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Functional analysis of the decorated ground stone tool from Terlago (TN)

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SUMMARY - *Functional analysis of the decorated ground stone tool from Terlago (TN)* - The 'fame' of the pebble is mainly due to the decorative motif of bundles made by linear incisions on both surfaces. Yet, the peculiarity of the artefact is also related to the presence of intense functional modifications located on its opposite ends, which singles it out as one of the few Italian Tardiglacial-Early Holocene examples of ground stone tools. This article presents the results of an use-wear analysis aimed at clarifying the function of the decorated tool. Moreover, the authors try to see a potential morpho-functional connection between the analysed pebble and a group of artefacts found in the Late Epigravettian levels of Riparo Dalmeri, which represent the main reference of ground stone tools for the end of the Upper Palaeolithic in Italy.

RIASSUNTO - *Analisi funzionale del ciottolo decorato di Terlago (TN)* - Il ciottolo del Terlago è noto per la sua decorazione costituita da una serie di linee incise su entrambe le superfici. Alcune modificazioni prodotte in seguito all'utilizzo dell'oggetto, qualificano il ciottolo come uno dei rari strumenti in pietra pesante documentati in Italia tra il Tardiglaciale e l'inizio dell'Olocene. Questo articolo presenta i risultati di un'analisi microscopica finalizzata a chiarire la natura di tali tracce funzionali. I risultati dello studio sono stati messi a confronto con i dati relativi alla funzione degli strumenti in pietra pesante provenienti dai livelli Epigravettiani del Riparo Dalmeri. Quest'ultimo sito rappresenta il riferimento principale per quel che riguarda l'uso di oggetti in pietra non scheggiata durante il Paleolitico superiore in Italia.

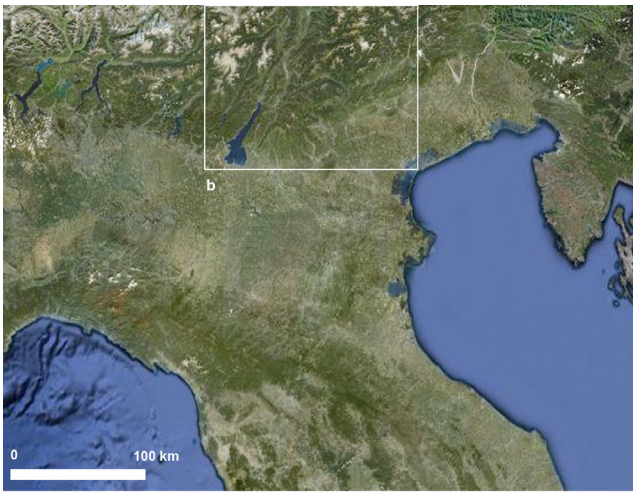
Key words: ground stone tools, use-wear traces, hide processing, ochre, Late Epigravettian and Early Mesolithic
Parole chiave: pietra pesante, trace d'uso, lavorazione della pelle, ocra, Epigravettiano recente e Mesolitico antico

1. INTRODUCTION

The decorated pebble from Terlago was found during archaeological investigations carried out at this site from 1980 to 1985 and in 1990 on the northern shore of the eponymous lake, located in Valle dei Laghi, few kilometres from the city of Trento (Fig. 1). Although no precise stratigraphic information is available for the pebble, it has been assigned to a generic final Late Epigravettian-Early Mesolithic period on the basis of the rich industry found at the site, characterised by geometrics and proto-geometric microliths as well as Sauveterrian armatures associated with the decorated pebble.

The 'fame' of the pebble is mainly due to its artistic aspect, i.e. a decorative motif of bundles made by linear incisions on both surfaces. Yet, the peculiarity of the artefact also related to the presence of intense functional modifications located on its opposite ends (one of which is fragmentary), which singles it out as one of the few Italian Tardiglacial-Early Holocene examples of ground stone tools. To-date, evidence for the use of pebbles and ground stone tools during the Upper Palaeolithic is very scarce for the whole of Apennine Peninsula. The most extraordinary example is a grinding stone found at the site of Bilancino in Tuscany, dated to the Gravettian and seen as the first evidence for plant-food processing across the Peninsula. In later period, at the end of the Upper Palaeolithic, ground stone tools are well documented at the mid-altitude site of Riparo Dalmeri (Asiago-Sette Comuni Plateau) and at Bus de La Lum (Cansiglio Plateau) in the Venetian Prealps (Cristiani *et al*. forthcoming, Peresani 2002). In particular, at Riparo Dalmeri, a group of polishers, slabs and hammerstones show that the tool-kit used by the Late Epigravettian hunters was not only composed of knapped stone artefacts but that it also involved ground stone tools, which were utilised in the process of hide-working, ochre-grinding, flint-knapping and stone-working (Cristiani *et al*. forthcoming). In the same area, and not so far from Riparo Dalmeri, the presence of hammerstones is also documented in the Epigravettian levels of Riparo Tagliente (Valpantena), although this evidence remains unpublished at present (F. Fontana *comm. pers*.).

This article presents the results of an analysis aimed at clarifying the function of the Terlago ground stone tool. Furthermore, the authors try to see a potential morpho-functional connection between the analysed pebble and a group of artefacts found in the Late Epigravettian levels of Riparo Dalmeri, which represent the main reference of ground stone tools for the end of the Upper Palaeolithic in Italy.



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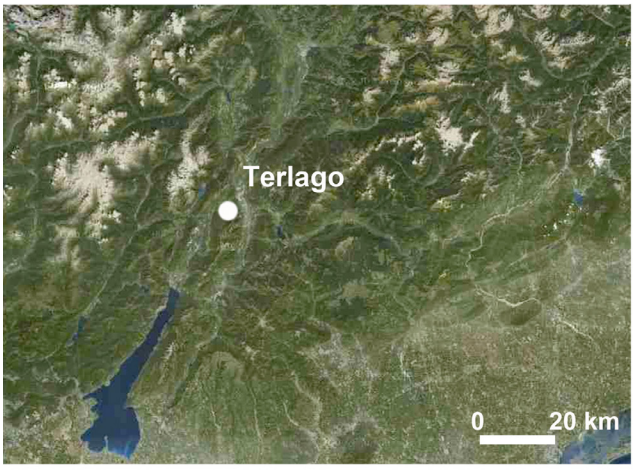

b

Fig. 1 - a, Area of study. b, Location of Terlago in the area of study
Fig. 1 - a, Area studio. b, Localizzazione del sito di Terlago all'interno dell'area studio

2. THE DECORATED PEBBLE (FIG. 2)

The decorated pebble is made out of siltstone. It is fragmentary (5 fragments) and characterised by a flattened oval shape and by two opposite functional areas: one complete and the other almost completely missing (Fig. 2, a). These functional areas can be identified by macroscopic use-modification located on both surfaces of the proximal as well as the distal extremity of the pebble. The latter is almost entirely missing. On both surfaces, a series of 6 transversal[1] incised bundles are present, out of which 4 are located on one surface and two on the other (Fig. 2, c, d). Each bundle is composed of 5 sub-parallel lines. Toward the centre of the artefact, which is partially missing, other 2 incised bundles are visible: one is composed of 6 subparallel lines and is located on one of the main surfaces while the second is characterised by 4 lines. On the extremity of one side, a column of short and subparallel lines is shown close to the end of the artefact (Fig. 2, d – drawing in the centre). This series is composed of 2 sequences: the first characterised by 11 lines regularly incised; the second shows numerous lines (ca. 30), which are incised on the lower part of the pebble, and are less visible towards the lower end of the tool. Other short subparallel lines are also present. These are characterised by different lengths, and they sometimes cross the main bundles.

The artefact has already been the object of a chrono-stylistic analysis in 1984 by one of the authors (G.D.). The results pointed out some stylistic analogies between the Terlago tool and some Italian Late Palaeolithic-Early Mesolithic red painted pebbles: two stones from Grotta di Cala dei Genovesi (at the Levanzo island – Sicily) and one from Grotta della Madonna a Praia a Mare (Calabria) (see: Graziosi 1954; 1973, Tab. VII-IX). Considering the engraved lines visible on the Terlago pebble a further analogy can be made with more than 300 rocks with geometric incisions from Grotta delle Veneri di Parabita (Puglia) (Radmilli 1974) and one calcareous rock from the Riparo Tagliente (Veneto) (Leonardi 1982). This latter resembles the Terlago object for the presence of short subparallel cuts. Nevertheless, the peculiarity of the incised decoration that characterises the Terlago pebble does not allow us to push further the stylistic comparison between this pebble and other decorated artefacts (Dalmeri 1984).

The decorated artefact from Terlago is also characterised by traces of use, which are visible on both of its convex opposite ends. They are mainly developed on the distal part of the pebble while they are partially missing on its lower portion (Fig. 1, b). The high development of the use-wear traces gives the idea that the tool was used for a long time despite or in relation to its decoration.

3. METHODOLOGY OF STUDY

The decorated pebble from Terlago has undergone a use-wear analysis by means of low and high magnification. For the first observation a stereoscope Leika M12.5 with magnifications from 8x to 100x was used. A further examination was carried out with a SEM (Scanning Electron Microscope)[2].

For the classification and interpretation of archaeological traces the results obtained by Dubreuil (2004, 2009) and Treuil and Procopiou (2002) were considered. Functional macro-traces have been classified as *fatigue* traces (fractures or edge-removals, pits) and *abrasive* traces (leveling or rounding of edge and striations). A series of tools created *ad hoc* for the analysis of the Late Epigravettian ground stone tools of Riparo Dalmeri as well as ground stone artefacts from the experimental collection of the Laboratory for Technological and Functional Study of Material Culture of Museo delle Origini (University "La Sapienza, Rome) have been used as a reference collection

1 Referring to the long axis of the artefact.

2 The stereoscopic analysis was carried out at the "Laboratorio Bagolini" (University of Trento) and the SEM observations were made at the Museo Tridentino di Scienze Naturali (Trento).

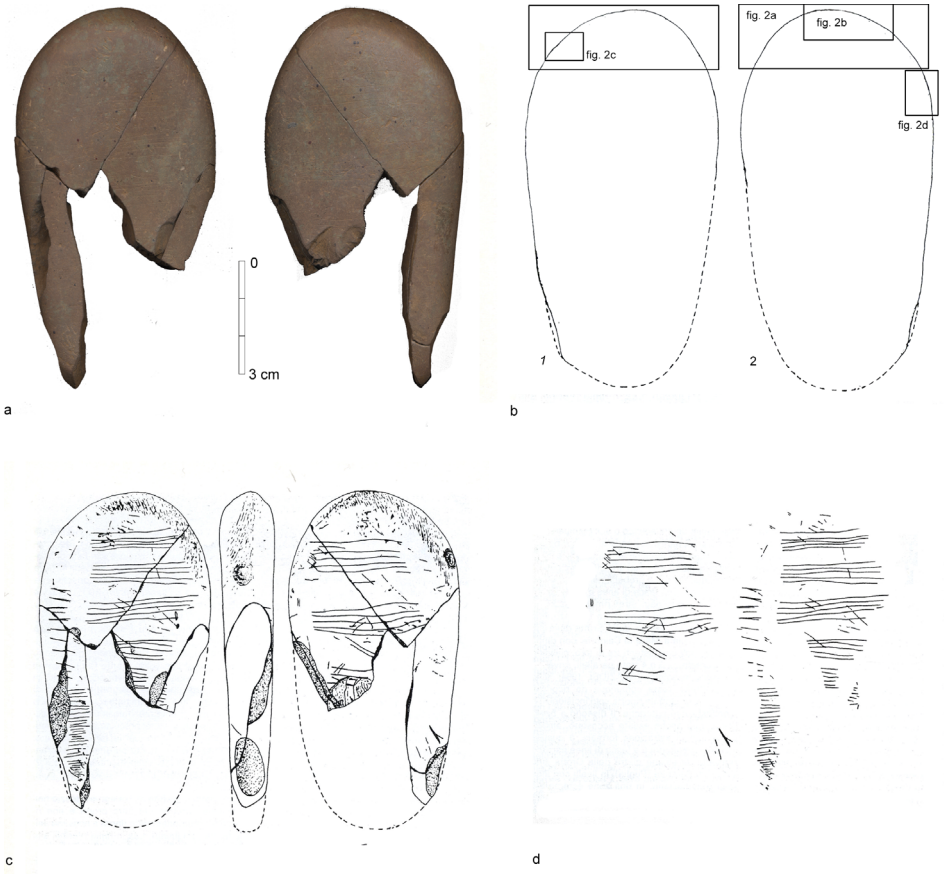

Fig. 2 - a. The decorate pebble
b. Profile of the decorated pebble and areas where use-wear traces have been identified
c. Drawing of the decorated pebble
d. Decoration of the pebble. The column in the centre represents the lateral decoration of the pebble.
Fig. 2 - a. Il ciottolo decorato
b. Profilo del ciottolo decorato e aree con tracce d'uso
c. Disegno del ciottolo decorato
d. Decorazione del ciottolo. La colonna nel centro rappresenta la decorazione laterale del ciottolo.

for the interpretation of pebble from Terlago (Cristiani *et al*. forthcoming). The experimental tools consists of polishers used for leather softening, regularization of limestone surfaces and ochre grinding as well as hammerstones for flint-knapping.

4. RESULTS OF THE FUNCTIONAL ANALYSIS

The study at low magnification allowed to locate the use-traces and to ascertain their disposition and extension as well as their macroscopic characteristics. Macroscopically, the utilisation produced faceting with slightly rounded borders, polished and striated surfaces (Fig. 3, a-d). The striations cover all of the flatten area; they are large, deep, transversal to the main axis and rough bottomed (Fig. 3, b-d). Their orientation implies that the tool was used with a back and forth movement. On the distal part, the traces are oriented in opposite direction on the lower and upper surfaces (Fig. 5, 1-2) suggesting the hypothesis that the artefact was used rotating its functional extremities around the main axis. Since the proximal portion of the artefact is mostly missing, it is not possible to be certain whether this part was also used in the same way.

Red residues have been identified at the low magnification as well as by the SEM analysis (Fig. 3, c, e; Fig. 4). The coloured substance is present in the form of red circular accretions on one of the surfaces of this tool: on the distal part of the tool in the proximity of the used edge (Fig. 3, e). Nodules of ochre were also found during the excavation of the site (Dalmeri 1984).

The nature of the traces suggests that the artefact was used as a polisher to process hide with the addition of an abrasive substance such as ochre (Fig. 3, f).

5. THE USE OF GROUND STONE TOOLS IN THE NORTH-EASTERN ALPINE REGION: A COMPARATIVE PERSPECTIVE

At present, the morphology and functional traces of the decorated pebble from Terlago can be compared to very few other specimens found in Italy. In particular, the only comparative objects are ground stone tools from the Epigravettian site of Riparo Dalmeri, in the Asiago-Sette Comuni Plateau (TN). The two main occupations of this site yielded 12 ground stone tools, out of which 6 have been classified as artefacts involved in hide processing (e.g. polishers, softening tools, etc.) by means of the use-wear analysis (Cristiani *et al*. forthcoming). One of these latter items can be compared to the pebble from Terlago on the basis of the raw material (it is made out of siltstone) and morphology (it is characterised by a flattened ovoid form). Also the location and distribution of the macroscopic use-modifications on this tool are similar to the ground stone tool from Terlago and are characterised by an opposite organisation of functional facets on both the utilised ends. This specific

Fig. 3 - a. Particular of the distal part of the pebble with use-wear (lower surface) (magnification 8x)
b. Particular of the distal part of the pebble with use-wear (upper surface) (magnification 16x)
c. Detail of the faceted surface created after the use of the pebble (upper surface). The arrows show a striation (the arrow on the right) and a residue (the arrow on the left) (magnification 1,6x)
d. Detail of the distal part of the pebble with use-wear (upper surface) (magnification 8x)
e. Detail of a red residue and striations (magnification 20x)
f. Use-wear modifications produced on an experimental siltstone tool after hide-working with addition of ochre (magnification 2x)
Fig. 3 - a. Particolare dell'estremità distale del ciottolo con tracce d'uso (superficie inferiore) (ingrandimento: 8x)
b. Particolare dell'estremità distale del ciottolo con tracce d'uso (superficie superiore) (ingrandimento: 8x)
c. Particolare della superficie sfaccettata prodotta in seguito all'utilizzo del ciottolo (superficie superiore). Le frecce indicano una stria (la freccia sulla destra) ed un residuo (la freccia sulla sinistra) (ingrandimento 1,6x)
d. Dettaglio dell'estremità distale del ciottolo con tracce d'uso (superficie superiore) (ingrandimento 8x)
e. Dettaglio di un residuo rosso e di strie d'uso
f. Tracce d'uso prodotte su uno strumento sperimentale in siltite in seguito alla lavorazione di pelle con aggiunta di ocra (ingrandimento 2x)

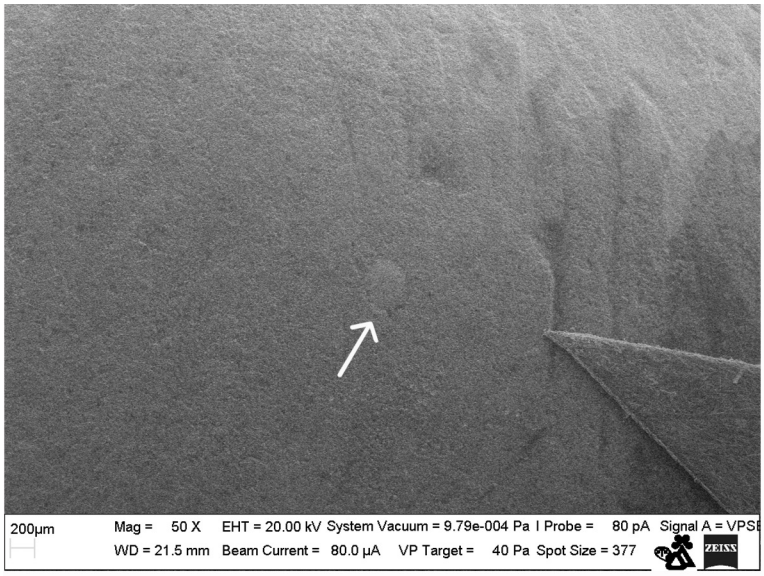

Fig. 4 - Detail of a red residue observed by SEM.
Fig. 4 - Dettaglio di un residuo rosso osservato al SEM.

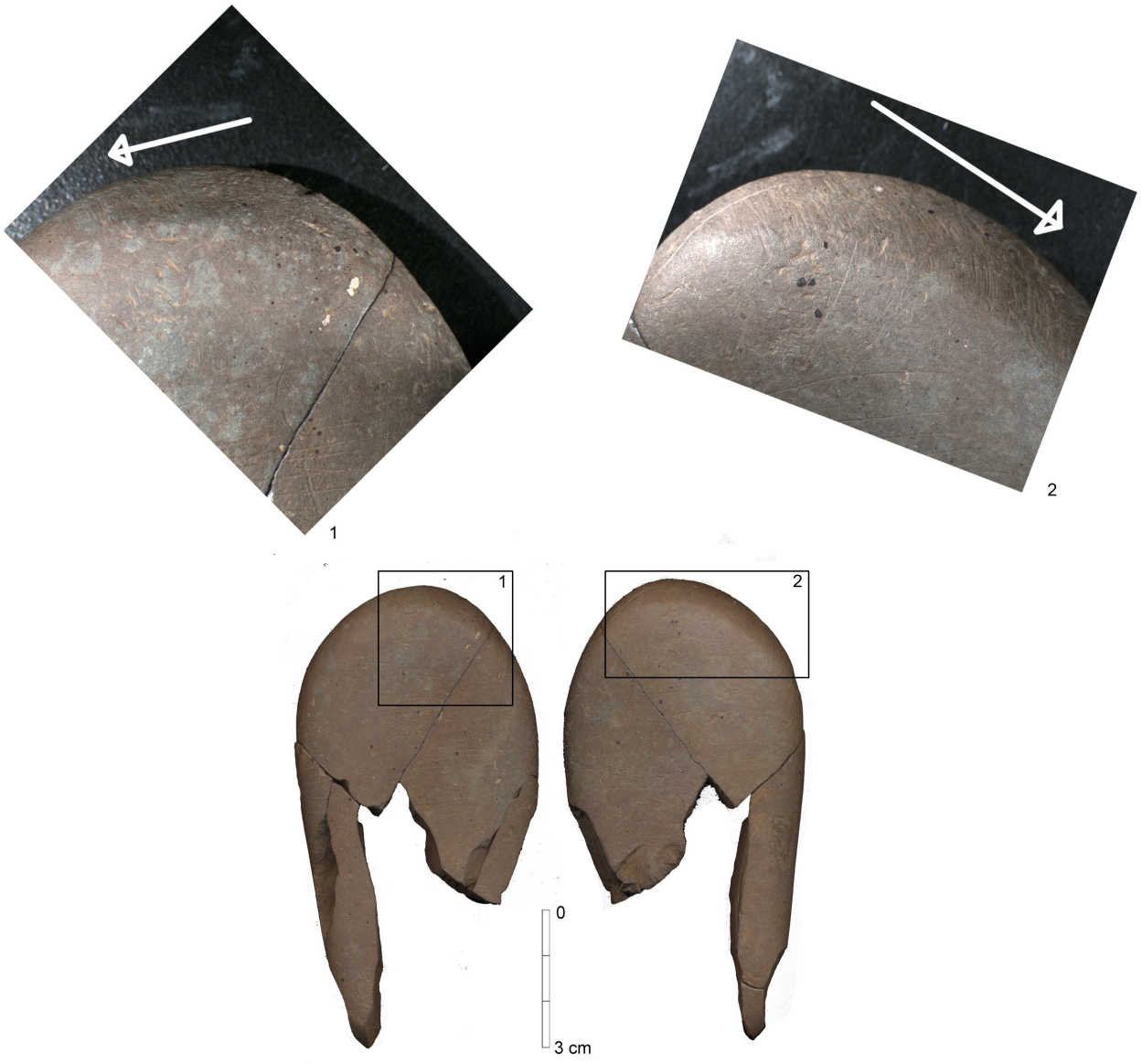

Fig. 5 - Images 1 and 2 show the orientation of the functional faceting identified on the upper (image 1) and lower (image 2) surfaces of the pebble with regards to the major axis of the tool which is represented below.
Fig. 5 - Le immagini 1 e 2 mostrano l'orientamento della sfaccettatura funzionale identificata sulla superficie superiore (immagine 1) e inferiore (immagine 2) del ciottolo rispetto all'asse maggiore dello strumento in basso.

modification suggests that both the ground stone tools from Terlago and Riparo Dalmeri were used in the same way, i.e. they have been rotated around their main axis during the use. As for their functions, both polishers were utilised for hide-working. Also the use of ochre is well documented at Riparo Dalmeri by the discovery of several ochre lumps and ferrous-like nodules (Bertola 2008) and by the presence of numerous red painted stones (related to the most ancient occupation, (Dalmeri et al 2005, 2008, 2009), and by the use of the colorant in the hafting system of the osseous tools with an eventual decorative/functional purpose (Cristiani 2008). Furthermore, ochre processing is also implicitly attested by the presence of a stone interpreted as a slab for crushing ochre nodules by analysis of the use-wear traces (Cristiani *et al*. forthcoming).

6. CONCLUSIONS

Use-wear analysis of the decorated pebble from Terlago allows us to interpret it as a stone polisher used in hide and ochre processing. The morpho-functional comparison carried out on the ground stone tools assemblage from the Late Epigravettian site of Riparo Dalmeri, found not far from Terlago, supports this explanation. At Riparo Dalmeri, at least two artefacts show use-wear modifications extraordinarily similar to the ones that characterise the Terlago pebble. The functional traces refer to the same worked material (i.e. hide) as well as to an identical gesture (i.e. the same way of using the polisher shared by the two sites). This is an interesting feature that allows one to hypothesise that the treatment of hides in the region could have involved a standardised chain of traditional actions and formal tools different from the classical flint scrapers (found in large numbers at Dalmeri site, Lemorini *et al*. 2006). Such an activity implied the use of ochre, the residues of which have been found on the Terlago pebble surfaces. This red colorant was a central element of the north-eastern Alpine and Prealpine Upper Palaeolithic way of living, involved in the hide processing carried out with both flint and osseous tools, in the preparation of hunting osseous weapons, in the ornamentation of the body and objects (e.g. on the shell ornaments – see: Dalmeri & Fiocchi 1998) as well as in the painting of stone pebbles which were eventually charged with symbolic meaning (see: Lemorini *et al*. 2006; Cristiani 2008, 2009, 2010; Dalmeri *et al*. 2004, 2005). In this context, the powerful significance of the colour red seems to have continued during the Mesolithic and Early Neolithic as an important element that characterised local traditions. Such a conclusion can further be supported on the basis of the reconstruction of the use of flint trapezes, the Upper Palaeolithic and Mesolithic mortuary practices (e.g. at the burials of Villabruna, Mondeval de Sora, Vatte di Zambana, Mezzocorona Borgonuovo – see: Dalmeri *et al*. 1998 and Dalmeri *et al*. 2001), the Upper Palaeolithic and Mesolithic alpine ornaments (Dalmeri & Fiocchi 1998, Cristiani 2009 *a, b*) and the technology of the *Venus* from Riparo Gaban in the Adige valley (TN) (Cristiani *et al*. 2009; Cristiani 2010).

Considering clear morphological and techno-functional similarities with the well-dated site of Riparo Dalmeri, we suggest that the pebble should chronologically be assigned to the Late Epigravettian occupation of the site, as suggested by the typological characteristics of most of the lithic remains.

7. ACKNOWLEDGEMENTS

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