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68. Techno-functional approach to a technological breakthrough: The Second Mesolithic of the Montclus rockshelter (Gard, France)

Elsa Defranould, Sylvie Philibert and Thomas Perrin

In the sixth millennium cal BC, in southern France, the spread of blade and trapeze industries ended a high stability of the technical and economic choices of Epipalaeolithic (Azilian) and First Mesolithic (Sauveterrian) groups. With the Second Mesolithic, the lithic technical system, technical standards, but also the conceptual scheme were substantially modified. To better characterize and understand these changes, a new techno-functional analysis was carried out on the lithic industries of Montclus rockshelter (Gard, France), which offers a significant stratigraphic sequence covering the whole of the Mesolithic (Montclusian facies of the Sauveterrian and Castelnovian). In this paper, we discuss some aspects of this technological breakthrough in the organization of lithic production and functional behaviour during the Second Mesolithic. We will also discuss the technological evolution of the production at the beginning of the Castelnovian sequence.

Keywords: Second Mesolithic, lithic industry, technology, traceology, Montclus rockshelter

Introduction

In 1958, John Desmond Clark was the first who identified a major change in the lithic assemblages of the Mesolithic with the appearance of 'blade and trapeze' industries (Clark 1958). This phenomenon encompassed western Europe as a whole, except the British Isles, as well as northern Africa. The change occurred during the seventh millennium cal BC, several centuries before the neolithization. On the basis of coherent assemblages and reliable radiocarbon dates, a recent consensus has been that the origins of the blade and trapeze industries are to be located somewhere in northern Africa (Perrin *et al.* 2009). The first step in the diffusion of this phenomenon encompassed the whole of the western Mediterranean Basin and was probably a process of demic diffusion. During the second stage, after *c.* 6000 cal BC, the process might have been again a matter of demic diffusion but more probably as a diffusion of concepts though pre-existent populations (Perrin *et al.* 2009). Despite these recent studies, the local evolution of the Second Mesolithic remains insufficiently understood even if a chronological phasing began to be clarified (Marchand and Perrin 2017). This is the reason we propose here a new milestone for understanding these phenomena.

The site of Montclus is a rockshelter located in the department of Gard, France, near its border with Ardèche. It lies some hundred kilometres away from the coast, on the left bank of the River Cèze, a tributary of the Rhône around 25 km from their confluence. The River Cèze is in this part slightly incised and cuts through secondary and tertiary limestones. The site itself was discovered in 1954 by Max Escalon de Fonton during a systematic survey of the gorges of the Cèze. The investigator dug at the foot of the cliff from 1956 to 1971. His excavations show a very long, four-metre-deep, stratigraphic sequence spanning the Middle Mesolithic through to the Early Neolithic.

Layers 16 to 14 of Montclus rockshelter

We focus our study on layers 16 to 14, which correspond to the beginning of the Second Mesolithic occupations. A previous work has highlighted a stratigraphic mixture is found between layers 15 and 16 (Perrin and Defranould 2016). For us, the 'Sauveterrian with trapezes' reflects two successive occupations (Sauveterrian and Castelnovian) rather than a transition facies. Several arguments can be put forward in favour of this view: layers 15 and 16 correspond to a layer of porch collapse which may have caused the stratigraphic mixing, the manufacture of microlithic triangular and trapeze arrowheads belongs to two completely different *chaînes opératoires*, and there is a clear spatial disjunction between trapezes and triangles. Hence, since our study is focusing on the Second Mesolithic evolution, we made the choice to consider only the elements that clearly belong to the

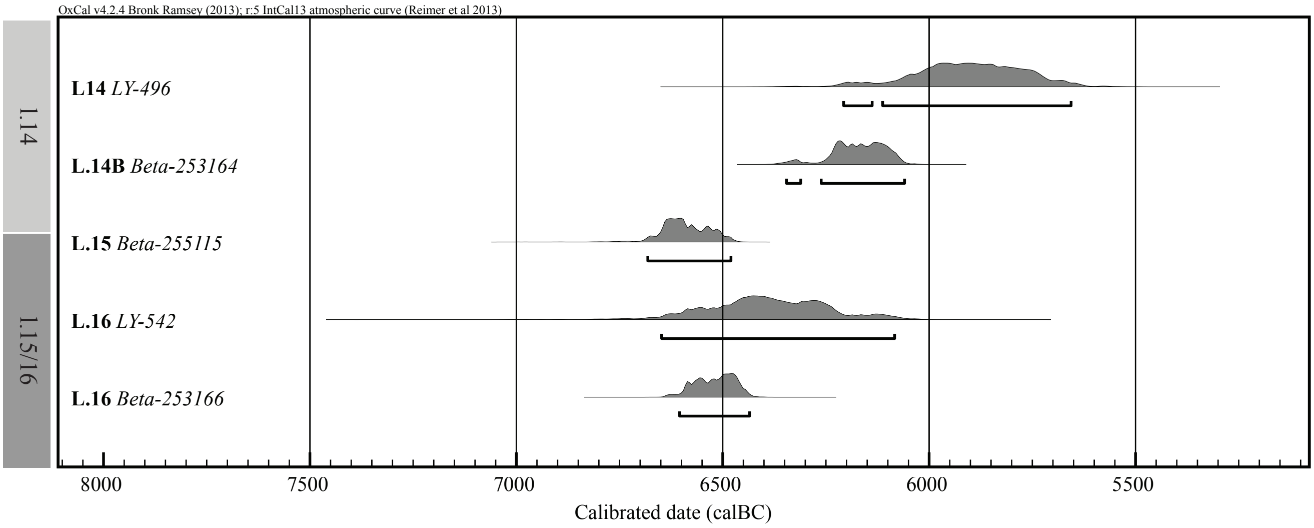

Fig. 68.1. Radiocarbon dates (95% confidence) from layers 16, 15, and 14 of the site of Montclus calibrated against IntCal13 (Reimer *et al.* 2013) using OxCal 4.2.3 (Bronk Ramsey *et al.* 2013).

Layer	Sample	Lab ID	Age (BP)	Std. dev.	Dating technique	Calibrated range (95% confidence)
C14	charcoal	LY-496	7020	140	conventional	6208–5657
C14B	bone (indet.)	Beta-253164	7320	50	AMS	6346–6060
C15	bone (Cervus)	Beta-255115	7770	50	AMS	6682–6481
C16	bone (indet.)	LY-542	7540	140	standard	6649–6084
C16	bone (indet.)	Beta-253166	7670	50	AMS	6605–6436

Table 68.1. Radiocarbon dates (95% confidence) from layers 16, 15, and 14 of the site of Montclus calibrated against IntCal13 (Reimer *et al.* 2013) using OxCal 4.2.3 (Bronk Ramsey *et al.* 2013).

Castelnovian way of knapping: pressure or punch technique, prismatic blades, and trapezoidal arrowhead from layers 16, 15, and 14.

There are five radiocarbon dates for layers 16, 15, and 14. Two were obtained during the excavations and exhibit a large standard deviation, while three were obtained more recently by the accelerator mass spectrometry (AMS) dating method and are more precise (Fig. 68.1, Table 68.1). Layer 14 is dated between *c.* 6500 and 6300 cal BC. Layers 15 and 16 are dated *c.* 6500 cal BC. However, as these layers present a mixed set of both Sauveterrian and Castelnovian industries, it is not yet possible to attribute those dates to one or the other period. Nonetheless, as these dates are contemporaneous with the date of layer 18 (Sauveterrian), we can assume that it is a Sauveterrian occupation which was dated in layers 16 and 15.

Technological point of view

In all layers, the same raw materials were used. There are many tertiary flint sources at around 5 to 10 km from the site, and the Montclus' knappers mainly exploited these boulders or elongated pebbles: they represent around 85 percent of the assemblages. A beige secondary flint is also used (*c.* 15 percent of the assemblages) probably coming from the banks of the Rhône, around 40 km from the site for the closer sources (on the right side of the river).

The Castelnovian debitage of layers 15 and 16 shows the production of large blades over a unidirectional flaked surface on either a narrow or a wide side of the core. There is no overhang abrasion and the proximal part of the blades shows flat or concave butts, which suggests the use of the punch technique for blade production. We noticed a similar way of blades' shaping in layers 14, but the pressure technique appears here. Indeed, layer 14 shows the appearance of facetted butts (*c.* 10 percent of preserved butts) often in connection with slight overhang abrasion. However, the angle of percussion is often around or above 90 degrees and some cores show the same angulation between the flake surface and striking platform. All these traits suggest the use of pressure technique associated with the punch technique. Namely, pressure technique was used to produce string bladelets (*c.* 8.8 mm wide on average) as the knappers of Montclus used the punch technique to produce larger blades (*c.* 11.3 mm wide).

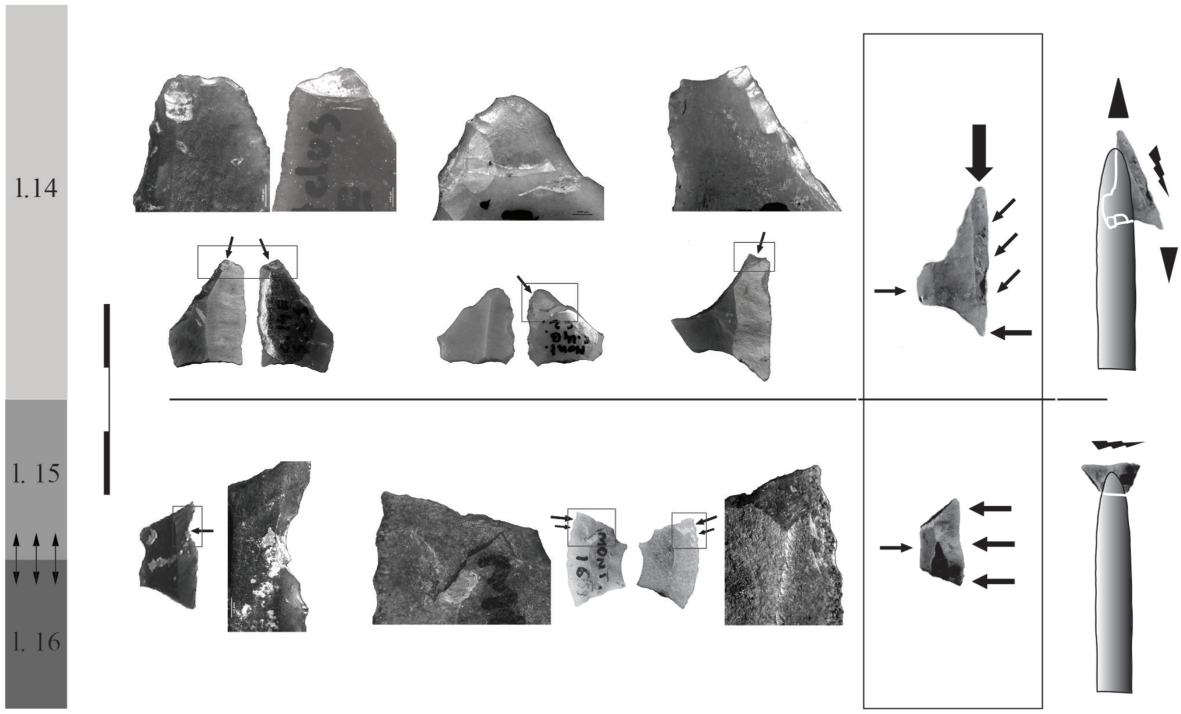

Fig. 68.2. Montclus, Castelnovian. Diagnostic impact fractures on asymmetric (l.14) and symmetric trapezes (l.16), recurring distribution and orientation of the damages and hypothetical reconstruction of their hafting and functioning mode.

Emphasis on Montbany blades

With the Second Mesolithic, we can notice the appearance of notched blades, also called 'Montbani blades'. Usually considered as emblematic of the Second Mesolithic, they seem to have a recurrent way of being used, which could correspond to the emergence of a dedicated tool, with a specific active edge – the notch – devolved to scraping different materials, in particular vegetal materials but also bones and hides (Gassin *et al.* 2013, 2014). At Montclus, those specific tools appear only in layer 14. Indeed, only 2 blades were found in layer 16, which corresponds to a rate shaping of 2 percent (and none shows a veritable notch), whereas in layer 14 retouched blades amount to 14 percent. The latter are not standardized and often appear with cortical flanks. The use-wear analysis of 12 blades allowed the identification of 8 used tools and 15 used zones. The notches appear to have a specific active edge, used for scraping with a negative rake-cutting, probably to remove fine shaving or to remove material without penetrating deeply. The notches are mainly involved in plant processing, several types of vegetal materials, rigid and siliceous plants, fibres, and wood. It is possible that some of these tools were used for scraping vegetal materials for nets or fish-trap manufacturing in connection with fishing activities carried out at the site. However, notched blades were used more specifically to process different materials for technical purposes (Philibert 2016).

Emphasis on trapezes

Concerning arrowheads, we can firstly underline that they were shaped from regular blanks, mostly with a trapezoidal section. Secondly, we noticed a clear increase in arrowheads' width between layers 16 and 15 and layer 14 (10.2 mm wide for layers 15 and 16; 11.7 mm wide for layer 14). Also, the microburin technique is not attested in layers 15 and 16 whereas layer 14 has yielded several microburins. Finally, from a typological point of view, the morphology of the trapezes also changes between these layers, with small symmetrical trapezes in the lower ones and with large asymmetrical trapezes with either a concave truncation or offset base and sometimes with inverse retouches in the upper ones. These morphometric changes correspond to a functional change. Trapezes, as projectiles inserts, also meet a new conception of wounding arrow tips and a new hafting system. A low magnification observation allowed diagnostic projectile impact wears to be identified on symmetric and asymmetric trapezes (6 out of 20 in layer 16 and 19 trapezes out of 56 in layer 14, Philibert 2016). The characterization of impact damages is based on experimental references published since the 1970s. They tend to agree on some diagnostic criteria specific to each type of arrowheads (*e.g.* Albarello 1988; Chesnaux 2014; Fischer *et al.* 1984; Gassin 1996; Geneste and Plisson 1990; Petillon *et al.* 2011; Philibert 2002; Yaroshevich *et al.* 2010). The recurrence and combination of diagnostic

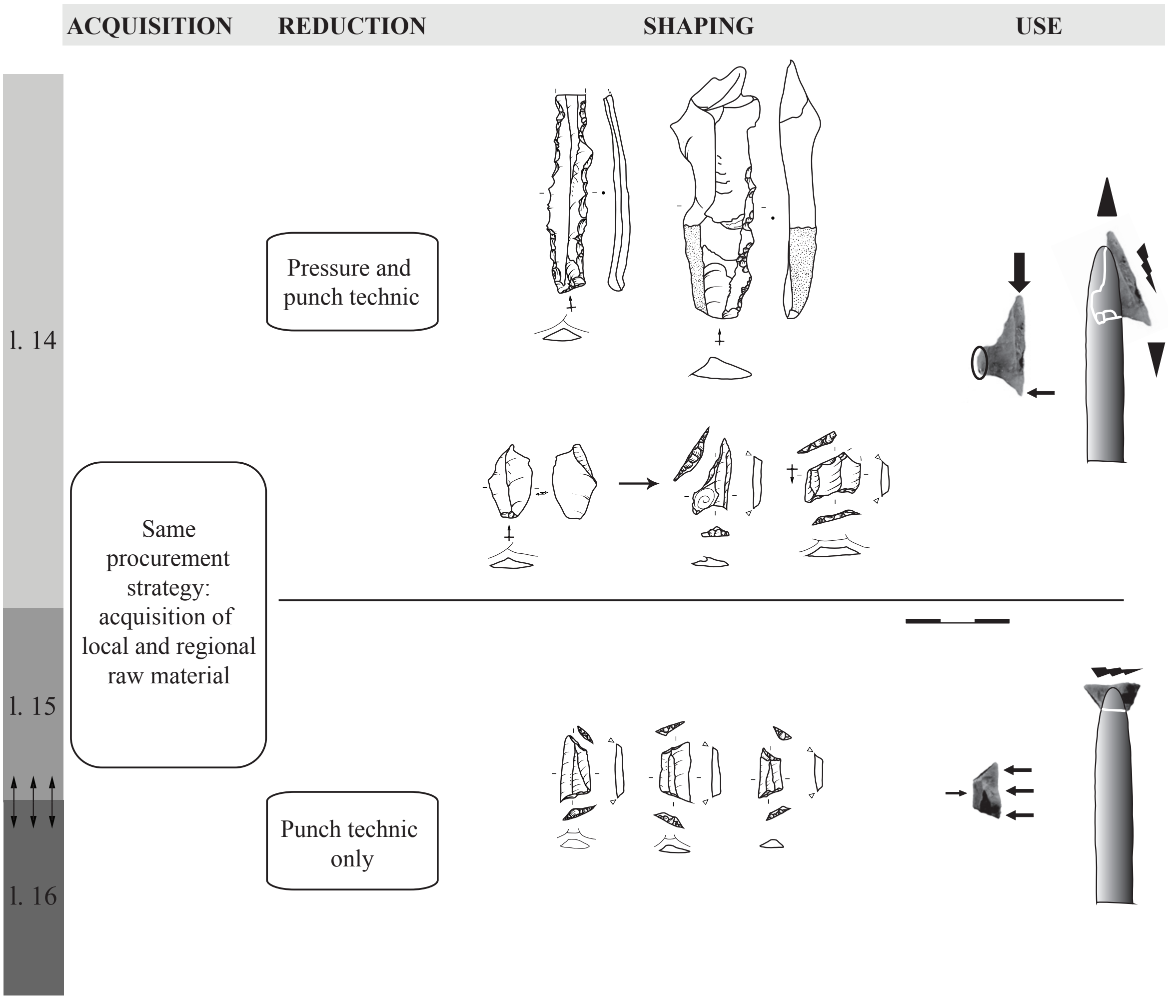

Fig. 68.3. Synthetic plan of major changes between layers 15–16 and layer 14 (drawing to scale 1/2).

impact damage allows us to propose a hypothesis for arrowheads' functioning (Fig. 68.2).

Asymmetric trapezes of layer 14, which that have assumed a 'point-barb' function, combined in a single microlith the ballistic properties – perforating, lacerating, and retaining (Philibert 2016). On their side, symmetric trapezes show compatible fractures with a transversal functioning. This interpretation needs to be confirmed through micro-wear observations and detailed analysis of all symmetric trapezes from layers 16 and 15. Nevertheless, the appearance of transverse arrowheads represents a break in terms of technical conception and ballistic properties with the Sauveterrian mode of assembling that precedes them, but also with the 'point-barb' arrowhead of layer 14. By contrast, in the Sauveterrian arrow every element, with various forms, has these different roles according to its specific hafting system and position on the shaft (Chesnaux 2014; Philibert 2002). Besides a return to a high investment in the production of regular blanks, these new technical choices come along a new hafting system and probably a new know-how in the manufacturing of glues.

Conclusion

To conclude, the site of Montclus yielded coherent and important assemblages for the beginning of the Castelnovian and it allows us to consider a technical and functional evolution during the sequence. This is the reason why we have proposed such a chronological phasing (Fig. 68.3). At least, these data confirm the existence of an early phase of the Second Mesolithic with symmetrical arrowheads, as observed in southern Italy at Latronico (Dini *et al*. 2008) and at Uzzo (Collina 2009), or in eastern Spain at the shelter of la Falguera, phase VIII (Garcia Puchol 2006) and at Abrigo de los Baños, levels 2b1 and 2b2, which also yielded symmetrical trapezes without microburin, used as transverse arrowheads similar to Montclus (Utrilla and Rodanés 2004). Finally, we also notice a similar evolution at La Grande Rivoire rockshelter, in the department of Isère (France), with the phase of symmetric trapezes probably being broken by flexion in the lower sequence and with larger asymmetric arrowheads broken by microburin technique in the upper layers (Nicod *et al.* 2012; see also Angelin *et al.* this volume). Even if this pattern must further be confirmed by complementary analysis in the Castelnovian area, this study highlighted the existence of different phases in the Second Mesolithic with the first stage with small symmetric trapezes corresponding to a phase of 'Castelnovianisation' (Kozłowski 2009) with a rapid diffusion of this phenomenon, and the second stage with large asymmetrical trapezes, which may correspond to a local cultural recombining as suggested by recent studies (*e.g.* Perrin *et al.* 2009).

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