CHAPTER THIRTY

HUMAN OCCUPATION OF THE HIGH-MOUNTAIN ENVIRONMENTS: THE CONTRIBUTION OF MICROWEAR ANALYSIS TO THE STUDY OF THE COVA DEL SARDO SITE (SPANISH PYRENEES)

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Abstract

In this report we assess the results of the microwear study of the Cova del Sardo (Catalan Pyrenees). The site is located at an altitude of 1780 m.a.s.l and presents a sequence of prehistoric occupations with radiocarbon dates from the VI millennium to III millennium cal BC. Our data indicate that lithic resources were used for both subsistence and crafting activities. Pastoralism was not the only economic activity practiced by local populations.

Keywords: Pyrenees; High-altitude environment, Neolithic, Lithic assemblage, Use-wear analysis.
1. Introduction

The Cova del Sardo de Boí (Caldes de Boí, Lleida) is one of the highest archeological sites of the Iberian Peninsula. It is a small rock-shelter located in the Sant Nicolau Valley, in the Aiguestortes i Estany de Sant Maurici National Park, at an altitude of 1790 m.a.s.l. The archeological deposit presents a stratigraphical sequence that covers a chronological span between the Early Neolithic to Modern times. Six different phases of prehistoric occupation have been documented: phase 9 (7500-7300 cal BP); phase 8 (6700-6400 cal BP); phase 7 (6000-5500 cal BP); phase 6 (5500-5000 cal BP) and phase 5 (4800-4400 cal BP). A detailed description of the occupational sequence has already been published (Gassiot et al. 2010; Gassiot et al. 2013) as well as a detailed analysis of the palaeobotanical and palynological records (Gassiot et al. 2012b). Some preliminary analyses of the lithic raw material provenance have also been completed (Gassiot et al. 2012a).

This paper will focus mainly on the functional aspects of the Cova del Sardo lithic assemblage. Despite the scarcity of the lithic materials, we can consider the Cova del Sardo industry extremely interesting for at least two reasons: 1) lithics are the most abundant archeological artefact recovered during the excavation. Ceramics and faunal materials are, in fact, poorly conserved. In this sense, a lithic record could offer a fundamental contribution for the understanding of the economic activities realized at the site; 2) the majority of lithic artefacts were transported at the site over mid and long distances: between 30-40 and 100-120 kilometres. Only non-siliceous rocks are available locally. The understanding of the functional destination of those instruments, transported over such territory, is thus even more compelling.

The main aim of this study is to evaluate the extent to which lithic resources contributed to the economic activities realized at the site. Often, starting from the Neolithic period, high-altitude areas were traditionally considered specialized areas, exclusively associated with pastoral practices. In this sense, microwear analysis could represent an appropriate technique to evaluate whether other subsistence or crafting activities were realized at the site.

2. Materials and methods

The analysed sample is made up of 368 elements in total, from phases 8 to 5. In this study we have considered all the lithic materials retrieved from the cave, both blade blanks and flakes and waste products (Table 30-
### Tab. 1. Technological composition of the Cova del Sardo assemblage. *Ind.* indicates indeterminable elements.
1). Considering the chronological span covered by the Cova del Sardo stratigraphical sequence—more than 3000 years—the lithic assemblage appears extremely scarce. However, this scarceness of findings is a typical characteristic of the Pyrenean Mountain sites in respect to contexts located at lower altitudes. This is probably due to the seasonal character of those occupations, and, not secondarily, to the distance from the raw material sources.

Microwear analysis has been realized through the combined use of a binocular microscope (Leica MZ16 A) equipped with a camera (Leica IC 3D) and a reflected-light microscope (Leica DM2500 M) equipped with a camera (Leica DFC420 C). The conservation of the materials has already been evaluated in a previous study (Mazzucco et al. 2013); experimental sessions have been also carried out (Mazzucco and Clemente 2013).

In this paper we only present a general overview of the obtained results. Data will not be discussed phase by phase, but only as a whole because of the limited extension of the article.

3. Results

The results of the analysis indicate that the majority of materials have not been used (n=308). Used implements amount to 19.5% of the assemblage (n=60 corresponding to 75 areas of use). Of those 54.8% provided a clear interpretation, while the remaining 45.2% show more doubtful traces because of the presence of post-depositional alteration. Non-utilitarian wears (wears caused by actions linked with the production, management or maintenance of the tool, such as technological and hafting traces) have been identified on 6.3% (n=23) of the industry, although we put a word of caution on their interpretation because of the presence of taphonomic agents. Among non-utilitarian wears, 26.1% (n=6) are probably related to hafting; 69.6% (n=16) are probably produced by transportation practices, while 4.3% (n=1) are associated with the presence of residues.

Among use-wears, traces linked to vegetal substances clearly prevail during all phases (n=38; 50.7%). Among those we recognized a large group of instruments related to herbaceous plant cutting and processing activities (n=29; 38.6%). Woodworking (n=2; 2.7%) and other indeterminable vegetal substances are scarcely represented (n=7; 9.3%). Processing of animal substances amount to 6.7% (n=5) of the sample, while indeterminate materials amount to 26.7% (n=20). Elements used as projectiles amount to 16.0% (n=12). A synthesis of those results is presented in Table 30-2.
<table>
<thead>
<tr>
<th>Phase</th>
<th>Vegetal Material</th>
<th>Animal</th>
<th>Indeterminate materials</th>
<th>Impact traces</th>
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<tr>
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<td>13</td>
<td>-</td>
<td>1</td>
<td>1</td>
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<td>%</td>
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<td>-</td>
<td>1</td>
<td>3</td>
</tr>
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<td>20.0%</td>
<td>-</td>
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</tr>
<tr>
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<td>-</td>
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</tr>
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</tr>
<tr>
<td>%</td>
<td>34.4%</td>
<td>-</td>
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<td>6.3%</td>
<td>18.7%</td>
</tr>
<tr>
<td>8</td>
<td>27.7%</td>
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<td>9.1%</td>
<td>36.4%</td>
</tr>
<tr>
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<td>27.7%</td>
<td>-</td>
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<td>9.1%</td>
<td>36.4%</td>
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<td>Tot</td>
<td>29</td>
<td>2</td>
<td>7</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>%</td>
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<td>2.7%</td>
<td>9.3%</td>
<td>6.7%</td>
<td>24.0%</td>
</tr>
</tbody>
</table>

Tab. 2. Use-wear traces identified among the Cova del Sardo lithic assemblage. The total reported in the table indicates the total number of used areas. *Ind.* indicates indeterminable elements.
4. Discussion

Despite the scarceness of findings, the microwear analysis of the Cova del Sardo lithic assemblage offer some interesting results, representing a relevant contribution for the understanding of the site.

The first aspect to highlight is the importance of the activities linked to herbaceous plant processing, especially during phases 7 and 5, as stated above. Within this category fall a wide number of different activities: cereal harvesting \( (n=4; 14.3\%) \); cutting straws at ground level \( (n=15; 53.6\%) \); scraping plants \( (n=2; 7.1\%) \) and cutting wild plants \( (n=7; 25\%) \).

Cereal harvesting. Four sickle blades with an intensive cereal lustre (Fig. 30-1, a-d) (Fig. 30-2, a-b) were found at the Cova del Sardo, respectively from phases 8, 7 and 5. However, considering that some of those blades show signs of being transported and in some cases retooled, it seems plausible that harvesting activities were not undertaken locally. Clear evidence of retooling, for example, comes from phase 5. In fact, during this phase two large sickle blades were transported to the site and extensively resharpened (Fig. 30-1, a-b). Under a microscopic view, the cereal polishes appear abruptly interrupted by the resharpening scars (see Fig. 30-2, b). The same edge has been successively used for cutting other plants or straws at ground level. In this case the edge appears dull, rounded and with many striations (Fig. 30-2, c). The presence of few barley and wheat burned seeds during phases 8 and 6 suggest that along with sickle blade also cereals grains were consumed at the Cova del Sardo. However, the absence of any Cerealia-type grains in the local pollen diagram also suggests that agricultural activities did not take place locally (Gassiot et al. 2012b). Both sickle blades and cereal grains were probably transported to the rock-shelter from sites located at lower altitudes.

Cutting straws at ground level. Most of the blades retrieved at the site show a vegetal polish with an abrasive component (Fig. 30-1, b, f, i, q) (Fig. 30-2, c-d) (Clemente and Gibaja 1998). On the basis of experimental works (Fig. 30-2, e-f) those traces seem to have been produced by cutting plant straws at ground level: abrasive component is thus produced by the soil particles involved in the action. In our opinion those materials could have been employed as constructive materials (e.g. to create domestic soils, as bedding pavements, or a perishable structure such as wooden/vegetal coverage), as combustible fuels, or as animal feed. In support to our hypothesis, litter/fodder bedding layers of herbs/straws have been discovered in many early Neolithic caves associated with herding practices in the Western Mediterranean (Angelucci et al. 2009). However, phytolith and micromorphological analyses are necessary to test our postulations.
Fig. 1. Selection of the Cova del Sardo assemblage (phases 8, 7, 6, 5). The dots indicate the used areas. The arrows indicate the directionality of the movement. CE – Cereal; VG – Vegetal substance; AN – Soft animal substance; RV2 – vegetal polish with a strong abrasive component; PY – projectile insert; Hf – Hafted part.

Other plant working activities. Vegetal materials were also involved in other types of activities, although with lower percentages. Among those we noticed the scraping of fresh vegetal material (Fig. 30-1, h, i, l) (Fig. 30-2, g). This action could correspond to the processing of vegetal fibre in order to produce materials for basketry or rope-making processes. Experimental works seem to confirm our hypothesis (Fig. 30-2, h). In addition, few lithics seem to have been employed in woodworking activities.
Fig. 2. Selection of use-wear traces from the Cova del Sardo assemblage. a) Extensive cereal polish; b) Cereal polish, ventral face. See how the resharpening scars interrupt the used edge; c) Abrasive plant polish on the same tool of the previous photo, dorsal face; d) Archeological plant polish with a strong abrasive component; e-f) Experimental wear resulting from cutting herbs at ground level, different stages of development; g) Archeological wear from scraping vegetal substance; h) Experimental wear resulting from scraping plant fibers; i) Burin-like fracture on a geometric segment; l) Bending/step fracture on a foliated point; m) MLITs on the same instrument; n) Edge scarring and rounding resulting from working soft animal substances.

The second aspect to remark is the presence of projectile inserts that testify to the practice of hunting activities. Impact traces have been detected mainly on geometric tools (segments and trapezes) (Fig. 30-1, n-p) except for the presence of a foliated point (Fig. 30-1, m). Observed use-wears are mainly of three types: extensive burin-like fractures (Fig. 30-2,
i), bifacial bending/step fractures (Fig. 30-2, l) and MLITs (Fig. 30-2, m) (Fischer et al. 1994), often in reciprocal association between them. On the basis of the orientation and the position of the impact fractures, most of the instruments seem to have been used as points or transversal arrowheads. However, considering the relatively scarce number of implements, the variability in the raw materials employed for manufacture, and, the variability in the shapes and forms of the microliths, foraging activities seem to respond to an occasional and not to a specialized hunting activity (Bleed 1986). The scarce preservation of faunal materials does not allow a correlation between hunting and the type of game.

Finally, the occasional presence of traces related to the processing of animal substances (butchering, cleaning, dehairing, etc.) (Fig. 30-1, e) (Fig. 30-2, n) suggest the realization at the Cova del Sardo of a variety of domestic activities probably associated to food preparation or game processing. It is worth remembering that those kinds of use-wears should be considered underestimated in the analyzed assemblage because of the effects of post-depositional alterations.

5. Conclusion

Starting from the 8th-7th millennium cal BP, the Cova del Sardo went through a long series of short occupations and abandonments; during those periods, human populations introduced domestic livestock in the Sant Nicolau Valley as anthropogenic indicators from pollen diagrams testify (Gassiot et al. 2012b). However, even if pastoral activities probably assumed–since the early Neolithic period–a great relevance in the Eastern Pyrenees, our study demonstrates that local groups also practiced other types of economic activities.

Results indicate that the first groups who settled in the subalpine zones of the Pyrenees were not entirely dependent on pastoral production. Domestic cereals were consumed at the site, even if it is likely that their harvesting was carried out at lower altitudes. In the pre-Pyrenees, the presence of sites, as Cova Colomera (Oms et al. 2008) and Feixa del Moro (Llovera 1986), with evidence of silos and cereal processing, seem to confirm that cultivation was carried out at mid-altitudes (700-1000 m.a.s.l.). The transportation and retooling of sickle blades at the Cova del Sardo should be interpreted within this economic context.

On the other hand, hunting activities were also represented. The integration of hunting in Neolithic agro-pastoral societies has been long discussed and various explications have been given (Orton in press). For highland pasture areas, one of the more reasonable explanations is that
hunting was practiced to avoid livestock slaughtering during the summer fattening season; however, more studies are necessary to confirm this hypothesis.

Finally, crafting activities, such as floor preparation, basketry or woodwork, should be considered as occasional practices, related to everyday domestic tasks. Moreover, we have to consider that the number of used implements is greatly reduced, and thus it is difficult to assess the role and the importance of such activities.

In conclusion, this scenario is in accordance with the existence of mobile agro-pastoral groups that seasonally occupied the high mountainous areas, mainly in relation to herding, but not exclusively. The Cova del Sardo was part of a wider subsistence and settlement system.

Acknowledgement

This study is part of the Project: “*Interacción entre clima y ocupación humana en la configuración del paisaje vegetal del Parque Nacional de Aigüestortes i Estany de Sant Maurici a lo largo de los últimos 15,000 años (OCUPA)*” of the Universtat Autònoma of Barcelona, Universitat Rovira i Virgili and Consejo Superior de Investigación Científicas (CEAB-CISC).

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