

Hugo Obermaier Society. 49th Annual Meeting in Trento (10th - 14th of April, 2007)

Recent data on the Late Epigravettian occupation at Riparo Tagliente, Monti Lessini (Grezzana, Verona): a multidisciplinary perspective¹

Federica FONTANA^{1*}, Cristina CILLI², Maria Giovanna CREMONA¹, Giacomo GIACOBINI², Fabio GURIOLI¹, Jeremie LIAGRE³, Giancarla MALERBA², Antonio ROCCI RIS², Carolina VERONESE¹ & Antonio GUERRESCHI¹

¹Dipartimento di Biologia ed Evoluzione, Università degli Studi di Ferrara, C.so Ercole I d'Este 32, 44100 Ferrara, Italy

²Dipartimento di Anatomia, Farmacologia e Medicina Legale, Università di Torino, C.so Massimo d'Azeglio 52, 10126 Torino, Italy

³Maison de l'Archéologie, Service Municipal d'Archéologie de Chartre, 1 rue de l'Étroit de Degré, 28000 Chartres, France

*Corresponding author e-mail: federica.fontana@unife.it

SUMMARY - *Recent data on the Late Epigravettian occupation at Riparo Tagliente, Monti Lessini (Grezzana, Verona): a multidisciplinary perspective* - This paper reports some new results of the multidisciplinary studies carried out at Riparo Tagliente (Tagliente Rockshelter, Stallavena di Grezzana, Verona, Italy), an Upper Pleistocene key-site located in northern Italy. Particularly the results presented concern the evidence which comes from the Late Epigravettian levels explored over the northern sector of the site in the last 30 years and confirm the importance of this deposit for the reconstruction of re-occupation dynamics in the southern slope of the Alps after the Last Glacial Maximum. After a brief review of the site stratigraphy, the paper examines data concerning the spatial organisation of this area. A recurrent pattern of use has been observed with differences between the inner and the outer zones of the shelter. Special attention is then given to the analysis of some accumulations mainly composed of lithic waste products located in the outer zone. Results concerning the zooarchaeological study of the whole collection of faunal remains so far recovered from investigated levels is also presented, along with the main information deriving from analytical studies on animal hard tissue artefacts, marine shell ornamental objects and ochre nodules, which are very abundant in the site.

RIASSUNTO - *Ultimi dati sull'occupazione del sito di Riparo Tagliente, Monti Lessini (Grezzana, Verona) nell'Epigravettiano recente: una prospettiva multidisciplinare* - Questo articolo riporta alcuni risultati recentemente acquisiti in seguito agli studi multidisciplinari condotti a Riparo Tagliente (Stallavena di Grezzana, Verona), uno dei principali depositi del Pleistocene superiore dell'Italia settentrionale. In particolare, vengono riportati dati relativi alle evidenze provenienti dai livelli dell'Epigravettiano recente indagati nell'area nord del sito negli ultimi 30 anni, che confermano l'importanza del deposito ai fini della ricostruzione delle dinamiche del ripopolamento del versante meridionale delle Alpi dopo l'Ultimo Massimo Glaciale. Dopo un breve quadro sulla stratigrafia del sito, il lavoro esamina i dati relativi all'organizzazione spaziale dell'area. È stato osservato un modello di utilizzo ricorrente con differenze marcate tra area interna ed esterna rispetto al riparo. Un'attenzione particolare è riservata all'analisi di alcuni accumuli prevalentemente costituiti da scarti litici messi in luce nell'area esterna. Inoltre, vengono presentati i risultati dello studio archeozoologico che ha riguardato l'intero insieme di resti faunistici rinvenuti nei livelli finora indagati, nonché le principali informazioni ottenute dagli studi effettuati sui manufatti in materia dura animale, gli ornamenti di conchiglie marine e gli abbondanti resti di ocre.

Key words: Tagliente Rockshelter, Monti Lessini, Late Epigravettian, multidisciplinary studies

Parole chiave: Riparo Tagliente, Monti Lessini, Epigravettiano recente, studi multidisciplinari

1. INTRODUCTION

The site of Riparo Tagliente (Tagliente Rockshelter, Stallavena di Grezzana, Verona, Italy) is located at the base of Monte Tregnago under a rockshelter formed by

oolitic limestone; it lies on the left slope of Valpantena, one of the main valley-bottoms of the pre-alpine massif of Monti Lessini, at an altitude of 250 m above sea level (Fig. 1). The rockshelter occupies a strategic position, about half way both from the plain and the top of the

¹ The paragraphs 1. INTRODUCTION, 2. THE LATE EPIGRAVETTIAN OCCUPATION were written by F. Fontana and A. Guerreschi; the 3. THE DEBITAGE ACCUMULATIONS: S.U. 10A, B and C, 11 and 411 by J. Liagre, M.G. Cremona and F. Fontana; the 4. THE FAUNAL ASSEMBLAGE by C. Cilli, G. Giacobini, A. Guerreschi, G. Malerba and A. Rocci Ris; the 5. THE ANIMAL HARD TISSUE ARTEFACTS by C. Cilli, G. Giacobini and A. Guerreschi; the 6. THE MARINE SHELLS ORNAMENTAL OBJECTS by F. Gurioli; the 7. THE OCHRE RESIDUES by C. Veronese; the 8. CONCLUSIONS AND FUTURE PERSPECTIVES OF RESEARCH by F. Fontana.

limestone plateau, and at the cross-way between different topographic situations: the plain, the valley-bottom, the rocky slopes and the top of the massif. Such a variety of situations matches with a rich mosaic of landscapes with different faunal and vegetal resources, which varied in distribution along time. The limestone nature of the massif brings also about the presence of several karst cavities and a richness in lithic and mineral resources, particularly flint outcrops and some deposits of ochres which were intensively exploited by the Palaeolithic groups.

Discovered in 1958 by Francesco Tagliente, the site was initially investigated, from 1962 to 1964, by the Museo Civico di Storia Naturale di Verona. In 1967 excavations were resumed by the University of Ferrara and are still in progress. Up to the mid-seventies research focused on the excavation of a long trench running transversally to the shelter and a smaller one located in the most internal area. This allowed a long stratigraphic series, over 4.50 m deep, to be brought to light formed by two main deposits separated by a river erosion: a lower deposit with Mousterian and Aurignacian industries and an upper one characterised by a Late Epigravettian record.

Starting from the late '70s, excavations in the Late Epigravettian deposit were extended over the northern area of the site in the aim of gaining insights into the patterns of resource exploitation and organisation of the living space in a dynamic spatial and functional perspective during the different occupation phases. As field investigations are progressing, a new program of interdisciplinary studies has been established, some main results of which are here presented.

2. THE LATE EPIGRAVETTIAN OCCUPATION

The Late Epigravettian deposit has an irregular width, being thinner in the internal part of the shelter (about 50 cm) and thicker in the external one (over 2 metres). This

situation is due to two main factors: the presence of the river escarpment which separates the upper deposit from the lower one leaning steeply outside the shelter and the different use of the two areas by the Epigravettian groups, namely the cleaning of inner zones and the consequent accumulation of waste products in the outer ones. Last but not least excavation works carried out in the Medieval period have led to the destruction of most part of the inner stratigraphical series, only allowing the preservation – in some areas – of the lowermost part of the deposits.

The lower Epigravettian sequence (levels 18-15) is constituted by a coarse breccia in a loess matrix; sediments, pollen, malacofauna, micro- and macrofaunal remains indicate a steppe environment with cold and arid climate conditions. Then there follow deposits formed by clasts in a loess matrix (14-5), which have yielded a very rich evidence of human occupation. The vegetation and the fauna are that of a temperate climate, characterised by a grassland wooded with conifers and deciduous trees. A recent systematic survey of the whole faunal assemblage from so far excavated layers confirms the framework which was first reconstructed after multidisciplinary analyses in the Eighties (Bartolomei *et al.* 1982, 1984) (see § 4).

Taking into account the radiocarbon dates, which range from $13,430 \pm 180$, $14,600$ - $13,280$ cal BC (levels 15-16) to $12,040 \pm 170$ BP, $12,520$ - $11,500$ cal BC (layers 10-8), the Epigravettian series of Riparo Tagliente formed between the Ancient Dryas and the beginning of the Allerød interstadial. Therefore the site represents the most ancient known deposit of the Southern slope of the Alps to be re-occupied by human groups after the last glacial maximum and its stratigraphic series is one of the most complete for the Late Epigravettian of Northern Italy.

Of great importance is also a group of mobile art objects, mostly engraved with both geometric and figurative representations and a burial which was brought to light in the Seventies in the southern sector of the site (Bartolomei *et al.* 1974, 1984; Guerreschi & Veronese 2002) and



Fig. 1 - Riparo Tagliente. General view of the site.
Fig. 1 - Riparo Tagliente. *Panoramica del sito.*



Fig. 2 - Tagliente Rockshelter. The small concentration of lithic waste products located in the outermost area of the site (SU 411, III décapage).
Fig. 2 - Riparo Tagliente. *Piccola concentrazione di scarti litici nell'area più esterna del sito (US 411, III taglio).*

recently dated to 13190±180, 14092-13280 cal BC.

Extensive investigations carried out in the two last decades over the northern sector, covering a surface of about 80 m², have shown the presence of a recurrent pattern of organisation of living floors. Thus, in the area protected by the overhang of the shelter some dwelling structures were identified, while outside several concentrations of various categories of waste were found. Particularly, in the zone of the drip-line chaotic accumulations of remains lie in an ash rich matrix, while the area immediately outside, where some large collapsed blocks are present, is characterised by huge *débitage* by-products concentrations (see § 3). Finally, the outermost zone seems to constitute an area for the unloading of the most cumbersome categories of materials, such as bone remains and the largest size lithic waste products: cores, tested nodules, shaping products (Guerreschi 1983; Fontana *et al.* 2002; Peretto *et al.* 2004).

3. THE DEBITAGE ACCUMULATIONS: SU 10A, B AND C, 11 AND 411

All Epigravettian layers are rich in lithic industry and characterised by considerable masses of products and debris, documenting intense knapping activities and transformation of blanks in the site. Due to this great abundance, only a small part of the amount of the assemblage which was collected during about 50 years of research has been so far the object of detailed studies. In the Eighties typological analyses were carried out over the assemblage retrieved in the “trench” area (Bartolomei *et al.* 1982), while studies aimed at reconstructing reduction sequences have only developed in the latest years, allowing to recognize an evolution of technical traditions along the series (Montoya in Bertola *et al.* 2007).

Other detailed analyses have been recently undertaken on the lithic accumulations that come from the outer area of the site, within and around the large limestone collapsed boulders: SU 10a, 10b and 10c dated with radiocarbon between 13,270±170 BP, 14,360-13,240 BC and 12,650±160 BP, 13,375-12,230 BP, and SU 11 which underlies them (Arzarello *et al.* 2006, 2007; Bietti *et al.* 2004; Liagre 2005; Fontana *et al.* 2007a, 2007b; Fontana *et al.* in Bertola *et al.* 2007). All these layers are composed of more than 80% lithic artefacts – about 20,000 pieces each – and, to a lesser extent, of other categories of finds (bone fragments, nodules of ochre, charcoals and burned artefacts). Even a smaller accumulation located in the outermost zone of the shelter (SU 411) has been recently the object of an analytical study (Cremona & Fontana 2007).

Exploited raw material appear exclusively local (i.e. Monti Lessini) and their proportions roughly correspond to those available in the surrounding territory, within a range of about 15 km from the shelter. In fact, the Lessini Mountains comprise several geological formations (*Biancone*, *Scaglia Variegata*, *Rosso Ammonitico*, *Scaglia Rossa* and *Calcari Grigi*) containing abundant flint nodules of varying physical nature, homogeneity and colour.

Several *chaînes opératoires* have been identified, aimed at producing a wide variety of rectilinear laminar blanks (large blades and laminar flakes, medium-size blades, small blades and bladelets) and, to a much lesser extent, of

small curved bladelets (Arzarello *et al.* op. cit. 2006, 2007, Liagre 2005; Fontana *et al.* op. cit. 2007a, 2007b).

The techno-economical study and the refitting programme undertaken were integrated with spatial and micro-stratigraphical analyses, in order to investigate the structure of these assemblages and try to detect the processes responsible for their formation. The structural analysis carried out on the three masses – one superposed to the other and apparently separated by thin “sterile” layers – located in the outer area (SU 10a, 10b and 10c) has allowed the presence of only two phases of accumulation to be confirmed, thus contradicting field observations (Liagre 2005). Concerning the specific function of these accumulations, the low rate of refits seems to testify only short sequences of possibly *in situ* exploitation of the flint nodules and cannot prove the presence of any sort of *postes de débitage*. Moreover, the structure of the two assemblages differs in some aspects, probably reflecting a change of function across time. The first depositional phase (corresponding to the lowermost concentration) seems to show the typical features of a waste area, mostly deriving from the evacuation of lithic by-products. The south-eastern and eastern part of this concentration form an homogeneous assemblage which appears very similar to another concentration, stratigraphically underlying it, in the same area (US 11) (Fontana *et al.* 2004). The upper deposit (therefore the two uppermost concentrations together) contains the highest number of laminar and lamellar products, cores, broken retouched tools and unworked nodules, as well as several burned artefacts and bone fragments. This area seems to assume the dimension of a real domestic zone resulting from a wide range of activities: short possibly on-site knapping sequences due both to skilled knappers and beginners, unloading of waste *débitage* debris and hearth residues, stocking of flint nodules and probably other functions (presence of several fragments of ochre, a pebble and a flint cortex painted with ochre).

In the outermost area SU 411 was located within a small depression delimited by some limestone blocks; it consisted of a smaller accumulation (about 1 m²) mainly composed of lithic by-products associated to two limestone pebbles probably used as hammer-stones (Cremona & Fontana 2007) within an area composed of chaotic and varied remains (Fig. 2). No retouched elements were present in this accumulation, made up of a total amount of 1167 lithic artefacts (not considering items smaller than 1 cm) and mostly composed of *débitage* by-products, including a discrete number of cores (3.9%). Most artefacts (90.6%) were obtained from the same flint variety (Biancone formation, grey and dark grey colour). Some main results are meaningful for interpreting this assemblage: a. the relative high number of refitting composed of elements coming from the whole unit, vertically developed over a width of about 18 cm; b. the apparent extraneous nature of most cores to the assemblage; c. the identification of refitting with elements from another unit located nearby (US 412).

As a whole, these data allow to assume that US 411 represents essentially the result of some short-term knapping episodes. Nonetheless some elements, especially cores, do not appear to be related to these episodes, but to probably derive from a longer term accumulation. The fact that they have been found as part of the same assemblage is probably a consequence of post-depositional

factors. Actually this reconstruction, besides confirming the complexity of formation processes in the site, seems to prove the fact that the outermost area of the site was used along time both as a waste zone for the evacuation of different categories of waste and as an area for carrying out specific tasks, as this and other isolated homogeneous concentrations seem to show.

4. THE FAUNAL ASSEMBLAGE

Some results of the archaeozoological study, which was recently carried out on the entire collection of remains recovered in the southern sector of the site, are here presented for the first time. These data up-date those available for the area of the “trench”, which were published in the '80s (Bartolomei *et al.* 1982). They also consider recently published preliminary results concerned with some portions of the faunal assemblage from the site (Cilli & Guerreschi 2000; Rocci Ris *et al.* 2005; Bertola *et al.* 2007).

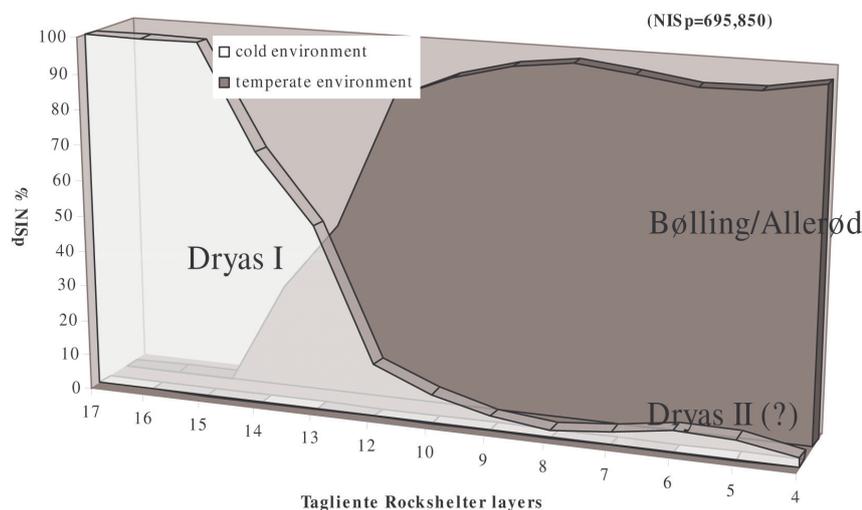
More than 695,000 remains were examined; 8620 of them were determined at the anatomic and taxonomic level (Number of Identified Specimens, NISp). The remains were characterized by a high level of fragmentation; 91% was smaller than 2 cm. The high degree of fragmentation can be attributed to several factors, mainly pre-depositional, both anthropic (i.e. intense exploitation of animal carcasses, use of animal hard tissues for artefact manufacture, possible use of bones as fuel, human trampling and accidental contact with fire) and non-anthropic (carnivore gnawing, trampling and weathering). Post-depositional phenomena may also have been involved in these processes.

Red deer is the most represented species (NISp= 4522) with 52.5% identified specimens. It is documented, from the bottom to the top, starting from layer 15, but it becomes abundant in the upper layers reaching 71.5% of determined specimens in layer 8. A selection of sub-adult and adult individuals is documented. The second best represented species is roe deer (NISp= 1118), already present in layer 14 and becoming more frequent in the upper part of the series, with a maximum of 18.9% of identified remains in layers 7 and 4. Ibex (NISp= 832) is very abundant at the bottom of the sequence, especially in layers 16 and 17 with about 58% of determined specimens. Starting from layer 12, it diminishes rapidly and disappears in layer 5. Most remains represent adult individuals.

Other ungulates include wild boar (NISp= 463), bison/aurochs (NISp= 253) and chamois (NISp= 219). The presence of both the elk (NISp= 79) and *Equus hydruntinus* (NISp= 2) is documented.

An important role in the subsistence of the Epigravettian hunters was also played by small mammals, which are present in all the layers: the marmot (NISp= 463) and the hare (NISp= 163), (*Lepus europaeus* and *Lepus timidus*). Most marmot remains come from the lower layers (layers 12-14); they are very abundant in layer 13 (28.6% of determined specimens). The beaver (NISp= 15) was also sporadically exploited, probably both for fur and fat.

The distribution of ungulates and marmots along the sequence confirms that the lower part of the deposit (layers 17-14) is characterised by a faunal association adapted to a cold environment, while in the upper layers (12-5) temperate species, which were totally absent in the lower layers, dominate (Fig. 3); in layer 13 the two faunal associations are equivalent.



17	16	15	14	13	12	10	9	8	7	6	5	4	
100,0	98,8	94,0	54,8	45,0	10,0	3,2	0,5		0,9	3,5	1,0		<i>Capra ibex</i>
			4,3	1,9	0,9	4,2	2,3	1,9	2,1	1,3	3,5	2,8	<i>Rupicapra rupicapra</i>
	1,2	6,0	12,2	5,2	3,9	0,7	1,0		0,8	1,3	1,3		<i>Alces alces</i>
			2,6	2,7	8,7	6,1	6,2	4,2	6,0	9,7	9,5	13,7	<i>Cervus elaphus</i>
			20,0	30,8	58,1	71,5	70,6	75,0	70,5	66,3	66,3	63,5	<i>Capreolus capreolus</i>
			6,1	14,5	18,5	14,3	19,2	18,9	19,7	17,8	15,5	19,9	<i>Sus scrofa</i>

Fig. 3 - Tagliente Rockshelter. Frequency of ungulate taxa indicative of cold and temperate environments (layers 4 to 17).

Fig. 3 - Riparo Tagliente. Frequenza dei taxa di ungulati indicativi di ambienti freddi e temperati (livelli da 4 a 17).

Exploitation of animal carcasses as a food resource is documented by the presence of frequent butchering marks, almost exclusively observed on ungulate remains, particularly on hindlimb bones. Some cutmarks were also identified on carnivore remains (wolf, wolverine, lion, lynx and marten).

Hypotheses on the seasonality of occupation of the site can be proposed on the basis of data obtained from the study of the remains of foetal and new-born individuals, as well as from the study of ungulate teeth eruption. It seems that the site was occupied all the year long, even if the evidence concentrates during spring and summer time.

Concerning the spatial distribution of remains, within the outer area (layers 10-12), some recurrent concentrations of finds have been observed, especially in the north-western sector, allowing this area to be considered as a privileged zone for either the processing of animal carcasses or the evacuation of this category of remains.

5. THE ANIMAL HARD TISSUE ARTEFACTS

The animal hard tissue artefacts of Riparo Tagliente represent the most important complex of tools and ornamental objects of the Italian Late Epigravettian for which both typological and technological studies are available (Cilli *et al.* 2006). This rich collection confirms the high technical ability and good knowledge of animal hard tissues' characteristics by the late Epigravettian group that inhabited this site.

Concerning bone and antler tools, the most frequent typological classes are represented by points (including double projectile points) and awls. These are followed by spatulas and tools with a distal *biseau*. Unfortunately most of these artefacts are broken. A further category is represented by ornamental elements and a group of undetermined objects, which do not find any parallel in the literature.

Among projectile points, five have a double point and are obtained from cervids' antler. Their distal extremities have sub-circular and elliptical cross-sections; in some cases they are fractured, probably as a consequence of use. Their proximal ends, which were probably hafted to a wooden stick, have either an elliptical or a plano-convex cross-section. Their length varies between 113 and 72 mm.

Among the objects which find no parallel in the literature, one is represented by an ibex left metacarpal fractured near the distal epiphysis, where a large elliptical hole, interrupted by the fracture, had been produced. Use-wear observation of the hole margins suggests an use as projectile points rectifier.

The collection of ornamental objects is mainly composed of perforated mammal teeth, in particular red deer atrophic canines. A detailed analysis aimed at identifying the *chaînes opératoires* and techniques of perforation was carried out. This analysis was based on a sample of 96 red deer atrophic canines, including 74 teeth showing no technological traces. Canines showing traces of anthropic actions are represented by 7 teeth with an incipient hole preparatory to perforation and by 15 characterised by the presence of a complete hole (Fig. 4). Considering sexual dimorphism, 66 over 74 unmodified items belong to female individuals. Among 15 perforated teeth, 2 can be attributed to female and 5 to male

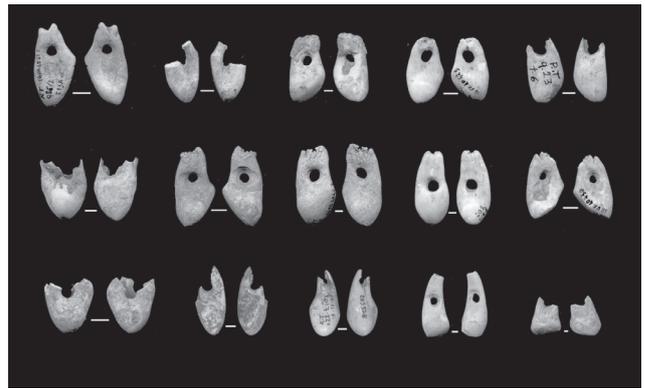


Fig. 4 - Riparo Tagliente. Perforated red deer atrophic canines.
Fig. 4 - Riparo Tagliente. Canini atrofici di cervo forati.

individuals. Among the 7 specimens with incipient holes 5 have been assigned to female individuals. These results confirm, as already reported in the literature, an intentional selection of canines belonging to male individuals as typical of the behaviour of Upper Palaeolithic groups. The 96 deer canines are distributed along the Epigravettian sequence from layer 13 to layer 4 and concentrate mainly in layers 7-10 which also correspond to the layers with a higher density of faunal remains. The collection of perforated teeth includes a deer central incisor and a wild boar third lateral incisor.

6. THE MARINE SHELLS ORNAMENTAL OBJECTS

The malacological collection, which was already the object of previous preliminary studies (Accorsi Benini 1972; Fiocchi 1998) is composed of 728 items, most of which have lost their original colour and have a corroded aspect. As a whole, 29 *taxa* have been recognised, belonging to the following classes: *Gastropoda* (24 *taxa*), *Bivalvia* (3 *taxa*) and *Scaphopoda* (2 *taxa*) (Cilli *et al.* 2006; Gurioli 2006) (Fig. 5). Two undeterminable fragments can be added.

Gastropods are represented by 4 fragments which have only been classified at a class level and by 23 species. Bivalves are represented by 3 species and scaphopods by two species (Tab. 1). Almost all determined species are widely diffused in the Mediterranean Sea, with the exception of *Nassarius circumcinctus*, which is only present in the Levantine area and *Buccinum undatum*, the presence of which in the Mediterranean basin is uncertain. Only one specimen classified as *Aspa marginata* is fossil: this species, considered as warm affine, disappears from the Mediterranean at the end of the Pliocene and settles on the north African coast where it is still present. In the area of Monti Lessini only one Pliocene age deposit is known, near Salò, in the Garda Lake area. Some Pliocene deposits have also been identified in the Veneto region, near Cornuda, Anzano di Vittorio Veneto and Bassano.

The assemblage is clearly the result of human selection: 638 items, corresponding to about 90% of the entire collection, belong to the genus *Cyclope* which therefore represents the main object either of collection or acquisition of the Epigravettian groups. Only one en-

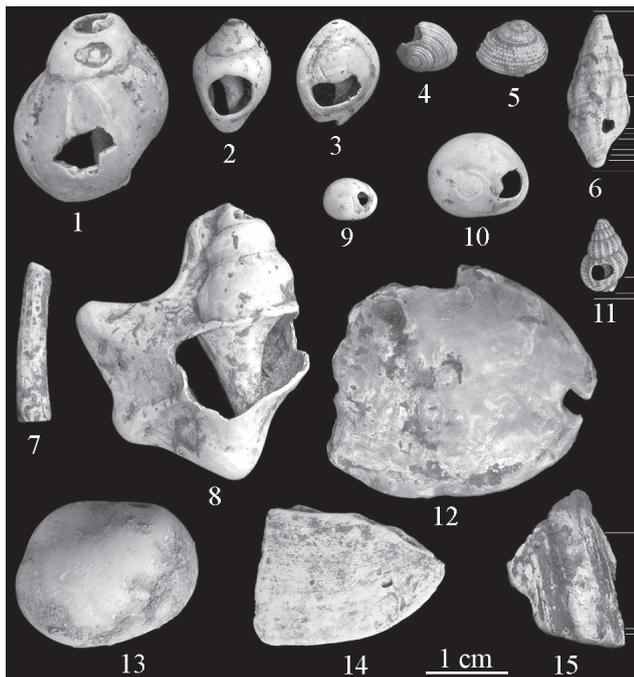


Fig. 5 - Riparo Tagliente. Selection of marine shells. 1. *Buccinum undatum*, 2. *Columbella rustica*, 3. *Nassarius circumcinctus*, 4. *Homalopoma sanguineum*, 5. *Clanculus cf. corallinus*, 6. *Cerithium vulgatum*, 7. *Dentalium inaequicostatum*, 8. *Aporrhais pespelecani*, 9. *Cyclope pellucida*, 10. *Cyclope neritea*, 11. *Nassarius incrassatus*, 12. *Anomia ephippium*, 13-14. *Glycymeris sp.*, 15. *Pecten jacobaeus*.

Fig. 5 - Riparo Tagliente. Alcune delle conchiglie marine ritrovate a Riparo Tagliente. 1. *Buccinum undatum*, 2. *Columbella rustica*, 3. *Nassarius circumcinctus*, 4. *Homalopoma sanguineum*, 5. *Clanculus cf. corallinus*, 6. *Cerithium vulgatum*, 7. *Dentalium inaequicostatum*, 8. *Aporrhais pespelecani*, 9. *Cyclope pellucida*, 10. *Cyclope neritea*, 11. *Nassarius incrassatus*, 12. *Anomia ephippium*, 13-14. *Glycymeris sp.*, 15. *Pecten jacobaeus*.

tire unmodified shell has been found (one specimen of *Cyclope neritea*). The two third of the collection is represented by fragments and one third is characterised by at least one intentional perforation. 208 perforated shells, over a total of 256, belong to the genus *Cyclope*. The perforation is usually located near the peristome in the E1 position (Taborin 1993); probably perforated specimens were even more numerous as 80 specimens have one margin of the perforation broken and consequently show the loss of the peristome. This fracture probably took place during use. 77 specimens (55 specimens of *Cyclope neritea* and 12 of *Cyclope pellucida*) are characterised by the presence of two perforations, located some millimetres further back of the first one, in the E4 position (Taborin 1993).

The only specimen belonging to the large-size bivalve *Anomia ephippium* shows traces of at least two intentional perforations, both partly broken, suggesting its use for suspension as a sort of medallion.

No traces connected to the phase of perforation have been observed on the surface of the shells, that could allow to reconstruct with certainty the technique used. Even the recognition of eventual use-wear traces along the perfora-

tions edges was not possible, because of the bad preservation conditions of the surfaces which appear frayed and corroded. The margins of three specimens of *Glycymeris sp.* and one of *Aporrhais pespelecani* could have been intentionally smoothed (Accorsi Benini 1972). Inside some gastropods and on the inner face of a bivalve a marked presence of ochre has been observed.

The shells, both unmodified and perforated, appear mainly concentrated in the inner area of the shelter, but some specimens are also present, in some cases in small concentrations, in the external one. Of the malacological collections of the Late Epigravettian of north-eastern Italy and the central Adriatic area that of Riparo Tagliente is no doubt the most numerous.

7. THE OCHRE RESIDUES

A high quantity of ochre nodules and fragments has been collected in the site amounting to a total of 8015.4 grams: 4675 have been classified as red ochre and 3340.4 as yellow ochre. Almost all the stratigraphic units explored have yielded varying amounts of these minerals. Both quantities, red and yellow, outcrop on the Monti Lessini where different deposits have been located (Zorzin 2005). Nonetheless, as shown by experimentation, most ochre used at Riparo Tagliente seems to derive from the transformation of yellow into red ochre, through the process of calcination (heat exposure under low temperatures). After this operation, the product undergoes a colour change and a light weigh increase, but it does not acquire any other particular property that may differentiate it from the initial one.

The results of spatial analysis in the site have shown that yellow ochre, which is almost absent in the inner area of the shelter, was heaped up in the external zone, especially among the large collapsed blocks. It was then brought inside the shelter where it was probably grinded and modified by heat exposure. In fact, in the inner area red ochre is very abundant, namely around the fireplaces, even if no real stocking zone was identified. After transformation red ochre was used for several purposes, which probably took place both in the inner and in the outer area of the site as suggested by its spatial distribution. Most available evidence in the site concerns its artistic use (especially the red type, of which traces have been found on several engraved object), but it could possibly be intensively exploited also for other, mostly practical, purposes (abrasives, mastics etc.).

8. CONCLUSIONS AND FUTURE PERSPECTIVES OF RESEARCH

Results of new researches confirm the importance of the site of Riparo Tagliente for the reconstruction of the dynamics connected to the first re-occupation of the Southern Alps in the Late Glacial, allowing some general considerations to be traced, which can be considered as both lines of investigation and new challenges for future studies.

The favourable position of the site at the crossway between different echotones and its location along the corridor of the Valpantena giving access the Lessini Plateau and the inner Alps have certainly favoured its intense occupation along time by Late Epigravettian groups, starting

Tab. 1 - Riparo Tagliente. Complete list of marine shells found until 2005. Specimens with at least one perforation are indicated between brackets.

Tab. 1 - Riparo Tagliente. Elenco delle conchiglie marine ritrovate fino alla campagna di scavo dell'anno 2005. Tra parentesi sono indicati gli esemplari che presentano almeno un foro.

Riparo Tagliente (1962-2005)	
Taxa	NR
GASTROPODA	
Gastropoda indet.	4
<i>Clanculus</i> cf. <i>corallinus</i> (Gmelin, 1791)	1
<i>Homalopoma sanguineum</i> (Linnaeus, 1758)	12 (9)
<i>Cerithium vulgatum</i> (Bruguière, 1792)	1 (1)
<i>Cerithium</i> cf. <i>vulgatum</i> (Bruguière, 1792)	3 (2)
<i>Aporrhais pespelecani</i> (Linnaeus, 1758)	3 (3)
<i>Luria</i> cf. <i>lurida</i> (Linnaeus, 1758)	1
Cf. <i>Neverita josephinia</i> (Risso, 1826)	1
<i>Buccinum undatum</i> (Linnaeus, 1758)	1 (1)
<i>Aspa</i> (<i>Bufonaria</i>) <i>marginata</i> (Gmelin, 1791)	1 (1)
<i>Nassarius incrassatus</i> (Stroem, 1768)	2 (2)
<i>Nassarius</i> cf. <i>pygmeus</i> (Lamarck, 1822)	9 (5)
<i>Nassarius mutabilis</i> (Linnaeus, 1758)	2 (1)
<i>Nassarius costulatus cuvierii</i> (Payraudeau, 1826)	1
<i>Nassarius</i> cf. <i>costulatus cuvierii</i> (Payraudeau, 1826)	1
<i>Nassarius</i> cf. <i>circumcinctus</i> (Adams A., 1852)	7 (3)
<i>Nassarius</i> cf. <i>corniculus</i> (Olivi, 1792)	1 (1)
<i>Nassarius</i> sp.	2 (2)
<i>Cyclope neritea</i> (Linnaeus, 1758)	428 (169)
<i>Cyclope</i> cf. <i>neritea</i> (Linnaeus, 1758)	79 (32)
<i>Cyclope pellucida</i> (Risso, 1826)	57 (3)
<i>Cyclope</i> cf. <i>pellucida</i> (Risso, 1826)	17 (4)
<i>Cyclope</i> sp.	57
<i>Columbella rustica</i> (Linnaeus, 1758)	16 (12)
BIVALVIA	
<i>Glycymeris</i> sp.	7 (4)
<i>Pecten jacobaeus</i> (Linnaeus, 1758)	1
<i>Anomia ephippium</i> (Linnaeus, 1758)	1 (1)
SCAPHOPODA	
<i>Dentalium inaequicostatum</i> (Dautzenberg, 1891)	3
<i>Dentalium</i> cf. <i>inaequicostatum</i> (Dautzenberg, 1891)	7
Undeterminate	2
Total	728 (256)

from the first part of the Late Glacial, and their potential permanence over most part of the year although with an emphasis in the period between the beginning of spring and the end of summer. The recent revision of the whole set of available faunal remains has confirmed that the site was occupied during two main different climatic phases, one with colder and drier conditions, the other one characterised by an increase in temperature and humidity. During each of these phases hunting was respectively ibex and red deer specialised, but the range of other exploited species appears varied, reflecting accessibility to different ecotones.

Raw materials exploitation strategies, especially considering flint and ochre residues, point to a strictly local dimension. Actually, the definition of the provenance of these materials indicates the provisioning area minimum range, but does not necessarily reflect the total territory covered by the groups. Particularly the presence of a considerable number of marine shells used as ornaments suggests both a much higher mobility of the groups and possible contacts with the neighbouring communities.

The identification of a recurrent pattern of spatial organisation based on the recognition of dwelling structures and of impressive concentrations of variably structured accumulations of waste products confirms the role of this site as a residential camp. Moreover structural and technological analyses carried out on some of the concentrations identified seem to underline the importance of knapping activities with implications for both possible exportation of prepared cores and the presence of different levels of craft specialisation, probably reflecting apprenticeship practises.

To conclude data are still missing concerning some possible changes of site use across time. This aspect has not been faced so far due to the complexity to establish stratigraphical correlations between the inner and outer deposits. The prosecution of investigations in the transition zone, along with detailed structural and functional studies of the layers located in the inner zone and new radiocarbon dates will probably help to shed new light on these aspects

ACKNOWLEDGEMENTS

Archaeological investigations in the site of Riparo Tagliente, which allowed the recovery of the evidence discussed in this paper, were carried out with the financial support of Fondazione Cariverona and Regione Veneto.

REFERENCES

- Accorsi Benini C., 1972 - Le conchiglie lavorate dell'Epigravettiano evoluto del Riparo Tagliente. *Memorie del Museo Civico di Storia Naturale di Verona*, 20: 405-411.
- Arzarello M., Bertola S., Fontana F., Guerreschi A., Liagre J. & Peretto C., 2006 - Modalità di approvvigionamento delle materie prime nel sito di Riparo Tagliente (Stallavena di Grezzana, Verona). Quali differenze nei comportamenti tecnico-economici tra Musteriano ed Epigravettiano? *Materie Prime e scambi nella Preistoria Italiana*. Atti della XXXIX Riunione Scientifica dell'Istituto Italiano di Preistoria e Protostoria, Firenze, 25-27 novembre 2004: vol. I, 357-361.
- Arzarello M., Bertola S., Fontana F., Guerreschi A., Liagre J., Peretto C., Rocci Ris A. & Thun Hohenstein U., (2007) - Aires d'approvisionnement en matières premières lithiques et en ressources alimentaires dans les niveaux mousteriens et épigravettiens de l'Abri Tagliente (Verone, Italie): une dimension «locale». In: Moncel M.-H, Moigne A.-M., Arzarello M. & Peretto C. (eds), Proceedings of the XV UISPP Congress, Lisbona, 3-9 settembre 2006. *BAR International Series* (in press).
- Bartolomei G., Broglio A., Guerreschi A., Leonardi P., Peretto C. & Sala B., 1974 - Una sepoltura epigravettiana nel deposito pleistocenico del Riparo Tagliente in Valpantena (Verona). *Rivista di Scienze Preistoriche*, 29 (2): 1-52.
- Bartolomei G., Broglio A., Cattani L., Cremaschi M., Guerreschi A., Mantovani E., Peretto C. & Sala B., 1982 - I depositi würmiani del Riparo Tagliente. *Annali dell'Università di Ferrara*, Nuova serie, Sez. 15, vol. 3, n. 4: 51-105.
- Bartolomei G., Broglio A., Cattani L., Cremaschi M., Guerreschi A., Leonardi P. & Peretto C., 1984 - Paleolitico e Mesolitico. In: Aspes A. (ed.), *Il Veneto nell'antichità. Preistoria e Protostoria*. 2. Banca Popolare di Verona, Verona: 167-319.
- Bertola S., Broglio A., Cassoli P., Cilli C., Dalmeri G., De Stefani M., Fiore I., Fontana F., Giacobini G., Guerreschi A., Gurioli F., Leporini C., Liagre J., Malerba G., Montoya C., Peresani M., Rocci Ris A., Rossetti P., Tagliacozzo A. & Ziggotti S., 2007 - L'Epigravettiano recente nell'area prealpina e alpina orientale. In: Martini F. (ed.), *L'Italia tra 15.000 e 10.000 anni fa. Cosmopolitismo e regionalità nel Tardoglaciale*. Atti della tavola Rotonda, Firenze, 18 novembre 2005. *Millenni. Studi di Archeologia Preistorica*, 5: 39-94.
- Bietti A., Boschian G., Mirocle Crisci G., Danese E., De Francesco A. M., Dini M., Fontana F., Giampietri A., Grifoni R., Guerreschi A., Liagre J., Negrino F., Radi G., Tozzi C. & Tykot R., 2004 - Inorganic raw materials economy and provenance of chipped industry in some stone age sites of Northern and Central Italy. *Collegium Anthropologicum*, 28 (1): 41-54
- Cilli C. & Guerreschi A., 2000 - *Studio archeozoologico e tafonomico di un'area di concentrazione di reperti faunistici di età epigravettiana (Riparo Tagliente, Verona)*. Atti del 2° Convegno Nazionale di Archeozoologia, Asti, 14-16 novembre 1997. ABACO Ed., Forlì: 141-149.
- Cilli C., Giacobini G., Guerreschi A. & Gurioli F., 2006 - *L'industria e gli oggetti ornamentali in materia dura animale dell'epigravettiano di Riparo Tagliente (Verona)*. 2. Atti della XXXIX Riunione Scientifica Materie prime e scambi nella preistoria italiana, Firenze, 25-27 novembre 2004: 843-854.
- Cremona M.G. & Fontana F., 2007 - Analisi tecno-economica di una concentrazione di scarti litici (US 411) dai livelli epigravettiani di Riparo Tagliente (Stallavena di Grezzana, Verona). Atti del Convegno Nazionale degli Studenti di Antropologia, Preistoria e Protostoria, Ferrara 8-10 maggio 2004. *Annali dell'Università degli Studi di Ferrara - Museologia Scientifica e Naturalistica*, vol. speci.: 59-62.
- Fiocchi C., 1998 - *Contributo alla conoscenza del comportamento simbolico di Homo sapiens sapiens. Le conchiglie marine nei siti del Paleolitico superiore europeo: strategie di approvvigionamento, reti di scambio, utilizzo*. Tesi di dottorato, Consorzio Universitario di Bologna, Ferrara, Parma.
- Fontana F., Guerreschi A. & Liagre J., 2002 - Riparo Tagliente. La serie epigravettiana. In: Aspes A. (ed.), *Preistoria Veronese. Contributi e aggiornamenti, Memorie del Museo Civico di Storia Naturale di Verona*, 2a serie, sez. Scienze dell'Uomo, 5: 42-47.

- Fontana F., Bertola S., Bonci F., Cilli C., Thun Hohenstein U., Liagre J., Longo L. & Pizziolo G., 2007a - L'Unità Stratigrafica 11 nei depositi epigravettiani di Riparo Tagliente (Stallavena di Grezzana, Verona). Analisi integrata di attributi tecnologici, funzionali, paleoeconomici e spaziali. In: Thun Hohenstein U. (ed.), Atti del I Convegno Nazionale degli Studenti di Antropologia, Preistoria e Protostoria, Ferrara, 8-10 maggio 2004. *Annali dell'Università di Ferrara - Museologia Scientifica e Naturalistica*, vol. spec.: 95-98.
- Fontana F., Bertola S., Bonci F., Cilli C., Liagre J., Longo L., Pizziolo G., Thun Hohenstein U. & Guerreschi A., (2007b) - The first occupation of the Southern Alps in the Late Glacial at the site of Riparo Tagliente (Verona, Italy). Detecting the organisation of living-floors through a G.I.S. integrated analysis of technological, functional, palaeoeconomic and spatial attributes. In: Grimaldi S. & Perrin T. (eds), Proceedings of the XV UISPP Congress, Lisbon, 3-9 September 2006, Colloquium 31, "Mountain environments in Prehistoric Europe". *BAR International Series* (in press).
- Guerreschi A., 1983 - Structures d'habitat épigravettiennes dans l'Abri Tagliente (Verone) et dans la grotte du Prete (Ancone-Italie). In: Berke H., Hahn J. & Kind C.J. (eds), Proceedings of the International conference "Upper Paleolithic settlement patterns in Europe", *Archaeologica Venatoria*, 6: 59-67.
- Guerreschi A. & Veronese C., 2002 - L'Epigravettiano di Riparo Tagliente: evidenze archeologiche di comportamenti simbolici. In: Aspes A. (ed.), Preistoria Veronese. Contributi e aggiornamenti, *Memorie del Museo Civico di Storia Naturale di Verona*, 2 a serie, sez. Scienze dell'Uomo, 5: 42-47.
- Gurioli, F., 2006 - *Il trattamento delle materie dure animali nel Paleolitico superiore dell'Italia nord-orientale. Sfruttamento a fini alimentari, tecnologici e simbolici*. Tesi di dottorato, Consorzio Universitario di Bologna, Ferrara, Padova.
- Liagre J., 2005 - *Gestion de l'activité de taille et de l'espace domestique au Tardiglaciaire en Italie nord orientale. Analyse des «Officine Litiche» de l'abri Tagliente (Vénetié)*. Université Aix-Marseille I, 380 pp.
- Peretto C., Biagi P., Boschian G., Broglio A., De Stefani M., Fasani L., Fontana F., Grifoni R., Guerreschi A., Iacopini A., Minelli A., Pala R., Peresani M., Radi G., Ronchitelli A., Sarti L., Thun Hohenstein U. & Tozzi C., 2004 - Living-floors and structures from the lower Palaeolithic to the Bronze age in Italy. *Collegium Anthropologicum*, 28 (1): 63-88.
- Rocci Ris A., Cilli C., Malerba G., Giacobini G. & Guerreschi A., 2005 - Archeozoologia e tafonomia dei reperti provenienti da un complesso epigravettiano (taglio 10) di Riparo Tagliente (Grezzana, VR). In: Malerba G. & Visentini P. (eds), Atti del 4° Convegno nazionale di Archeozoologia AIAZ. (Pordenone, 13-15 novembre 2003). *Quaderni del Museo Archeologico del Friuli Occidentale*, 6: 111-123.
- Taborin Y., 1993 - Traces de façonnage et d'usage sur les coquillages perforés. In: Anderson P.C., Beyries S., Otte M. & Plisson H. (eds), Traces et fonction: les gestes retrouvés. ERAUL, 50: 255-267.
- Zorzin R., 2005 - Le terre coloranti dei Monti Lessini. In: Broglio A. & Dalmeri G., Pitture Paleolitiche nelle Prealpi venete: Grotta di Fumane e Riparo Dalmeri. *Memorie del Museo Civico di Storia Naturale di Verona*, 2: 47-49.

