
Presence of the Solutrean on the North Eastern side of the Pyrenees: The case of Ruisseau de la Boulière 2

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Abstract:

Until recently, the extreme Eastern part of the Northern Pyrenean Piedmont was a "vacuum" on the distribution map of the Solutrean. As a matter of fact, only two sites, the Embullas cave and Espassoles open-air site, reported the Solutrean on the Pyrénées-Orientales territory which covers an area of over 4000 square kilometers.

There is no explanation to justify this situation, since this zone is flanked by two important Solutrean areas. Indeed, further South, just beyond the Pyrenees there are a number of Solutrean sites in Spanish Catalonia: l'Arbreda and Reclau Viver caves in the Serinya region. For hundred and forty kilometers towards the North East, a set of remarkable Solutrean sites spread over Eastern Languedoc along the right bank of the Rhône: the Oullins, Chabot, Pâques and La Salpêtrière caves in the Gard and Ardèche regions. Along the Mediterranean coast, between these two clusters, the Solutrean presence is more discreet, in the form of a discontinuous structure of sites (la Roque cave, the Col de Gigean site and the caves of Bize and La Cruzade).

The publication in 2014 of the open-air site of the Vigne Bertrand at Vingrau (Pyrénées Orientales, France), close to the Espassoles site, revived the interest for the Corbières zone, a low mountainous area near the Pyrenees.

The Ruisseau de la Boulière 2, located very close to the first two sites, confirms the Solutrean presence in this micro-zone. The Eastern Corbières appear today as an identifiable landmark of the Solutrean before crossing the Pyrenees. On the other hand, the discovery of a Montaut type bifacial asymmetrical point in the site leads us to suggest the hypothesis of east-western mobility, along the northern and/or southern Pyrenean piedmonts. The existence of such connections has already been reported on the basis of techno-typological convergences between Aragón (Cueva de Chaves) and Hérault (La Salpêtrière) lithic industries.

Keywords: Solutrean, Pyrenees, lithic industry, open-air site, Palaeolithic

1. Introduction and background

In a survey of the Solutrean presence in the whole of the French Mediterranean Pyrenees (Aude and Pyrénées-Orientales "departments") published in the early 1990s, D. Sacchi



estimated there were six sites where this culture had been identified (Sacchi 1990). In the last thirty years, only the open-air site of Vigne Bertrand, at Vingrau (Pyrénées-Orientales), added to this number (Baills 2014). In this context, the discovery of a new Solutrean occupation in the same zone allows us to re-assess the distribution of this chrono-culture in the eastern part of the French Pyrenees (Figure 1).

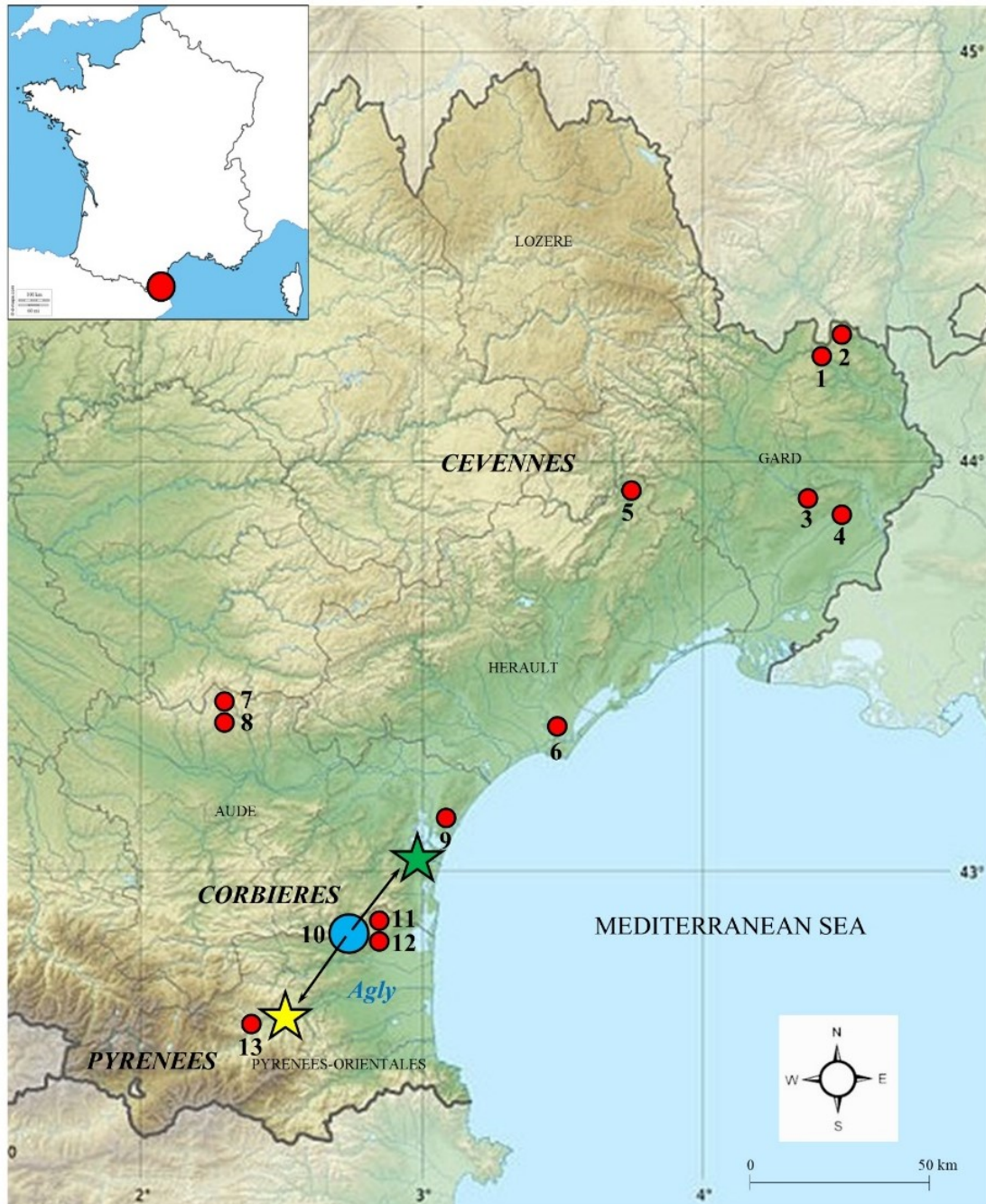


Figure 1: Location of the main Solutrean sites in Languedoc-Roussillon, France (Salpe trian sites have not been taken into account, Bazile & Boccaccio 2008) (the large big circle indicates the Ruisseau de la Boulière 2 site). 1: Oullins cave (Le Garn, Gard); 2: Chabot cave (Aiguièze, Gard); 3: Pâques cave (Collias, Gard); 4: The Salpêtrière cave (Remoulins, Gard); 5: Laroque II cave (Ganges, Hérault); 6: Col de Gigean cave; 7: Petite Grotte de Bize (Bize, Aude); 8: Grande Grotte de Bize (Bize, Aude); 9: La Crouzade cave (Gruissan, Aude); 10: Ruisseau de la Boulière 2 (Vingrau, Pyrénées-Orientales); 11: Vigne Bertrand (Vingrau, Pyrénées-Orientales); 12: Les Espassoles (Vingrau, Pyrénées-Orientales); 13: Les Embullas cave (Villefranche-de-Conflent). The green star indicates the Oligo-Miocene formations of Bages-Sigean and Roquefort-des-Corbières and the yellow star indicates the jasper of the Villefranche-de-Conflent syncline.

In the far south of France, at the border of the Aude and Pyrénées-Orientales “departments”, the Corbières limestone massif forms a part of the North Pyrenean Piedmont. Its Eastern fringe runs along the Mediterranean Côte Vermeille (Figure 1). In this zone, the average height gradually drops from 600 m asl to 300 m, closer to the coast. Within this karstic landscape, a few narrow alluvial valleys connect the two sides of the Corbières. Thus, they form natural communication pathways which were always available for us both by humans and animals.

Their existence makes it relatively easy to reach the Roussillon Plain from the Carcassonne and Narbonne areas located further north. These ways of penetration following the overall north-south orientation of the local rivers such as; the Aude, Orbieu and Agly rivers, were very much used in the past and even up to recent times. Nowadays, some of these are only materialized by footpaths used by hikers, while other more important ones are now roads connecting villages. Such is the case of the local D611 road which connects Tautavel and Paziols, running alongside the site of Ruisseau de la Boulière 2 (RDB2).

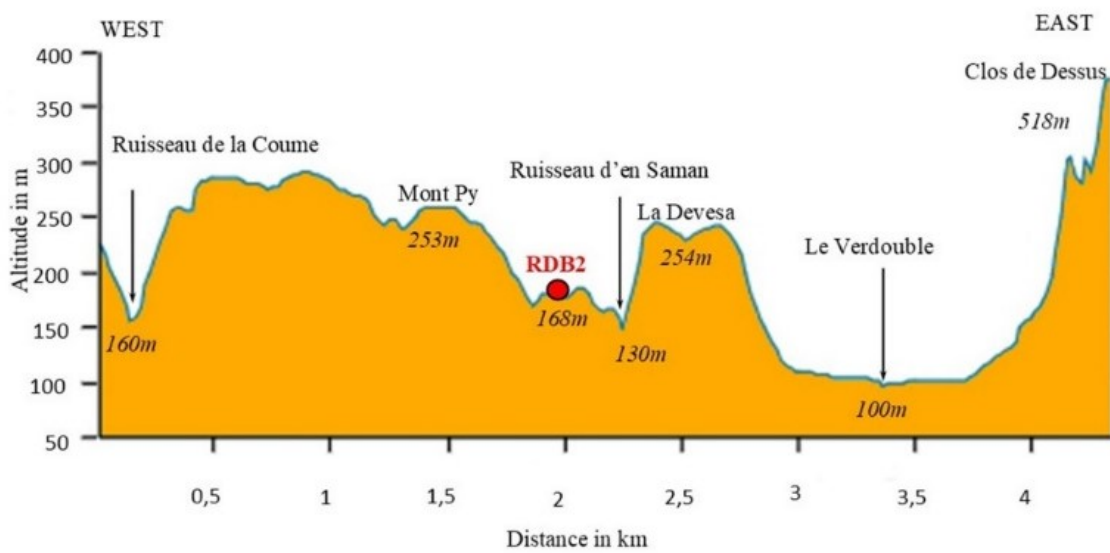
RDB2 is located at the bottom of the small valley of the Ruisseau d'en Saman-Cabrils (Tautavel registry, page AI, number 117-118 parcels). The creek flows into the Verdoble river 300 m further north, at the entrance to the Gouleyrous Gorges. The Caune de l'Arago cave, a famous Early Palaeolithic site, is located on the left bank, 70 m above water level at the termination of the gorge.

RDB2 covers a 500 m wide terrace enclosed between hills of similar heights: the summit of La Devesa (254m) and the Mont Py (253 m) (Figure 2B). This sub-horizontal space of alluvial origin is 168 m high and consists of soft clay deposits with rare blocks from the natural destruction of Oligocene formations in neighboring Paziols (E2°43'36" – N42°50'01").

With a good east exposure, close to the junction of the small watercourses of Saman and la Boulière, the site also benefits from slightly stony soft soil. These characteristics may have played an important role in the choice of Prehistoric settlements. The valley of the Saman creek starts at a height of 195 m above sea level at the Coll del Boix and flows along with a 3% slope down to its junction with the Verdoble River, 2.8 Km towards the northeast. It seems the Coll del Boix played an important part in the choice of Prehistoric human settlements. As a real watershed, this passage organizes a partition between the Saman and the Fenoll hydrographic basins. Despite its limited height, this essential passage may have been an obstacle to the natural migrations of animals during the Pleniglacial period.



A



B

Figure 2: A. The Ruisseau de la Boulière 2 site (view towards east). The dotted rectangle indicates the surface collection area. B. West-east cross-section of the valley.

2. Materials and methods

The RDB2 site was discovered during surveys carried out as part of a program focusing on the Saman-Cabrils Creek and its tributaries (Figure 2A). The research was conducted with the collaboration of C. Calvet and C. Planchand during the years 2000-2005. The lithic series is now preserved in the laboratory of the Centre Européen de Recherches Préhistoriques de Tautavel (France). The numerous parcels along its banks are planted with vineyards. The site occupies a slightly low-lying area of about one hectare (50 m x 20 m). No concentrations of objects were found, which did not favor an accurate mapping of their position. Due to the cultivation of vines, this land is regularly ploughed, leading to a significant displacement of objects. The surveys were conducted taking into account local climatic conditions and the requirements of the viticulture calendar. Research was carried out with collecting and GIS geo-tracking of the evidence of human occupations. The discovery of the site was followed by frequent visits, which provided a series of 334 lithic items (Table 1). Each of the pieces was attributed a personal inventory number, with qualitative and quantitative parameters completing the description of each one. This methodology allowed to elaborate a database and the statistical processing of 12 variables (length, width, thickness, blank type, cortex, bulb, impact ring, removal negatives, platform type, fissures, platform and edge morphology). The 178 debris were organized into three classes according to their length (Table 1). The tools were determined based on the Upper Palaeolithic lithic typology listing by Sonnevile-Bordes & Perrot (1954; 1955; 1956a; 1956b). The 16 cores were analyzed by way of their diacritical patterns (Dauvois 1976: 30; Inizan *et al.* 1995: 133-163). The technological approach to study the knapping was performed by combining results from the observation of prehistoric lithic series, experimental archaeology and ethno-archaeological data (Pelegrin & Roche 2017; Perlès 1991;). During successive surveys, the Ruisseau de la Boulière 2 site provided a limited lithic series with rather few retouched tools, which makes it difficult to compare to other regional Upper Palaeolithic assemblages such as the Gravettian sites of the Jas d'en Biel 1 and 2 (Bails 2008; 2023). The study of the lithic raw materials was carried out using the lithic database of the Mediterranean Pyrenees and bordering areas (Grégoire 2002).

Table 1: General count of the lithic assemblage from the Ruisseau de la Boulière 2 site.

Category		Subtotal (n)	Total	%
retouched tools		32	32	9.6%
cores	core fragment	5	16	4.8%
	flake core	5		
	bladelet core	4		
	flake and bladelet core	1		
	burin-like core	1		
flakes	decortication flake	2	63	18.9%
	cortical flake	11		
	core preparation or maintenance flake	13		
	blade-like flake	12		
	regular flake	25		
blades	blade fragment	3	5	1.5%
	neo-crested blade	2		
bladelets	bladelet fragment	25	34	10.2%
	neo-crested bladelet fragment	2		
	cortical bladelet fragment	4		
	plunging bladelet fragment	3		
debris	length between 5 and 10 mm	13	178	53.3%
	length between 11 and 20 mm	108		
	length greater than 21 mm	57		
cobble	quartz cobble	1	6	1.8%
	marl and sandstone cobble	5		
Total			334	100%

3. Results

3.1. Lithic raw materials

Like in the other Upper Palaeolithic sites in the zone, flint is the dominant raw material, comprising up to 93% of the series under study (Figure 1). This rock type originates from the Oligo-Miocene formations situated in the Bages-Sigean Basin some 33 km away from the site (Grégoire 2002) (Figure 1: green star). In primary formation, this flint is available in the form of irregular nodules of variable color. When broken, fossils of gastropods are observed. Its patina is usually white. There also exists scarce dark marls with sandstone intercalations (1.5%) which can be found in detrital position in the sediment constituting the site's terrace. Being naturally oblong, they may or may not display stigma resulting from anthropic shocks. However, they may be interpreted, though with caution, as soft hammerstones used in the knapping operations of siliceous rocks. However, analogous traces can be caused by shocks related to vineyard ploughing. Twelve pieces of local milky quartz are also found (3.6% of the assemblage). Finally, the presence of jasper is noticeable among the raw materials, representing the most exogenous element of the corpus (0.6% of the assemblage). With only two items (including a core), its primary source is located in the Villefranche-de-Conflent syncline some 35 km away (Figure 1: yellow star). This brown rock, wrongly called jasper, corresponds in fact to "ferruginous mineralizations composed essentially of silica and ferruginous minerals" (Grégoire 2002: 68). However, this raw material could have been obtained in secondary position from the Têt River alluvial deposits situated less than 13 km

away. While generally scarce, this raw material is recurrent in the Upper Palaeolithic assemblages of the Corbières zone. Finally, we note the presence of three pieces of limestone (1.2% of the assemblage): two fragments and a flake. There is also a single piece in an unidentified raw material.

3.2. Retouched tools

The end-scrapers largely prevail in the corpus of retouched tools ($IG^r=47.8$), with the prevalence of a single type (Figure 3: 1, 2, 6). Some end-scrapers have retouched edges (Figure 3: 7, 9). A few thick items, close to the thick type, are also found (Figure 3: 5, 8). Finally, some types are only represented by a single specimen: the fan-shaped end-scrapers (Figure 3: 7) and a possible shouldered end-scrapers (Figure 3: 3).

Few burins are present (6.3%): the burin on break type (Figure 3: 12) and the straight retouched truncation type (Figure 3: 14). If we leave end-scrapers on blades aside, the laminar tools are scarce since there is only one blade retouched on both edges (Figure 3: 10). Lamellar ones are more often represented with different kinds of manufacture: truncated (Figure 5: 13), backed (Figure 3: 15) or denticulated (Figure 3: 13). Denticulates and notches (Figure 4: 9), chips and retouched debris (Figure 4: 10), splintered pieces, a pointed blade (Figure 3: 17) and a dubious tanged piece (Figure 3: 16), form the common base of the toolkit. Although not typologically identified as tools, a number of pieces display scarred edges. However, a traceological study may be required here, as the scarring could result from natural post-depositional phenomena. This very heterogeneous group of pieces, composed of blades (Figure 5: 10), laminar flakes (Figure 5: 11) and bladelets (Figure 5: 4, 5), shows traces of being used.

In addition, there is a bifacial asymmetrical point made on a fine-grained, dark-grey flint (Figure 3: 11). While the typical Montaut points were made on Chalosse Audignon flint (Séronie-Vivien *et al.* 2006), the one from Ruisseau de la Boulière 2 was fashioned from a flint with opaque hematite mineral inclusions and ferruginous layers in a very homogeneous micritic siliceous matrix. (Petroarchaeological determination by Sophie Grégoire. University Via Domitia Perpignan. UMR 7194 of CNRS.) This raw material comes from the Oligocene formations of the Roquefort-les-Corbières outcrops. The lack of fossils in this lacustrine flint differentiates it from the fossiliferous marine flint of the Bages-Sigean Basin (Grégoire 2002). It is bifacially shaped by flat, subparallel lamellar retouch, which is clearly in keeping with the standards of Solutrean retouching. The shoulder consists of a scaly abrupt direct retouch. A fine marginal retouch regularizes some parts of the edges. One can infer that some retouched bladelets may have been arrowheads before their breakage (Figure 3: 15). But this bifacial asymmetrical point is the only possible “weapon” in the Ruisseau de la Boulière 2 series. The typological determination of the asymmetrical bifacial point justifies a thorough comparative approach. Its global asymmetrical profile, together with its subparallel retouch, relates it quite clearly to the Montaut type. However, the absence of a peduncle differentiates it from the warped peduncled points from the Serinyadell. Here is N. Soler’s opinion about this piece:

“To my mind, the Solutrean point found at Tautavel is a point with a kind of notch which gives it a roughly peduncled look. It is definitely not a Serinyadell point, which, when they are typical, have a neatly prominent and crooked peduncle and are thinner and more precise.

In the Solutrean sites of Serinya, there are also other points and blades with different shapes or coarser sizes, that’s why a point like the one found at Tautavel would not be out of place. But, since it is in no way a Serinyadell point, cautiousness would require not to refine so much and think that it should be better placed in Pyrenean sites with more or less peduncled

pieces, such as the sites of Montaut, Roquecoubère or Serinya, sites presenting some likeness but keeping their own features” (personal communication, SOLER on OCTOBER 2022).

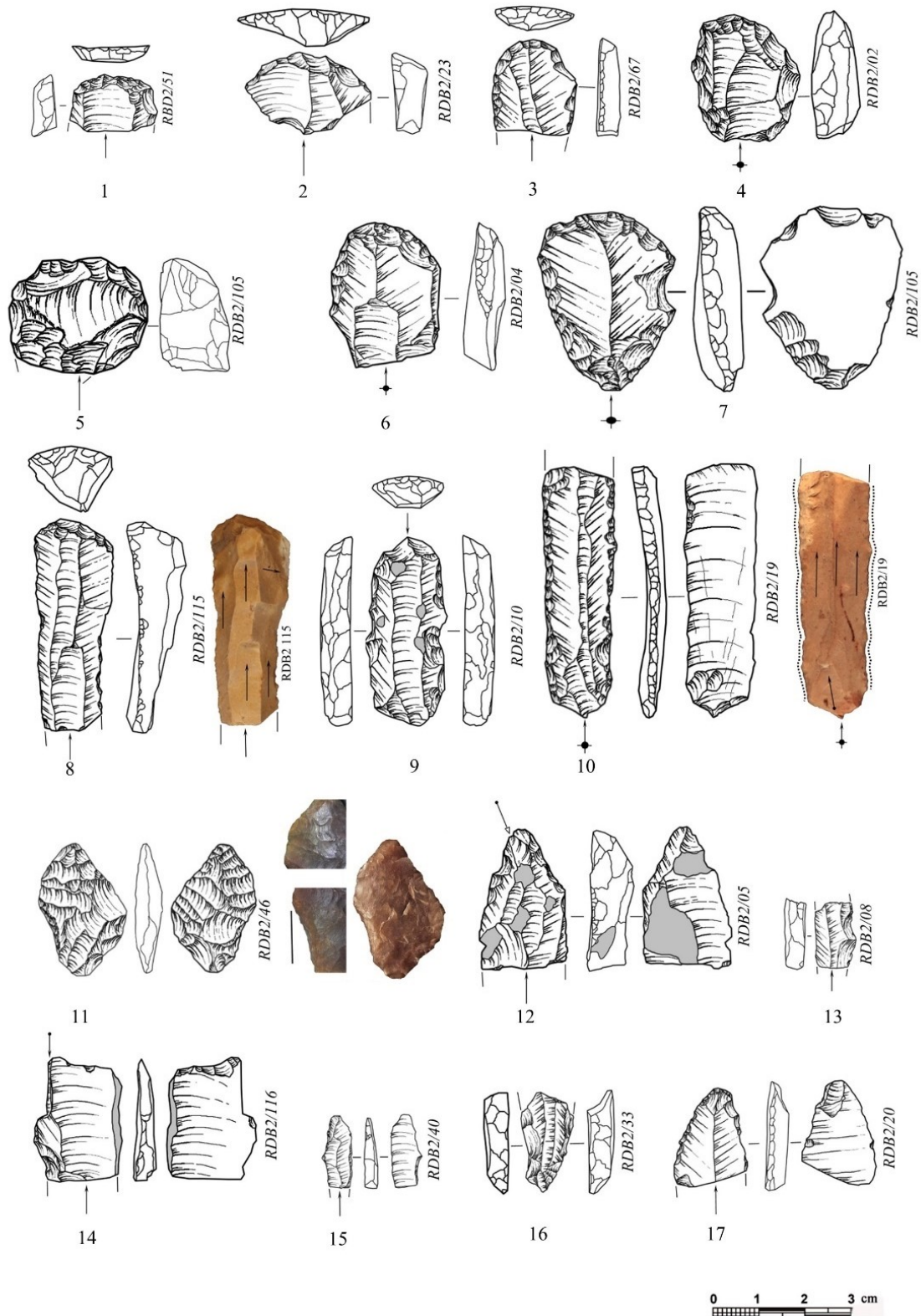


Figure 3: 1-6, 8, 9: single end scrapers; 7: fan end scraper; 10: blade with continuous bilateral retouch; 11: bifacial asymmetrical point; 12: angle burin on break; 13: denticulated bladelet; 14: burin on retouched truncation; 15: backed bladelet; 16: fragment of possible tanged piece; 17: pointed blade. Please note that grey areas correspond to cortical surfaces, with the exception of the burin (12) where they correspond to alterations of the raw material.

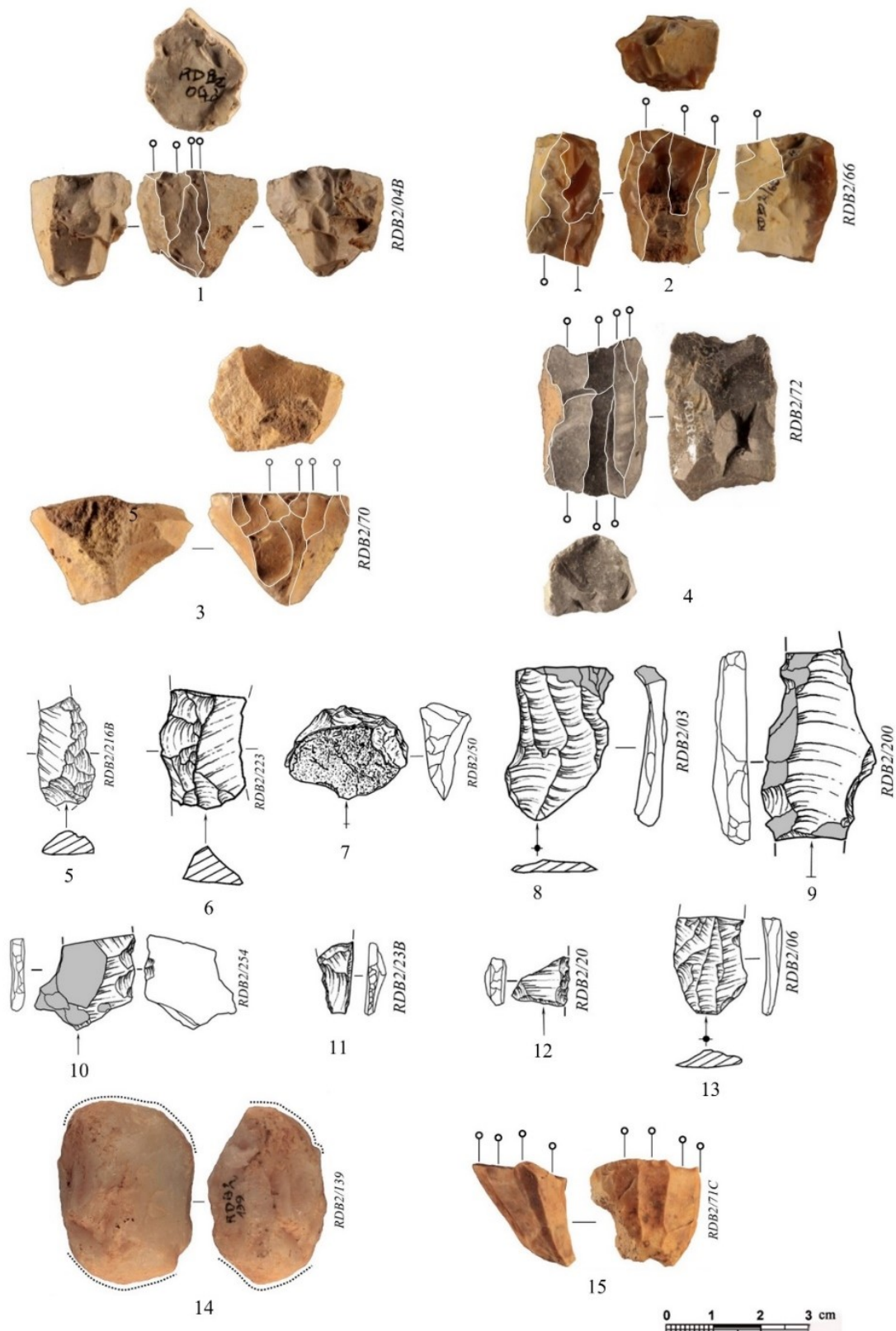


Figure 4: 1, 3: unidirectional flake cores; 2, 4: bidirectional bladelet cores; 5, 6: neo-crested bladelets; 7: core tablet; 8: flake resulting from bidirectional knapping; 9: notched piece; 10: retouched flake; 11, 12: backed pieces; 13: bladelet; 14: hammerstone; 15: bladelet core. (grey areas correspond to cortical surfaces).

3.3. Technological features.

The most numerous debris are between 11 and 20 mm long, namely 61% of the whole group of fragments. The small number of debris measuring less than 11 mm long (7%) can certainly be explained by the fact that the series comes from shallow prospecting, and not from excavations (Table 1). These items, because of their small sizes, can easily escape visual scanning. Finally, a quite noticeable percentage of the debris (32%) is over 20 mm long. These fragments may come from knapping operations performed *in situ*.

The 32 tools represent 9.6% of the total number of remains (Table 1). It can be assumed, comparing with surveys carried out in the neighboring Palaeolithic sites, that this proportion is relatively large. The two Ravin d'en Saman sites (RS1-RS2 and RS4-RS5) have the same taphonomic context as Ruisseau de la Boulière 2, yielding 7% and 11% of tools, respectively. However, it should be noted that they do not belong to the same technocomplex (they are respectively Aurignacian and Gravettian) as Ruisseau de la Boulière 2. As for the knapping economy, thanks to the stigma observed, the type of percussion technique used by prehistoric knappers can be specified (Inizan *et al.* 1995: 30-32). In the case of Ruisseau de la Boulière 2, there are no noticeable differences between the stigma observed on the flakes and those observed on the laminar-lamellar products. When present, the striking platforms are smooth and small (38%). The bulbs are visible and often diffuse (77%). The impact ring is not visible on 38% of the flakes and 46% of the blades, and is only noticeable on 48% of the flakes and 54% of the blades and bladelets. There is no trace of bulb scars on 68% of the bladelets and 52% of the flakes. *Lancettes* are more often non-existent on flakes (72%) than on bladelets (67%). Abrasion of the overhang at the junction of the striking platform and the flaking surface was an operation commonly used by the knappers. All of these characteristics suggest the use of direct percussion with a soft hammerstone. A small quartz cobble presenting star-shaped lines was discovered and, while it was considered a hammerstone (Figure 4: 14), was not used to knap rocks but rather to perform actions such as, for example, the grinding of hard plants. Residual areas of cortex are only present on 15% of the pieces. They are proportionally more frequent on the flakes (17%) than on the blades and the bladelets (10%). There is only one cortically backed flake in the series.

With 18.3%, rough flakes dominate the group of the non-modified artifacts, prevailing over laminar-lamellar products (11.7%). There are also 4.8% of cores. They confirm the existence of various knapping stages *in situ*. Only 12 cores allow a reading of the knapping organization, the rest being only fragments. The readable cores can also be divided into bladelet cores with a cylindrical profile, and flake cores with a pyramidal profile. The bladelet cores are the result of bipolar knapping performed according to a volume-based semi-rotational management of the block (Figure 4: 2, 4). A few neo-crests and plunging bladelets show that the knapping was carried out on the flanks of the core (Figure 4:5, 6). The knapping platforms were sometimes reorganized by detaching partial tablets (Figure 4: 7). The size of the extracted bladelets can be assessed by drawing on the observation of bulb negatives. In a specific case, the association of easily workable jasper and a mastered core shaping enabled the knappers to obtain thin rectilinear narrow bladelets, 30 mm long at the most. Such bladelets were used as supports for the small tools of the series (Figure 3:13, 15, 16; Figure 4: 11, 13; Figure 5:1-7, 13). The flake cores were exploited from a single knapping platform following a unidirectional knapping strategy along the wider face of the piece (Figure 4: 1, 3). Cores often show traces of an overhang knapping, not necessarily associated with edge abrasion of the overhang.

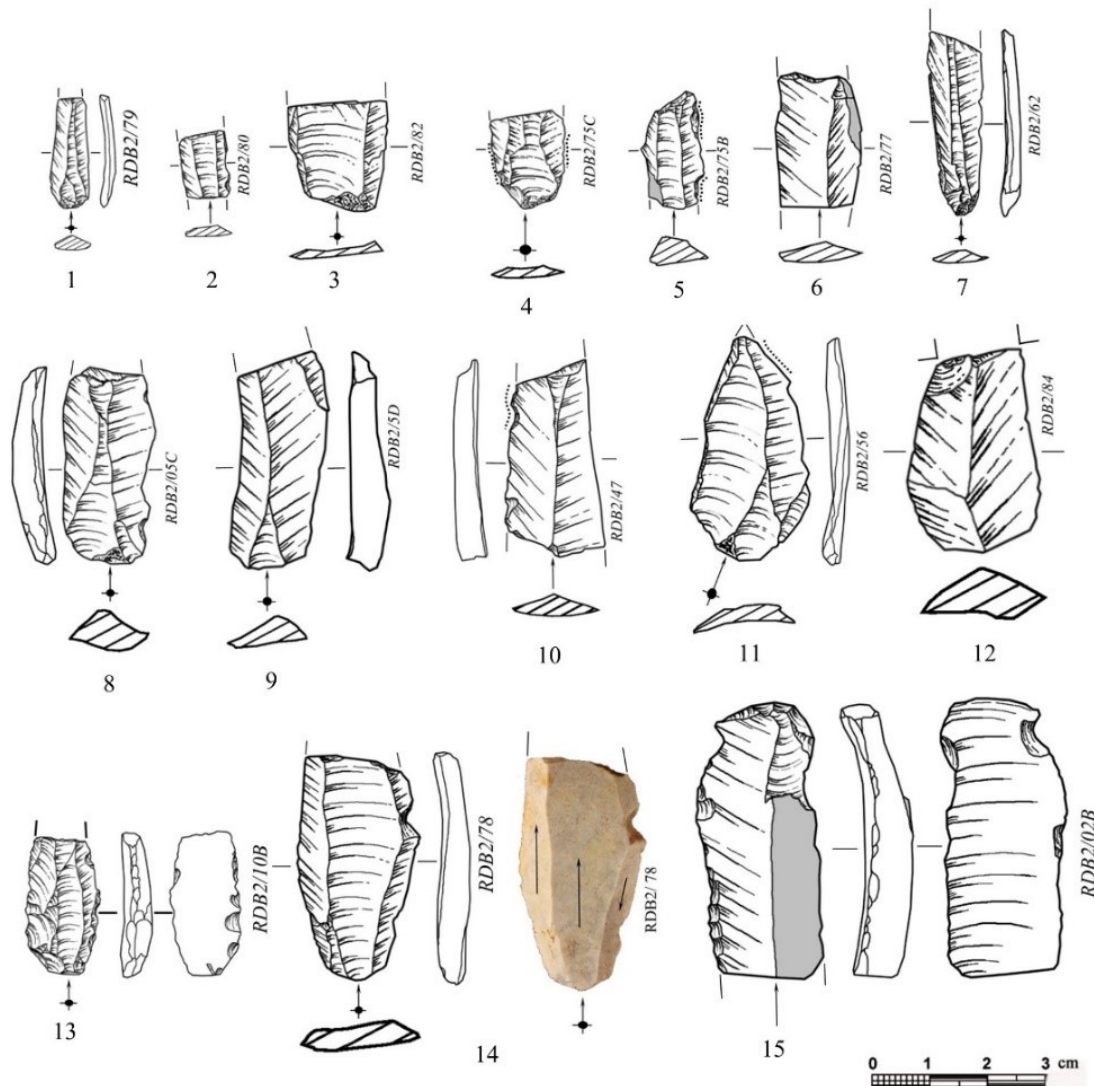


Figure 5: 1-7: bladelets; 8-12,14: blade fragments; 13: truncated bladelet; 15: blade with possible use scars.

It would be hypothetical to try to reconstruct the operational sequence on the basis of such scarce elements. However, it is obvious that some larger blades manufactured according to unidirectional knapping could not derive from the cores in their current state (Figure 3:8-10; Figure 5:14). One may postulate that the cores, being at terminal stages of their exploitation, were previously larger, which would have led to a production of longer supports during the first stages of the reduction sequence. Such knapping might justify the presence of 53.3% debris. Yet, the small sizes of the debris, among which only one is over 4 mm long, may suggest a different scenario, in which the production of larger supports would have occurred outside of the site.

The unretouched products resulting from the knapping, such as flakes, blades or bladelets, represent 10 to 20% of the whole assemblage. In most cases, the flakes are complete (69%), with an average length of 22 mm long and 10 mm on standard deviation. Such small dimensions are hardly standardized and indicate the final stages of knapping, in coherency with the sizes of the discovered cores (see above).

It is impossible to use the same approach in the case of laminar-lamellar products since all of them are broken (Figure 5: 14,15). These observations support the idea that only the final knapping stages took place *in situ*. The smallest bladelets may have been manufactured at this time. Of course, it is necessary to remain cautious and identify the limits of the data

from a surface survey, however it seems, in this specific case, that the knappers preferentially sought to produce thin light bladelets (in 65.7% of the cases).

As for their width, a possible preference is less clearly visible, since 58.8% of the bladelets are wide and 41.2% are narrow (Figure 6) (Bon 2002).

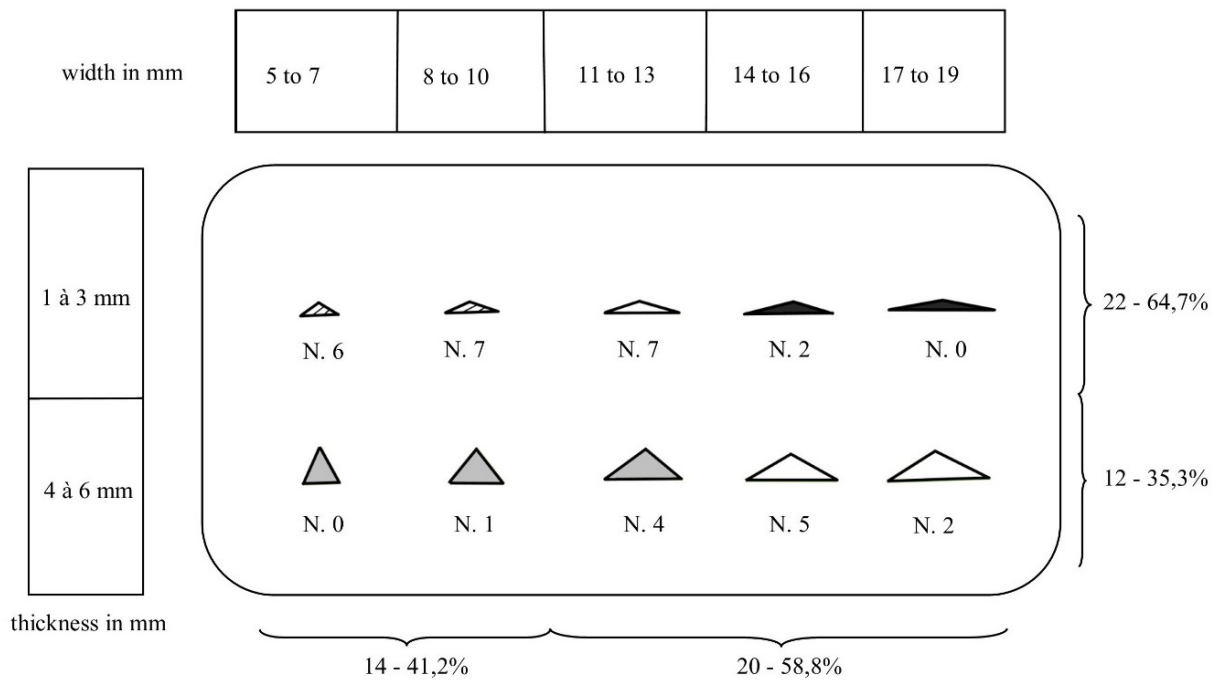


Figure 6: Dimensional characteristics of the bladelets (from Bon 2002).

As for the blanks used to make the tools, it is interesting to note that the calculated ratio “rough flakes per rough blades-bladelets” seems the same as the “rough flakes per rough blades-bladelets” and “tools on flakes or tools on rough blades-bladelets”, *i.e.*, 1.5. With all the reservations related to the constitution of the series itself, this finding might indicate some calculated predestination in the production of supports and their final transformation into tools (Table 2).

Table 2: Typological inventory of the tools from the Ruisseau de la Boulière 2 (F: flake, B: blade, BL: bladelet, D: debris).

Tool name	Number	%	% group	Blank type			
				F	B	BL	D
single end scraper	7	21.9%	47.8%	2	3	1	
end scraper on retouched flake	3	9.4%		3			
angle burin on break	1	3.1%		1			
angle burin on straight retouched truncation	1	3.1%	6.3%		1		
blade with continuous retouch	1	3.1%	4.3%		1		
bifacial asymmetrical point	1	3.1%	4.3%	1			
denticulate	2	6.3%	4.3%	2			
truncated bladelet	2	6.3%					2
backed bladelet	1	3.1%	13.1%				1
denticulated bladelet	1	3.1%					1
retouched flake	6	18.8%	13%	6			
splintered piece	2	6.3%		2			
fragment of a possible tanged piece	1	3.1%	4.3%				1
point	1	3.1%		1			
retouched debris	2	6.3%					2
Total	32	100%	100%	18	5	6	2

4. Discussion and conclusion

It is certainly useful to remember the conditions under which the Ruisseau de la Boulière 2 series was constituted. In this surface assemblage, the possibility of the existence of materials from other technocomplexes, different from the Solutrean, cannot be ruled out. If that is the case, however, they remain indistinguishable. Among the lithic series from open air sites, it is fairly common to find human occupations related to several chrono-cultural moments. This observation can be applied to the different deposits in the Saman-Cabrils valley where it was noted that the same site had been occupied on various occasions throughout the prehistoric times. Such is the case of the two Ravin d'en Saman sites (RS1-RS2 and RS4-RS5) where Aurignacian type artifacts can be found within a Gravettian context. However, and more exceptionally, there may have been deposits referring to a single chrono-culture, as it is the case for the Late Gravettian of the two Jas d'en Biel sites (JB1 and JB2), or for the second Mesolithic at the Rec de la Redouna 2 (RDR2).

Following these observations, one may quite legitimately wonder whether there is a real homogeneity in the RDB2 lithic series. Objectively, none of the Upper Palaeolithic leading fossils can be spotted in the corpus of this site. On the other hand, the ubiquitous character of the debitage and the typology makes the chronocultural attribution of the lithic objects rather difficult. In this context, the asymmetrical bifacial piece has a crucial chrono-typological importance.

So, the chrono-cultural attribution to the Solutrean of the lithic collection discovered at Ruisseau de la Boulière 2 is based on a few morpho-typological clues:

- Knapping was carried out in order to produce blades and bladelets by way of direct percussion with a soft hammerstone,
- Among the tools, scrapers with thick or subcarinated shapes on a splinter or thick blade base can be noticed. This type of object, without being specifically Solutrean, has often been

identified in the series of that culture. Thus, it exists in the first layer of the Embullas cave at Villefranche de Conflent where D. Sacchi mentions it as “atypical carinated scraper: (Sacchi, 1986: 73) or on the Espassoles open air site at Vingrau where M. Martzluff calls it type 5 “thick scraper on splinter or shortened blade” (Martzluff 2012: 138). Finally, further away, in the gorges of Ardèche, F. Bazile mentions it in the Solutrean series of the Chabot cave and the Baume d’Oullins (Bazile 1999: 44-46). Those thick scrapers become rare in the Magdalenian occupations, as it can be noticed in the Conques cave at Vingrau (Baills 2003: 147).

- The presence of an asymmetrical Montaut-type point. Concerning the latter, this bifacial asymmetrical point has counterparts in those from Montaut, in the Landes Department, more than 320 km away. Contacts with the Aquitain zone had existed for a long time, at least since early Gravettian, as shown by the recent discovery of Aquitain raw material together with a Font-Robert point on the Ravin d’en Saman 4-5 site (Baills forthcoming).

Unfortunately, this open-air site of Montaut, known for a long time and later destroyed by quarry exploitation, only allowed a late excavation concerning side sectors. The study of the asymmetrical points from this site was carried out on pieces from ancient collections (Lenoir et Merlet 2013). Due to this state of affairs, it was not possible to attribute these tools a precise chronological position, even though Smith placed them in a later phase of the French Solutrean (Smith 1966: 302). In his thesis on the Upper Palaeolithic in Western Languedoc and Roussillon, Sacchi states that Genson had reported a Montaut point in the excavated material from La Crouzade Cave. The loss of this piece makes it impossible to check whether this report is correct or not (Sacchi 1986: 69). The Solutrean, Western Europe’s iconic culture, often presents in its final phase regional facies characterized by the presence of original tools. Undoubtedly, it is what N.Soler referred to when he mentioned the special, more or less original, peduncled pieces which might characterize the various Solutrean facies of the Pyrenean world (see above). Therefore, the hypothesis of the existence of peduncled points corresponding to local production cannot radically be dismissed. Being rare, atypical, not easily characterized, these objects have scarcely been mentioned in the series. They can only be found on a few sites, where their diagnosis remains difficult as they are fragmented items.

Such is the case of two questionable specimens spotted on the Espassoles site at Vingrau (Martzluff 2012: 166-168), or the item from the Chabot cave in the Gard (Bazile 1999: pl. 44).

Such is the case of the Spanish Solutrean of the Parpalló cave with finned and tanged tools (Valencia, Spain; Villaverde Bonilla & Fullola Pericot 1990) or the Serinya cave (Girona, Spain; Soler & Soler Subils 2013) with asymmetrical points with a “déjeté” peduncle (Serinyadell points). In this context of great local diversity, the presence of a Montaut point at the Ruisseau de la Boulière 2 raises questions. Namely, could it indicate contacts between groups travelling over long distances along the Pyrenees? According to a quite recent study, it can be noticed that there are techno-typological convergences between the lithic industries of the Cueva de Chaves in Aragon and those of similar Salpatrian sites (Boccaccio & Utrilla 2013). This fact should open research perspectives on the identification of human mobility during the Upper Pleniglacial along and across the eastern part of the Pyrenees. This hypothesis still needs to be validated by more numerous clues. These techno-typological characteristics remind us of the Solutrean in the south of France; probably in its upper phase. Locally, the presence of the Solutrean is confirmed by the discovery of this new site. Indeed, le Ruisseau de la Boulière 2 is today the fourth Solutrean site on the northeastern side of the Pyrenees. The first mention of the Solutrean in the Pyrénées-Orientales dates back to the mid-1950s (excavation J. Abelanet). This excavation had been carried out in the Embullas Cave at

Villefranche-de-Conflent and corresponded to a relic from a 3 m² archeological layer, saved during the emptying of the cave in view of installing a sheepfold (Sacchi 1986: 70-76). It was only sixty years later that the local Solutrean was mentioned with the publishing of the Espassoles open-air site at Vingrau (Abelanet 1991; Martzluff 2012). The sites of Espassoles and Embullas, which yielded slender bifacial points, mistletoe leaf type, are considered to belong to a recent local Solutrean phase. In 2014, the discovery of a new open-air Solutrean settlement, the Vigne Bertrand site (Bails 2014), only 1 km away from the previous one, rekindled interest in this zone, previously considered to be “lacking” in Solutrean sites. This site, which yielded unifacial points associated with a virtual absence of bifacial retouch, is considered to belong to a Middle Solutrean phase. Presently, Le Ruisseau de la Boulière 2 confirms the reality of an authentic Solutrean presence in the eastern part of the Corbières. The existence of three sites belonging to this chrono-culture within a 3 km radius, corresponding to the territories of Vingrau and Tautavel, raises questions all the more so since they are exclusively open-air settlements. This situation may be surprising in a karstic massif where caves and shelters abound and where none of them has so far revealed traces of a Solutrean occupation. This may perhaps be explained by the desire of the Solutrean hunters to settle as close as possible to their hunting areas. There are a small cluster of sites in this micro-zone. In order to lend this work a prospective view, future research programs should take into account the environmental parameters of such open-air settlements, specifying their characteristics and the anthropogenic choices they reflect. In such cases, sun exposure, protection from prevalent winds, the proximity of water, the geomorphological nature of the landscapes and the adaptation of the geographical structure to hunting-related strategies, all constituted a number of parameters which must have played a part and that ought to be studied in evaluating the choices made by Prehistoric peoples. When speaking about the Gard and Hérault Solutrean sites, G. Boccaccio called them “places with strategic requirements” (Boccaccio 2018: 118-119). Additionally, it is worth estimating the possible existence of mobility networks within which the acquisition of lithic raw materials and the seasonal nature of hunting places might explain the Solutrean presence in the open-air contexts of the Corbières massif. A multi-scale approach would allow us to envision a link with the low mountain settlements, like the Embullas Cave, situated 50 km from the Ruisseau de la Boulière 2 and at 500 m above sea level. The discovery of Le Ruisseau de la Boulière 2 now adds to the list of scarce Solutrean sites in Languedoc-Roussillon, underpinning the micro-region of the eastern Corbières as an original context, very close to the Pyrenees. Thanks to this small territory we can infer cultural continuity between the great sites of the Gard (Oulins Caves, Chabot, Pâques and Salpêtrière; Bazile, 1999) and the Spanish sites situated on the Mediterranean coast (Serinya Caves and Parpalló) and possibly beyond (Cueva de Chaves, Aragón). Between these two regions, a few Solutrean sites in Hérault (Col de Gigan settlement, Laroque II Cave; Bazile 2010; Boccaccio 2005) or Aude (Bize Caves and La Crouzade; Sacchi 1986: 58-59; 1990) undoubtedly materialize the existence of human mobility networks along the coast or within the Mediterranean inland.

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Data accessibility statement

The authors confirm that the data supporting the findings of this study are available within the article.

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Présence du Solutréen sur le versant nord-est des Pyrénées: le cas du ruisseau de la Boulière 2

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Abstract:

Jusqu'à récemment, la partie extrême orientale du Piémont nord-pyrénéen constituait un " vide " archéologique sur la carte de distribution du Solutréen en France. En effet, seuls deux sites, la grotte des Embullas (Villefranche-de Conflent) et le site de plein air des Espassoles (Vingrau) avaient indiqué la présence du Solutréen sur le territoire des Pyrénées-Orientales, département dont la superficie dépasse pourtant 4000 kilomètres carrés. Aucune explication rationnelle ne permettait cependant de justifier cette situation de "vide", puisque cette zone est encadrée par deux importantes aires solutréennes. En effet, au sud, juste au-delà de la crête des Pyrénées, on trouve plusieurs sites solutréens en Catalogne espagnole qui sont les grottes de l'Arbreda et du Reclau Viver dans la région de Serinya. D'un autre côté, à cent quarante kilomètres vers le nord-est, un ensemble remarquable de sites solutréens s'étend en Languedoc oriental, le long de la rive droite du Rhône. Il s'agit des grottes d'Oullins (Labastide-de-Virac), de Chabot (Aiguèze), de Pâques (Collias) et de la Salpêtrière (Remoulins) dans les départements du Gard et de l'Ardèche. Le long de la côte méditerranéenne, entre ces deux pôles, la présence solutréenne est plus discrète et se présente sous la forme d'un maillage discontinu de sites. On pense, en particulier, aux grottes de la Roque (La Roque), du Col de Gigean (Gigean), de Bize (Bize) et de la Crozade (Gruissan).

Récemment, la publication, en 2014, du site de plein air de la Vigne Bertrand à Vingrau, proche du site des Espassoles, avait relancé l'intérêt des préhistoriens pour cette zone des Corbières. Elle correspond à un environnement de basse montagne constituant le piémont nord des Pyrénées.

Aujourd'hui, la découverte du site du Ruisseau de la Boulière 2 (Vingrau), qui est situé dans l'environnement immédiat des sites des Espassoles et de la Vigne Bertrand, amène une nouvelle preuve de la présence du Solutréen dans cette micro-zone. Les Corbières Orientales apparaissent, dans ce contexte, comme un authentique territoire d'occupation solutréenne, positionné avant le franchissement des Pyrénées. Plus particulièrement, la découverte d'une pointe asymétrique bifaciale de type Montaut découverte dans le site nous amène à envisager l'hypothèse d'une certaine mobilité est-ouest des groupes solutréens qui aurait existé le long des piémonts nord mais également sud-pyrénéens. L'existence de telles connexions n'est pas nouvelle dans la mesure où elle avait déjà été envisagée sur la base de convergences techno-typologiques entre les industries lithiques aragonaises comme à Cueva de Chaves (Casbas de Huesca) et héraultaises comme à la grotte de La Salpêtrière (Remoulins).

Les recherches à venir devront certainement prendre en compte cette nouvelle présence solutréenne dans des lieux d'où elle était, jusqu'à ce jour, quasiment absente. Dans cette démarche, le petit bassin hydrographique du Verdoubert et de ses affluents qui regroupe trois des sites solutréens (Les Espassoles, la Vigne Bertrand et le Ruisseau de la Boulière 2), tous trois de plein air, devrait occuper une place de choix. Une des problématiques des futures études pourrait consister à amener des

justifications à l'existence d'une telle concentration de sites de plein, le long des berges de ce petit cours d'eau.

Mots-clés: Solutréen, Pyrénées, industrie lithique, site de plein air.