Le Rec de la Redouna 2: a site testifying to the “Second Mesolithic” of the North-Eastern piedmont of the Pyrenees

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Le Rec de la Redouna 2: a site testifying to the “Second Mesolithic” of the North-Eastern piedmont of the Pyrenees

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EDITOR’S NOTE
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Introduction

1 The prehistoric site of Le Rec de la Redouna 2 is an open-air site located in the southeastern part of the Corbières limestone massif, at the boundaries of the Aude and Pyrénées-Orientales departments. The site was discovered in 2015 by Cyril Calvet on the occasion of systematic fieldwalking carried out along the course of the Verdoublé river. The various discoveries collected produced an initial assemblage of 273 lithic pieces that form the body studied in the present article.

2 The site was established in a prominent position on a river terrace at the confluence of two creeks with permanent flow: the Correc del Trauc de l’Olla creek and the Rec del Redonar, creek that meet as the Rec de la Devesa river (coordinates: Long. 02°41’08,92”E; Lat. 42°48’41,70”N; fig. 1a). In the land register the site is referenced on the territory of the Tautavel municipality, section A2 sheet 1 n°0094. This particular position, at the end of a natural rock spur at an altitude of 113 m NGF and near to a water source, probably influenced the decision to settle in this place. At this point the surface of the terrace exhibits sub-horizontal profiles, and the ground is rather soft and
contains rare pebbles (fig. 1b). Located in the lower area compared to the surrounding mountains, the site is protected from the tramontane, the predominant wind of the region. Lastly, its southern orientation ensures sunshine. On the ground there were no remains indicating the presence of possible structures. Nor did the organic materials (bones and charcoal) leave any visible traces in situ.

1. a- Location of the site on plot n°0094 section AZ sheet 1. b- View of the site to the northern direction.

The red point on the map indicates the position of Le Rec de la Redouna 2 site in France. The orange circle indicates the area in which the pieces were collected.

Materials and method

The site of Le Rec de la Redouna 2 was discovered during surveys carried out as part of a research programme centred on the Rec del Fenouil river and its tributaries. The numerous land plots along its banks were investigated during a research programme which aimed to collect and systematically geolocalise settlement traces. The discovery was completed by repeated fieldwalking, which made it possible to build up a series of 273 lithic pieces (table I). Each piece was given an individual inventory number, which facilitated its recording in a database and made possible a statistical analysis of the variables. The shapeless debris and broken flakes were allocated to five classes according to their size (table II). The tools were named using the typological list for the knapped lithic industries of the Late European Prehistory (Perrin et al. 2018). The cores were analysed by using a diacritical scheme (Inizan et al. 1995, Dauvois 1976).
Table I. Morpho-technical composition of the lithic assemblage of Le Rec de la Redouna 2 site.

<table>
<thead>
<tr>
<th>nature</th>
<th>numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>cores</td>
<td>14</td>
</tr>
<tr>
<td>flakes</td>
<td>25</td>
</tr>
<tr>
<td>blades</td>
<td>1</td>
</tr>
<tr>
<td>bladelets</td>
<td>23</td>
</tr>
<tr>
<td>microburin</td>
<td>1</td>
</tr>
<tr>
<td>tablets</td>
<td>2</td>
</tr>
<tr>
<td>debris</td>
<td>179</td>
</tr>
<tr>
<td>tools</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td>273</td>
</tr>
</tbody>
</table>

Table II. Distribution of lengths of the debris from Le Rec de la Redouna 2 site.

<table>
<thead>
<tr>
<th>Classes dimensions</th>
<th>≥2</th>
<th>2.1 to 5</th>
<th>5.1 to 10</th>
<th>10.1 to 20</th>
<th>&gt;20</th>
<th>Total number</th>
</tr>
</thead>
<tbody>
<tr>
<td>numbers</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>124</td>
<td>25</td>
<td>179</td>
</tr>
</tbody>
</table>

Results

4 It is important to specify that not a single pottery piece was spotted during the fieldwalking. The assemblage under study is therefore exclusively composed of lithic pieces.

5 Out of the 273 lithic pieces 179 are shapeless debris or broken flakes associated with the various operations linked to the debitage of hard rocks. These pieces make up the greater part of the assemblage. The group made up of complete and fragmented cores, flakes, blades, bladelets and core tablets is comprised of 66 pieces. Lastly, 28 pieces are retouched pieces or tools (table I).

6 Very many pieces show marks related to heat treatment which are evidenced by changes in surface coloration or by the presence of cupules. Yet, the intentional heat treatment of these objects by humans remains a hypothesis. Nonetheless the question arises as to why only certain artifacts had their natural patination preserved. This is the case more particularly for geometric arrowheads and bladelets that show no visible mark stemming from thermic impact.

7 In most cases the cores correspond to “worked” pieces frequently occurring as fragments (14 out of 273). This is the case, for example, for a pyramidion (fig. 2, no 4). On distinct pieces the tablet portions are still intact and provide information about the
organisation of bladelet debitage that aims to produce thin straight pieces of the Montbani type. Bladelet debitage was initiated by core preparation involving the removal of crested bladelets, as is shown by the two pieces underlying a crested bladelet that were discovered (fig. 2, nos 6, 7).

2. Drawings of the knapping products and lithic mutual fund.

1- knapping technique Montbani microblade core; 2, 3- unretouched blades; 4- Montbani microblade core fragment; 5, 9, 10- lateral direct fine retouched bladelets; 8- proximal microburin; 6, 7- undercrest bladelets.

Twenty-five flakes were identified which are mostly represented by intact specimens (16 out of 25) and by a smaller number of broken pieces (9 out of 25). Among the intact flakes, wide pieces prevail (10 pieces) compared to long pieces (6 out of 25). Only one case of plunging termination was identified among these pieces.

Blades are extremely rare (1 out of 273). Bladelets are more numerous than blades and they are almost as frequent as flakes (24 out of 273). Broken specimens are the most numerous (21 out of 24; fig. 2, no 3), compared to complete pieces, which are in a minority (3 out of 24; fig. 2, no 2). In this situation the most frequent standard cases are bladelets with two facets (14 out of 24), without cortex (19 out of 24), without heat alteration (22 out of 24), of medium size (22 mm length, 7 mm width and 2-3 mm thickness).

Two core tablets were discovered, one complete and the other partial. These make it possible to highlight the intention of the knappers to maintain and to manage the striking platform.

Twenty-eight tools were identified, representing 12% of the whole assemblage (table I). Geometric arrowheads are the best represented (10 pieces). Among these latter, trapezes stemming from abrupt, direct or crossed truncations are the most numerous.
(8 pieces), followed by short triangles with bifacial retouch (2 pieces). The microburin technique was used for the manufacturing of geometric pieces as is attested by the presence of a proximal piece (fig. 2, no 8). The group of end-scrappers (fig. 3) is composed exclusively of simple types (6 pieces), the type with retouched edges being the most frequent (4 pieces; table III). Retouched bladelets form a rather large group (6 pieces). Some of these are Montbani-type bladelets combining semi-abrupt lateral retouch and notches (3 pieces). Lastly, more ubiquitous tools occur as single pieces within the assemblage: a notch, a side-scraper or a pointed flake (table III).

Table III. Typology and frequency of the tools of the Le Rec de la Redouna 2 site.

<table>
<thead>
<tr>
<th>Tool description</th>
<th>Typology</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>single end scraper on thick lateral retouch flake</td>
<td>GR11B</td>
<td>4</td>
</tr>
<tr>
<td>single short thin end scraper</td>
<td>GR21A</td>
<td>1</td>
</tr>
<tr>
<td>single end scrapers on thick flake</td>
<td>GR11A</td>
<td>1</td>
</tr>
<tr>
<td>fine direct lateral retouched bladelet</td>
<td>RA22A</td>
<td>1</td>
</tr>
<tr>
<td>partial backed bladelets with notch (Montbani type)</td>
<td>BA25A</td>
<td>3</td>
</tr>
<tr>
<td>straight backed bladelet</td>
<td>BA11A</td>
<td>1</td>
</tr>
<tr>
<td>fine inverse semi-abrupt lateral retouched bladelet</td>
<td>RA22B</td>
<td>1</td>
</tr>
<tr>
<td>fine retouched pointed flakes</td>
<td>RA21</td>
<td>2</td>
</tr>
<tr>
<td>regular microdents flake</td>
<td>IR31A</td>
<td>1</td>
</tr>
<tr>
<td>notched flake</td>
<td>CC2</td>
<td>1</td>
</tr>
<tr>
<td>Side scraper on thick flake</td>
<td>RA11</td>
<td>1</td>
</tr>
<tr>
<td>proximal microburin</td>
<td>MB12A</td>
<td>1</td>
</tr>
<tr>
<td>short bifacial retouched triangle</td>
<td>FB31A</td>
<td>2</td>
</tr>
<tr>
<td>long trapeze with two direct similarly oblique truncations</td>
<td>BG22A</td>
<td>2</td>
</tr>
<tr>
<td>trapeze presenting oblique truncations with reflected retouching</td>
<td>BG12A</td>
<td>1</td>
</tr>
<tr>
<td>short trapezes with 2 direct similarly oblique truncations</td>
<td>BG22B</td>
<td>2</td>
</tr>
<tr>
<td>trapeze with both a direct and a bifacial truncation</td>
<td>BG41B</td>
<td>1</td>
</tr>
<tr>
<td>short trapeze with two differently oblique truncations</td>
<td>BG21B</td>
<td>1</td>
</tr>
<tr>
<td>long trapeze with two differently oblique truncations</td>
<td>BG21A</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>28</td>
</tr>
</tbody>
</table>
3. Drawing of the knapping products and lithic mutual fund.

1, 2, 7, 9- single end scrapers on thick lateral retouch flake. 8- single end scrapers on thick flake. 10- preform of bifacial piece. 11, 12- fine retouched pointed flakes. 5, 14, 15, 16- partial backed bladelets with notch (Montbani type). 4- fine direct lateral retouched bladelet. 3- single thin end scraper. 6- straight backed bladelet (pointe?).

5, 14, 15, 16- partial backed bladelets with notch (Montbani type). 4- fine direct lateral retouched bladelet. 3- single thin end scraper. 6- straight backed bladelet (pointe?). 13- truncated retouche blade. 17- circular segment (?). 18, 19- retouched flakes.

Despite the small number of pieces that make up this assemblage it is possible to characterise the technology used by the knappers at the site of Le Rec de la Redouna 2. The pieces that indicate certain actions make it possible to reconstruct the various stages of the operational sequence. Debitage was preceded by core preparation involving a crested blade that made it possible to set up the subsequent removals. Although crested specimens were not found during the collection process, the immediately underlying pieces are present (fig. 2, nos 6, 7). The knapping technique used was punch percussion which makes it possible to obtain thin straight bladelets. This hypothesis can be confirmed by the only intact core that was found (fig. 2, no 1). This was a bladelet core with unidirectional semi-rotating debitage and invasion of the sides. An opposed second platform was used to bend the products. This piece stems from a Montbani-type debitage (Rozoy 1968). The bladelets that were obtained served as blanks for the geometric pieces discovered, such as triangles and trapezes (fig. 4, nos 1-10 and fig. 5, nos 1-10). They were also used after the shaping of notches and partial retouch of the edges as is the case for the Montbani bladelets (Escalon de Fonton 1979).

4. Photographs of the geometric lithic pieces.

1, 10- short bifacial retouched triangles. 2- trapeze presenting oblique truncations with reflected retouching. 3, 5- long trapezes with 2 direct similarly oblique truncations. 4, 9- short trapezes with 2 direct similarly oblique truncations. 6- short trapeze with 2 differently oblique truncations. 7- long trapeze with 2 differently oblique truncations. 8- trapeze with both a direct and a bifacial truncation.
5. Drawings of the geometric lithic pieces.

1, 10- short bifacial retouched triangles. 2- trapeze presenting oblique truncations with reflected retouching. 3, 5- long trapezes with 2 direct similarly oblique truncations. 4, 9- short trapezes with 2 direct similarly oblique truncations. 6- short trapeze with 2 differently oblique truncations. 7- long trapeze with 2 differently oblique truncations. 8- trapeze with both a direct and a bifacial truncation.
It can also be observed, as evidenced on the tablet portions belonging to fragmented cores, that in parallel to the striking of bladelets there was also an intercalated production of thick flakes. These flakes served as blanks for tools such as end-scrapers, points and notches.

The raw material economy of the site of Le Rec de la Redouna 2 indicates procurement of Oligocene and Miocene flints in the Bages-Sigean basin, located 41 km as the crow flies to the north-east. This raw material source was known for a long time given that this flint type was used as early as the Lower Palaeolithic at the Caune de l’Arago at Tautavel (Grégoire 1996) and was still being used during the Middle and Upper Magdalenia of the Conques cave at Vingrau (Baills 2003). In addition, during fieldwalking at the site, some rare flakes of white rock crystal of local origin (fewer than ten pieces) were collected. These were possibly produced and used in an opportunistic manner.

It is interesting to note the absence of Canigou jasper. This raw material was regularly associated with Bages-Sigean flint among the palaeolithic lithic industries of the region.

**Discussion**

The lithic industry of Le Rec de la Redouna 2 site is characterised by a debitage technique that uses an intermediary punch for the serial production of light bladelets. These were mainly destined to serve as blanks for geometric pieces after fracturing using the microburin technique (Tixier 1976). Among these, trapezes are the most frequent shapes although rare isosceles triangles with semi-abrupt bifacial retouch are present. Other common tools are Montbani bladelets, short end-scrapers and some flakes pointed by fine retouch.

As Jean Guilaine stated, this period witnessed the development of trapezes preceding the emergence and then the generalisation of arrowheads with flat retouch which will spread during the Early Neolithic, as could be evidenced at the Jean Cros rock shelter at Labastide-en Val in the Aude department (Guilaine et al. 1979 and 1985).

It is interesting to temporally and culturally classify the human settlement of Le Rec de la Redouna 2 as being among the occupations of other Mesolithic sites of Western Languedoc, although we are dealing here with the first open-air site discovered in the Eastern Pyrenees (Guilaine et al. 2015). As a matter of fact, on a regional scale, settlements of the same period are quite rare. Nearby are the sites Cova de l’Espérit et la Coma Francesa (Salses), 12 km away in the foothills of the Corbières massif, overlooking the marsh of Leucate-Salses. At Cova de l’Espérit, the remains recovered from layer C2b, dated to 6370-6020 cal. BC, were assigned to a Mesolithic qualified as “coastal Tardenoisian” (Abe lanet 1964, Martzluff & Abelanet 1987). It yielded isosceles trapezes and scalene triangles with abrupt retouch that are identical to those discovered at the site of Le Rec de la Redouna 2.

At the Coma Francesa site these same types of geometric pieces were present in layer c4, located at a distance of 18 km as the crow flies from Le Rec de la Redouna 2 (Baills & Geroumi 1993). Some rare pottery sherds associated with the lithic industry in the layer of this site suggest that this occupation may be dated to the Early Neolithic period, most probably the Epicardial.
Farther away, at a distance of 50 km in the upper Aude valley in the central part of the Corbières massif, the site of Roc de Dourgne (Fontanès-de-Sault) presents a stratigraphical sequence that makes it possible to follow the transition between the last groups of Mesolithic hunter-gatherers and the first Neolithic farmers (Guilaine 1993). Layers 9, 8 and 7 of this site have been attributed to the Mesolithic period, layer 7 being dated to 5980-5570 cal. BC. Within the deposit the Gazel point can be considered as a diagnostic type of the Final Mesolithic in that, as stated by Michel Barbaza, “these arrowheads are no longer part of the set of the Early Neolithic hunter-stockbreeders“worked” (Barbaza 1993: 269). Its presence/absence would therefore make it possible to identify the transition between the Final Mesolithic and the Early Neolithic. This projectile type was previously identified in layer 3a and hearth 4 under the porch of the Gazel cave (Sallèles-Cabardès) at a distance of 61 km (Guilaine 1973). This point is characterised by a triangular shape associated with the use of thinning retouch. The chronological and cultural interest of the Gazel point is obvious in that – according to the above-mentioned chronological, typological and cultural data – this (emblematic) object is thought to disappear as early as the initial Neolithic layers, the earliest of which (Leucate) in the department was dated to 5890-5540 cal. BC (Guilaine et al. 1984). This is also the case for the Roc de Dourgne site where it disappears in layer 6, which is assigned to the Early Neolithic and dated to 5620-5220 cal. BC. However, in the case of Le Rec de la Redouna 2, the Gazel point is (for the moment) absent from the assemblage that was collected which leads us to advance two hypotheses in order to propose a dating (fig. 6):

- Based on the chrono-stratigraphy established on the basis of the sites in the Aude department, a Final Mesolithic stage including Gazel points (Gazel c3a; Roc de Dourgne c9-c7) would reflect the last instances of hunter-gatherers.

- A second, more plausible scenario looks at Le Rec de la Redouna 2 site from a more maritime and Mediterranean and therefore more eastern perspective, which would bring the site closer to the temporal sequences in Provence. In this case it may indeed correspond to a “Second Mesolithic”, possibly of the Castelnovian type (?) thus preceding the Neolithic during a period between the 7th and the 6th millennium BC (Binder & Courtin 1987, Perrin et al. 2009).

6. Table of the calibrated ^14C dates mentioned in the text.
The presence of two triangular points with bifacial retouch suggests possible occupation during the Early Neolithic, i.e. the Epicardial (fig. 4, no 8; fig. 5, nos 8 and 10). However, the complete absence of pottery at the site is still a cause of debate.

**Conclusion**

The discovery of an open-air site belonging to the “Second Mesolithic” remains exceptional in this coastal Mediterranean area (Perrin et al. 2009). A few sporadic traces that could not always be accurately dated were identified in the fillings of caves or rock shelters, but these remains were considered as uncertain.

Currently, Le Rec de la Redouna 2 site provides additional information as regards the choices made by humans with regard to the selection of their settlement place. Thus, the location at the confluence of two creeks with permanent water flow, in a flat area, with soft ground, with favourable exposure (sunshine and protection from the prevailing winds) has many parameters that make it possible to study the living conditions and the motivations of the last Mesolithic hunter-gatherers with regard to their strategies of spatial occupation. The proven presence of a terminal Mesolithic in the Eastern Pyrenees is a significant feature for future research on the last hunter-gatherers being systematically organised when it comes to identifying these open-air sites in singular topographic locations.

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ABSTRACTS

The site of Le Rec de la Redouna 2 is located in the eastern part of the Corbieres limestone massif, a karst landform in the southernmost part of France. The open air site was discovered in 2015, during fieldwalking on a flat terrace of a natural rock spur at the confluence of two creeks. Lithic raw materials used at Le Rec de la Redouna 2 site were flints from Oligocene-Miocene deposits in the the Bages-Sigean basin, located 41 km as the crow flies to the north-east. The knappers used punch percussion techniques to obtain thin rectilinear bladelets that were found in significant numbers. Despite a limited number of diagnostic pieces, the lithic industry of Le Rec de la Redouna 2 can be culturally connected with the “Second Mesolithic” as defined in the Corbieres mountains and more widely in Southern France. This temporal and cultural classification is based on the presence of geometrical microliths with abrupt truncations, mainly trapezes, which are markers of that period in the north-eastern part of the foothills of the Pyrenees. The remainder of the lithic artifacts are ubiquitous and are comprised of small end-scrapers and Montbani-type retouched bladelets. The site of Le Rec de la Redouna 2 increases our knowledge regarding the characteristics of human settlement during this period of the Holocene. It makes it possible to highlight anthropic choices. Thus, its localization at the confluence of two permanent creeks, in a flat zone with soft ground, (well exposed to sunshine and protected from the prevailing winds), provides us with many parameters that make it possible enhance our understanding of the living conditions and motivations of Late Mesolithic hunters with regard to their strategies of spatial occupation. Currently, the presence of a Late Mesolithic period evidenced in the Eastern Pyrenees provides a very important information for further research into how late hunters were systematically organised when it came to identifying these open-air sites with such singular topographical locations.

Le gisement du Rec de la Redouna 2 se situe dans la partie orientale du massif calcaire des Corbières, formation karstique dans l’extrême sud de la France. Il a été découvert en 2015, lors de prospections de surface. Sa position, en plein air sur la terrasse plane d’un éperon naturel est à l’interfluve de deux ruisseaux. L’économie des matières premières du site du Rec de la Redouna 2 indique un approvisionnement en silex oligo-miocènes du bassin de Bages-Sigean, situé à 41 km à vol d’oiseau en direction du nord-est. La technique de débitage mise en place par les tailleurs correspond à la percussion avec chasse lame interposé. Elle permet d’obtenir des lamelles rectilignes de faible épaisseur que l’on retrouve en nombre dans la série. Malgré un effectif numériquement faible, l’industrie lithique du Rec de la Redouna est à rattacher culturellement au "second Mésolithique" tel qu’il s’exprime dans le massif des Corbières et plus généralement dans le Sud de la France. Ce diagnostic chrono-culturel s’appuie sur la présence de microlithes géométriques à troncatures abruptes, essentiellement des trapèzes, qui sont des marqueurs de ces moments dans la zone nord orientale du piémont pyrénéen. Le reste des artefacts lithiques est assez banal, il montre des grattoirs de petite taille et des lamelles retouchées de type Montbani. Le gisement du Rec de la Redouna 2 enrichit notre documentation concernant les caractéristiques des implantations humaines à ce moment de l’Holocène. Il met en évidence les choix anthropiques. Ainsi sa localisation, à la confluence de deux ruisseaux aux cours pérennes, sur une zone plane, au sol meuble, jouissant d’une bonne exposition (ensoleillement et protection au vent dominant) sont autant de paramètres qui permettent d’approcher les conditions de vie et les motivations des derniers chasseurs mésolithiques dans leurs stratégies d’occupation spatiale. La présence avérée d’un Mésolithique terminal dans les Pyrénées-Orientales est une information importante pour que des recherches futures sur les derniers chasseurs s’organisent systématiquement autour du repérage de ces sites de plein air aux positions topographiques singulières.
INDEX

Mots-clés: Mésolithique, France, microlithes géométriques, Castelnovien, Pyrénées-Orientales
Keywords: Mesolithic, France, eastern pyrenees, geometric microliths, Castelnovian

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