

# The Early Mesolithic Occupation of Mondeval De Sora (Belluno, Dolomites): A Residential Site or a Hunting Camp?

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## Introduction

Since the '70s of last century, when the first Mesolithic sites of north-eastern Italy were identified, the reconstruction of settlement strategies has represented one of the most investigated aspects of prehistoric research in this sector of the Alps. The hypothesis of a "vertical nomadism" model has thus been proposed with winter residential sites located in valley-bottoms and mountain hunting camps situated at the cross-way between the Alpine grassland and the forest (Broglio, 1992).

Opposite to most other mountain sites, characterized only by the presence of lithic artifacts, the extraordinary conservation of the depósitos of Mondeval de Sora 1 (S.Vito di Cadore, BL) has allowed the recovery also of organic remains and traces of dwelling structures delivering new elements for an evaluation of its functional role (Fontana and Vullo, 2000). The aim of this work is thus to delineate the main characteristics of the Early Mesolithic (Sauveterrian) occupation of this site by the adoption of a multidisciplinary approach.

Mondeval de Sora 1 site is located in the Cordevole valley, a sub-tributary of the Piave river, about 2,150 m a.s.l., at the centre of a wide basin, connected to the surrounding valleys by passes and saddles. Important occupation traces have been recovered on the south-western (sector I) and north-eastern (sector III) sides of a large boulder (Fig. 1). In particular, sector I, where excavation was carried out between 1987 and 2000 over a surface of about 60 sqm, has yielded a stratigraphic sequence about 50 cm thick, spanning from the ancient Mesolithic (Sauveterrian) to the modern age. It includes a recent Mesolithic (Castelnovian) burial accompanied by a rich set of grave goods and some Bronze Age dwelling structures (Alciati *et al.*, 1992). The Early Mesolithic (Sauveterrian) evidence contains a paved area made of local tufa slabs (SU 14), delimited by an arrangement of blocks of dolomite stones (SU 33) and a sub-circular structure, interpreted as a hearth (SU 32).



Fig. 1. The site of Mondeval de Sora with sector I on the right and sector III on the left.

Two anthropic layers covered these structures being located respectively in the inner (SU 8) and in the external part of the shelter (SU 31). Stratigraphic Unit 8, which is the object of this analysis, is constituted by a 20cm deep dark brown-black silty-sandy layer, rich in lithic artefacts, faunal remains and charcoals. S.U. 8 has been attributed to the middle and recent phases of the Sauveterrian on the basis of the techno-typological features of the lithic assemblage and of a radiocarbon date obtained from a charcoal sample (GX-21788- 9185 ± 240 BP, 9175-7731 cal BC) (Fontana and Vullo, 2000). As indicated by geomorphological studies during the Mesolithic occupation a small lake of pro-glacial origin was present in front of the erratic boulder while pollen analyses reflect an open Alpine environment close to the tree-line (Alciati *et al.*, 1992; Cattani, 1992).

## Materials and Methods

S.U. 8 has yielded about 20,000 lithic artefacts corresponding to 9 kilograms of flint raw material; more than 50% of the artefacts are not diagnostic from a techno-typological viewpoint since deeply altered by fire or smaller than 10 mm. The study has thus focused on 8,066 *débitage* products, 46 cores,

1,395 retouched pieces and 1,206 microburins (Fontana and Vullo, 2000). The techno-economical study has included the identification by a macroscopical approach of raw materials and their origin. The high number of altered elements has not favoured refitting; therefore the reconstruction of reduction sequences and *débitage* objectives only derives from the technological analysis of the artefacts collection. The typological study has been undertaken according to G. Laplace's list (1964).

For the functional study a sample of 266 pieces was selected, 48 of which are formal tools (32% of the total amount of tools), 204 armatures (6% of the total amount of armatures) and 14 blanks. Armatures include geometric microliths (triangles and segments, n. 61), backed points (n. 28), truncated bladelets (n. 27) and fragmented pieces (n. 88). The analysis has followed an "integrated approach" (Philibert, 2002) by means of an Optech stereomicroscope for low-power approach (magnification from 7X up to 45X) and a LEICA DMLN metallographic microscope for high-power approach (from 100X up to 200X). The fractures on microliths have been analysed according to the criteria proposed by Fisher et al. (1984), and confirmed by other authors (Philibert, 2002; O'Farrell, 2005).

The macrofaunal assemblage from SU 8 is composed of 83,711 remains. The specimens examined for this study are 2,284 including identified remains and the unidentified fragments longer than 2 cm. The archaeozoological study has been carried out on the whole assemblages by separating unidentified remains according to size classes. A high degree of fragmentation due both to anthropic activities and post-depositional factors has been observed. Identification at a species level, calculation of the minimum number of individuals, estimation of the age at death and age classes has followed the classical methods. Age at death has been estimated on the basis of the degree of dental eruption and attrition, and on the state of ossification of long bones.

A taphonomical analysis has been aimed at defining the preservation degree of the bone surfaces and to distinguish edafic and anthropic modifications using a LEICA MZ6 stereomicroscope. A detailed observation with a scanning electron microscope of the marks has been done on replicas produced with silicic elastomer (Provil Novo © Bayer-Leverkunsen) and eposidic resina (Araldite LY554 © and Hardener HY956 ©).

## Results

### 1. Techno-economical and typological analysis of the lithic assemblage

The raw materials exploited for lithic manufacture are mostly exogenous. Their provenance can be traced within the Jurassic and Cretaceous formations outcropping along the Prealpine belt and are dominated by Scaglia Rossa formation. Preliminary studies support that these were mainly imported from the Piave valley-bottom, about 20-40km from the site as the crow flies, within an embedded

procurement system. Strictly local Alpine flints (Livinallongo formation and local conglomerates) were also exploited, while a few artifacts are obtained from hyaline quartz the origin of which can be traced further north in the metamorphic formations of the inner Alps.

The technological analysis has highlighted that *débitage* was mainly aimed at the production of a set of blanks spanning from micro-bladelets to micro-flakes with lengths shorter than 40 mm, using as supports small blocks and thick flakes (Fontana and Guerreschi, 2009). *Débitage* started from the exploitation of natural angles or the ventral surfaces of flakes passing to a frontal and *semi-tournant* exploitation with some bidirectional and orthogonal re-orientation over the same or adjacent surfaces.

Retouched artifacts are dominated by fragmented backed elements (n. 880). Considering entire specimens (n. 349) armatures are more abundant than tools (n. 166). Microburins are also very numerous (n. 1,206). Among armatures, triangles dominate (n. 126), in particular long scalene types with three retouched sides (cfr. Montclus) (n. 117) followed by backed points (n. 84) truncated backed bladelets (n. 77) and segments (n. 50) (Tab. 1).

Mondeval de Sora SU 8		
ARMATURES	N	%
	1.229	100
Backed points	84	6,8
Backed bladelets	19	1,5
Truncated backed bladelets	69	5,6
Triangles	126	10,2
Trapezes	1	0,1
Fgmts of truncated backed bladelets	129	10,5
Fgmts of backed pieces	751	61,2

Tab. 1. Mondeval de Sora, US 8, microliths typological table.

Among tools endscrapers (n. 39) and truncated pieces (n. 47) are the best represented, and are associated to some denticulates (n. 26), *pièces écaillées* (n. 12) and burins (n. 11) (Tab. 2).

Mondeval de Sora US 8		
TOOLS	N	%
	166	100
Burins	11	6,7
Endscrapers	39	23,6
Truncated bladelets	47	28,4
Perforators	1	0,7
Scrapers	4	2,4
Backed flakes	9	5,5
Denticulates	26	15,7
<i>Pièces écaillées</i>	12	7,4
Fgmts of tools	16	9,6

Tab. 2. Mondeval de Sora, US 8, tools typological table.

## 2. Functional analysis of a sample of artifacts from S.U. 8

The functional analysis of the selected sample has shown the presence of alterations over around 87% of artifacts

with higher percentages of soil sheen (68%), thermoclastic traces (10,5%) and white patina (4%). Among 48 formal tools, 18 are characterized by use-wear traces (37,5% of the analyzed sample; Tab. 3).

	Scraping hard animal materials	Scraping hide	Scraping soft animal materials	Cutting soft animal materials	Scraping wood	Engraving/cutting wood	Scraping mineral materials	Chopping hard materials	Scraping medium-hard materials	Cutting medium-hard materials	Cutting soft materials	Impact	Total
End-scrapers	3	2	1	1	1								8
Truncated bladelets	1	1	2			2							6
Denticulates	1			1									2
Burins							1						1
Backed blades													-
Pièces écaillées								1					1
Flakes	2								2	1	1		6
Triangles/Segments	1			1								20	22
Backed points												9	9
Truncated backed bladelets	2								1			37	40

Tab. 3. Mondeval de Sora, US 8, use-wear traces classified according to typology and activities

The microscopic traces observed (polish and striations) are not marked, an aspect which is mostly due to the low intensity of their use. Transversal actions dominate (17) over longitudinal (6). The latter are mostly carried out on medium-hard and soft materials, especially leather (2 cases), meat tissues (2 cases) and vegetal materials (2 cases). Among armatures 71 items are characterized by diagnostic use-wear traces (34,8% of the sample), most of which are macroscopic impact traces (66 cases, Fig. 2). Only two items (2 geometric microliths) show polish and scars which are not related to their use as throwing weapons: one case is connected to the scraping of hard material while the other one was used first as a projectile, and then as the element of a knife for leather processing.

observed and their distribution have allowed to recognize a lateral fixing (as *barbelures*) for most geometrical microliths (18 cases), while only two specimens have been hafted according to an axial fixing as perforating elements. The typology and location of the traces identified on backed points fit with an axial hafting on the shafts.

## 3. Zooarcheological and taphonomical analysis of macrofaunal assemblage from S.U. 8

The identified specimens represent 26% of the sample. Regarding the composition of the faunal assemblage, on the basis of the Number of Identified Specimens and the Minimum Number of Individual (Tab. 4), red deer is the

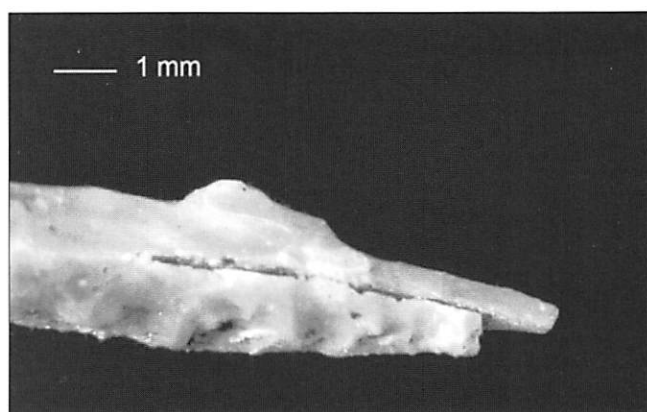


Fig. 2. Mondeval de Sora, US 8, impact macro-trace on a double backed point (bar length: 1 mm).

Mondeval de Sora SU 8		
TAXON	NISP	MNI
	593	62
<i>Canis lupus</i>	1	1
<i>Vulpes vulpes</i>	1	1
<i>Ursus arctos</i>	11	2
<i>Sus scrofa</i>	12	2
<i>Cervus elaphus</i>	336	27
<i>Capreolus capreolus</i>	20	5
Cervidae	2	
<i>Capra ibex</i>	153	11
<i>Rupicapra rupicapra</i>	31	8
<i>Capra sp.</i>	24	4
<i>Bos primigenius</i>	2	1

Tab. 4. Mondeval de Sora, US 8, NISP and MNI per taxon.

On the base of experimental studies (Philibert, 2002) we have tried to identify the type of microliths hafting. Traces

most represented species (MNI 27), followed by ibex (MNI 11), chamois (MNI 8) and roe deer (MNI 5). Some remains of wild boar have been identified, while carnivores such as wolf, fox and bear are scarce. Age at death reveals that the majority of species belongs to adults although some young individuals are present except for the aurochs and the wolf. Red deer and ibex are represented by almost all anatomical elements, showing the introduction in the site of the whole carcasses.

The under-representation of the post-cranial skeleton is probably due to intentional bone fracturing aimed at extracting the marrow.

The spatial distribution of faunal remains shows that identified specimens are mainly concentrated in the central part of the area occupied by S.U. 8 (Fig. 3) while

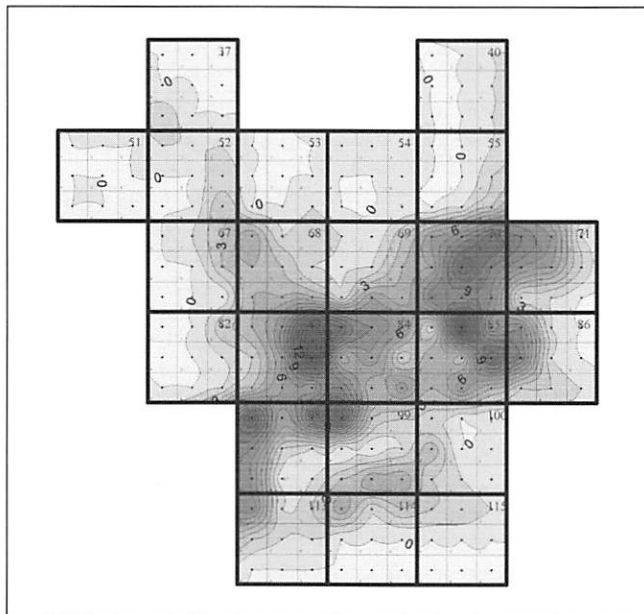


Fig. 3. Mondeval de Sora, US 8, spatial distribution of faunal identified specimens.

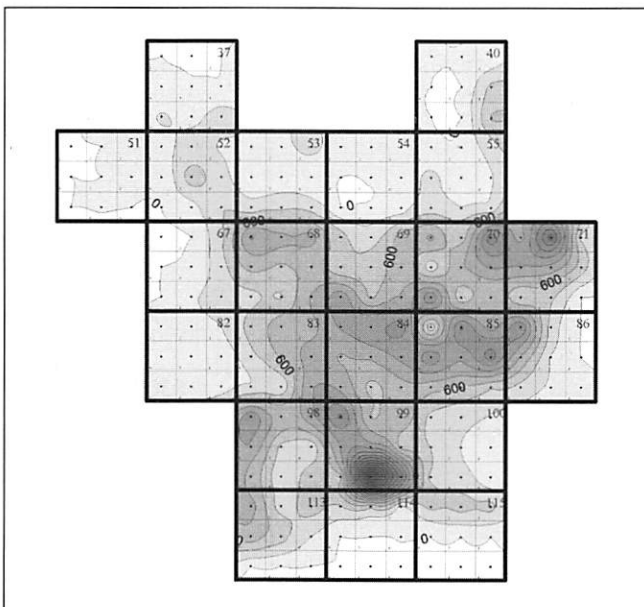


Fig. 4. Mondeval de Sora, US 8, spatial distribution of faunal fragments smaller than 2 cm.

unidentified remains are located in the surrounding zones with some concentrations of fragments smaller than 2 cm (Fig. 4). A previous work of spatial analysis carried out on lithic artefacts had allowed to interpret the area occupied by S.U. 8 as a "complex multifunctional area" for blanks' production, manufacturing and replacing of armatures on the shafts and other domestic activities, such as the processing of carcasses (Fontana and Vullo, 2000). Taphonomical analyses have showed that the assemblage is characterized by a high degree of fragmentation caused both by anthropic activity and post-depositional factors (Tab. 5). Evidence of exfoliation, erosion and weathering cracks has been recognised on the bone surfaces. A fair

Mondeval de Sora SU 8		
Modification	NR	%NRT
Cutmarks	79	3,4
Intentional breakage	208	9,1
Rodents marks	20	0,8
Carnivore gnawing	4	0,2
Root etching	106	4,6
Weathering	174	7,6
Erosion	102	4,4
Exfoliation	23	1

Tab.5. Mondeval de Sora, US 8, Absolute frequency of the different categories of alterations on bone surfaces.

number of remains is interested by root-etching. Rodents and carnivores marks are rare, revealing their occasional occupation of the site.

The good degree of preservation of the bone surfaces has enabled to recognise cut-marks related to slaughter. Butchery marks are present on about 3% of the total amount of remains. Most cut-marks were observed on unidentified specimens, especially shaft fragments. Skinning and disarticulation marks produced by the sharp edge of a lithic tool have been detected on a few remains of red deer and ibex. Cut-marks and scraping are present on a few long bones and can be attributed to muscle mass removal actions. SEM analysis has allowed to identify the micromorphological characteristics referable to the sliding edge of a lithic tool. Bone intentional fracturing is the best represented anthropic modification as it is documented by the presence of notches, impact points, percussion cones and cortical and medullar detachments. The high quantity of percussion cones (n. 153) confirms an intensive intentional bone fracturing. Burned bones are well documented amounting to 21% (17,713).

## Discussion

The results presented in this paper allow to interpret Stratigraphic Unit 8, the main Sauveterrian habitation layer in the site of Mondeval, as a palimpsest formed by several occupations. The presence of dwelling structures indicates the seasonal residential character of the site while results



of the analysis of the archaeological record delineate a functional emphasis towards the procurement and exploitation of animal carcasses. This vocation is reflected by several aspects: the composition of the lithic industry (around 1,000 armatures mostly fragmented over about 1,400 retouched artefacts that compose the assemblage and a corresponding number of microburins documenting on site manufacturing of armatures), the results of functional analyses of the lithic assemblage (dominating impact fractures on microliths associated to meat and leather processing traces on formal tools and flakes and, more rarely, to hard tissues processing such as scraping the periosteum in order to facilitate bone fracturing and marrow extraction) and of taphonomical investigations of macrofaunal remains (high degree of fragmentation mostly due to anthropic activity, high number of percussion cones, repetitive fragmentation patterns, long bones almost exclusively represented by epiphysal parts, skinning and disarticulation traces). In particular, the presence of the almost complete skeletons of red deer and ibex allows to advance the hypothesis that the carcasses introduced in the site were the object of processing aimed at a direct consume of the most perishable parts (bones fragmentation aimed at bone extraction), and the preparation and conservation of other portions, particularly meat, to be transported outside the site. Two main hypotheses can thus be proposed for the possible role of the site of Mondeval within the regional settlement pattern: "residential hunting site" occupied by entire familiar groups or "specialized hunting camp" of task groups. The absence of anthropological remains from young individuals and of other evidences such as possible *débitage* sequences operated by apprentices cannot allow an *a priori* exclusion of the first hypothesis.

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