

Review of the Acheulean component of the lithic industry from Galería (Atapuerca, Burgos, Spain)*

Revisión del componente achelense de la industria lítica de Galería (Atapuerca, Burgos, España)

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ABSTRACT

The lithic industry of the Galería site at the Atapuerca complex (Burgos), dated to the second half of the Middle Pleistocene, has been interpreted as one of the most remarkable assemblages of the Acheulean technocomplex known in the Iberian Peninsula and southern Europe. It has been considered that the long stratigraphic sequence of the site allows the observation of the evolution of the Acheulean in the second half of the Middle Pleistocene. This proposal has been the subject of a recent review on our part, in which the discontinuous nature of the stratigraphy at Galería is highlighted, and the possibility of establishing any type of archaeological sequence based on the limited record it contains is negatively valued. The attribution of the archaeological sites at Galería exclusively to the Acheulean techno-complex is also discussed, based on a level-by-level analysis of the representativeness of the published lithic industry.

In order to assess the Acheulean attribution in-depth, and to contrast the consistency of the evolutionary trends that have been proposed for this techno-complex through the stratigraphy of Galería, we present here a detailed study of all the artifacts interpreted in previous publications as “LCTs” (handaxes, cleavers and other macro-tools). This work, complementary to our previous review, has been carried out on the collections obtained in the field seasons undertaken in Galería between 1982 and 1996, currently deposited at CENIEH and the Museum of Evolution (Burgos). The conclusions reached corroborate the weak and discontinuous presence of characteristic Acheulean elements in this site, ruling out the possibility of recognizing any type of evolutionary sequence in these materials. Our main conclusion is that the interpretations that propose to see in the industry of Galería

as a representative sequence of the European Acheulean which evolves progressively, have no base.

RESUMEN

La industria lítica del yacimiento de Galería (complejo de Atapuerca, Burgos), datado en la segunda mitad del Pleistoceno Medio, ha sido interpretada como uno de los más notables conjuntos del tecnocomplejo achelense que se conocen en la península ibérica y en el sur de Europa. Se ha estimado que su prolongada secuencia estratigráfica permitiría observar la evolución del Achelense en la segunda mitad del Pleistoceno Medio. Esta propuesta ha sido objeto por nuestra parte de una revisión reciente, en la que se destaca el carácter discontinuo de la estratigrafía de Galería y se valora negativamente la posibilidad de establecer cualquier tipo de secuencia arqueológica basada en el limitado registro que contiene. A partir del análisis nivel por nivel de la representatividad de la industria lítica publicada, se discute además en ese trabajo la atribución exclusiva al tecnocomplejo achelense de los conjuntos arqueológicos de Galería.

Con objeto de valorar en profundidad la atribución achelense y de contrastar la consistencia de las tendencias evolutivas que han sido propuestas para este tecnocomplejo a través de la estratigrafía de Galería, presentamos aquí un estudio detallado de todos los artefactos interpretados en publicaciones precedentes como LCT (bifaces, hendedores y otros macro-útiles). Este trabajo, complementario de nuestra revisión anterior, se ha efectuado sobre las colecciones obtenidas en las campañas realizadas en Galería en 1982-1996, actualmente depositadas en el CENIEH y en el Museo de la Evolución Humana (Burgos). Las conclusiones alcanzadas

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corroboran la débil y discontinua presencia de elementos achelenses característicos en este yacimiento, descartando la posibilidad de llegar a reconocer cualquier tipo de secuencia evolutiva en estos materiales. Nuestra principal conclusión es que las interpretaciones que proponen ver en la industria de Galería una secuencia representativa del Achelense europeo con una evolución progresiva, carecen de fundamento.

Key words: Acheulean; Iberian Peninsula; Atapuerca; Galería site; large cutting tools (LCTs).

Palabras clave: Achelense; península ibérica; Atapuerca; Yacimiento de Galería; grandes utensilios cortantes.

1. INTRODUCTION

1.1. Former research and site characteristics

The archaeological site of Galería (Fig. 1), together with Sima de los Huesos, Gran Dolina and Sima del

Elefante, is part of the major set of palaeolithic sites of the Atapuerca Complex (Burgos, Spain). It has been so far the only site whose industrial record has been entirely attributed to the Acheulean techno-complex. The preserved deposit measures c. 18 m in width and up to 12 m in maximum depth, of 124 m² estimated total surface, and with a thickness between 12 and 17 m of the total stratigraphic sequence (Ollé *et al.* 2013: 142 and fig. 4; García-Medrano *et al.* 2017: 366, fig. 2). The first phase of excavations took place in 1982-1995 in two of the different sectors, Trinchera Galería (TG) and Trinchera Norte (TN), and in 1991-1996 in the third sector, named Cueva de los Zarpazos (TZ). The total surface excavated in this period reached up to 80 m², at least 28 m² in Galería and 16 m² in TN (Ortega 1999: 15, fig. 2; Vallverdú *et al.* 1999: 65, fig. 3; Ollé *et al.* 2013: 142, fig. 4).

Each sector corresponds to different karst entities (Gil *et al.* 1987). Formation processes conditioned by different factors are recognized in all of them,

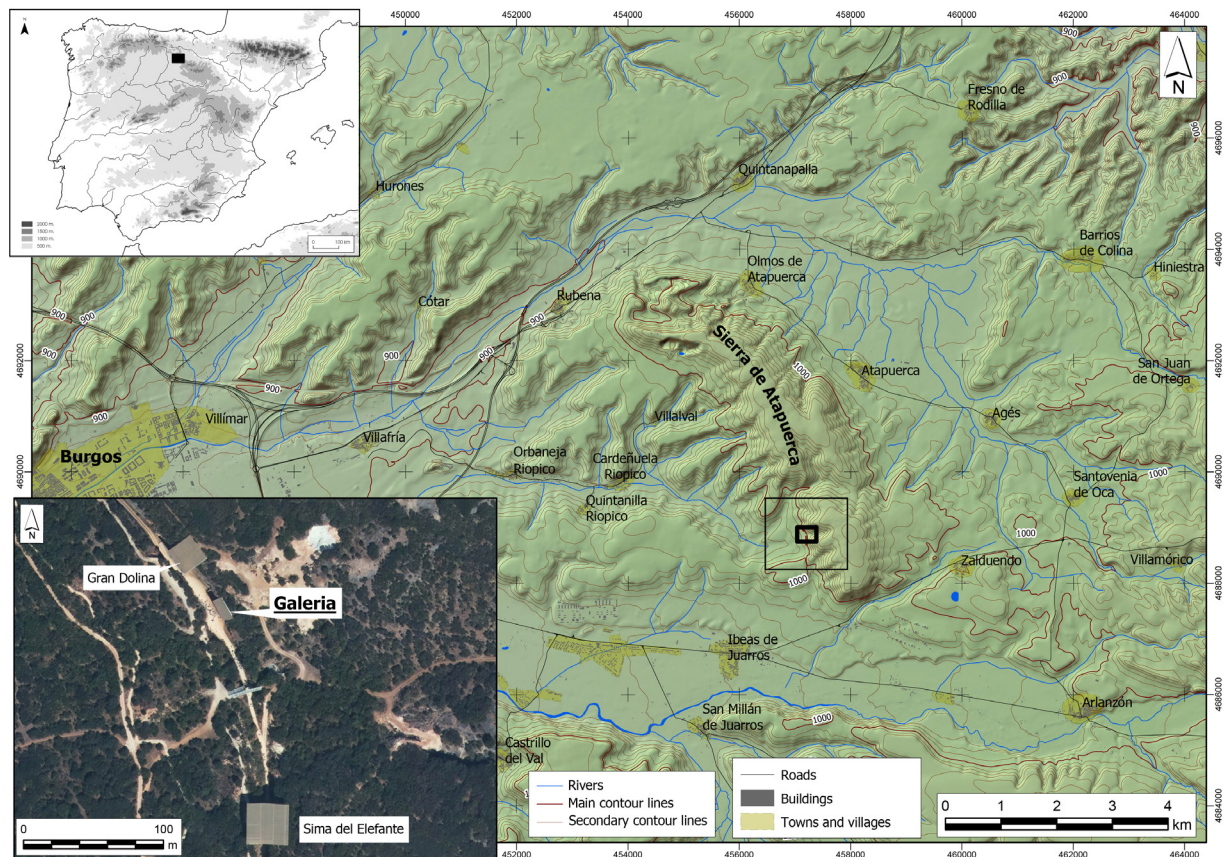


Fig. 1. Geographical location of the Galería and other Atapuerca sites with Middle Pleistocene industrial assemblages within the Sierra de Atapuerca (Burgos, Spain). Cartography prepared with ArcGIS Pro2.6 from digital elevation model and cartographic data from the Centro Nacional de Información geográfica, Lidar 2015. In colour in the electronic version.

and stratigraphic sequences specific to each one have been established. These have been correlated to each other and grouped into five stratigraphic phases (Pérez-González *et al.* 1995, 1999). The section with archaeological content, units GIII and GII—divided from top to base in subunits GIIb and GIIa—include allochthonous deposits composed mainly of detrital flows of limestone cobbles in clay matrices and homometric limestone gravels sorted by water currents (Tab. 1). GII, 1.20 to 3 m thick, lies in angular and erosive discordance over GI and consists of external cobble flowstones. Seven gravity flows can be recognized from the South and a further three from the North. GIII, 1 to 2 m thick, is arranged in angular and erosive discordance over GII and consists of gravity sediments along with others caused by water transport (Santonja and Pérez-González 2018).

1.2. Current hypothesis about the industrial sequence of Galería

Part of the published interpretations on the lithic industry in Galería are based on global studies, referring only to the industry from the TG and TN sectors (Car-

bonell *et al.* 1987a, 1999). The industrial assemblage of the whole site thus unified was then considered as fully representative of the Acheulean techno-complex, and integrated in a continuous sequence within the general framework of the European Acheulean known at the time (Mosquera *et al.* 1995: 507-524; Carbonell *et al.* 1999: 344-349). Subsequent studies, which already took into account the recorded materials from TZ in a global way (Carbonell *et al.* 2001; Ollé *et al.* 2005, 2013, 2016; García-Medrano *et al.* 2014, 2015, 2017; Terradillos-Bernal 2013), have established more detailed conclusions, although always insisting on the evolutionary nature of the industrial sequence, and adopting the established stratigraphic units or subunits (GIIa, GIIb and GIII) as the subject of analysis, despite the fact that each one integrates a variable number of levels that show evident discontinuities (Santonja and Pérez-González 2018).

The sequence of Galería has been considered as one of the most representative of the European Acheulean (Ollé *et al.* 2013; García-Medrano *et al.* 2014, 2015, 2017; Moncel *et al.* 2015), and a development from 503 ± 95 to $221/269$ ka has been proposed. The industrial sequences of Galería and the Gran Dolina TD10 level—which are adjacent sites, 50 m from each

	TG	TN	TZ	Dates (ka) ESR & U series (Falgüeres <i>et al.</i> 2001; Falgüeres <i>et al.</i> 2013)	Dates (ka) TT-OSL & pIR-IR (Demuro <i>et al.</i> 2014)
G III	TG11 ¹	TN8	TZGIII	GSU3: 238 ± 19 ; $221 +15/-12$ GSU4: $269 +51/-44$ GSU11: $283 +30/-27$ GSU12: $244 +29/-26$; $231 +25/-24$ TN8: 256 ± 33	GSU2: 241 ± 13 ; 225 ± 18 GSU7: 260 ± 20 ; 236 ± 12
	TG10A	TN7	TZGIIa	TN7: $256 +26/-25$; $227 +34/-32$	TG10A: 244 ± 16 ; 231 ± 18
G IIb	TG10B	TN6-DA TN6	TZGIIb/c		
	TG10C TG10D	TN5	TZGIIb/c	TG10D: $269 +26/-24$; $237 +26/-24$	
G IIa	TG9	TN2B and TN2A	TZGIIId	TG9: $350 +47/-46$	TN2A: 231 ± 20 ; 242 ± 17
	TG8	TN2B	TZGIIId	TG8: $274 +28/-26$; $211 +18/-16$ TZGIIId: $363 +44/-42$	
	TG7	TN2B	TZGIIId	TN2B: $217 +31/-28$	TG7: 335 ± 21 ; 284 ± 17 ; 324 ± 42 ; 329 ± 33

Tab 1. Stratigraphic equivalence Trincheras Galería (TG) / Trincheras Norte (TN) / Cueva de los Zarpazos (TZ) and dates from Galería (Stratigraphies of TG and TN according to Ollé and Hugué 1999; TZ according to García Medrano *et al.* 2014).

¹TG11: this level, which is 1.2 m thick in average, includes 12 sublevels between 4 and 18 cm thick, consisting of small gravels and/or lutite from the inner area of the cave. They were initially considered as occupation floors (Díez *et al.* 1986; Carbonell *et al.* 1987b; Lorenzo and Carbonell 1999), although we do not agree with this interpretation (Santonja and Pérez-González 2018: 27-28).

other (Fig. 1)—have also been the subject of some correlation attempts, giving rise to interpretations articulated in phases, presented as possible models for the Middle Pleistocene of the Iberian Peninsula and even Western Europe (Ollé *et al.* 2016: 317). The first of these phases, represented by level GIIa in Galería, would imply the occupation of the region by the new populations identified in Sima de los Huesos, to which the limited human remains that turned up in Galería were assimilated. Next, the GIIb and GIII series would offer evolutionary developments of that Acheulean, and finally the TD10.1 industry of Gran Dolina—the only TD10 sub-level, located at the top of the unit and fully excavated at the time—was interpreted as representative of a hypothetical Acheulean-Mousterien transition, or Mode 2-Mode 3, in the terms used by the Atapuerca researchers.

A further assessment of the integrated sequence of Galería and TD10 took into account the dates obtained in recent years (Falguères *et al.* 2013; Demuro *et al.* 2014; *vid.* Tab. 1) and introduced important nuances. The first Acheulean industries of Atapuerca would be recognized in Galería, TD10 and Sima de los Huesos, and would be roughly contemporary, considering the initial reference (Ollé *et al.* 2016: 316) of the minimum age established for Sima de los Huesos, 427 ± 12 ka¹ (Arnold *et al.* 2014). The chronological framework of GII and GIII provided by the latest dates (Tab. 1) placed the archaeological sequence of Galería between *c.* 363 and *c.* 220 ka, a time interval that refers to MIS 10-MIS 7, although it can perfectly reach as far as the MIS 11 (424/374 ka). The most problematic aspect derived from the new chronology for Galería is that its archaeological sequence, considered fully Acheulean, would be more modern than TD10.1—the last dates locate TD10 in the 400/450 ka range (Moreno *et al.* 2015: 539)—, whose industry was considered as a transition between the Acheulean and the Middle Paleolithic (Ollé *et al.* 2016). Such interpretation has also been proposed for the industry of GIII, which is the highest stratigraphic unit at Galería (Terradillos-Bernal and Díez 2012).

1.3. Aims of this paper

The conclusions reached in the interpretation of Galería, which was summarized in a very concise way in the two previous sections, introduce some aspects that deserve attention. From a limited industrial record, distributed over a wide and complex stratigraphic sequence, a general evolutionary hypothesis of the European Acheulean has been built. There is an added nu-

ance: these were occupations inside caves, in contrast to the usual situation in the open air of the Acheulean deposits known throughout the world, and in particular in Europe, and more specifically in the Iberian Peninsula. In order to contrast the proposed hypotheses, we have analysed the publications focused on the lithic industry of Galería retrieved during the 1982-1996 seasons, and studied the materials kept in the Museum of Burgos and the Museum of Human Evolution². In the first phase, the entity and integrity of the archaeological content of each level has been evaluated from strictly a geo-archaeological perspective, both the general technological characteristics of the industry and the sedimentary processes involved in the formation of the deposits. Based on the detailed discussion of such aspects, we have proposed (Santonja and Pérez-González 2018) that it is not possible to accept a unitary Acheulean interpretation for Galería without refuting the possibility that the registered industries belong to different techno-cultural traditions, Acheulean and Middle Paleolithic.

The results that we present here complement our previous work and focus on the technical analysis of the shaped macro-tools (handaxes, cleavers and large tools on flake) of Galería. The aim of this study is to clarify the characteristics and frequency of these materials and contrast the possibility of identifying a representative industrial sequence of the European Acheulean in Galería. Our starting point is to consider these macro-tools assemblage as a component of the series retrieved from the site that initially can be accepted as linked to the Acheulean techno-complex.

2. MATERIALS AND METHODS

Information has been obtained from an assemblage of 37 pieces from the field seasons at Galería between 1982 and 1996. This material was taken for granted as typical Acheulean macro-tools in the consequent publications. Virtually all of these pieces have been found in the Burgos Museum and in the Museum of Human Evolution. In order to establish this total of 37 pieces, we have consulted all publications covering the industry of Galería, both the older general publications (especially Carbonell *et al.* 1999), which refer exclusively to the industry obtained in the 1982-1995 seasons in TG and TN, as well as later ones (Ollé *et al.* 2013, 2016; García-Medrano *et al.* 2014, 2015, 2017). Some of these are dedicated exclusively to this precise type of tool, which also include the industry of TZ, although without providing detailed information by level. The first general

¹ A slightly older date has recently been published, 448 ± 15 ka (Demuro *et al.* 2019).

² The materials of the Burgos Museum are currently located at the CENIEH, although access to researchers is pending the availability of a fully verified inventory (information provided on 05/04/2020).

study (Carbonell *et al.* 1999) mentions 19 pieces from this assemblage. None of the subsequent articles specifically devoted to the study of Galería LCTs include all of the tools that will be discussed here.

The initial stratigraphic allocation of this material (Tab. 2), which is the starting point of our review, places the pieces in the GIII unit in the three sectors of Galería: four in TZ, all of them in GIIIb, six in TG and two in TN. The specimens of TG come three from TG11 and three more from TG10A. The two pieces of TN correspond to TN7, whereas none come from TN8. Following an order from top to base, the next unit is GIIb. According to the preliminary attribution from which we started it provided a similar number, 13 pieces. Most of these—eight—were in TG, and a further two and three in sectors TZ and TN respectively. The TG pieces are distributed by 10B, 10C and 10D, with four, three and one specimen respectively. Both pieces of TZ were found in GIIC, and none in GIIb. As for the TN pieces, one was in TN6DA, two in TN5 and none in TN6. A further 12 items have been mentioned in GIIa: most of them—nine—in TN, only one in TZ, and two in TG. The piece from TZ comes from the only level of this unit in the sector, GIIId. The two pieces of TG were from TG7. Pieces with these characteristics have not been mentioned for TG8 nor TG9. The pieces of TN are concentrated in level TN2B, the deepest one of Sima Norte, with at least six pieces. A further piece comes from TN2A, whereas the last one, which lacks location coordinates, has been assigned to level TN2 undifferentiated.

	TZ		TG		TN	
	Level	Total	Level	Total	Level	Total
G III	TZGIII	4	TG11 (12 sublevels)	3 (of GSU 4, 11 and 12)	TN8	0
	TZGIIa	0	TG10A	3	TN7	2
G IIb	TZGIIb	0	TG10B	4	TN6DA	1
					TN6	0
G IIc	TZGIIc	2	TG10C	3	TN5	2
			TG10D	1		
G IIa	TZGIIId	1	TG9	0	TN2A	1 (+1 TN2 UD)
			TG8	0	TN2B	6
			TG7	2	TN2B	

Tab 2. Macro tools of Galería identified in older publications. TG Trinchera Galería, TN Trinchera Norte, TZ Cueva de los Zarpazos, UD undifferentiated.

The physical study carried out in the Burgos Museum and in the Museum of Human Evolution will allow us to go deeper into the characterization of these materials and review the enumeration of the previous paragraph. Following Sharon (2007), we use the expression “Large Cutting Tools” or its abbreviation, LCT, to refer to both the unifacial and bifacial Acheulean macro-tools: handaxes, cleavers, trihedral picks, large back knives, macro scrapers and other pieces characterised mainly by having large cutting edges. These are tools made by means of specific knapping sequences, from a natural support or a large flake, seeking the configuration of a unique object. The term LCT has also been used in the publications of the Atapuerca team about Galería, in some cases with nuances (“due the characteristics of our record, we have considered the LCT made on large flakes (more than 10 cm, Sharon 2007) as well as those made on smaller blanks”, García-Medrano *et al.* 2015: 96) that the size of the industry of Galería, often small in size, was considered. However, our study always primarily takes the processes applied in the configuration of the pieces into account.

For the identification of handaxes we stick to the technological concept of bifacial shaping, according to which it is possible to divide the bifacial *façonnage* into two operations, roughing and finishing (Inizan *et al.* 1992: 41-43, 1995: 44-49). The first of these procedures is primarily related to the bifacial equilibrium plane, while the second addresses the definition of bilateral symmetry. In the studied assemblage of Galería it has been recognized that in some pieces the process was interrupted even without completing the first phase, identifying them in that case as handaxe preform. In the description of the handaxes we also resort to the typological terminology defined by Bordes (1961).

We apply the term cleaver to handaxes with a transverse edge, regardless of the type of support used. We specifically reserve the expression “cleaver on flake” for LCTs initially defined as *hachereau* in French (Tixier 1956; Inizan *et al.* 1995), equivalent of the term *hendedor* in Spanish, including also other pieces on flake with close formal characteristics, which will be described in each case. In the scientific literature in the English language, the term cleaver is commonly used for any type of handaxe with a transverse edge, and with that sense it has been habitually applied by the Atapuerca researchers. However, we consider that the concept defined by Tixier defines accurately a type of tool which is the product of a specific elaboration process. These are tools that are essential elements to characterise the Acheulean techno complex, which is why we have adopted the expression cleaver on flake to differentiate them.

2.1. LCTs of Unit GIII

2.1.1. Zarpazos Sector

Four pieces have been cited in this sector, at the TZIIIb level. All have been interpreted as handaxes in recent publications by the Atapuerca team, although no references to any of them appear in the 1999 monograph:

1. First, a small quartzite handaxe, with amigaloid silhouette and a cutting base (103 x 73 x 45 mm, 261 g). The apical end was modified by an extraction that produced a bevel end (Fig. 2.1). Unidentifiable support. It shows slight rounding. Retrieved during the 1993 season, grid Q5. Formerly interpreted as a handaxe (García-Medrano *et al.* 2015: 102, fig 13C).

2. Another small amigdaloid quartzite handaxe, with a thick base (90 x 76 x 34 mm, 250 g), on cortical flake and mainly unifacial knapping (Fig. 2.2). It

shows an old distal fracture and slight rounding. 1992 season, grid M4. It has been interpreted as a handaxe (García-Medrano *et al.* 2015: 102, fig 13D).

3. A larger handaxe (150 x 89 x 44 mm, 464 g), with irregular oval silhouette, cutting base and tip re-knapped on bevel edge, later fractured (Fig. 2.3). The support was possibly a cortical flake from a flat quartzite pebble, although as no remains of the ventral surface are preserved, this identification is not certain. It shows rounding of similar intensity to the piece above. 1992 season, grid K5. It has also been interpreted as a handaxe (García-Medrano *et al.* 2015: 102, fig 13F).

4. Quartzite handaxe with oval asymmetric silhouette, thick base and almost exclusively non-invasive unifacial knapping (Fig. 2.4). Medium sized (114 x 67 x 35 mm, 290 g), on non-cortical flake. Rounding more intense than in the previous pieces. 1992 season, grid M5. It has been published as a handaxe (García-Medrano *et al.* 2015: 102, fig 13E). The possibility of

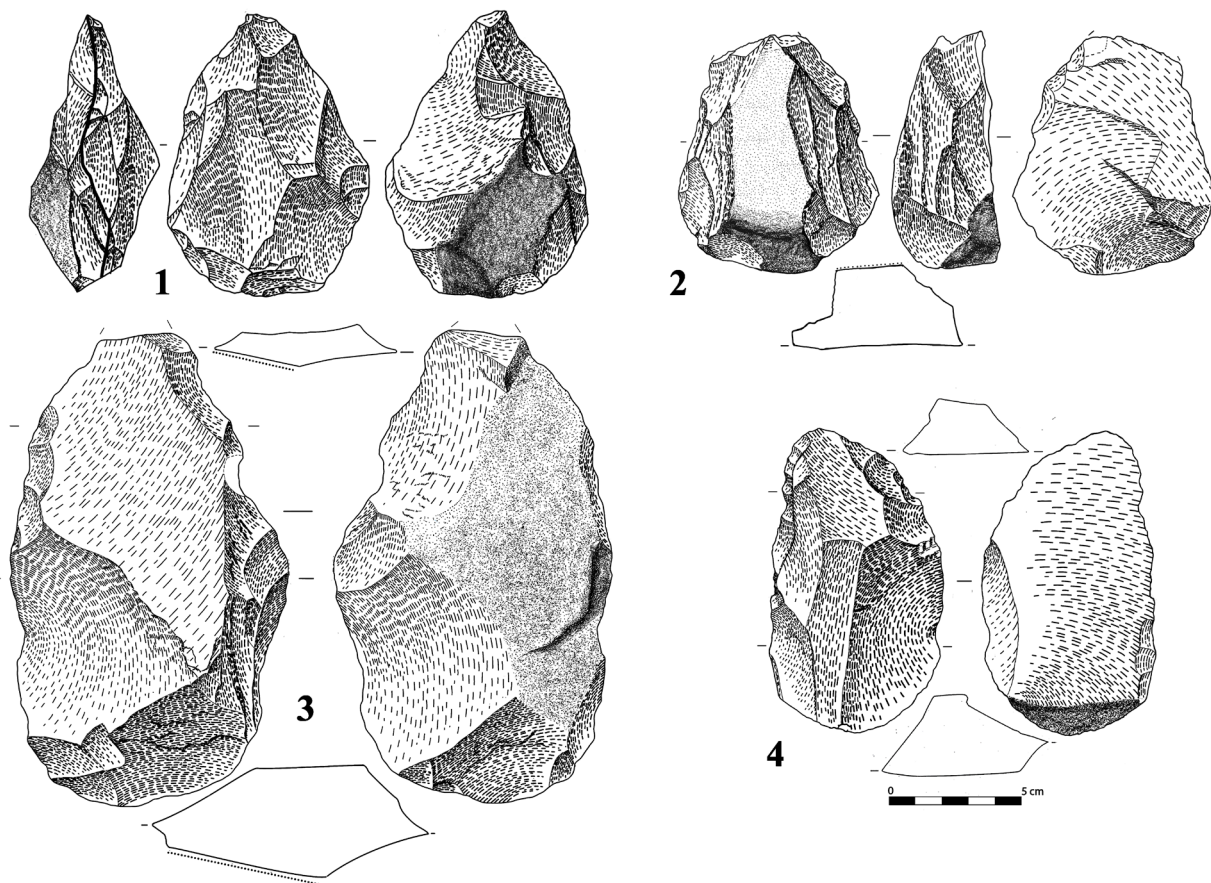


Fig. 2. Handaxes from Galería (Atapuerca), GIII unit, level TZIIIb: 1. and 2. Small amygdaloid handaxes; 3. and 4. Handaxes of irregular oval outline. Quartzite.

a flake refitting this handaxe was mentioned, although it could actually be an accidental detachment (García-Medrano *et al.* 2017: table 3 and fig. 12, págs. 367 and 374).

2.1.2. Galería Sector

The five LCTs that we recognise here, three handaxes, a cleaver on flake and another piece on flake morphologically assimilate to this category of tools, come from each of the GSU 4, 11 and 12 from the TG11 level (see Tab. 1, note), and two from level 10A. A sixth piece of this last level, previously identified as LCT, is an elementarily knapped pebble, without defined configuration.

5. Oval handaxe, slightly pointed, with cutting base and a distal fracture (Fig. 3.1). Finishing retouch on one side made with a soft hammer. Made on a kidney-

shaped pebble (127 x 87 x 49 mm, 270 g), of slightly rounded, partially dehydrated Neogene flint. 1982 season, grid G21 sublevel GSU4, according to its identification serial number. In Carbonell *et al.* (1999: 332, fig. 35b), it was mistakenly assigned to sublevel GSU5 and is identified as BN2GC. The support is identified as a flake (*vid.* Santonja and Pérez-González 2018: 21, fig. 3A). It is not mentioned again in later publications about the Galería LCTs.

6. Cleaver on flake of Neogene flint, shaped through invasive unifacial retouch over the basal half of the dorsal surface (139 x 88 x 48 mm, 393 g), which does not prevent the recognition of the nature of the support flake, cortical, allowing it to be included in type 0 (Tixier 1956). The rest of the silhouette presents a less invasive direct knapping, bifacial on the left side, which together define trapezoidal sections and give rise to a straight and fairly oblique natural edge (Fig. 4.1). It shows very light rounding and some alter-

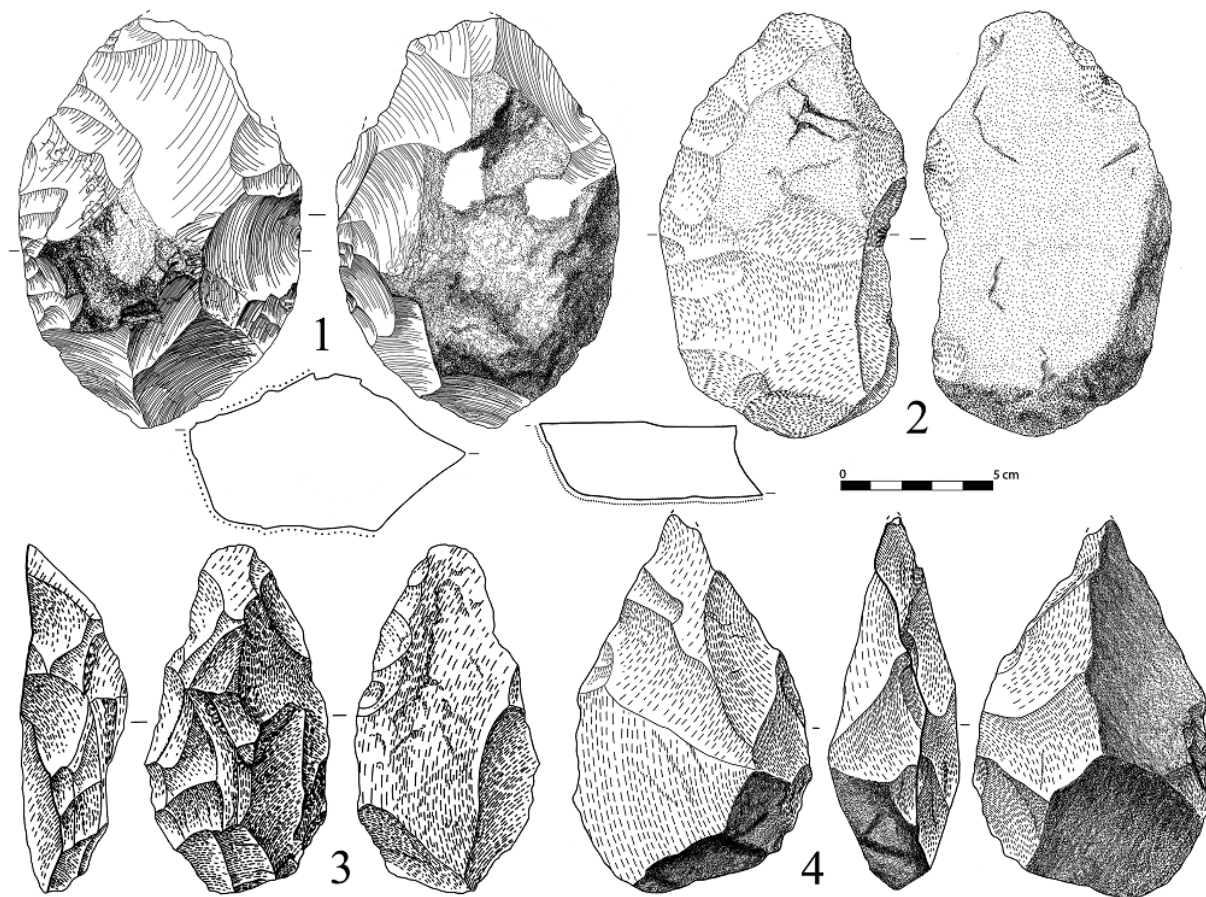


Fig. 3. Handaxes of Galería (Atapuerca), GIII unit: 1. Oval handaxe, distal end fractured, level TG11 (GSU 4). 2. Handaxe of oval irregular outline, level TG11 (GSU 12). 3. Elongated partial amygdaloid handaxe, level TG10A. 4. Amygdaloid tool-support handaxe, level TN7. Flint (1) and quartzite (2, 3, 4).

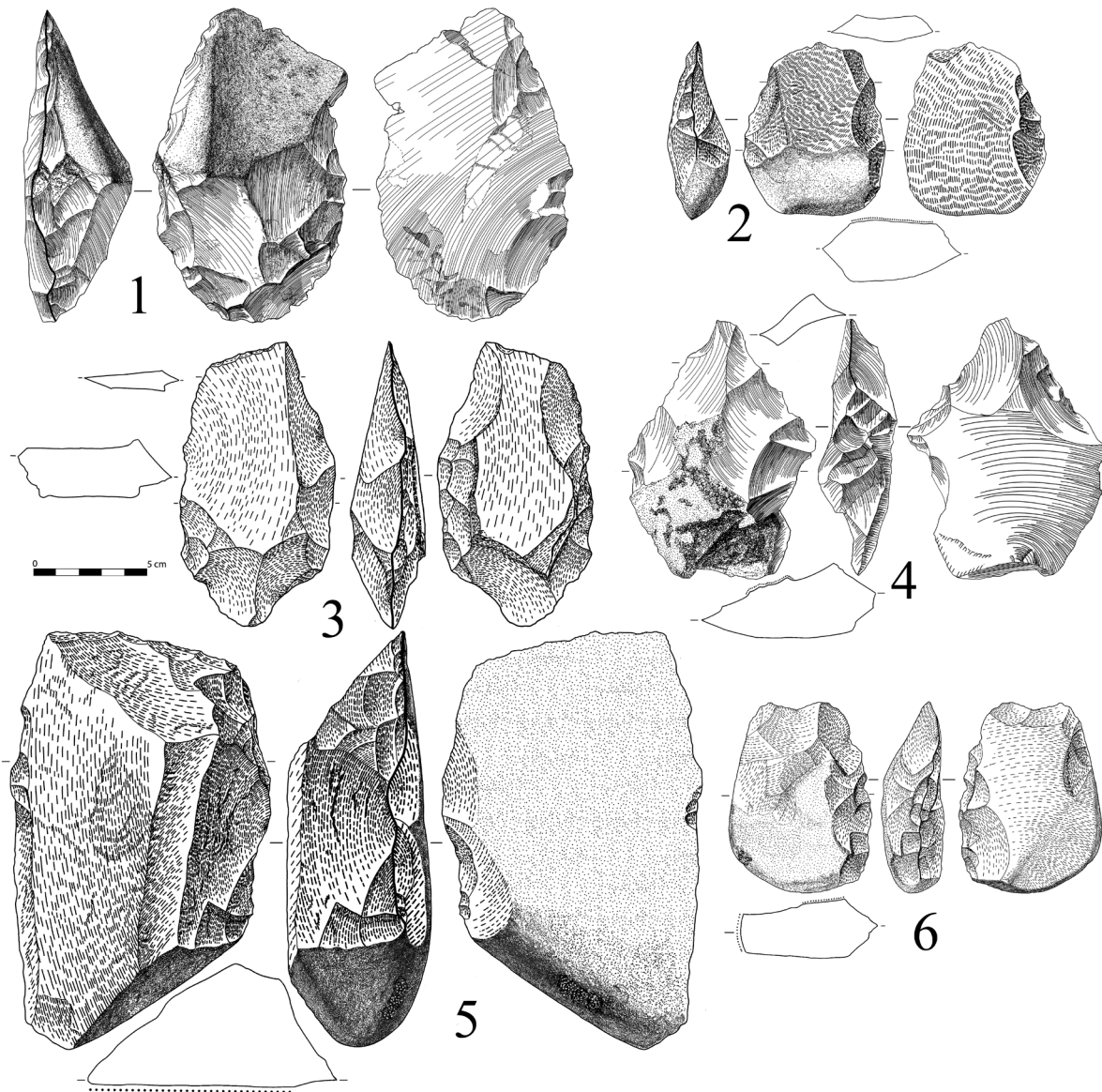


Fig. 4. Galería (Atapuerca), units GIII (1, 3), GIIB (5) and GIIA (2, 4, 6): 1. Cleaver on flake, *hachereau* Tixier type 0, level TG11 (GSU 11). 2. Small cleaver on flake, *hachereau* Tixier type I, level TG7. 3. Cleaver on flake, not *hachereau*, configured by a lateral tranchet blow, level TG10A. 4. Bifacial point on flake, level TN2. 5. Cleaver on flake, not *hachereau*, level TN5. 6. Flake tool, bifacial scraper, level TN2B. Flint (1, 4), quartzite (2, 3, 5 and 6).

ation on the right side. 1985 season, grid G21, sublevel GSU11. It is present in a good deal of the bibliography about Galería, on one occasion represented by an inaccurate drawing (mirrored in Mosquera *et al.* 1995: 486, fig. 29; 493, fig. 34), also interpreted as BN2GC (Mosquera *et al.* 1995: 486, fig. 29; 493, fig. 34; Carbonell *et al.* 1999: 330, fig. 29a). It has also been interpreted as a cleaver (García-Medrano *et al.* 2015: 100, fig. 9J) or as handaxe/cleaver (Ollé *et al.* 2016: 319, fig. 2D).

The previously published drawings of this piece do not accurately represent, as in the case above, the knapping system implemented (*cf.* Santonja and Pérez-González 2018: 21, fig. 3B).

7. Irregular oval silhouette handaxe with thick base and partial bifacial knapping, invasive exclusively on its main surface (Fig. 3.2). Made on a flat quartzite pebble (148 x 87 x 33 mm, 477 g). Moderate rounding can be observed on all ridges and edges. 1988 season,

grid G20-21, sublevel GSU12. In the first publications about the site, it was interpreted as BN2GC (Mosquera *et al.* 1995: 555; Carbonell *et al.* 1999: 330, fig. 29b), with identical and inaccurate drawings (cf. Santonja and Pérez-González 2018: 22, fig. 4A), however it is not mentioned in any later publications.

8. Flake on sandstone slab (125 x 70 x 29 mm, 234 g), with cleaver morphology (Fig. 4.3). The edge, not natural, was shaped through tranchet blow (cf. Inizan *et al.* 1992: 99-100) and received a later marginal retouch. U-shaped silhouette, totally defined through wide knapping, inverse on the left side and bifacial on the right side and the cutting base. Peripheral knapping is mostly later than the lateral blow to prepare the edge, which allows us to interpret that the piece is in its original state of configuration and is not the product of a subsequent resharping. It presents variable rounding, little marked in some sectors and somewhat more intense in others. It was retrieved from level 10A, grid G-17, 1983 season. It is mentioned in virtually all publications about the Galería LCTs, first as BN2GC (Mosquera *et al.* 1995: 550; Carbonell *et al.* 1999: 329, fig. 28b), and later as a cleaver (García-Medrano *et al.* 2015: 100, fig 9I; Ollé *et al.* 2016: 319, fig. 2C). The original drawing (Mosquera *et al.* 1995) was later corrected (Carbonell *et al.* 1999), although we do not agree with these later interpretations either.

9. Partial quartzite handaxe, with elongated amygdaloid silhouette. Cutting base and partial bifacial knapping, invasive exclusively on the main surface (Fig. 3.3). Made on a flake, it shows low intensity variable rounding (115 x 61 x 35 mm, 280 g). 1990 season, grid G21, level 10A. It was interpreted first as BN2GC (Mosquera *et al.* 1995: 549; Carbonell *et al.* 1999: 332, fig. 33 b), and later as a handaxe (García-Medrano *et al.* 2015: 102, fig. 13A; Ollé *et al.* 2016: 319, fig. 2A).

10. Piece G20-7 from level 10A, 1990 season, has been interpreted as “LCT on cobble” in the past (García-Medrano *et al.* 2017: 373, fig. 10-R01), even as “coming from longer shaping processes”. Actually, it is a small sandstone pebble (79 x 51 x 14 mm, 72 g), with a single extraction that forms a possible edge, and two further extractions that virtually cover both surfaces (Fig. 5.1). We interpret this specimen as a casual core. It does not appear in any other study about the Galería LCTs.

2.1.3. Trinchera Norte Sector (TN)

In the higher levels of TN, in marked contrast to what happens in the lower levels of the sector, the presence of possible LCTs is very low. We only recognize a small tool-support handaxe (cf. Boëda 2001) in level TN7, while in TN8 no piece is registered. Another



Fig. 5. Casual cores (non LCT tools) of Galería (Atapuerca), unit GIII, levels TG10A and TN7. Quartzite. In colour in the electronic version.

piece of TN7, accepted as LCT in some publications, is a pebble with isolated extractions that we rule out for this technological group:

11. Handaxe with amygdaloid silhouette and cutting base, made on a fairly cortical flake that was detached from an angular quartzite pebble (122 x 76 x 46 mm, 307 g). Broad bifacial knapping on left side and unifacial on right side, in which large cortical planes of the support flake are preserved. Also, there is scraper retouch in a short central stretch on the left side, over cortical surface (Fig. 3.4). It shows little intense rounding. 1990 season, grid E29, level TN7. It has been interpreted as BN2GC (Mosquera *et al.* 1995: 486, fig. 29; Carbonell *et al.* 1999: fig. 33a), and as a handaxe in later publications (García-Medrano *et al.* 2015: 102, fig. 13B; Ollé *et al.* 2016: 319, fig. 2B).

12. Another piece from level TN7, F25-27, obtained in the 1990 season, has also been identified as –similar to piece G20-7 of level 10A– “LCT on cobble” (García-Medrano *et al.* 2017: 373, fig. 10-R03), and “coming from longer shaping processes”. We have here a small flat sandstone pebble (75 x 55 x 32 mm, 133 g) with a natural fracture and some isolated extractions (Fig. 5.2). This piece has not been included in any

publication about the Galería LCTs, and we believe it can also be interpreted as a casual core.

2.2. LCTs of unit GIIB

2.2.1. Zarpazos Sector

There is only one LCT in this sector, a handaxe specifically, from level GIIC. The published studies also include another piece at this level, supposedly a cleaver, which we have interpreted as a core, as we will see below:

13. Piece from the 1996 season, identification serial number H13-17, level TZGIIC, interpreted as a cleaver (García-Medrano *et al.* 2014: 190, fig. 23E, 2015: 100, fig. 9F). It is an angled pebble of quartzite exploited as a core (158 x 96 x 63 mm, 976 g), slightly rolled. It shows centripetal extractions on an almost fully decorticated surface, and some more on the opposite surface, monopolar, knapped from the main surface

(Fig. 6.1). The exploitation system applied is obvious, and has nothing to do with configuration concepts typical of the LCTs.

14. Amygdaloid handaxe shaped by bifacial knapping on the right side and unifacial on the left one –bifacial in the basal area– relatively invasive. This is a well-balanced piece, with finishing retouch on the distal tip (Fig. 7.1), made on a Neogene flint flake. It has a cutting base, although part of the butt of the support flake is preserved (130 x 85 x 45 mm, 212 g). 1996 season, grid L2, level GIIC. Slight rounding. It has been interpreted as “handaxe on flake” (García-Medrano *et al.* 2014: 179 and 189, fig. 22H), and as “LCT on flake” (García-Medrano *et al.* 2017: 367 and 371, tabla 3 and fig. 8-R03).

2.2.2. Galería Sector

Apart from three well-defined handaxes, a further five pieces have been included in this group. In

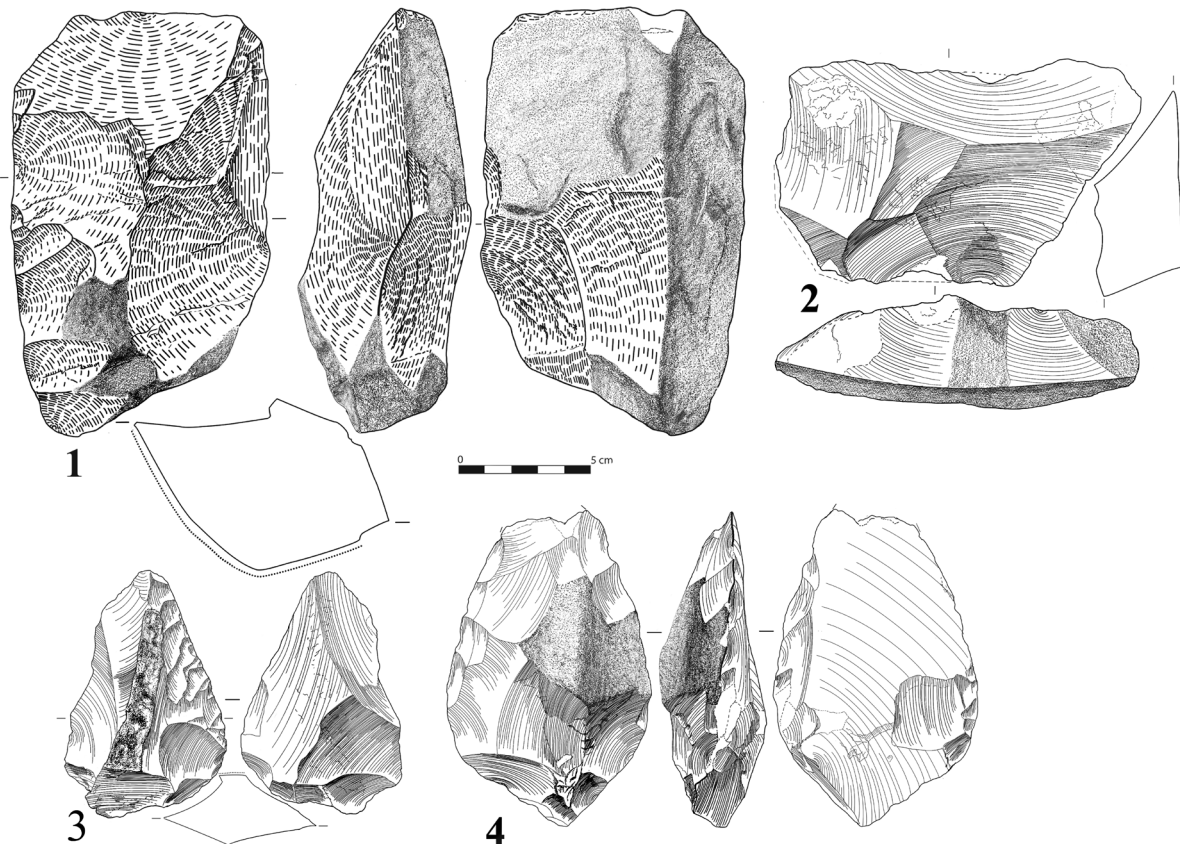


Fig. 6. Galería (Atapuerca), units GIIB (1, 2, 3) and GIIA (4): 1. and 2. Centripetal cores, levels TZGIIC and TG10B. 3. Handaxe preform with scraper final retouch, level TG10B. 4. Amygdaloid tool-support handaxe, level TZIIC. Quartzite (1), flint (2, 3, 4).

two cases these are pebbles with particular knapping schemes, which can be included among the LCTs. Among the remaining three, there is a core and two handaxe preforms, one with a final scraper retouch:

15. Lanceolate quartzite handaxe on cortical flake, with a cutting base at least in part (163 x 90 x 36 mm, 465 g). Bifacial invasive knapping—small remains of the ventral and dorsal surfaces of the support flake are preserved—, with peripheral regularization retouch produced with a soft hammer (Fig. 7.2). Evident rounding marks can be recognised. 1992 season, grid H20, level TG10B. It was interpreted as BN2G in the first publications (Mosquera *et al.* 1995: 552) and as BN1GC, made on a pebble (Carbonell *et al.* 1999: 332, fig. 34b). In later publications it is mentioned as a handaxe, not recognizing the support as a flake (García-Medrano *et al.* 2014: 179 and 189, fig. 22F, 2015: 101, fig. 10F). It has even been mistakenly assigned to the stratigraphic unit GIII (Ollé *et al.* 2013: 157, fig. 16d).

16. Partial handaxe of amygdaloid silhouette with little invasive and incomplete bifacial knapping and partly thick base (Fig. 7.3). Made on a flint pebble (136 x 90 x 40 mm, 475 g). It shows severe rounding. 1988 season, grid E18, level 10B. The information published on this piece, particularly the drawings, suffers from notable errors of interpretation (*cf.* Santonja and Pérez-González 2018: 22, fig. 4B). It was initially considered as a tool made on flake—BN2GC—the raw material being silicified limestone (Carbonell *et al.* 1999: 332, fig. 34a); it was later interpreted as a handaxe, made on unidentified blank (García-Medrano *et al.* 2014: 179 and 189, fig. 22E, 2015: 101, fig. 10G), although with some inexact attribution to the stratigraphic unit of origin—they place it in GIII—and with the same drawing as 1999 (Ollé *et al.* 2013: 157, fig. 16b).

17. Piece F20-53 of level 10B, 1992 season, has been interpreted as a cleaver (García-Medrano *et al.* 2014: 190, fig. 23B, 2015: 100, fig. 9H). It is a speci-

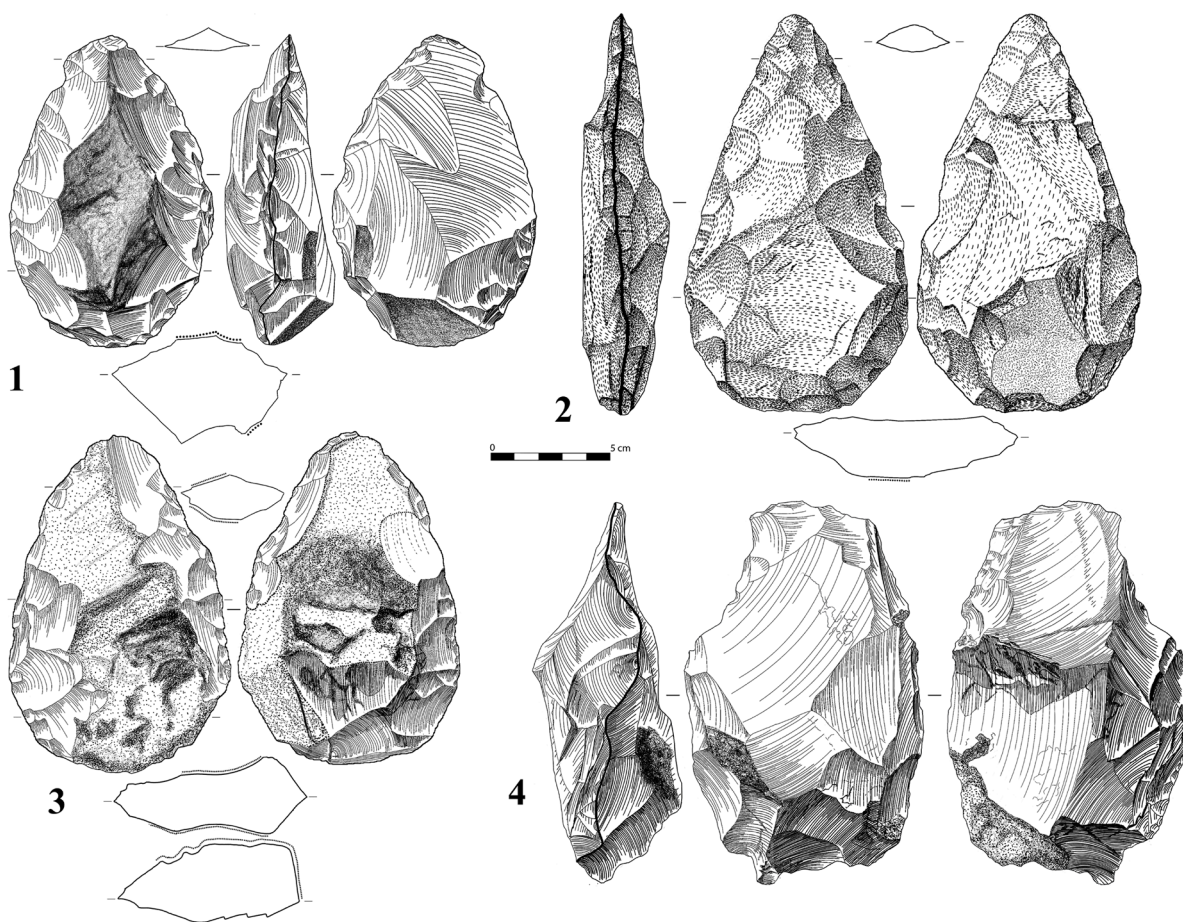


Fig. 7. Handaxes of Galería (Atapuerca), unit GIIb: 1. Amygdaloid handaxe, level TZIIc. 2. Lanceolate handaxe, level TG10B. 3. Partial amygdaloid handaxe, level TG10B. 4. Tool-support handaxe with transversal edge, level TG10C. Flint (1, 3, 4), quartzite (2).

men of parallelepiped volume, on a flint cobble-slab altered by dehydration in some areas and with clear rounding marks (130 x 82 x 31 mm, 203 g). The type of exploitation it presents corresponds to that of a core, with centripetal extractions on one surface and with a pair of posterior extractions on the back, which do not constitute a hierarchical percussion surface (Fig. 6.2). There is no configuration that allows its identification as LCT.

18. Piece with amygdaloid silhouette on unidentified flint blank (91 x 60 x 30 mm, 89 g). It was retrieved during the 1990 season, level 10B, identification serial number F17-63, and has been published as a handaxe (García-Medrano *et al.* 2014: 189, fig. 22G). It has been fully knapped through large bifacial extractions, without finishing retouch, and a large final extraction on the left side, which offsets the bilateral symmetry of the piece (Fig. 6.3). Retouch on the opposite side gives rise to a well defined straight scraper. We interpret it as a tool made on a handaxe preform. Alternatively, it could also be a core bifacially exploited, with a final scraper retouch.

19. Handaxe support of tool with transverse edge and cutting base. Broad irregular bifacial knapping. Scraper retouch in a distal portion of the right side and also in the lower area of the left side—on the secondary surface in both cases—and final retouch on the transverse edge, affected by old fractures (Fig. 7.4). Made on a nodule of Neogene flint (162 x 102 x 58 mm, 826 g), with obvious rounding on peripheral edges and internal ridges. 1992 season, grid G18, level 10C. The support has been considered to be a flake (Mosquera *et al.* 1995: 551), and has been represented by a drawing that does not match the knapping scheme we observe on the piece (Carbonell *et al.* 1999: 331, fig. 32a). It has been later interpreted as a cleaver (García-Medrano *et al.* 2014: 190, fig. 23A, 2015: 100, fig. 9D).

20. Possible handaxe in shaping process. Well-defined bifacial knapping can be observed in the distal half of the left side; on the right, only unifacial knapping is observed, also in the distal half, as well as a fracture orthogonal to the main plane at the basal half which we interpret as a knapping accident (Fig. 8.1). This accident could have resulted in the piece being abandoned. Alternatively, it could be interpreted as a core with bifacial and unifacial exploitation. It has a thick base with percussion marks. The support is a quartzite cortical flake (102 x 76 x 41 mm, 343 g), with slight rounding marks. 1989 season, grid F15, level 10C. It has been included in only one relatively recent publication, where it was interpreted as a handaxe on flake (García-Medrano *et al.* 2014: 179 and 189, fig. 22A).

21. Quartzite slab with wide lateral extraction following a very irregular detachment plane (147 x 87 x 43 mm, 604 g). It shows some lateral knapping on that

surface and shallow distal extractions on the cortical surface, which gives rise to a convex edge altered by recent fractures (Fig. 8.2). Some percussion marks can be observed on the thick base. Rounding of moderate intensity and alterations that have caused deep fracture lines can also be seen. 1992 season, grid G17, level 10 C. This piece has been interpreted on occasions as a cleaver (García-Medrano *et al.* 2014: 190, fig. 23F), however although it can be considered as macro-tool within the LCT group, it lacks the characteristic configuration of a true cleaver.

22. Tool on flattened quartzite pebble, with morphology and elaboration scheme similar to that of the previous piece (141 x 78 x 39 mm, 498 g). In this case it shows two edges, both configured from large extractions of the same surface, finished with no invasive reverse knapping, partly bifacial (Fig. 8.4). The edge in the lower part presents old detachments that can be interpreted as macro wear marks. Little intense rounding marks. There is no data regarding season and grid, only that it was retrieved from level 10D. It has been only mentioned in the general monograph about the excavation as BN1GC (Carbonell *et al.* 1999: 330, fig. 30a), although not specifically in any later studies.

2.2.3. *Trincherá Norte Sector (TN)*

Only three handaxes have been recorded in the intermediate stratigraphic section of TN. We agree with this interpretation in two cases, whereas in the third one, we observe a particular configuration which does not match the proposed classification.

23. Oval partial handaxe with cutting base. Bifacial knapping on virtually the whole edge, more invasive on the main surface. Finishing retouch in some sectors, especially in the central area of the right side, although not giving rise to a differentiated edge that could be interpreted as a tool (Fig. 9.1). Preservation of some cortex identifies the support as a flat flint pebble, slightly dehydrated on the edges (148 x 87 x 39 mm, 248 g). It shows little intense rounding. 1991 season, grid F25, level 6DA. It was not drawn or described in the 1999 monograph; later it was interpreted as a handaxe on flake (García-Medrano *et al.* 2014: 179 and 189, fig. 22C).

24. Tool that can be considered as a cleaver on flake, although it does not fit within the technical concept of *hachereau* (Tixier 1956). The unnatural cutting edge was obtained by knapping, a wide reverse extraction perpendicular to the cutting edge and subsequent retouching, which creates a straight cutting edge. Rectangular silhouette defined by wide reverse retouch on both sides and final alternate retouch on the right (Fig. 4.5). Thick base with percussion marks. It shows lit-

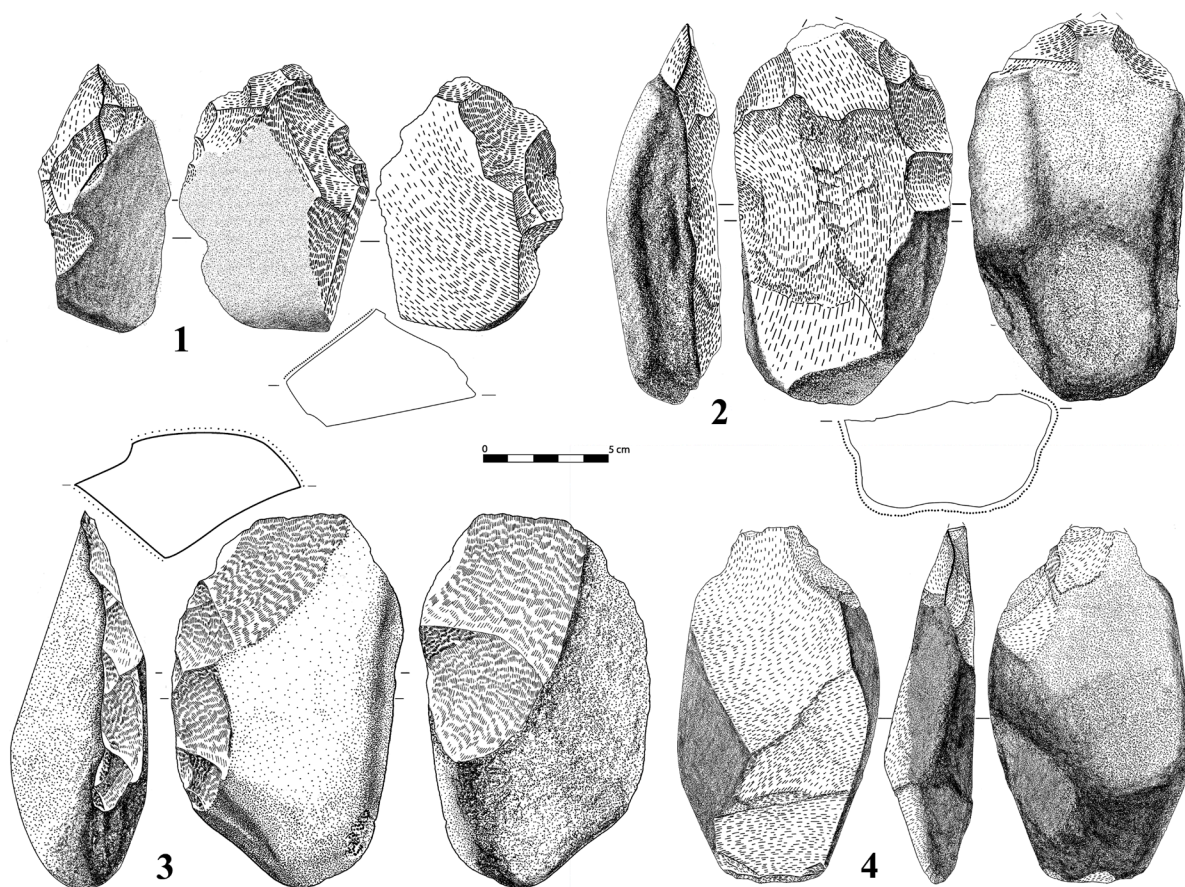


Fig. 8. Galería (Atapuerca), units GI1b (1, 2, 4) and GI1a (3): 1. Handaxe preform on flake, level TG10C. 2, 3, and 4. Macro-tools on pebbles, levels TG10C, TN2B and TG10D. Quartzite.

tle intense rounding. The blank is a lateral percussion cortical flake, which was obtained from a flat quartzite pebble (132 x 83 x 41 mm, 536 g). 1993 season, grid F25, level TN5. It has been interpreted as a large BN2GC (Carbonell *et al.* 1999: 329, fig. 27a), and later as a cleaver (García-Medrano *et al.* 2014: 190, fig. 23D, 2015: 100, fig. 9E), never delving into its particular technical characteristics.

25. Irregular oval handaxe, with asymmetric sections. Generalised invasive knapping all over the piece, cutting base and totally lacking regularization retouch in the outline of the piece (Fig. 9.2). Made on a thick cortical quartzite flake, with lateral percussion (117 x 76 x 41 mm, 334 g). It shows variable rounding, little intensity in some areas and more noticeable in others. Retrieved during the 1993 season, grid G25, level TN5, it was recorded as BN2GC in earlier publications (Mosquera *et al.* 1995: 546; Carbonell *et al.* 1999: 331, fig. 32b), and later as a handaxe on flake

(García-Medrano *et al.* 2014: 179 and 189, fig. 22B, 2015: 101, fig. 10E). The drawing published in the 1999 monographical volume and later repeated to illustrate the location of the wear marks on the cutting edge (García-Medrano *et al.* 2014: 185, fig. 17) shows substantial technical interpretation differences in relation to that provided here.

2.3. LCTs of unit GI1a

2.3.1. Zarpazos Sector

Only one handaxe has been recorded among the LCTs of Galería, from the only level, differentiated in this sector, GI1d:

26. Partial handaxe with amygdaloid silhouette. Well-defined bilateral configuration through fundamentally direct unifacial knapping. In the basal area on

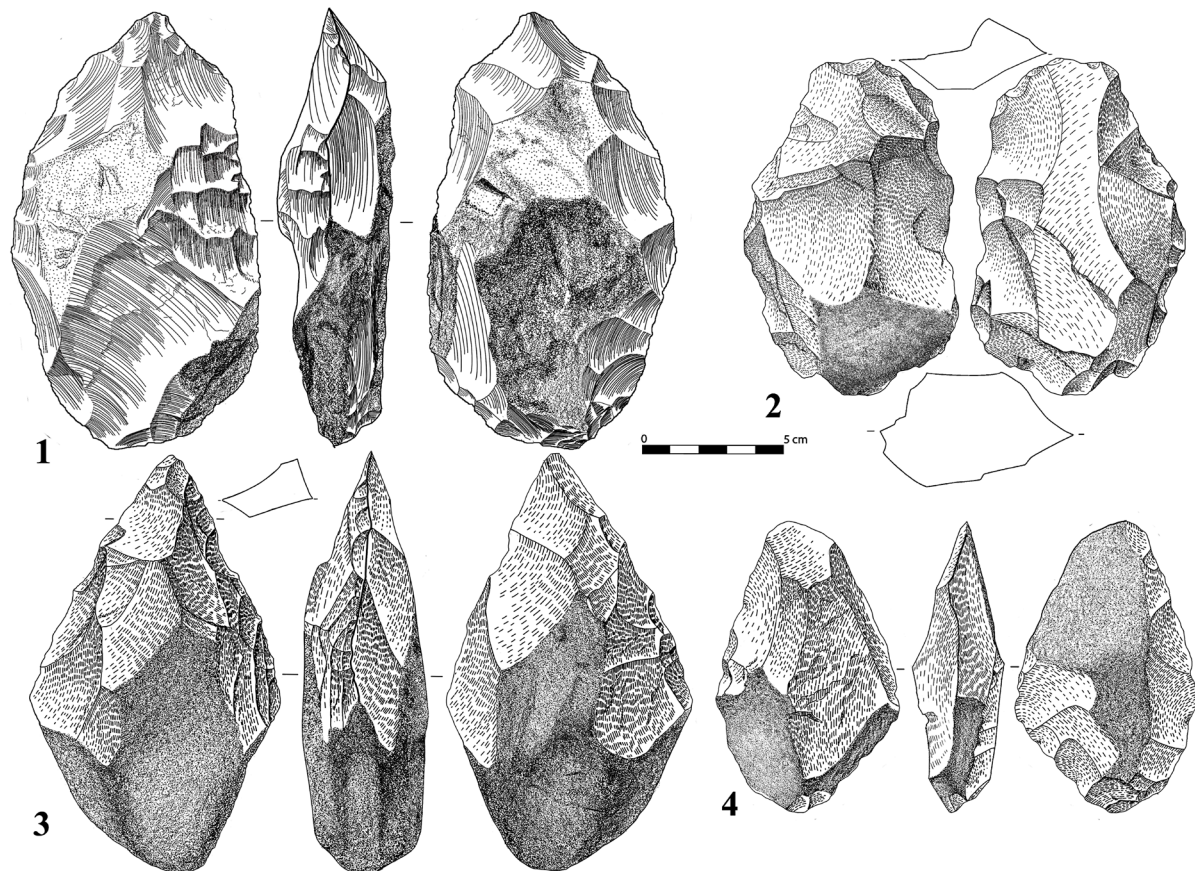


Fig. 9. Handaxes of Galería (Atapuerca), units GIIB (1, 2, 4) and GIIA (3): 1. Partial oval handaxe, level TN6DA. 2. Handaxe of oval irregular outline; level TN5. 3. Lanceolate handaxe, level TG7. 4. Small partial amygdaloid handaxe, level TN4. Flint (1), quartzite (2, 3, 4).

the left side, there is a convex scraper; so it is a handaxe tool-support. V-shaped base, one of the sides corresponds to the butt of the support flake (Fig. 6.4), a Neogene cortical flint flake. This piece features a carbonate crust adhered as well as deep dehydration alteration in some areas, particularly around the tip, which is not preserved (117 x 75 x 40 mm; 208 g). It shows variable rounding, of low intensity in general. Level II, grid H12, 1996 season. It has been identified in recent publications as a handaxe on flake (García-Medrano *et al.* 2014: 187, fig. 20D, 2015: 101, fig. 10D).

2.3.2. Galería Sector

The LCTs recorded in this stratigraphic section of the Galería sector are also scarce: only two pieces, a handaxe and a cleaver from the TG7 level. None have been identified from the TG8 and TG9 levels:

27. Lanceolate handaxe with invasive bifacial knapping and finishing retouch with hammerstone,

and with the basal third reserved, i.e. without knapping (Fig. 9.3). The base shows intense percussion marks. Made on a quartzite pebble (148 x 88 x 43 mm, 562 g) with very shallow rounding marks. 1994 season, grid F20, level G7. Initially catalogued as BN1GC (Carbonell *et al.* 1999: 332, fig. 34a), in any later mentions it has been classified as a handaxe on pebble (Ollé *et al.* 2013: 157, fig. 16f, 2016: 319, fig. 2G; García-Medrano *et al.* 2014: 179 and 187, fig. 20G, 2015: 101, fig. 10A).

28. Quartzite cleaver on flake, with natural cutting edge, result of the intersection of a previous negative of the support flake—semi-cortical with lateral percussion—and its ventral surface, which determines its classification within the group I (Tixier 1956). Rectangular silhouette, shaped through bifacial extractions on the left side and direct unifacial on the right, with convex cutting edge and cortical base (Fig. 4.2). Its small size (77 x 61 x 28 mm, 136 g) rules out the interpretation of this piece as *hachereau*, although from a technomorphological point of view it matches the established configuration model perfectly (Tixier 1956; Inizan *et*

al. 1995). Retrieved from level TG7, grid F20, 1994 season. This piece was not drawn nor described in the 1999 monograph, and it is only mentioned as a cleaver in a later publication (García-Medrano *et al.* 2014: 188, fig. 21D), where the identification of season and grid has been swapped with the continuous piece (which is our number 37).

2.3.3. *Trinchera Norte Sector (TN)*

This constitutes the spatial and stratigraphic section with the largest number of LCTs in the site, especially the TN2B level. Nine pieces have been mentioned in total, although not all of them can be considered LCTs. There are five handaxes—most of them small in size, just 65 mm long in one case—and two shaped flakes larger than 10 cm. The other two items consist of a simple worked pebble and a tool on flake that cannot be considered a LCT:

29. Small partial amygdaloid handaxe with broadly without total bifacial knapping—large cortical areas remain—nor totally invasive, and without regularization retouch. Slightly cutting V-shaped base (Fig. 9.4). Made on a flat sandstone pebble (101 x 65 x 29 mm, 163 g), with evident rounding on edges and ridges. 1995 season, level TN4³, grid G28. It was not mentioned in the 1999 monograph. Although the support is clearly a pebble, it is later described as a handaxe on flake (García-Medrano *et al.* 2014: 179 and 187, fig. 20C).

30. Neogene flint flake with large extractions and a very limited final knapping that give rise to a bifacial tip opposite a thick base (Fig. 4.4) formed by the flat butt of the support, a partially cortical flake (117 x 85 x 31 mm, 118 g). Piece with very slight rounding, but affected by especially intense corrosion in the basal area. 1987 season, level TN2, unspecified sublevel and coordinates (serial number TS N-Mn). It was not described in the 1999 monograph and is mentioned in a later bibliography as handaxe on flake (García-Medrano *et al.* 2014: 179 and 187, fig. 20A) or LCT on flake (García-Medrano *et al.* 2017: 369, fig. 6-R05).

31. The only piece from TN2A liable to be considered LCT is mentioned in the 1999 monograph as BN1GC. According to the published drawing (Carbonell *et al.* 1999: 330, fig. 30b), this is a flat quartzite pebble, 10 cm long, with 2.5 – 3 cm extractions that give rise to a convex cutting edge. The configuration

scheme does not allow the conceptualization of this piece as LCT. It is not included in any subsequent publication and not located by us among the material deposited in the Burgos Museum.

32. Quartzite pebble (143 x 87 x 49 mm, 647 g) with wide extractions, in particular two alternate tranchet blows that make up a straight edge at one end, opposite the reserved basal area (Fig. 8.3). Percussion wear marks in a small area at the base. It shows variable rounding, with areas barely altered and others where rounded edges are more evident. The formal aspect, the dimensions and even the configuration scheme, bring pieces 21 and 22 (Figs. 8.2 and 8.4), respectively, of TG10C and TG10D levels, to mind. Grid F27, 1994 season. It was initially considered BN1GC, based on a configuration scheme (Carbonell *et al.* 1999: 317, fig. 27b) that does not match our technical interpretation (Fig. 8.3). It is later mentioned as a “cleaver”, without providing greater accuracy (García-Medrano *et al.* 2014: 188, fig. 21B, 2015: 100, fig. 9A).

33. Unifacial amygdaloid handaxe. Bilateral configuration by means of wide extractions, without final regularization (Fig. 10.1). V-shaped base, partially cortical, with percussion wear marks. Made on a quartzite pebble (124 x 70 x 39 mm, 271 g). The edges are very sharp on the right side and somewhat blunt on the left. 1994 season, grid G22, level TN2B. It was first described as BN1GC (Carbonell *et al.* 1999: 331, fig. 31b) and later as a handaxe (García-Medrano *et al.* 2014: 187, fig. 20B, 2015: 101, fig. 10B).

34. Quartzite handaxe with rectangular silhouette and transverse edge produced by tranchet blow and perpendicular sharpening extraction on the opposite surface. Invasive knapping, generally by broad planes, from which only a cortical portion centered on the secondary surface is exempt (Fig. 10.2). It does not allow the full identification of the support, which given the proportions of the piece, could be a lateral percussion flake (120 x 84 x 44 mm, 432 g). The base is thick and shows detachments by percussion. Rounding is only intense in some interior ridges. 1994 season, grid F22, level TN2B. It was first considered as BN2GC—*i. e.* on flake, despite the total absence of remains of the ventral surface—(Carbonell *et al.* 1999: 329, fig. 28a) and as a cleaver later (García-Medrano *et al.* 2014: 181 and 188, figs. 11A and 21A; Ollé *et al.* 2013: 157, fig. 16e, 2016: 319, fig. 2J).

35. Partial handaxe of elongated silhouette and cordiform volume, with cutting base and predominant unifacial knapping, bifacial only in part of the base, with well-defined bilateral configuration only in the distal half (Fig. 10.3). Made on a flat quartzite or sandstone pebble (115 x 68 x 21, 180 g). It shows very slight rounding. 1995 season, grid H23 level TN2B. It was first identified as BN1GC (Carbonell *et al.* 1999: 331,

³ Levels TN3 and TN4, located to top of GIIa, were observed in grid E28 (Ollé and Huguet 1999: 61), they had small surfaces, and are not included in most of the published stratigraphic sequences of Galeria. However, the piece described here comes from a grid located 1 m away from E28 (*vid.* Ortega 1999: 15, fig. 1).

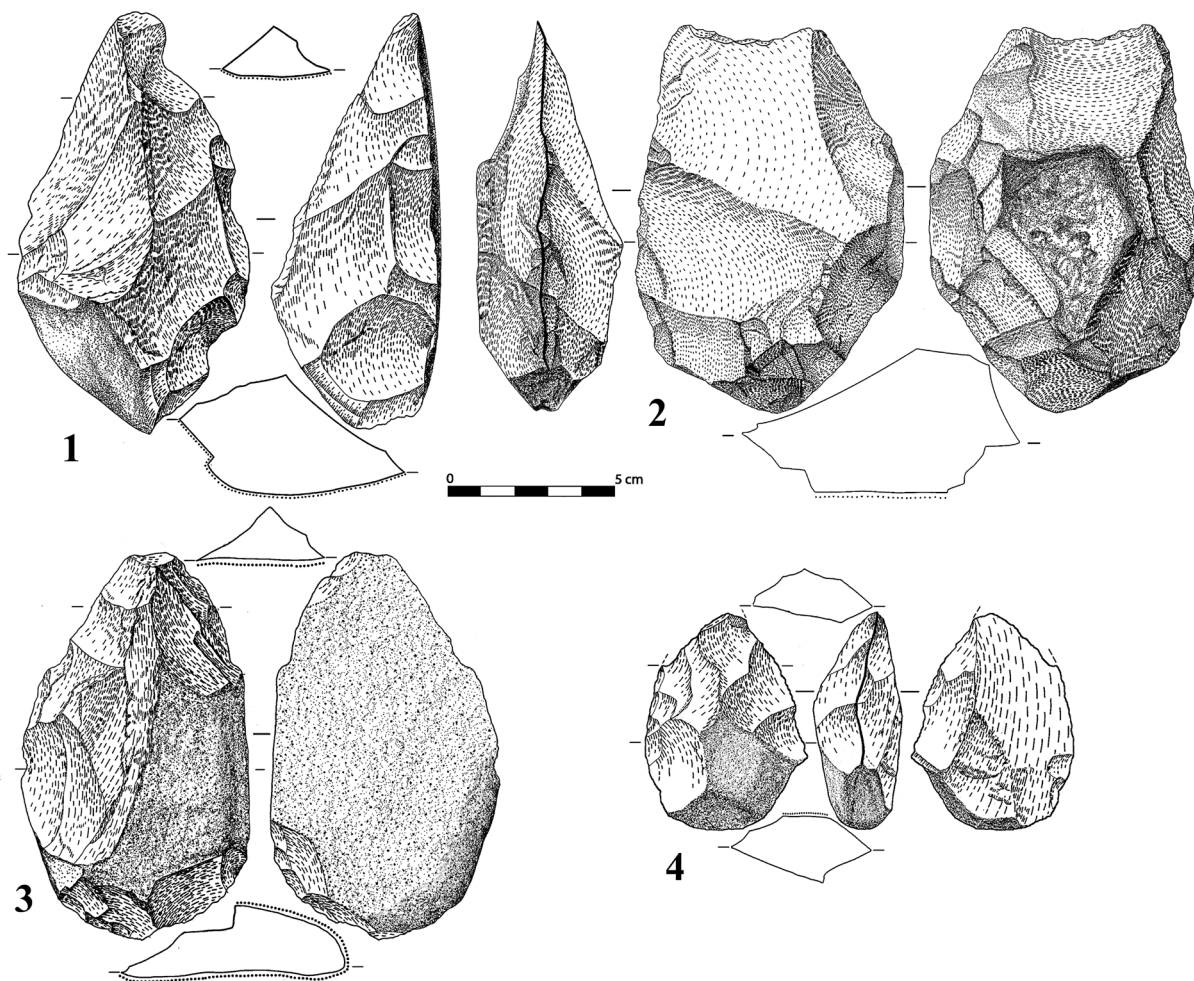


Fig. 10. Handaxes of Galería (Atapuerca), unit GIIa, level TN2B: 1. Unifacial amygdaloid handaxe. 2. Handaxe with transversal edge. 3. Partial cordiform handaxe. 4. Small tool-support amygdaloid handaxe. Quartzite.

fig. 31a) and later as a handaxe (García-Medrano *et al.* 2014: 179 and 187, fig 20E, 2015: 101, fig. 10C).

36. Small tool support handaxe, amygdaloid with butt. Bifacial knapping on the right side and direct monofacial on the left, broad in both cases, which defines a good bilateral configuration. There is a fracture in the apical area, later to the scraper retouch visible on the distal area of the left side (Fig. 10.4). Made on a cortical flake of a quartzite pebble (65 x 49 x 22 mm, 73 g). Low intensity rounding and faint percussion marks on the cortical basal area can be observed. 1995 season, grid G28, level TN2B. It is not mentioned in the 1999 monograph. In other publications it has been mentioned as a handaxe on flake (García-Medrano *et al.* 2014: 179 and 187, fig. 20F).

37. Convergent right lateral and distal scraper opposed to cortical back, obtained by bifacial retouch

(Fig. 4.6). The base is thick and has some percussion wear marks previous to the obtention of the support, a quartzite semi-cortical flake (86 x 63 x 25 mm, 180 g). Uneven rounding, more noticeable in some areas. 1995 season, grid G28, level TN2B. It is not specifically mentioned in the 1999 monograph. It is later interpreted as a cleaver (García-Medrano *et al.* 2014: 181 and 188, fig. 11B—right identification serial number in this figure—and 21C, 2015: 100, fig. 9C), however, retouching analysis clearly shows the link between the distal front and the lateral extractions, showing the intention of achieving a continuous scraper edge. Neither the size nor the configuration of this tool allows it to be interpreted as a LCT.

The balance of LCTs that we recognize in Galería is smaller than that observed in the publications that we have used as a starting point for our review. In GIII 10 pieces correspond to real LCTs, eight handaxes, one

cleaver on flake and one macro-tool with cleaver on flake morphology, whereas two further pieces can be interpreted as elemental cores. In GIIb eight handaxes can be confirmed, as long as the two preforms that never reached their final configuration are included. One macro-tool with cleaver on flake morphology and a further two macro-tools on pebble are also included among the LCTs of this stratigraphic unit, although we have interpreted two pieces, one of them with retouch, as cores. Finally, in GIIa we consider there are seven handaxes, one cleaver on flake and two macro-tools, one on pebble and another one on flake, among the 12 pieces formerly considered “handaxe” or “cleaver”. The other two are a tool on flake and a worked pebble. We have verified a total 29 LCTs—to which two handaxe preforms can be added—with quite varied technical concepts (SF1).

3. DISCUSSION

Although Acheulean elements have been mentioned in Sima de los Huesos and in the upper levels of Sima del Elefante, and their existence has been assumed in the lower sublevels of TD10 (Ollé *et al.* 2013; De Lombera-Hermida *et al.* 2015), Galería represents the most important Acheulean reference in Atapuerca, and its sequence has been considered representative of the complete evolution of this techno-complex in Europe (Mosquera *et al.* 1995; Carbonell *et al.* 1999, 2001, 2014, 2015; Ollé *et al.* 2005, 2013). However, the most recent chronological determinations (*cf.* Tab. 1) do not allow the continuation of the inclusion of the industry of the GIIa unit among the oldest Acheulean assemblages known in Europe and has forced new interpretations (Ollé *et al.* 2016). The extreme dates, obtained from the top of GIII unit and the base of GII unit, match the archaeological sequence of Galería between 363 +44/-42 and 225 ± 18 ka; this interval can extend from MIS 11 (424/374 ka) to MIS 7 (243/191 ka). A great deal of well-known Acheulean and Middle Palaeolithic sites in the Iberian Peninsula fit within this time span (Santonja *et al.* 2014; Santonja *et al.* 2016; Rubio-Jara *et al.* 2016; Méndez-Quintas *et al.* 2018), although the Acheulean techno-complex is recognized in southern Europe, including the Iberian Peninsula, from dates earlier than MIS 11 (Moncel *et al.* 2016; Santonja *et al.* 2016). The presence of LCTs in all units of Galería with a significant archaeological record—GII and GIII—together with the characteristics observed in these tools, has formed the basis for considering the entire industry of the site as Acheulean, as well as identifying evolutionary trends that would provide an outstanding, almost unique reference for the Peninsular and European Acheulean (Ollé *et al.* 2013: 149, 163, 2016: 325; García-Medrano *et al.* 2015: 93, 106).

The continuity and magnitude of the presence of LCTs throughout the stratigraphy of Galería is, however, an issue that needs to be explored further in order to assess the true entity of this sequence. The size of the series at each level can also provide essential complementary information to assess the coherence and significance of the archaeological record obtained in the field seasons between 1982 and 1996.

In sectors TG and TN surfaces of a minimum extension of 28 and 16 m² respectively were excavated (Vallverdú *et al.* 1999: 65, fig. 3). The total thickness of units GII and GIII were between 2 and 5 m (Pérez González *et al.* 1995, 1999). Publications provide information by levels only for sectors TG and TN (Carbonell *et al.* 1999), whereas the data for TZ are essentially global (Ollé *et al.* 2013). For some LCTs, however—pieces no. 1 to 4, 14 and 26, SF1—references to the level of origin are provided (García-Medrano *et al.* 2014, 2015).

While looking at the presence of LCTs in levels in the TG and TN sectors (Tab. 3), only TN2B reaches

	TZ			TG			TN				
	Level	A	B	Level	A	B	Level	A	B		
GIII	TZGIII	n.d.	4	TG11	138	0	TN8	33	0		
										GSU1	0
										GSU2	0
										GSU3	0
										GSU4	1
										GSU5	0
										GSU6	0
										GSU7	0
										GSU8	0
										GSU9	0
										GSU10	0
										GSU11	1
GSU12	1										
	TZGIIa	n.d.	0	TG10A	67	2	TN7	92	1		
GIIb	TZGIIb	n.d.	0	TG10B	94	3	TN6DA	95	1		
							TN6	63	0		
	TZGIIc	n.d.	1	TG10C	16	3	TN5	162	2		
TG10D										24	1
GIIa	TZGIIId	n.d.	1	TG9	14	0	TN3 + TN4	19	1		
							TN2 UD	-	1		
							TG8	1	0	TN2A	22
	TG7	15	2	TN2B	183	5					
Totales	260	6		369	14		669	11			

Tab. 3. Lithic industry in Galería by sector and level: (A): number of flakes and cores + number of tools on flake. (B): number of LCTs (Large Cutting Tools) checked. TG Trinchera Galería, TN Trinchera Norte, TZ Cueva de los Zarpazos, n.d. no date, UD Undifferentiated.

an appreciable amount, 5 pieces, with several levels having no specimen at all. In 9 of the 12 GSU distinguished in TG11 the absence is total, as well as in levels TG9, TG8, TN8, TN6, TN3 and TN2A. In other cases (TG10D, TN7, TN6DA and TN4), there is only one LCT; two in TG10A and TN5, and three in TG10B and TG10C. As for the Zarpazos Sector, four LTCs were recorded in the whole unit GIII, and there was only one in both GIIB and GIIA.

As regards the entire industrial assemblage, its distribution by levels reflects very low densities (Tab. 3), especially taking into consideration that it is a cave site. The total amount of pieces retrieved from TG and TN in the 1982-1996 seasons was 1427 (cf. Carbonell *et al.* 1999). Only part of those, 1304, have an accurate stratigraphic reference (Santonja and Pérez-González 2018: 15 and 17, tables IV and V). The level which provided the highest number was TN2B, 188 in total, meaning an average lower than 12 remains per square meter in 30 cm thickness (Ollé and Huguet 1999: figs. 7 and 8). The density in TN5 is 10 pieces per square meter, whereas in the other levels densities are even lower than 6 in TN7 and TN6DA, and 3.5 in TG10B, level with the highest frequency in sector TG.

The lack of consistency of the industrial series of Galería, together with the weak and discontinuous representation of LCTs, pushes us to question their usefulness in establishing technological elements that allow the characterization of representative sequences. In addition to the fragmentary nature of the represented *chaînes opératoires* (Ollé *et al.* 2016: 318-319), the processes of deposit formation should be taken into consideration, with inflows that may have brought industry, which may also have been added to by direct falls from the outer slope, especially in the TN sector. The remarkable differences amongst the total amounts of industry coming from TZ, TG and TN, 260, 383 and 680 pieces (Tab. 3), with 28 m² and 16 m² in TG and TN—and a larger surface in TZ—, strengthens the possibility that the influence of pieces coming from outer contexts has been more intense in TN than in TG. This eventuality was already clearly pointed out (Ollé and Huguet 1999: 55), although it has not been always taken into consideration.

The rounding marks of variable intensity observed in all the studied LCTs also lead to the conclusion that they were not in autochthonous position. This is particularly significant in TN2B, the level with the highest concentration of LCTs: five pieces—numbers 32 to 36—, two of which show slight rolling traces; the other three however show variable and even intense rolling. These characteristics seem incompatible with an autochthonous position for these elements. It suits better an external origin, specifically from the slope right by the

Trinchera Norte sector mouth, and fits the sedimentary characteristics of the TN2B level, which corresponds to the early time when the cave opened to the exterior and consists of external deposits of gravels and boulders in gravity facies (Santonja and Pérez-González 2018: fig. 2 and p. 26).

Despite these constraints, emphasis has been placed not only on maintaining the reality of a sequence in Galería, but also on recognizing evolutionary trends. These have been described time and time again with similar terms (Ollé *et al.* 2013; García-Medrano *et al.* 2014, 2015), and we recall them from the most recent review (Ollé *et al.* 2016: 319-320), where they are deemed as “subtle changes”. Handaxes are considered the “most frequent large tool type and they are all presented in the last stages of their shaping processes”. Oval silhouettes would be the most frequent. A progressive increase in the use of flakes as support can be observed both in handaxes as well as in other types of LCTs. The broad use of quartzite pebbles in GIIA, the lowest level of the archaeological sequence, to make handaxes and cleavers would be gradually replaced by that of large flakes. The configuration strategies would have evolved from the less intense ones in GIIA, where they would have often limited themselves to taking advantage of the original shapes of the pebbles, applying shallow knapping processes. In contrast, in GIII a greater intensity of the configuration can be observed, linked to a tendency to decrease cortex, a “more significant technological change (...) the handaxes were made on flakes and are smaller-sized (...) the shaping processes affect a larger area of the tools periphery, resulting in a total absence of cortex. In addition, the shaping took place using fewer blows⁴”. “They were made both on flakes (cleavers *sensu stricto*) and on cobbles, and very few of them present a slightly retouched distal edge”. Cleavers of any type would be more frequent in the basal levels of the sequence, and disappear from GIII. It is also pointed that “Typologically, the most frequent cleaver types are 1, 2 and 5 (Tixier 1956)”.

Although we have serious doubts about the efficacy that the mentioned technological characteristics can bring in the identification of evolutionary trends, we will examine to what extent it is possible to establish clearly defined characteristics of any kind in the LCTs studied.

⁴ In apparent contradiction with what is expressed here, it is also pointed out (Ollé *et al.* 2016: 319) that in GIII the size and intensity of the configuration of the LCTs would decrease. This appreciation is linked to the recognition of a parallel development of more complex schemes in the elaboration of the small tools on flake, as well as that of an increase of cores with hierarchical exploitation surfaces. Both trends have come to be identified as typical of a transition industry towards the Mousterien (Terradillos-Bernal and Diez 2012).

Indeed, handaxes are by far the most common type among the Galería LCTs (Tab. 4). Including two preforms, 23 of the 31 recognised LCTs are handaxes, whereas only four cleavers and a further four macro-tools have been identified. Handaxes dominated both in sectors and stratigraphic units, although there are specific sections (sector TN in GIII, TZ in GIIB and TZ, and TG in GIIa) in which the general presence of LCTs is so meagre, it can only be considered that they represent gaps in the presence of this category of tools. This is true even for the whole industry of TG in GIIa, although not in the case of TN in GIII, where the non-LCT lithic elements are present within a significant amount in the context of the Galería figures—25 pieces.

	Handaxes				Cleavers on flake				Macro-tools				Total		
	TZ	TG	TN	N	TZ	TG	TN	N	TZ	TG	TN	N			
GIII	4	3	1	8	0	2	0	2	0	0	0	0	<u>10</u>		
GIIB	1	5	2	8	0	0	1	1	0	2	0	2	<u>11</u>		
GIIa	1	1	5	7	0	1	0	1	0	0	2	2	<u>10</u>		
Total	6	9	8	<u>23</u>	0	3	1	<u>4</u>	0	2	2	<u>4</u>	<u>31</u>		
Total by sectors				TZ 6 LCT's // TG 14 LCT's // TN 11 LCT's											

Tab. 4. Types of LCTs (Large Cutting Tools) from Galería by sector and stratigraphic unit. TG Trinchera Galería, TN Trinchera Norte, TZ Cueva de los Zarpazos.

Shapes with pointed tips predominate among the handaxes of units IIB and IIA, and are on a par with the oval ones in GIII. In this last unit, we have observed four amygdaloid handaxes (Figs. 2.1, 2.2, 3.3 and 3.4), as well as four ovals, one of which is characterised by a final bevel that interrupts the convex line of the perimeter (Figs. 2.3, 2.4, 3.1 and 3.2). The amygdaloid handaxes have greater regularity on their silhouette. In both IIB and IIA handaxes with oval silhouette are a minority. In IIB—without considering two preforms—there are three pointed specimens—two amygdaloid (Fig. 7.1 and 7.3) and one lanceolate (Fig. 8.2)—and one with transverse cutting edge (Fig. 7.4), as well as two oval handaxes, one with one side convex and the other straight (Fig. 9.1), and the other one poorly regular, with nucleiform aspect (Fig. 9.2) In the deepest stratigraphic unit, IIA, pointed shapes, mostly amygdaloid, clearly dominate (Figs. 6.4, 9.3—lanceolate—, 9.4, 10.1, 10.3 and 10.4), with 6 pieces, and also a seventh specimen with asymmetrical silhouette, one side straight and the other one convex, and transverse cutting edge (Fig. 10.2).

The use of flakes as LCT supports (Tab. 5) is verified in the three units with archaeological remains of Galería. While in IIB and IIA there is a balance in flakes and pebbles, in GIII flakes clearly exceed pebbles, although if we refer exclusively to handaxes, the unidentifiable supports could equal the relationship. In any

case, if we refer to the origin by level, the totals we are considering decrease practically into units. In one of the most representative, that of level TN2, to the base of unit GIIa, there is a tool-support handaxe (piece 36, Fig. 10.4) and possibly another handaxe (piece 34, Fig. 10.2) on flake. As a counterpoint, in favour of a progression in the sequence of the use of flakes as support, the presence of two small handaxes on flake (pieces 2 and 4, Fig. 2.2 and 2.4) could be adduced, in addition to another one on unidentifiable support that could be a cortical flake (piece 3, Fig. 3.3), at TZIIIb level, to the top of unit GIII in the Zarpazos Sector, a deposit that is over 1 m thick and that cannot be understood as a unitary temporal representation.

	GIII			GIIB		GIIa		
	Pebble	Flake	U	Pebble	Flake	Pebble	Flake	U
Handaxes	2	4	2	3	4	4	2	1
Cleavers	0	2	0	0	1	0	1	0
Macro-tools	0	0	0	2	0	1	1	0
Total	2	6	2	5	5	5	4	1

Tab. 5. LCTs (Large Cutting Tools) supports at Galería stratigraphic units. U Unidentified.

The supposed stratigraphic progression of the handaxe configuration intensity is not verified. On the contrary, almost all the specimens of GIII show broad and short knapping, most without regularization—the exception is piece 5 (Fig. 3.1), finished with a soft hammer on one side—, preserving large cortical or ventral surface areas of the support flake (2.2, 2.3, 2.4, 3.1, 3.2, 3.3 and 3.4). In IIB there are also pieces with unworked surfaces (Figs. 7.1, 7.2 and 9.1) of lesser extension than in GIII, although in some it is almost total (Fig. 7.3). Silhouettes in GIIB are in general more symmetrical than in GIII, with regularization final touch in many cases, even in some with soft hammer (Fig. 7.2). In GIIa specimens with unworked surfaces seem as frequent as in GIII (Figs. 6.4, 9.3, 9.4, 10.1, 10.3 and 10.4). The knapping range is also comparable, with a predominance of specimens without final regularization (Figs. 9.4, 10.1, 10.2 and 10.3). In summary and regardless of the fact that the number of pieces per level is very small, the configuration processes that we have observed seem quite repetitive, without any remarkable differences being observed throughout the stratigraphic sequence. Other characteristics that could be significant, such as the presence of tool-support handaxes, has been observed in the three stratigraphic units, one piece in GIII (Fig. 3.4), another one in GIIB (Fig. 7.4) and a further two in GIIa (Figs. 6.4 and 10.4).

Handaxes dimensions do not seem to experience significant changes either through the sequence of Galería. Once again, apart from the possible lack of representativeness of the unit assemblages that make up the record, it is observed that the pieces of slightly larger size are found in the GIIb unit, with average dimensions exceeding those recorded in the GIIa sample by 2.4 cm, which in turn are 1.5 cm larger than those of GIII (Tab. 6). These measurements are ultimately very similar, not only adhering to the mean values, but also to the dispersion of sizes in all the units, and that coincides in general terms with those of the whole of the LCTs. Probably the most striking feature is the frequency of specimens with sizes of 10 cm or less in all units, both handaxes and other LCTs.

Handaxes				
Stratigraphic unit	N	M-m	Mean	Median
GIII	8	150-90	121.1	115/122
GIIf	7	163- 102	136.7	136
GIIa	7	148-65	112.8	117
Total	22	163-65	123.4	120/122
LCTs total assemblage				
Total	31	163-65	123.5	124

Tab. 6. Length (mm) of handaxes and LCTs (Large Cutting Tools) total assemblage from Galería

The presence of cleavers on flake is in a minority compared to handaxes, although distributed throughout all the stratigraphy. Only two typical *hachereaux* (Tixier 1956) have been recognised, located to the top and base of the sequence. The most characteristic, on cortical flake⁵—Tixier type 0—, was retrieved from unit GIII, level 11 and GSU11 (Fig. 4.1). A second specimen, type I according to Tixier (Fig. 4.2), atypical for its small size, was recorded at level TG7, in unit GIIa. Two further cleavers on flake were manufactured by means of wide *coup de tranchet*, a technical gesture also of clear Acheulean roots. These were found in levels 10A, unit GIII (Fig. 4.3), and TN5, unit IIb (Fig. 4.5). Along with this particular group of cleavers on flake, three macro-tools on pebble with morphologies similar to *hachereaux* should be considered: in

⁵ The identification of the support flake (Carbonell *et al.* 1999a: 330, fig. 29a) may have motivated the identification of this *hachereau* as type II (on ordinary flake) or type V (with bifacial knapping that prevents recognition of the characteristics of the support flake) of Tixier, but it is a cortical flake and therefore there is no doubt about its describing as type 0.

two cases with edges also defined by tranchet blow (Fig. 8.3 and 8.4, TN2B levels of GIIa and 10D of GIII respectively), and a third piece with invasive unifacial knapping and with a formal appearance similar to the previous ones. (Fig. 8.2, 10C level of GIII).

In the territory around Galería, both sites with Acheulean technology industries and other clearly differentiated ones, of an ancient Middle Palaeolithic type, are known (Ollé *et al.* 2013, 2016; Santonja *et al.* 2016) within the chronological range established for Galería with the available dates, from MIS 11 (424/374 ka) to MIS 7 (243/191 ka). The frequency of LCTs is substantially lower than that of retouched tools in all levels of Galería (Santonja and Pérez González 2018: tab. 4), and in some levels there are no LCTs at all. On the other hand, the levels of Galería represent discontinuous time units, and the industry recorded in each one corresponds undoubtedly to short-lived episodes. In these circumstances, it cannot be ruled out that the registered lithic industry may correspond to different technological traditions. The presence of assemblages of industry with technological characteristics (De Lombera-Hermida *et al.* 2020) clearly adscribable from our point of view to the Ancient Middle Palaeolithic, only 25 m away, in the upper stratigraphic stretch of Gran Dolina, also supports this theory.

4. CONCLUSIONS

The examination of the technical characteristics of the LCTs of Galería and the assessment of their distribution through the levels that make up the stratigraphy of the site, have allowed us to contrast the supposed existence of a progressive industrial sequence, representative of the European Acheulean.

The low density of industry recorded in all levels, even the total absence of remains in some, as well as the stratigraphic discontinuities are significant limiting factors. On the one hand, it does not seem possible to establish technical identification criteria in the series of each level with such a low number of elements. The presence of industry in them is, in addition, influenced by the formation processes of the deposits (Santonja and Pérez-González 2018), which implies that at least part of the archaeological material may be in a non-autochthonous position.

The most representative Acheulean component, the LCTs, are a minority in the already small assemblages of each level. Their analysis has not recognized any net differential characteristics through stratigraphy. Sizes, supports and configuration processes show repetitive examples from base to top, and are not related to any kind of evolutionary trend.

The possibility that the industry recorded in Galería may correspond to two different technological traditions, Acheulean and Middle Paleolithic, inevitably leads to questioning repeated interpretations defining the lithic series of the upper levels of Galería and Gran Dolina, GIII (Terradillos-Bernal and Díez 2012) and TD10.1 and .2 (Ollé *et al.* 2013, 2016; De Lombera-Hermida *et al.* 2020), as typical of a phase of “transition between the technological Modes 2 and 3” (De Lombera-Hermida *et al.* 2020).

We have alluded before to the inconsistency that this approach supposes, since the evolved industry—that of TD10.1 and TD10.2, which was interpreted as the result of a theoretical transition from the Acheulean to the Middle Paleolithic—, according to the numerical dating is older than the supposed starting point, the Acheulean of Galería. But also, from a general theoretical perspective, the notion of “transition” is an inapplicable concept in this context, since it refers to processes of change that require knowing a multitude of data integrated in precise chronologies, which obviously did not occur in Paleolithic times. The coexistence of the Acheulean and the Middle palaeolithic in the Peninsula and other European regions (Santonja *et al.* 2016), may however have led to different types of responses derived from acculturation phenomena. Assemblages interpreted as transitional from linear evolutionary perspectives, could respond to contact between different human groups, with results that may differ widely from one region to another, a perspective that opens a different way of interpretation for these industrial assemblages.

This is a possibility that should be considered from now on when interpreting the industry of any site of the second half of the Middle Pleistocene on an Iberian peninsular scale. This is especially valid when it is a matter of assemblages whose industry does not correspond to complete *chaînes opératoires*, as in the case at hand, and which were accumulated on a recurring basis through a discontinuous and prolonged time frame.

The main purpose of our study was to contrast the existence in Galería of an industrial sequence in progressive development and representative of the European Acheulean. Our final conclusion is to flatly rule out both possibilities.

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ANNEX: SUPPLEMENTARY FILE

An annex with supplementary material is available in the electronic version: Review of the Galería LCTs. Synthesis of results.

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