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## The Montclus rock shelter (Gard) and the continuity hypothesis between 1st and 2nd Mesolithic in Southern France

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### ABSTRACT

Excavated in the 1960s, the Baume de Montclus rock shelter (Gard, France) contained a significant stratigraphic sequence covering the entire Mesolithic. The oldest layers (layer 30 to 17) belong to the first Mesolithic, and contain particular hyper-microlithic flint industries (Montclusian facies of the Sauveterrian). The overlying layers 14 to 7, underlying the Neolithic ones (layers 5 to 3), document a second Mesolithic sequence (Castelnovian). Layers 16 and 15 are the stratigraphical transition between those two main sets. The lithic industries from those two layers have characteristic elements referred both to the first and second Mesolithic. Generally, this duality was understood as evidence of the existence of a local transition facies between Sauveterrian and Castelnovian, and thus, of a permanent regional occupation. However, the analysis of spatial and stratigraphical data of those two layers 16 and 15, as well as that of their lithic industries, question this hypothesis. There is more probably a real break between the two main sets of occupation, Sauveterrian and Castelnovian. As generally noticed elsewhere in Southern France, we cannot highlight a transition facies between first and second Mesolithic. Consequently, the durability of human occupations at the end of the 6th millennium cal. BC in this region of Southern France is questioned.

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### 1. Introduction

The transition from the first Mesolithic to the second is a question which arises with a quite particular acuteness in Southern France. There, two large cultural blocks seem to be in confrontation: the Sauveterrian, which corresponds to the First Mesolithic, and the Castelnovian, corresponding to the Second Mesolithic. The switch from one to another is approximately dated to the second half of the 7th millennium cal BC. These two cultural groups differ from many points of view, and specifically on the processes of production of the lithic industries, the most plentiful available data. Their industries differ, from the raw materials procurements to the way of using tools. In the first Mesolithic, knappers used mainly local flints to produce thin and narrow bladelets, on small cores and by direct percussion techniques. Those bladelets are shaped into crescents and most often into triangles. In the Second Mesolithic, they used regional flints to produce large blades, on biggest cores and by punch and pressure techniques. Those blades are shaped

into trapezes by microburin techniques. All these differences highlight that this change not only concerns some technical or typological points but includes the whole technical system of the knappers, making it rather difficult to imagine a scenario of continuity, a technological transition in the know-how of the knappers. However, to imagine a total replacement of the population is hardly more credible. The truth is probably out there, somewhere between these two extreme positions. Due to the lack of recent excavations of stratified deposits with levels relating to these two periods, we can refer only to data from more or less old excavations to approach these questions. Furthermore, sites presenting occupations of these two periods are rare. Among these, the Montclus rock shelter dug by Max Escalon de Fonton during the 1960s plays an important role. From a historiographical point of view, some of its layers allowed the definition of a hyper-microlithic facies of the Sauveterrian: the Montclusian. Then, from a stratigraphical point of view, the Montclus rock shelter is one of the few sites of Southern France with layers referred to the whole Mesolithic sequence and even to the Early and Middle Neolithic. Thus, it allows following the evolution of the techniques of production of the lithic industries in a relatively stable environment in time. It is finally an important site because the data coming from these excavations was used to

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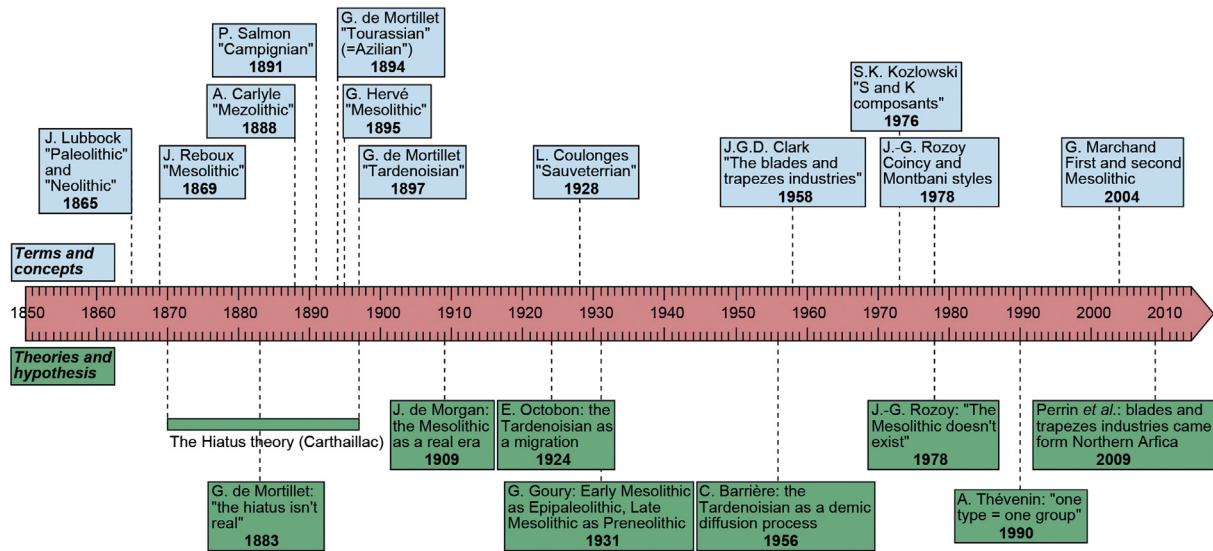


Fig. 1. Timeline of the main theories and hypotheses (below) as well as terms and concepts (at the top) relative to the Mesolithic.

formulate the main hypothesis of continuity between the first and the second Mesolithic, the existence of a facies of transition between the Sauveterrian and the Castelnovian, the Sauveterrian with trapezes. This hypothesis of the continuity between these two periods would be translated in the lithic productions by stability in both the flaking manners or the technological choices and the knappers' knowledge. This implies that the passage between the first and the second Mesolithic would correspond to a local evolution, a progressive transformation of the production line. Finally, this hypothesis suggests a permanence of hunter-gatherer populations during all this period. The aim of our work is to test the

relevance and the credibility of this hypothesis using the data from Montclus.

## 2. First and second Mesolithic

### 2.1. Chronological division of the Mesolithic

This distinction between two main phases during Mesolithic is not a new concept, at least in Southern France. From a historiographical point of view (Fig. 1), 'Mesolithic' was used for the first time in 1869 by Jules Reboux, shortly after John Lubbock's

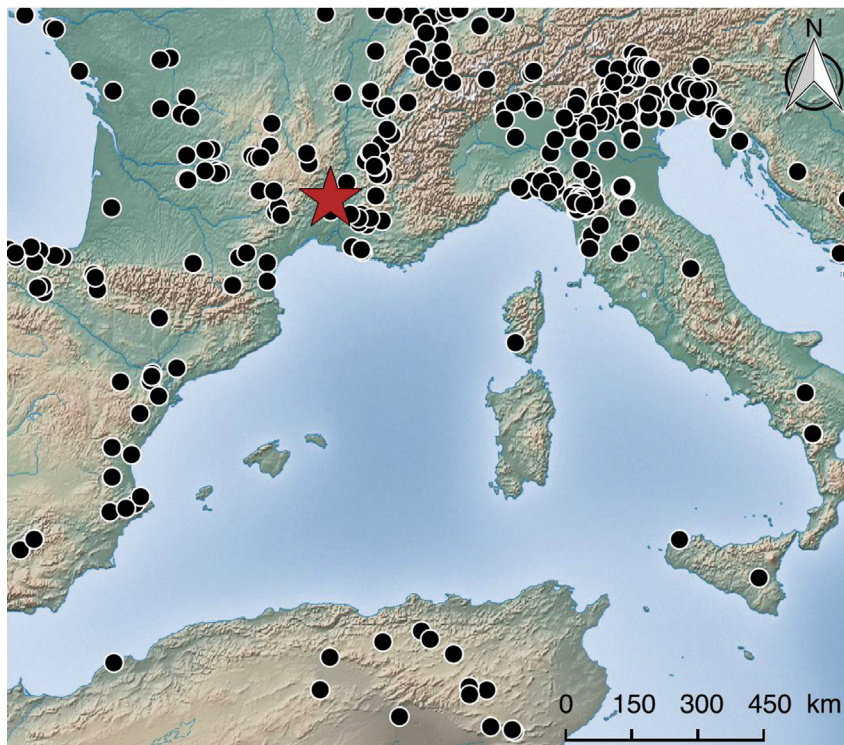


Fig. 2. Localization of the Montclus rock-shelter (red star) on the map of the main sites of the Second Mesolithic of the Western Mediterranean Basin. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

publication (Lubbock, 1865). de Morgan (1909) gave this term its almost current sense. Although the concept of 'Tardenoisian' appears very early in this story (Mortillet de, 1897), Sauveterrian was identified by Coulonges (1928) in southwestern France. It is during the 1920s – 1930s that the distinction between two major phases of the Mesolithic appeared (e.g. Goury, 1931). Immediately, some interpretations were built, sometimes very uncertain from an anthropological point of view. Examples include the works of Octobon (1924) and Barrière (1956), for whom the appearance of the Tardenoisian represents a migration. Clark (1958) highlighted the existence of the "blade and trapeze industries" and demonstrated that it is a European phenomenon, which he considered to be possibly related to the Neolithisation process. Kozłowski (1976) insisted on this differentiation, with his S and K components, but without linking them strictly to a demic diffusion. It is during these two decades of the 1970s and 1980s that we can see a shift in the understanding of this cycle. The accent is less and less put on the differences, but more on the criteria of continuity between the First and the Second Mesolithic, especially the works of Rozoy (1978) in France and Fortea Pérez (1975) in Spain. According to Rozoy (1978), both Coincy and Montbani styles coexisted in Southern France for about '5 or 10 centuries', and for him, the changes remain confined in the lithic industries. He wrote, 'there is nothing new under

foliage' (Rozoy, 1978, p. 925). The arguments of Rozoy, and after him Thévenin (1990), for this continuity hypothesis are based essentially on stratified sites with long sequences of occupations. In such sites, some mixed or transitional layers could be identified. Layers 15 and 16 at Montclus play a leading role in these discussions. Finally, in France, it is only in the last decade that the first and second Mesolithic concept reappears, especially after the works of Marchand (2004, published in 2008). At present, this bipartition of the Mesolithic in two main groups seems to have reached a consensus, in France at least. The First Mesolithic contains the phases traditionally attributed to the Early and Middle stages. In Southern France, it corresponds mainly to the Sauveterrian. The Second Mesolithic includes the Recent and Final phases of the traditional sequences, and corresponds mainly to the Castelnovian and its local versions in Southern France.

## 2.2. The first and second Mesolithic in Southern France

In this region, the lithic industries and especially the arrowheads are particularly illustrative of the change between the first and the second Mesolithic. To summarize in a very simplistic way, whereas the first Mesolithic is mainly characterized by thin and narrow bladelets that are shaped into crescents and most often into

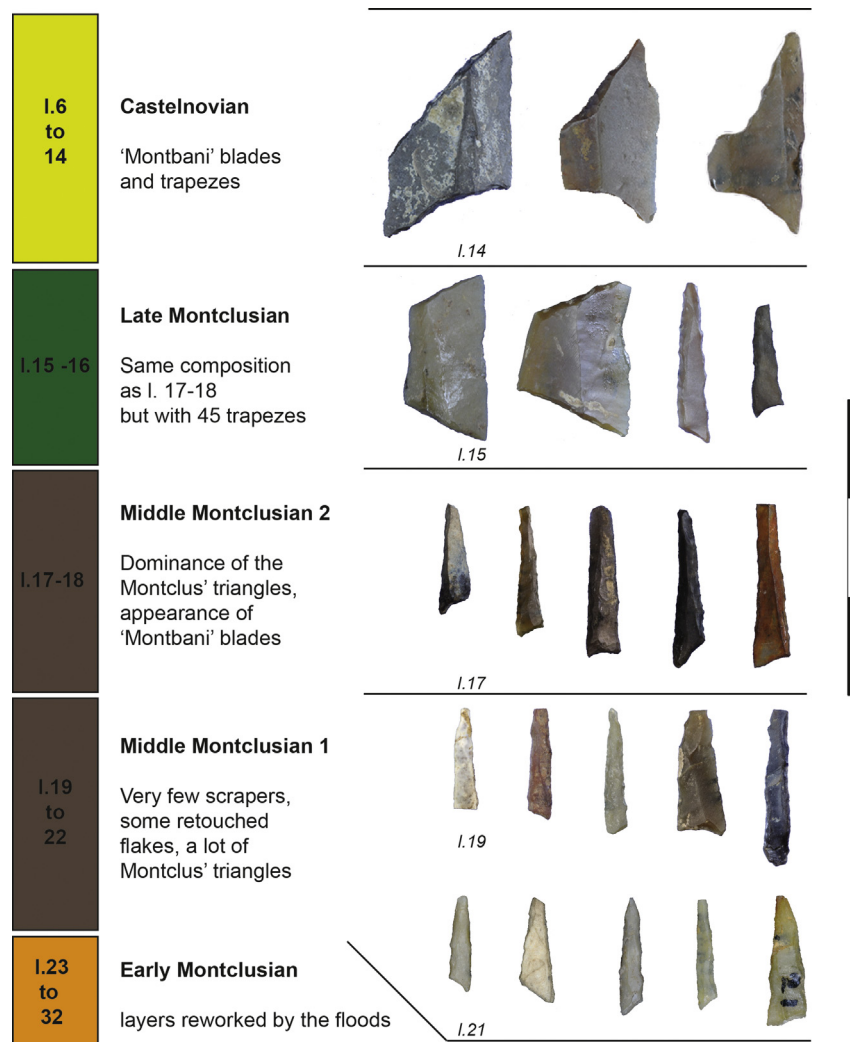


Fig. 3. Main characters of the lithic assemblages of the layers 22 to 14.



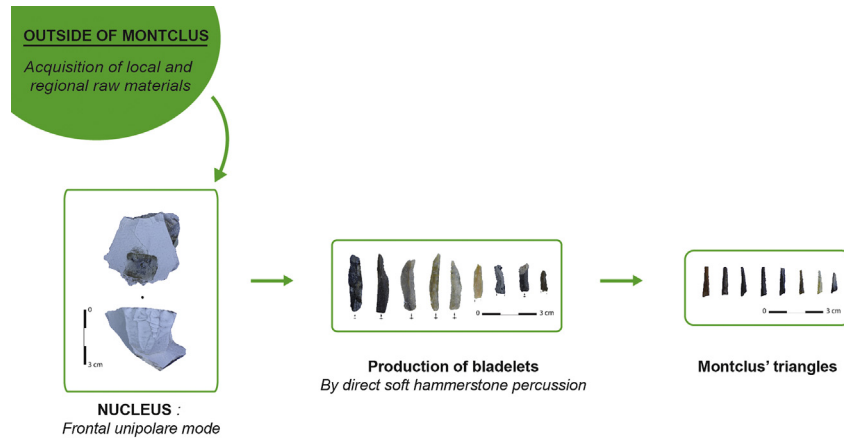


Fig. 4. Synthetic scheme of the bladelet production of layer 17 (Sauveterrian).

triangles, second Mesolithic assemblages include large blades and trapezes.

This difference in the arrowhead types concerns the ways of knapping. For example, the small bladelets of the First Mesolithic are mainly produced by direct percussion, often with a soft hammerstone, while the Second Mesolithic large blades are produced by indirect percussion and pressure techniques (Binder et al., 2012; Allard et al., in press).

This major change occurs during the 7th millennium cal. BC, several centuries before the Neolithisation (Perrin et al., 2009). It concerns the whole of Western Europe and Northern Africa, except Britain. This phenomenon was identified by Clark (1958), but until recently, we did not understand its origin or the modalities of its diffusion. Several collective and European projects in recent years brought new knowledge for a better understanding of this phenomenon. Coherent assemblages and reliable radiocarbon dates demonstrate that the origin of the blades and trapezes industries for Western Europe was probably somewhere in Northern Africa (Perrin et al., 2009, in press). The first step of this diffusion concerns the whole Western Mediterranean Basin, and is probably a process

of demic diffusion. The dissemination was extremely fast along all the coast of the western Mediterranean, hardly encompassing a few centuries, the "Mediterranean flash" (Perrin et al., 2009). Furthermore, this expansion of the phenomenon of the industries with blades and trapezes takes place without major modification of the technical system, suggesting a movement of people more than a distribution of concepts or technical practices. It is only during the second stage of this phenomenon, after 6000 cal. BC, that the process dealt more probably with a diffusion of concepts in pre-existent populations, even if we cannot fully exclude the obstinacy of some movements of populations. So, whatever the validity of all these hypotheses, the question we have to handle is: is there evidence of coexisting populations of the first and the second Mesolithic in Southern France?

### 2.3. A transition or a break?

According to Rozoy (1978) and Thévenin (1990), the most reliable proof of this coexistence is the Montclus rock shelter. This interpretation is especially based on the lithic assemblages of layers

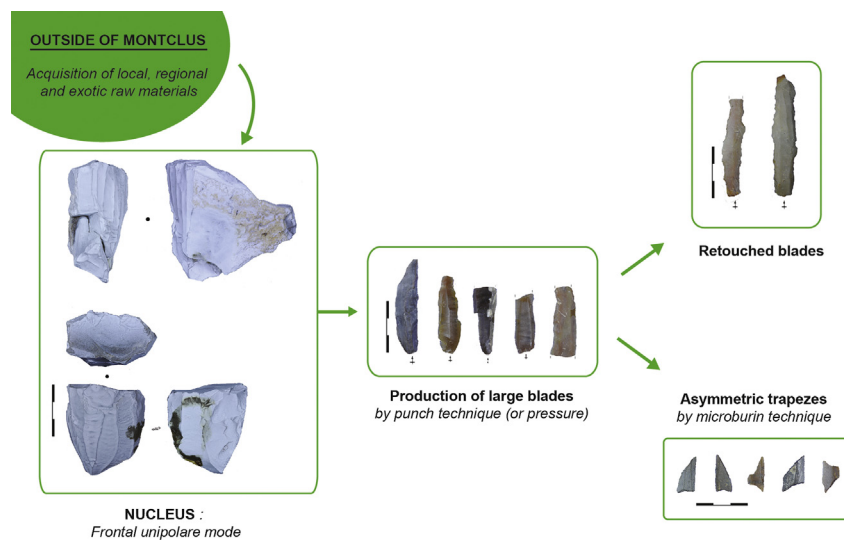


Fig. 5. Synthetic scheme of the laminar production of layer 14 (Castelnovian).

16 and 15. Rozoy created the concept of the ‘Montclousian with symmetric trapezes’. From a historiographical point of view, this rock shelter of Montclus is a crucial site for the construction of the Mesolithic sequence in Southern France. It is all the more surprising that the materials from these excavations were never correctly studied. Max Escalon de Fonton published only a few notes during the excavation itself (Escalon de Fonton, 1964, 1965, 1966, 1970), but no detailed data. Rozoy (1978) described some aspects of lithic and bone industries, but not exhaustively. Darmedru and Onoratini (2003) analysed the origin and the filiation of the Montclousian in a more recent paper, but the lack of reflection on taphonomic processes and some doubtful identification of certain lithic products limit this study. Before being able to identify a transition process within a site, it is necessary to know each of the upper and lower layers, both from the point of view of the material production and of the stratigraphy and of the chronology. It is essential to wonder about the coherence of the identified layers. If the stratigraphy of caves and shelters provide irreplaceable information for the recognition of the cultural sequences, they are also extremely convenient to assess taphonomical phenomena or more or less local disturbances. An archaeological layer within a stratified site complex as a cave or a shelter cannot be thus considered initially as a closed unit: it is necessary to demonstrate it first.

### 3. Montclus rock shelter

The site of Montclus is a rock shelter located in the department of the Gard, near the border with the Ardèche. It is 100 km from the sea, on the left bank of the river Cèze, at about 30 m from the river

itself, a tributary of the Rhône, 25 km from their confluence (Fig. 2). The river Cèze is incised and winds through limestones. It flows only a few meters away from the foot of the cliff, and its silts and sands, deposited during more or less periodic floods, gives rhythm to the whole stratigraphic sequence.

The site was discovered in 1954 by Max Escalon de Fonton during a systematic survey of the gorges of the Cèze. He then excavated the foot of the cliff from 1956 to 1971. His excavations show a very long stratigraphic sequence, from Middle Mesolithic to Late Neolithic (Escalon de Fonton, 1966, Fig. 68 p. 160). Layers 32 to 17 belong to the First Mesolithic, whereas layers 14 to 6 belong to the Second one. The layers which interest us here, layers 16 and 15, lie in an intermediate stratigraphic position. Throughout the sequence, from the Sauveterrian up to the Early Neolithic, the populations seem to have taken advantage of the resources of the river. Max Escalon de Fonton indicates very numerous fish remains at all the levels (these remains seem to be lost today...). The rock shelter is near plentiful siliceous resources, although of average to good quality. They are very present in particular in Cenozoic deposits some kilometers to the north.

All the archaeological levels identified by Max Escalon de Fonton are found in a sedimentary succession of about 4 m. The stratigraphy continues for an additional 4 m depth, but without traces of human occupations. The deepest part of this archaeological sequence, layers 32 to 23, gives only poor information. Those layers were seen only in a very limited survey, less than a square meter, and yielded very few materials. Above them, according to Rozoy (1978), we can divide the sequence into three main steps (Fig. 3). The first one concerns layers 22 to 19, and is called ‘Middle

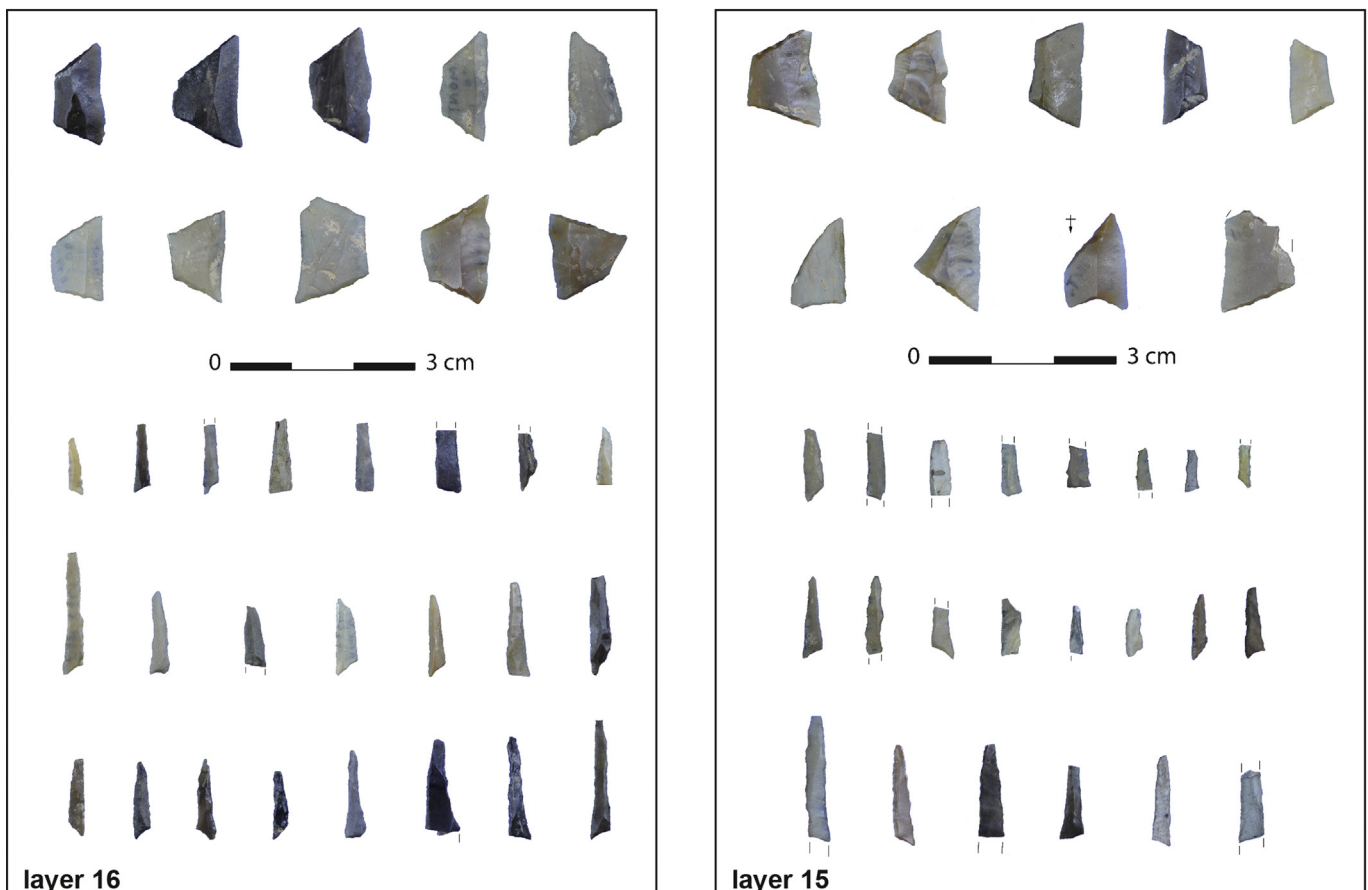


Fig. 6. Different arrowhead types of layers 16 and 15. Trapezes and triangles are present in both layers.

Montclusian 1'. Its main characteristics are some scrapers, some retouched flakes and many very small Montclus' triangles. The next stage is the 'Middle Montclusian 2', with layers 18 and 17. Scrapers and retouched flakes seem to be less abundant. The Montclus' triangles are still very frequent but are smaller. Some Montbani blades appear at this step. The later stage is called 'Late Montclusian'. It shows the same composition as layers 18 and 17, but with 45 trapezes. Above, layer 14 initiates the Castelnovian sequence where those trapezes are the common arrowheads. The lithic industry is sufficiently abundant in all these layers to obtain more detailed information. The hypothesis of the existence of a facies of transition between the First and Second Mesolithic implied considering as reliable the artefacts samples coming from layers 15 and 16. To do this, we are thus going to test the coherence of the lithic industries of layers 15 and 16 from technological and typological, functional and taphonomical, spatial, and chronological points of view.

#### 4. From the first to the second Mesolithic at Montclus

Before being able to estimate the homogeneity of possible levels of transition, it is thus essential to be clearly able to define the nature of the immediately preceding and later assemblages. For each of the criteria taken into account here (technological and typological, functional and taphonomical, spatial and chronological), we consider the data from these four layers: 14, 15, 16 and 17.

##### 4.1. Technological and typological approach of lithic industries

Layer 17 is just below those which interest us here. Its laminar production indicates a simple process (Fig. 4). Knappers mainly used local and regional raw materials, Cenozoic flints from sources 5–10 km distant. On those pebbles or plates, they produced narrow bladelets by direct percussion with soft hammerstones on flat striking platforms. All laminar sequences are unipolar and are often short. If the raw material allows it, several sequences could have been made on the same core. Most of those bladelets were retouched in Montclus' triangles, which are a kind of scalene

triangle, but the length of which is 4 times the width (Barrière et al., 1969 p.357; Valdeyron, 1991, p.219). Most are very small, less than 20 mm in length. Apart from those arrowheads, the flakes are sometimes retouched as scrapers or denticulates. There is a great contrast between the very small size of the triangles and the large size of the common tools, which are often around 10 cm long.

Layer 14 shows a completely different production (Fig. 5). There, although local and regional raw materials are still often used, we noticed the appearance of exotic ones, especially a blond flint type, probably coming from the banks of the Rhône. The 'debitage' is completely different, with a production of large blades along the unidirectional flaked surface on a narrow or a wide side of the core. There is no overhang abrasion, but a lot of faceted butts. The angle of percussion is often around or above 90°. All these points underline that this production was made by indirect percussion and perhaps pressure techniques. The blades are generally about 12 mm wide. They are broken by the microburin technique to transform them into trapeze arrowheads, mostly asymmetric. Some blades have also been retouched in Montbani blades. All those characteristics are clearly Castelnovian (Binder, 1987; Perrin et al., 2009; Binder et al., 2012).

From a typological point of view, layers 16 and 15 show Montclus' triangles and trapezes (Fig. 6), as noted since the excavations. However, it is hard to imagine how those two kinds of arrowheads could belong to the same production, at least for a simple and obvious question of the width of the supports. This simple fact suggests that they came from two different production lines. All the characteristic elements of both reduction sequences identified in layers 17 and 14 are present in layers 16 and 15. Two contradictory hypotheses can be moved forward to explain this unusual association: the first one supposes that both reduction sequences are strictly contemporary and even integrated within the same production, whereas for the second, these two reduction sequences are considered as chronologically successive and send back to two different productions.

In the present state of our new studies on the series, we were able to highlight no element suggesting a possible continuity

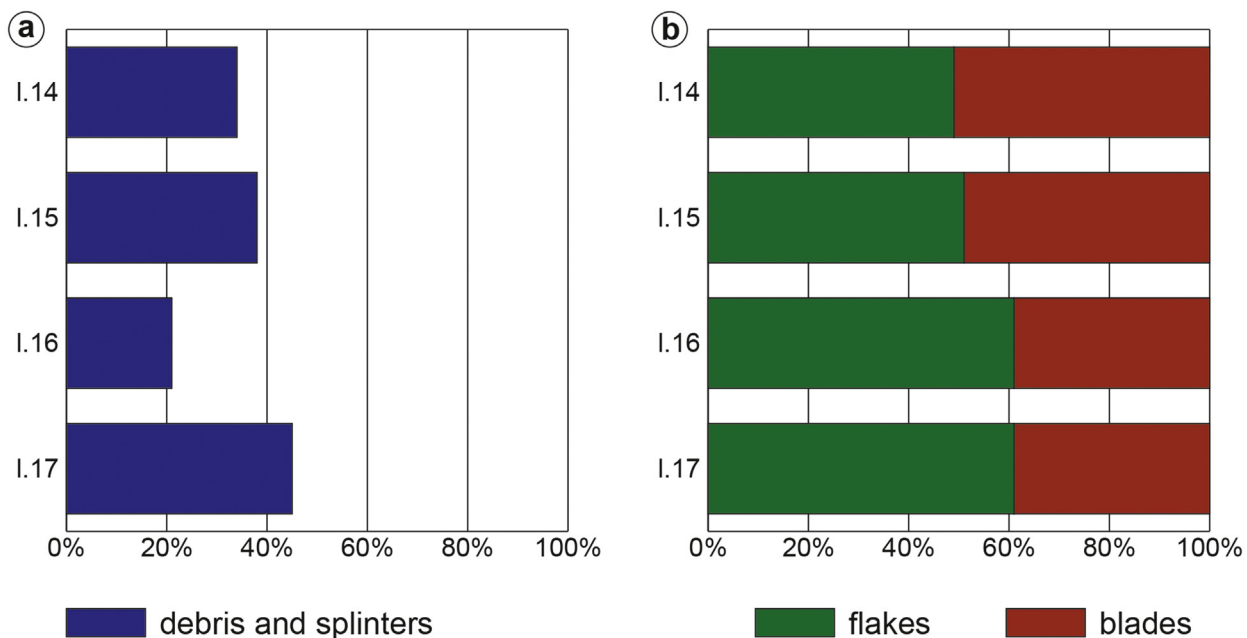
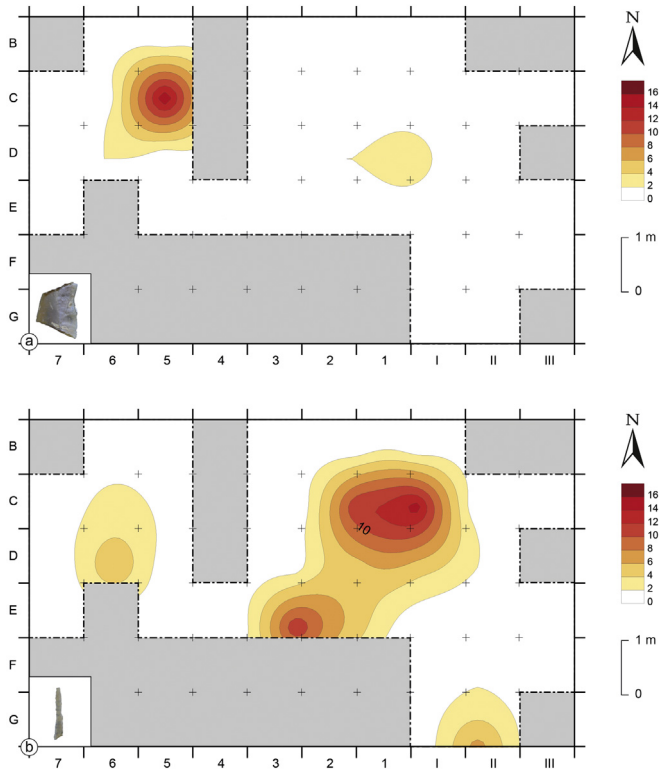


Fig. 7. On the left (a), relative proportions of debris and splinters relative to the total number of artefacts by layers, from layers 14 to 17. On the right (b), relative proportions of flakes and blades by layers.

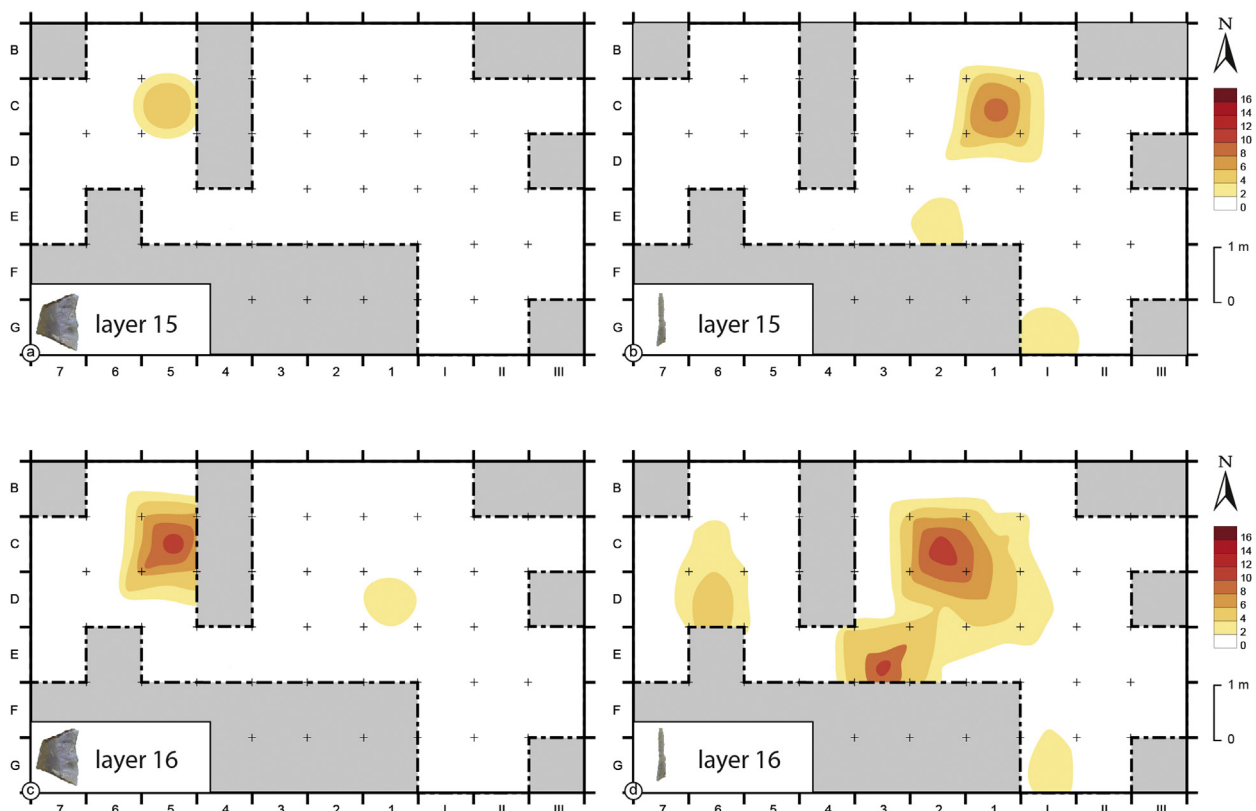


**Fig. 8.** Spatial evidence. At the top (a): planimetric projection of all the trapezes of layers 15 and 16; at the bottom (b): planimetric projection of all the triangles of layers 15 and 16.

between these two production chains. There is no laminar element of intermediate module between the Castelnovian wide blade type and the Sauveterrian narrow small bladelet type. There are no maintenance flakes which could suggest a reduction of large blade cores into small bladelets. It seems that these different laminar products result from two very specific and distinct reduction sequences. From a typological point of view, it implies that trapezes and triangles of layers 16 and 15 also refer to two totally differentiated production sequences. From an anthropological point of view, to admit the coherence of the assemblages of layers 16 and 15 would imply to admit that the same group of knappers could produce two types of blanks (intended for a function appreciably equivalent) simultaneously according to their needs, or that the human groups used within them two very opposed technical traditions. The hypothesis of a mixture of two asynchronous productions seems *a priori* more realistic. From a typological point of view, the only difference which we could find between the trapezes of layers 16 and 15 is that they are more symmetrical than in the overlying levels.

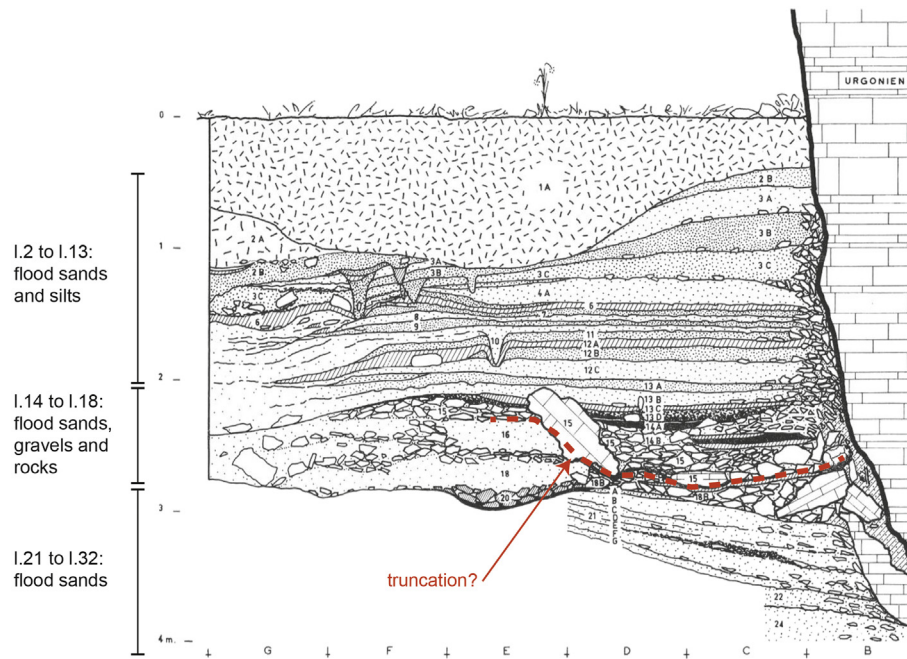
#### 4.2. Functional and taphonomical aspects

If we examine the composition of the lithic industries of each of those layers (Table 1), we can underline some significant points. First, the amount of debris and splinters tends to be reduced in each layer (Fig. 7a). Layer 16 shows a real anomaly with a low proportion of this technological category. Debris and splinters are good witnesses of the kind of occupation of pre-historic sites. They allow in particular to diagnose the existence (or not) of on-the-spot flint knapping. With other criteria, they also allow estimation of the intensity of the occupations of an archaeological site (Perrin et al., 2002). As the excavation



**Fig. 9.** Spatial evidence. Right: planimetric projections of all the trapezes of layers 15 (a) and 16 (c); left: planimetric projection of all the triangles of layers 15 (b) and 16 (d).





**Fig. 10.** South-north section of the Montclus rock-shelter (extract from Escalon de Fonton, 1970, Fig. 35 p. 533). Most of the layers are constituted by sands, with the exception of layer 15, the profile of which suggests the existence of partial erosion of layer 16 along the cliff.

methodology was similar for all layers, this difference between layer 16 and the others could be due to functional changes or to a taphonomic bias.

**Table 1**  
Distribution of the lithic industries of layers 18 to 14 according to the main technical categories.

N	Debris	Splinters	Blocks	Flakes	Blades	Cores	Total
l.14	464	393	27	761	782	64	2491
l.15	297	239	13	427	407	16	1399
l.16	329	194	20	1178	747	27	2495
l.17	578	270	2	627	398	11	1886
Total	1668	1096	62	2993	2334	118	8271

Considering the heaviest elements, we can examine the full 'débitage' pieces, and especially the blade: flake ratio. From this point of view, it seems that layers 16 and 17 show around 40% blades, while layers 15 and 14 show more than 55% (Fig. 7b). This difference is statistically very significant ( $\chi^2$  test = 36.8123,  $df = 2$ ,  $p$ -value = 1.015e-08). The operating modalities between layers 17 and 16, and layers 15 and 14, changed in a substantial way.

From those points of view, we can underline that layer 16 seems to be similar to layer 17, and that layer 15 is most similar to layer 14. Furthermore, layer 16 shows an abnormal composition of lithic assemblage, especially with a lack of small elements.

#### 4.3. Spatial evidence

The spatial distribution of all these artefacts shows significant differences. The position of the artefacts in space was not measured in three dimensions. The spatial approach can thus be made only by the annotations written on the objects themselves, on which the meters-squares and the layers from which they were

obtained are mentioned. In spite of this limitation, mapping of all the arrowheads for which we know the square meter from which they came clearly indicates that the two distributions of triangles and trapezes are totally different, almost exclusive (Fig. 8). On these two projections, we considered at first only the type of tool, without taking into account the layer to which they are attributed. This first projection shows that there is thus a contrast between triangles situated essentially in the eastern part of the site (B-G/3-III, Fig. 8b), and the trapezes mainly present in the western part (C-E/5-7, Fig. 8a). Secondly, if we plot the types of arrowheads according to layers, this exclusion between trapezes and triangles is reproduced both in layer 15 and layer 16 (Fig. 9). From a strictly planimetric point of view, there exists a clear difference between the spatial dispersal of both types of arrowheads. This suggests that triangles and trapezes are not mixed in the same layers, but that they belong to very different occupations. This planimetric dichotomy could translate into a functional partition between two contemporary groups, with two groups of knappers sharing a common space but using very different operating plans. It is, however, less credible that this bipartition reproduces exactly identically, from a spatial point of view, differences between two different and successive layers.

Unfortunately, the vertical position of the artefacts was not documented, and we cannot thus see if the exclusion in plan of trapezes and triangles is reproduced vertically. However, some interesting points can be underlined through examination of the stratigraphy.

The published stratigraphy indicates that the lower layers are mainly made of sands brought by the floods of the Cèze (Fig. 10). Layers 18 to 14, above them, show a very different composition. There, some flood sands are present, as in layer 16, but there are pebbles and cobbles. Above, the sedimentary composition changes, and layers 13 to 2 are sands and silts.

As the site is adjacent to the river, this sequence shows a significant contribution of sand. As those sands are mainly brought to the site by flooding, we have to consider possible impacts of the river on the coherence of the layers.

**Table 2**

Radiocarbon dates of the site of Montclus (all dates are calibrated with Calib7.0 software and IntCal13 calibration curve).

Layer	Sample	Reference	Author	Age (BP)	Std. Dev.	Technique	Two sigmas ranges (2s)	Reliability
I. 2B	charcoal	Ly-493	M. Escalon de Fonton	380	90	standard	1328/1951	doubtful
I. 4	charcoal	Ly-303	M. Escalon de Fonton	6300	140	standard	–5533/–4911	good
I. 4	bone	Ly-304	M. Escalon de Fonton	6140	140	standard	–5375/–4725	good
I. 4	charcoal	MC-694	M. Escalon de Fonton	6170	200	standard	–5520/–4619	good
I. 4	bone (ovis/capra)bone (ovis/capra)	Beta-253158	T. Perrin	6550	40	AMS	–5615/–5468	good
I. 5	charcoal	MC-695	M. Escalon de Fonton	6450	100	standard	–5613/–5224	doubtful
I. 5	bone (indet.)bone (indet.)	Beta-253159	T. Perrin	6360	40	AMS	–5469/–5229	good
I. 7	bone (capreolus)bone (capreolus)	Beta-253160	T. Perrin	6660	40	AMS	–5646/–5512	good
I. 7–8–9	charcoal	MC-728	M. Escalon de Fonton	6880	100	standard	–5983/–5626	good
I. 8	charcoal	Ly-494	M. Escalon de Fonton	6230	150	standard	–5481/–4808	doubtful
I. 10B	bone (Sus scrofa)bone (Sus scrofa)	Beta-253161	T. Perrin	6990	40	AMS	–5984/–5771	good
I. 12A sq. EIII. 12A sq. EII	bone (indet.)bone (indet.)	Beta-253162	T. Perrin	7170	50	AMS	–6207/–5923	good
I. 13B	bone (Capreolus)bone (Capreolus)	Beta-253163	T. Perrin	7190	50	AMS	–6210/–5987	good
I. 13D	charcoal	MC-729	M. Escalon de Fonton	7200	100	standard	–6343/–5850	good
I. 14	charcoal	Ly-495	M. Escalon de Fonton	6440	230	standard	–5795/–4846	doubtful
I. 14	charcoal	Ly-496	M. Escalon de Fonton	7020	140	standard	–6208/–5657	doubtful
I. 14B	bone (indet.)	Beta-253164	T. Perrin	7320	50	AMS	–6346/–6060	good
I. 15 D6	bone (Cervus)	Beta-255115	T. Perrin	7770	50	AMS	–6682/–6480	good
I. 16	bone (indet.)	Beta-253166	T. Perrin	7670	50	AMS	–6605/–6436	good
I. 16	bone	Ly-542	M. Escalon de Fonton	7540	160	standard	–6748/–6050	good
I. 18B	bone (indet.)	Beta-255116	T. Perrin	7720	50	AMS	–6641/–6467	good
I. 21F	bone	Ly-306	M. Escalon de Fonton	7780	250	standard	–7352/–6107	doubtful
I. 22	charcoal	KN-58	M. Escalon de Fonton	8130	240	standard	–7591/–6506	good
I. 22	charcoal	Ly-307	M. Escalon de Fonton	7770	410	standard	–7647/–5841	doubtful
I. 22	unknown	Ly-308	M. Escalon de Fonton	7750	340	standard	–7503/–6017	doubtful
I. 23	charcoal	MC-730	M. Escalon de Fonton	7950	100	standard	–7127/–6596	good

A more detail examination of the stratigraphy shows that layer 16 seems to be limited to the southern part of the profile (Fig. 10). This is a sandy and thick layer, directly over layer 18. Layer 15 shows a completely different composition. This layer does not contain sand, but is made of an accumulation of pebbles and blocks. Escalon de Fonton (1970) thought that it corresponds to a collapse of the cliff: this hypothesis needs new analyses before it could be accepted. The analysis of spatial data of an old excavation is a difficult exercise, especially in the absence of the primary field observations (no notes of excavations, no three-dimensional statement of objects). However, some points can be highlighted. Layer 16 would correspond to an accumulation of sands deposited by Cèze river flooding, between which some human groups lived in the site; these deposits would have been partially cut along the cliff. Layer 15 shows a very unusual profile, especially on its contact with layer 16. It is quite clear here that layer 16 was probably eroded in the northern part of the site before layer 15 was created. Although geomorphological analysis is lacking, this basin profile could result from flooding and fluvial erosion. Sometime later, layer 15 was deposited according to processes which remain uncertain, but which mobilized much more angular elements, blocks, and pebbles. If, in the absence of field surveys, we do not know the planimetric extent of layers 15 and 16, the observation of the dispersal of the various types of arrowheads suggests the existence of a real spatial exclusion. It seems then reasonable to think that this spatial dichotomy reflects two successive occupations in time. Layer 16 would be connected to the great majority, if not all, of the triangular armatures, in similar sandy deposits to those of the whole sedimentary sequence of the First Mesolithic. Layer 15 would be connected to all the trapezes, witnesses of an occupation by different groups under different environmental conditions.

#### 4.4. Chronological data

Finally, we can look at the  $^{14}\text{C}$  dates. There are 25, 15 made during the excavation, and 10 made in recent years by AMS (Table 2 and Fig. 11). For the moment, our efforts essentially concerned the top of

the sequence, Castelnovian and Early Neolithic. The Castelnovian sequence is now well dated between 6300 and 5600 cal. BC. The bottom part of the sequence, that of the First Mesolithic, was not able to be the object of new dating. Layer 18 is well dated to around 6500 cal. BC. The lowest part of the stratigraphy is much less well dated, and we do not know the precise dates of the earliest occupations, between 7500 and 6500 cal. BC. This bottom part of the sequence will be dated very soon, to pursue the chronological refinement of the site.

Layers 16 and 15 are dated by three radiocarbon dates, an old one and two recent. Two dates obtained recently (Beta-255115 for layer 15 and Beta-253164 for layer 16) supply almost similar results, between 6600 and 6400 cal. BC approximately. This range is similar to that of layer 18, and all those dates are statistically coherent (t-test at 95%). However, the bone fragment dated for layer 15 comes from square meter D-6, at the heart of the concentration of triangles (Fig. 8). This dating constitutes an additional argument to assert that triangles and trapezes belong to two different occupations. For the moment, this occupation of the First Mesolithic with triangles and which we could connect with layer 16, would thus be dated between 6600 and 6470 cal. BC approximately. The Second Mesolithic occupation, with trapezes, is not still directly dated but would take place between layer 16 and layer 14, between approximately 6500 and 6300 cal. BC.

#### 4.5. Interpretation

Finally, what can we conclude about all those typological, technological, functional, taphonomical, spatial and chronological evidence? There are only two arguments to see a transitional facies between the first and second Mesolithic in layers 16 and 15. The first one is the coexistence of trapezes and triangles in the same layers. The second one is the fact that layers 16 and 15 contain only small asymmetric trapezes, while layer 14 and layers above contain large asymmetric ones.

However, there are some spatial evidence suggesting that those layers are partially eroded, resulting from cliff collapse or river flooding. In all those cases, those layers cannot be considered as

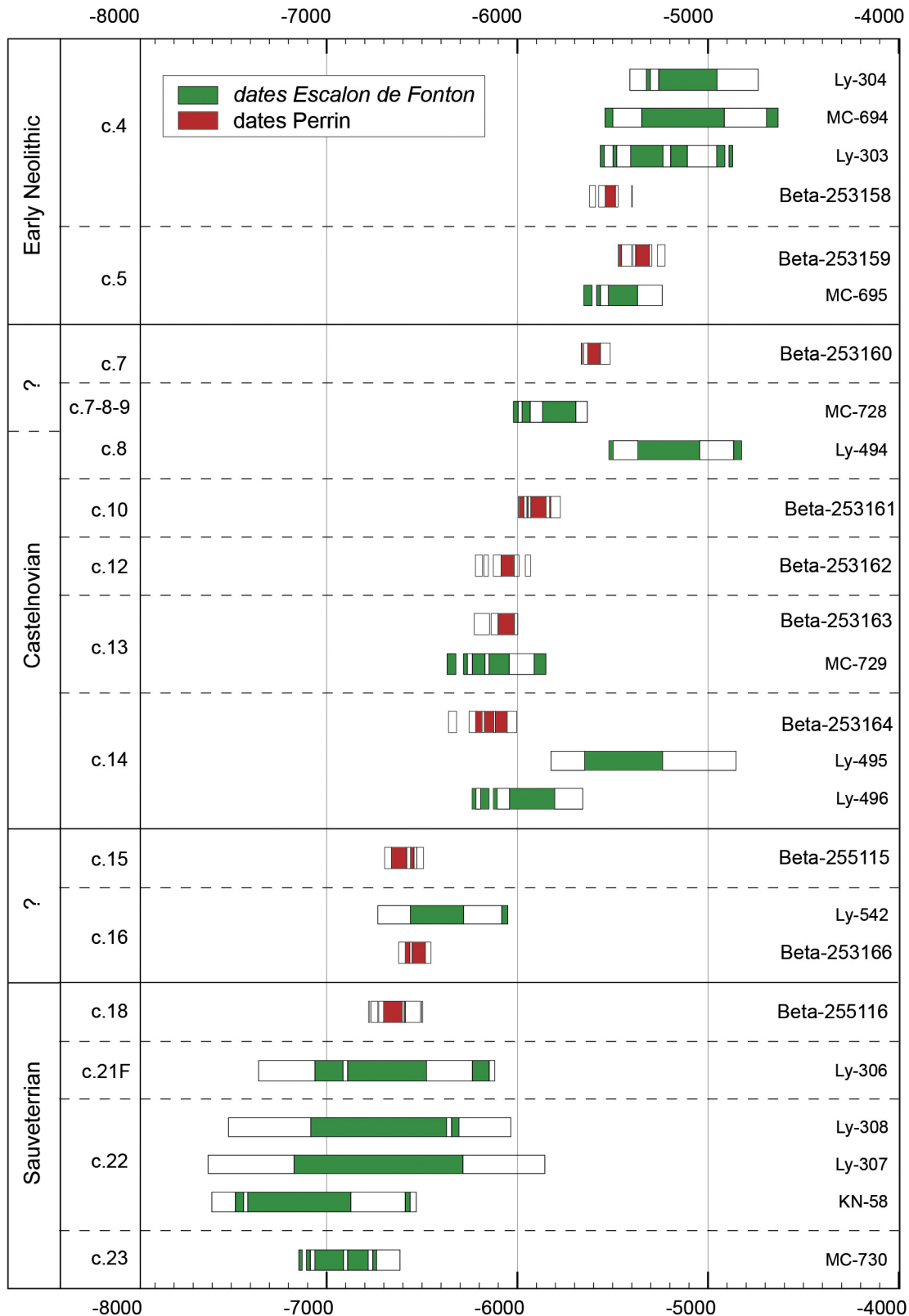


Fig. 11. Radiocarbon dates of the site of Montclus (all dates are calibrated with Calib7.0 software – cf. Table 2 for numerical values).

integral. There is a clear spatial differentiation between the triangles and the trapezes. Furthermore, trapezes and triangles clearly belong to two different production lines, from the raw material acquirement to the knapping technique. Finally,  $^{14}\text{C}$  dates suggest firstly, that layer 16 is quite contemporaneous with layer 18 and

secondly, that a gap of about three centuries could have existed between the last Sauveterrian occupations and the first Castelnovian ones.

More than a transitional facies between the first and the second Mesolithic, the evidence suggests that the lithic artefacts

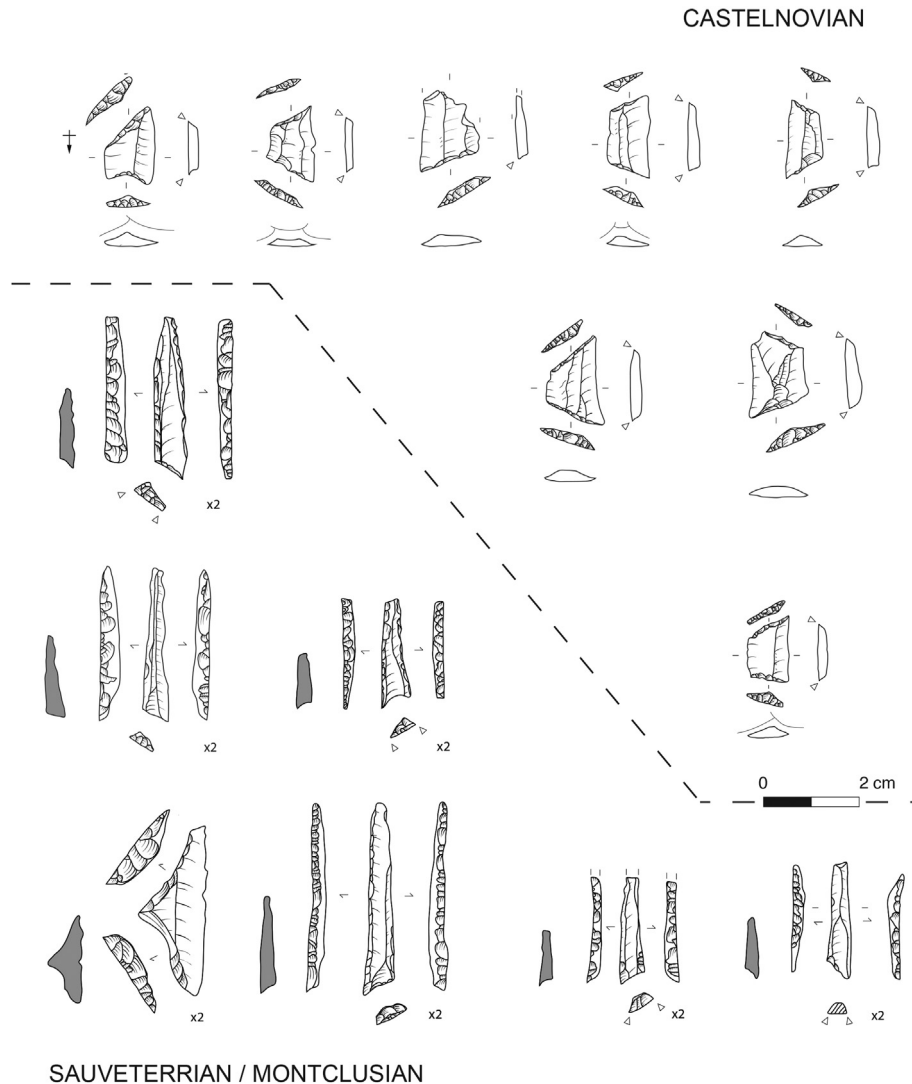


Fig. 12. Interpretation of layers 16 (at the bottom, Sauveterrian) and 15 (at the top, Castelnavian).

assemblages of these two layers result from some mixture of two different and successive occupations (Fig. 12). The first one would belong to the first Mesolithic and to the Montclusian sequence, with Montclus' triangles only. The second one would belong to the very first stages of the second Mesolithic, with small symmetric trapezes. These small and symmetric trapezes are particularly present in the first steps of the blades and trapezes' diffusion, around 6500 cal. BC (Perrin et al., 2009). So, from this point of view, the hypothesis of a first occupation with small symmetric trapezes would be in perfect coherence with this general framework.

Not much more can be said on all those points, and we cannot definitely demonstrate that the layers are mixed. However, there is enough evidence to discard a hypothesis of transition.

## 5. Conclusion

In Southern France at present, the Baume de Montclus was the main site used to defend the hypothesis of the existence of a phase of transition between the First and the Second Mesolithic. Nothing at Montclus excludes the hypothesis that this mixed facies resulted simply from the mixture of two very different occupations in time. The first one would fall completely within the First

Mesolithic, the Sauveterrian, whereas the second would fall completely within the Castelnavian. The dominance of small symmetric trapezes within the range of the arrowheads places it rather in an early stage of this culture, in agreement with the radiocarbon dating. The hypothesis according to which the first wave of the Castelnavian expansion on the Mediterranean banks would correspond to a population displacement would thus find there an additional argument. As occurred later during the Neolithisation of the same geographical space, interactions with the autochthonous populations of Sauveterrian traditions should have existed. In the field of the lithic industries, this resulted in original facies, but which we are struggling to identify. In a very general way for Southern France, most of the Mesolithic sites are always multi-stratified ones, and we cannot exclude that some taphonomical processes could have altered the deposits and created mixed assemblages. There is no open-air site with unique individualized occupations presenting mixed reduction sequences between the First and the Second Mesolithic. Is this a methodological problem, or does it indicate a full and whole historic reality? Only future research will tell us. At present, the hypothesis of an arrival of moving human groups of technical traditions (of Castelnavian types) very different from that of the native groups (of Sauveterrian types) thus seems to be plausible.



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