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INITIAL MAGDALENIAN ARTIFACT ASSEMBLAGES IN EL MIRÓN CAVE (RAMALES DE LA VICTORIA, CANTABRIA, SPAIN): A PRELIMINARY REPORT

Conjuntos de artefactos del Magdaleniense inicial en la Cueva de El Mirón (Ramales de la Victoria, Cantabria, España): un informe preliminar

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ABSTRACT: El Mirón Cave, in the Cantabrian Cordillera near the border between Cantabria and Vizcaya, contains a long sequence of radiocarbon-dated Magdalenian and Azilian levels. Lying between a series of Solutrean levels and a major, multi-level horizon pertaining to the classic Cantabrian Lower Magdalenian –CLM–, are several layers dating between *c.* 17-16 uncal. kya –*c.* 20.5-19 cal. kya– and lacking traditional hallmarks of the CLM –e.g., scapulae with striation engraved images of hinds and other ungulates, square section antler points with complex geometric (‘tectiform’) engravings–. In these Initial Magdalenian –IM– levels, both microliths –mainly backed bladelets– and macroliths –sidescrapers, denticulates, notches– are well represented; the former are made on non-local, high-quality flint and the latter on local, non-flint materials –quartzite, mudstone, limestone–. Large, often round-section antler points –mostly undecorated– are present, together with bone needles and awls. In several respects, however, there is evidence of industrial continuity among the Solutrean, Initial –‘Archaic’– Magdalenian and Lower Magdalenian assemblages, with no hint of a Badegoulian component in the original French sense of the term –i.e., essentially there are no *raclettes* or transversal burins–. The presence of many “archaic” –‘substrate’, ‘Mousteroid’– tools is a constant in many Cantabrian Upper Paleolithic sites and El Mirón is no exception. This can be explained by site-functional and lithological factors, without recourse to the *deus ex machina* of extra-Iberian ‘cultures’.

Key words: Lithic artifacts. Osseous artifacts. Microliths. Macroliths. Continuity. Late Glacial.

RESUMEN: La Cueva de El Mirón, en la Cordillera Cantábrica cerca del límite entre Cantabria y Vizcaya, contiene una larga secuencia de niveles magdalenienses y azilienses datados por radiocarbono. Yaciendo entre una serie de niveles solutrenses y un espeso horizonte formado por varios niveles del clásico Magdaleniense inferior cantábrico –CLM–, hay varios niveles datados entre 17000 y 16000 años BP sin calibrar –*c.* 20500-19000 cal BP– y sin las marcas tradicionales del CLM –por ejemplo, escápulas con imágenes grabadas y estriados de ciervas y otros ungulados, azagayas de sección cuadrada con grabados complejos –‘tectiformes’–. En estos niveles del Magdaleniense inicial –IM–, están bien representados los

microlitos –principalmente hojitas de dorso– y los ‘macrolitos’ –raederas, denticulados, escotaduras–; los primeros están hechos sobre sílex no local de buena calidad y los últimos sobre materias primas locales –cuarcita, lutita, caliza–. Están presentes algunas azagayas grandes, varias de sección redonda y en su mayoría sin decorar –junto con agujas y punzones de hueso–. Sin embargo, en varios aspectos hay evidencia de continuidad entre los conjuntos solutrenses, magdalenenses iniciales y magdalenenses inferiores, sin rasgo alguno de un componente ‘badegulense’ en el sentido original francés del término –es decir, casi no hay racletas o buriles transversales–. La presencia de muchos utensilios ‘arcaicos’ –‘musteroides’ o ‘del sustrato’– es una constante en muchos yacimientos del Paleolítico superior y El Mirón no es ninguna excepción. Este hecho podría explicarse por factores funcionales del yacimiento y litológicos, sin tener que recurrir al *deus ex machine* de unas ‘culturas’ extraibéricas.

Palabras clave: Artefactos líticos. Artefactos óseos. Microlitos. Macrolitos. Continuidad. Glacial tardío.

1. Introduction¹

The question of the relationship between the Solutrean and the Magdalenian in Cantabrian Spain –and SW Europe in general– is an old and complex one. Was there a complete cultural rupture involving an abrupt end to the putatively unusual Solutrean culture and its substitution by a new Magdalenian –or ‘Badegoulian’– culture –perhaps actually involving a phenomenon of population replacement (e.g., Bosselin, and Djindjian, 1999; *contra* Straus and Clark, 2000; see also Ducasse, 2012; Ducasse and Langlais 2007)–? Or was there substantial continuity between the two technological traditions, involving human adaptation to the new, subtly different environmental realities of the post-Last Glacial Maximum conditions of Oldest Dryas, i.e., *in situ* development (e.g., Straus, 1975; Straus and Clark, 1986)? Part of the historic debate goes back to early views of the Solutrean as an intrusive culture whose foliate stone points broke with a tradition of backed

blade(let) points/*armatures* that was sometimes seen as linking the Gravettian or ‘Perigordian’ tradition with that of the Magdalenian *sensu lato* –see, for example, discussion in Smith, 1966–. Part of it has to do with the problem of macrolithic tools made on local, non-flint materials that commonly occur in Magdalenian –and other– contexts throughout the Upper Paleolithic of especially Cantabria and Asturias –regions where good-quality, large-nodule flint is far from ubiquitous (see discussion in Straus and Clark, 1986; Straus, 1992 *inter alii*)–.

Until the 1970s, it was difficult to define the existence of artifact assemblages intermediate in time and stratigraphic position between the Solutrean and CLM. The excavation in 1974 of the small, specialized ibex-hunting site of El Rascaño Cave in the montane zone of central Cantabria revealed the presence of just such assemblages (González Echegaray and Barandiarán, 1981) and permitted P. Utrilla (1981; for subsequent updates, see e.g. Utrilla, 1996, 2007; González Sainz and Utrilla, 2005; see also Corchón, 2005; Cazals and Bracco, 2007) to define the existence of an Archaic Magdalenian stage –also suggested at other long-ago excavated sites [e.g., La Paloma, El Castillo] in her dissertation analyses–. The modern excavation of the very small remnant deposit in El Rascaño –a long-lost site rediscovered by LGS in the Miera valley, immediately to the west of the Asón valley, where El Mirón is located–, with fine water-screening and the application of radiocarbon dating, made possible the definition of occupations intermediate in age between the Solutrean and CLM. But how general the characteristics of Level 5 from such a small excavation in a functionally very specialized site might be, remained unknown until the excavation of layers

¹ Excavations in El Mirón Cave, directed by Straus and González Morales since 1996, have been authorized and partially financed by the Consejería de Cultura, Gobierno de Cantabria. The research has also been funded by the U. S. National Science Foundation, Fundación M. Botín, National Geographic Society, Ministerio de Educación y Ciencia, L. S. B. Leakey Foundation, Fund for Stone Age Research –Jean and Ray Auel, principal donors– and University of New Mexico. Material support has been provided by the Town of Ramales de la Victoria and Universidad de Cantabria (IIMP). Fontes’ research is funded by a National Science Foundation Doctoral Dissertation Improvement Award. Thanks go to the scores of student excavators from all over Europe and the Americas who have worked conscientiously at El Mirón over the years and to our many scientific collaborators.

of similar age from El Mirón, which, although also a montane site, is a vastly larger cave, with physical attributes and possibilities far different from those of El Rascaño and with an actual Solutrean sequence underlying the Magdalenian, something which was lacking in the smaller site. Likewise, there existed the possibility of a 'transitional' assemblages at the base of Level F in Urtiaga Cave, Guipúzcoa, but the materials "associated" with a single radiocarbon date of 17050 ± 140 uncal BP included some Solutrean-like pieces according to the excavator, J. M. de Barandiarán (Utrilla, 2007: 252) –despite differing cultural assignments to the IM and CLM– and the site was dug between the 1920s and late 1950s. With regard to the question of 'Magdalenian origins', as with so many others, El Mirón provides the opportunity for studying how a single, highly-favorable cave location was utilized by humans over a very long period of time, across the climatic vicissitudes of Marine Isotope Stages 3, 2 and 1 –notably in the case discussed here, Greenland Stadial 2c-a–.

2. El Mirón Cave and its Early Oldest Dryas Stratigraphy

The cave is located at 260 m above present sea level and about 20 km from the present shore –c. 25-27 km from the LGM/Oldest Dryas shore– on a west-facing cliff dominating the upper valley of the Asón river, some 100 m above the valley floor near the confluence with the Calera and Gándara rivers. It is surrounded by peaks and ridges at or above 1000 m.a.s.l. in the second range of the Cantabrian Cordillera, whose third –and highest– range attains elevations over 1200 m in the Asón sector, where the provinces of

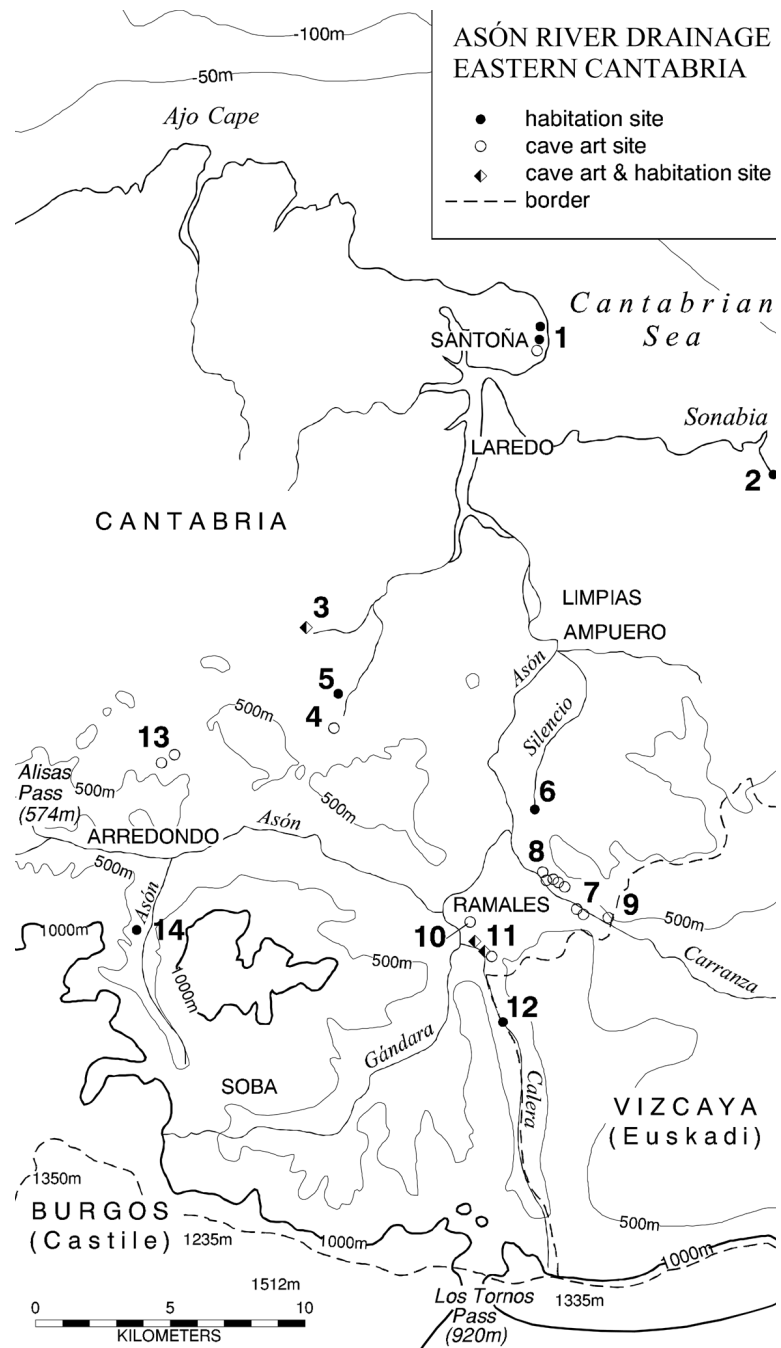


FIG. 1. Map of the Río Asón valley with the location of El Mirón Cave at n.º 11: 1) La Fragua, El Perro; 2) La Trecha; 3) El Otero; 4) La Chora; 5) Cobrante; 6) El Valle; 7) Sotarriza, Covanegra; 8) Morro del Oridillo, Arco A,B,C, Pondra; 9) Venta Laperra, Polvorín; 10) La Cullalvera; 11) El Mirón, Covalanas, La Haza, El Horno, La Luz, El Cabrito; 12) Tarrerón; 13) Emboscados, Patatal, Cubio Redondo; 14) Cubero (L. G. Straus and R. Stauber).

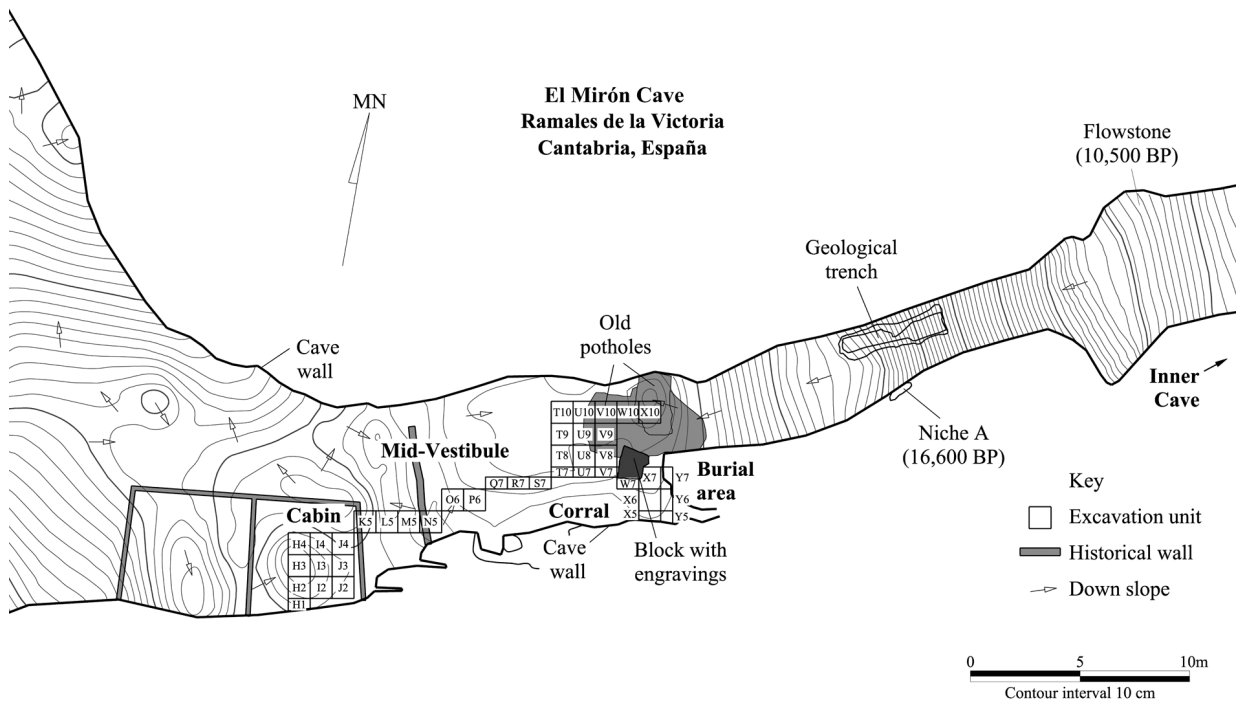


FIG. 2. Plan of El Mirón Cave vestibule with the location of the 1996-2013 excavations; the Initial Magdalenian levels were reached in squares V8, U9 and U10 of the 'Corral' area (E. Torres and R. Stauber).

Cantabria, Vizcaya (Basque Country) and Burgos (Old Castile) come together near one of the chain's lowest passes –Los Tornos, 920 m–. The site is near one of the easiest avenues of E-W communication, the Carranza Gorge, which is lined with cave art sites (Fig. 1). El Mirón is also immediately surrounded by cave art loci –La Haza, Covalanas, La Luz and La Cullalvera– and itself contains rupestral engravings (García *et al.*, 2012). The cave's highly visible mouth is 20 m high by 16 m wide and its capacious, dry, well-sheltered vestibule measures 30 m deep by 8-12 m wide by 13 m high (Fig. 2). The narrower inner gallery continues eastward another 100 m and also contains evidence of Lower/Initial Magdalenian occupations. The main excavations –conducted by LGSand MRGM since 1996– have been in the vestibule: a 9-10 m², block near the front –the 'Cabin' area– and a 9-14 m², block at the rear –the 'Corral' area–, connected by a 9 x 1 m "Mid-Vestibule" trench at the center of which is a 1 m² *sondage* that reached the base of the

Magdalenian sequence. Initial Magdalenian levels were reached in part of the Corral area on the edge of a large looters' pit, from the base of which we had been able to excavate the Solutrean sequence, as well as poor Gravettian and late Mousterian levels. The Initial Magdalenian levels were excavated in squares V8, U9 and U10. The Solutrean sequence was excavated under these levels in U9 and U10, as well as in adjacent squares V9, W10 and X10, where the Magdalenian sequence had been removed by looters before 1996 (Straus and González Morales, 2009)².

In striking contrast to the light brown/yellowish-beige, organically and culturally poor Solutrean levels, the lowest Magdalenian levels –119.3-119.1– are dark brown-gray in color with

² Cf. also Straus, L. G.; González Morales, M. R.; Marin, A. B. and Iriarte, M. J.: "The human occupations of El Mirón Cave (Ramales, Cantabria, Spain) during the Last Glacial Maximum/Solutrean period", *Espacio, Tiempo y Forma* (in press).

abundant charcoal dust and particles and organic and cultural remains, including abundant blackened bones (Figs. 3-4). The following are descriptions from bottom to top of all the layers considered in this article:

“119.3: Dark brown, loose silty loam with relatively few *éboulis* in U10A + north part of C: Fill of pit 2011.1. Contains blackened bones... Possible continuation of pit 2006.2 (119.1). [c. 7 cm thick in U10].

119.2: Continuation of 119 at its base, surrounding the 119.1 pit fill. Dark brown (but highly variegated), clayey silt with abundant *éboulis* and, with many fine silt lenses/patches of various colors (beige, greenish-gray, reddish), as well as ashy areas. Culturally rich. Lies atop 121/122 [uppermost Solutrean levels except where 119.3 is present; c. 1 cm thick in U10].

119.1: Dark gray, loose, silty loam fill of a pit (2006.1) partially exposed in U10. Small white *éboulis* at base. [ca. 10 cm thick in U10].

119: Massive layer of medium-large, rounded, weathered *éboulis* in an orange-brown, clayey silt essentially like 118, with which it intergrades. Contains abundant bones like 118. Slopes down steeply to west and north, like 118. It is very important to note that Level 119 in square v8 (where it is not subdivided) and Level 119.2 or 119.3 in squares U9-U10 lay directly atop lighter, more compact Level 121. This underlying layer was originally thought to be ‘Level 120’ until we excavated squares v9-10 at the base of the looters’ pit and discovered that 120 is in reality the first layer of compacted backdirt in that hole and does not continue beyond the hole, so that the first intact archeological level below the base of the looters’ pit is in fact Level 121 –Solutrean [c. 19 cm thick in v8, 4 cm. in U10]– all thicknesses for levels extending across full meter-squares are those measured in the centers of squares].

118: Hard, very compact, light brown (or orange-brown), clayey silt with gravels and small limestone ‘flecks’ dispersed throughout the hard, clayey-silt matrix, but no larger *éboulis*. Slopes much more steeply down toward the west than the overlying levels. [ca. 3 cm thick in v8; 10 cm in U9; 8 cm in U10].

117: Larger white *éboulis* in a compact, gray-brown silt matrix, lighter at the top and darker at

the base. A clear, hard surface, sloping down toward the south and west. A sharp break in texture [*vis à vis* overlying Level 116] and a major rockfall episode. Matrix is rich in burning evidence (a few calcined bones and fire-cracked rocks + charcoal) and consists of loose, blackish sediments below the surface. [ca. 35 cm thick in v8; 14 cm in U9; 11 cm in U10]” (Straus and González Morales, 2012: 57).

The stratigraphic position of Level 119 –with its subdivisions– immediately above the very distinctive Level 121 in both v8 and U9-10 provides a guarantee that, although only contiguous at the southeast corner of U9/northwest corner of v8, the materials from 119 in both the northeastern and southeastern sectors of the Corral excavation area can be studied together, while recognizing that all of them represent the contents of a major palimpsest. It follows that materials from Level 118 and from Level 117 from the two separated units also can be analyzed as individual assemblages. A caveat in this *modus operandi* is that it was very hard to actually physically follow the continuity of the levels in the stratigraphic section at the western edge of the looters’ pit and in the subsequent south wall of square U9 because of the presence of a dense accumulation of rock fall –*éboulis*– with little sedimentary matrix in the area of square U8 at the depth corresponding to these levels.

Presumably the abundant *éboulis* of various sizes are indicative of meteorization of the cave ceiling and walls under cold, but humid climatic conditions of early Oldest Dryas –Greenland Stadial 2a–.

There are seven somewhat stratigraphically incoherent radiocarbon dates from the Initial Magdalenian levels –all dates calibrated with CALIB per Stuiver and Reimer–:

Level 117 –square v8–: 17050 ± 60 BP –20710-19980 cal BP at 1δ– Charcoal; AMS GX-25857.

Level 117base –square U10–: 17240 ± 40 BP –20270-20530 cal BP at 1δ– Bone; AMS UG-15180.

Level 118 –square U10–: 15460 ± 190 BP –18830-18120 cal BP at 1δ– Charcoal; Conv. GX-31933.

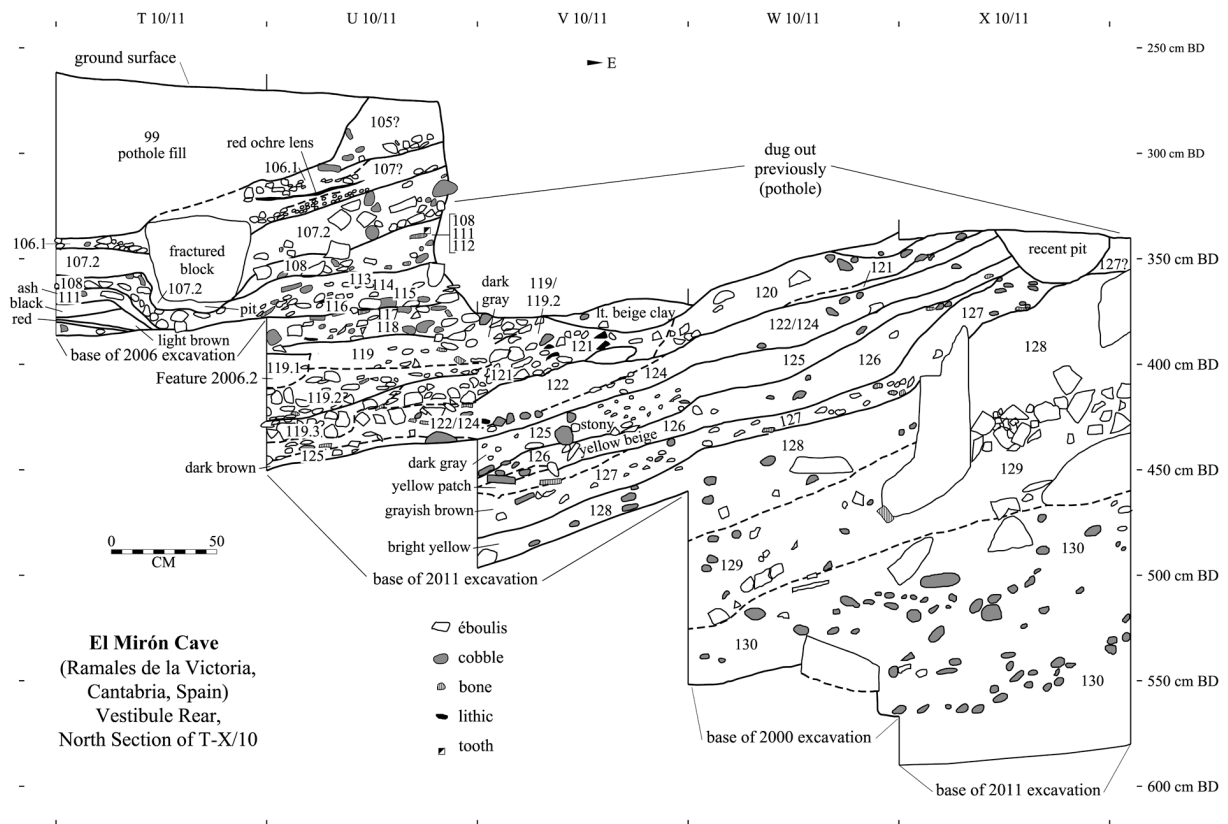


FIG. 3. Stratigraphic section of the north face of the El Mirón 'Corral' excavation area (T-X/10-11) (L. G. Straus and R. Stauber).

Level 119 –square v8–: 16960 ± 80 BP –20520-19870 cal BP at 1δ – Charcoal; AMS GX-25858.

Level 119 –square U10–: 17230 ± 40 BP (20280-20510 cal BP at 1δ) Bone; AMS UG-15182.

Level 119.2 –square U9–: 16320 ± 160 BP (20110-19820 cal BP at 1δ) Bone; Conv. GX-32656.

Level 119.2base –square U10–: 17620 ± 40 BP (20580-20670 cal BP at 1δ) Bone; AMS UG-15181.

Charcoal from a pit dug in square v7 from overlying Level 116 –hence possibly originating in Level 117– yielded an AMS date of 17400 ± 80 BP –21040-20370 cal BP– (GX-29439). Bone collagen from directly underlying Level 121 –Level 120 having turned out to be a layer of compacted backdirt at the base of the looters' pit, albeit

without modern artifacts, as noted above– is dated to 18390 ± 300 BP –22330-21370 cal BP– (GX-32655) –all calibrations according to CALIB, rounded to the nearest 10 years–. Despite the inconsistencies of AMS GX-32656 –seemingly a bit “too young”, but at $+1\delta$ and especially $+2\delta$, more or less acceptable– and conventional date GX-31933, which is far out of line and perhaps explicable if the piece of dated charcoal had been displaced downward by human or natural processes, the levels in v8 at the south end of the Corral excavation and in U10 at the north end seem to correlate temporally, confirming our efforts to follow the slightly sloping –south down to north– “lay of the land”, although there can never be a guarantee that artifacts and bones scattered at one end of this area in a given archeologist-defined ‘level’ were deposited during the same occupation as the materials at the other end.

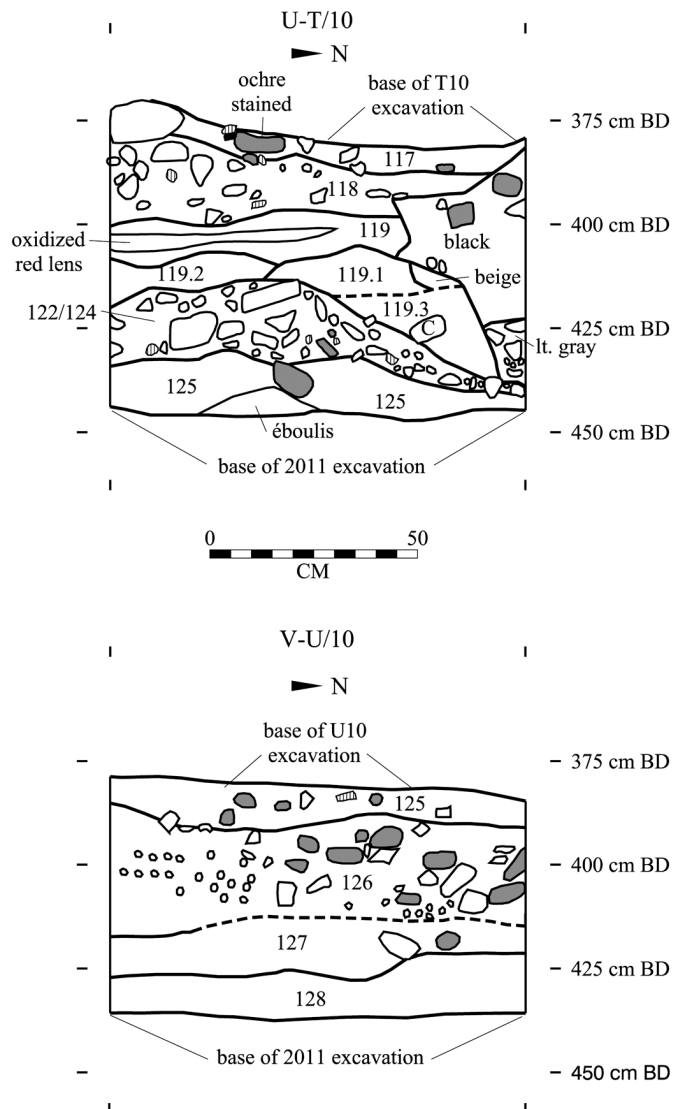
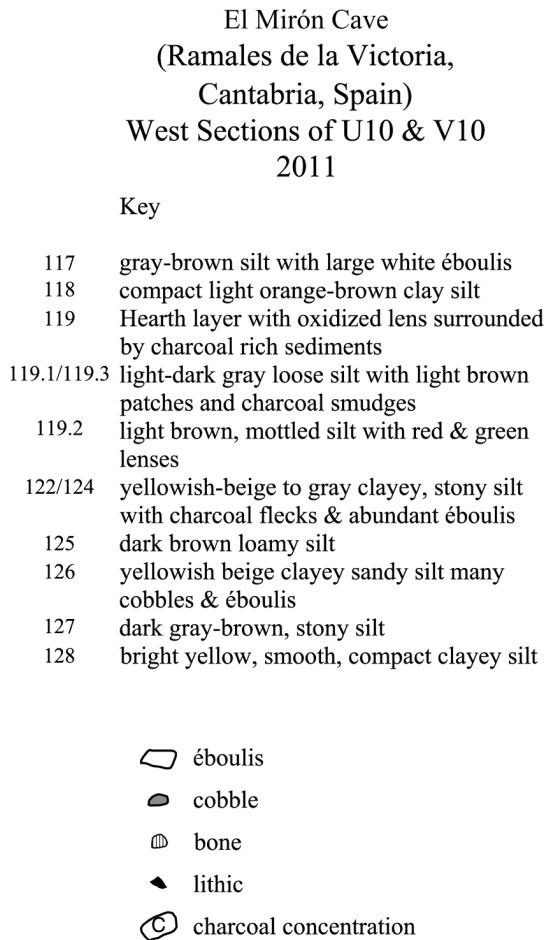


FIG. 4. Stratigraphic sections of the west faces of squares U10 and T10 (L. G. Straus y R. Stauber).

Clearly all the levels are palimpsests representing the accumulated garbage of several occupations of the cave over a certain period of time, which could have been repeated visits during decades or even centuries. Nonetheless it seems clear that the pits in U10 –119.1-119.3– were filled relatively rapidly.

Given these dates and the sharp break between the light yellowish-brown clayey silt layers of the Solutrean –and pre-Solutrean– sequence and the

darker brown-gray, silty loam layers of the Initial Magdalenian, it is possible that there is an unconformity corresponding to a depositional hiatus of several centuries at the rear of the El Mirón vestibule. This gap may be in part filled further to the west by Level 313 –17400 ± 270 BP– uncovered in the P6 *sondage* in the center of the Mid-Vestibule Trench below a classic CLM horizon, but lacking in Solutrean points –in admittedly the very small area of 1 m² (Straus *et al.*, 2008)–. In

DEBRIS TYPE	LEVELS 119.3-119.1	LEVEL 119	LEVEL 118	LEVEL 117
Microburin	0	0	0	5
Plain trimming flake	8962	23,007	4400	9771
Cortical trimming flake	217	762	186	474
Plain shatter	5987	8523	706	1823
Cortical shatter	295	376	62	139
Plain flake	1176	2505	588	1318
Primary decortication flake	173	182	40	106
Secondary decortication flake	418	763	174	381
Plain, whole or proximal blade	107	351	99	192
Plain, distal or mesial blade	22	104	25	41
Primary, whole/prox. decort. blade	19	93	20	73
Secondary, distal/mesial decort. blade	4	3	2	2
Plain, whole/proximal bladelet	699	2237	733	1034
Plain, distal/mesial bladelet	365	1405	337	569
Whole/proximal decort. bladelet	35	137	50	80
Mesial/distal decortication bladelet	9	40	6	11
Burin spall	217	311	105	96
Unidirectional crested blade	2	9	5	1
Bidirectional crested blade	0	1	3	2
Flake core	14	29	21	22
Prismatic blade core	1	6	3	3
Pyramidal blade core	0	0	0	1
Prismatic bladelet core	4	10	4	5
Pyramidal bladelet core	1	4	1	4
Mixed core	17	44	32	29
Non-cortical chunk	831	970	96	232
Cortical chunk	242	266	40	64
Platform renewal flake	14	32	9	104
Splintered piece (= tool type 76)	0	2	0	1

FIG. 5. *Debris Types (débitage + cores) from Initial Magdalenian Levels.*

any event, the Initial Magdalenian at the vestibule rear seems to date between *c.* 20.6–20.3 cal kya—hence less than a millennium—, after which the classic CLM developed from it.

As noted above, excavation of the northwest quadrant of square U10 seems to have “caught” a corner of a hearth pit of relatively long-duration, used and re-used during the period of deposition of massive Level 119. It was filled with loose, charcoal-rich silt, but contained only a few fire-cracked

rocks, blackened bones or other finds. The edges were well defined by more compact, somewhat lighter brown sediments into which the pit had been dug. The fill was labeled 119.3 and 119.1, to distinguish it from the surrounding Level 119.2 + 119, which are continuous and intergrade. The patches/very fine localized lenses of colored pigments in 119.2 suggest *in situ* production and/or use of ochres for practical and/or decorative purposes, possibly associated with fire.

Although the faunal remains have not yet been studied, field observations suggest that red deer and ibex—as always in the Upper Paleolithic layers of this site— were the main game animals, although fish remains—notably salmon vertebrae—are also present.

3. Lithic Industry

3.1. Knapping Debris

The levels in question, but especially 119 and 119.1-119.3 in squares U9-10, are extraordinarily rich in lithic knapping debris—cores, chunks + débitage—. Because v8 is almost separated from U9, we will summarize the contents of the two areas separately. v8 Level 117 yielded 5341 items of which 74.2% are micro-débitage—‘md’ = trimming flakes [chips] and shatter [small angular debris], all <1 cm long and by-products of knapping—, U9-10 10374 items, of which 79.3% are md. v8 Level 118 produced 1319 debris, of which 78.5% are md; U9-10 6424 items, of which 67.2% are md. v8 Level 119 has 4091 debris, of which 77.9% are md; U 9-10 38140 debris, of which 77.5% are md. U9-10 Levels 119.1-119.3 yielded 19838 knapping products, of which 81.4% (!) are md. The masses of microdébitage are indicative of *in situ* blank production and retouching during these occupations. Although we use a typology of

30 types for knapping debris –and tool blanks– that includes information on cortex and other technological data and we classify the lithic raw materials among dozens of apparent rock types (Fig. 5), we will summarize the assemblages –from lower to upper– in terms of both broad debris groups and lithic raw material groups for the sake of brevity in this preliminary report (Fig. 6).

Flakes (≥ 1 cm) make up a fairly constant tenth of the debris assemblages –Levels 119.3-119.1 = 8.9%; Level 119 = 8.2%; Level 118 = 10.3%; Level 117 = 10.9–; blades (≥ 2 cm) are rare –0.1-2.0%–, being clearly more abundant in Levels 118 and 117 than in 119 and subdivisions. In contrast, chunks –large angular debris, core fragments– decline through time from 5.4% and 2.4% to 1.6% and 1.8% of the debris assemblages; cores –mostly ‘mixed’, with both flake and blade[let] removal scars– are present in trace-small quantities –0.2-0.7%–. Bladelets are quite variable in their relative frequencies, from 2.3% in Level 119.3-119.1 to 9.0%, 14.5% and 10.2% in Levels 119, 118 and 117 respectively. Bladelet cores are virtually absent in 119.1-119.3. The latter facts may be suggestive of an overall trend toward increasing ‘popularity’ of bladelets from the Solutrean to the Lower Magdalenian at El Mirón, but with the caveat that the ‘trend’ in the small areas in which the Solutrean and Initial Magdalenian were excavated may be a consequence of sampling factors interacting with activity-related variability in artifact discard within individual levels, especially since Levels 119.1-119.3 are pit-fill deposits.

As a further indicator of the fact that knapping was taking place in the cave, there are many primary and especially secondary cortical products in the Initial Magdalenian levels. Flakes (≥ 1 cm) with cortex make up 33.4%, 27.5%, 26.8% and 27% of total flakes in Levels 119.1-119.3 through 117 respectively. Blades with cortex represent 22.0%, 19.4%, 17.1% and 24.2% and bladelets with cortex represent 9.6%, 4.6%, 5.0% and 5.4% respectively. Non-local flint was often being

DEBRIS GROUP	LEVELS 119.3-119.1	LEVEL 119	LEVEL 118	LEVEL 117
Flakes	1767	3450	802	1805
Blades	123	568	152	310
Bladelets*	460	3819	1126	1694
Chunks*	1073	1236	126	296
Cores	37	93	51	64
Burin Spalls	217	311	105	96
PRFs+Crested Blades***	16	24	17	107
Microdébitage****	16,145	32,748	5374	12,193
Totals	19,838	42,249	7753	16,565

FIG. 6. *Simplified Debris (débitage + cores) groups from Initial Magdalenian Levels. *Bladelets are ≤ 2 cm long; **Chunks are large angular debris (>1 cm long); ***PRF = platform renewal flake; ****Microdébitage is composed of trimming flakes (“chips”) and shatter (small angular debris), ≤ 1 cm long.*

transported to the cave in the form of small nodules with cortex, while local quartzite and mudstone were also being used to knap in the form of river cobbles –probably from the bedload of the Asón, 1-2 km from the cave–. Cores are more or less evenly divided among the three squares in Level 117, but are almost exclusively found in U9 and U10 in Levels 118 and 119 (Fig. 7).

3.2. Retouched Tools

The retouched stone tools, as classified according to the standard –original– Upper Paleolithic typology of D. de Sonneville-Bordes and J. Perrot, are presented in Fig. 8. The type list is slightly modified to include lightly, but continuously retouched or nibbled –but not abruptly backed– bladelets as Type 90, as these are fairly abundant, while true Dufour bladelets are absent. These lightly modified bladelets are consistent with the so-called ‘El Juyo type’. The basal subdivisions of Level 119 –fills of an apparent succession of superimposed or multi-episode pits that were probably dug-out hearths in the northern part of square U10: 119.1 and 119.3, plus surrounding 119.2 in both U9 and U10– were grouped. Level 119 is undivided in v8, continuing all the way down to contact with Level 121. The samples of

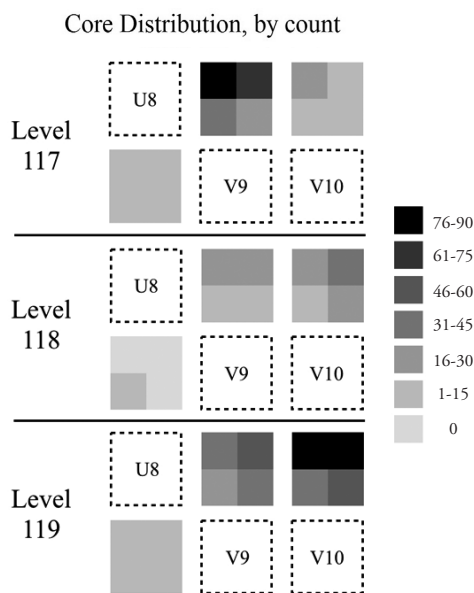


FIG. 7. Density plots of distribution of cores among squares V8, U9 and U10 in Levels 119-117.

formal tools are large to very large, especially when considering the small total area excavated: 175 tools in Levels 119.3-119.1, 464 in 119, 163 in 118 and 321 in 117. Barely contiguous square V8 is consistently far poorer in tools than U9 and U10, not only in retouched/backed bladelets, but also in all types except notches –in Levels 117 and, to a lesser extent, 119–, with minor ‘peaks’ in perforators and continuously retouched pieces in V8 Levels 117 and 118 respectively, perhaps suggesting some spatial effect concerning the consistent locus of tool discard –and use?– at the northern end of the vestibule rear versus the middle area thereof. Squares U9 and U10 trade places among levels and types in terms of having the highest numbers of different kinds of tools (Fig. 9). There does seem to be evidence of spatially non-random discard of tools, which means that if we had only dug U9-10 or V8, we would have gotten very different pictures of assemblage composition –a cautionary tale to be taken seriously when considering the small sample of the cave we have excavated, especially in the levels older than *c.* 16000 uncal BP.

The relative frequencies of the major tool groups are presented by level in Fig. 10. The

percentages are remarkably similar among levels, especially for the most abundant groups. Endscrapers only range –non-directionally– between 11.7-8.6%, although nucleiform endscrapers –probably cores that were used as heavy-duty scrapers after ‘exhaustion’ for the purpose of blank extraction– increase from very rare in Level 119 and its subdivisions to substantial –8-5%– in the uppermost levels –i.e., those closest to the classic Cantabrian Lower Magdalenian, for which these artifacts are common and temporally diagnostic–. Burins –classic ‘Magdalenian’ tools– range from 10.3-7.8%, ironically decreasing steadily with the passage of time ‘toward’ the Cantabrian Lower Magdalenian. Perforators fluctuate non-directionally between 8.6-3.1%. Backed and retouched bladelets –including straight– and curved-backed micro-points and a few geometric microliths –all [*n* = 4] in the uppermost Level 117, a harbinger of the overlying CLM assemblages– fall within a very tight range between 28-30%. The presence of a few geometrics in 117 is interesting as these artifacts are consistently found –albeit in very small numbers– in the Lower Cantabrian Magdalenian assemblages at El Mirón, as well as in other sites of the region. On the other hand, ‘macroliths’ are also common in Levels 119.3-117. What we call ‘macroliths’ are “archaic” tools (i.e., ones usually typical of Mousterian industries) made on large flakes often of non-flint raw materials such as quartzite, mudstone and limestone. Denticulates and notches on flakes actually increase through time, from 18.3 to 24.3%.

Sidescrapers –on flakes– fluctuate between 0.6-2.5%, being most frequent in Level 118. It is interesting to note the near-equal balance between ‘macroliths’ and ‘microliths’ –bladelet tools/armatures– in all the assemblages –*c.* 20-30% each–. In addition to the ‘macroliths’ referenced above, there are continuously retouched pieces –flakes and blades that display intensively working of suitably sized blanks– that range in relative frequency steadily downward through time from 17.1-10.6%. The other notable large artifacts are splintered pieces that fluctuate between 1.2-5.8%. These are probably evidence of bipolar reduction at the site. In terms of putative diagnostic ‘Badegoulian’ artifacts, there is only one “raclette” in Level 118 and one burin on a lateral retouched truncation in Level 119. On the other hand, there are two possible/

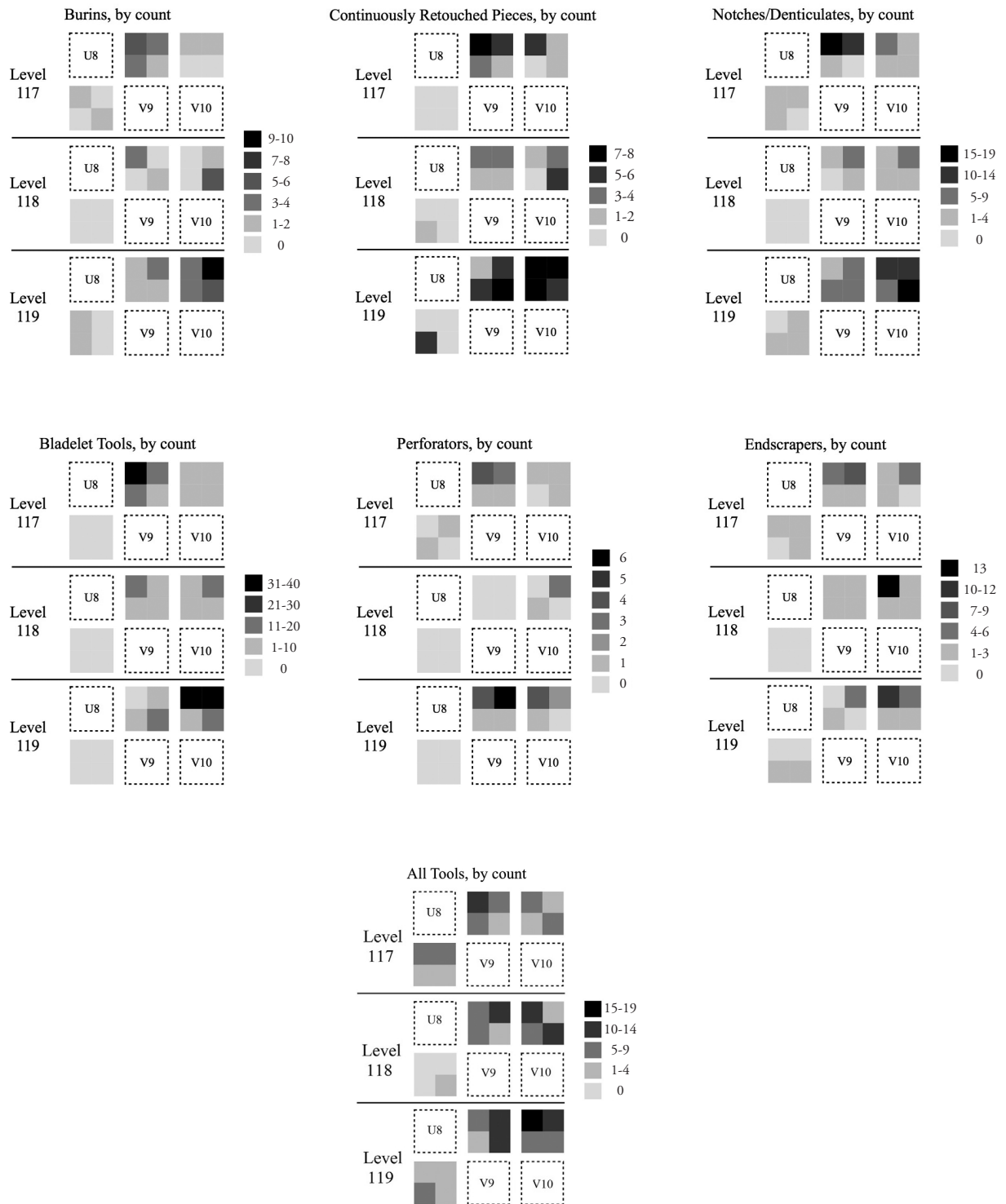


FIG. 8. Density plots of distribution of all retouched tools combined and various major tool groups among squares V8, U9 and U10 in Levels 119-117.

TOOL TYPE	LEVELS 119.3-119.1	LEVEL 119	LEVEL 118	LEVEL 117
1. Simple endscraper		3	1	2
2. Atypical endscraper	4	6	1	2
3. Double endscraper			1	1
4. Ogival endscraper		4		
5. Endscraper on ret. flake or blade	1	2		4
8. Endscraper on flake	5	8	1	5
10. Thumbnail endscraper	2			1
11. Keeled endscraper				1
12. Atypical keeled endscraper		2		
13. Thick nosed endscraper	1		2	
14. Thin nosed endscraper	2	2		1
15. Nucleiform endscraper	1	13	13	16
17. Endscraper-burin		1	4	2
18. Endscraper-truncated blade		1		2
20. Perforator-truncated blade				1
21. Perforator-endscraper				2
22. Perforator-burin			1	1
23. Perforator	2	5		4
24. Atypical perforator (bec)	9	14	5	11
25. Multiple perforator	2	1		
26. Microperforator	2	2		2
27. Straight dihedral burin	2	2	2	2
28. Canted dihedral burin	1	4	2	
29. Angle dihedral burin	2	3		2
30. Angle burin on break	8	19	5	12
31. Multiple dihedral burin	1	7		4
33. Parrot beak burin	1	1		
34. Burin on straight truncation		1		
35. Burin on oblique truncation	1	4	2	1
36. Burin on concave truncation	1	2		1
38. Transverse burin on lateral trunc.		1		
39. Transverse burin on notch				1
41. Multiple mixed burin		1		
43. Nucleiform burin				1
44. Flat-face burin	1		2	1
51. Straight backed micro-point			1	
52. Font-Yves point		1		
53. Humped backed piece		1	1	
54. Flechette		1		

FIG. 9. Stone Tools from Initial Magdalenian Levels (Sonnevile-Bordes & Perrot Typology). *Non-‘de Sonnevile-Bordes/Perrot’ combination tools (e.g., double/triple denticulates, denticulates + notches, denticulates + sidescrapers) are counted twice (or thrice) as needed here (but only once each in terms of raw material tabulation).

probable Solutrean points fragments in Level 119 –both in v8, where this unit is in direct contact with Level 121; indeed one is a shouldered point base that was found in a thin charcoal lens at the base of Level 119 adjacent to a pit–. It should be noted that a few isolated, invasively retouched items –possibly Solutrean point fragments– have been found in other –later– Magdalenian levels in El Mirón, perhaps the consequences of “finds” made –while digging hearth pits, for example– by Oldest Dryas-age inhabitants of the cave.

3.3. Lithic Raw Materials

The lithic tools are made on a relative wide gamut of raw materials, but differentially so, depending on their morphological –and presumably functional– type. The macroliths –‘archaic’ or “Mousteroid” types–, namely denticulates, notches and sidescrapers, are very often made on local non-flint materials –limestone, mudstone, quartzite or, more rarely, quartz, all variously available in the beds of nearby rivers–: 24.3% in Levels 119.1-119.3, 43.9% in Level 119, 46.2% in Level 118 and 44.6% in Level 117. In contrast, almost all backed and retouched bladelets –and most unretouched bladelets >1 cm in length, for which we determined raw materials– are made on various flints, including excellent-quality Upper Cretaceous material from flysch outcrops along the present sea cliffs of western Vizcaya and eastern Cantabria –our flint groups B and especially A, a group of very fine grain gray to black flints–. These sources –Barrika, Sonabia and Llaranza, between Langre and Loreda– are about 40-70 km from El Mirón, depending on the routes utilized³. Most of the other classic

³ Risetto, J.: *Late Pleistocene hunter-gatherer mobility patterns and lithic exploitation in eastern Cantabria (Spain)*. Ph. D. dissertation, defended in 2009 in the University of New Mexico; with confirmation by A. Tarrío in personal communication, July 2013.

TOOL TYPE	LEVELS 119.3-119.1	LEVEL 119	LEVEL 118	LEVEL 117
56. Atypical shouldered point	1			
57. Shouldered piece		1	1	2
58. Fully backed blade	3	8		
59. Partly backed blade		2	1	
60. Straight truncated piece		5	1	2
61. Oblique truncated piece	1	6	5	5
63. Convex truncated piece	1	1		2
65. Continuously ret. pc., 1 edge	26	59	19	33
66. Continuously ret. pc., 2 edges	4	2	3	1
68. Notched or strangled blade		1		
69. Unifacial point (fragment)		1		
72. Shouldered point (fragment)		1		
74. Notch	21	50	22	33
75. Denticulate	11	52	11	45
76. Splintered piece	7	27	2	15
77. Sidescraper	1	6	4	4
78. Raclette			1	
79. Triangle				1
80. Rectangle				1
81. Trapeze				2
84. Truncated bladelet		5	1	1
85. Backed bladelet	39	97	30	58
86. Truncated backed bladelet		2		
87. Denticulate backed bladelet	1		1	
88. Denticulate bladelet	2	5	4	5
89. Notched bladelet	1	2	2	9
90. Retouched bladelet	4	17	11	18
91. Curved backed micro-point	1	1		
Totals	175	464	163	321

FIG. 9. (cont.) *Stone Tools from Initial Magdalenian Levels (Sonneville-Bordes & Perrot Typology)*. *Non-*de Sonneville-Bordes/Perrot* combination tools (e.g., double/triple denticulates, denticulates + notches, denticulates + sidescrapers) are counted twice (or thrice) as needed here (but only once each in terms of raw material tabulation).

'Upper Paleolithic' tools –endscrapers, burins, perforators– are made on flints –especially type A–, while continuously retouched pieces are more evenly divided between flints and non-flints in all the Initial Magdalenian levels. The 'archaic' tools are large, as are the unretouched non-flint flakes as a group. The latter make up 35.5% of all large flakes –i.e., flakes of ≥ 1 cm in length– in Levels 119.1-119.3

by count, but 55.1% by weight. In Level 119 they make up 49.3% by count, but 76.9% by weight; in Level 118, 40.8% and 84.3%; and in Level 117, 41.2% and 80.6% respectively. The 'large' flint flakes are far lighter and hence smaller on average than the non-flint ones.

In short, these assemblages are largely bi-partite in their composition: macroliths often made on local non-flint raw materials and microliths made on non-local high-quality flint. Both kinds of materials are also well represented among the cores and chunks –which are either fragments of cores or large angular waste–, indicating that even the excellent 'coastal zone' flysch flints were transported to the site in the form of cores –albeit small in comparison to the local quartzites and mudstones–. The different classes of lithic raw materials were generally destined for different uses, largely based on size and –presumably– performance qualities in flaking and in intended function. It is not that these Initial Magdalenian assemblages are dominated by large, non-flint flakes and 'archaic' tools on flakes, but rather that they have many of these artifacts, along with other more classically Upper Palaeolithic types of artifacts, including backed/retouched and unretouched bladelets in substantial quantities. The question of abundant "archaic" types in Cantabrian Upper Paleolithic lithic assemblages is a common and enduring one from both old and modern excavations, even so far as to include choppers –of which there is a case in association with the well-dated Mirón Lower Magdalenian human secondary burial, for example (Straus *et al.*, 2011)–.

4. Osseous Industry

Bone and antler artifacts are numerous in Level 119, though they are few in 119.2-119.3 and absent in 119.1. Lower pit fill 119.3 yielded an antler *sagaie* blank with groove and splinter

TOTAL GROUP	LEVELS 119.3-119.1	LEVEL 119	LEVEL 118	LEVEL 117
Endscrapers	9.1	8.6	11.7	10.3
Nucleiform endscrapers#	(0.6)	(2.8)	(8.0)	(5.0)
Perforators	8.6	4.7	3.1	5.3
Burins	10.3	9.7	8.0	7.8
Contin. retouched pieces	17.1	13.1	13.5	10.6
Denticulates + Notches	18.3	22.0	20.2	24.3
Splintered pieces	4.0	5.8	1.2	4.7
Sidescrapers	0.6	1.3	2.5	1.2
Ret./backed bladelets*	28.0	28.0	30.1	29.9

FIG. 10. Percentages of Major Tool Groups. *Includes mostly de Sonneville-Bordes & Perrot types 85 & 90, plus single or small numbers of 51, 54, 84, 79, 80-81, 86-89 & 91 types, on the assumption that all may have been used as composite projectile barb, edge or tip elements. #Percentages of the whole tool assemblages.

marks and a single perforated red deer canine with scrape marks on one face of the root. Level 119.2 produced two undecorated, circular-section

antler *sagaie* fragments –one quite massive, the other more gracile–. There is also a possible “fine point” or rib fragment.

Level 119 yielded 10 *sagaie* fragments –none of these projectile points having been abandoned whole–. Three have circular sections, 1 oval, 3 circular or oval/centrally flattened, 2 semi-convex, but none have quadrangular sections –the type most characteristic of the CLM–. No base portions are present. One point has a single, shallow, sinuous groove. One, which is massive in its nearly round circumference –width = 15.6 mm, thickness = 12.0 mm–, has an elaborate ‘wheat sheaf’ engraved motif near its broken base and another has a series of fine oblique engraved lines across its flattened face (Fig. 11). The “wheat sheaf” *sagaie* fragment measures 127.5 mm in

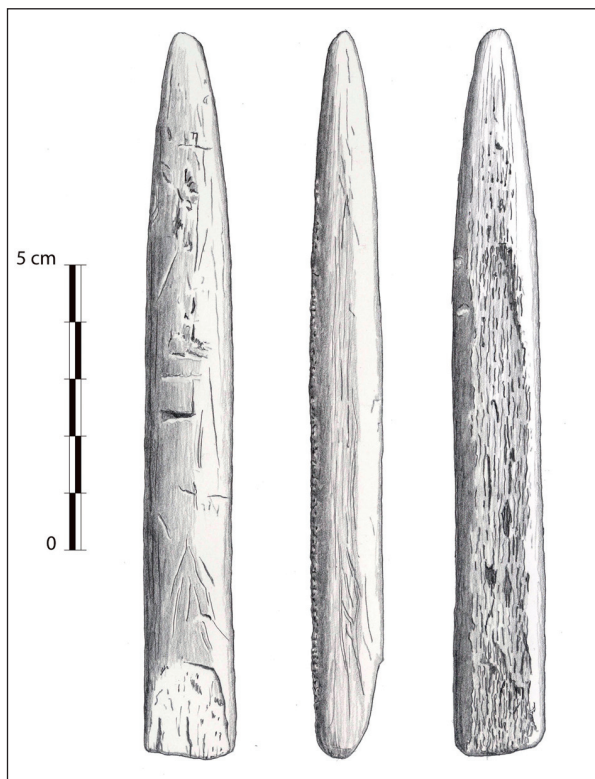


FIG. 11. Drawing of large, nearly whole decorated *sagaie* from Level 119 (U9c, n.º 5991) (L. Teira).

length even in its broken state. It is vaguely reminiscent of a “wand” or “point” with an engraved motif from the early Magdalenian of Cova Rosa in eastern Asturias: a flattened cross-section piece which –albeit missing its distal end or tip– measures about 150 mm long by about 17 mm wide by about 7 mm thick (Jordá, 1969: 9; Corchón, 1971: 34; Barandiarán, 1972: 116-117, fig. 8, plate 26.5). There is a small –L = 21.0 mm– mesial fragment of an oval section (9.0 x 7.4 mm) *sagaie* with a “barbed” longitudinal incised decoration on one face with 8-9 short diagonal lines oriented in the opposite direction to the ‘barbs’ (Fig. 12). All other points are undecorated and three are quite stout –with thicknesses of *c.* 10 mm–. There are also 10 bone needles: two whole and eyed. The needles –some classifiable as ‘fine points’– vary greatly in thickness: from 1.5-3.3 mm. Finally there are several *sagaie* or fine point blanks or undefined antler fragments that may have been destined for point production or use as other tools.

Level 118 yielded 6 *sagaie* fragments –none whole, none proximal–. Four have circular or oval sections, one is triangular –and perhaps unfinished–, and one is irregular. One has fine engraved lines perpendicular to the axis of one face, another has oblique ones, and a third has some possible engraved lines. One of the round-section items is very massive –width = 13.3 mm; thickness = 13.0 mm–. There is an oval section fine point, a circular section fine point or large needle –mesial fragment–. Again there are no quadrangular section points.

Level 117 yielded 14 *sagaie* fragments –none whole–; one has a reworked conical base. Six have circular sections, 2 oval, 3 oval-quadrangular, 1 flattened and 1 quadrangular. Given that this is the uppermost of these levels –in contact with CLM Level 116– the first appearance of –semi–quadrangular-section points is notable. Five have some –possible or certain– engraved lines on their shafts. One of the *sagaie* fragments is very stout –width = 13.5 mm; thickness = 10.5 mm– and two others have a thickness of *c.* 10 mm. There are also two antler blanks –for fine point and point–, an antler fragment, a polished long bone/spatula, a metapodial shaft with engraved lines, a pointed bone splinter with flaking and cut

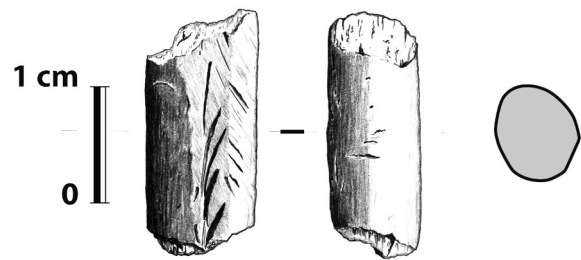


FIG. 12. Drawing of small, mesial fragment of a *sagaie* with “barbed line” decoration from Level 119 (U10c, n.º 6153) (L. Teira).

marks that might be an awl, and a polished long bone splinter that was also probably an awl. Finally there are 3 small needle fragments –all mesial. *Sagaie* manufacture was clearly one of the activities that took place on-site, along with clothes production including sewing. Cleaning of the northern face of the looters’ pit in square V10a-b above the floor of that pit –‘Level 120’– yielded a nearly whole, classic centrally flattened *sagaie* that could either have been redeposited from underlying Solutrean levels or actually pertain to the Initial Magdalenian (Fig. 13). The flattening is “decorated” with oblique lines that could have been anti-skid features used in the attachment of a short, single-bevel base antler barb (see Pokines and Krupa, 1997).

The most spectacular find from these levels –specifically 119.2 in square U9– is a small perforated plaquette of a schist-like stone decorated with a finely engraved image of a horse head on one highly polished surface, with failed –non-aligned– perforations from both faces of the piece which apparently led to breakage of the piece. The stone is probably from a known local outcrop; it is a silicate of aluminum, potassium and iron that occurs along the Asón Valley near Ramales in bands within clayey mudstones and calcareous clays. The horse image has a particularly dramatic mane and is drawn in what is usually considered to be an “archaic” style reminiscent of certain images in Lascaux, for example (González Morales and Straus, 2013).

What is notable about the collection of *sagaies* from all these levels is the almost complete absence of quadrangular section pieces and of the

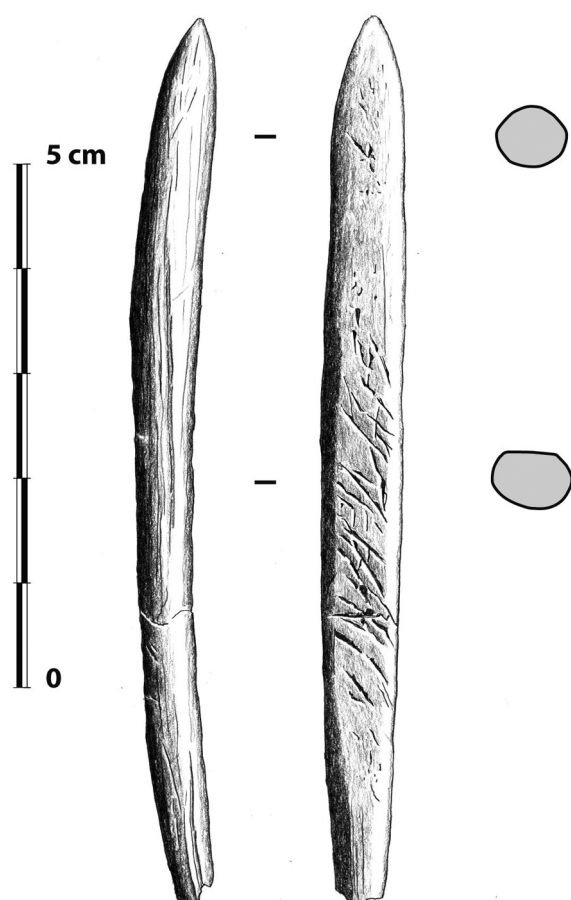


FIG. 13. Drawing of nearly whole, centrally flattened *sagaie* from cleaning of north wall of looters' pit in V10a-b above 'Level 120', corresponding to the Initial Magdalenian (L. Teira).

tectiform-motif engraved decorations so characteristic of the Lower Cantabrian Magdalenian –including the overlying CLM levels in El Mirón–. Indeed only the highest (most recent) of these levels –117– yielded one quadrangular section point fragment. On the other hand, these levels all contain massive, circular-section *sagaies* (one decorated, the others plain), totaling eight items altogether. These may have been spear points for hand-thrust or thrown spear points, while the smaller ones may have been delivered by spear-thrower –at-at–, an example of which was found in CLM Level 17 in the vestibule front excavation area (González Morales and Straus, 2009).

5. Tentative Comparisons with the Solutrean and Lower Magdalenian of El Mirón

As noted earlier, the Initial Magdalenian levels overlie a series of levels –121-127– containing Solutrean points of all sorts –bifacial willow and laurel leaves, including ones with concave bases, shouldered points, and unifacial points (Straus and González Morales, 2009; Straus *et al.*, 2011, n.d.–. Indeed a couple of such point fragments have been found in Level 119, and others have been found in chronometrically even more recent Magdalenian levels –probably either found on the surface or dug up during hearth construction–. There are aspects of both continuity and difference between the Solutrean and Initial Magdalenian levels. Both have bone needles and a variety of antler *sagaies*, although these are not very numerous in the Solutrean. The *sagaies* have diverse cross sections –round, quadrangular, centrally flattened or plano-convex– and bases –single bevel, conical–, but square-section items are far rarer than in the overlying Cantabrian Lower Magdalenian levels. The Solutrean assemblages –admittedly from a small area: 3-4 m²– lack the very large, round-section *sagaies* of which a few have been found in the Initial and Lower Magdalenian levels.

The small Solutrean assemblages contain discrete quantities of retouched and especially backed bladelets –about 10 % of all the retouched tools from all levels combined–, thus less than in the Initial Magdalenian assemblages, in which, in turn, such microlithic elements are relatively fewer than in the Cantabrian Lower Magdalenian assemblages of El Mirón. On the other hand, archaic tool types –denticulates, notches and sidescrapers– are very abundant –32%– in the combined Solutrean collection, even a bit more so than in the Initial Magdalenian. Endscrapers –including only a pair of nucleiform ones–, perforators and simple burins are found in rather low percentages in the Solutrean, while continuously retouched pieces are abundant—as in the Initial Magdalenian. In terms of raw materials, it is the uppermost Solutrean level –121– that most resembles the Initial Magdalenian assemblages in having high percentages of non-local materials, which, in contrast are far rarer in the earlier

Solutrean levels whose artifacts are dominated by flints –including coastal flysch types–. The impression given by the Solutrean levels –which are light in color and poor in organic matter, containing fairly small quantities of fauna, with no constructed hearths– is of short-term, special-purpose –i.e., hunting– camps, with many weapon tips on non-local flints –of several different types– that had been brought to the cave from the coastal zone, and with some large, possibly expedient tools –scrapers, denticulates, notches– made on local stones. Cores are rare, but trimming flakes are abundant. The Initial Magdalenian levels are black with charcoal, contain a repeatedly used pit hearth, and have abundant faunal remains, plus ochre lenses and patches. All of this tends to suggest longer-term, denser, more complex residential occupations, something which is also true of the overlying Lower Magdalenian levels, which are rich in hearths, pits, pavements and possibly even a stone wall. The increase in local lithic raw materials suggests longer, more multi-purpose occupations of the cave after the Last Glacial Maximum in early Oldest Dryas.

Backed bladelets, while abundant in the Initial Magdalenian levels, are far less dominant as retouched tools than in the overlying Lower Magdalenian levels (Straus *et al.*, 2008 and unpublished data). An even greater difference is true for nucleiform endscrapers, present in the Initial Magdalenian, but very numerous in the Lower Magdalenian ones. While geometric microliths are virtually absent in the Initial Magdalenian levels, they are relatively common –though never abundant– in the Lower Magdalenian assemblages.

6. Preliminary Observations by Way of an Interim Conclusion

For comparisons with the El Mirón Initial Magdalenian levels, there are few assemblages from recently excavated sites where comprehensive recovery methods were used including water screening through fine mesh. Fortunately one is Level 5 in El Rascaño Cave, in the upper valley of the Miera River, the next valley immediately to the west of the Asón, about 23 km from El Mirón. Nearly entirely excavated –but virtually

unpublished– by J. Carballo and later H. Obermaier in the first couple of decades of the 20th century, only about 2-3 square meters of intact deposits remained to be dug at the rear of the vestibule of this small cave in 1974 under the direction of J. González Echegaray and I. Barandiarán (1981). The oldest Magdalenian level (5) is radiocarbon dated to 16430 ± 130 BP. It yielded 207 retouched tools according to González Echegaray's classification. There are four raclettes –1.9%– and 1 burin on a lateral truncation –meagre numbers to be assigned to a classic Badergoulian industry–. Endscrapers total 21.3% –nucleiform endscrapers by themselves making up only 5.3% of the whole assemblage–, burins 14.5%, continuously retouched –and 'Aurignacian'– blades 7.8%, notches and denticulates 17.9%, sidescrapers 7.7%, splintered pieces 4.8% and retouched and backed bladelets –including 11 atypical 'Dufours'– 9.1%. –Unpublished research by Fontes indicates that splintered pieces are in fact far more frequent in this unit–. The collection of *sagaie* fragments is composed almost entirely of round-section pieces, many with single-bevel –often obliquely engraved– bases, one with a longitudinal groove, some with transverse engraved lines on the shaft –but no geometric/tectiform designs and no square section shafts, features that are typical of the Cantabrian Lower Magdalenian in the following millennium–. There is one very large single-bevel base *sagaie* with complex engravings on the bevel –not simply the usual oblique hafting-related lines– and a continuous, zipper-like series of small pock-marks along the shaft.

Level 17 in La Riera Cave –eastern Asturias, about 150 km west of El Mirón– is dated to 16910 ± 200 and 17070 ± 230 BP (Straus and Clark, 1986). It yielded one fragment of a willow leaf point, but the underlying level (16) produced no Solutrean points and Levels 15 and 14 only one and three respectively, with the levels below these being rich in such diagnostic pieces. Level 17 yielded few endscrapers –6.0%, with slightly more than half being nucleiform scrapers–, fewer burins –4.6%, none of which are truncation types, either lateral or terminal–, no raclettes or geometric microliths. Notches and denticulates total 8.6%, but there are only 2 sidescrapers

–1.3%–. Continuously retouched pieces constitute 3.3%, the one splintered piece equals 0.7%. Backed –plus a few retouched– bladelets make up a full 72.9%– an overwhelmingly specialized tool assemblages. Antler points are very few in Level 17. Among them are oval, circular and one quadrangular section items, none decorated.

So, technologically, what was happening in the Cantabrian region around 17000 radiocarbon years or 20400 calendar years ago? Straus (e.g., 1975) has long argued for technological continuity between the regional Solutrean and early Magdalenian. The chrono-stratigraphic sequence in La Riera Cave seemed to bear out the idea of a gradual, *in situ* replacement of Solutrean lithic points by antler points with backed bladelet inserts, with the former dwindling as the latter compound weapon types increased (Straus and Clark, 1986). Backed bladelets are found together with foliate and/or shouldered Solutrean points, but the numbers increase significantly as the Solutrean points disappear. Nucleiform burins are present in Solutrean-point-bearing levels and increase thereafter in the early Magdalenian. “Substrate” lithic tool types –basic endscrapers, simple burins and perforators, “archaic” artifacts such as denticulates, notches and sidescrapers, plus continuously retouched pieces, etc.– display considerable similarity in representation between the two classic culture-historical ‘entities’, but tend to vary inversely with the backed bladeletst in terms of relative frequency, probably as a reflection of site functional differences and sampling factors. A few raclettes are found in the last –uppermost– Solutrean-point-bearing levels at La Riera, but only one transversal burin –fairly far below the top of the Solutrean sequence, in Level 14–. There is also general continuity in the Cantabrian region between the two “cultural periods” in terms of osseous artifacts, namely the presence of quadrangular section, short single-bevel base and centrally flattened *sagaies* in assemblages pertaining to both “entities”. However, we must acknowledge the absence of quadrangular section *sagaies* in the lowest Magdalenian levels in El Mirón, at least in the 3 m² sample we excavated. It is also the case that the small area of Initial Magdalenian Level 5 dug in El Rascaño yielded

several round or oval section *sagaies*, but no quadrangular section ones, these latter being present in the overlying Lower Magdalenian levels (Barandiarán, 1981). The idea of fundamental overall Solutrean-Magdalenian continuity, but with renovation in the area of armaments, finds support in the long sequence in Las Caldas Cave at the far western end of the Cantabrian Paleolithic region in the Nalón valley of Asturias –where, however, there are numerous raclettes in early Magdalenian contexts–, as argued in general by its excavator, M. S. Corchón (2005, with references). Other chronometrically late Solutrean levels –e.g., in Amalda, Guipúzcoa, and in Chufín, Cantabria– have very low numbers of foliate or shouldered points and many backed bladelets, like the uppermost Solutrean levels in La Riera. The notion of continuity is fundamentally shared by P. Utrilla (2007, with references) in her review of the early Magdalenian. In Straus’ opinion this case might be one of cultural selection in action: the gradual replacement of one class of weapon tip by another –a frequency distribution shift. Whether this process occurred as a consequence of the diffusion of ideas from a neighboring region –e.g., SW France– or was a “native” development –or both– is of course subject to debate.

What at least the artifact samples we have between the Solutrean and the Cantabrian Lower Magdalenian levels in El Mirón are not is Badegoulian –also known as Magdalenian 0– per the classic definition as developed in France by A. Cheynier, D. de Sonneville-Bordes and F. Trotignon, *et al.* –i.e., presence of many raclettes and transversal burins–. However, recently the Solutrean and Badegoulian of the rockshelter of Cuzoul de Vers (Lot) has been published (Clottes *et al.*, 2012) and reveals the existence of a possible early ‘Badegoulian’ that differs from the traditional Badegoulian. The Solutrean levels lack raclettes and transversal burins (Renard, 2012). The lowest two of five Badegoulian layers have no and one raclette respectively, but 14 –5.9%– and 4 –1.1%– transversal burins respectively (Ducasse and Lelouvier, 2012). Then in the upper three layers raclettes “explode”, with 114 (19.9%), 119 (20.2%) and 78 (23.2%) respectively and there

are also many transversal burins: 61 (10.7%), 54 (9.2%) and 28 (8.3%). While backed bladelets are absent and retouched bladelets are very few in two of the three Solutrean levels, so too are they rare in all the Badegoulian ones. A few denticulates and sidescrapers and relatively numerous notches are found throughout the Badegoulian levels and there are even some macroliths including a classic chopper (Servelle, 2012). A few (14 [2.4%] and 1 [0.3%]) shouldered points are found in the middle and uppermost layers respectively (Ducasse and Lelouvier, 2012). The Solutrean levels yielded very few osseous artifacts –none of which are antler points–, but the Badegoulian ones produced many, including numerous round-oval section *sagaies*, some with single bevel bases and generally undecorated (Le Guillou, 2012). The assemblages in Cuzoul present another example of the technological similarities and differences –in short, the transition– between the Solutrean and Magdalenian *sensu lato*. It is a case different from the one at El Mirón and in turn different from other Cantabrian cases mentioned here –e.g., El Rascaño, Las Caldas, La Riera–. The impression is that the Solutrean-Magdalenian transition took different forms in different sites and regions. Importantly, in France this occurred roughly two millennia before it happened in Iberia. The latest Solutrean dates in Cuzoul are 19400 and 19510 uncal BP, while the oldest Badegoulian ones are –incoherently– 20230, 19950 and 19540 uncal BP. The most recent ones are 18180 and 18730 uncal BP –at which time the Iberian Solutrean technology was still being made and would be for at least another millennium–. Despite some –possibly convergent– lithic similarities between the so-called Early Badegoulian of Cuzoul and the more recent Initial Magdalenian of El Mirón –and other Cantabrian assemblages of various Upper Paleolithic ages–, what was going on in France by way of the substitution of the Solutrean technology by the Badegoulian ones was materially irrelevant to the Cantabrian case.

In recent years, the subject of the Badegoulian –ex-Magdalenian 0– has received considerable attention in regions where such a technological tradition clearly exists –per the classic defining lithic characteristics thereof, plus the new criterion

of antler blank removal by flaking as opposed to groove-and-splinter–, namely in southwestern and north-central France and in an arguable extension of its range into Mediterranean Spain (see papers in Bodu *et al.*, 2007; Ducasse, 2012; Aura *et al.*, 2012, with references). A considerable degree of variability –in terms of the representation of such artifacts as blades, bladelets [including backed ones], flakes, raclettes, transversal burins, antler points with serpentiform “pseudo-excision” decoration, etc.– characterizes “the” Badegoulian in the regions where it is recognized and there is no clear temporal directionality to its markers. What seems apparent to us is that classic French Badegoulian assemblages do not really bear much similarity to those of El Mirón Levels 119.3-117, whose chronostratigraphic position is nevertheless clear: intermediate between Solutrean and classic Cantabrian Lower Magdalenian levels and dated between about 17500 and about 17000 uncal BP. Unlike the French assemblages –that are centuries older to boot–, in which it is true that flakes as well as blades and bladelets are sometimes important as tool blanks, the Mirón ones have large quantities of flakes and flake tools on local, non-flint raw materials and variable quantities of laminar and especially lamellar products on fine-grain, non-local flints. But this mix is not unique to the Initial Magdalenian of El Mirón or of Cantabria and Asturias; rather it is a characteristic of many Upper Paleolithic assemblages throughout the region, as a reflection of fundamental lithological, topographic and ecological facts and how they conditioned hunter-gatherer adaptations during the Last Glacial. Whether the French Badegoulian represents a cultural tradition separate from that of the succeeding Magdalenian or not is a debate that seems largely irrelevant to the situation in Cantabrian Spain, even if we acknowledge that people there were no doubt in contact –directly or indirectly– with people in Aquitaine, as they had been before and would be after this time. The flow of ideas, objects and genes –however precarious during glacial times– is undoubted, but this does not negate the existence of different regional traditions and cultural trajectories, conditioned by such factors as bedrock, geography, climate, vegetation, fauna, and –yes– history.

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