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A COMPARISON OF THE LITHIC INDUSTRIES FROM TWO AZILIAN SITES IN AQUITAINE: how to interpret different degrees of technical simplification?

Célia FAT CHEUNG

Abstract

The Azilian is generally characterized by a simplification of lithic industries, associated with a regional exploitation of raw materials. The variability of these manifestations is studied here through an analysis of the lithic assemblages of two regions where this culture appears to have evolved differently. Two sites are compared, the Pagès rockshelter (Lot, France) and Troubat cave-rockshelter (Hautes-Pyrénées, France), both located in the Aquitaine region, but in very different environmental contexts. Through this comparison, it is possible to address questions concerning adaptations to the environment (reductions sequences that are simple, but applied to two specific environmental contexts) and distinct cultural practices. These differences can be seen in the reduction techniques, even if they remain simple in both cases. At the Pyrenean site, they reveal practices linked to environmental constraints, which are also integrated with regional cultural practices, and reflected in the techno-economic organization.

Keywords

Azilian, technical simplification, Pyrenees, Quercy, lithic.

Introduction

The Azilian is often characterized by a simple lithic industry, reflected both in a limited number of technical objectives (backed points and endscrapers are the most common tools), and in manufacturing techniques. A certain technological “degeneration” has even been suggested relative to contexts preceding the Magdalenian, also opposing it to the more recent Laborian and Belloisian industries.

Two notions are often associated with the definition of the Azilian. First, the idea that the Azilian culture is not homogeneous in time and space. Numerous examples indeed show that the passage from the Magdalenian to the Azilian was realized through a diffusion of ideas, a trend of “Azilianization” diverging in diverse directions (Barbaza, 1997; Célérier, 1998; Valentin, 2008). Many authors have also insisted on the idea of a regionalization phenomenon that was more accentuated than before (cf. Upper Magdalenian), based on raw material procurement strategies focused on a regional, or even local, exploitation (Simonnet, 1967; Lacombe, 1998; Barbaza, Lacombe, 2005; Langlais, 2010).

But how does this simplification of techniques correlate with the idea of a strong regionalization? Several factors can explain this phenomenon (Astruc et al., 2006). Meanwhile, the exploitation of local raw materials induces a bias in our perception of these practices: the skills can be the same, but adapted to environments resulting in “circumstantial facies”, illustrated in some Mesolithic
contexts, for example (Barbaza et al., 1984). In this case, the simplified practices are dependent on the exploitation of local raw materials without necessarily implying a regionalization phenomenon, but on the contrary, a circumstantial adaptation to environmental conditions. These groups would thus have occupied a larger territory than that indicated by the origins of the raw materials they used. In the opposite case, the observable differences could correspond to a stronger regionalization by some groups, but raises the problem of the simplification of their industries, which can in effect bias their perception since they favor the existence of technical convergences, thus leading to possible confusion.

Taking into account these different parameters and potential biases, this study compares Azilian technologies and their variability in southwestern France through the analysis of two archaeological assemblages. The first site, Abri Pagès (Pages rockshelter), south of the Dordogne River, is located in a context with relatively good access to siliceous raw materials. The second site, the Grotte de Troubat (Troubat Cave), is located on the Pyrenean piedmont near flint sources with nodules that are smaller than in the preceding context.

We must remember that the internal chronology of the Azilian is different in the northern Aquitaine region (Célérier, 1998) and in the Pyrenees (Barbaza, 2009; Martzluff, 2009), and that we cannot be certain that these Azilian occupations are contemporary, or even that they belong to the same climatic phase (end of the Allerød or Early Dryas). In the Quercy region, the Azilian sequence is present at the sites of Mural (Lorblanchet, 1996) and Pont d’Ambon (Célérier, 1998). It is divided into two main phases, Early and Late, at each of these sites (Fat Cheung et al., in press).

The techno-typological characteristics at Pagès, on the other hand, correspond only to a late Azilian. In the Pyrenees, this division is more difficult to establish based on lithic industries. Troubat, Level 6, could belong to a late phase if we accept the available radiocarbon dates: 10 770 ± 100 BP (Ly-5275; Barbaza, 2009) and 10 225 ± 45 BP (Lyon–9968), or 10 806 ± 96 and 9 992 ± 135 cal BC.

Whatever the case, we do not discuss here the chronological development of this culture since our focus is the comparison of two lithic assemblages belonging to the same techno-complex and broadly defined as Azilian. The choice of the site of Troubat was also influenced by the dominance of flint exploitation, which is not always the case in the other Pyrenean sites. It is thus possible to eliminate the factor of different reduction techniques being associated with the varying structures of different rock types (Mourre, 1996).

1 - The sites

A - Abri Pagès (Rocamadour, Lot)

The Abri Pagès, excavated in 1929 and 1931 by A. Niederlender and R. Lacam (Niederlender et al., 1956), is located in the Alzou valley (figure 1) near other late Tardiglacial sites, the most famous being Abri Malaurie and Abri Murat (Lorblanchet, 1989). Though the excavations at Pagès revealed a stratified deposit, the collection was grouped together as a whole by the excavator and globally attributed to the Azilian (Niederlender et al., 1956).

The endscrapers and backed points are the main tools that can be subject to a statistical analysis (ibid.; figures 2-4). Concerning the osseous industry, the excavators mention 11 worked bone pieces, including awls, but no Azilian harpoons. The hunted fauna is dominated by Red Deer, captured during the warm season, while numerous rabbit remains are also present (Bouchud, in Niederlender et al., 1956: 444-446).

1. Dates calibrated with CalPal (http://www.calpal-online.de/).
Analyses of the portable art (painted and engraved pebbles) show that it is clearly attributable to the late regional Azilian, such as it is represented in the last phase at Abri Murat (Lorblanchet, Couraud, 1986). According to these same authors, this art illustrates not only strong diachronic differences with the art from earlier phases (end of the Magdalenian and Early Azilian), but they also conclude the art of Pagès is more similar to that of the Perigord region or eastern France, than to that of the Pyrenees (ibid.). The different components of the artefacts, both lithic remains and artistic objects, as well as the hunted fauna, constitute an interesting collection for the Late Azilian in this region (Fat Cheung et al., in press).

The lithic assemblage is composed of 3335 pieces, including 83 cores and 717 retouched pieces (table 1). It appears that sieving was done (Niederlender et al., 1956), but that certain pieces were nonetheless selected, visible in particular in the ratio of tools to non-retouched blanks (table 1).

The study by P. Chalard of the raw materials used shows a high proportion of Senonian flint (67% of the analyzed pieces) and Tertiary flint (22%). Both of these materials could be procured over a large area, in contrast to the other, less numerous raw materials whose geographic extension is more limited (table 2).
Figure 2 - Lithic tools and weapon elements at Pagès (Lot); in red: possibly non Azilian artifacts (after Niederlender et al., 1956, modified).
Figure 3 - Lithic tools at Pagès (Lot) (after Niederlender et al., 1956, modified).
Figure 4 - Tools at Pagès (Lot) (after Niederlender et al., 1956, modified).
Table 1 - Lithic artifacts at Pagès (Lot) and Troubat (Hautes-Pyrenées).

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>Pagès Number</th>
<th>Troubat Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tools</td>
<td>717</td>
<td>688</td>
</tr>
<tr>
<td>Cores</td>
<td>82</td>
<td>33</td>
</tr>
<tr>
<td>Flakes and splinters</td>
<td>1532</td>
<td>5283</td>
</tr>
<tr>
<td>Elongated flakes</td>
<td>391</td>
<td>1096</td>
</tr>
<tr>
<td>Central blades/bladelets</td>
<td>282</td>
<td>460</td>
</tr>
<tr>
<td>Lateral blades/bladelets</td>
<td>161</td>
<td>380</td>
</tr>
<tr>
<td>Crested blades/bladelets</td>
<td>42</td>
<td>87</td>
</tr>
<tr>
<td>First blades/bladelets</td>
<td>79</td>
<td>379</td>
</tr>
<tr>
<td>Neocrested blades/bladelets</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Rejuvenation flakes</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Undetermined</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>Separated pieces</td>
<td>34</td>
<td>-</td>
</tr>
<tr>
<td>Rods</td>
<td>-</td>
<td>224</td>
</tr>
<tr>
<td>Splintered pieces (Troubat)</td>
<td>-</td>
<td>150</td>
</tr>
<tr>
<td>Burin spalls</td>
<td>-</td>
<td>44</td>
</tr>
<tr>
<td>Quartz*</td>
<td>-</td>
<td>437</td>
</tr>
<tr>
<td>Quartzites and other stones*</td>
<td>-</td>
<td>171</td>
</tr>
<tr>
<td>Hard stones*</td>
<td>-</td>
<td>83</td>
</tr>
<tr>
<td>TOTAL</td>
<td>3335</td>
<td>9558</td>
</tr>
</tbody>
</table>

* non-transformed pieces not included here.

Table 2 - Raw materials at Pagès (Lot).

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senonian</td>
<td>1186</td>
<td>68</td>
</tr>
<tr>
<td>Tertiary</td>
<td>385</td>
<td>22</td>
</tr>
<tr>
<td>Jaspers</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Marin</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Bajocien</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Belvès</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>Grain de mil</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Bergeracois</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Fumélois</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Undetermined</td>
<td>110</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1755</td>
<td>100</td>
</tr>
</tbody>
</table>
B - Moulin cave-rockshelter (Troubat, Hautes-Pyrénées)

The site of Troubat is a rockshelter extended by a cave, located at the foot of the central Pyrenees in the Ourse Valley. The excavations, conducted from 1986 to 2002 by M. Barbaza, revealed a deep sedimentary deposit extending from the Middle Magdalenian to Protohistory (Barbaza 1989, 1997, 2009).

The Azilian occupation is found in Level 6 (figures 5-8). Nearly all of the fauna is composed of Red Deer and Ibex, associated with other species including Chamois, Wild Boar and Roe Deer (Ferrié, study in progress). There are many fish remains (Le Gall, 1999), while the less numerous avifauna remains reflect the exploitation of varied environments (Laroulandie, 2007).

Harpoons with buttonhole perforations compose most of the bone industry, along with awls and smoothers. Some of the personal ornaments and engraved art objects were made from shells and bone fragments. In association with these objects, painted pebbles confirm the attribution of this assemblage to the “classic” Pyrenean Azilian (Barbaza, 1999, 2009), as it was originally defined.

The study presented here concerns the internal zone of the site, of which 6 m² were selected (Fat Cheung, 2009, thesis in progress). This zone yielded 9558 artifacts, including 688 retouched pieces and 33 cores (table 1). We should note that the blanks selected for retouch were often heavily transformed, especially the backed points and scrapers, sometimes creating a bias in their analysis. The flint industry corresponds to a regional raw material procurement strategy exploiting different varieties of Danien and Flysch flints, with sources located respectively to the east and west of the site. The most distant materials are the Chalosse type flints, as always associated with the Pyrenees region.

Non-transformed quartz and quartzites are less numerous (table 1). They are primarily associated with flake manufacturing and a few bladelets. In other Pyrenean sites, such as Rhodes II (Simonnet, 1967) and La Balma Margineda (Guilaine, Martzluff, 1995; Guilaine et al., 2007), the local hard stones appear to have played a more important role in the economic strategies than they do here (table 1). Moreover, there are very few tools made on stones other than flint (quartz: 3; hard stone: 13).

2 - Comparison of the lithic assemblages from Pagès and Troubat

A - Tool categories and blank selection

The broad typological categories are relatively similar at these two sites (tables 3-4). Both assemblages are composed mainly of endscrapers, elongated pieces with lateral retouch and backed mono-points, along with a small proportion of burins and truncated pieces. In both cases, blade-bladelet blanks were often selected for retouched, along with numerous flakes.

Beyond these similarities, differences exist in the precise nature of the selected blanks and in the morpho-dimensional properties of the tools: flake tools are clearly more numerous at Troubat than at Pagès. This is particularly evident for the endscrapers, which were rarely made on blades at Troubat.

Other tools types also show differences between the two assemblages. When elongated blanks were deliberately selected (tools with lateral retouch), blades were most often chosen at Pagès, while elongated flakes (often originating from the blade-bladelet core reduction) were favored at Troubat. This practice is seen in the entire domestic tool kit at Pagès (tables 3-4). Blade tools are thus more visible at this site in the Lot, thus accentuating the differences between these two assemblages.
Figure 5 - Endscrapers at Troubat (after Barbaza, 2009).
Figure 6 - Splintered pieces at Troubat (after Barbaza, 2009).
Figure 7 - Backed points (1-10) and tools with lateral retouch (11-14) at Troubat.
Figure 8 - Backed points at Troubat (1-8) and Rhodes II (9-16); double backed points (1-5; 12); truncated (6-7) bladelets and simple (8) bladelets, points with a back and abrupt opposite edge (9-11; 13-16); 14: shaded = anterior patina; 10, 12, 13 and 15: schisty stones.
Table 3 - Lithic tool blanks at Pagès (Lot).

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Central blades/bladelets</th>
<th>Lateral and maintenance blades/bladelets</th>
<th>Laminar and elongated flakes</th>
<th>Flakes and undetermined</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endscrapers</td>
<td>73</td>
<td>30</td>
<td>82</td>
<td>115</td>
<td>300</td>
</tr>
<tr>
<td>Burins</td>
<td>19</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>Truncated blades</td>
<td>13</td>
<td>8</td>
<td>3</td>
<td>0</td>
<td>24</td>
</tr>
<tr>
<td>Retouched blades and knives</td>
<td>30</td>
<td>18</td>
<td>6</td>
<td>1</td>
<td>55</td>
</tr>
<tr>
<td>Flakes / Elongated flakes with lateral retouch</td>
<td>1</td>
<td>2</td>
<td>24</td>
<td>2</td>
<td>29</td>
</tr>
<tr>
<td>Flakes / Elongated flakes with retouched extremity</td>
<td>2</td>
<td>2</td>
<td>16</td>
<td>8</td>
<td>28</td>
</tr>
<tr>
<td>Perforators</td>
<td>4</td>
<td>3</td>
<td>12</td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>Whole backed points</td>
<td>19</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>Backed points / fragments</td>
<td>18</td>
<td>5</td>
<td>10</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>Backed fragments</td>
<td>40</td>
<td>3</td>
<td>10</td>
<td>3</td>
<td>56</td>
</tr>
<tr>
<td><strong>SUB-TOTAL (quantity)</strong></td>
<td>219</td>
<td>77</td>
<td>172</td>
<td>137</td>
<td>605</td>
</tr>
<tr>
<td><strong>SUB-TOTAL (percentage)</strong></td>
<td>36 %</td>
<td>13 %</td>
<td>28 %</td>
<td>23 %</td>
<td>100 %</td>
</tr>
<tr>
<td><strong>Weapon elements (not included here)</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Splintered or crushed pieces</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Crushed pieces</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Undetermined tool fragments</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>717</td>
</tr>
</tbody>
</table>

Table 4 - Lithic tool blanks at Troubat (Hautes-Pyrénées).

<table>
<thead>
<tr>
<th>Tool Type</th>
<th>Central blades/bladelets</th>
<th>Lateral and maintenance blades/bladelets</th>
<th>Laminar and elongated flakes</th>
<th>Flakes and undetermined</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endscrapers</td>
<td>18</td>
<td>7</td>
<td>44</td>
<td>102</td>
<td>171</td>
</tr>
<tr>
<td>Burins</td>
<td>5</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Truncated blades</td>
<td>3</td>
<td>7</td>
<td>3</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Retouched blades</td>
<td>16</td>
<td>12</td>
<td>10</td>
<td>0</td>
<td>38</td>
</tr>
<tr>
<td>Flakes / Elongated flakes with lateral retouch</td>
<td>1</td>
<td>3</td>
<td>43</td>
<td>11</td>
<td>58</td>
</tr>
<tr>
<td>Flakes / Elongated flakes with retouched extremity</td>
<td>2</td>
<td>3</td>
<td>8</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>Perforators</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Notches</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Truncated bladelets</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Whole backed bladelets</td>
<td>11</td>
<td>4</td>
<td>35</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td>Double-black bladelets</td>
<td>0</td>
<td>0</td>
<td>11</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Backed piece / undet. point-base</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Backed points / fragments</td>
<td>8</td>
<td>2</td>
<td>9</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Backed fragments</td>
<td>34</td>
<td>15</td>
<td>31</td>
<td>6</td>
<td>86</td>
</tr>
<tr>
<td>Other weapon elements</td>
<td>8</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td><strong>SUB-TOTAL (quantity)</strong></td>
<td>115</td>
<td>67</td>
<td>212</td>
<td>147</td>
<td>541</td>
</tr>
<tr>
<td><strong>SUB-TOTAL (percentage)</strong></td>
<td>21 %</td>
<td>13 %</td>
<td>39 %</td>
<td>27 %</td>
<td>100</td>
</tr>
<tr>
<td><strong>Non-Azilian pieces</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Roughouts</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Light retouch</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>Tool fragments and undetermined</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>688</td>
</tr>
</tbody>
</table>
Nonetheless, the blade tools at Pagès were probably used in a manner very similar to the flake tools or elongated flakes at Troubat. Therefore, endscrapers on blades or flakes, and laterally retouched elongated flakes and blades, could have been conceived with a similar intention, even in the case of a periodical technical adaptation (circumstantial facies in a territory where the availability of good quality raw materials was limited).

The higher proportion of blade-bladelet products transformed at the Quercy site concords with the fact that this population has a greater morpho-dimensional variability (graphic 1). At Troubat, on the other hand, these less numerous elements are also smaller because they are more closely associated with the bladelet production. At this site, the reduction of smaller blade-bladelet modules thus appears to have freed the knappers from the constraints associated with the production of larger blanks. Therefore, larger pieces do exist, but consist more often of elongated flakes that of true blades.

The endscrapers can provide additional information concerning the perceptible differences in these tool assemblages. The whole pieces are often smaller at Troubat (graphic 2), the unguiforme (thumbnail) type being characteristic of the Pyrenean assemblage. This microlithism (or miniaturation) is also confirmed by additional modifications of the endscrapers on parts other than the front: sometimes deep lateral retouch: 24 pieces; modification of the base by a notch: 4 pieces; fabrication of a second front: 2 pieces). The small size of these endscrapers is nearly exclusive for this tool type in Pyrenean sites and is not found in Quercy. This regionalization could be nuanced by the possibility of a specific activity at the site, at a given moment. But even when taking this bias into account, this microlithism is rare in Quercy, while it is characteristic of central Pyrenean sites. It is thus possible that these different endscraper populations served similar function, but correspond to clearly different tools. We will further address this question with another type of emblematic tools, points, but is first necessary to consider the manufacturing techniques in greater detail in order to better understand the system in which they were integrated.
B - Reduction strategies at Pagès

At Pagès, the cores (figures 9-11) show three intentions: blade, bladelet and narrow bladelet manufacturing. The manufacturing of narrow bladelets (visible on 11 cores), especially perceptible on cores that are nearly carinated in their conception (figure 11), is difficult to describe with precision because it appears to be absent from the unworked pieces and the tools, probably due to sorting during the excavations (cf. supra). Simple bladelet manufacturing, shown on many cores and other products (table 1), was realized on blocks and flakes. The analysis of some of these cores shows that blades were detached before the bladelets, the latter resulting from a gradual reduction or reorientation of the flaking surface (N = 3). In other cases, such as that of cores on thick flakes (N = 13), this bladelet manufacturing is autonomous and does not correspond to a continuation of blade manufacturing.
Figure 10 - Bladelet core (1) and unworked products (2-5) from Pagès.
As we have mentioned, cores were frequently reoriented (N = 36), depending on the opportunities presented by the morphology of their support. Two zones were often worked, sometimes three, with distinct and independent flaking zones: there can thus be surfaces exploited with two opposed striking platforms (N = 18, including 6 on a flake edge), but the second striking platform is consecutive to the first, and not simultaneous. Bipolar flaking is moreover rarely visible on the upper faces of the products (N = 12 bipolar blades out of 276 complete central, lateral and neo-crested blades, including tools on blades). We will discuss other forms of bipolar flaking at Troubat, but we can already note that splintered pieces are rare at this site.

Figure 11 - Centered (1) and carinated (2) bladelet cores from Pagès.
The flaked raw material volumes were often only slightly prepared. The initial preparation, when it was necessary, was realized by the creation of anterior or posterior crests, often with one, slightly regularized side. The intention of the initial shaping was sometimes to center the flaking surface through lateral, parallel removals. There are few re-preparations by neo-crests or by striking platform modifications (table 1). Most of the cores were flaked nearly to exhaustion, and thus discarded with one flaking surface degraded by numerous, successive, hinged flake scars.

Most of the percussion was realized with a hard stone hammer (Pelegrin, 2000) on a plain platform with little preparation. Most of the blade butts are over 3 mm wide, indicating that the percussion blows were made rather far from the edge of the striking platform, toward the center of the core. The non-transformed pieces show that bladelet manufacturing was more frequent than blade manufacturing (graphic 1). Blade manufacturing is more frequent here than at Troubat, however, in both the non-transformed pieces and the tools.

C - Reduction strategies at Troubat

For this site, we will discuss two categories of action: flaking with or without an anvil support, but always realized on cores with at least one striking platform, and; the exploitation of splintered pieces, which, whether used a core or a tool, are axially modified (Mourre, 2004) and potentially bifacial, with no striking plane.

The few cores associated with the first category (N = 33) are associated with the manufacturing of bladelets (N = 13), elongated flakes (N = 7) and flakes (N = 3), independent of each other, but sometimes consecutive on the same core (figures 12-13). A few standardized micro-bladelet cores (N = 5) appear in this context to originate from the underlying Magdalenian levels.

The objective of this flaking w to obtain bladelets, but this poorly standardized production results in numerous by-products, especially elongated flakes (figure 12). The flaking is realized by parallel removals, or sometimes removals that converge at the distal part of the core. It is realized on blocks (N = 11) or flakes (N = 9). Some have earlier removals or are too small to enable a reliable attribution (N = 8). A few pieces show evidence for the reduction of slabs.

Bladelet manufacturing was often realized using a plain platform. The preparation phases are rarely visible on the cores, but are attested by numerous, often irregular, crested bladelets, while core rejuvenations flakes are rare (table 1).

While the flake manufacturing technique was very simple, realized with a stone hammer, several modalities were employed, depending on whether one or several surfaces were exploited through semi-turning flaking or, on the contrary, if it was a bifacial exploitation (figure 12) with a more open platform angle. This latter modality is similar to that of splintered pieces in that it is bifacial, but preserves a thicker volume. The pieces were detached with a hard stone hammer and platform angle that does not correspond well with the production of splintered pieces that will discuss below.

The cores can have one flaking surface (N = 8), but were sometimes reworked in a second zone (N = 5), or more (N = 10), independent of the first and sometimes with a different manufacturing intention, even if mostly flakes were detached in the latter case. They were often discarded when the detached pieces became irregular, leading to numerous hinge terminations at the end of the core exploitation.

For all of these productions, flaking was most often realized with a stone hammer on non-prepared impact zones. Various types of percussion were employed: freehand stone hammer, or soft or hard stone on an anvil. Freehand percussion with a soft hammer is more difficult to identify. The percussion was applied with an internal or external blow, sometimes with an axial orientation, sometimes not. We should note that these determinations are based on criteria (Pelegrin, 2000;
Mourre, Jarry, 2010) that are sometimes difficult to apply to industries with small pieces. While the flakes from splintered pieces can be separated because they are specific to this precise manufacturing technique (cf. infra), some cores or flaked pieces display stigmata associated with anvil flaking, visible by the striking zone and the fracture surface (ibid.). It is sometimes visible on the distal part of the core (N = 13), as well as on the products, thus attesting to this practice. In this case, in contrast to the features associated with the exploitation of splintered pieces, the anvil probably served as a support, sometimes accidentally leaving traces on the products. Meanwhile, they are less present in the production.
Cores indicating blade manufacturing are absent and small blades are less numerous in the assemblage, in contrast to bladelets (graphic 1). The high number of crested bladelets and scarcity of crested blades confirms that bladelet manufacturing was more frequent (cf. supra) than blade manufacturing.

Apart from this classic production, a group of pieces were produced by breaking splintered pieces. The by-products associated with this process are numerous in the form of flakes, but especially rods, which are exclusive to this percussion technique (table 1). This leads us to question the role of splintered pieces, given their ubiquitous nature: they seem to have had two functions often considered to be contradictory – tools and cores (Le Brun-Ricalens, 2006).

**Figure 13** - Flake core, bifacial reduction (1) and core with several reorientations (2) from Troubat.
Arguing for the use of splintered pieces as tools, we observe splinters on endscrapers that are similar to those of splintered pieces. These are small splinters that do not fracture the whole tool. These stigmata are not present on the other tools (even the largest or thickest ones, such as flakes with lateral retouch), but confirm the use of actions resulting in violent fractures, which can also be produced during the use of splintered pieces as tools. A usewear study of these pieces would be useful to better understand how they were used in this context.

Meanwhile, there is other evidence for the use of products resulting from the fracturing of splintered pieces. Because they are transformed, they attest to a selection of support originating from this type of flaking \((N = 10)\). The two uses – as cores and tools – are possible and it is difficult to clearly distinguish these two intentions. In addition, these uses could have been complementary and are not contradictory, the selection of blanks being very broad, regardless of the flaking modalities. An additional element of information comes the macro-tools. The anvils display usewear in the form of cupules, as well as linear marks, suggesting a variable function of these cobbles as supports for violent percussion.

In general, this industry shows a very efficient use of lithic raw materials. The variability of the chaînes opératoires (reduction sequences) also reveals a low intention to manufacture standardized blanks, in particular for the large sized ones. These reduction sequences thus produce a broad range of blanks that can easily be used in this context. The use of flakes of varied forms originating from the fracturing of splintered pieces is visible in the tool assemblage, though the rods are not often transformed in this assemblage.

**D - Comparison of backed pieces and weapon elements**

Returning to the transformed pieces, we will now discuss those associated with hunting. At both sites, points were made on elongated blanks, though their morpho-dimensional variability is greater at Pagès than at Troubat, which concords with observations previously made. The transformations by retouching show three intentions for all of these pieces: the creation of relatively thick, slightly convex to straight back; a base that is sometimes reworked; and a pointed apex. The back retouching modified the blanks along more than one third of their width. The apex is carefully shaped, sometimes with alternate retouch or finer retouch, or sometimes reworked on the opposite edge. The basal retouch is variable and can be more or less invasive, sometimes forming an oblique truncation in the Quercy assemblage. The general morphology of the points is often symmetrical relative to the longitudinal axis in both assemblages, while symmetry relative to the transverse axis is greater at Troubat, often resulting in a fusiform morphology.

Though some of the points are difficult to orient, most of the whole pieces have a distinct base and point. At Troubat, the points with points and bases that are difficult to orient appear to belong to the same group: their back is slightly convex to straight and parallel to the axis of the blank, the angle of the extremities is not very sharp on the mono-points, and similar blank types were used. They thus represent a variant of the more fusiform mono-points, rather than true bi-points as are known in the more northern Early Azilian in France (Valentin, 2005; Célérier, 1993, 1998).

Impact fractures are present, showing that these pieces were used as projectiles at both Pagès \((N = 17\) out of 32 whole points and 90 back fragments) and Troubat \((N = 9\) out of 76 whole points and 109 back fragments).
The points are generally smaller in the Pyrenees (graphic 3), in coherence with the differences already observed in the whole assemblage. Another contrast is seen in the double-backed pieces: the one specimen at Pagès suggests a marginal production, while the 14 examples at Troubat indicate a more frequent practice. These double backs are not exclusive at Troubat as they are also present at Rhodes II (Simonnet, 1967; Fat Cheung, study in progress). It is difficult to determine whether they alone represent a regional practice. On the other hand, they clearly express a need to intensively transform blanks in the Pyrenean region. At Rhodes II, some points have a back on one side and a non-transformed back on the other (natural or formed by a previous flaking surface; figure 8). This type of point is rare at Troubat, but could correspond to the same need in the manufacturing of weapon elements (figure 8).

In the Pyrenees, it is common for weapon elements to be heavily transformed (Guilaine et al., 2007), sometimes going as far as the conception of a trihedral point composed of three retouched faces, as at La Balma Margineda (Martzluff, 2009: 420). The Pyrenean points are thus stocky and sometimes heavily retouched. Does this Pyrenean feature correspond to a specific adaptation employing different (smaller) weapon elements relative to the larger ones found in northern Aquitaine? Though retouch is used to standardize the dimensions, graphic 4 shows that the

4. We define a second back as when the retouch extends along more than half of the length of the point, following the general symmetric axis and often following an abrupt edge.
double-backed pieces fall in the range of variability of the dimensions of backed points without there being a greater transformation of the larger ones. Furthermore, the same raw materials are used (only flint, though other stones could be used for single points). These differences from northern Aquitaine could be explained by variable hunting strategies, employing smaller, but more robust points.

It is difficult to clearly determine the role of backed bladelets in these sites. Apical hafting is certain at both sites due to the large number of backed points, while it is more complex to identify bladelets hafted laterally as barbs. In the Pyrenean assemblage of Troubat, most of the pieces are broken, but some whole backed bladelets (N = 4) indicate the manufacturing of lateral elements (figure 8). These are wider and thicker than Magdalenian backed bladelets (cf. supra) and could be part of the Azilian assemblage. However, this assemblage as a whole is clearly more lamellar than those in Quercy, even for the fabrication of points. Bladelet manufacturing is present at Pagès, but due to selection during the excavation, few of the smallest bladelets remain and thus do not enable us to analyze their use. The large number of back fragments cannot be taken into account here to better understand this practice since we cannot determine where they were hafted on the weapon shaft.

Some pieces were separated from the assemblage clearly attributable to the Azilian. These are backed pieces whose blank, technology and configuration suggest that they may be intrusive from earlier or later occupations. At Pagès, a few pieces resemble Laborian (four fragments of truncated backed pieces and a rectangle) and Mesolithic (one Sauveterrian point) weapon elements. At Troubat, these are Magdalenian elements (18 backed bladelets, three scalene triangles and one rectangle) that could originate from the underlying levels, while the Laborian (16 truncated backed bladelets and one unfinished back) and Mesolithic (two isosceles triangles) elements would be from the overlying levels, since this type of artifact is present in Level 5 (Rufino, 2011).

Another element that can be discussed at Troubat is the “rectangles” formed by one (N = 1) or two (N = 4) backs. The sediments in level in which they were found are homogeneous, but the occupation succession and the attribution of these pieces to the Azilian is still debatable since a Laborian occupation is perceptible in the underlying level. To resolve this issue we must obtain a better understanding of the Laborian in this region. Hunting elements other than backed points thus appear for now to be marginal in both contexts.

Conclusion

With this comparison of two sites, several elements associated with the technical simplification of these industries were confronted. Broadly, these two assemblages share several features: at both sites, blades and bladelets were manufactured from cores using a stone hammer, and the preparation of these cores was minimal. Most of the short blades, wide bladelets, elongated flakes and regular flakes were retouched to make endscrapers, laterally retouched blades or elongated flakes (sidescrapers) and backed mono-points, sometimes with a retouched base.

Though both assemblages are associated with simple production techniques, this technical simplification is realized in a different manner. In Quercy, blade-bladelet manufacturing remains frequent, while in the Pyrenees, other methods are employed, such as flake manufacturing and anvil flaking. Blade manufacturing is thus not frequent at Troubat, being replaced by smaller products, such as bladelets, elongated flakes and flakes. What do these differences mean? Do they represent circumstantial adaptations by identical groups, or on the contrary, a regionalization perceptible in their cultural practices?
This microlithization (or miniaturization) in the Pyrenean reduction strategies concords with tools that are also smaller than those in the Quercy region. The procurement of raw materials is different as well, concerning both flint, which is smaller, and the use of stones other than flint. In the scenario in which the same groups would have occupied the Pyrenees and Quercy region, this constraint would have had little influence on the tool kit: the tools and reduction strategies could have been similar. However, the transformation of the products is different.

The backed points are indeed smaller, but they also have some specific features, especially in the fabrication of a second back. The microlithism of endscrapers also provides information on these Pyrenean particularities: in this case, the morpho-dimensional reduction is clearly intentional. It is probable that these endscrapers were hafted and that their size was thus dictated by other modalities, such as those related to their attachment to a handle. The small dimensions of these tools in the Pyrenees thus indicates that there were distinct practices in these two regions.

These differences in the tools are associated with differences in the manufacturing strategies, thus confirming a regionalization of this culture. The Pyrenean strategies are not found in sites north of the Aquitaine, where small tools are also much less abundant. Blade manufacturing is relatively infrequent in the Pyrenees, but remains preponderant in Quercy. Even if the constraints of the manufacturing strategies are low in both assemblages, this difference in the size of the products is important to our understanding of the variability of Pyrenean strategies. Bladelet manufacturing requires little standardization in core preparation, in contrast to blade manufacturing, which, even when it is simple, must follow more precise technical rules. This emancipation from the constraints of blade manufacturing thus distinguished the practices in Pyrenees from those in Quercy, and could also explain the originality of the use of anvil percussion in the Pyrenees.

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