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PALEOLITHIC OCCUPATIONS AND LITHIC ASSEMBLAGES FROM FURNINHA CAVE, PENICHE (PORTUGAL)[1]

Ocupaciones paleolíticas e industrias líticas de la Gruta Furninha, Peniche (Portugal)

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Resumen: La formación de la Cueva Furninha, abierta actualmente sobre el mar, se relaciona con la plataforma de abrasión marina a cerca de 15 m sobre el nivel del mar. El llenado de un aven vertical, con cerca de 10 m de altura, existente en su interior es, por tanto, más reciente que aquel episodio marino, atribuido al último interglaciar (Breuil y Zbyszewski, 1945). La excavación, después de una primera intervención efectuada en 1865, fue realizada en 1879, prolongándose probablemente a principios de 1880, bajo la dirección de J. F. Nery Delgado (Delgado, 1884) y respetó las mejores normas científicas vigentes de la época, habiendo sido registrada cuidadosamente la estratigrafía y la posición de todas las piezas líticas y óseas recuperadas, que todavía hoy se conservan en el Museo Geológico y Minero de Lisboa. La secuencia pleistocena estaba constituida, en su base, por un nivel de cantos rodados, con escasos restos faunísticos, sucediéndose un espeso conjunto sedimentario, separado de los cantos de base por una costra estalagmítica mostrando discontinuidad en la sedimentación; esta sucesión estaba compuesta por siete niveles osíferos, separados por episodios de abandono constituidos por arenas eólicas. En el nivel 3 se ha recogido un grande bifaz de sílex, no rodado, del Achelense Superior. La tipología de las piezas de sílex asociadas se encuadra sobre todo en el Musteriense, evidenciando mixturas provocadas por las corrientes de circulación dentro de la gruta. Tales mixturas fueron señaladas por Nery Delgado y valoradas posteriormente por Joaquín Fuentes, que llevó a cabo una revisión de los materiales líticos, con la identificación de ejemplares musterienses (Fontes, 1916: Pl. 1), más tarde confirmada por Breuil y Zbyszewski (Breuil y Zbyszewski, 1945). La existencia de elementos musterienses, conjuntamente con materiales osteológicos, fue explicada debido a la existencia de indicios de la coexistencia de humanos con grandes carnívoros, principalmente la hiena rayada *(Hyaena hyaena prisca)* y un lobo de pequeño tamaño *(Canis lupus lunellensis)*, identificados por uno de los autores (Cardoso, 1993).

Prueba de esto es el hecho, subrayado por Fontes, de haberse recogido en el segundo nivel osífero la mitad de un radio de *Canis lupus* que no habrá sufrido un transporte destacable, mientras que la otra mitad se recogió 1,30 m más arriba, ya en otro nivel osífero. A pesar de ser cierta la existencia de indicios de movimientos en el sustrato, no hay lugar a dudas sobre la contemporaneidad del Musteriense con la hiena rayada en esta gruta.

Una datación por U/Th realizada en la Southern Methodist University (Dallas, USA) situó la formación de esta secuencia en 80880 (+42420; –31260 años) (Cardoso, 1993); a pesar del elevado grado de incertidumbre,

[1] Drawings by Filipe Martins. Photos by João Luís Cardoso.

este resultado es compatible con la atribución de la apertura de la gruta durante o después del MIS 5, así como con las industrias musterienses recogidas en ella.

La parte superior de la acumulación, correspondiente a un nivel con 1,5 m de potencia, estaba compuesta por arenas eólicas, finas y micáceas, correlativas del pleniglaciar (ca. 18000 años), cuando el litoral se encontraba alejado varios kilómetros, dejando al descubierto una vasta planicie litoral arenosa, barrida por el viento. Las escasas industrias recogidas en la cavidad y reconocidas como pertenecientes al Paleolítico Superior son asociables a esta última fase de llenado de la gruta, destacando diversas hojas de laurel solutrenses y unas hojas de dorso, así como una cuarentena de otras piezas separadas por H. Breuil y Zbyszewski en 1945 del conjunto lítico de la necrópolis neolítica posteriormente instalada en el interior de la gruta.

Más tarde, estas mismas piezas fueron incluidas en la síntesis sobre el Solutrense en el territorio portugués presentada por O. da Veiga Ferreira en 1962, identificando seis hojas con talla bifacial que atribuyó a aquella época. Jean Roche, en 1972, tuvo oportunidad de revisar estas mismas industrias, confirmando la existencia de los seis artefactos solutrenses referidos anteriormente; la presencia de un corto pedúnculo, en dos de ellos, constituye un argumento para que el autor admitiese la extensión del Solutrense de tipo levantino al litoral atlántico occidental. Esta interpretación fue discutida por J. Zilhão en 1997, que, basándose en los argumentos aducidos, considera que los dos ejemplares eran productos del Neolítico Final o del Calcolítico, al mismo tiempo sin negar la autenticidad de un foliáceo como solutrense, ni la asignación de otros dos artefactos al Paleolítico Superior. No habiendo procedido a la revisión sistemática del material disponible del Paleolítico Superior, únicamente le fue posible concluir la frecuentación "extremadamente esporádica" de la cavidad durante el Paleolítico Superior, en el transcurso del Solutrense y, posiblemente, del Gravetiense.

Esta conclusión ha sido profundamente alterada con el estudio exhaustivo de los materiales que se realiza en el presente trabajo.

De hecho, el conjunto analizado en el presente estudio excede con creces las escasas decenas de piezas consideradas como pertenecientes al Paleolítico Medio y Superior por H. Breuil y G. Zbyszewski, con un total de 389 piezas provenientes de contextos del Paleolítico Medio y Paleolítico Superior, siendo en su mayoría de este último periodo. El conjunto está constituido por 221 lascas, 73 láminas, 6 lamelas, 4 núcleos o restos de núcleo, 34 restos de preparación y mantenimiento del núcleo, 3 residuos de buril, 3 piezas con evidencia tecnológica de trabajo bifacial y una azagaya en hueso, fracturada en su ápice.

El análisis de estos materiales demuestra la presencia de una ocupación humana durante el Paleolítico Medio, con una industria constituida por materiales típicos de esta fase, concretamente raspadores, denticulados y muescas, así como núcleos discoideos. Los talones de los soportes son frecuentemente marcados por preparación de tipo diedro y polifacética con raros casos de presencia de *chapeau de gendarme*.

Sin embargo, y contrariamente a lo que afirma Zilhão (1997), la mayoría de los materiales líticos apunta hacia una ocupación bastante intensiva de la cavidad y con una cronología larga durante el Paleolítico Superior: la presencia de hojas de cierta dimensión, a veces con cresta, recuerdan a los materiales referenciados por Zilhão (1997) en Vascas y Vale de Porcos (ambos en Rio Maior, Santarém) o por Bicho (2005) en la Quinta do Sanguinhal (al Sur de Rio Maior, Santarém) y atribuidos por este último al Gravetiense. La presencia de una hoja de doble dorso parcial, recordando a una punta de La Gravette atípica, confirma también la presencia de una ocupación gravetiense. Naturalmente, el conjunto relativamente amplio de buriles, parte de ellos bastante finos y sobre soportes alargados, indica la presencia de un Gravetiense final, tal vez semejante al del sitio de Rio Maior de Picos, cerca de la localidad de Azinheira (Rio Maior, Santarém).

El conjunto de varias piezas foliáceas bifaciales en varias fases de acabado, así como de dos lascas de adelgazamiento bifacial confirman claramente la ocupación de la Gruta Furninha durante el Último Máximo Glaciar por los cazadores-recolectores del Solutrense. La presencia de dos puntas pedunculadas, de las que infelizmente sólo se conservan los dibujos publicados en 1884 por Nery Delgado, y las fotos presentadas por Breuil y Zbyszewski en 1945, al contrario de lo que afirma Zilhão (1997) que las atribuye a periodos más tardíos de la Prehistoria, hace sospechar que las tendencias estilísticas y tecnológicas del Levante español llegaron a un sitio más de la fachada atlántica portuguesa. Tal es el caso de Vale Boi en el Algarve, o de las puntas del mismo tipo de las Grutas do Caldeirão o de la Casa da Moura, que presentan dimensiones semejantes a estas dos piezas hoy desaparecidas.

Quizás el aspecto más interesante del presente análisis es la presencia de un conjunto de piezas que incluye algunas lamelas y núcleos para extracción de lascas y de lamelas, y que visiblemente sugieren la presencia de una ocupación Magdaleniense durante el Tardiglaciar de la Península de Peniche. Aunque marcada por un conjunto relativamente pequeño de piezas, parece claro que estas laminillas y los núcleos de tipo ortogonal, muy característicos del Magdaleniense de Rio Maior y también del Algarve, por sus dimensiones reducidas y extensa utilización en un nivel de desgaste del bloque, sirven como fósiles-directores de la última ocupación paleolítica de la Cueva Furninha.

Puede afirmarse que la Cueva Furninha tuvo una ocupación humana, que probablemente habrá comenzado en el MIS 4 y que se prolongó durante las dos fases siguientes, hasta el final del Pleistoceno. La presencia de varios materiales musterienses, aunque en número reducido, puede significar que la presencia de neandertales en el local se dio hasta épocas bastante tardías, como es el caso de otros sitios del Sur de la Península Ibérica, aspecto que esperamos poder confirmar con resultados de determinaciones de Radiocarbono que aguardamos.

En conclusión, la ocupación de Furninha durante el Paleolítico Superior, al contrario de lo que se pensaba anteriormente, fue bastante larga e intensa, como se puede verificar por la diversidad de la tipología de los núcleos e instrumentos retocados, aunque haya habido una criba, debido también a la metodología de la excavación. En todo caso, los materiales aquí presentados indican la presencia de sucesivas ocupaciones humanas durante el Gravetiense, el Solutrense y el Magdaleniense, perfectamente encuadrables en lo que se conoce de la Extremadura portuguesa y del Algarve, conclusión que tiene tanto más interés y actualidad, en el año en que se cumplen ciento treinta años sobre la fecha de explotación de esta notable estación arqueológica.

Palabras clave: Musteriense. Gravetiense. Solutrense. Magdaleniense. Portugal. Furninha. Nery Delgado.

ABSTRACT: Furninha Cave was the object of a very early paper by Nery Delgado in 1884. The description of Pleistocene lithic and faunal materials implied that there had been a Paleolithic occupation in the cave. That was confirmed by the later work of Breuil and Zbyszewski in 1945, where they attributed those materials to the Middle and Upper Paleolithic. Some 30 years later, O. da Veiga Ferreira (1962) and J. Roche included some of the Furninha materials in their own synthesis of the Portuguese Solutrean. By the end of the century, J. Zilhão (1997) excluded most materials attributed by Breuil and Zbyszewski to the Upper Paleolithic, stating that this occupation was highly ephemeral and those materials thought to be Upper Paleolithic were, in fact, Neolithic or later.

With the present study, with a new and complete revision of the lithic paleolithic assemblages in a total of 389 artifacts, the presence of Mousterian, Gravettian, Solutrean and Magdalenian occupations in Furninha were clearly demonstrated.

Finally, we also present a new interpretation based on the lithic analysis and a reanalysis of the cave stratigraphy, and the attribution of the different materials to the original bone beds described by Nery Delgado in 1880. This interpretation indicates that the original field work was of great quality, and that the stratigraphical mixing thought to have happen by most researchers, including Breuil, Roche and Zilhão, most likely did no take place and the cave was kept essentially pristine up to the moment of the complete excavation by Delgado.

Key words: Mousterian. Gravettian. Solutrean. Magdalenian. Portugal. Furninha. Nery Delgado.

1. Research history

Joaquim Filipe Nery da Encarnação Delgado (Elvas, 26th of May, 1835 – Figueira da Foz, 3rd of August, 1908), military engineer, geologist and archaeologist, was from very early on, starting in 1857, part of the Second Geological Commission of Portugal. There, he developed a notable carrier, with successive promotions in the military organization reaching the position of Lt. General.

His research in geology, in the Commission, was abandoned 51 years later when death took him over in 1908, still in full time activity, due to a double pneumonia caught during field work as the Director of the National Geological Services of Portugal.

As an archaeologist, his contribution to the European research was remarkable and of the highest quality. His work in 1865 at Casa da Moura Cave (Óbidos), published in 1867 in a magnificent monograph that shows the care, quality and precision of the data observation and recording, matching the best at the time (Delgado, 1867) is a perfect case to illustrate his contribution. Another example is the cautious and detailed study of Furninha Cave, which excavation he directed during 1879 and the beginning of the following year. The results were presented in that same year at the IX International Congress of Anthropology and Prehistoric Archaeology, held in Lisbon in 1880, where he was the Vice-President, and published in the proceedings (Delgado, 1884).

Nery Delgado, together with Carlos Ribeiro and Francisco Pereira da Costa, is the symbol of the emergence and development in Portugal of the scientific prehistoric archaeology. It was closely related to the geological research, from which he used some methodology, as it can be seen in the early field work and publications during this early period.

In the first report of the Geological Work relative to the economic year of 1879-80, published by Imprensa Nacional (The National Governmental Publisher) in 1881 (pp. 19 and 20) it is stated:

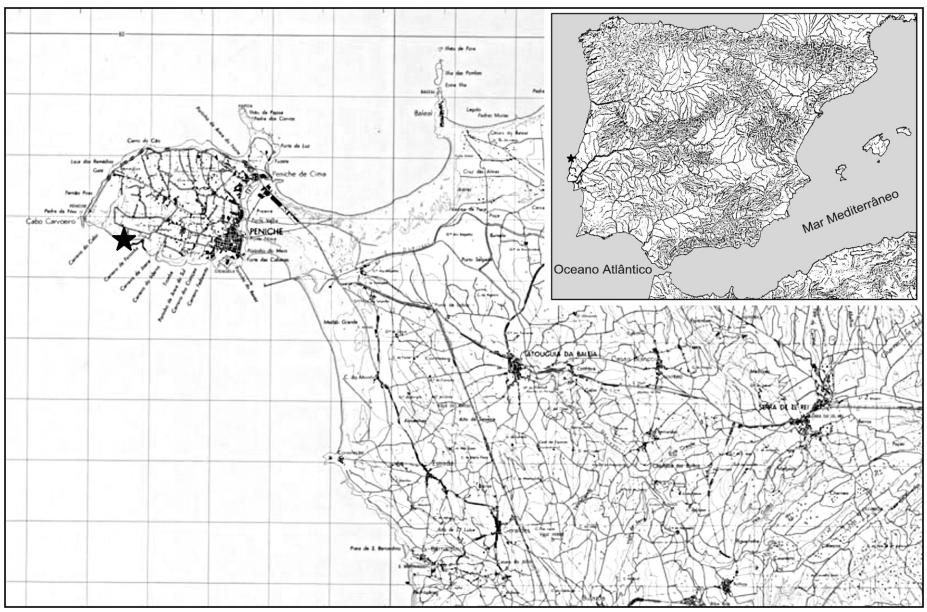

FIG. 1. *Map of the Peniche peninsula with the location of Furninha Cave.*

"The adjunct to the Commission, Major Nery Delgado, in the first two months of this economic year, was busy collecting fossils and putting together the figures that should accompany the description that he had started of the Silurian land of Alentejo, after which, on the beginning of the month of September, he was entrusted with the supervision of excavation of various caves, starting by those in Maceira, which were of little productivity, and then those of Cesareda and Peniche, from where in 1866 there were already clear evidence of having been used as habitation during Neolithic times. Unfortunately, the collections obtained then did not go to the geological section of the museum, but were transferred in 1869 to the Polytechnic school together with the paleontological collections from the old Geologic Commission, which obligated to execute that work as nothing had taken place before. Meanwhile, the first exploration of these caves, carried out thirteen years ago, was highly productive resulting in a memoire that the same official published then on the subject, while the more recent explorations exceeded the most demanding expectations due to their importance and number of collected objects.

In the Peniche Cave (Fig. 1), which was completely excavated, besides the objects from the top deposit or the Neolithic epoch, which reveals well the main habits of the tribe who had inhabited the cave during that period, in the lower deposit and in successive levels separated by intervals during which the water deposited in the cave representatives of partially extinct fauna, but contemporaneous of man, as it is proven by the presence of numerous bone flakes fractured longitudinally, associated with flint flakes and some other tools of this same type of material, where it is patent an intentional action or intervention of a intelligent being […]. As field work, this official made some short time excursions to these sites where cave exploration was carried out and that it is his obligation to inspect".

This long description, along with the conclusion that Nery Delgado was not present permanently in the various excavations, indicates that there were precedents that justified the 1879 work in the caves. It was exactly in that same year that the work started in Furninha, contrarily to what M. Diniz (1994) has stated, arguing that the cave was explored in 1865 based on the dates of Agust 21st, 1865, written on some artifacts (confirmed by the present analysis on two Mousterian artifacts). These were certainly collected previous to Delgado's field work in 1879.

Thus, the importance of the archaeology in the cave was well known by the Geologic Commission whose director, eager to show those results to the world renowned scholars meeting in Lisbon at the IX session of the International Congress of Anthropology and Prehistoric Archaeology in 1880, charged Nery Delgado of the cave excavation, very much in the same fashion to what took place in other Estremadura caves. He was, however, far from guessing the true importance of the deposit of Furninha.

Another aspect that needs to be highlighted, and that the text refers to, is the mention to intentionally modified animal bones in the lower deposits, some of which were drawn and published (Delgado, 1884), aspect that only much later was confirmed in other Portuguese Mousterian sites. Although the intentionality of those bone fractures, in the case of Furninha, is disputable, Nery Delgado had the merit to call attention, for the first time, for such issue.

Joaquim Fontes (1917) based on information by Delgado, reached the following conclusions concerning the cave stratigraphy:

"1.º L'Homme et l'Hyène rayée ont été contemporains à Furninha, comme le prouve l'existence d'outils paléolithiques de silex et d'os, mélangés avec des osssements de ce quadrupède.

2.º L'examen de la dépouille industrielle de Furninha démontre l'existence de deux industries paléolithiques : la chelléenne et la moustérienne.

3.º À côté des objects de facies moustérien, on a trouvé des os taillés par l'Homme".

Thus, the Furninha lithic artifacts were later classified as Middle Paleolithic by Joaquim Fontes (Fontes 1923) and shortly afterwards confirmed by H. Obermaier (1925).

H. Breuil, during his second trip to Portugal, in 1918, refers already to the presence of some Paleolithic artifacts: "Au niveau de 7 m, correspond le coup de poing d'aspect cheléen, et des éclats et lames de sílex et de quartz laiteux d'aspect moustérien; au niveau de 6 m, paraissent des éclats de silex tut-à-fait inutilisables. A 4,2 m, se retrouvent des éclats de quartzite d'aspect plutôt moustérien, et à 4 m, une lame moustérienne typique" (Breuil, 1918: 37). The necessary conclusion is that, up to then, Upper Paleolithic materials had not been recognized in Furninha. These had to wait for Breuils' third trip to Portugal between the spring of 1941 and the fall of 1942. The revision of the lithic assemblage from Furninha by Breuil and Zbyszewski (1945) resulted in the attribution for the first time of a set of around 40 artifacts to the Upper Paleolithic. This assemblage was separated from both the Mousterian and the Neolithic. In fact, the latter set includes materials from Early and Late Neolithic and Chalcolithic, to which likely belongs the fragment of the bone recipient, mentioned before, and published in one of the figures by Pereira da Costa. The identification of the Upper Paleolithic by the French and Polish authors was certainly aided by the work carried out by Heleno in the Rio Maior area (Santarém), as themselves stated "plusieurs groupes et probablement plusieurs niveaux du Paléolithique supérieur, y compris le Solutréen absolument typique, tous, jusqu'à cês importantes recherches, absolument ignorés" (Breuil and Zbyszewski, 1945: 44). Thus, the Rio Maior research permitted the establishment also in Furninha of the presence of Upper Paleolithic materials, including cores, non-retouched and retouched blades, burins, and 5 Solutrean points, some of which were published in the form of photographs. These artifacts were collected by Delgado in the top levels, while some of the Mousterian artifacts come from lower levels, confirming the information by Joaquim Fontes of the contemporaneity of humans and hyenas, though probably the occupation of the cave was not simultaneous, very much like in Figueira Brava (Setúbal) and Columbeira Cave (Bombarral) (Cardoso, 2006).

More recently, O. da Veiga Ferreira (1962) and J. Roche (1974) both writing on the Portuguese Solutrean, acknowledged the presence and importance of two stemmed points, similar to some found in the Spanish Levantine region and to those very common in southern Portugal (Bicho, 2009). These bifacial Solutrean projectiles were also compared to those found in Casa da Moura, located only some 6 kms away from Furninha, which Roche (1974: 86) interpreted as the spread of the Solutrean Levantine facies to the Portuguese Atlantic coast.

The most recent work on the Furninha material was that of J. Zilhão (1997) for his doctoral research. Although he never actually saw them since they were stolen from the Museu Geológico, this author rebutted the attribution of those two stemmed points to the Solutrean, stating that they are, in fact, of Neolithic or Chalcolithic age. At the same time, Zilhão considered the Upper Paleolithic occupation of Furninha very ephemeral, since he attributed to that period only three artifacts: a laurel leaf point, one of the six published by Breuil and Zbyszewski in 1945; a Gravette point; and a dihedral burin without any indication of chronology. The other artifacts attributed to the Upper Paleolithic by Breuil and Zbyszewki were said by Zilhão, after a quick view of them at the

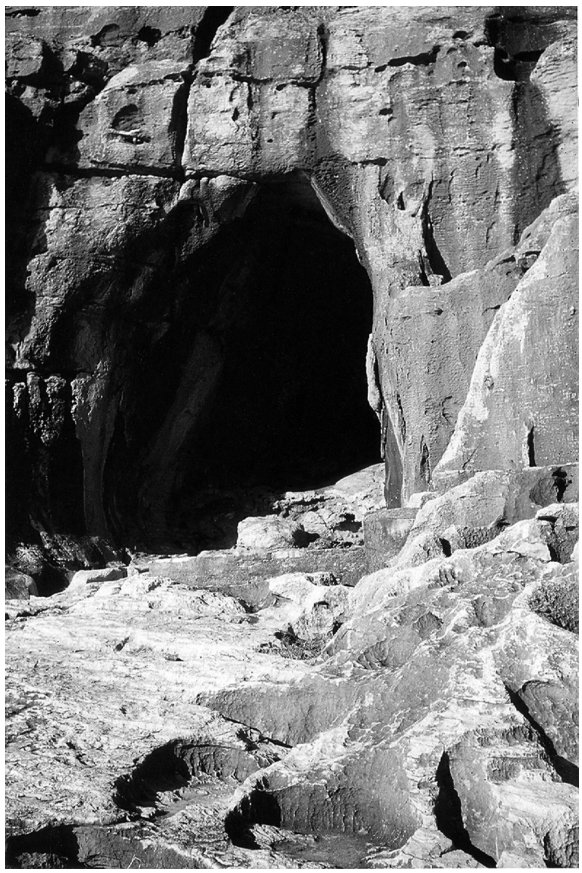

FIG. 2. *Photograph with the Furninha Cave entrance.*

Museum trays where they were placed in the 40's, to belong to the Neolithic together with those "on Museum display" (Zilhão, 1997: 591). His conclusions will be refuted in the present study, based on a complete and detailed analysis of all the materials present today in the Museu Geológico, confirming that there are, in fact, unequivocal evidence for frequent human occupation during the Middle and Upper Paleolithic in Furninha.

2. Geology and Chronostratigraphy

From the geologic point of view, Furninha cave (N 39º21'23"; W 9º 26'14") is a karstic cavity open in Lias limestone, forming a littoral scarp at the southern edge of the Peniche Peninsula. The Peninsula, with a tabular topography, represents an erosional surface that was submerged in times of high sea stands during the Pleistocene, and connected to the main land during cold phases or, as today, by a narrow sand tombolo during low sea stand phases.

Along the southern peninsula face, there is evidence for the presence of various marine levels based on the existence of small erosional platforms or detritic deposits in small cavities at different elevations. The 15 m marine beach level, formed during the last Interglacial, is represented in front of the cave by a clear erosional platform (Fig. 2). Most likely, it was during this phase that the opening of the cave occurred, due to marine erosion while the subsequent sea level drop was responsible for the formation of the vertical shaft found inside the cave. The bottom of this shaft was filled with a conglomerate that is related to the 5-8 m marine beach level found also outside the cave.

The cave with some 30 meters of length is marked by horizontal ramifications (Fig. 3); following the U shaped entrance, it continues into a corridor with N-S orientation for about 9 meters and 3 meters wide. This corridor ends in the main chamber; in the opposite side of this chamber, there is a short and narrow corridor that leads to another small oval chamber.

There are two main sedimentary complexes in the cave, both fully excavated by Delgado. The top deposit, corresponding to the Neolithic necropolis, is characterized by a sandy texture, like the under laying deposit, but it is very dark and rich in organic matter, and with some faunal remains, some of which might have come from the lower deposit (Breuil and Zbyszewski, 1945).

The excavation of the sediments in the narrow corridor between the two chambers and the sediments from the 3-4 meters wide shaft with almost 9 meters in depth, compose the lower deposit, dated to MIS 4 , 3, and 2. Most mammal remains uncovered by Delgado came from there, as well as many lithic artifacts, including the Mousterian ones now at the Museu Geológico. The lower deposit, below the 1 m thick organic sands with the Neolithic, had 7 bone beds, where the preservation is excellent, though there is some evidence of manganesian deposition on the surface of some bones. The bone content of each bed is very uniform, corresponding "à une seule faune" (Harlé, 1910/11: 39).

From bottom to top, based on Delgado's description (1884) the cave stratigraphy is:

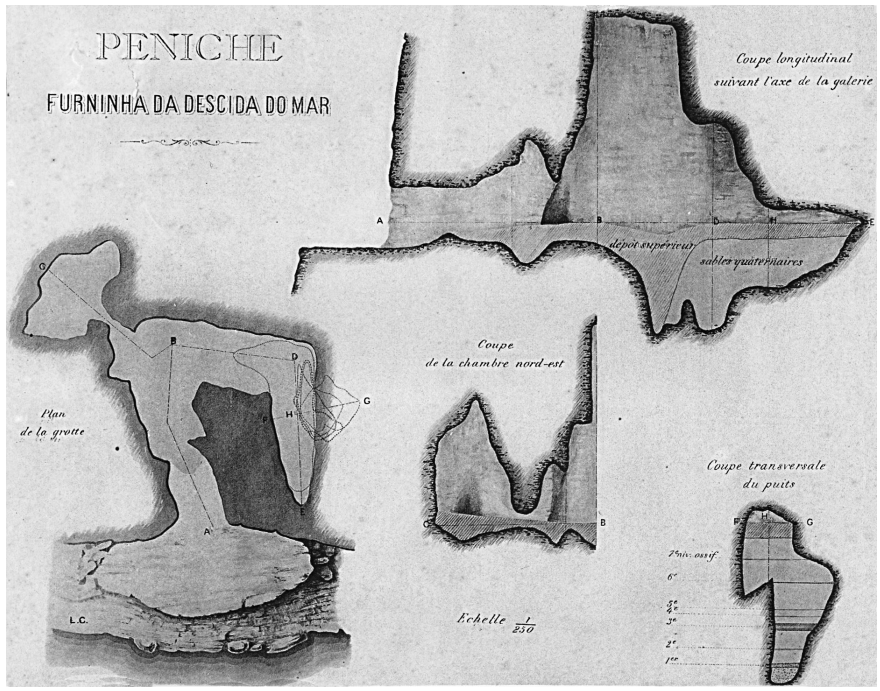

FIG. 3. *Plan, cross-section, and stratigraphy of Furninha Cave published by Delgado (1884).*

Layer 1 (1st bone bed) – at a depth of 10.3 m below the cave surface and at 9.3 m below the Pleistocene surface, there was a cemented polygenic conglomerate with flint pebbles and, more rarely, granite from Berlenga, quartz and quartzite, that laterally changes into a very coarse sand with many shell fragments. A travertine a few decimeters thick covered this layer, although Delgado considered it as part of Level 1 because it contained the same rock diversity found below. Its existence indicates that the bottom level was uncovered for some time. The bone bed overlaid the travertine deposit.

Layer 2 – very fine loose sands, probably of eolian origin, 1 meter thick. Delgado interpreted this level as of marine origin, deposited by large tides; however, it is likely that the sea level was away from the wave action, aspect that is also suggested by the presence of the travertine layer below. Another possible hypothesis is that this layer resulted from reworked materials inside the cave by the passage of internal waters. The abundant and extensive sand platform in front of the cave at the time of low sea stands and available for local wind transportation is the likely candidate for the presence of fine sands inside Furninha. The bone weathering thought by Delgado as the result of water action may be, in fact, of chemical origin. The existence of two fragments of a wolf radius each in two bottom bone beds, separated vertically by over a meter, was explained by Delgado as the proof for water transport. However, it may be easier to explain such a fact by carnivore action inside the cave.

Layer 3 (2nd bone bed) – no data on the thickness or composition, but based on the original section by Delgado (1884) it was fairly thin, perhaps less than 20 cm thick.

Layer 4 – loose sterile sand, 1.3 meter thick.

Layer 5 (3rd bone bed) – between 7 and 7.5 meters of depth below the original cave surface. The bones were present in three different horizons, separated by sand. It is the richest level in terms of number of species and best preserved. Nery Delgado also collected in this layer a rich flint, quartz and quartzite artifact assemblage, assigned to the Middle Paleolithic, as well as to the Acheulian due to the presence of a single biface found at a depth of 5.8 meters in the corridor section of the cave. There is, therefore, no association to the rest of the material found in the shaft.

Layer 6 – sterile sands, .5 meters thick.

Layer 7 (4th bone bed) – started at 6.5 meters depth, it is a thin horizon with "une petit espèce de *Helix*, a été seulement trouvée dans ce niveaux, paraissait marquer une période […] pendant laquelle (la grotte) était parfaiment à sec" (Delgado, 1884: 257). This statement confirms the eolian origin for the sandy deposits.

Layer 8 – sterile sands, .5 meters thick.

Layer 9 (5th bone bed) – the top part of the layer was at a depth of 6 meters below the original cave

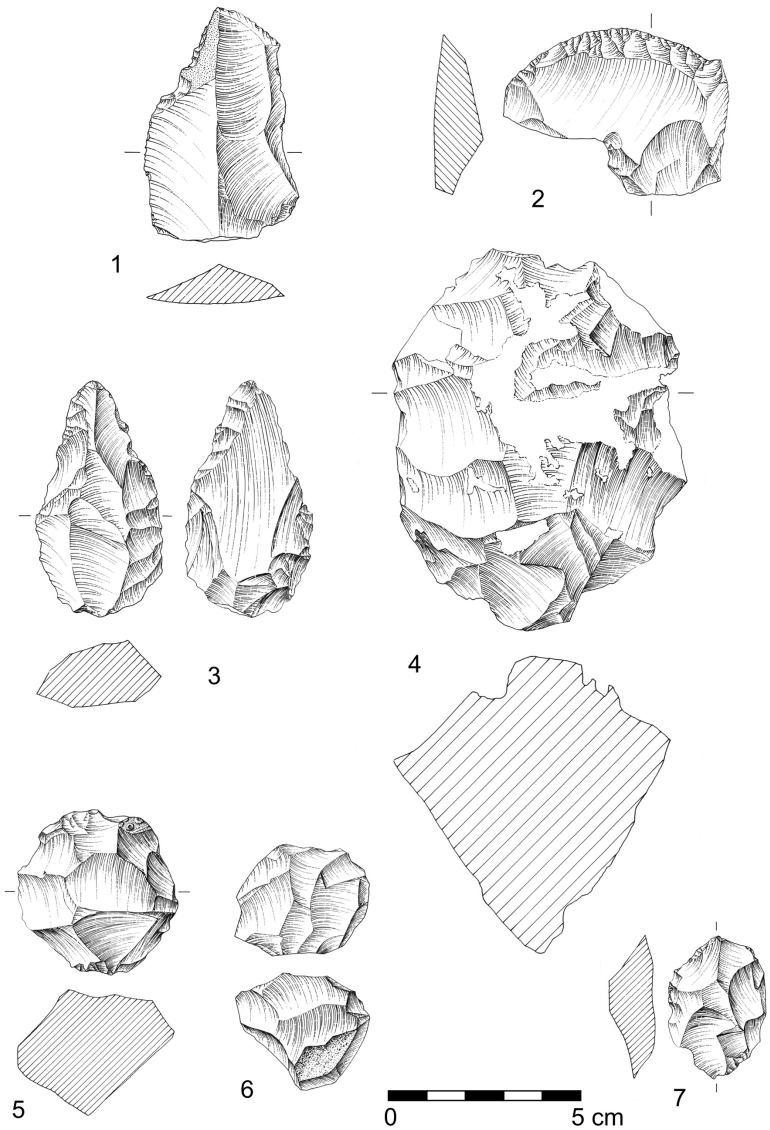

FIG. 4. *Mousterian artefacts (all in flint). 1. notched flake; 2. convex sidescraper; 3. doubled sidescraper; 4-7. discoidal cores.*

floor. It had abundant faunal remains and the presence of large amounts of hyena coprolites confirms its presence in the cave during this phase (Delgado, 1884: 259), although some flint artifacts were also recovered. There is no description of the layer thickness but comparing to the under- and overlaying deposits it is possible to say that it was around 30 cm thick.

Layer 10 – loose sterile sands, 1.5 meters thick.

Layer 11 (6th bone bed) – it is composed of two thin fossil horizons separated by 20 cm of sterile sands, 4.2 meters below the original cave floor. Within it there were flint, quartz and quartzite flakes, as well as a bone fragments "avec des incisions […] produites par un instrument trenchant" (Delgado, 1884: 262), and it is clearly of anthropogenic nature.

Layer 12 – loose sterile sands, 1.5 meters thick.

Layer 13 (7th bone bed) – 2.5 meters below the original corridor floor. The sands that composed the matrix were different from those below: they were finer, lighter colour and partially cemented by an overlaying travertine depoist (1.5 meters thick). The importance of water in the deposition of sandy deposits separating the bone beds given by Nery Delgado (1884) can be explained in a different form. In fact, the idea of large marine waves is not compatible with the deposition of diverse and abundant terrestrial large mammals composing the many bone beds found in the shaft and interstratified with the sand layers. Most likely these are related to low sea level. The U series date of 80886+42423/-31265 BP (Cardoso, 1993) from the 3rd bone bed at a depth of 7.5m, it is easy to conclude that at the time of the beginning of the last Glacial phase the low sea level was the norm, with new dry areas now exposed due to the drop in the sea level with sandy deposits remobilized by eolian action and filled the shaft inside the cave during periods when large fauna, mostly bears and hyenas, was progressively abandoning the cavity. The formation of the lower deposit, conserved in the shaft section of the cave and completely excavated by Delgado, took place during the low sea stand, during the MIS 4.

The very detailed section described by Nery Delgado from Furninha reveals the cyclic human occupation of the cave after the retreat of the sea after MIS 5. Phases when humans were not in the cave are represented by the sterile eolian sands. During those episodes of large carnivore occupation, such as hyenas, there was bone accumulation in the shaft of prey species (horse, red deer, and aurochs), as well as of carnivores (together with the coprolites, hyena remains are the most common in the cave). The cave also served at other times, but less frequently, as shelter for other predators such as bears, wolves and lynxes as well as to humans, represented not only by lithic assemblages but also by a child mandible (Delgado, 1884: fig. Ia) recovered in the 3rd bone bed. This human fossil, clearly very important as it likely was the first fragment of Neandertal ever found in Portugal, together with other pieces such as a complete bear skull also cited in Delgado's work (1884: 251) disappeared from the Geologic Museum. It is not likely that, as was frequent at the time, they served for inter-museum exchange, although there were faunal materials of lesser importance offered to the Institute of Coimbra now the Instituto de Antropologia da Universidade de Coimbra, that were object of previous analysis (Cardoso, 1993).

The classification of the Pleistocene fauna from Furninha was initially made by Delgado himself. Despite of the up to date bibliography that was available to him, the difficulties were certainly great. Although he was not an expert on Pleistocene faunas, he was able to identify correctly, accordingly to the contemporaneous standards, most *taxa* present at the cave. In some cases, however, the complexity of this task resulted in the attribution of bones from the same species to various species within the same family (e.g., *Felis*). One of the most interesting cases is that of the extinct European hyena *(Hyaena hyaena prisca)* was divided into two species based on size. It is one of the most recent examples of this species, since it went extinct much earlier on the eastern side of the Pyrenees. In any case, Delgado exchanged correspondence with the reputed paleontologist from Paris, Albert Gaudry, followed by contacts with Édouard Harlé, from Toulouse in 1897 about this same topic. The initial contact developed later into a firm cooperation, since Harlé ended up studying the faunal materials from Furninha as well as all other Portuguese Pleistocene materials (Harlé, 1910/11). These bones were sent to France for analysis, resulting in various short publications on Fontainhas (1908) and Furninha (1909), prior to the next major revision of Pleistocene fauna more than 80 years later (Cardoso, 1993).

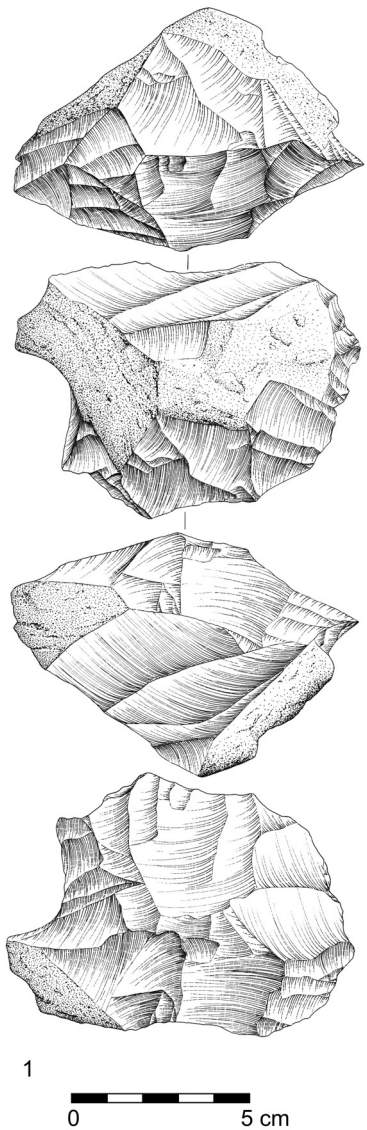

FIG. 5. *Flint discoidal core.*

From Delgado's description there is no clear evidence that there are two different levels in the base of the shaft, nor to conclude, unlike other authors, that the Mousterian artifacts were in the top section of the Pleistocene sequence. In the section published by Delgado there seem to be 3 main sectors below the Holocene sediments with the Neolithic materials:

1) In the base there in a marine level of gravel with *Patella* sp., *Littorina littorea*, birds, rabbit, bear and other undifferentiated carnivores and few or no true lithic artifacts. It is likely associated with the 5-8 meter marine formation outside the cave dated to the beginning of the MIS 4.
2) In the middle part there was a fairly thick deposit of whitish sands, separated by the cobble layer by a travertine deposit and showing sedimentological discontinuity. This section includes 6 bone beds with homogenous faunal representation as well as Middle Paleolithic artifacts. The deposition of the sandy horizons was of eolian origin.
3) The top section of the sequence, overlaid by about 1.5 meters of white fine and micaceous sands, probably or eolian origin, said by Zbyszewksi (1943b) to be of loessic type, probably represents the Last Glacial Maximum and the Tardiglacial. This is likely to be the context of the 40 or so artifacts said to be Upper Paleolithic by Breuil and Zbyszewski in 1945.

The results presented here, based on close to 400 artifacts from, will show that human occupation during the Middle and Upper Paleolithic was far from ephemeral in Furninha.

3. The lithic assemblages

The present analysis of the lithic assemblages from Gruta da Furninha, deposited in the Museu Geológico, revealed over 450 artifacts, of which 70 are from the top section with a Neolithic and Chalcolithic chronology and are object of a separate specific analysis by one of us (J. L. C.) and António Faustino Carvalho to be published elsewhere. The remaining materials, in a total of 389 lithic pieces (Table 1) and one bone projectile (Fig. 14, 7; and Fig. 18), are likely to be of Paleolithic chronology, coming from Bone beds 1 through 7. Breuil and Zbyszeswki (1945), however, describe paleolithic materials from 8 different bone beds, arguing that Bone bed 8 was in fact the Neolithic top layer. Therefore, the first seven levels must correspond to the 7 Bone beds described in the Delgado's 1884 publication. It is interesting that the materials described from levels 1 and 2 by Breuil and Zbyszewski were not photographed or drawn, like many others from the other levels. Their description suggests that they may not have been artifacts at all, but natural elements deposited and transformed by natural factors. Thus, the first true artifacts appeared for the first time in Bone bed 3.

There are a few artifacts, however, that have in Delgado's hand writing their stratigraphical provenience. In all cases, those artifacts are coming from levels 8 and 9, respectively, with the symbols "8º N." and "9º N.", where the "N." likely corresponds to *niveau*. Consequently, the interpretation of Breuil and Zbyszewski (1945) that includes 8 levels, does not match the original labeling of the artifacts by Delgado. Thus, it is likely that this attribution was not correct, since there are artifacts with level 9

	Flint	Quartzite	Quartz	Limestone	Other	Total
Fragments	7	3	13			23
Flakes	128	9	35	1	2	175
Blades	44	1	1			46
Bladelets	6					6
Burin spalls	3					3
Core front	1	1				2
Core tablet	1		1			2
Bifacial thinning flake	2					2
Crest	4					4
Retouched tools	75		7		1	83
Cores	26	10	5		2	43
Pebbles	1		1			2
Total	298	24	63	1	5	391

TABLE 1. *All Paleolithic lithic artifacts by raw-material, Furninha Cave.*

Flint	Quartz	Quartzite	Other	Total	
Flakes	15	2	2	2	21
Discoidal cores	5		2	2	9
Sidescrapers	1			1	2
Notches	3			1	4
Denticulates	1				1
Total	25	2	4	6	37

TABLE 2. *Mousterian lithic artifacts, Furninha Cave.*

inscribed on them, as the case of a La Gravette point in fig. 111 from their own publication (Breuil and Zbyszewski, 1945: PL9; Fig. 12, 6. in the present study). Also of importance is that fact no Neolithic artifacts are attributed by Delgado to either Bone beds 8 or 9 (Carvalho, personal communication).

Based on Delgado's stratigraphical description, the most parsimonious interpretation is *that there were 10 different bone horizons* (below the travertine overlaid by the Neolithic dark layer) and not only 7 as he labeled in his description. In two cases, Bone beds 3 and 6, had various thin horizons that were collapsed and integrated into a single bone bed level for the effects of publishing and analysis, but were seen, registered, and separated in the field, as the good field practices dictated. Bone bed 3 is described as having 3 thin horizons separated by sterile sands: "Cette couche ossifère a l'épaisseur de 0^{m},50 comprise entre 6^{m},0 et 6^{m},50 de profondeur ; cependant les os n'etaint pas distribués au hasard à cette hauteur; ils y formaient *trois petites couches* distinctes séparées par minces lits de sable; nous avons cru, dependent, convenable de les réunir dans un niveau unique" (Delgado, 1884: 251); and for bone bed 6 it can be read "On ne saurauit cependant *séparer de cette strate une autre* qui se trouvait 0^{m},20 au-dessus et dans çaquelle étaint enfouis plusieurs os et quelques dents d'animaux rencontrés dans les deax strates et les vestiges qu'on y a trouvés de l'existence simultanée de l'homme" (Delgado, 1884: 262). Paleolithic artifacts were distributed unevenly from bone horizons 3 to 10, and for the purpose of Delgado's publication in 1884 collapsed into only seven Bone beds. The chronological composition for each Bone bed and horizon will be discussed below.

The lithic assemblage is composed of three main raw-materials present in the collection (Table 1): flint is the majority (296 artifacts), followed by quartz (63) and quartzite (24). In addition there are also a few pieces made on limestone and hematite.

The assemblage show a wide range of classes, including fragments, cores (Figs. 4-9), flakes (mostly complete – Fig. 11), blades (Figs. 11 and 12) and bladelets (again, mostly complete items – Fig. 12), retouched tools (Figs. 4, and 10-18), as well as a wide series of preparation and maintenance products such as crests (Fig. 10, 1), core tablets, burin spalls, and bifacial thinning flakes.

The only class absent from this collection is chipage. This fact clearly shows that the assemblage was truncated sometime in the past. The problem that needs resolving is if this triage was natural and took place during the archaeological cave formation or if it was the result of more recent anthropogenic

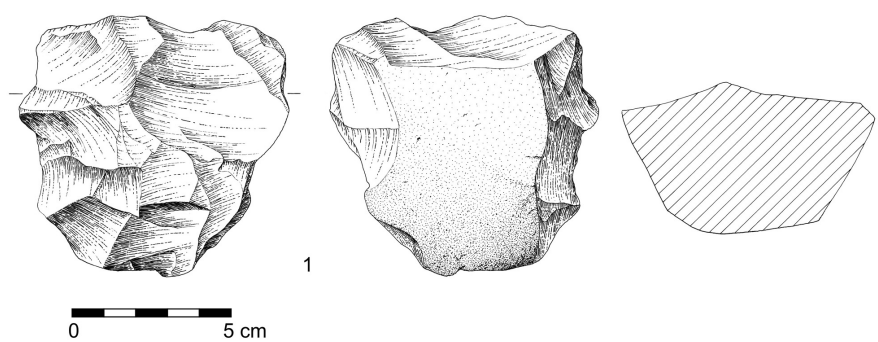

FIG. 6. *Hematite discoidal core made on a cobble.*

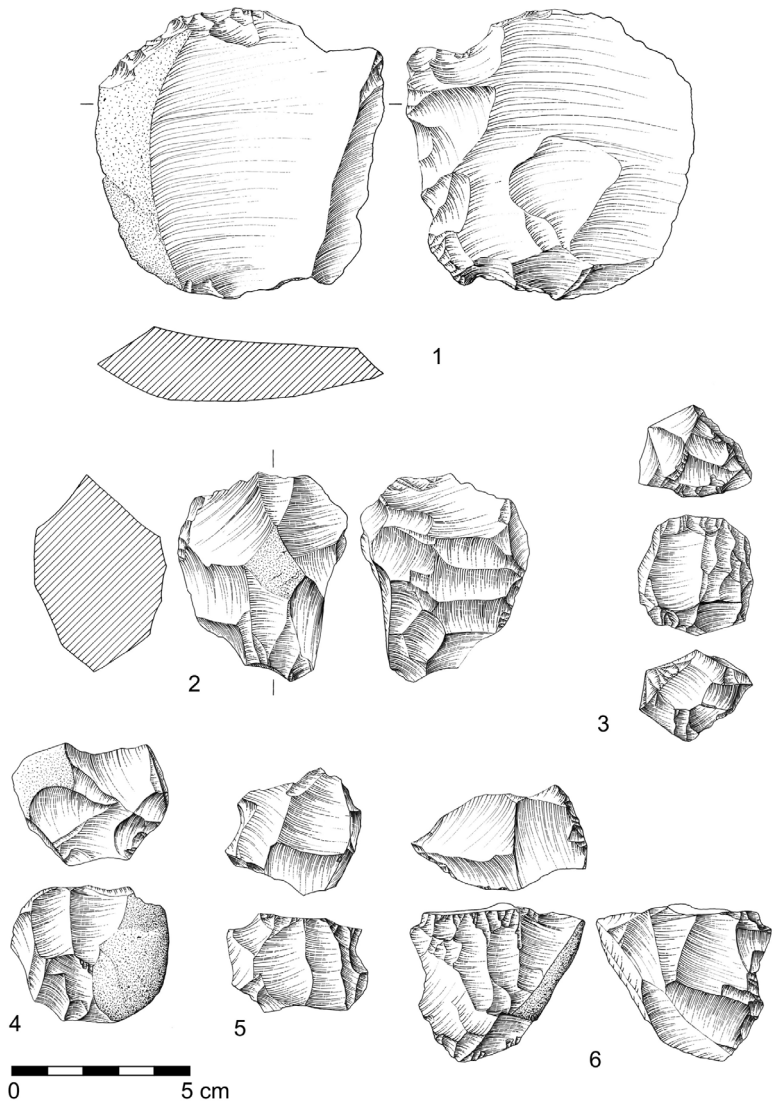

FIG. 7. *Middle and Upper Paleolithic flint artifacts. 1. large retouched Levallois flake, with two different levels of eolian erosion and patina, suggesting that it was made in the Middle Paleolithic and reused in a later occupation; 2.-6. Gravettian prismatic flint cores used to produce flakes, blades and/or bladelets.*

action. The fact that there are very few fragments and rare broken blanks indicate that size sorting is a consequence of human hand, human hand, most likely during excavation, which was a frequent trait up to the mid 50's of the last century in prehistoric excavations in Portugal. On the other hand, it is possible to have taken place already in the museum, either by Nery Delgado during his analysis or, less likely, later at any given moment during reorganization of the materials in the museum.

3.1. The Mousterian assemblage

The core assemblage from Furninha, with a fair diversity of types, include forms such as, among other, discoidal, simple prismatic, orthogonal, and a variety of prismatic with two platforms, either opposed or independent. With the exception of the discoidal type, all the others referred above were used to produce flakes, blades and bladelets, although, not all types of blanks from a single core. They belong, most likely, to the Upper Paleolithic occupations of Furninha.

The most interesting aspect in the core assemblage is the presence of a few discoidal examples (Table 2), made on various raw-materials (Fig. 4, 4; Figs. 5 and 6). This aspect is typical of many Mousterian assemblages both in central and southern Portugal (Bicho, 2004; Cardoso, 2006; Raposo and Cardoso, 1998). This type of reduction sequence is also seen in half a dozen flakes, both in flint and in quartz. In addition to these flakes there are a couple flakes that are likely to have been produced by Levallois technique, showing typical shapes, cross-sections and multifaceted platforms (Fig. 7, 1), some of which typical *chapeau*. Mousterian materials are also represented by a series of retouched tools, such as sidescrapers (Fig. 4, 2 and 3) and notches and denticulates (Figs. 3 and 19).

Naturally, the presence of Mousterian at Furninha has been a constant in all publications, since the first monograph by Delgado (1884). There are, however, two aspects that are worthy mentioning: the fact that this is the first time when the technology

and typology are described, though in a very simple manner since data are scarce, and thus allow comparing the rare observed traits with other lithic assemblages known for the same period – this is the case of a wide diversity of raw-materials, the presence of various core types, including discoidal, as well as the presence of at least two typical reduction strategies for this period, discoidal and levallois; the second aspect is that all artifacts that retain Middle Paleolithic characteristics and have stratigraphical provenience indicated on show that they are coming from Bone bed 8. The few exceptions to this rule coming from Bone bed 8 are a very atypical endscraper and flakes with cortical platforms, aspect that is interesting in itself, since this is also frequent in those artifacts attributed to the Middle Paleolithic but without provenience. The consequence of this observation, however, is that there are a few pieces coming from that level and all seem to be Middle Paleolithic. Thus, it is possible that while bone bed 3 (comprising 3 different horizons) dated to c. 80 kyr and said to be rich in artifacts, including the only handaxe found at the site (which may in fact be of Mousterian age and not of Acheulian), was the beginning of the human occupation of Furninha (as mentioned before, the materials described by Breuil and Zbyszewski in 1945 coming from bone beds 1 and 2 are likely natural elements and not of anthropogenic) - Neanderthals used sporadically the cavity for many thousands of years, probably up to the moment of their extinction, some 30 thousand years ago, and Bone bed 8 corresponds to the end of the Neanderthal occupation.

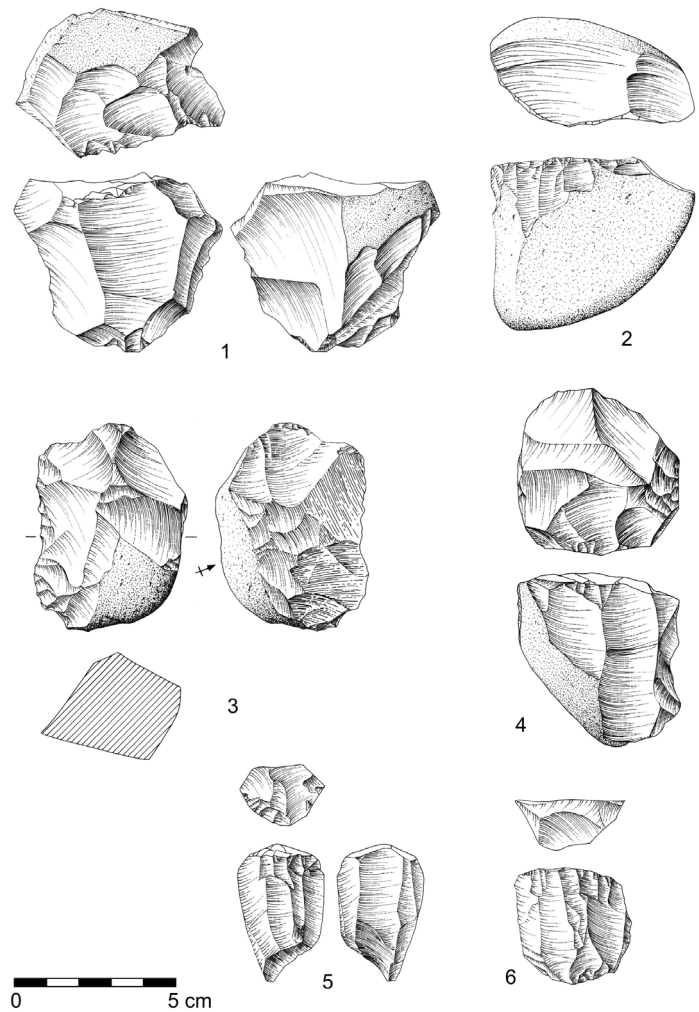

FIG. 8. *Upper Paleolithic cores. 1. and 4. flint cores for flakes and blades, probably Gravettian; 2. and 3. quartzite cores for flakes; 5. and 6. bladelet flint cores.*

3.2. The Upper Paleolithic - Gravettian

The Upper Paleolithic occupation might, then, start in bone horizon 9 (or the 6th bone bed as described by Delgado). If this is the case, then there were 2 archaeological levels dated to the Upper Paleolithic (Bone horizons 9 and 10, respectively the top horizon of Bone bed 6 and Bone bed 7). Again, there seems to be a general tendency for those pieces clearly secured as coming from Bone horizon 9 to belong to a single chronology: in this case the Gravettian (Table 3). There are a few long blades retouched and non-retouched (Figs. 10 and 11), as well as a series of burins (Fig. 13), both on truncation and dihedral. These burins are similar to those found in Rio Maior at sites such as Cabeço do Porto Marinho, Tocas, and Picos (Marks *et al.*, 1994; Zilhão, 1997) while the blades are identical to those from Vale de Porcos and Vascas said to be Aurignacian

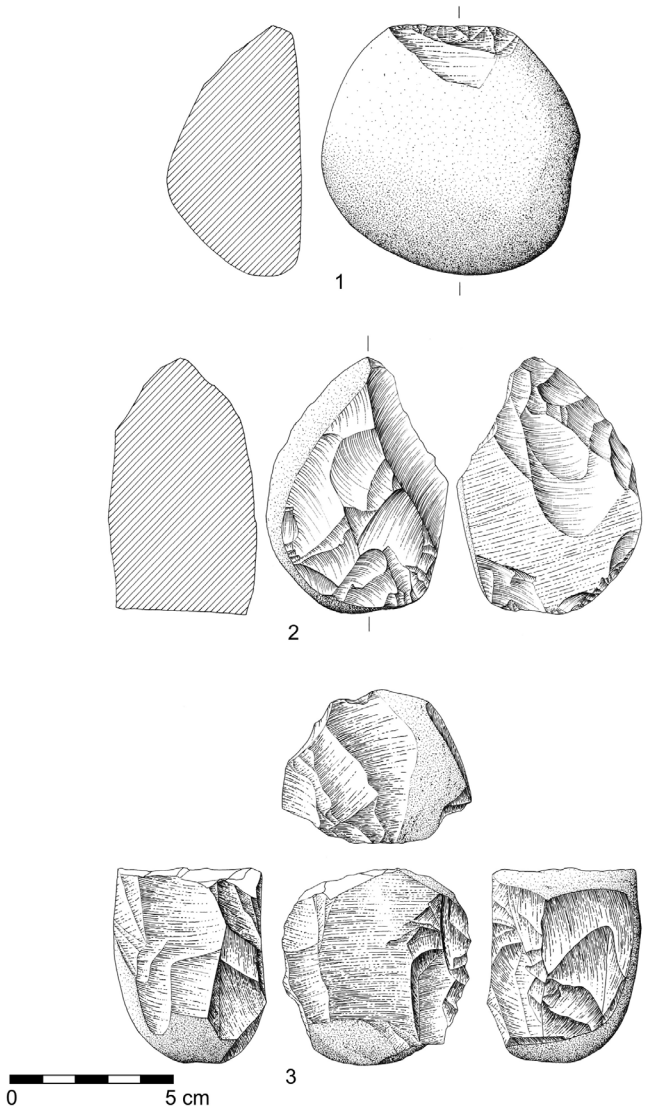

FIG. 9. *Upper Paleolithc cores. 1. quartzite chopper; 2. hematite flake core made on flake; 3. prismatic quartzite core.*

by Zilhão (1997), but reanalysis of the Rio Maior material and comparison to materials coming from the site of Quinta do Sanguinhal by Bicho (2005) indicate they are Gravettian.

The Gravettian materials from Furninha are in general characterized by the presence of burins (both dihedral or on truncation, made on blades or long flakes, relatively thin), endscapers (on relatively thin blades) and blades (Figs. 12 and 13) and bladelet cores. They are also made on flint.

	Flint	Other	Total
Blades	10		10
Burin spall	3		3
Prismatic core for blades		1	1
Prismatic core for bladelets	1		1
Simple endscraper	1		1
Atypical endscraper	1		1
Ogival endscraper	1		1
Dihedral burin	1		1
Burin on concave truncation	1		1
Retouched blade	3		3
Gravette point	2		2
Total	24	1	25

TABLE 3. *Gravettian lithic artifacts, Furninha Cave.*

	Flint	Quartzite	Total
Flake	1		1
Blade	4		4
Bladelet	1		1
Core front	1		1
Core tablet	1		1
Simple flake core	1		1
Prismatic core for flakes	1		1
Core with 2 platforms	1		1
Core with 2 opposed platforms		1	1
Prismatic core for bladelets	1		1
Orthogonal core for flakes	1		1
Core fragment	1		1
Thin shouldered endscraper	1		1
Thick nosed endscraper	1		1
Carinated endscraper	1		1
Atypical carinated endscraper	2		2
Burin-endscaper	1		1
Straight dihedral burin	1		1
Angled dihedral burin	3		3
Burin on snap	4		4
Straight truncation	1		1
Notches	8		8
Denticulates	2		2
Scaled pieces	7		7
Total	46	1	47

TABLE 4. *Upper Paleolithic lithic artifacts, Furninha Cave.*

In addition to those artifacts attributed to the Gravettian, there are a series of materials that were recognized as having an undetermined Upper Paleolithic chronology (Table 4). Unfortunately it was

	Flint
Bifacial thinning flakes	2
Bifacial preforms	2
Pointed flake with bifacial retouched	1
Laurel leaf	2
Stemmed points	2*

* These two artifacts are not present in the collection but were published in the original publication by Delgado.

TABLE 5. *Solutrean lithic artifacts, Furninha Cave.*

	Flint
Orthogonal core for flakes	1
Orthogonal core for flakes and bladelets	1
Atypical carinated endscraper	1
Dihedral burin	1
Dejete dihedral burin	1
Multiple dihedral burin	1
Transversal burin on truncation	1
Burin multiple mixed	1
Total	8

TABLE 6. *Magdalenian lithic artifacts, Furninha Cave.*

impossible to securely assign them to a specific chrono-cultural phase of the Upper Paleolithic based on either technology or typology. Some of their characteristics suggest that they belong to the Upper Paleolithic due to the tendency for oblong proportionality and thinness of the materials, which are in general related to the Upper Paleolithic, more so when the butts do not show any sign of multifacetting or the dorsal surface for the use of Levallois technology.

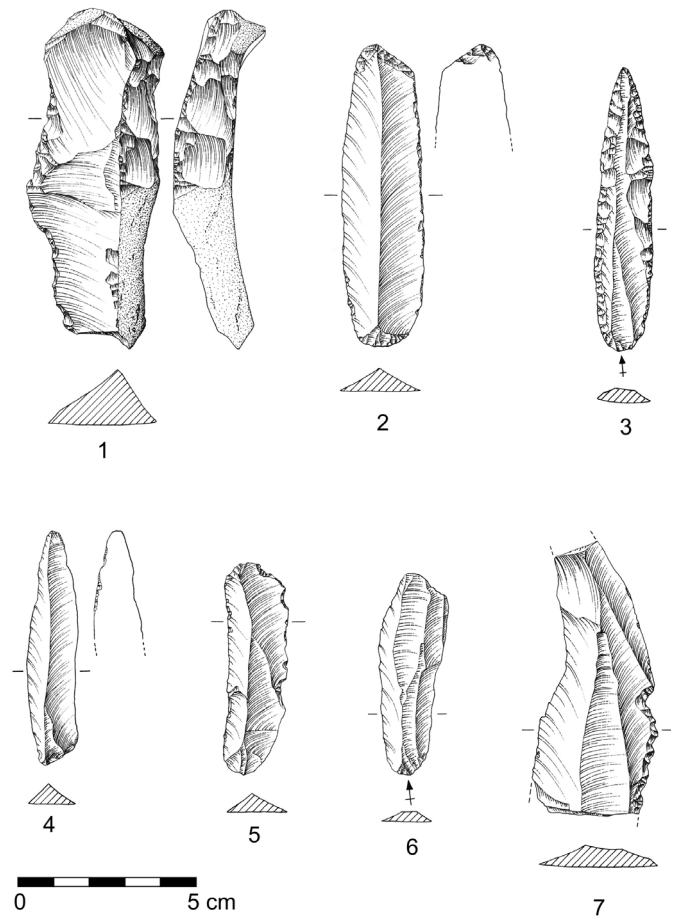

FIG. 10. *Gravettian artifacts made on blades, all flint. 1. crested blade; 2. doubled endscraper; 3. atypical La Gravette point; 4.-6. unretouched blades; 7. denticulated blade.*

3.3. The Solutrean

Though not many, there are, however, materials that are unequivocally Solutrean. These include only a total of seven typical bifacial pieces (Table 5). There are two bifacial thinning flakes typical of bifacial technology during the Last Glacial Maximum in Portugal and a single pointed flake that has a slight bifacial retouch on the distal end. More characteristic are the two laurel leaf points (one almost complete with just a broken apex, and another represented only by the medial fragment – Fig. 14, 5 and 6) and two bifacial preforms of which unfortunately neither have indication of stratigraphical provenience (Fig. 14, 4). To this seven artifact collection can be added two more stemmed bifacial points (Fig. 14, 1 and 2) with c. 7 cm long that regrettably have disappeared that were in the original publication of Nery Delgado (1884; figs. 27 and 35). They were attributed to the Upper Paleolithic by Breuil and Zbyszeswki (1945) and a couple of decades later as Solutrean by Roche (1974: 86).

More recently, Zilhão (Zilhão, 1997) declared those two artifacts as Late Neolithic or Early Chalcolithic daggers. This interpretation was based on the fact that there was a Late Neolithic occupation in the cave that included bifacial materials; and by

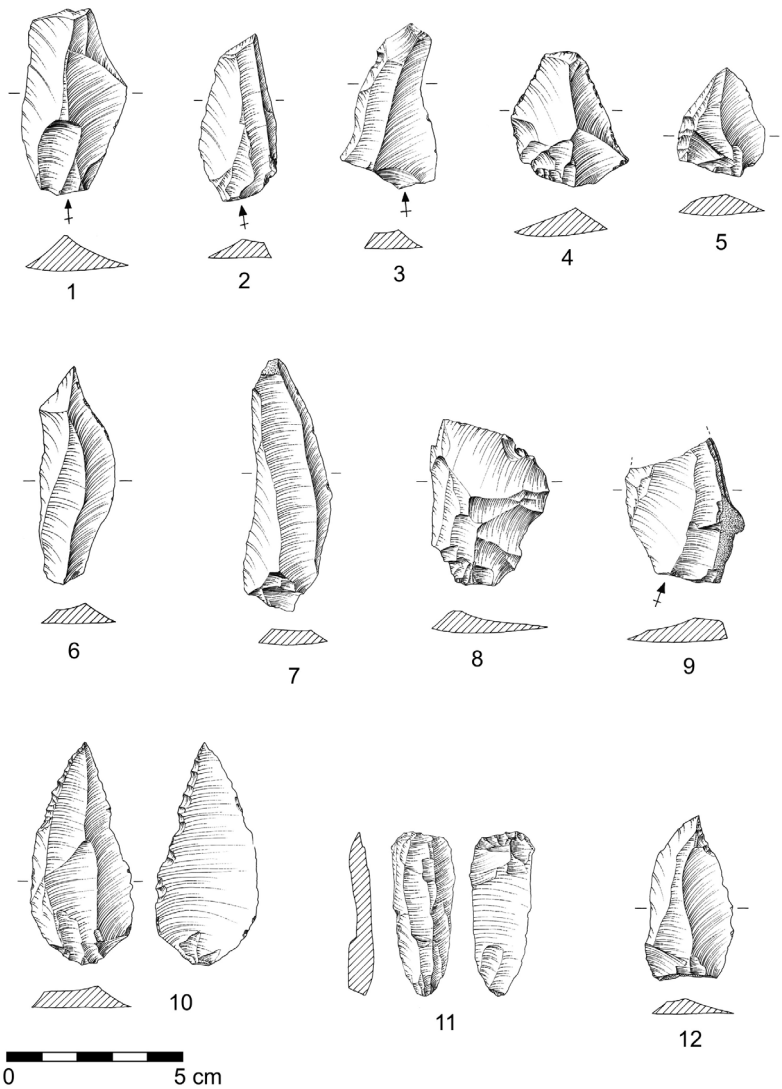

FIG. 11. *Flake and blade flint artifacts, Upper Paleolithic. 1.-6. and 9. Flakes; 6. and 7. unretouched blades; 8. and 12. notched flakes; 10. alternated retouched pointed blade; 11. oblique truncated blade.*

formal resemblance to materials published by Ferreira (1957) on the subject of late prehistoric daggers, specifically an example from Casa da Moura (Ferreira, 1957: Est. III, fig. 12). Also and important aspect to this conclusion was the fact that in Zilhão's view the human occupation of Furninha during the Upper Paleolithic was, at the most, ephemeral. However, with the present reanalysis of the materials, it is clear that the Upper Paleolithic occupation of Furninha was not nearly as ephemeral as Zilhão thought it to be. While it is true that there are half a dozen bifacial artifacts coming from the top late prehistoric level, the original drawings as well as the recent reanalysis by one of us (J. L. C.) and António Carvalho of those materials (Cardoso and Carvalho, 2010) show typological and technological traits that are very distinct from the two stemmed points, including on the homogeneity and regularity of the bifacial scar patterns. In fact, all other bifacial tools, mostly projectile points of some kind are very different in morphology and size. Thus, the two points do not seem to indicate a late prehistoric chronology. Rather, they do show formal similarities with other material found in Algarve (Bicho *et al.*, no prelo; Cascalheira, 2010) and in Portuguese Estremadura published by Zilhão as Solutrean: it is the case of materials from Salemas, Poço Velho, Baío, Casa da Moura, Passal, and Caldeirão (Zilhão, 1997: respectively pp. 659, 666, 605, 593, 580, and 504). Some of these cases, though presenting a very general typological resemblance, show important differences in terms of size. However, some of the stemmed points published by Zilhão are virtually identical in shape and size to the two examples from Furninha – it is the case of those coming from Baío and Casa da Moura. The interesting aspect is that those are the two closest Solutrean sites to Furninha, both in a similar geographical setting that is, close to the present coast line (though this should not be an important factor, since during the LGM the distance to the Atlantic shore would be much greater than today). Therefore, with distinct scar patterns from those found in more recent Neolithic/Chalcolithic bifacial artifacts, with similar typological and technological traits with stemmed points from nearby sites as well as from southern Portugal, and with a frequent

human occupation of Furninha it seems that most likely these two points are, in fact, Solutrean.

There is also a bone point (Figs. 14, 7 and 19), made on a long bone flake, completely polished and asymmetrical section. The distal tip shows an apparently old impact fracture while its base is marked by a straight truncation. The dorsal surface is convex, with multiple lines from production, and the ventral side is fairly flat. While there is no stratigraphical identification or provenience, due to its morphology it is possible that is coming from the Solutrean occupation, since it is similar to artifacts coming form other Portuguese sites (Cardoso and Gomes, 1994) such as Buraca Grande (Pombal), dated to the late Solutrean (17430 ± 170 BP e 17850 ± 200 BP, *in* Aubry and Moura, 1994), or to those from Vale Boi, in Algarve (Évora, 2007).

The question that remains is the provenience of these materials. In a perfect world, they would come from the 7th bone bed level overlaying the Gravettian materials from the previous bone bed. Unfortunately, there are no Solutrean artifacts with indication of provenience as there are no artifacts labeled from other bone horizons other than 8 and 9. In any case, it seems reasonably safe to suggest that the Solutrean occupation happened in the later part to the geologic record of the cave, after the Gravettian and that corresponds to the top bone bed, that is bone horizon 10, probably together with the Magdalenian.

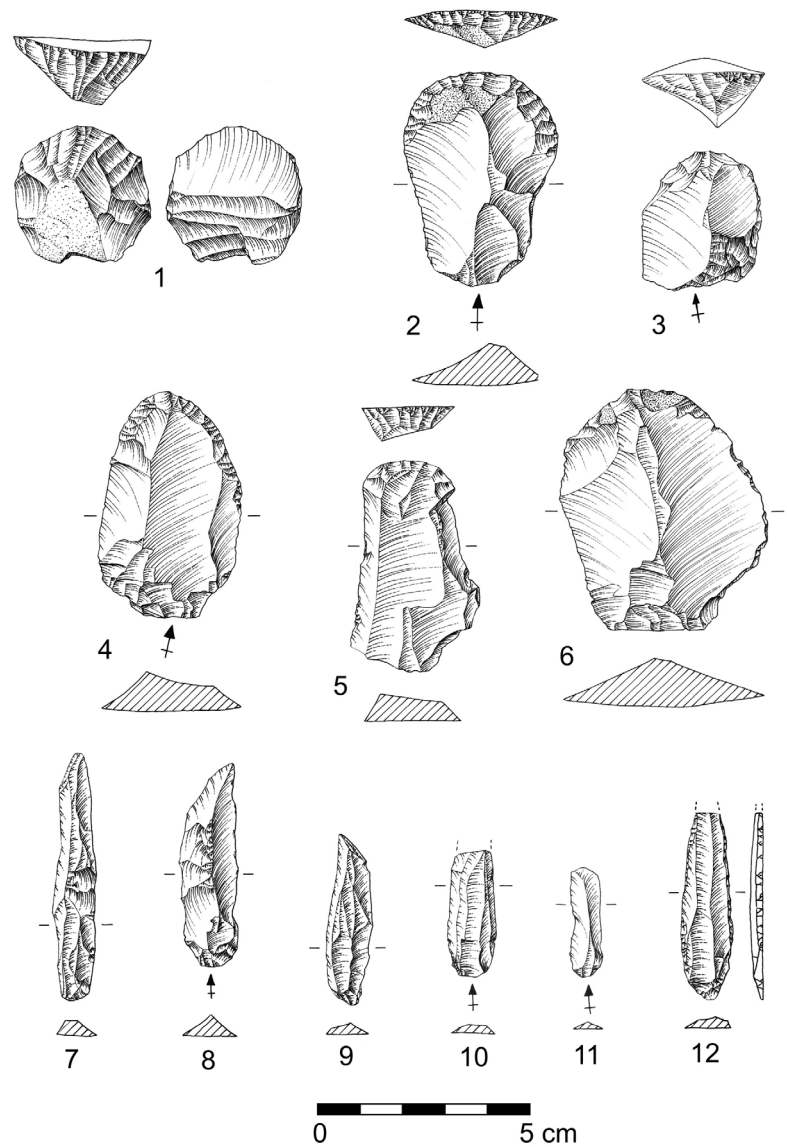

FIG. 12. *Flint Upper Paleolithic artifacts. 1. and 3. carinated endscrapers; 2., 4. and 5. simple endsrapers; 6. atypical endscraper; 7. and 8. crested bladelets; 9.-11. small unretouched bladelets; 12. Gravette point.*

3.4. Magdalenian artifacts

Although Zilhão (1997) in his analysis in 1992 did not find any Magdalenian materials, the presence of artifacts dated to the last Upper Paleolithic phase were referred to by Roche (1974). The present analysis confirmed Roche's idea that there was Magdalanian in Furninha. In fact, while there are typical examples of cores producing either flakes or bladelets, there are a few producing both those types of supports, usually of very small size showing a clear exhausted condition with an orthogonal shape (Fig. 7, 3 and 4;

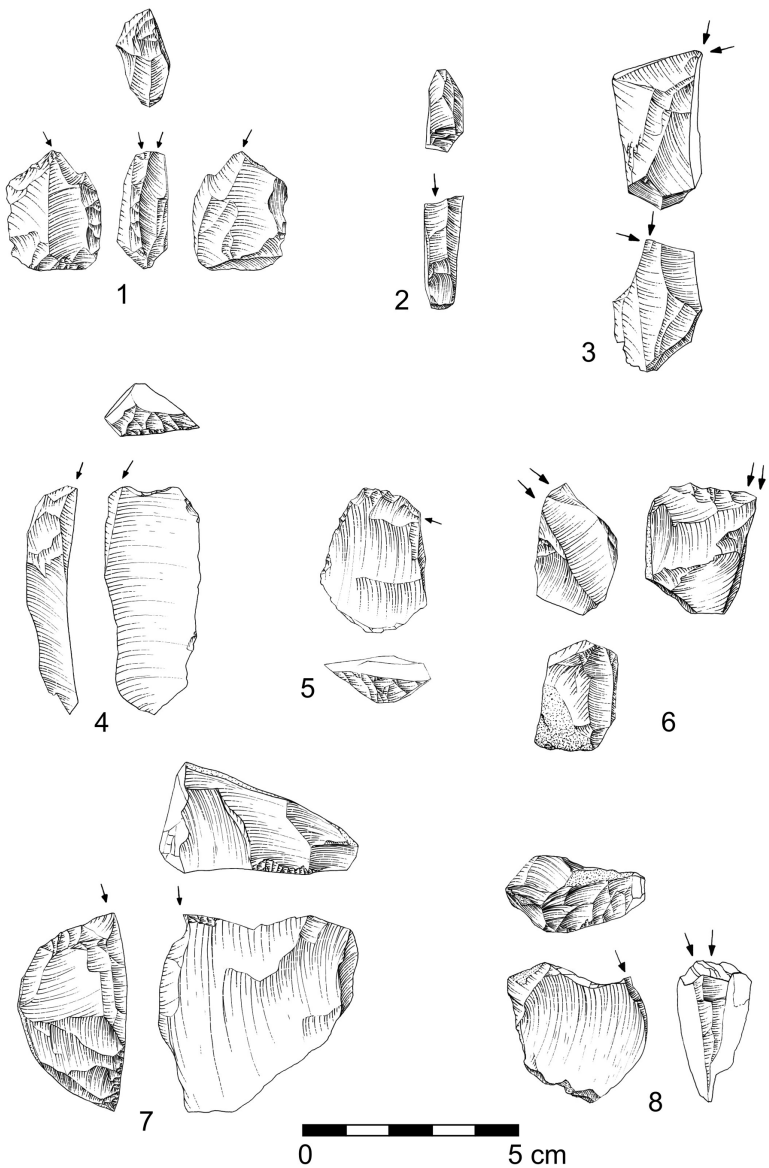

FIG. 13. *Flint Upper Paleolithic burins. 1. burin on oblique straight truncation; 2. burin on snap; 3. dihedral burin; 4. burin on concave truncation (Gravettian); 5. and 7. transversal burin on lateral truncation; 6. burin on straight truncation; 8. burin on concave truncation.*

Fig. 8, 5 and 6), very typical of the Magdalenian from Rio Maior (Bicho, 2000) and from Algarve (Bicho *et al.*, no prelo; Mendonça, 2009).

The occurrence of a few small unretouched bladelets (Fig. 12, 8-11) as well as a series of small dihedral burins of various types (Table 6) also seems to confirm the presence of a Magdalenian occupation on the top of the sequence of Furninha. According to the description and drawn section by Delgado (1884), this top Paleolithic occupation was then separated by over a meter of a travertine layer from the late prehistoric occupation.

4. Final notes

The recent analysis and the new data presented here resulted in a series of elements relevant for the knowledge of the Middle and Upper Paleolithic of Portuguese Estremadura. Probably one of the most interesting aspects is that while a group of researchers during the mid to late 20th century that reviewed the materials recovered and published by Delgado in 1884 did not analyze the complete set of artifacts. After Delgado's publication of his own analysis, the work by Breuil and Zbyszewski (1945), though fairly extensive, did not include all of the materials, at least those of Upper Paleolithic chronology. This fact is confirmed by the fact that some of the artifacts presented in this paper, some of which are important and diagnostic materials, do not show either in their description or in the figures. It is not surprising that the later work by Roche (1974) and then by Ferreira (1962) did not mention any of the other possible Upper Paleolithic materials since they focused only on the Solutrean type-fossils. Strange, however, is the fact that in Zilhão's Ph.D. dissertation (Zilhão, 1997) he only referred to those 40 or so artifacts described by Breuil and Zbyszewski in 1945 stating that he had seen the drawers and boxes where the artifacts were stowed at the Museum. Consequently, only very few artifacts were attributed by

Zilhão to the Upper Paleolithic. We do know now that there are close to 400 Paleolithic artifacts and most of these are, in fact, Upper Paleolithic. They were likely more than that, since artifacts from the assemblage published in 1945 are not present today in the Furninha collection at the Museu Geológico in Lisbon.

Despite the fact that the excavation of Furninha with the supervision of Delgado followed the highest methodological quality available then (as did his own faunal and stratigraphical analyses), it is likely that some of the materials were not collected during excavation. In fact, this was a common strategy for most of the history of archaeology in Portugal, until fairly recently. Examples of this artificial sorting took place during and after many excavations in the Rio Maior area during the the 30' and 40's of the last century (Bicho, 1999; Zilhão, 1997).

The description of the original stratigraphy by Delgado clearly raises some questions – this can be seen by the description and attribution of the artifacts to bone beds made by Breuil and Zbyszewski in 1945 and later followed by Zilhão, suggesting that the cave was object of important disturbance: the conclusion was that Paleolithic materials came from all levels, starting at the bottom and ending on the top level where the Neolithic and Chalcolithic materials were found. After the present review, it is unproblematic to suggest that, in fact, Furninha did not suffer any major alterations, and the Paleolithic sequence was not disturbed, with the Middle Paleolithic starting in Bone bed 3, some 80 kyr ago, and ending at the lower horizon of Bone bed 6 (here called bone horizon 8), as yet with an unknown date. The Upper Paleolithic started with the deposition of horizon bed 9 (or the top horizon of Bone bed 6), followed by the Solutrean and by the Magdalenian, likely corresponding to bone horizon 10 (Bone bed 7). There is no indication of Upper Paleolithic materials below horizon 9 and all the Gravettian artifacts with level provenience are coming from 9. Also, there are no artifacts attributed to the Solutrean or Magdalenian that have indication of provenience – not even from the Neolithic layer as attributed by Breuil and Zbyszeswki in 1945. Also, no Neolithic materials have any indication of provenience, either to level 8 or 9, as Breuil and Zbyszewski believed.

So what is the importance of Furninha in the Middle and Upper Paleolithic context of Portuguese Estremadura? Clearly, it shows one of the rare sites in Portugal with a long sequence, since the Mousterian till the end of the Upper Paleolithic. Again, like many other sites, does not suggest the presence

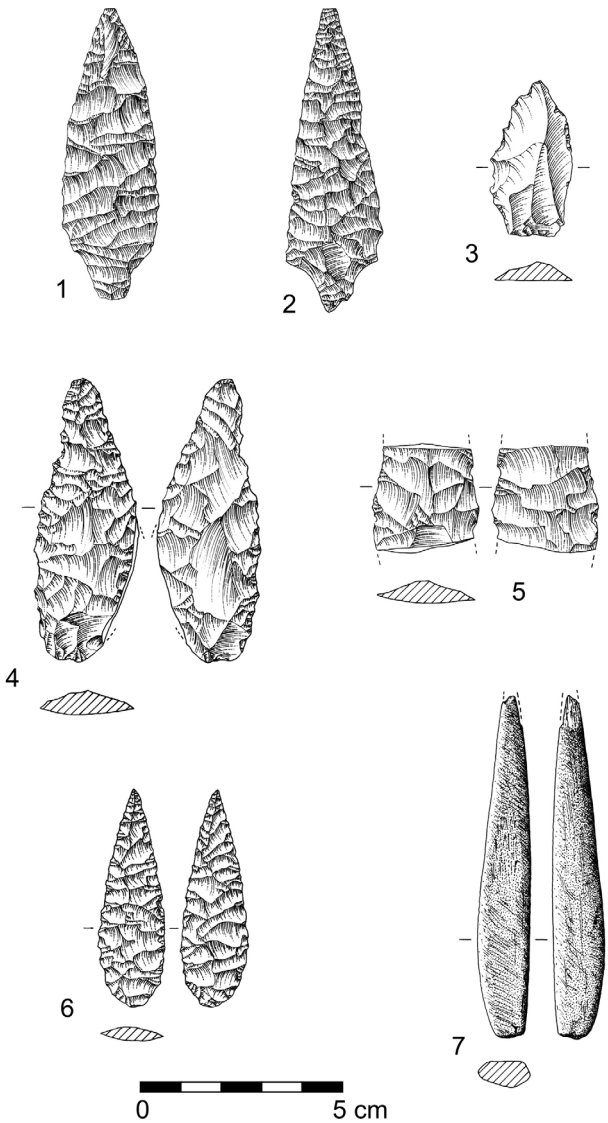

FIG. 14. *Lithic Solutrean points and Upper Paleolithic bone point. 1. and 2. Parpalló points drawn based on the original drawings and photographs respectively by Delgado (1884) and by Breuil and Zbyszewski (1945); 3. partially lightly bifacial retouched pointed flake; 4. bifacial preforme; 5. medial fragment of a laurel leaf point; 6. laurel leaf point; 7. bone point.*

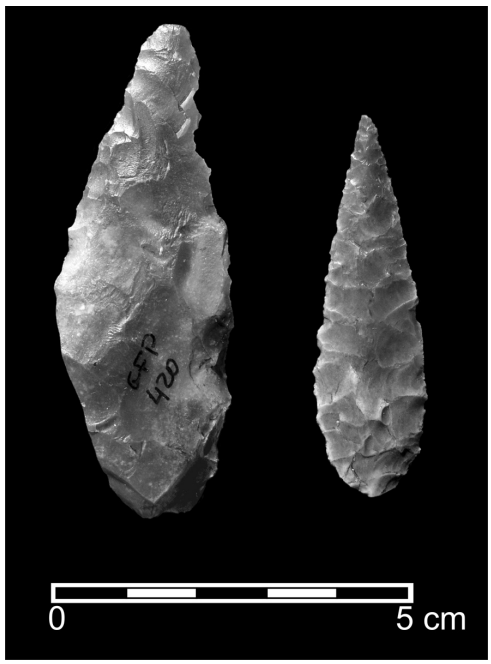

FIG. 15. *Solutrean armatures. A nearly complete point on the left and a laurel leaf point on the right.*

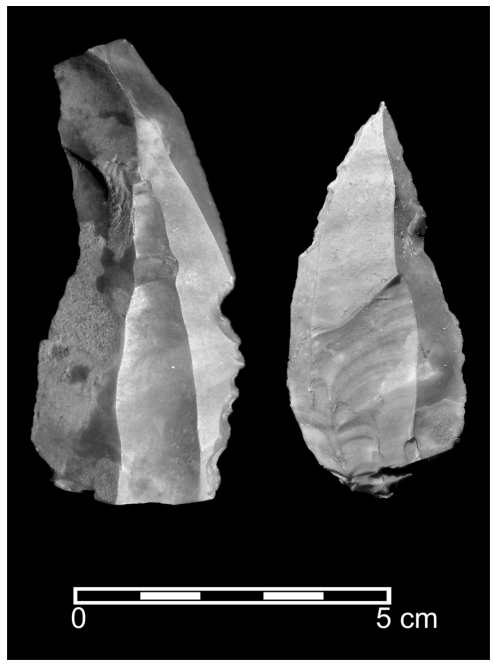

FIG. 16. *Gravettian retouched tools. A denticulated blade on the left and a pointed blade with partially backing on the right.*

FIG. 17. *Mousterian artifacts. On the top a denticulate and on the bottom a sidescraper. Note on the top artifact the original label with the indication of the provenience and date.*

FIG. 18. *Upper Paleolithic bone point from Furninha.*

of Aurignacian, although this fact may be a consequence of the size of the assemblage. The sequence of Gravettian, Solutrean and Magdalenian seems to follow the normal chronostratigraphy, with common technological and typological traits for each of those periods, respectively blades, backing, and La Gravette points; Laurel and stemmed points; and the production of small bladelets and simple burins.

The present study, thus, suggests a perfectly conserved cave with a long stratigraphy, in fact very similar to that found at Caldeirão cave, near Tomar (Zilhão, 1997), and replicating those technological and typological traits found in the Middle and Upper Paleolithic of Portuguesa Estremadura. For the Pleistocene human occupation of Furninha it remains only the integration of the faunal data (Cardoso, 1993) with the lithic assemblage data, presented here. Though most likely not an easy task due to questions related to the provenience of lithic artifacts and the association with the faunal beds, but certainly an exercise worthwhile to take place in the near future – more so if the bone samples sent to be radiocarbon dated result in reliable dates.

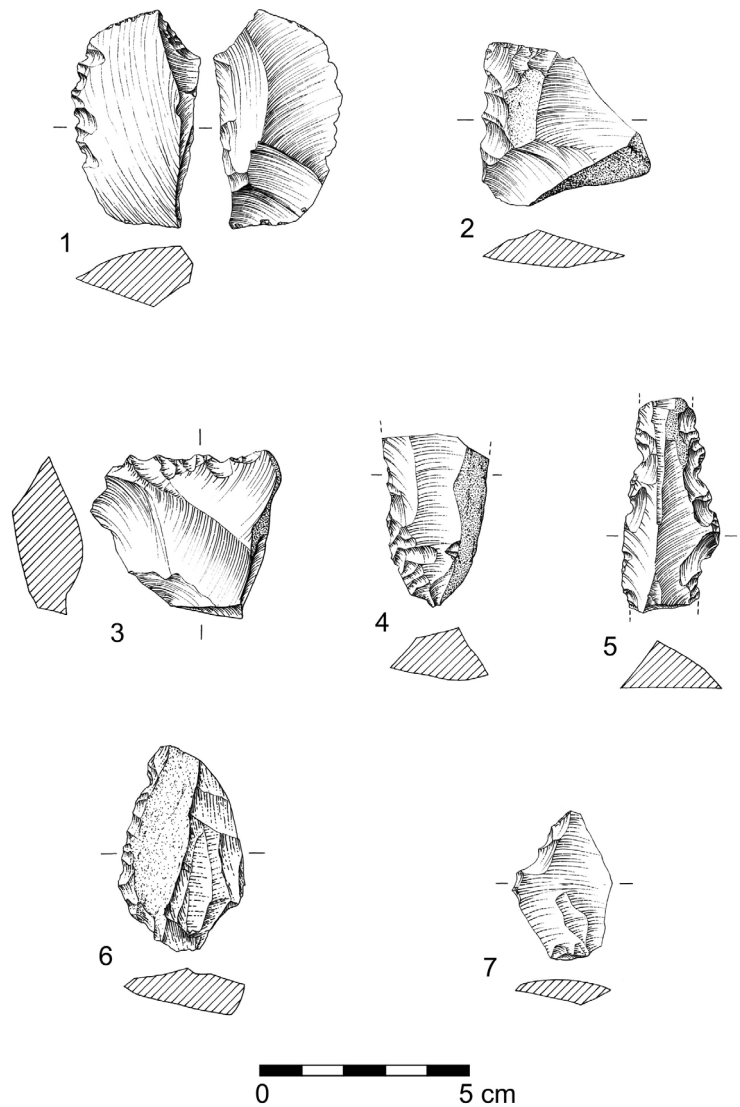

FIG. 19. *Denticulated and notched Upper Paleolithic flakes and blades from Furninha.*

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