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Article

The Mesolithic lithic assemblage of site VF1-sector III of Mondeval de Sora (Belluno, Italy). Economy, technology and typology

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Key words

- Sauveterrian
- Dolomites
- lithic raw materials
- reduction sequence
- diachronical evolution

Parole chiave

- Sauveterriano
- Dolomiti
- materie prime litiche
- sequenza operativa
- evoluzione diacronica

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Summary

The Mesolithic lithic assemblage of site VF1-sector III of Mondeval de Sora (BL, Italy). Economy, technology and typology. Site VF1 (2,150 m a.s.l.) is located in the wide Mondeval de Sora basin (Belluno, Italy), protected by a dolomite erratic boulder. Sector III is characterized by a well preserved stratigraphic sequence, attesting Mesolithic, Bronze Age and historical occupations. Radiocarbon dates are available for two Mesolithic stratigraphic units, supporting the archaeological attribution of these layers to the Sauveterrian. The typological analysis of the lithic assemblages from the whole Mesolithic sequence along with the reconstruction of provisioning systems and reduction sequences has allowed the contextualization of the early Holocene frequentation of this sector. Evolution of techno-typological and economic parameters through time is highlighted by the comparison between different Mesolithic layers. The picture obtained fits well the general Sauveterrian sequence of the south-eastern Alps.

Riassunto

L'insieme litico mesolitico del sito VF1-settore III di Mondeval de Sora (Belluno, Italia). Economia, tecnologia e tipologia. Il sito VF1 (2.150 m s.l.m.) si trova nell'ampia conca di Mondeval de Sora (Belluno), protetto da un masso erratico di dolomia. Il settore III è caratterizzato da una sequenza stratigrafica ben conservata, con evidenze di frequentazioni durante il Mesolitico, l'età del Bronzo e l'epoca storica. Le datazioni radiometriche disponibili per due livelli mesolitici supportano l'attribuzione di queste unità stratigrafiche al Sauveterriano. L'analisi tipologica degli insiemi litici provenienti dalla sequenza mesolitica, assieme alla ricostruzione delle strategie di approvvigionamento e delle catene operative permettono di ben inquadrare la frequentazione antico olocenica di questo settore. Sulla base del confronto tra i diversi livelli è stato possibile evidenziare che l'evoluzione diacronica di alcuni aspetti tecno-tipologici ed economici ben si integra nel quadro del Sauveterriano dell'area alpina sud-orientale.

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Fig. 1 *- Site VF1 of Mondeval de Sora located under a large erratic dolomite boulder. Sector III lies on the left side and sector I on the right one. / Il sito VF1 di Mondeval de Sora situato sotto un grande masso erratico di dolomia. Il settore III si trova sul lato sinistro e il settore I su quello destro.*

Introduction

The object of this paper is the lithic assemblage yielded by site VF1-sector III, of Mondeval de Sora (S.Vito di Cadore, Belluno, Italy). The importance of this site for the reconstruction of Mesolithic high mountain occupation in the Alps is related to its exceptional preservation that has allowed the survival of a rich lithic assemblage, organic remains and dwelling structures. In particular, sector III presents a high resolution stratigraphic sequence, in which different Mesolithic Stratigraphic Units have been detected. Results of the techno-economical and typological analysis of these Mesolithic layers are here presented aiming at highlighting possible evolutionary trends along the sequence and comparing them to the evidence available for other contemporary sites of the south-eastern Alps.

The study area

Site VF1 is located under a large erratic boulder at the center of the wide Mondeval basin at an elevation of 2,150 m a.s.l., surrounded on the western, northern and eastern side by Dolomitic reliefs and facing south on the Cordevole valley with a steep slope. It is connected by passes and saddles to the surrounding Boite and Zoldo valleys. From sector I, lying under the south-western side of the boulder, comes a thick layer (SU 8) rich in organic and lithic materials and a series of dwelling structures which have been referred to the Sauveterrian period (Fontana & Vullo 2000, Fontana & Guerreschi 2005, Fontana *et al.* 2012). This sector is also well known for the discovery of a Castelnovian burial accompanied by a rich set of grave goods (Fontana *et al.* in press).

Sector III is located on the northern side of the boulder and is characterized by a 50 cm thick stratigraphic sequence (Fig. 1), attesting the occupation of the site during the Mesolithic, the Bronze Age and the historical period (Fontana *et al.* 2009, Fontana *et al*. 2015). Archaeological investigations in this area, carried out between 1996 and 2000, have covered a surface of *ca.* 30 m^2.

The Mesolithic sequence consists of five main stratigraphic units (10, 20, 21, 30, 32) probably representing three main frequentation phases (Valletta 2013) (Fig. 2). In the eastern sector of the excavated area three SUs are superimposed one to another: the sequence starts with SU 10, followed by SU 21 and SU 32, the latter lying upon an archaeologically sterile layer. In the western sector SUs 20 and 30 are separated from the previous series by a preliminary test-pit (see further). These units, separated from one another by a recent bioturbation, lie directly on the sterile soil. Together with SU 10 they represent a single frequentation phase, later than SU 21. Two further layers are considered not reliable for archaeological comparisons: SU 10 “test-pit”, that was identified during a preliminary stratigraphic test-pit and corresponds to

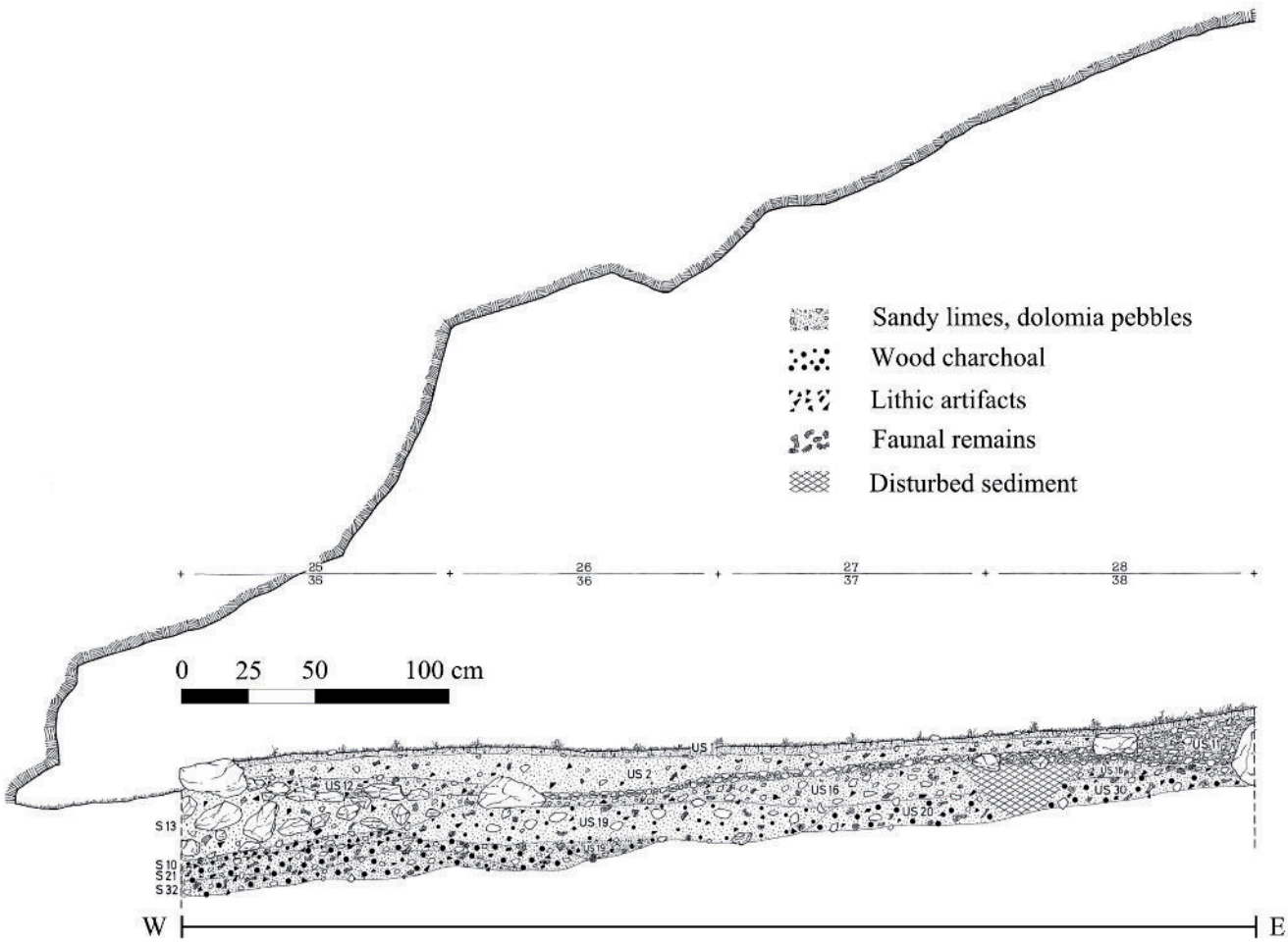

Fig. 2 *- VF1, sector III: longitudinal profile. / VF1, settore III: sezione stratigrafica longitudinale.*

SUs 10-20-30 and 21 (recognized by the extensive investigation), and SU 29, that is located above SU 30 in the outer area of the site but it is partially disturbed by later occupations. Two ^{14}C dates are available respectively for SU 32 (GX-27748: 9,160 ± 90 BP, 8,613-8,243 cal BC) and SU 10 (GX-21797: 8,445 ± 50 BP, 7,587-7,370 cal BC) attesting the attribution of these layers to the Sauveterrian phase of the Mesolithic. The first one refers to the end of the Preboreal and the second one to the Boreal.

The upper part of the sequence is characterized by layers of protohistoric (Bronze Age) and historic age. Concerning the latter, SU 11 yielded two roman coins respectively attributed to Emperors Theodosius I (388 - 393 CE) and Constantine I (306 - 337 CE) or Constans I (337 - 350 CE) that allow a *post quem* dating of this layer and the ones that cover it to the IV century A.D. (Fontana *et al.* 2005).

Methods

This study is focused on the analysis of the chert assemblages from the Mesolithic layers of site VFI-Sector III of Mondeval de Sora. A small quantity of hyaline quartz artifacts was also recovered from the same layers, but it will not be included in this analysis.

The chert assemblage has been studied according to the *chaîne opératoire* approach in order to reconstruct lithic reduction sequences from raw material procurement to discard. Non-orientable *debris*, burned items and items smaller than 5 mm have been separated and counted, while all other elements (*i.e.* retouched blanks and non-retouched blanks bigger than 5 mm and cores) have been singularly analyzed.

In order to reconstruct raw material procurement strategies, the geological sources of the exploited cherts have been identified by comparing geological and archaeological samples by naked eye and microscopic observations (with a Leica MZ6 microscope). The original shape of the raw material exploited has been reconstructed on the basis of cortical surfaces on blanks and cores.

The technological analysis of cores consisted in the description of the reduction methods, considering the relationship between striking platforms and flaking surfaces and the modality of reduction of the latter (frontal, *semi-tournant* etc.). Each blank has been described according to the phase and the specific role occupied in the reduction sequence. In order to identify the final objectives of *débitage*, production blanks have been defined according to simple typometrical data and to their morphology. Typometrical data (*i.e.* length and width) have also been noted for the scars visible on the core surfaces. Discard patterns have been reconstructed on the base of cores size, the phase of the reduction sequence in which reduction was interrupted and the cause that presumably led to their abandonment. In addition to technological analysis, retouched items have been classified according to Laplace's typological list (1964).

Results

The studied assemblage amounts to a total of 5,528 items diagnostic for the reconstruction of reductions sequences (Tab. 1).

Raw material provisioning

Considering the different Stratigraphic Units alltogether, most of the exploited raw material comes from the formations of Scaglia Rossa (45%), Maiolica (20%) and Scaglia Variegata (9%) outcropping on the southern slope of the Belluno Valley, in the Alpago and Longarone areas (Tab. 2) (Visentin *et al*. submitted). Furthermore, the exploitation of local Alpine cherts from the Livinallongo formation (8%) is attested.

Some variability concerns the cortical/non-cortical ratio between local and regional raw materials. The higher incidence of cortical elements on Livinallongo chert artefacts (20% against a 14% incidence of cortical elements on the whole assemblage) can be related to the introduction in the site of some non-prepared blanks of this raw material. The generally low incidence of cortical elements in the whole assemblage suggests that the raw material blanks were preferably carried into the site after a preliminary shaping.

The reduction sequence

Raw materials are mostly exploited as small sized blocks and portions of nodules (74% of the cortical blanks), but along the Mesolithic sequence the reduction of thick flakes is also constantly attested (18%). The higher incidence of cores on flake than of burins suggests that most of the items described as "burin spall" (*i.e.* bladelets with a triangular section detached from a flake edge) could actually correspond to the initialization of *débitage* on the edge of a flake.

The analysis of cores (Fig. 3: a, b) has allowed the identification of one main reduction sequence generally carried out from one single platform according to a *semitournant* method. More rarely, a frontal large or narrow modality from a single plain striking platform is also documented.

The production of *plein débitage* blanks was alternated to the removal of flakes (*sensu lato*) aimed at maintaining the flaking surface (*i.e.* removing scars of hinged flakes and reshaping of distal convexity through the removal of flakes from an opposite striking platform) and the lateral convexities of the cores (backed - often cortical - bladelets and flakes). When the striking platform morphology was no more fit to the extraction of blanks and/or problems occurred on the flaking surface, the platform could be reshaped through the removal of a rejuvenation flake or a *tablette.* Alternatively, the core was reoriented, allowing reduction from a platform which was either orthogonal or opposed to the original one, possibly with the opening of a new flaking surface.

Morphology of production blanks

Measures of the scars on the surfaces of the cores suggest that the *débitage* objectives were mostly represented by elongated blanks (length / width ratio > 2). Most of the scars fall in the length class between 16 and 20 mm (min. 7 mm, max. 22 mm). The objectives identified on the base of the blanks analysis are slightly different: flakes (length / width ratio < 2) and laminar flakes (length / width ratio >1.5 < 2) are better represented than elongated blanks and most products are characterized by length spanning between 11 and 15 mm, even if a wider variability is attested (min. 7 mm, max. 41 mm). The apparent contradiction between these data can be explained by an over-representation among blanks of items discarded as too small or not functional to the crafter's aims. We therefore hypothesize that production mostly focused on elongated items with dimensions spanning between 10 and 40 mm.

Tab. 1 *- VF1, sector III: artifacts from the Mesolithic series, divided by SUs and technological categories (the three shades of grey indicate the attribution of the single SUs to the three identified occupation phases listed from the most recent to the most ancient; the absence of a background is related to layers that cannot be attributed to a specific horizon). / VF1, settore III: manufatti dai livelli mesolitici suddivisi per UUSS e per categoria tecnologica (le tre tonalità di grigio indicano l'appartenenza delle singole UUSS alle tre fasi di occupazione identificate, dalla più recente alla più antica; quelli privi di sfondo non sono riferibili ad un orizzonte specifico della sequenza).*

	SU 10	SU 20	SU 30	SU 21	SU 32	SU 10 test	SU 29
Blanks	538	1,260	497	578	550	479	96
Cores	2	13	2	1	1	0	1
Retouched blanks	85	252	52	121	100	144	30
Waste elements from armatures manufact.	97	302	26	71	55	140	26
TOT.	722	1,827	577	780	706	763	153

Tab. 2 *- VF1, sector III: artifacts per SUs and raw material (geological formation). / VF1, settore III: manufatti suddivisi per UUSS e materia prima (formazione geologica di provenienza).*

	SU 10		SU 20		SU 30		SU 21		SU 32		SU 10 test		SU 29	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Maiolica	82	11%	422	23%	142	25%	174	22%	169	24%	114	15%	28	18%
Scaglia Rossa	179	25%	964	53%	277	48%	352	45%	303	43%	369	48%	65	42%
Scaglia Variegata	52	7%	201	11%	45	8%	84	11%	61	9%	44	6%	14	9%
Livinallogo	23	3%	133	7%	38	7%	67	9%	104	15%	47	6%	15	10%
Eocenic	2	0%	5	0%	-	-	1	0%	1	0%	-	-	2	1%
Undet.	384	53%	102	6%	75	13%	102	13%	68	10%	189	25%	29	19%
TOT.	722	100%	1,827	100%	577	100%	780	100%	706	100%	763	100%	153	100%

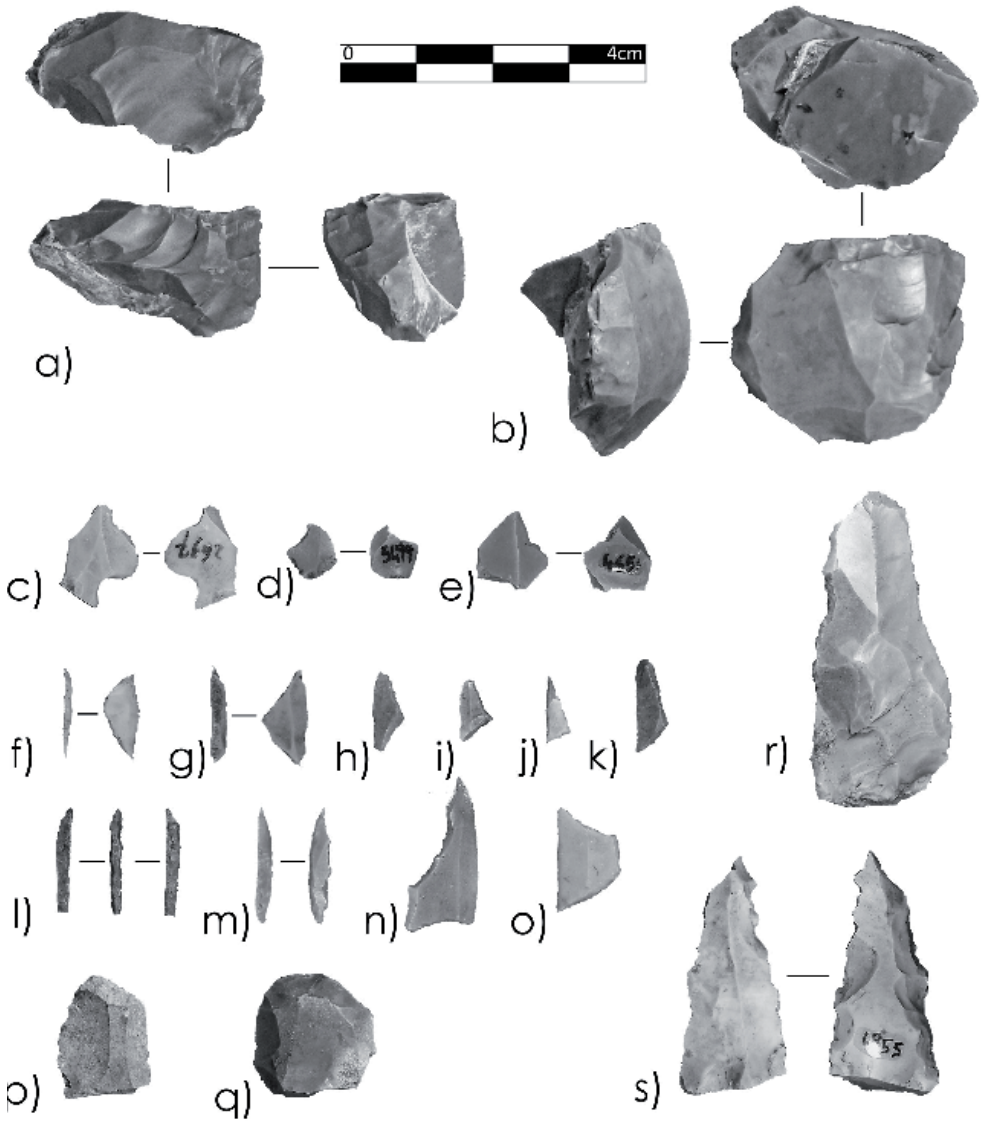

Fig. 3 *- VF1, sector III, lithic assemblage: cores (a, b), microburins (c, d, e), crescent (f), isosceles triangles (g, h), scalene triangles (i, j, k), backed points (l, m), scalene trapeze (n), isosceles trapeze (o), end-scrapers (p, q), retouched blade (r) and denticulate (s). / VF1, settore III industria litica: nuclei (a, b), microbulini (c, d, e), segmento (f), triangoli isosceli (g, h) , triangoli scaleni (i, j, k), punte a dorso (l, m), trapezio scaleno (n), trapezio isoscele (o), grattatoi (p, q), lama ritoccata (r) e denticolato (s).*

Transformation

When determined, the original blanks of microliths and end-scrapers are preferentially represented by flakes and bladelets from the production phase, while burins and other tools are obtained indifferently from any element of the reduction sequence (including cortical and maintenance flakes). The better represented typological categories are geometric and non-geometric microliths (87% of the whole retouched assemblage, Tab.3), while end-scrapers, burins and other tools have sensibly lower values (Tab. 4).

Most microliths (70%) are fragmentary. Among complete ones, the better represented types are scalene triangles (often with three retouched sides, Fig. 3: i, j, k), followed by crescents (Fig. 3: f) and isosceles triangles (Fig. 3: g, h). Backed points are mainly of the double backed type (Fig. 3: l, m). The presence of some trapezes (Fig.3: n, o) from SSUU 10, 20 and 21, probably due to an infiltration from above layers which were then destroyed by more recent occupations, attests that the frequentation of the site continued during the Castelnovian. Abrupt retouched flakes (Fig. 3: r) and truncations (generally with invasive retouch) are the best represented types among tools (Tab. 4). Burins are simple

Tab. 3 - VF1, Sector III: typology of microliths for each Mesolithic SU. / VF1, Settore III: tipologia delle armature nelle diverse UUSS mesolitiche.

	US 10		US 20		US 30		US 21		US 32		10 test		US 29	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Backed point	**4**	**5%**	**15**	**7%**	**2**	**5%**	**5**	**4%**	**3**	**3%**	**17**	**13%**	**2**	**8%**
Marginal (PD1)	-	-	-	-	1	2%	1	1%	-	-	-	-	-	-
Deep partial (PD2)	-	-	2	1%	1	2%	3	3%	1	1%	3	2%	-	-
Deep total (PD4)	4	5%	13	6%	-	-	1	1%	2	2%	14	11%	2	8%
Backed bladelet	**-**	**-**	**4**	**2%**	**1**	**2%**	**-**	**-**	**2**	**2%**	**1**	**1%**	**-**	**-**
Marginal (LD1)	-	-	3	1%	-	-	-	-	2	2%	1	1%	-	-
Deep (LD2)	-	-	1	0%	1	2%	-	-	-	-	-	-	-	-
Backed and truncated bladelet	**1**	**1%**	**6**	**3%**	**2**	**5%**	**4**	**4%**	**3**	**3%**	**-**	**-**	**-**	**-**
With single trucation (DT1, 3, 4)	1	1%	4	2%	2	5%	4	4%	2	2%	-	-	-	-
With double truncation (DT2)	-	-	1	0%	-	-	-	-		-	-	-	-	-
Backed and truncated point (DT7)	-	-	1	0%	-	-	-	-	1	1%	-	-	-	-
Geometric	**10**	**13%**	**38**	**17%**	**12**	**28%**	**16**	**14%**	**22**	**26%**	**26**	**21%**	**7**	**29%**
Crescent (Gm1, 2)	2	3%	12	5%	-	-	2	2%	5	6%	10	8%	2	8%
Scalene triangle (Gm3)	4	5%	23	10%	11	26%	12	11%	7	8%	6	5%	4	17%
Isosceles triangle (Gm4)	3	4%	2	1%	1	2%	1	1%	10	12%	7	6%	1	4%
Trapezes (Gm5, 6, 8)	1	1%	1	0%	-	-	1	1%	-	-	3	2%	-	-
Backed fragments (fD)	**54**	**71%**	**122**	**55%**	**20**	**47%**	**75**	**66%**	**44**	**51%**	**71**	**56%**	**14**	**58%**
Backed and truncated fragments (fDT-Gm)	**7**	**9%**	**36**	**16%**	**6**	**14%**	**13**	**12%**	**12**	**14%**	**11**	**9%**	**1**	**4%**
Backed and truncated	2	3%	24	11%	-	-	2	2%	5	6%	3	2%	-	-
Backed and truncated/ Geometric	5	7%	12	5%	6	14%	11	10%	7	8%	8	6%	1	4%
Tot.	**76**	**100%**	**221**	**100%**	**43**	**100%**	**113**	**100%**	**86**	**100%**	**126**	**100%**	**24**	**100%**

and on fracture, while end-scrapers are dominated by frontal short types (Fig. 3: p, q). Denticulates (Fig. 3: s) are mostly represented by a few notches. The presence of several microburins and other waste elements related to the manufacturing of backed microliths (Tab. 5, Fig. 3: c, d, e) suggests that the production of armatures was one of the main activities carried out in the site.

Discard

Discard patterns are attested by a few cores (n. 20). Their generally small size (length and width < 30 mm, thickness < 20 mm) suggests an intense exploitation, even if most of them are discarded before being completely exhausted. Only four cores appear so intensively reduced not to allow any further exploitation. Four cores, all

yielded by SU 20, were discarded during the shaping phase.

Diachronical evolution

Variation of some features among the assemblages yielded by SU 32 (first occupation phase) SU 21 (middle occupation phase) and 10-20-30 (latest occupation phase) suggests some chronological trends in the occupation of the site by the Sauveterrian groups.

Raw material analysis (Tab. 2) shows a higher percentage of local Livinallongo chert in SU 32 assemblage, as well as a higher incidence of cortical elements in this lithological class (*cf. supra*), indicating a provisioning strategy which was more reliant on local raw materials and with reduced preliminary shaping during the first phase of occupation. In addition, a higher reliance on the use of pebbles (12% of the determined original blanks, opposed to a mean value of 5%) as blanks for *débitage* is attested in SU 21 (*cf. supra*).

Some trends are also highlighted by the typological composition of the microliths assemblage (Tab. 3): in SU 32 isosceles triangles are the best represented (12%), while scalene triangles show lower values (8%); in the most recent phases a slight increase is recorded for scalene triangles (11% in SU 21 and in the latest phase), while isosceles ones suffer an abrupt drop (1% in SU 21 and 2% in the latest occupation phase). The percentage of backed points slightly increases, while no significant changes are observed among crescents. Although the number of elements is not very significant in statistical terms, a decline in the incidence of triangles retouched on the three sides (12/17 in SU 32, 6/13 is SU 21 and 20/44 in the latest phase, considering both scalene and isosceles triangles) has also been observed along the sequence.

The typometrical analysis has highlighted a decrease in the mean length of scalene triangles in the middle occupation phase (SU 21, mean length 8.5 mm), while this value is constant in the earlier (9.7 mm) and in the later phases (9.8 mm). The mean width is constant along the whole Mesolithic sequence (3.7 mm in the earlier phases, 3.6 mm in SU 21 and 3.8 mm in the later phase).

Typological analysis of the upper layers

The upper layers of the site, dated to the Bronze Age and the historical period, also contained rich lithic assemblages. Retouched artifacts from these layers have been the object of a preliminary typological analysis. This analysis has revealed a dominance of elements of Sauveterrian typology accompanied by some Castelnovian items and some artefacts of a more recent chronology such as a foliated point and a modern striker (Tab. 6). This aspect can be related to the occurrence of intense mixing events in the most recent phases of occupation of the site that caused severe disturbance of the upper portion of the Mesolithic sequence, which can be thus supposed to be originally more developed.

Tab. 4 *- VF1, Sector III: typology of tools for each Mesolithic SU. / VF1, Settore III: tipologia degli strumenti nelle diverse UUSS mesolitiche.*

	SU 10	SU 20	SU 30	SU 21	SU 32	SU 10 test	SU 29
Burins (B)	-	-	-	1	1	2	-
End-scrapers (G)	1	3	2	-	3	-	1
Truncated bladelets (T)	2	9	4	2	-	4	3
Borers (Bc)	-	-	-	1	1	1	-
Scrapers on blade (L)	-	1	-	-	1	1	-
Side-scrapers (R)	-	1	-	1	-	-	-
Abrupt-retouched flakes (A)	4	6	2	10	5	7	-
Denticulates (D)	1	5	1	-	2	1	2
Fragments with simple retouch (fS)	1	6	1	2	1	2	-
TOT.	9	31	10	17	14	18	6

Discussion and conclusions

The Mesolithic sequence of site VF1-sector III is attributed to the time span included between the end of the Early and the onset of the Late Sauveterrian (*i.e.* the Middle Sauveterrian) on the basis of the radiometric dates obtained from SSUU 32 and 10 (cf. *supra*). A Castelnovian phase of occupation seems also to be attested, as in sector I, although much less intense than the Sauveterrian one and with no possibility to distinguish it stratigraphically. A few items have thus been recovered in the upper Sauveterrian layers as well as in the layers belonging to most recent phases of occupation of the site that seal the Mesolithic series.

As far as the Sauveterrian occupation is concerned, techno-typological comparisons can be carried out with the sequences of two Alpine valley-bottom sites (Romagnano Loc III - Trento, TN and Galgenbühel-Dos de la Forca - Salorno, BZ) and two high-altitude camps (Mondeval de Sora VF1-sector I - S. Vito di Cadore, BL and Frea IV - Selva di Val Gardena, BZ).

The lithic series from Romagnano III (layers from AC 8: 9,200 ± 60 BP, 8,567 - 8,288 cal. BC to AC 3: 8,590 ± 90 BP, 7,938 - 7,486

Tab. 5 *- VF1, Sector III: waste elements from the manufacturing of armatures counted for each Mesolithic SU. Mb: microburins, Mbk: Krukowski microburins, If: notch associated to a fracture. For the definition of "notch flake" cf. Miolo & Peresani (2005). / VF1, Settore III: residui della fabbricazione di armature nelle diverse US mesolitiche. Mb: microbulini, Mbk: microbulini a dorso, If: incavi adiacenti a frattura. Per la definizione di scheggia d'incavo ("notch flake") si veda Miolo & Peresani (2005).*

	SU 10		SU 20		SU 30		SU 21		SU 32		SU 10 test		SU 29	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Mb	66	68%	201	67%	23	88%	49	69%	33	60%	105	75%	18	69%
Mbk	14	14%	50	17%	-	-	6	8%	4	7%	16	11%	5	19%
Double Mb	2	2%	11	4%	-	-	3	4%	-	-	3	2%	-	-
If	7	7%	15	5%	-	-	12	17%	13	24%	4	3%	3	12%
Notch flake	8	9%	25	8%	3	12%	1	1%	5	9%	12	9%	-	-
TOT.	97	100%	302	100%	26	100%	71	100%	55	100%	140	100%	26	100%

Tab. 6 - VF1, Sector III: list of retouched items and cores from the layers overlying the Mesolithic sequence. / VF1, Settore III: elementi ritoccati e nuclei dai livelli soprastanti la sequenza mesolitica.

	N	%
Burins	**2**	**0%**
End-scrapers	**10**	**1%**
Long end-scrapers	1	0%
Short end-scrapers	4	0%
End-scraper fragments	5	0%
Domestic tools (*outils du fond commun*)	**71**	**5%**
Truncated bladelets	34	3%
Notches	2	0%
Denticulates	2	0%
Side-scrapers	1	0%
Retouched flakes	5	0%
Fragments with simple retouch	27	2%
Backed microliths	**189**	**14%**
Backed points	63	5%
Backed bladelets	3	0%
Backed and truncated bladelets	10	1%
Crescents	12	1%
Isosceles triangles	22	2%
Scalene triangles	75	6%
Trapezes	4	0%
Backed fragments	**383**	**28%**
Backed fragments	320	24%
Backed truncated/Geometric fragments	63	5%
Foliates	**1**	**0%**
Gunflints	**1**	**0%**
Waste from armatures	**683**	**50%**
Incomplete backed pieces	5	0%
Microburins	548	40%
Krukowski microburins	52	4%
Notches associated to a fracture	27	2%
Notch waste	51	4%
Cores	**17**	**1%**
TOT.	1,357	100%

cal. BC) and Galgenbühel (from 9,275 ± 70 BP, 8,425 - 8,089 cal. BC to 8,560 ± 65 BP, 7,705 - 7,478 cal. BC) rock-shelters, both located at the bottom of the Adige valley, show several common features with Mondeval VF1-sector III, *i.e.* exploitation of regional raw materials, reduction sequences suited to the original shapes in which the raw material is available and aimed at the production of small irregular flakes and bladelets (Flor *et al.* 2011, Wierer 2008). In spite of the differences observed in the incidence of the diverse retouched artifacts classes, which reflect the specific functional vocations of the three sites (oriented towards the exploitation of resources from wet environments at Galgenbühel, Wierer & Boscato 2006), the diachronical trends highlighted at VF1-sector III in the evolution of the typological structure of the microliths assemblage (increase of scalene triangles and decrease of isosceles ones, decline in triangles retouched on three sides) also fit well those observed in the Middle Sauveterrian sequences of the other two sites (Broglio & Kozlowski 1984, Wierer 2008).

Tab. 7 - Ratios of retouched tools, cores and microliths in the lithic assemblages of Mondeval de Sora (VF 1-III and VF 1-I) and Plan de Frea (Frea IV). / Indici dell'incidenza di strumenti ritoccati, nuclei e armature negli insiemi litici dei siti di Mondeval de Sora (VF 1-III e VF 1-I) e di Plan de Frea (Frea IV)

	VF 1-III	VF 1-I	Frea IV
Microliths/tools (*fond commun*)	6.48	7.4	1.8
Microliths/Microburins	0.95	1.02	1.26

As to highland sites, at VF1-Sector I (Fontana & Vullo 2000, Fontana & Guerreschi 2005, Fontana *et al.* 2012) SU 8 has yielded a radiometric date of 9,185 ± 240 BP, 9,175 - 7,131 cal. BC (GX-21788). Several affinities can be recognized with Sector III concerning raw material economy (exploitation of regional and local cherts), technology (reduction sequence suited to the available raw material shape, unipolar reduction), objectives of the *débitage* (small irregular flakes and bladelets) and typology (assemblage dominated by microliths, especially triangles) (Fontana & Vullo 2000; Cavallari 2010-2011). Lastly, the high altitude rock-shelter of Frea IV is characterized by a well preserved stratigraphic sequence attesting the repeated frequentation of the site as a seasonal camp in the Sauveterrian (Angelucci *et al.* 1998). Particularly, the chronological span attested at VF1-III corresponds to phases F3 and F4 of Plan de Frea IV, which are attributed to the Early and Middle Sauveterrian respectively (between 9,016 and 7,502 cal BC) (Angelucci *et al*. 1998). The assemblages are similar to VF1-III for their technological features (production of irregular flakes and bladelets), typological composition (domination of retouched flakes over end-scrapers and of triangles over double backed points and crescents) and diachronical trends (increase of elongated scalene triangles and decrease of isosceles ones). In addition, the appearance of some trapezes in the upper part of the series attests that in both cases the sites were frequented until the Castelnovian phase of the Mesolithic. A comparison of the main typological indexes from the three sites shows that the lithic assemblages of VF1- sectors I and III appear "more specialised" and with a higher index of microliths over common tools and of microliths over microburins (Tab. 7) that those of Frea IV.

To conclude, the comparison of the three lithic assemblages and the cross-checking with data coming from the study of the faunal assemblages of Frea IV and VF1-I and taphonomy, use-wear and spatial distribution of VF1-I (Angelucci *et al.* 1998, Fontana *et al.* 2009), suggest to interpret these sites as specialised camps oriented towards activities related to the provisioning and exploitation of animal carcasses (preparation of hunting weapons, butchering of carcasses, recovery of fleshy portions, skin working etc.) with an additional residential function (Fontana 2011). The presence in the high altitude Alpine area of sites with more or less marked hunting vocations indicates an articulated settlement pattern with both camps as Frea IV, in which a wider array of activities were carried out (cfr. *supra*), and sites with a higher specialization as VF1-I and III.

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