

Of the more than 1200 recorded lithic objects, approximately 80 objects derive from subsurface contexts within the Ravne tunnel system, while the remainder originate from surface excavation sites, such as tumuli in Vratnica and the Bosnian Pyramids of the Sun and Moon. A substantial portion of the assemblage derives from mixed or redeposited deposits, particularly within tunnel fill, whereas a smaller subset is associated with stratified contexts.

3.2. Lithic Assemblage

The lithic assemblage documented from the Visoko region comprises a diverse

group of objects varying in size, morphology, and degree of modification. A representative selection of this material is shown in **Figure 10**, which illustrates the range of forms present in the dataset.

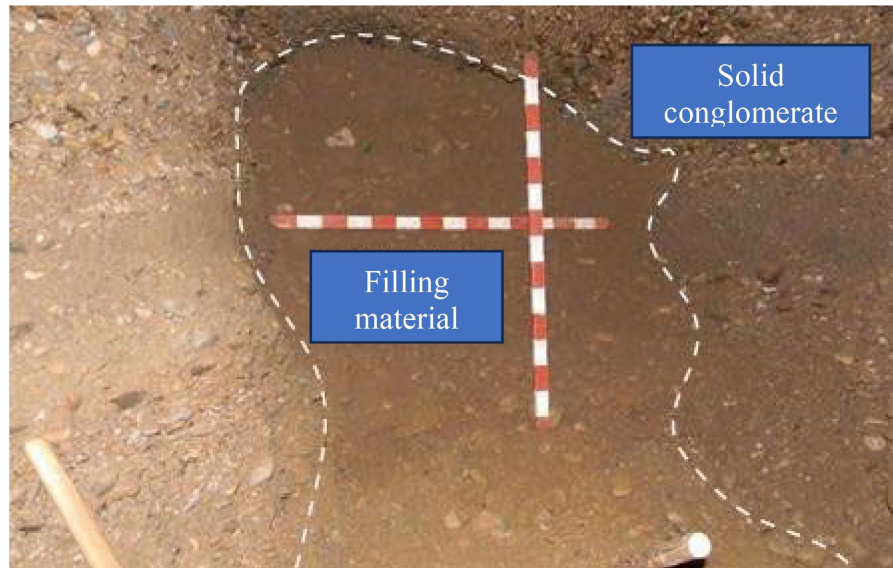


Figure 8. Excavation profile showing a defined fill pocket within consolidated conglomerate (Ravne 3 tunnel).



Figure 9. Archaeological test trench (1 × 1 m) within the Ravne 3 tunnel floor, showing stratified excavation.

The majority of artifacts are composed of sandstone, reflecting the availability of local raw material. Objects range from small, irregular fragments to larger,

shaped pieces displaying evidence of intentional modification. In several cases, artifacts exhibit smoothed surfaces, defined edges, or symmetrical forms that distinguish them from naturally occurring stone fragments.



Figure 10. Selection of lithic artifacts from the Visoko region, illustrating variation in size, morphology, and form.

Carved sandstone artifacts (**Figure 11**) show clear surface modification, including engraved lines, grooves, and patterned motifs. These features indicate deliberate alteration of the stone surface and suggest functional or symbolic use. Additional carved objects (**Figure 12**) display variation in form and decoration, indicating a range of approaches to shaping and modifying stone.



Figure 11. Carved sandstone artifacts recovered from the Ravne tunnel system fill, showing engraved motifs and surface modification.



Figure 12. Selected carved stone objects from multiple contexts, illustrating variation in decorative and symbolic features.

A distinct artifact type is represented by the sandstone “foot” object recovered from the Vratnica tumulus (**Figure 13**). This piece exhibits a recognizable anthropomorphic form and was found beneath a compacted layer of soil and clay. Its morphology suggests intentional shaping, although its precise function remains uncertain.



Figure 13. Sandstone ‘foot’ artifact recovered from the Vratnica tumulus terrace.

Another category includes tool-like objects, such as the sandstone implement shown in **Figure 14**. This artifact displays an ergonomic form and surface smoothing consistent with handling and repeated use. While the functional interpretation remains tentative, its morphology is consistent with that of handheld tools.

Paired sandstone objects interpreted as a possible grinding tool (**Figure 15**) represent a further example of lithic technology. The two components fit together and were found in close proximity, suggesting a functional relationship. Their

morphology and context support interpretation as part of a tool used for processing material, such as grinding or pigment preparation.



Figure 14. Sandstone tool recovered beneath soil and clay layers in the Vratnica tumulus.



Figure 15. Paired sandstone objects interpreted as a possible grinding tool, discovered near a dry-stone wall.

3.3. Evidence of Modification and Use

Evidence for lithic modification is not limited to portable artifacts but is also observed in situ within excavation contexts. Tool marks recorded on clay surfaces within the Ravne tunnel system (**Figure 16**) consist of repeated linear impressions and grooves, indicating the use of hand tools to shape or remove material.

Worked stone surfaces (**Figure 17**) display smoothing, planar faces, and angular edges that are not readily explained by natural erosion or fracture processes. These features include repeated linear grooves, smooth surfaces, and regular edges. Such characteristics are consistent with intentional modification and differ from irregular fracture patterns or erosion typically produced by natural pro-

cesses. Similarly, modified construction stones (**Figure 18**) exhibit surface treatment and shaping indicative of human intervention.



Figure 16. Tool marks observed on clay surfaces within the Ravne tunnel system.



Figure 17. Worked stone surfaces showing smooth finishes and sharp angular edges inconsistent with natural erosion.



Figure 18. Modified construction stone from the Ravne tunnel system context showing shaping and surface treatment.

A perforated sandstone object (**Figure 19**) provides additional evidence of deliberate modification. The presence of multiple drilled holes indicates controlled alteration of the stone, suggesting functional or technical use. The regularity of these features distinguishes the object from naturally perforated stone.



Figure 19. Perforated sandstone object showing deliberate modification, recovered from Ravne tunnel system context.

3.4. Contextual Associations

Lithic artifacts are frequently associated with other archaeological materials. In both surface and subsurface contexts, they occur alongside ceramic fragments, organic remains, and architectural features. This association indicates that lithic material is integrated within broader depositional processes rather than occurring as isolated finds.

In stratified contexts, lithic artifacts are embedded within sedimentary layers that also contain other materials, allowing them to be placed within a relative chronological framework. In mixed deposits, particularly within the Ravne tunnels, lithic artifacts occur alongside redeposited material, reflecting processes such as backfilling, collapse, and later environmental modification.

3.5. Summary of Observations

The results show that lithic material from the Visoko region:

- occurs across multiple sites and excavation contexts;
- is composed primarily of locally available sandstone;
- includes a range of forms, from simple fragments to shaped and carved objects;
- displays evidence of intentional modification, including carving, smoothing, and perforation;
- is associated with both surface structures and subsurface architectural features.

Taken together, these observations demonstrate that lithic artifacts form a consistent and significant component of the archaeological record in the Visoko region.

4. Discussion

4.1. Lithic Material as Evidence of Technological Activity

The lithic assemblage documented in this study represents a consistent category of material across multiple excavation contexts in the Visoko region. Unlike isolated or incidental finds, lithic artifacts occur in both surface and subsurface settings and are associated with stratified deposits, architectural features, and mixed sedimentary contexts.

In archaeological research, lithic artifacts are widely recognized as primary indicators of human technological activity, particularly in prehistoric contexts where organic materials are rarely preserved (Andrefsky, 2005; Odell, 2004). The presence of shaped, carved, and modified stone objects in the Visoko region aligns with this broader understanding. The observed characteristics—such as smoothed surfaces, defined edges, engraved lines, and perforations—indicate deliberate modification rather than natural formation.

The assemblage's diversity further supports this interpretation. Tool-like objects, grinding implements, carved stones, and perforated artifacts suggest a range of technological practices involving the selection, shaping, and use of stone materials (Voytek, 1997). Although the functional interpretation of individual objects remains tentative, the overall pattern indicates a sustained engagement with stone as a technological resource.

4.2. Early Phases of Human Activity

One of the key questions addressed in this study is the chronological significance of lithic material. While direct dating of individual artifacts has not been undertaken, their morphological characteristics and contextual associations provide a basis for interpretation.

These features show general similarities to ground-stone tools and simple implements documented in Neolithic contexts in Southeast Europe (Perić, 2000), particularly in relation to grinding surfaces and basic tool morphology (Perić, 1996).

In addition, lithic material recovered from stratified layers beneath compacted soil and clay deposits, such as those documented at the Vratnica tumulus, suggests that at least part of the assemblage may originate from early phases of human activity (Osmanagich, 2025).

At the same time, the presence of lithic artifacts in mixed and redeposited contexts indicates that these materials have been disturbed later. This is particularly evident within the Ravne tunnel system, where sediment infill includes material from multiple periods (Osmanagich, 2026a; Osmanagich, 2026b). As a result, lithic artifacts cannot be assigned to a single chronological phase with certainty.

Rather than indicating a discrete period of occupation, the lithic record points to the persistence of stone-based technology across different phases of site use. This interpretation is consistent with broader archaeological observations that lithic tools continue to be used alongside other material technologies in many historical contexts (Perić, 1996; Benac, 1979; Čović, 1983; Perlès, 2001).

4.3. Context and Deposition

The interpretation of lithic material depends in large part on its depositional context. In stratified settings, artifacts embedded within defined sedimentary layers can be associated with specific depositional phases, providing a relative chronology (Harris, 1989). In the Visoko region, such contexts are present in both surface trenches and subsurface profiles.

However, a substantial portion of the lithic assemblage derives from secondary contexts. Within the Ravne tunnels, sediment infill consists of a mixture of materials resulting from processes such as collapse, backfilling, and later modification of underground spaces. These processes have contributed to the mixing of artifacts from different periods within the same deposits.

While this limits the precision of chronological interpretation, it does not diminish the overall significance of the lithic material. Even when redeposited, lithic artifacts provide evidence for their presence within the broader landscape. The repeated occurrence of such material across different contexts suggests that stone-based technology formed a persistent component of human activity in the region (Harris, 1989; Goldberg & Macphail, 2006; Stein, 2001).

4.4. Lithic Technology and Landscape Use

The lithic evidence presented here extends beyond portable artifacts to include traces of technological activity within the landscape itself. Tool marks observed on clay and stone surfaces within the Ravne tunnels indicate the use of hand tools in the excavation or shaping of subterranean spaces. These markings, characterized by repeated linear impressions and grooves, provide direct evidence of tool interaction with the surrounding material.

In addition, the presence of worked stone surfaces and modified construction elements suggests that stone was used not only for tool production but also in architectural contexts. The shaping and placement of sandstone blocks, as well as the preparation of surfaces, indicate a broader technological system involving both small-scale tools and larger construction practices (Wright, 1992; Adams, 2014).

This integration of lithic technology with architectural features supports the interpretation of the Visoko region as a landscape shaped through sustained human activity. Stone materials were not used in isolation but formed part of a wider set of practices involving construction, modification, and use of both surface and subsurface environments.

4.5. Scope and Limitations

It is important to define the scope of the present analysis. The study is based on

macroscopic observation of lithic artifacts and their contexts, without detailed typological classification, microscopic use-wear analysis, or geochemical sourcing of raw materials. As a result, functional interpretations remain provisional.

In addition, the presence of mixed and redeposited contexts limits the ability to establish precise chronological sequences. While some artifacts may be associated with early phases of activity, including the Neolithic period, this attribution is based on morphological comparison and contextual association rather than direct dating.

These limitations are acknowledged, and the results should be understood as a descriptive and contextual synthesis rather than a comprehensive technological study.

4.6. Interpretation

Taken together, the available evidence indicates that lithic material from the Visoko region represents a consistent and meaningful component of the archaeological record. The presence of shaped and modified stone objects, combined with evidence of tool use and association with architectural features, supports the interpretation of sustained technological activity involving stone materials.

Rather than representing isolated or incidental finds, lithic artifacts occur across multiple sites, contexts, and depositional environments. This pattern suggests that stone-based technology formed an integral part of human activity in the region, particularly during early phases but continuing into later periods.

Within this framework, lithic evidence contributes to a broader understanding of long-term human presence in the Visoko region. When considered alongside ceramic assemblages and architectural features, it provides an additional line of evidence supporting the interpretation of repeated occupation and ongoing interaction with the landscape over extended periods.

5. Conclusion

The material presented in this study demonstrates that lithic artifacts form a consistent component of the archaeological record in the Visoko region. Although these artifacts were not the primary focus of excavation, they occur across multiple sites and contexts, including both surface and subsurface environments. Their presence in association with stratified deposits, architectural features, and mixed sedimentary contexts confirms their relevance for archaeological interpretation.

The lithic assemblage includes a range of objects, from simple fragments to shaped and modified stones, as well as tool-like forms and possible grinding implements. Evidence of intentional modification—such as carving, smoothing, perforation, and repeated tool marks—indicates that these materials were actively worked and used. In addition to portable artifacts, traces of lithic technology are visible in the modification of clay and stone surfaces within excavation contexts, particularly in the Ravne tunnel system.

While precise chronological attribution remains limited, the morphology and

contextual associations of several artifacts are consistent with early phases of human activity, including the Neolithic period. At the same time, the presence of lithic material in redeposited contexts reflects later processes of site transformation and reuse. Rather than representing a single phase of occupation, the lithic record points to the persistence of stone-based technology across multiple periods.

This study has approached lithic material as an independent line of evidence within a broader archaeological dataset. The results indicate that lithic artifacts contribute to the identification of early technological activity in the Visoko region and support the interpretation of long-term human presence. When considered alongside ceramic assemblages and architectural features, the lithic record strengthens the overall picture of sustained interaction between human populations and the landscape over an extended period.

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Data Availability

The data supporting the findings of this study were collected during archaeological fieldwork conducted between 2006 and 2025 in the Visoko region. Field documentation, photographs, and excavation records are maintained by the Archaeological Park: Bosnian Pyramid of the Sun Foundation and are available from the author upon reasonable request.

Ethical Approval

All archaeological investigations were conducted in accordance with applicable local regulations and professional standards for archaeological research.

Author's Contributions

The author was responsible for the conception of the study, coordination of field-work, analysis of the material, and preparation of the manuscript.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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