



Middle Pleistocene hominin presence in the Southern Iberian Plateau: Lithic assemblages from the Cueva de los Toriles site (Carrizosa, Castilla-La Mancha, Spain)

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ABSTRACT

The “La Mancha” area in central Spain has provided valuable insights into the Paleolithic sequence, particularly within the Upper and Middle Guadiana Basin. This study focuses on recent discoveries at Cueva de los Toriles, emphasizing its importance within the regional archaeological framework. The area’s Quaternary deposits have facilitated the identification of numerous Paleolithic sites, primarily yielding quartzite lithic artifacts. The Lower Paleolithic record—mainly documented on the terraces of the Guadiana River and its tributaries—is characterized by Acheulean assemblages dominated by large tools such as handaxes. In contrast, the Middle Paleolithic is marked by an increase in Mousterian sites distributed throughout the region, reflecting diverse lithic exploitation strategies, including discoidal and Levallois core reduction methods.

Cueva de los Toriles stands out for the exceptional preservation of its diverse lithic assemblage, despite disturbances caused by historical human activity. The site offers new insights into technological adaptations and cultural practices spanning from the Middle Paleolithic to recent historical periods, as evidenced by the coexistence of bifacial tools and agricultural implements such as threshing blades. The cave’s stratigraphy, though complex and partially reworked, reveals a multilayered sequence of occupation that presents both interpretive challenges and opportunities.

Overall, this study contributes novel data to our understanding of prehistoric occupation in inland Iberia. It underscores the significance of Cueva de los Toriles as a key site for investigating the long-term cultural evolution of human populations in the southern sub-plateau of the Iberian Peninsula.

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1. Introduction

The Southern Iberian Plateau has traditionally been explored through studies of fluvial terrace sites containing faunal and archaeological remains, as highlighted by Mazo et al. (1990) or Santonja et al. (2022). However, despite the abundance of Paleolithic archaeological material, no unequivocal evidence of sustained human occupation has been identified, as noted by previous authors (Santonja and Villa, 2006). This absence of well-defined archaeological contexts has hindered a comprehensive understanding of the territories between the Guadiana and Guadalquivir basins during the Paleolithic. The limited research in this area has also restricted the development of regional syntheses necessary to interpret the presence and behavior of early human populations. Although some efforts have been made, as indicated by Ciudad Serrano (2000), a significant gap in our knowledge remains.

This gap becomes even more evident in the Upper Guadiana Basin, a region distant from the last foothills of the Central and Iberian Systems (Arribas and Jordá, 1999; Jordá Pardo, 2008). Although around 70 sites with Pleistocene evidence (2.6–0.11 Ma) have been recorded in the area, only 14 exhibit known stratigraphic contexts, as reported by previous authors (Fernández et al., 2005; García-Martínez, 2019). Furthermore, only one site—Molino del Emperador, located on the +13/16 m terrace of the Guadiana River—has yielded an absolute date using Optically Stimulated Luminescence (OSL), as noted by Fernández et al. (2005).

The complex archaeological visibility in the region stems from two main factors (Fernández et al., 2005; García-Martínez, 2019). First, there is a marked scarcity of karstic systems (e.g., caves and sinkholes) that could naturally preserve archaeological and paleontological remains. Second, most Pleistocene finds come from alluvial plains that have been extensively altered by modern agriculture. Currently, cultivated land covers approximately 50 % of the territory (García-Martínez, 2019; García-Martínez et al., 2022). As a result, Paleolithic materials are often found on the surface, exposed in outcrops or mixed within plowed soils.

This situation poses significant challenges to establishing absolute chronologies for lithic assemblages. With rare exceptions, such as Molino del Emperador, most sites cannot be securely dated, limiting our ability to build broader cultural or chronological frameworks (Morín de Pablos et al., 2007). Moreover, the surface-level nature of these finds results in a scarcity of associated faunal remains, hampering paleoenvironmental and biochronological interpretations. To address these issues, intensified research is essential—particularly systematic excavations, the application of robust dating methods, and interdisciplinary collaboration—to enhance our understanding of the prehistoric occupation of the Upper Guadiana Basin.

The current bias in the archaeological record has led scholars to propose low levels of human occupation in this area, particularly between the Upper Paleolithic and the Early Chalcolithic (Ciudad Serrano, 2000; Moya-Maleno, 2006). However, these hypotheses—largely based on the absence of evidence—are falsifiable. Recent discoveries by various research teams have provided indisputable evidence of human presence in inland Iberia during the coldest phases of Marine Isotope Stage 2 (MIS 2) (Alcaraz-Castaño et al., 2015; de la Torre, I., & Calvo, 2023; Klein et al., 2023; Roquero et al., 2015; Sala et al., 2024).

Consequently, the limited Paleolithic archaeological record in the Southern Iberian Plateau is more likely a result of preservation and research biases than of a true absence of Pleistocene human populations. In this context, the recent discovery of lithic artifacts at the Cueva de los Toriles site (Carrizosa, Ciudad Real, Spain) is particularly significant. This study presents the results of the lithic analysis of the materials recovered from the cave and its surrounding area.

1.1. The Paleolithic in the Upper Guadiana Basin

The scarcity of scientific studies focused on the Pleistocene in the area does not imply the absence of archaeological sites; rather, these are

primarily documented through surface finds, as previously discussed. This pattern is largely a consequence of the region's abundant quartzite cobbles, which favored the development of open-air knapping areas (López et al., 2001, 2005). Quartzite was obtained from alluvial terrace deposits or directly from bedrock outcrops, such as the nearby site of Los Pizorros in Villanueva de los Infantes, currently under investigation (Díaz-Pérez et al., 2022). These sites predominantly date from the Lower Paleolithic to the Middle Paleolithic, with scarce evidence for Upper Paleolithic occupations in the study area.

Middle Pleistocene sites such as Puente Picón, Laguna Blanca, El Carmelín, Puente Pozuelos, and Puente Morena (Ciudad Serrano, 1986; López et al., 2001) are particularly important for understanding the earliest phases of human occupation in the Upper Guadiana Basin. These sites yield artifacts attributed to the Lower Acheulean, including bifacially worked cobbles and a growing typological diversity with the presence of trihedral picks, cleavers, and scrapers (Ciudad Serrano, 2000). The study of materials from these chronologies continues to develop with the presence of quartzite pebbles such as those found at the closeby Middle Pleistocene site of Ruidera (Ruidera, Castilla-La Mancha) (García-Martínez et al., 2022; Díaz-Pérez et al., 2024).

During the Middle Pleistocene, coinciding with Marine Isotope Stage 6 (MIS 6), several sites are associated with Middle Acheulean industries. These include Albalá (Arroyo and De La Torre, 2013; Demuro et al., 2024; Santonja et al., 1977), El Martinete (Santonja and Querol, 1983), and the +13–16 m terrace of Molino del Emperador, which has been dated by Optically Stimulated Luminescence (OSL) to between $153,867 \pm 12,448$ and $140,016 \pm 9,405$ years before present (BP, with 1950 as the reference year) (Fernández et al., 2005; López et al., 2001). These assemblages are characterized by classic amygdaloid handaxes, trihedrons, and cleavers, conforming to Tixier's typology (Ciudad Serrano, 2000; Tixier, 1956).

In MIS 5, between the Riss and Würm glaciations, Upper Acheulean industries have been identified at sites such as El Sotillo (Arroyo and De La Torre, 2013; A Ciudad Serrano et al., 1983; Ugarte Villalba and Baena Preysler, 2023) and Porzuna (Vallespí et al., 1985; Vallespí Pérez et al., 1979). The assemblage at Porzuna is particularly significant due to the abundance of handaxes and cleavers. Some researchers interpret this evidence as indicating a localized concentration of human occupations throughout the Bullaque River Basin, suggesting its use as a site for quartzite procurement, tool production, and game processing—activities that may reflect long-term settlement. Moreover, Mousterian industries documented at the site extend its use into the Middle Paleolithic.

During the Upper Pleistocene, there appears to be an increase in both population density and territorial expansion, as evidenced by the proliferation of Mousterian sites. In fact, the number of Mousterian localities—exceeding 70—surpasses those attributed to earlier periods (Fernández et al., 2005). In the study area, these assemblages are often classified as Mousterian of Acheulean Tradition (MTA), following classic terminology (GLASSON, 1958), which links them typologically to Upper Acheulean industries. However, recent research suggests a complex overlap between Acheulean and Mousterian traditions in the Iberian Peninsula between 300 and 100 ka BP, challenging linear models of cultural evolution (Arroyo and de la Torre, 2013). As such, assigning chronological phases based solely on the presence or absence of certain tool types may be misleading—despite a documented decline in handaxe frequency during the Mousterian (Moncel et al., 2011). Therefore, expanding the number of well-dated assemblages is crucial for refining the region's prehistoric chronology.

As previously noted, several sites in the region display clear Mousterian characteristics, including La Atalaya, Casa Calares, La Celada, Casa de los Castillejos, La Fonteva, La Raña, and El Vicario (Ciudad Serrano, 1986; López et al., 2001). These assemblages are marked by the dominance of discoid cores and a significant presence of the Levallois technique, alongside a varied toolkit comprising retouched flakes such as side scrapers, denticulates, and notched tools (Fernández et al.,

2005).

1.2. Geographical and geomorphological framework

The study area is located within the Upper Guadiana Basin, a geomorphologically distinct region positioned at the southeastern edge of the Central Plateau (the so-called “Southern Iberian Plateau”), which occupies a substantial part of the Iberian Peninsula. The territory is predominantly crossed by rivers belonging to the Guadiana drainage system, while fewer watercourses flow southward into the Guadalquivir Basin (Fig. 1). From a geopolitical point of view, this area is located between the Ciudad Real and Albacete provinces, in the local area known as “Campo de Montiel” (Serrano de la Cruz Santos-Olmo, 2013) in “La Mancha” historical area (Jessen, 1946).

From a geomorphological perspective, this area comprises a Mesozoic cover overlying the Palaeozoic formations of the Iberian Plateau (Jiménez Ramírez and Chaparro Sabina, 1989; Montero González, 2003). This unit is composed of two main lithostratigraphic layers: a lower Triassic layer made up of detrital sediments belonging to the Keuper facies, and an upper Jurassic layer consisting of carbonates, which have shaped the current landscape. The region’s nearly sub-horizontal, tabular structure gives it the appearance of a high plateau, now dissected by several rivers—most notably the Jabalón, Azuer, and Cañamares.

This extensive plain, carved into Jurassic carbonate rocks and known as the Ossa de Montiel Surface, has undergone significant karstification, resulting in sinkholes, caves, and other endokarst features with developments extending over several meters (González Martín et al., 1987; Rodríguez Fernández et al., 2015). It is in the southern sector of this surface that various archaeo-paleontological investigations have been carried out, with the partial results of these efforts forming the basis of

this study (Fig. 2).

The Cueva de los Toriles is located on the eastern slope of an area known as the Cañada del Pozo Hondo, where prior survey work has been conducted (García-Martínez et al., 2020). This intermittent stream drains into the Cañamares River on its right bank, a tributary of the Azuer river, itself one of the main tributaries of the Guadiana River. The cave forms part of a cluster of karstic formations that have been known since antiquity by the inhabitants of Carrizosa, the municipality to which it belongs. Traditionally, the cave has been used for recreational and leisure purposes by the local population, which led to the chance discovery of a notable fossil assemblage (García-Martínez et al., 2020), including two mustelid teeth that subsequently prompted further research in the area (Fig. 3).

In the Cañada del Pozo Hondo, travertine layers were deposited over Mesozoic carbonate rocks. These travertines were subsequently eroded, shaping the present-day morphology of the canyon. On one of its walls, within a level of suspended travertine deposits, the cavity known as the Cueva de los Toriles was formed. This small cave is partially infilled with Pleistocene and Holocene sediments (García-Martínez et al., 2020), which have been stratigraphically divided into two units: Tor I and Tor II.

Tor I consists of yellowish-brown sandy silt with gravel, and can be subdivided into at least three recognizable sub-layers. The deposit dips toward the cave entrance and is massive and poorly compacted, indicating a relatively recent chronology. Tor I lies above an erosional surface that truncates the top of Tor II.

Tor II is composed of grey carbonate-rich silt, distinguishable into three sub-layers in the current stratigraphic section. Similar carbonate deposits are also present on the cave walls, suggesting that this unit formed concurrently with the surrounding travertine layers. The sub-layers of Tor II also dip gently toward the entrance and are capped by

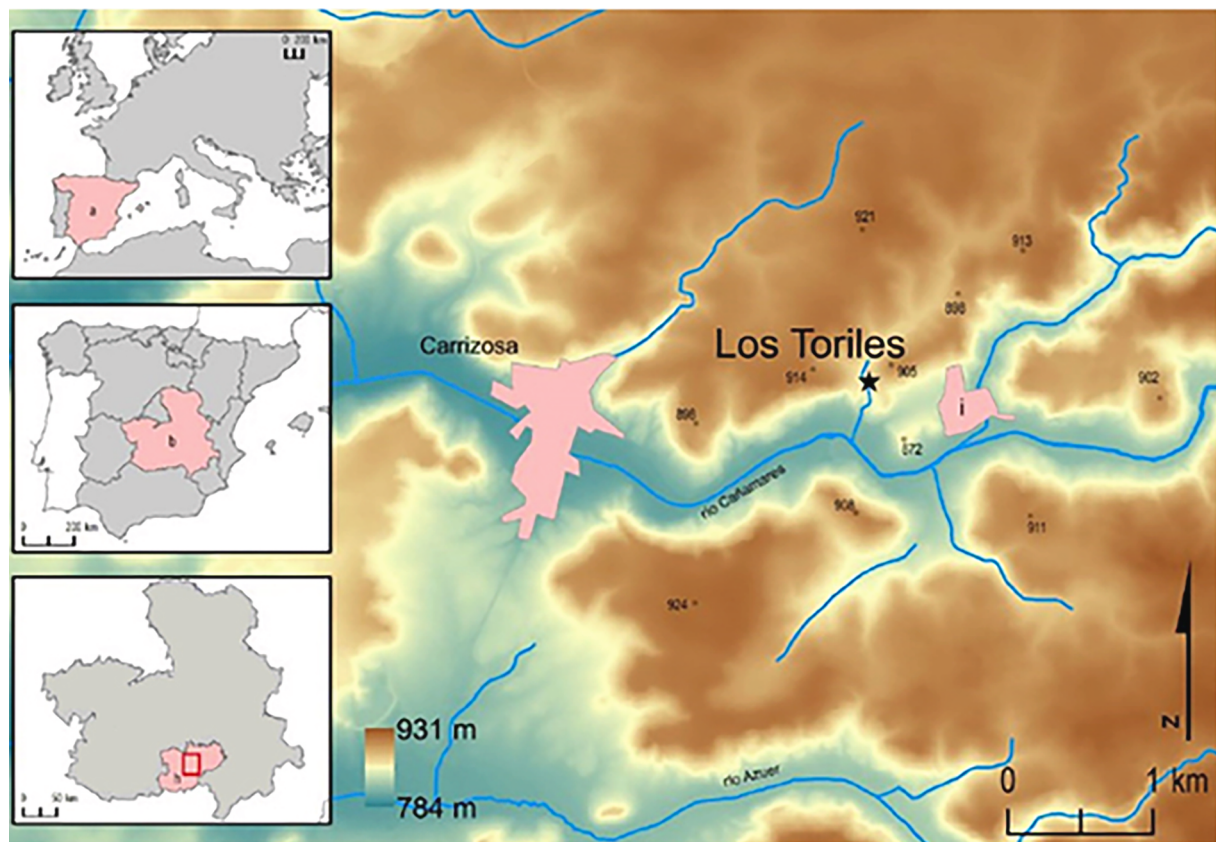


Fig. 1. Geographical location of the Cueva de los Toriles: (top left) Europe; (top center) the Iberian Peninsula; (bottom left) the Castilla-La Mancha Autonomous Community. The bottom-right panel shows a detailed color map indicating the site’s position between the two nearest towns. Adapted from García-Martínez et al. (2020).

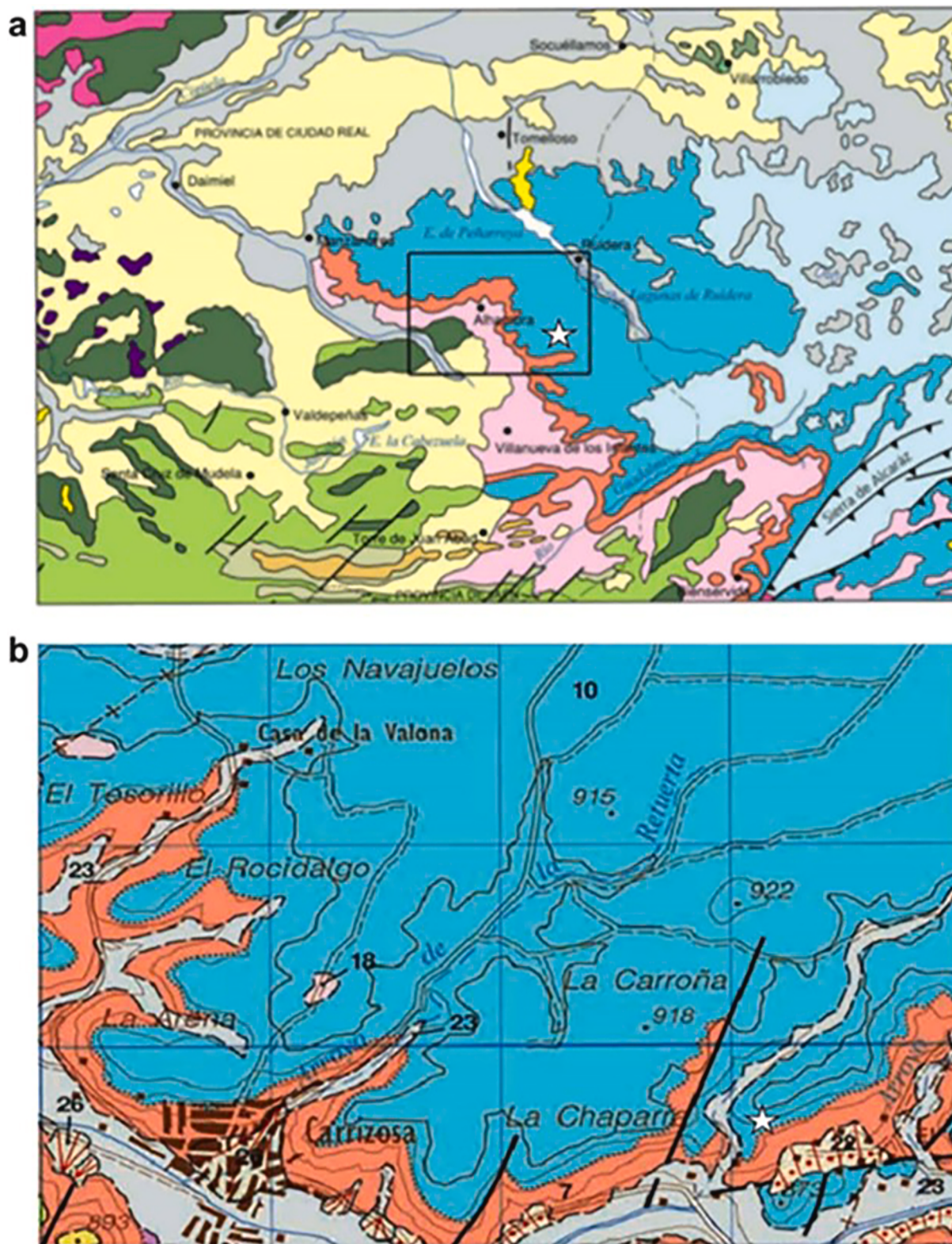


Fig. 2. Location of the Cueva de los Toriles, marked with a star, on regional geological maps from the IGME at two scales: (a) 1:1,000,000 and (b) 1:50,000. The cave is situated at the boundary between Jurassic (blue) and Upper Triassic (Keuper facies, red) formations. Adapted from García-Martínez et al. (2020).

a partially cemented yellowish crust at the top of each sub-layer.

1.3. Aims of this study

Despite the abundance of Paleolithic surface finds in the Southern Iberian Plateau, the region continues to lack stratified sites with well-

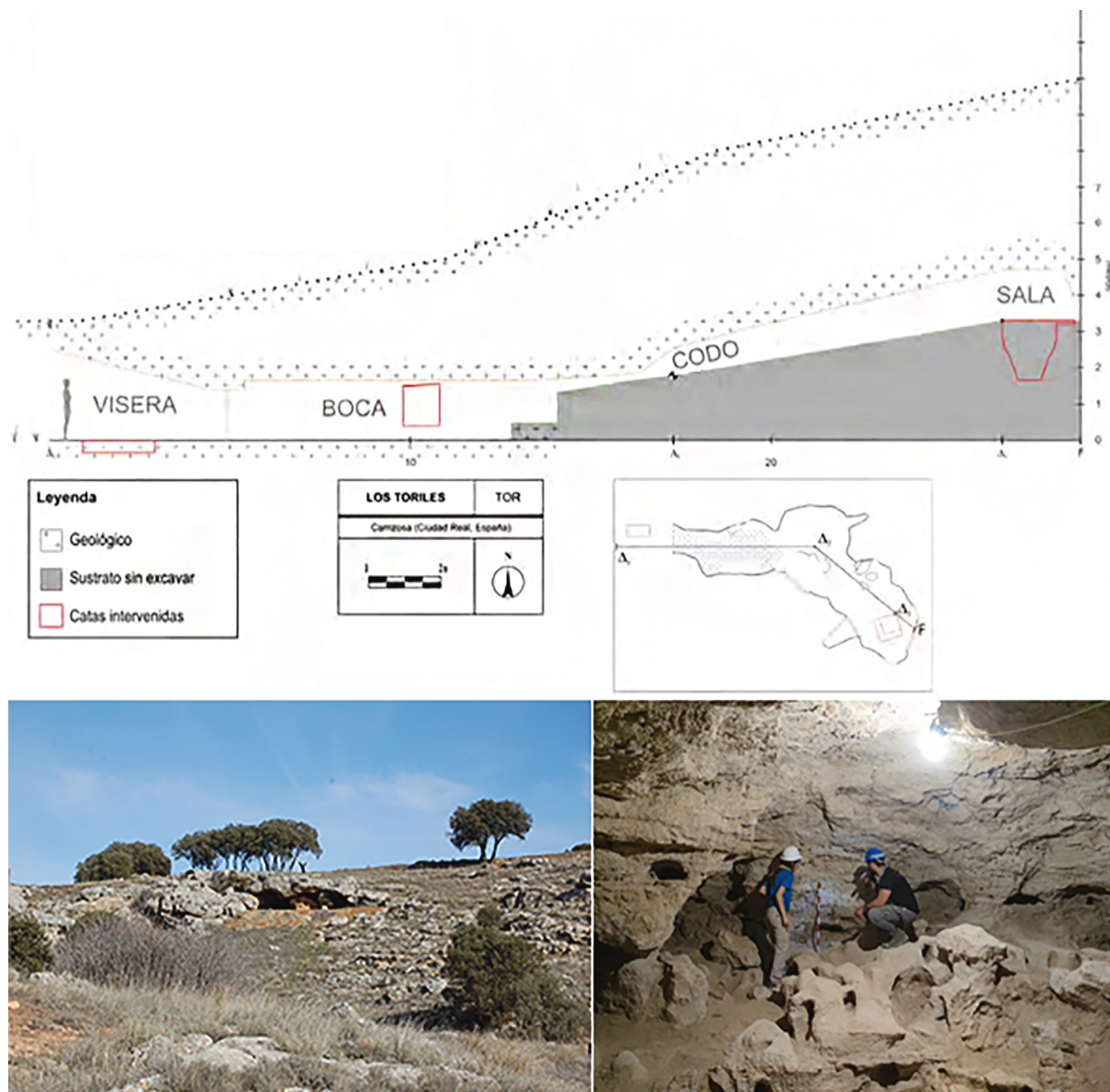


Fig. 3. Approximate section and plan of the Cueva de los Toriles (adapted from Moya Maleno et al., 2021). Bottom left: photograph of the cave entrance; bottom right: view of the interior chamber.

documented archaeopalaeontological records. This persistent gap has hindered the development of robust chronological and cultural frameworks for understanding human occupation in inland Iberia. The research conducted at the Cueva de los Toriles represents a significant step toward addressing this regional deficiency. Through systematic archaeological documentation and the application of Uranium-Thorium (U/Th) absolute dating to several lithic artifacts, this study provides one of the first securely dated contexts for Middle Pleistocene occupation in this understudied part of the Iberian Peninsula.

The aim of this study is to contribute to the growing body of evidence for Middle Pleistocene human presence in the Southern Iberian Plateau. This paper presents the results of archaeological surveys and excavations carried out at the Cueva de los Toriles and its surrounding area (Carrizosa, Ciudad Real), as part of a broader research initiative aimed at addressing the long-standing bias in the region's archaeological and palaeontological record.

Since 2019, four field seasons have been conducted at the site, yielding promising preliminary results. In addition to the recovery of Pleistocene faunal remains (García-Martínez et al., 2020), the

excavations have revealed evidence of human occupation spanning from at least the Middle Paleolithic (Megía García et al., 2020), through the Chalcolithic and Roman periods (Moya-Maleno et al., 2021), and continuing into modern times. These findings have prompted further survey work in the surrounding area to better understand the cave's environmental setting and the territorial features that may have influenced Paleolithic human occupation and mobility.

2. Material and methods

The surveyed area covers approximately 75,900 square meters in the vicinity of the Cañada del Pozo Hondo, with the cave located on its eastern slope. In addition to ceramic fragments recovered during the ongoing investigation (Moya-Maleno et al., in preparation), a total of 45 lithic artifacts have been collected. Of these, four were recovered from controlled excavations within the cave, in stratigraphically secure contexts, while the remainder were found during surface surveys in the surrounding area (Fig. 4).

A techno-typological analysis was carried out on all lithic artifacts. In

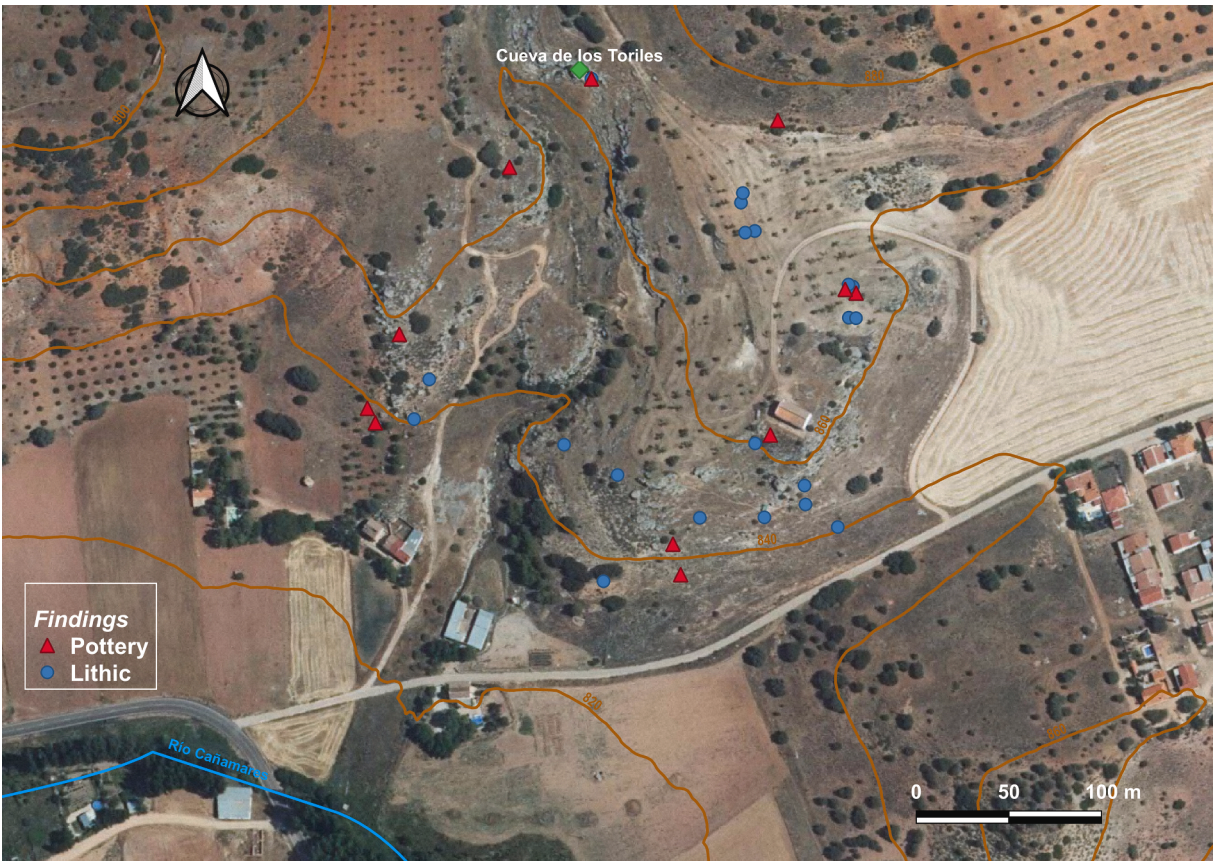


Fig. 4. Map showing the locations where pottery and lithic remains were recovered during surveys conducted outside the Cueva de los Toriles.

addition, standardized length and width measurements of the lithic artifacts were taken using a classic anthropometric caliper (Mitutoyo, Japan) in the Virtual Anthropology Laboratory of the Physical Anthropology Teaching Unit at the Universidad Complutense de Madrid. All measurements followed established protocols for lithic analysis, recording the maximum length and width of each piece to ensure consistency and comparability across the assemblage.

In addition, four specimens were subjected to absolute dating using the Uranium-Thorium (U/Th) series method, applied to the calcareous crusts formed by the precipitation of calcium carbonate on the surfaces of the artifacts. Furthermore, a fragment of speleothem was recovered during the survey. Given the rarity of such formations in the region and their potential to provide minimum ages for karstic features, the speleothem was also dated using the Uranium-Thorium dating method (Pourmand et al., 2014).

Finally, a fragment of speleothem (a stalactite) recovered during the survey was also analyzed. Isotopic ratio measurements and Uranium-Thorium quantification were performed using a dual-focusing magnetic sector mass spectrometer equipped with a multi-collector detector system and operating in inductively coupled plasma ionization mode (MC-ICP-MS Thermo NEPTUNE). Sampling was conducted on the calcium carbonate layer of the speleothem, from which a small superficial portion was removed, without affecting any of the archaeological pieces under study. The samples analyzed are the following: TOR20PR-4000, TOR20PR-4001, TOR20PR-4002, TOR20PR-4003, and TOR20PR-0001.

3. Results: The lithic assemblage from Cueva de los Toriles

3.1. Typological characterization

Geoarchaeological analyses were carried out at the Cueva de los Toriles to determine the mineralogical and petrological characteristics

of the site's lithic assemblage. The typological study was conducted in conjunction with lithological analysis to identify potential raw material procurement areas, both autochthonous and allochthonous.

The lithic assemblage from the Cueva de los Toriles comprises 39 quartzite artifacts, the predominant raw material, and 6 flint fragments, including the proximal fragment of a blade. All archaeological materials were recovered from the cave's main chamber, within stratigraphic units containing altered sediments. Due to the absence of a clearly defined context and the irregular distribution of the materials, each artifact was analyzed individually.

Nonetheless, the homogeneity of the quartzite and the presence of debitage flakes suggest a Paleolithic assemblage, while the flint artifacts were excluded from further interpretation. Typologically, the assemblage is composed of retouched tools, points, blades, and cores, accompanied by knapping debris (Table 1). The variability of the assemblage is further reflected in the size of the artifacts, which range from small and medium-sized flakes—including triangular flakes and retouched tools—to larger implements, such as quartzite hammerstones.

Table 1 Lithic assemblage from the Cueva de Los Toriles (Carrizosa, Ciudad Real).		
Lithic categories	N°. of pieces	Raw material
Handaxe	2	Quartzite
Handaxe fragment	1	Quartzite
Triangular flake	1	Quartzite
Simple flake	13	Quartzite
Retouched flake	5	Quartzite
Cortical flake	5	Quartzite
Flake fragments	14	Quartzite/Flint
Quartzite cobbles	2	Quartzite
Hammerstone fragment	2	Quartzite
TOTAL	45	

Different phases of the *chaîne opératoire* are represented in the lithic assemblage, including raw material procurement, core reduction, and the production of flakes and finished tools. The assemblage reveals a predominance of reduction strategies aimed at producing simple flakes and flake fragments, followed by a smaller proportion of retouched tools.

Among the retouched artifacts, three quartzite pieces are particularly noteworthy. One of the most relevant is a small bifacial fragment with a convergent morphology on a flake (Fig. 5a). Only a limited area of the lower surface is preserved, possibly corresponding to the ventral face of the original flake. The upper surface exhibits a convergent shape, with bifacial plano-invasive retouch on the left edge and unifacial scalariform retouch on the right. The platform area on the lower face is depressed, indicating preparation or impact modification.

The second specimen is a small, asymmetrical bifacial tool. The removal scars are small, flat, and terminate in step fractures at the distal ends of both faces. The quartzite used for this piece differs in quality from that of the first biface, displaying a sandier texture and fewer flake scars (Fig. 5b). On the left edge, a sequence of flat, invasive retouch scars converge toward the center of the piece, forming a bifacial, straight, and sharp edge.

The third artifact is a distal fragment of a bifacial piece, with flat removals directed toward the interior of one of its edges (Fig. 5c), suggesting shaping aimed at edge regularization or thinning.

In addition, the assemblage includes a triangular flake with a dihedral platform and direct retouch along both edges in a continuous distribution (Fig. 6). The left edge displays rectilinear retouch, while the right edge is concave in the mesial zone. The retouch is semi-abrupt, with a unifacial scalar morphology, consistent with shaping for cutting or scraping purposes.

The majority of the lithic assemblage is made from locally available quartzite, likely collected in the form of cobbles from the vicinity of the cave. Quartzite accounts for approximately 85 % of the analyzed sample, while flint artifacts, all recovered from inside the cave, represent the remaining 15 % (Fig. 7).

From a technological perspective, the assemblage displays considerable variability. The most common artifacts are simple flakes, which exhibit a range of platform types, including flat, faceted, and dihedral platforms.

Unfortunately, the lithic tools recovered from inside the cave were found in a disturbed context. Nevertheless, the quartzite artifacts do not exhibit significant post-depositional rolling or surface alteration, as the edges and ridges show minimal rounding.

During the cleaning of the upper stratigraphic layers, several flint artifacts were recovered that differ markedly from the quartzite material. These are small, patinated pieces, likely corresponding to threshing tools or gunflints, along with a single tool attributed to the Chalcolithic period. Some of the flint artifacts exhibit clear evidence of thermal alteration, including color changes, surface fissures, and the presence of pitted scars (Fig. 8).

Another type of alteration observed is the presence of a carbonate coating on several of the analyzed pieces. These carbonates are formed through mineral transformations that can significantly increase the silica concentration in interstitial waters.

3.2. Traditional measurements of the lithic remains

A biplot showing the relationship between length and width for the lithic assemblage (Fig. 9) illustrates the notable variability in artifact sizes recovered from *Cueva de los Toriles*. The scatterplot reveals a continuous distribution ranging from small flakes (length $\approx$ 10–20 mm; width $\approx$ 10–20 mm) to large bifacial tools (length up to $\approx$ 95 mm; width up to $\approx$ 70 mm). Thickness values, indicated by the color gradient, also show a broad range ($\approx$ 5–60 mm), with larger and wider artifacts tending to display higher thickness values. The overall distribution supports the interpretation of on-site knapping activities, with

products representing multiple stages of the *chaîne opératoire*. Average measurements across the sample are approximately 40 mm in length, 30 mm in width, and 20 mm in thickness, although the size spectrum is notably broad.

3.3. Uranium-Thorium (U-Th) dating.

The results of the Uranium-Thorium (U-Th) dating are presented in Table 2.

Sample TOR20PR-4000 corresponds to a 7×4 cm bifacial artifact made of amygdaloid quartzite, from which a sample was taken from the calcium carbonate (CaCO_3) patina on its surface. This sample yielded the most recent date in the series: $28,604 \pm 549$ years BP.

Sample TOR20PR-4001, taken from another amygdaloid handaxe, provided an older date of $158,694 \pm 429$ years BP. The production and use of small-sized amygdaloid bifacial tools appears to have been recurrent in the environment of the *Cueva de los Toriles* during the Middle Paleolithic.

Sample TOR20PR-4002 derives from a 6×4 cm quartzite flake with a carbonate crust. The U-Th dating of this sample yielded an age of $44,983 \pm 423$ years BP.

Sample TOR20PR-4003 corresponds to a 3×3 cm quartzite core also covered by a calcium carbonate crust. This is the oldest date obtained in the study, with a result of $180,680 \pm 1,513$ years BP.

Finally, the carbonate sample TOR20PR-0001 was taken from a peripheral portion of a speleothem, away from its central axis. The analysis produced a date of $141,406 \pm 369$ years BP.

4. Discussion and conclusions

The discovery of Paleolithic sites across the Southern Iberian Plateau is largely the result of systematic archaeological prospecting conducted on Quaternary terraces, where in situ lithic materials, mostly made of quartzite, have been documented (Ciudad Serrano, 2000; Santonja et al., 2022; Santonja and Redondo, 1973). These investigations have contributed to the establishment of a tentative but increasingly coherent Paleolithic sequence for the region, particularly along the Guadiana River and its tributaries.

In the Upper and Middle Guadiana Basin, evidence of human activity during the Early Pleistocene is sparse and largely limited to isolated lithic finds on high terraces. By contrast, the Middle Pleistocene signals a significant expansion of hominins (of unknown taxonomical attribution) in the area (de la Torre Sáinz, 2006). Most documented Lower Paleolithic sites—such as El Sotillo, Albalá, El Martinete, and Porzuna—are open-air and consist predominantly of Acheulean assemblages, including handaxes, picks, trihedral tools, and retouched edges. These artifacts are typically surface finds and are often derived from terraces between + 6 and + 16 m, associated with fluvial dynamics of the Guadiana and its tributaries (Arroyo and De La Torre, 2013; A Ciudad Serrano et al., 1983; Santonja and Querol, 1983; Vallespí et al., 1985).

The number and spatial distribution of Mousterian sites exceed those of the earlier Acheulean phases (Fernández et al., 2005; Lopez et al., 2001; Santonja et al., 2022). These are found along tributary valleys, endorheic lagoon margins, and even in upland areas distant from active river channels. Chronologically situated between Marine Isotope Stages (MIS) 5 and 3, these assemblages often reflect discoid, Levallois, and multidirectional core reduction strategies, producing simple flake tools—frequently retouched—and exploiting local quartzite sources.

In this regional context, the *Cueva de los Toriles* stands out as a rare stratified site and the only known cave with Middle Pleistocene deposits in the area (García-Martínez et al., 2020). Most Paleolithic sites in the Guadiana Basin are located on alluvial terraces and lack associated faunal remains or well-preserved stratigraphy (Fernández et al., 2005). In contrast, the *Cueva de los Toriles* presents a sequence that includes Pleistocene faunal assemblages, Uranium-Thorium (U/Th) dates, and a lithic industry suggestive of both Acheulean and Mousterian

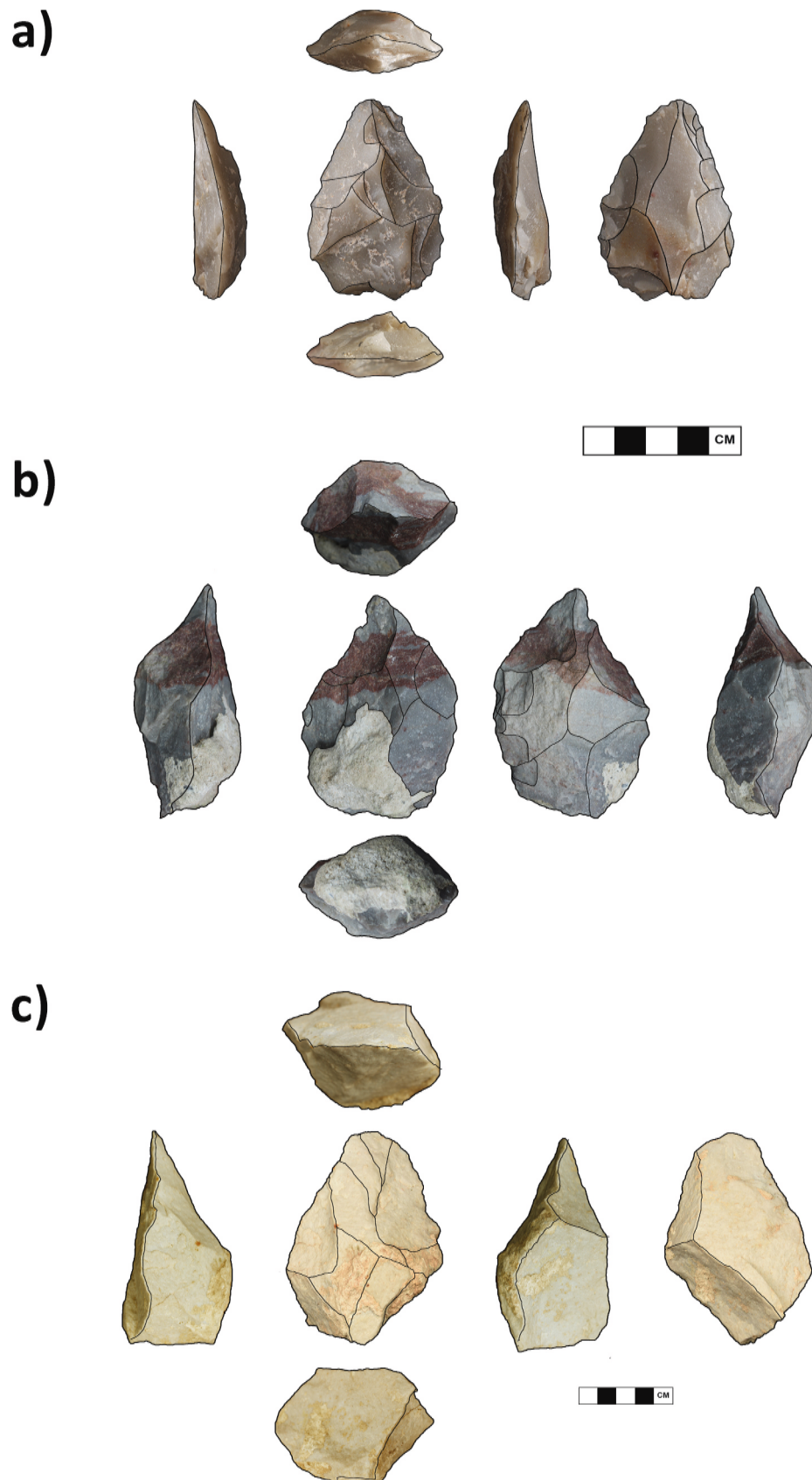


Fig. 5. Bifacial tools recovered from the Cueva de los Toriles (Carrizosa, Ciudad Real). The illustrated specimens correspond to handaxes and handaxe fragments made of quartzite.



Fig. 6. Triangular flake from the Cueva de los Toriles (Carrizosa, Ciudad Real).

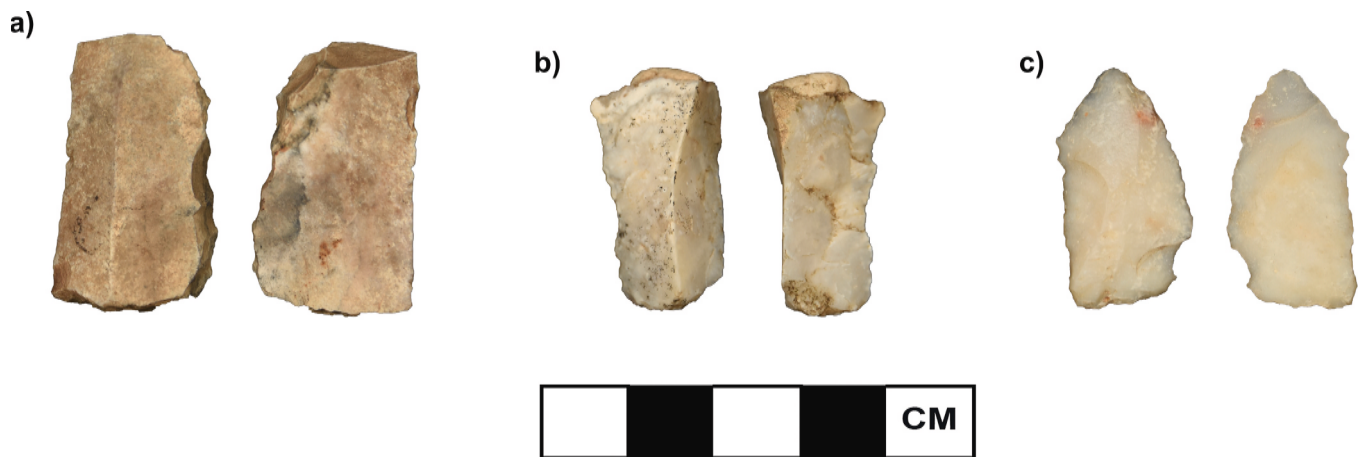


Fig. 7. Lithic artifacts recovered from inside the Cueva de los Toriles (Carrizosa, Ciudad Real). a) and b) Possibly fragments of threshing tools or gunflints; c) Fragment of heat-treated evaporitic flint (silex), a type commonly associated with the Chalcolithic period).

components.

Despite significant post-depositional disturbance—mainly due to modern reuse of the cave up to its closure in 2018—the lithic material from the Cueva de los Toriles shows minimal rolling or abrasion, supporting its relative in situ preservation. The presence of handaxes suggests a possible Acheulean attribution, while the existence of faceted platforms and small retouched flakes raises the possibility of a Mousterian occupation. However, the absence of cores complicates firm typotechnological assignment.

The use of quartzite as the main raw material aligns with regional trends, yet the absence of nearby primary sources in the immediate surroundings of the cave contrasts with the abundance of quartzite

cobbles at sites such as El Sotillo (Antonio Ciudad Serrano et al., 1983; Ugarte Villalba and Baena Preysler, 2023), highlighting potential raw material transport or provisioning behavior.

The stratigraphic complexity of the site—marked by reworked deposits and successive occupation phases—poses interpretive challenges. Nevertheless, the carbonate crusts on several lithic pieces and a speleothem sample have been successfully dated using U/Th methods, producing minimum ages that range from ~ 180 ka to ~ 28 ka, and anchoring the archaeological material within the broader Middle and Late Pleistocene sequence of the Iberian Peninsula. These are the first absolute dates for Paleolithic occupations in this part of the Upper Guadiana Basin (the so-called “La Mancha” area in the “Campo de



Fig. 8. Flint fragment recovered from the Cueva de los Toriles (Carrizosa, Ciudad Real), exhibiting color alteration, a cracked surface, and the presence of potlid scars, indicative of thermal exposure.

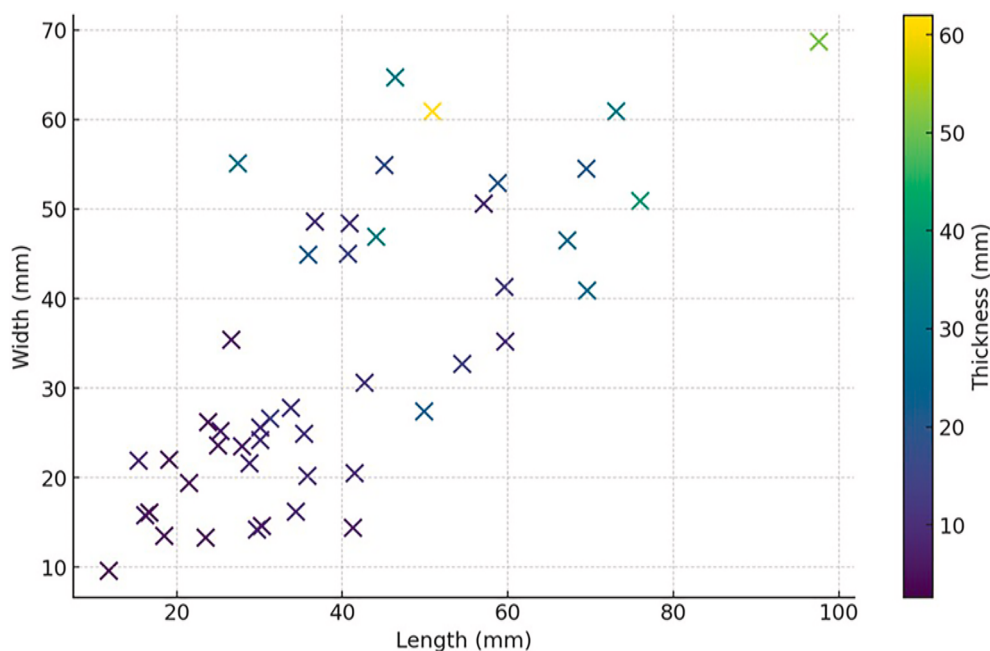


Fig. 9. Biplot showing the relationship between length and width (in mm) of the lithic artifacts from Cueva de los Toriles. Color gradient indicates thickness values (in mm), highlighting the variability in artifact dimensions across the assemblage.

Montiel" area), representing a major step forward in building a regional chrono-cultural framework.

Importantly, the Cueva de los Toriles contributes to reducing the long-standing geographic and historiographic bias that has left the Southern Iberian Plateau underrepresented in narratives of human prehistory (García-Martínez, 2019). Until recently, the central-Southern Iberian Plateau, and particularly Castilla-La Mancha province, had remained largely absent from models of Paleolithic settlement due to the scarcity of stratified sites and absolute dates. The Cueva de los Toriles, by providing a multi-phase sequence in a protected karstic context,

challenges this void and suggests that inland regions like the Upper Guadiana Basin played a more significant role in Pleistocene hominin occupation than previously acknowledged.

The archaeological potential of the site is underscored by the co-occurrence of lithic tools and faunal remains (García-Martínez et al., 2020; Megía García et al., 2020), allowing future studies to explore subsistence behaviors, site function, and environmental adaptation. Furthermore, the documented presence of Chalcolithic and Roman-period materials attests to the cave's long-term importance as a human shelter, reinforcing its value for studying diachronic occupation

Table 2

Results of the Uranium-Thorium (U-Th) analysis for the measured samples. All ages are expressed in years Before Present (BP), with 1950 as the reference year. Values in parentheses indicate the 2σ analytical uncertainty.

	TOR 20	TOR 202	TOR 203	TOR 204	TOR 205
Sample	PR-4000	PR-4001	PR-4002	PR-4003	PR-001
Lad-Id	SU-	SU-	SU-	SU-	SU-
	20205-3	20205-4	20205-1	20205-2	20205-5
SU-ID	SU477	SU478	SU475	SU476	SU479
²³⁸ U	81.8	73.9	63.4	72.0	36.9
[μg g ⁻¹]	(0.008)	(0.002)	(0.004)	(0.007)	(0.001)
²³² Th	34.9	107.4	91.5	109.0	1.3
[μg g ⁻¹]	(0.1)	(1.9)	(0.2)	(0.8)	(0.1)
²³⁰ Th/ ²³² Th	22.5	26.1	10.3	24.0	1309
x10-6					
[at/at]	(0.01)	(0.02)	(0.02)	(0.02)	(2)
δ ²³⁴ U	984.8	1,249.8	496.4	1,004.2	2,181
[med]	(0.2)	(1.2)	(0.07)	(0.09)	(3)
δ ²³⁴ Uinit	1,067.5	1,955.9	563.6	1,672.2	3,367
[estimated]	(0.2)	(1.9)	(0.08)	(0.15)	(4)
230Th/ ²³⁸ U	0.552	2.185	0.856	2.092	2.593
[act/act]	(0.008)	(0.002)	(0.004)	(0.007)	(0.0003)
²³⁰ Th	34,569	210,311	87,296	264,662	153,925
[y]	(574)	(460)	(594)	(2,772)	(1,000)
²³⁰ Th corr	28,604	158,694	44,983	180,680	141,406
[y]	(549)	(429)	(423)	(1,513)	(369)

(Moya-Maleno et al., 2021).

In conclusion, despite the challenges posed by disturbed sediments and limited artifact density, the Cueva de los Toriles represents a key site for understanding Middle Pleistocene occupations in the Southern Iberian Plateau. It offers a rare opportunity to construct a secure archaeological sequence for a region traditionally neglected in Paleolithic research, and paves the way for future interdisciplinary investigations that can clarify the role of the Southern Iberian Plateau in the broader context of human evolution in Western Europe.

Data availability statement.

All data necessary for the interpretation of this study are presented within the manuscript. Any additional information or supporting materials will be made available by the authors upon reasonable request.

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During the preparation of this work, the author(s) used ChatGPT (OpenAI) in order to assist with language editing, improve clarity, and enhance the readability of the manuscript and supporting documents. After using this tool, the author(s) carefully reviewed and edited the content as needed and take(s) full responsibility for the content of the publication.

CRediT authorship contribution statement

Sara Díaz-Pérez: Writing – review & editing, Writing – original draft, Formal analysis, Conceptualization. **Irene Megía García:** Conceptualization. **Rodrigo Paulos-Bravo:** Writing – review & editing, Writing – original draft, Conceptualization. **Gabriel Cifuentes Alcobendas:** Methodology, Investigation, Conceptualization. **Carlos A. Palancar:** Writing – original draft, Conceptualization. **Francesc Gascó-Lluna:** Investigation, Conceptualization. **Isidoro Campaña Lozano:** Investigation, Conceptualization. **Davinia Moreno:** Investigation, Conceptualization. **Fernando Jiménez Barredo:** Formal analysis. **Pedro R. Moya-Maleno:** Conceptualization. **Daniel García-Martínez:** Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization.

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Data availability

Data will be made available on request.

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