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Short-term Neandertal occupations in the late Middle Pleistocene of Arlanpe (Lemoa, northern Iberian Peninsula)

Occupations à court terme de groupes de Néandertaliens à la fin du Pléistocène moyen d'Arlanpe (Lemoa, Nord de la péninsule Ibérique)

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ABSTRACT

The end of the Middle Pleistocene is an interesting period for investigating the transformation of Neandertal behavior from the early Middle Paleolithic to the late Middle Paleolithic. Few sites in the Iberian Peninsula have sequences corresponding to the last interglacial (MIS5) and even fewer in the Cantabrian Region. One of the best places to investigate this subject is the sequence recently excavated in Arlanpe cave. Several proxies (sedimentology, pollen, small vertebrates, malacofauna, U/Th dating) locate the first phases of this sequence between MIS7 and MIS5, with the important occurrence of temperate environmental evidence. The archaeological record describes populations with high mobility that used the cave as an occasional shelter in the first phases, or as an activity area in the later ones. The

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Interglacial
Lithic Technology
Levallois
Biface
Mobility

characteristics of lithic productions show a combination of Lower (Acheulean bifacial shaping) and Middle Paleolithic (Levallois Technology) traits that justifies an early Middle Paleolithic attribution.

Mots clés :
Paléolithique moyen ancien
Interglaciaire
Technique lithique
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Biface
Mobilité

RÉSUMÉ

La fin du Pléistocène moyen est une période intéressante pour la recherche de la transformation du comportement de l'homme de Néandertal depuis le début jusqu'à la fin du Paléolithique moyen. Quelques sites de la péninsule Ibérique ont des séquences correspondant au dernier Interglaciaire (MIS5) et aussi, mais moins nombreuses, dans la région cantabrique. L'un des endroits le plus favorable pour ce type d'étude est la séquence récemment mise à jour dans la grotte d'Arlanpe. Différentes approches (sédimentologie, pollen, petits vertébrés, malacofaune, datation U/Th) placent les premières phases de cette séquence entre MIS7 et MIS5, avec l'important evidence d'un environnement tempéré. Le registre archéologique décrit des populations à mobilité élevée, qui utilisaient la grotte comme abri occasionnel dans les premières phases ou comme zone d'activité dans les dernières. Les caractéristiques des productions lithiques montrent une combinaison de traits du Paléolithique inférieur (façonnement biface acheuléen) et moyen (technique Levallois) qui justifient l'attribution au Paléolithique moyen ancien.

1. Introduction

The end of the Middle Pleistocene, which developed simultaneously with the temperate pulse at the Eemian (MIS5e), is poorly known in the archaeological and paleontological record from the Iberian Peninsula. This situation is extensible to the record of the western Pyrenean region, where only a few sites offer complete information about human behavior, climate, flora and fauna (Arrizabalaga and Rios-Garaizar, 2012). In this area the archaeological record of the late Middle Pleistocene shows some transitional features, such as the concurrence of Lower Paleolithic (LP) bifacial tradition with Early Middle Paleolithic (EMP) Levallois technology, which can be very informative about the process of technological evolution and regional adaptations of Middle Pleistocene Neandertals.

The excavations carried out between 2006 and 2011 in Arlanpe cave discovered an interesting sequence with Middle Pleistocene to Holocene occupations. The detailed results of this investigations were recently published in a monograph including geoarchaeology, territorial analysis, pollen, small vertebrates, macrofauna, marine and terrestrial mollusks, AAR dating, bone industry, lithic industry and portable art analyses (Rios-Garaizar et al., 2013a). The main objective of this paper is to synthesize the study of environmental and archaeological data recovered in the late Middle Pleistocene levels (MIS7-5), in order to provide additional data about the evolution of Neandertals in the Iberian Peninsula.

2. Geographical setting

The North of the Iberian Peninsula is characterized by an almost continuous mountain chain, the Cantabrian Range, which runs parallel to the coast, leaving a short strip of land between the sea and the mountains, usually called the Cantabrian Region. This area concentrates a high density of Middle and Upper Paleolithic sites, most of which are cave sites, due to the abundance of limestone formations. The easternmost part of the Cantabrian Region and the westernmost part of the Pyrenees has functioned as a natural communication route between the Iberian Peninsula and the rest of the European continent (Arrizabalaga and Rios-Garaizar, 2012). This area is characterized by a large geographic diversity that includes a rough landscape, with low altitude mountains and hills and short valleys running almost perpendicular to the coast (Fig. 1: A). Three main valleys connect, through low altitude mountain passes (< 600 m.a.s.l.), this area with the Alavese Plateau and the Upper Ebro Valley, situated to the south. Close to and in both sides of these mountain passes several sites with long Middle Paleolithic sequences are known. The most important ones are Arrillor, Axlor and Lezetxiki, but other sites, which have not been fully excavated such as Askondo, are also present.

Arlanpe cave is situated in the Arratia Valley close to its confluence with the Ibaizabal River. Potential visibility analysis shows that, from Arlanpe, the confluence of Arratia and Ibaizabal can be easily controlled (Fig. 1: B). The modeling of the accumulated movement cost from the cave established an immediate territory (less than two hours) with access to the bottom of the valley and to the aforementioned rivers, as well as the Nervión River (Fig. 1: C).

3. Site description

Arlanpe is a small cave that opens in the northeastern face of an Albian limestone crag. The cave was subdivided into three main excavation sectors, the Entrance, Central

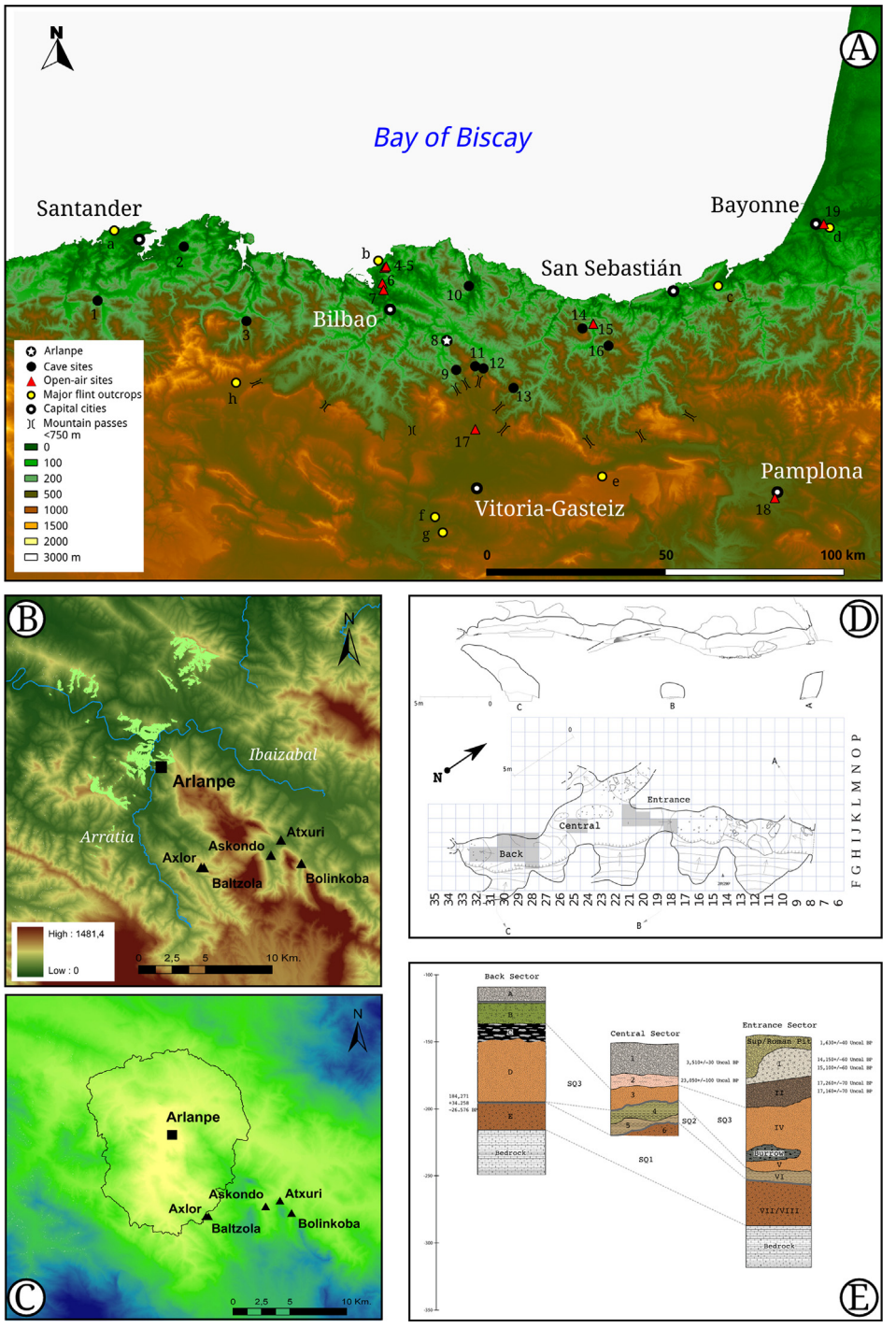

Fig. 1. A: Map with the localization of Arlanpe, and main Middle Pleistocene-Initial Upper Pleistocene archaeological sites, major flint outcrops and main mountain passes < 750 m.a.s.l. in the eastern Cantabrian Region. Sites: 1: El Castillo; 2: La Garma; 3: Abrigo Rojo; 4: Mendieta I; 5: Moreaga; 6: Kurkudi; 7: Mendibarrena; 8: Arlanpe; 9: Axlor; 10: Atxagakoa; 11: Askondo; 12: Asuntze; 13: Lezetxiki; 14: Astigarraga; 15: Irikaitz; 16: Arnaileta; 17: Urrunaga; 18: Cuenca de Pamplona; 19: Avenue du Prissé. Flint outcrops: a: Monte Picota; b: Kurtzia; c: Gaintxurizketa; d: Bidache; e: Urbasa; f: Treviño; g: Loza; h: Ojo Guareña; B: viewshed from Arlanpe; C: modeling of the accumulated movement cost from the cave (the black line represents < 2 h); D: plan of the cave; E: schematic stratigraphy of each sector and the correlations between them, SQ: sedimentary sequence.

Fig. 1. A : Carte avec localisation d'Arlanpe et des principaux sites archéologiques du Pléistocene moyen et du début du Pléistocene supérieur, principaux affleurements de silex et cols de montagne < 750 m.a.s.l. dans la région cantabrique orientale. Sites (1 à 19) ; affleurements de flint (a à h). B : champ de vision depuis Arlanpe. C : Modélisation du coût de mouvement accumulé à partir de la grotte (la ligne noire correspond à < 2 h). D : Plan de la grotte. E : Stratigraphie schématique de chaque secteur et corrélations entre eux. SQ : Séquence sédimentaire.

and Back sectors (Fig. 1: D). The archaeological site was discovered in 1961 but no systematic archaeological work was carried out until 2006.

The excavation was performed on a surface of 14 m^2 but the Middle Pleistocene deposit was excavated only on 7 m^2. In each sector a concrete stratigraphic sequence, with its own numeration, was established (Fig. 1: E). The Middle Pleistocene levels were named E, D and C in the Back sector; 6, 5, 4 and 3 in the Central sector; and VIII, VII, VI, V and IV in the Entrance sector. Three major sedimentary sequences (SQ1, SQ2 and SQ3) could be lithostratigraphically correlated. The major alteration processes that partially affected some of these levels, mainly bioturbations caused by burrowing, were clearly identified during the excavation and the material coming from these altered sediments is not included here. Also, major postdepositional alterations caused by localized karstic water percolation processes were identified in C level, and thus only the lithic raw material, very similar to underlying D level, was included in this analysis. Finally some of the levels, for example level 4, showed more abundant carnivore remains (Arceredillo-Alonso et al., 2013), which is also consistent with the observed phosphatic aggregates in the micromorphological samples obtained from level D, interpreted as coprolite remains (Iriarte-Avilés et al., 2013). Apart from that, the preservation of lithic and faunal material in these sedimentary sequences is good, and no inconsistencies in the horizontal or vertical distribution, piece orientation or dip were observed. Nevertheless no occupation soil was individualized and, therefore, the levels must be considered as palimpsest of repeated occupation events.

The first sedimentary sequence (SQ1) recorded in the cave was represented by the sterile level VIII, and the archaeological levels E, VII and 6. On top of these levels carbonate precipitation formed a flowstone. This flowstone was dated in the Back sector by U/Th, giving an age of 184,271 + 34,258/–26,576 (ICTJA-4711), which roughly places its formation during MIS7-6.

Above this flowstone levels 5–4 and VI (SQ2) formed. These levels display common sedimentological features, such as grayish silt, with small limestone fragments, charcoal, many land snails, faunal and lithic remains.

The SQ3 clusters levels D, 3 and V–IV that show an orange color with speleothem fragments and abundant lithic and faunal remains. Several AAR dates were essayed but the results presented some problems due to sampling and preservation problems. The only reliable sample (LEB10457) yielded an age of 70.6 kyr BP, which should be used only as a minimum age for the SQ3 formation (Rios-Garaizar et al., 2013a; Torres Pérez-Hidalgo et al., 2013). In the back sector above SQ3, level C was identified. This level is the result of postdepositional alteration of level D, including burrowing, water caused erosion and sediment redeposition. Despite this alteration, the majority of the lithic material from level C can be directly linked with the level D assemblage and thus has been included in the analysis. Also, it should be noted that an important hiatus between SQ3 levels and the Upper Pleistocene levels has been observed in all the excavation areas.

4. Palaeoenvironmental conditions

The sedimentological and mineralogical results suggest that infiltration from outside the cavity during wet conditions was the main responsible for the endokarstic sediment accumulation of Middle Pleistocene deposits. On the contrary, the Upper Pleistocene sediments with intense evidence of cryoclastic activity, were deposited under colder conditions. The micromorphological data suggest an alternate use of the cavity by humans and carnivores (Iriarte-Avilés et al., 2013). This is consistent with the palaeontological record, in which carnivores are abundant in both relative numbers and specific representation (wolf, fox, dhole, bear, leopard). The most abundant carnivore remains are bear's (*Ursus* sp.) deciduous teeth, which suggest that Arlanpe was used as a hibernation den. The most abundant species among the ungulate remains are Iberian ibex (*Capra pyrenaica*) and chamois (*Rupicapra pyrenaica*), which is consistent with the rough terrain around the cave. Other ungulate species, such as *Cervus elaphus*, are also present, indicating varied ecosystems nearby. Although cold-adapted species such as the reindeer (*Rangifer tarandus*) have been identified in several layers in Arlanpe, its low prevalence precludes its use as a climate proxy (see additional discussion in Gómez-Olivencia et al., 2014).

The information obtained from sedimentology, pollen, small vertebrates and malacofauna indicate certain variability in environmental conditions throughout the stratigraphic sequence, which seems to coincide with climatic fluctuations.

The environmental data for the SQ1 are scarce. The abundance of iron hydroxide nodules in the sediment is representative of relatively wet and temperate soil formation and erosion processes outside the cave, while the small vertebrate information suggests the existence of a humid and open environment. The flowstone formation on the top of SQ1 suggests an increase of temperature and humidity, which was dated to the MIS7/6 transition.

SQ2 was formed during better climatic conditions than SQ1, as suggested by the presence of *Apodemus sylvaticus-flavicollis, Glis glis* or *Eliomys quercinus*, small mammals related to the woodland landscape, although open landscape species continue to dominate the assemblage. The abundance of the gastropod *Cepaea nemoralis* in level VI suggests the formation of this level under relatively warm conditions and with a remarkable development of forests. Also, major concentration of pedogenic minerals (vermiculite and kaolinite) in SQ2 vs. SQ1 and Upper Paleolithic sequence suggest that sediments were accumulated mainly by the infiltration of autochthonous soils. This would indicate warmer conditions outside the cave during its formation, compared to those occurred in SQ1 and the Upper Paleolithic sequence (Arriolabengoa et al., 2014; Iriarte-Avilés et al., 2013).

Finally SQ3 shows, at the beginning of the sequence, colder conditions expressed by the lower values of tree pollen taxa and the abundance of *Pinus sylvestris* tp. Later, the pollen data record an increase of arboreal taxa, a decrease of *Pinus*, and the appearance of *Betula*, *Alnus*, *Carpinus*, *Fagus*, and *Tilia*. The small vertebrate record shows, from the beginning of the SQ3, an increase of

woodland species. This is also the part of the sequence with a high content of pedogenic minerals, which indicates soil formation processes outside the cave (Arriolabengoa et al., 2014; Iriarte-Avilés et al., 2013). All this evidence suggests that SQ3 formed under the warmest and wettest conditions of all the sequences. These warm and humid conditions could correspond to the climatic improvement that took place from MIS6 to MIS5e (Eemian), and would be consistent with the limited penecontemporaneous pollen record of the Cantabrian Region (Iriarte-Chiapusso, 2013).

5. Lithic industry

5.1. Raw material procurement

The groups that occupied Arlanpe during the Middle Pleistocene mainly used local raw materials, including mudstone nodules, sandstone, limonite or quartz, to produce their tools. Mudstone appears as strongly cemented nodules, which developed inside softer true black mudstone beds of Lower Cretaceous age, and were transported and eroded by the Arratia River and its tributaries. Some of them are not good enough for knapping due to their internal impurities, therefore an initial testing and selection was absolutely indispensable. This raw material was collected after being tested in the vicinity of the site (less than 1 km), and transported as tested cores to the site. Besides the local materials, other rocks, such as flint or quartzite, were also transported to the site and left there. Up to now, it has been possible to identify several flint varieties such as Flysch (29 km NW), Urbasa (65 km SE), Treviño (50 km S) and Loza (60 km S) (Fig. 1: A). Quartzite can be found in the Alavese Plateau terraces and in conglomerates of Tertiary chronology situated in the seashore.

Some differences in the raw material provisioning strategies can be observed between the major sedimentary sequences. The SQ1 (levels E, 6 and VII) yielded few lithic artifacts, including some flint pieces. In the SQ2 (levels 5, 4 and VI) the flint proportion rises significantly (31.6%), while in the SQ3 (levels D, C, 3, V and IV) the ratio between flint and mudstone decreases (22.9%) (Table 1).

5.2. Lithic technology

Technological features differ when the raw material, either flint or mudstone nodules, is considered. In the case of the flint artifacts, the blanks are introduced to the site having already been made, so it is difficult to define the operational sequence of production. These blanks are thin, many of them show prepared platforms, and detaching angles are quite low; previous negatives usually are organized following a centripetal scheme, suggesting that a Levallois reduction strategy was employed (Fig. 2: 1–5; Fig. 3: 6–8). The presence of flakes and tools with these Levallois technological features have been identified only in SQ2 and SQ3, being more abundant in SQ2. Also, in SQ2 and SQ3 elongated supports (blades), usually retouched (Fig. 2: 1–3; Fig. 3: 6), Discoid and Quina flakes have been identified but technological interpretation is difficult given the fragmentary representation of the reduction sequence.

Mudstone reduction sequence is more completely represented in Arlanpe. The abundance of cortical flakes (Fig. 2: 8–11; Fig. 3: 3) and non-retouched blanks in SQ2 and SQ3 are sufficient to reconstruct the reduction sequences followed to obtain mudstone blanks and tools. In the SQ3, the most common system is the *Système par surface de débitage alterné* (SSDA) reduction strategy (Forestier, 1993). This produces big blanks, because the extractions exploit one entire surface, with asymmetrical sections, and usually orthogonal plans in the laterals or in the distal part (Fig. 3: 1, 3). The platforms are cortical or formed by lateral or opposed extractions. This system seems to be an adaptation to the nature of mudstone nodules, where the cortical edges are more tenacious than the internal ones. Besides there are flakes with typical Discoid features, including some pseudo-Levallois points. Finally, in SQ3 bifacial reduction sequences, applied to pebbles and flakes, were implemented to shape bifacial tools (Fig. 3: 2, 4). These are bifacially reduced, sometimes partially, to create a pointed extremity or a reduced handling surface. In SQ2 the SSDA system, although present, is not as important in the mudstone assemblage, being more frequent the flakes obtained following a Discoid method (Fig. 2: 12). Also, in this level there is almost no evidence of bifacial tools.

5.3. Tool making and use

In Arlanpe EMP levels the proportion of conformed tools is low. However, when formless fragments, debris and natural fragments are not considered, this proportion raises considerably (Table 1). The most intensively retouched tools are made from flint and take the final form of Mousterian points and side scrapers. In mudstone there are denticulates, backed knifes, pieces with small retouches creating small prehensile surfaces, and bifacial tools. In sandstone some large choppers are present. Other tools are unretouched flakes used for varied activities, and unmodified pebbles and blocks, which were used in percussion activities. Some of the pointed elements display impact fractures (Fig. 2: 2; Fig. 3: 6). This can be confidently interpreted as wear related to weapon use, similar to those observed in other Middle Paleolithic sites from this region (Rios-Garaizar, 2012a; Villa and Lenoir, 2006). Other activities in flint tools were related to carcass processing and wood working. Mudstone tools present macro traces corresponding to cutting and scraping activities (Rios-Garaizar, 2013).

6. Subsistence strategies and paleontological information

The most abundant species in the whole Arlanpe sequence are rocky dwellers such as Iberian ibex (*Capra pyrenaica*) and the chamois (*Rupicapra pyrenaica*), which is consistent with the abrupt terrain surrounding the cave (Table 2).

In SQ2, carnivores are quite abundant, especially in level 4, where they are more numerous than herbivores. The most abundant carnivore species in these levels is *Ursus* sp., but also present are *Canis lupus*, *Vulpes vulpes* and a large felid (probably a leopard). The significant presence of land

Table 1
Techno-typological classification of the lithic remains from Arlanpe early Middle Palaeolithic.
Tableau 1
Classification techno-typologique des restes lithiques d'Arlanpe du Paléolithique moyen ancien.

Technological classification	SQ1					SQ2					SQ3						
	E	VII	6	Flint	Others	VI	5	4	Flint	Others	V	IV	3	D	C	Flint	Others
Flake cores											1		3	1	1		6
Cortical flakes	2	1	1		4	20	2	5	4	23	7	14	33	45	31	7	123
Cortical blades								1		1					1	1	
Outrepassing flakes	1				1	5		3	2	6	8	1	2	21	10	6	36
Overshot flakes						1			1					8	1		9
Flakes		2			2	17	2	16	12	23	12	18	20	55	29	37	97
Kombewa flakes	1	1			2	1		1	1	1		1	3	7	3	8	6
Blades						4	1	1	4	2	2	7	1	1	15	23	3
Resharpening flakes						4	1	2	2	5	1	3	2	21	3	12	18
Bifacial resharpening flakes			1		1			1		1		2		4	3		9
Burin spalls											1		1			2	
Splints								1	1			1			1	1	1
Inform fragments and debris (< 10 mm)	13	1	7	2	19	137	20	61	82	136	29	75	133	195	77	139	370
Natural fragments	1	2			3	31	3			34	1	22	7	42	20		92
Used/Flaked pebbles		2			2	1	**1**	2		4			**4**	2	20		26
Total	**18**	**9**	**9**	**2**	**35**	**221**	**30**	**94**	**109**	**236**	**62**	**144**	**209**	**402**	**215**	**236**	**796**
Mousterian points						**1**		**1**	**2**		**2**					**2**	
Tayac points														**4**	**1**	**3**	**2**
Pedunculate pieces								**1**	**1**					**1**		**1**	
Side scrapers						**4**	**1**	**1**	**5**	**1**	**1**		**1**	**2**	**1**	**3**	**2**
UP Tools[a]						**1**		**2**		**3**			**1**	**5**	**4**	**3**	**7**
Notches and denticulates						**3**	**1**	**2**	**1**	**5**	**2**		**3**	**7**	**6**	**2**	**16**
Retouched flakes	**1**				**1**	**3**		**1**	**3**	**1**		**2**	**6**	**16**	**3**	**7**	**20**
Bifacial pieces													**4**	**1**	**2**	**1**	**6**
Cleavers													**1**		**1**		**2**
Choppers															**3**		**3**
Total	**1**				**1**	**12**	**2**	**8**	**12**	**10**	**5**	**2**	**16**	**36**	**21**	**22**	**58**
% Retouched[b]	**25**	**–**	**–**	**–**	**8.3**	**22.6**	**28.6**	**24.2**	**44.4**	**15.2**	**15.7**	**4.3**	**23.2**	**21.8**	**17.8**	**22.7**	**17.4**
Extension excavated (m^2)	2.5					4.5					9.5						

[a] UP (Upper Palaeolithic) tools include endscrapers, burins and backed pieces.
[b] Percentages were calculated taking in consideration the total without Inform fragments, debris (< 10 mm) and natural fragments.

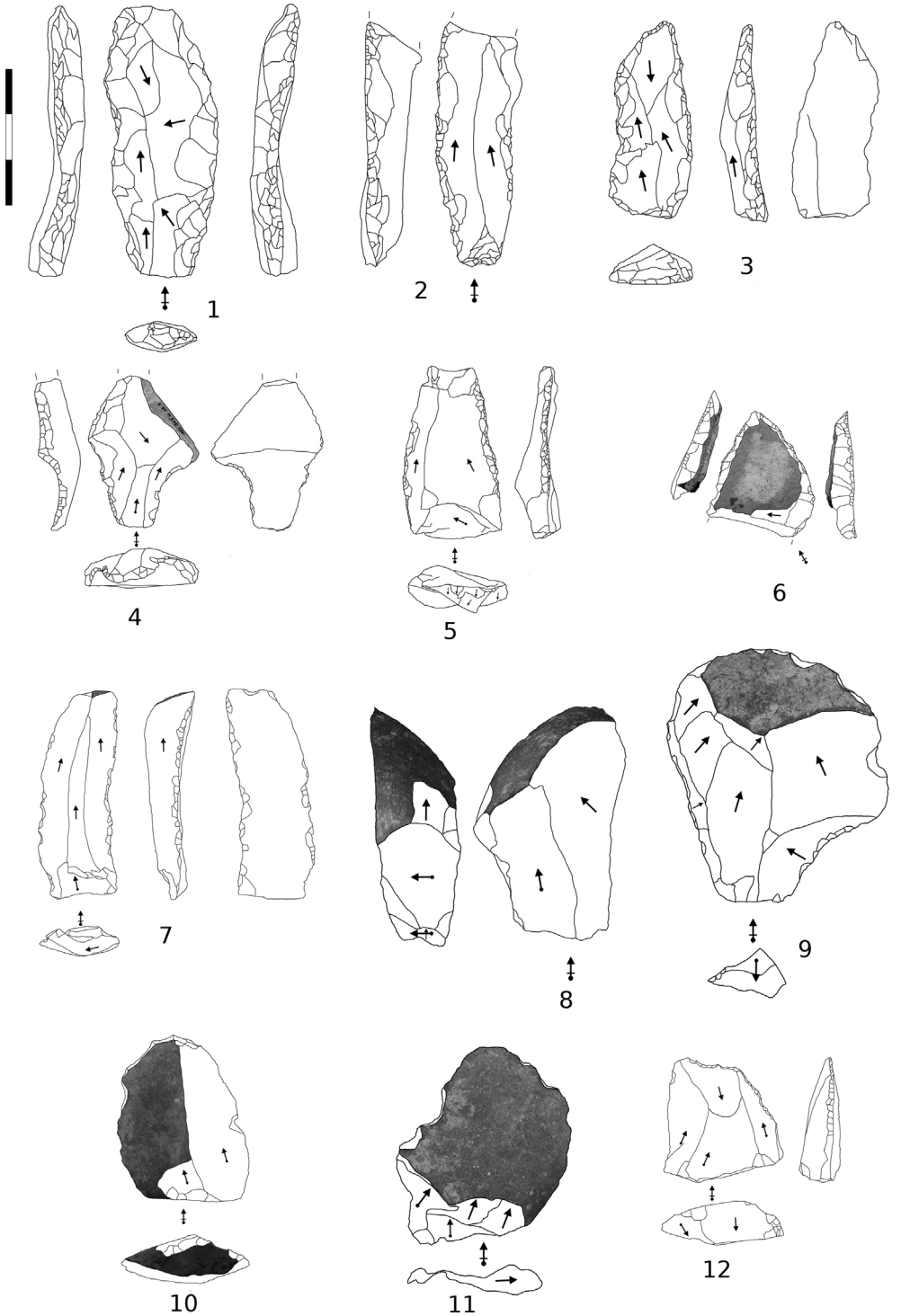

Fig. 2. Lithic artifacts from SQ2: 1–6: flint; 7–12: mudstone. 1: Side scraper on blade; 2: elongated Mousterian point (with diagnostic impact fracture [DIF]); 3: Mousterian point; 4: pedunculated piece; 5–6, 9; side scraper; 7: retouched blade; 8, 11: cortical flake; 10; atypical end scraper; 12: backed pseudo-Levallois point. The arrows indicate the direction of previous flaking scars, if the base is rounded percussion point was visible. Arrows with crossed base indicate flaking direction for flakes and blades. Cortical surfaces are represented with actual cortical texture.

Fig. 2. Objets lithiques en provenance de SQ2 : 1–6 : silex ; 7–12 : lutite. 1 : Racloir sur lame ; 2 : pointe moustérienne allongée (avec fracture diagnostique d'impact [DIF]) ; 3 : pointe moustérienne ; 4 : pièce pédonculée ; 5–6, 9 : racloir ; 7 : lame retouchée ; 8, 11 : éclat corticale ; 10 : grattoir atypique ; 12 : pointe pseudo-Levallois. Les flèches indiquent la direction des extractions antérieures, si le point de percussion est arrondi, il était est visible. Les flèches à base en croix indiquent la direction du débitage pour les éclats et les lames. Les surfaces corticales sont représentées avec leur texture corticale réelle.

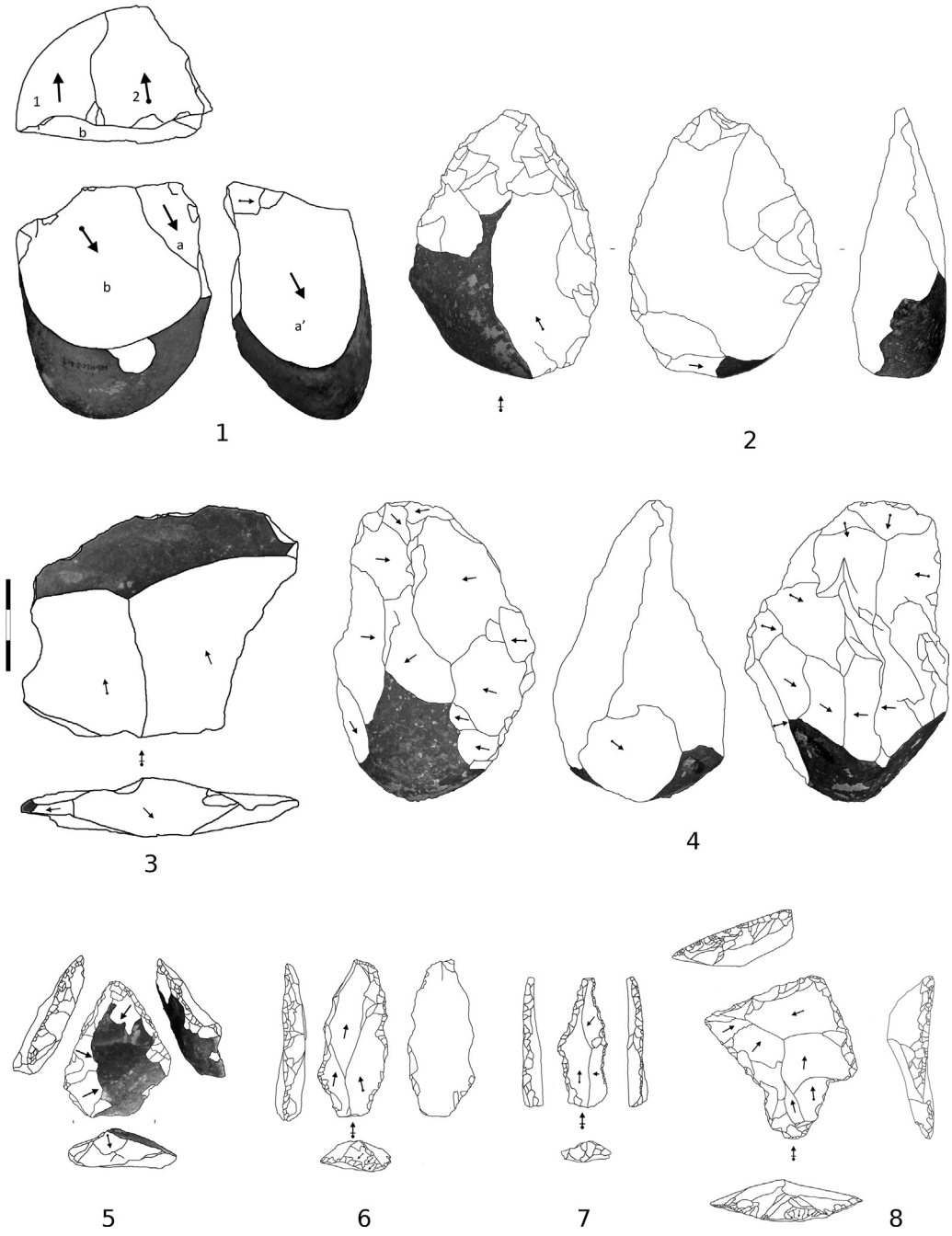

Fig. 3. Lithic artifacts from SQ3: 1–4: Mudstone; 5–8: flint (66% of actual size). 1: SSDA core; 2: cordiform biface on flake; 3: big SSDA flake; 4: ovate biface; 5: Mousterian point; 6: elongated Mousterian point (with DIF); 7: convergent side scraper (denticulate); convergent side scraper on pedunculated piece. The arrows indicate the direction of previous flaking scars, if a rounded percussion point is visible. Arrows with crossed base indicate the flake direction for flakes and blades. Cortical surfaces are represented with the actual cortical texture.

Fig. 3. Objets lithiques en provenance de SQ3 : 1–4 : Lutite ; 5–8 : silex (66 % de la taille actuelle). 1 : Nucléus SSDA ; 2 : biface cordiforme sur éclat ; 3 : grande éclat SSDA ; 4 : biface ovale ; 5 : pointe moustérienne ; 6 : pointe moustérienne allongée (avec DIF) ; 7 : racloir convergent (denticulé) ; 8 : racloir convergent sur pièce pédonculée. Les flèches indiquent la direction des extractions antérieures, si le point de percussion arrondi est visible.Les flèches à base en croix indiquent la direction du débitage pour les éclats et les lames. Les surfaces corticales sont représentées avec leur texture corticale réelle.

snails *Cepaea nemoralis* of considerable size, and the limited association of species found (only four or five species of land snails are represented), suggest that they were collected and consumed by humans, but more detailed taphonomic assessment is needed to shed light upon this issue. In the SQ3, the number of caprines is remarkable (Table 2). In SQ2 and SQ3, the presence of anthropogenic modifications in the bones indicates that part of these

Table 2
Number of remains (NR) and minimum number of individuals (MNI) represented in the macromammal assemblage from the early Middle Paleolithic layers from Arlanpe.
Tableau 2
Nombre de restes (NR) et nombre minimum d'individus (MNI) représentés dans l'assemblage des macromammifères des couches du début du Paléolithique moyen d'Arlanpe.

TAXON	SQ2						SQ3							
	VI		5		4		V		IV		3		D	
	NR	MNI	NR	MNI	NR	MNI	NR	MNI	NR	MNI	NR	MNI	NR	MNI
Rhinocerotidae indet.													2	1
Artiodactyla indet.	26	–	15	–	29	–	8	–	14	–	51	–	159	–
Cervidae indet.	2	–	1	–	3	–					2	–	6	–
Cervus elaphus	1	1							1	1	1	1	4	2
Rangifer tarandus					1	1							1	1
Capreolus capreolus			2	1	2	1	1	1			1	1	6	1
Bovidae indet.													1	–
Bovinae indet.													2	1
Caprinae indet.			1	–					1	–			7	–
Rupicapra pyrenaica	9	2	2	1					8	2	9	2	10	2
Capra pyrenaica	7	2	1	1	1	1	4	1	9	2	3	2	38	5
Total herbivores	45	5	22	3	36	3	13	2	33	5	67	6	236	13
Carnivora indet.	11	1	1	–	9	–	2	–	3	–	6	–	18	–
Canidae indet.													1	–
Canis lupus					1	1								
Cuon alpinus													2	1
Vulpes vulpes					1	1	1	1			1	1	5	1
Meles meles													3	1
Panthera cf. *pardus*					2	1					1	1	2	1
Crocuta crocuta													3	1
Ursus sp.	16	1+2[a]	16	1+3[a]	28	1+2[a]	6	1+1[a]	1	1[a]	5	1+1[a]	21	3[a]
Ursus arctos													1	1
Total carnivores	27	2+3[a]	17	1+3[a]	41	4+2[a]	9	2+1[a]	4	1[a]	13	3+1[a]	56	6+3[a]
TOTAL	72	7+3[a]	39	4+3[a]	77	7+2[a]	22	4+1[a]	37	5+1[a]	80	9+1[a]	292	19+3[a]
% Herbivores compared to the total	62.5		56.4		46.7		59.1		89.2		83.7		80.8	

[a] Individuals represented by decidual dentition (bear decidual canines). Note that while level V has an herbivore percentage similar to those from SQ2, it is likely a sample bias related to the low number of taxonomically identifiable remains that this level has yielded.

faunal remains was processed *in situ* (Arceredillo-Alonso et al., 2013).

7. Site function

The excavation carried out in Arlanpe cave was designed to obtain a good record of the stratigraphy in different parts of the cave, even though a handicap exists when assessing questions such as the site's function or the duration of the occupations. Environmental information and potential distribution of vegetation suggest that the surroundings of Arlanpe were mixed, with rocky surfaces, temperate woods with pine and riverine trees, as well as open spaces probably located in the valley. The position of Arlanpe cave was somehow strategic because of the good view from the site of the confluences of the Arratia and Ibaizabal rivers, which probably was an interesting environment for herbivore herds. Furthermore, the position of the cave, midway between the coast and the mountain passes, probably made it a good shelter for populations moving between these major ecoregions. Taking into account the analysis of lithic and macro faunal assemblages, combined with other evidence provided by micromorphology or small vertebrate analyses, it is possible to see some differences between SQ2 and SQ3. The SQ2 shows higher proportions of imported flint, more fragmented reduction sequences, higher percentages of retouched tools and more curated tools such as side scrapers or points. This suggests that the occupations during SQ2 were occasional and short, and that the human groups visiting the cave were moving through extensive territories. This brevity of human occupations can be also deduced from the abundance of carnivores in these levels, mostly bears. On the other hand, in SQ3 technological provisioning relays more intensively on local raw materials, the reduction sequences are more complete, the proportion of retouched tools is lower and there are many large-sized tools (macro-tools), minimally modified tools and many flakes with use-wear. The percentage of herbivores is larger possibly revealing a higher incidence of human activity in faunal accumulations. This evidence suggest that SQ3 corresponds to longer occupations where different resources, probably hunted animals, were processed intensively, at least partially, at the site. As was pointed out for SQ2, the inhabitants of the cave during SQ3 were also moving through extensive territories, as can be deduced from the varied origins of flint, and the fragmentary nature of the flint processing sequences.

8. Discussion

8.1. Chrono-environmental framework

Direct dating of anthropogenic activities in the Middle Pleistocene levels of Arlanpe cave has been hampered by

the absence of archaeological remains that could be dated by TL or ESR. For this reason we have dated karstic formations (U/Th) and carnivore remains (AAR). These dates situate SQ1 before MIS6 (probably during MIS7 to 6 transition) and SQ2 and SQ3 between MIS7 and MIS4. The different environmental proxies (sedimentology, pollen and small vertebrate) suggest that the SQ1 formed under colder environmental conditions while the SQ2 and SQ3 formed under more temperate or even warmer conditions. The available information suggest that the SQ3 formed during the MIS5, probably during MIS5e, therefore the most probable chronological attribution for SQ2 is the end of MIS6, which should be regarded as our working hypothesis. Only a few caves and open-air sites in this region can be attributed to the same chronological range (Arrizabalaga and Rios-Garaizar, 2012) being the most important Lezetxiki (Falguères et al., 2005), Lezetxiki II (Castaños et al., 2011), Irikaitz and Mendieta I (Arrizabalaga and Iriarte-Chiapusso, 2011; Rios-Garaizar et al., 2008).

8.2. Archaeological framework

At the end of the Middle Pleistocene (ca. 300 kyr BP) different sites from Western Europe show the appearance of technocomplexes (early Middle Paleolithic) based on complex systems of flake production and management, including Levallois, Discoid and Quina technologies, and evidence of recycling and ramified productions (Baena et al., 2014; Moncel et al., 2011; Picin et al., 2013; Santonja et al., 2014; Turq et al., 2013). The origins of these technocomplexes and the apparent spatial and temporal coincidence with classic Acheulean industries fuel the debate about the possible coexistence of two technological traditions in Western Europe during the Middle Pleistocene and about the nature of the so-called transition from Mode 2 to Mode 3 (Santonja et al., 2014). In the northern Meseta, the first EMP levels have been identified in the upper levels of Trinchera Dolina site (TD 10.2 and TD 10.1), dated around 350 kyr BP (Ollé et al., 2013; Rodríguez, 2004), and in the middle sedimentary unit of Ambrona, roughly belonging to the same chronology (Falguères et al., 2006; Santonja and Pérez-González, 2006). Significantly, new dates for Galería complex in Atapuerca situate the level GIII occupations around 240 kyr BP (Demuro et al., 2014). The lithic assemblage from this level shows classic Acheulean tools (cleavers and handaxes) alongside prepared bifacial centripetal cores, flakes and a notable quantity of sidescrapers and denticulates (Ollé et al., 2013). Similar dates have been proposed for other Acheulean assemblages in the Meseta and the region around Madrid (Santonja and Pérez-González, 2010). The situation in SW France is very similar with assemblages characterized by the use of Discoid and Levallois flaking methods, an independent production of large flakes, the abundance of cleavers and the presence of poorly standardized bifaces (Mourre and Cologne, 2007; Turq et al., 2010). These assemblages, attributed to EMP, are dated between ca. 250 and 140 kyr BP (Frouin et al., 2014; Hernandez et al., 2012). In the Cantabrian Region assemblages with bifaces and Levallois or Discoid technology have been described in sites such as Bañugues or Castillo in the central and western Cantabrian Region (Álvarez-Alonso, 2014). At Lezetxiki levels VII and VI industries characterized by the presence of Levallois technology and the scarcity, and even absence, of bifacial technology have been described (Álvarez-Alonso and Arrizabalaga, 2012). Other sites, both cave or open-air sites, have yielded lithic assemblages with features, like the low proportion of flint, the presence of thick bifaces or the existence of Levallois technology, which suggests an attribution to the EMP, for example Urrunaga (Sáenz de Buruaga et al., 1989), the sites of Uribe Kosta (Rios-Garaizar et al., 2012, 2013b) or Atxagakoa (López Quintana et al., 2005).

The lithic assemblages from Arlanpe SQ2 and SQ3 reveal a similar management strategy for flint implements but a different pattern in the management of mudstone. While the SQ2 assemblage is characterized by Levallois, Laminar and Discoid flaking systems, without bifaces, the SQ3 assemblage is characterized by the combination of SSDA, Levallois and Discoid flaking systems and the presence of poorly standardized bifacial tools, always made on local raw materials. Given these considerations we have in Arlanpe, during MIS6-5, an alternation of typical EMP assemblages and EMP assemblages with bifaces, similar to those described for SW France and some sites in the Cantabrian Region. In the case of Arlanpe SQ3, the use of SSDA to obtain big flakes, the use of bifacial tools made on flake and pebbles and the use of massive choppers and chopping tools, seems to be an adaptation to the concrete function of the site and to the availability and nature of local raw materials.

Compared with other EMP sites in the region as Lezetxiki or Atxagakoa, Arlanpe shows a higher intensity of occupations, revealed by the density of remains and the lower incidence of carnivores (Castaños, 2010; Villaluenga et al., 2012). However, if we compare it with the late Middle Paleolithic (LMP) sites in the region, as Amalda or Axlor, the density of archaeological remains is significantly lower, while the presence of carnivores is higher (Altuna, 1989; Castaños, 2005; Yravedra Sainz de los Terreros, 2000). Although the exploited territories are similar, the LMP sites show more deeply planned technological provisioning strategies (Rios-Garaizar, 2008, 2012b). Finally, in Arlanpe the subsistence strategies seem more closely dependent on the prey from the immediate surroundings than in LMP (Rios-Garaizar and García-Moreno, in press).

9. Conclusion

The different levels from the end of Middle Pleistocene at Arlanpe offer an almost unique opportunity to investigate the EMP in the eastern Cantabrian Region. The EMP assemblages from Arlanpe, situated in MIS6-5, show important differences between an EMP without bifaces, in SQ2, and an EMP with bifaces in SQ3. These differences are congruent with the complex spatial and temporal pattern of distribution of these technocomplexes in the second half of the Middle Pleistocene, and in the case of Arlanpe, seem to be more related to site function and intensity of occupations.

Despite some similarities with the LMP assemblages, important differences in settlement, technological

organization and subsistence practices can be observed, describing a less complex economic and social organization in the EMP compared with the LMP. This accounts for a certain sense of cultural evolution and increasing complexity in Neandertal populations in this region between MIS6 and MIS3.

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