ANTHROPOLOGIE • LX/3 • pp. 453–468 • 2022

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NEW OCHRE PAINTED STONES FROM THE LATE PROTO-AURIGNACIAN OF FUMANE CAVE

ABSTRACT: Fumane Cave, northern Italy, with its early Upper Palaeolithic deposit, dating between 41.2–35 ky cal BP, is one of the most significant sites for the understanding of the first Anatomically Modern Human groups in Europe. The archaeological excavations led to discover a consistent archaeological record which includes numerous items connected to the symbolic production too: shells, engraved bones and six ochred stones which are considered among the most ancient evidence of painting activity in Europe. Aside the six painted stones, a high number of ochred rock flakes collected during the excavations have been recently re-examined with the aim to trace further lines of research, i.e. what their origin is, so if they are fragments of parietal art or not and how these stones or part of them fit in the wider context of the most ancient forms of art in Europe. Specifically, within this paper, authors present four newly recognised painted stones which were analysed according to their graphic themes and techniques, their chronology and spatial distribution. This leads to deepen the issues of symbolic production in the Fumane Cave, the use of the site, identifying any productive area. Moreover, the newly presented findings, together with the already known ones are contextualized into the contemporaneous Italian and European context providing data towards the understanding of any morphological and stylistic variability and semiotic transformations to interpret any cultural dynamic process occurred in the Alpine area and beyond.

KEY WORDS: Portable art – Palaeolithic art – Aurignacian – Symbolic behaviour – Northern Italy – Alps

INTRODUCTION

Over the last 30 years, the application of new chronometric methodologies has permitted to confirm or modify the chronologies of both portable and parietal art in the Middle Stone Age and the Upper Palaeolithic. So, the stylistic comparisons between parietal and portable art objects together with the analysis of figurative palimpsest were further qualified by the new information, giving more accurate data to establish both the synchronicity and the diachronicity of the artistic production, the use of the sites and the graphic and cultural connections among sites.

Received 12 January 2022; Accepted 3 March 2022. Available online 23 May 2022.

DOI: https://doi.org.10.26720/anthro.22.03.03.1

Within this framework great importance has been paid to the emergence of the symbolic production, the discovery of sites and decorated objects, all of which have given a great impulse to the debate among scholars (see Hoffmann *et al.* 2018, White *et al.* 2020, Hoffmann *et al.* 2020).

Beside the chronological issue is the one linked to the concept of cultural geographies and graphic territories (Bourdier 2013), i.e. the discovery of new sites that have significantly widen the Palaeolithic art distribution over a large territory including Balkans (Ruiz-Redondo *et al.* 2019), Caucasus (Sigari 2017), Borneo (Aubert *et al.* 2018, Brumm *et al.* 2021) and Egypt (Huyge *et al.* 2011).

Therefore, the new advances in Palaeolithic studies and the research on the development of the artistic production focused both the chronology and the space variables.

This is also the case for intentionally painted stones, which are a clear distinctive trait of Anatomically Modern Humans (AMH) since their early presence in Europe, especially during the Aurignacian, when several caves and shelters yielded undisputable evidence of the use of red ochre as pigment for both parietal and mobile art (Chiotti *et al.* 2007, Clottes 2010, García-Diez *et al.* 2015, Bourrillon *et al.* 2018, Wolf *et al.* 2018).

In this perspective, the red ochred stones from Fumane Cave offer a preferential insight into the earliest symbolic production, its development along the Aurignacian and Gravettian, and its relationship both with the cave space itself and the other contemporary sites.

Fumane Cave in Italy belongs to the group of the most important Aurignacian sites, preserving a detailed stratigraphy including the transition from the Middle to the Upper Palaeolithic. The early Upper Palaeolithic layers witness the large use of symbolic items at the site represented by hundreds of perforated shells, some of them stained with ochre, engraved bones, and finally six ochred stones which are considered among the most ancient evidence of painting activity of anatomically modern humans in Europe (Broglio 2005). Aside these pieces of art, hundreds of small and fragmented stones coated with ochre were collected during the excavations carried out in the 90ies and stored for future analyses. In the frame of a PhD project led by one of us (D.S.), this large assemblage was re-examined with the aim to trace further lines of research to question the origin of the painted stones, i.e. are they fragments of parietal art or not? During this investigation, four additional painted stones were recognised. Within this paper we present this material to deepen our knowledge around the most ancient forms of art in Europe and the issue of symbolic production in the Fumane Cave.

FUMANE CAVE

Fumane Cave is located in the Monti Lessini Plateau at the southern belt of the Italian Alps. This is a key-site for the study of Neanderthal and modern human behaviour and has been under excavation coordinated by the University of Ferrara since 1988. The cave is part of a fossil karst network developed at the base of a rock cliff, formed by a wide cavity and two tunnels that enclose the deposits, a finely layered sedimentary succession with Mousterian, Uluzzian, Protoaurignacian and Gravettian records. Further details on the Late Pleistocene stratigraphic sequence, and paleoclimatic significance, as well as its paleontological and cultural content are further described in a consistent number of publications (Abu Zeid *et al.* 2019, Broglio, Dalmeri 2005, Falcucci *et al.* 2017, López-García *et al.* 2015, Peresani 2012, Peresani *et al.* 2016, Peretto *et al.* 2004)

The Protoaurignacian was recorded in the upper part of macro-unit A, layers A2, A1 (and correlated), dated at 41.2–40.4 ky cal. BP (Higham *et al.* 2009). The late Protoaurignacian was detected in most of macro-unit D, layers D3, D6, D3+D6 (Falcucci *et al.* 2020), dated at 38.9–37.7 ky cal. BP (Higham *et al.* 2009), and the Gravettian in layer D1d, dated to 35 ky cal. BP (Falcucci, Peresani 2019). In addition to dwelling structures, faunal assemblages, lithic and bone tools, and marine shells the late Protoaurignacian layers are featured by the notable painted stones (Broglio *et al.* 2009). The use of colouring materials was intense, indeed: tiny pieces of red and yellow ochre scattered in the area, two reddish layers (A2R and A2 S21) with massive presence of ochre (Broglio *et al.* 2005a, 2009, Cavallo *et al.* 2017) belong to the Aurignacian complex, artefacts and shells with red pigment smeared on the surface (Aleo *et al.* 2021, Peresani *et al.* 2019) and a high number of small plaquettes smeared of red ochre (Broglio, Dalmeri 2005, Broglio *et al.* 2009).

THE PIGMENT ORIGIN

A recent study aimed to understand the provenance of the archaeological ochre found in the site, providing information towards the understanding of the human skills to select, process and treat suitable raw materials (Cavallo *et al.* 2017).

Samples of archaeological ochre from Aurignacian layers A and D were analysed and later compared with possible geological resources. According to their texture, microstructure and composition, the fragments were grouped into four main typological categories. The first

type includes those that show dolomite crystals with ferruginous compounds and are covered by Fe-based reddish coating with secondary calcite and apatite. Within this group there are two more samples with an uneven pinkish patina coating the surface whose texture, due to the presence of partially dolomitised sparry calcite including cemented ooids, is similar to the cave bedrock. The mineralogical composition of the first typology samples can be linked to the weathering of Jurassic dolomitised limestones (Cavallo *et al.* 2017). Only one sample belongs to the second typological group, being made of non-homogeneous quartz and Fe-oxides. Differently, yellow isotropic fragments of goethite characterise the third typological group. Finally, within the Type 4 there are two samples made of Fe-oxides and/or Fe-oxyhydroxides with Ca-phosphate, due to a consistent amount of bone fragments (Cavallo *et al.* 2017).

All these fragments were compared with samples taken from potential geological resources identified both close to the cave (Manune burg) and distant c. 20 km far from the Fumane Cave, in the Sant'Andrea and San Bortolo caves. The high incidence of dolomite samples that can be related to the dolomitised limestones, led to suggest two main interpretative hypotheses to explain their origin: 1) they are fragments of the cave walls and the red colour on their surface can be a ferruginous patina or a post-depositional event; 2) they were taken from fully dolomitised oolitic limestone outcropping at Manune and other sites (Cavallo *et al.* 2017). In conclusion, the (ferroan) dolomite associated with hematite fragments are related to the weathering of dolomitised limestones that can be found with similar characteristics at the Manune, Sant'Andrea and San Bortolo sites, though they have scarce quantity of red material. Differently, the microscopic observation of the characteristic minerals association and of the textural and microstructural features of the ochre Types 3 and 4 have given no information about their origin (Cavallo *et al.* 2017). The rest of the samples show texture, microstructure and composition that recall the cave bedrock (Cavallo *et al.* 2017). During the Upper Palaeolithic occupation of the site, the inhabitants of Fumane Cave mainly exploited the carbonate-based resources. The ochre was then used as pigment and in some cases was probably powdered and mixed with bone fragments (Cavallo *et al.* 2017). So, the presence of bone fragments provides new information about the organic binders that were not recorded by Colombini *et al.* (2005), where these authors differently suggested that the ochre was mixed only to water and that the recognised lipids and proteins were mainly tied to the environmental deposit (Colombini *et al.* 2005, Broglio *et al.* 2006).

THE PAINTED STONES

Six stones painted with red graphic units are already known: IG VR 60679 (Stone I), IG VR 60768 (Stone II), IG VR 63643 (Stone III), IG VR 63642 (Stone IV), IG VR 63641 (Stone V) (Broglio, Dalmeri 2005, Broglio *et al.* 2006, Broglio *et al.* 2009). The sixth one was published in (Broglio, Dalmeri 2005, Broglio *et al.* 2006), but it has never received a catalogue number and has not been described so far.

The painted motifs portray different subjects. Stone I and II have figurative themes respectively a zoomorph, interpreted as a mustelid, and the so-called shaman of Fumane. An unidentifiable geometric sign, possibly a scalariform, was painted on Stone III, while a circle with dots and lines is on Stone IV. The fifth fragment has a probable running zoomorph with a spot just under it (Broglio *et al.* 2005b). The last stone flake has few traces that cannot be associated to any specific figurative category.

The six stones were respectively found within the Aurignacian layers A2–D3dbase, D5, D3 and D3a+b, in association with the above mentioned massive deposits of ochre and numerous ochred plaquettes, and the Gravettian layer D1d (Masetti 2005, Broglio *et al.* 2005b, 2009). Their distribution is not uniform: two of them, Stones IV and V, were found close to the entrance of the Gallery B, the mustelid at the entrance of Gallery A, the shaman close to the eastern wall and the last one, Stone IV, at the main entrance of the site (Broglio *et al.* 2005b). Four of the six stones briefly described here were found isolated, though more ochred stones were recovered within different layers from both macro-units A and D, in the whole cave space. At the time of their discovery, the stones had whitish concretions and sediment residuals on their surface, impeding to immediately recognise the painted graphic units (Broglio *et al.* 2005b, Velluti *et al.* 2005). So, once cleaned by the coatings over the paintings, graphic signs were exposed.

The stone lithology belongs to the locally dolomitised San Vigilio carbonatic sandstone and mudstone, and their origin was linked to ancient detachments of the vault of the cave (Masetti 2005, Cavallo *et al.* 2017, Colombini *et al.* 2005). Mineralogical and chemical analysis of both rock support and pigment led to recognise a surface alteration on the stones under the pigment coating (Colombini *et al.* 2005).

In one case hematite was recognised, while on the remaining four stones possibly local iron-oxide had been used to paint the red figures (Colombini *et al.* 2005).The abrupt interruption of the paintings on three of the stones (Stone I, II and V), and the paucity of human traces in association to the painted fragments (Stones II and V) led to hypothesise they were fragments of an ancient decorated vault that collapsed, breaking up into different pieces (Bertola 2005, Broglio *et al.* 2005b, 2009).

In 2017 the whole assemblage made of 481 stones smeared with ochre was reviewed, leading to recognise more new stones with painted graphic units. In this works we present four of them that were labelled following the previously chosen code system (Broglio 2005).

FORMAL DESCRIPTION OF THE STONES

The four new stones, which are here labelled as Stones VII–X, were unearthed during excavation activities from the layers of the macro-unit D (*Table 1*). Like the already published five painted stones (Colombini *et al.* 2005, Masetti 2005), all the new collected rock flakes with ochre belong to the same lithology of the cave, so they are fragments of the cave walls:

VII. This stone comes from layer D1e, which has not yet yielded any evidence of human frequentation aside an only one date 32.0–29.8 ky cal BP (Broglio, Dalmeri 2005) close to the cave wall at the entrance of the Gallery B. It has convex and almost regular face A (*Figure 1A*), opposed to the face B (*Figure 1B*), which is irregular showing an orange patina caused by natural alteration. The irregular fractures of this surface explain the preferential use of face A, which has an almost oval shape and whose limits are remarked by two clear and continuous curved lines. The red signs are partially covered by the sediment coating. However, the intense colour makes the graphic units standing out.

VIII comes from a Gravettian layer (D1d) as well. The stone flake was recovered in the middle of the entering area to the Gallery B. Traces of ochre were found only on one surface, face A (*Figure 2A*), which is ovaloid in its shape and is less irregular than the opposite face B (*Figure 2B*). The red colour traces are vivid and were applied on the whole surface features, including the fracture edges, where pigment remains are uncovered by the coatings. The whole surface of the stone is uniformly coated by sediment which let partially free the small red traces on the face A.

IX. It was unearthed in the Aurignacian layer D6, in the Gallery B mouth. Its face A (*Figure 3A*), which is almost quadrangular, is characterised by several superficial detachments which affected the dark red-purplish coat of pigment. Light red powder residuals can be seen concentrated inside and around a fracture close to the edge of the stone. On the opposite face B (*Figure 3B*), in the upper part, red-orange patina caused by natural alteration of the limestone itself can be recognised, together with dark a red ochre spot on the lower edge. The dark red-purplish ochre film is preserved in discontinuous spots due to the superficial detachments. The traces are all concentrated in a half of the face A. Despite the fragmentary status, the colouring substance appears homogeneous in colour and texture, and constitutes a proper layer applied on the rock, so marking a substantial difference with both the naturally deposited loose red powder on the same face A and the reddened area caused by the natural patina of the lithic support, that are on the opposite side and can be recognised in the fracture section.

X. The stone fragment was unearthed close to the northern cave wall, at the entrance of Tunnel B, within the Aurignacian layer D6base. The stone has an almost triangular shape and only one ochred face, A (*Figure 4A*). On this surface, a faded red curved line can be

TABLE 1: Catalogue of the Stones VII–X with indication of their spatial coordinates, square and layer of provenience, number of ochred surfaces, and presence of calcite concretion covering the pigment and sizes.

Stone	Excav. Year	Square	SU	Progr. Excav. Numb.	Cleaning	Ochred sides	Calcite	Length	Width	Thickness
VII	–	147i	D1e	12	no	1	no	11.5	8.1	3.4
VIII	n/a	137A	D1d	376	no	2	no	11.4	6.5	3.5
IX	–	128c	D6	37	no	2	no	12.2	9.8	1.6
X	–	135i	D6-base	30	no	1	yes	16	12.5	1.7

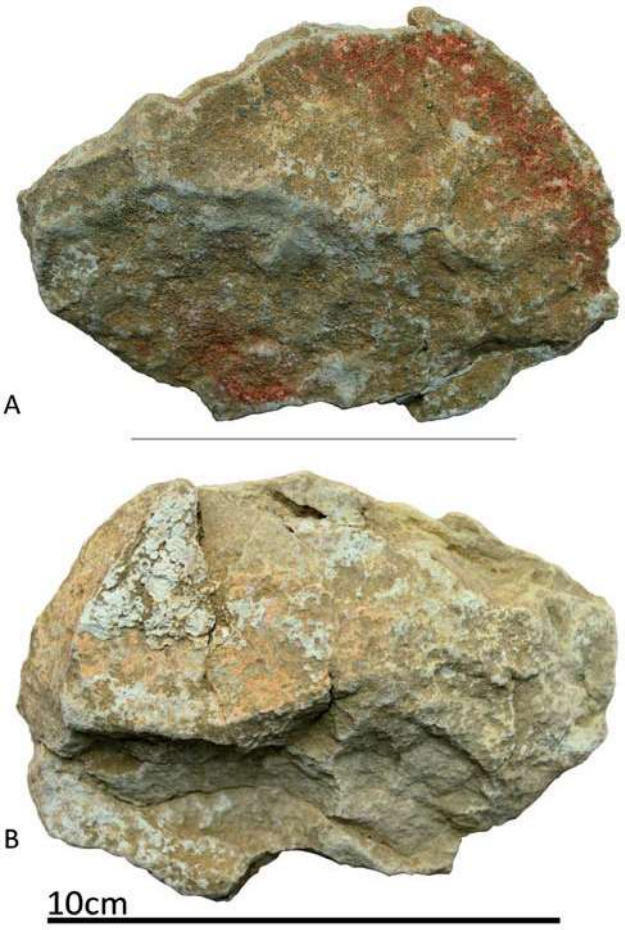

FIGURE 1: Stone VII, (A) face A with the red signs that mark the upper and lower edge of the surface. The sediment coat is clearly visible on the whole face (B) the irregular face B with its orange patina.

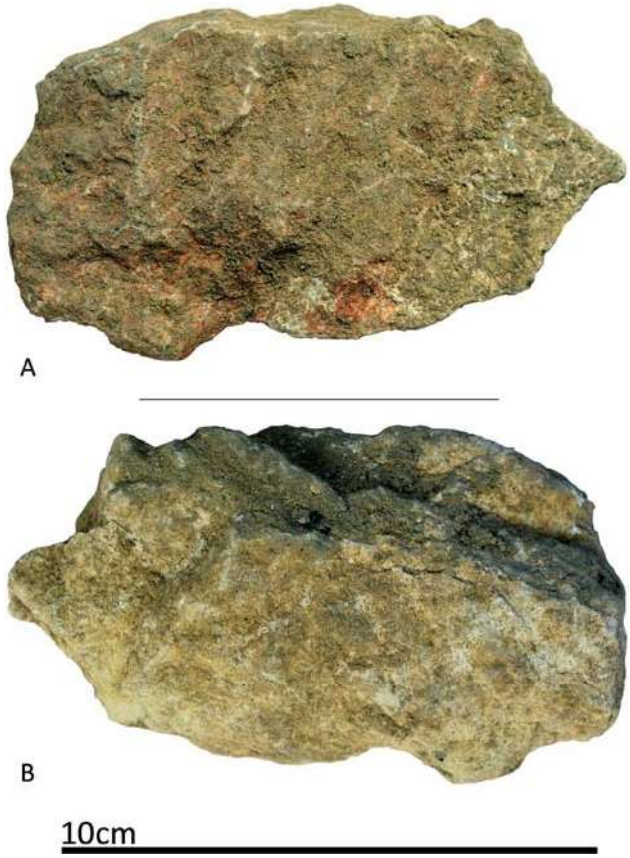

FIGURE 2: Stone VIII, (A) side A with the exposed red marks in the lower part. Red traces can be seen under the sediment coat the covers the surface; (B) face B is free from the sediment coat and has an orange patina.

recognised under a calcite veil. Similarly to Stone VII, the painted mark looks continuous. The opposite side B (*Figure 4B*) shows a regular fracture surface without any anthropic intervention.

METHODS

As mentioned above, each stone was labelled following the previous numeration, so VII–X, in the wait for being recorded with the official and standard classification code provided by the Institutions. For this first study stage, stones have not been cleaned avoiding the removal of their external sedimentary coat. All the stones were photographed using DSLR photography with a digital camera Nikon D5200 24.1-megapixel DX-format CMOS sensor and the produced documentation was checked using the plugin D-Stretch (Harman 2008, Domingo *et al.* 2013, Le Quellec *et al.* 2013) for the software ImageJ to enhance the red pigment traces. Later digital tracing was done using the raster graphic editor software Photoshop.

To examine the relationships between ochre and sedimentary residues, and ascertain if the colouring material was anthropically added or determined by post-depositional events, optical microscopic observation was performed through stereomicroscope Leica EZ4 HD equipped with digital camera 8–35× magnification.

The four pieces were placed on a rotating platform to do Digital 3D photogrammetry using Canon EOS 100D 18 megapixel CMOS sensor digital camera. The photogrammetric models were later built using the software Agisoft PhotoScan. To have the enhanced 3D

photogrammetric models of the stones, the extracted texture files were then processed by using the DStretch plugin (Sigari 2022).

RESULTS AND DISCUSSION

The new stones presented here were painted using only red pigment and do not show neither any preferential decorated surface, nor the presence of any engraved signs, differently from the Mousterian levels (Peresani *et al.* 2014).

Concerning the figurative motifs, the enhancing mean of DStretch plugin highlighted some graphic units and some issues linked to their making and composition technique (*Figure 5*). Specifically:

VII. A curved line measuring 8.1 cm in length and 6.1 cm in height follows and marks the edge of the rock support. The line width is almost regular being 1.5–2 cm. Opposed to it, on the same face, there is a shorter red painted segment, 3.8 cm long and 2.3 cm high. The painting mark width is almost regular being around 1.5 cm. The two marks were possibly part of a circle that used and remarked the face A of the stone fragment. The red pigment is dark, intense and homogeneous in the way it was spread on the stone flake (*Figure 5A*).

VIII. The sediment coating obliterates the painting and limits our understanding of the painted motif.

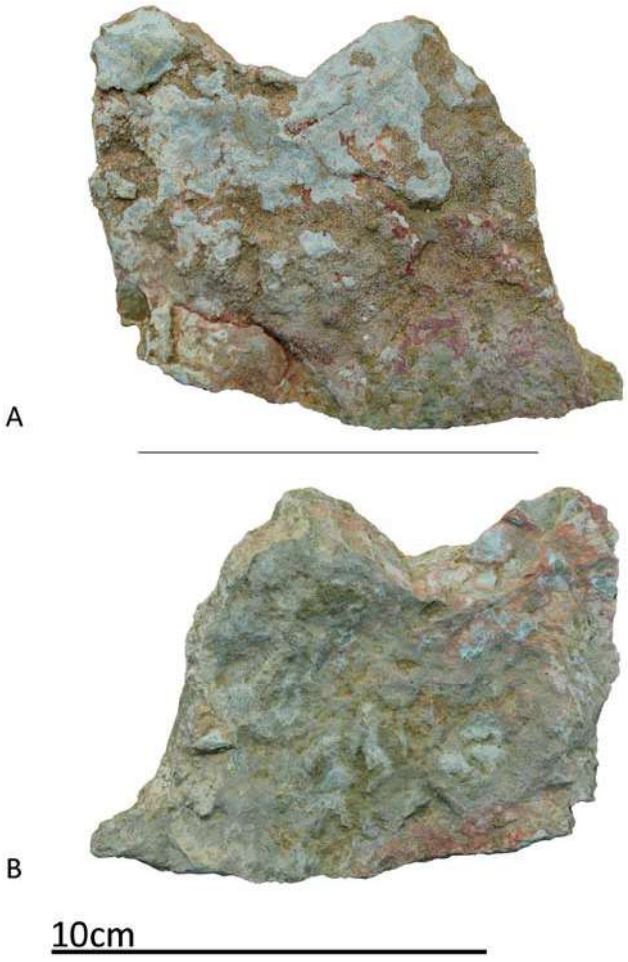

FIGURE 3: Stone IX, it has not sediment coat on its surface. However, on its face A red sediment powder is in a fracture in the left bottom part, while on right side are the traces of pigment (A); below (B), on face B the reddish patina caused by natural alteration of the limestone support can be recognised.

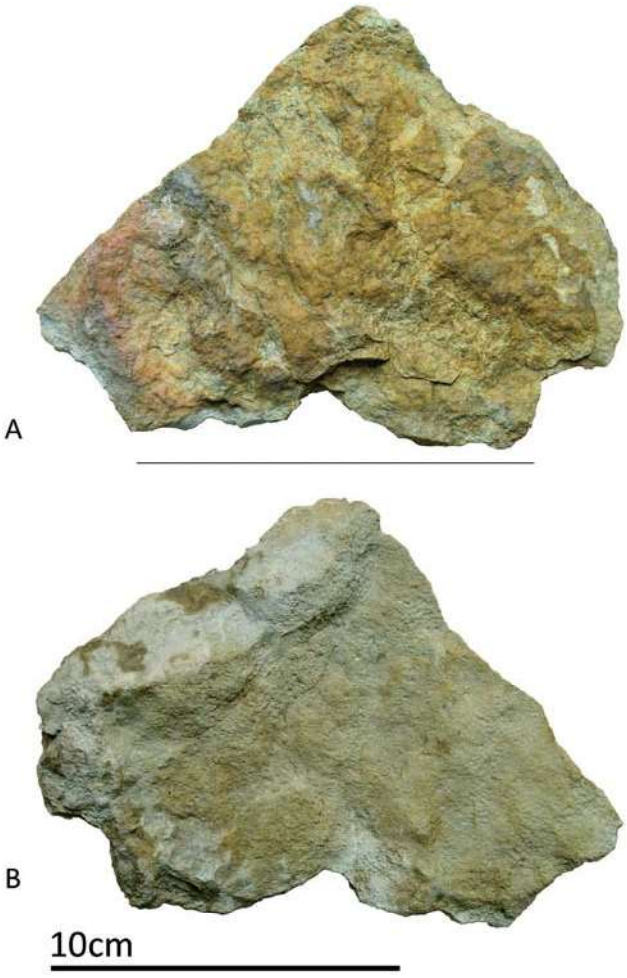

FIGURE 4: Stone X has the red curved line in the left part of face A, under a calcite veil (A), differently from face B which does not show any anthropic intervention, nor any other specific natural alteration, apart some surface detachments (B).

Nevertheless, two preserved small traces of red pigment provide information about the tool used to spread the pigment on the whole rock surface. Indeed, the two marks, which are on the low edge of face A and one close to the other (*Figure 5B, 2A*), measure 1 cm in width and 1.8–2 cm in length and show continuous parallel striations inside. The pigment, which partially covers the edge of the stone, is quite vivid, though not bright enough.

IX. We observed a main straight line, 5.5 cm long and 0.7 cm wide, which may possibly correspond to the torso of an anthropomorphic figure. Its extremities show possible perpendicular elements painted with the same colour that remind the arms and the legs, recalling the silhouette of the famous 'shaman' (Broglio 2005). Beside this graphic unit there is a doubtful motif in the shape of a pointed square that reminds an example from the

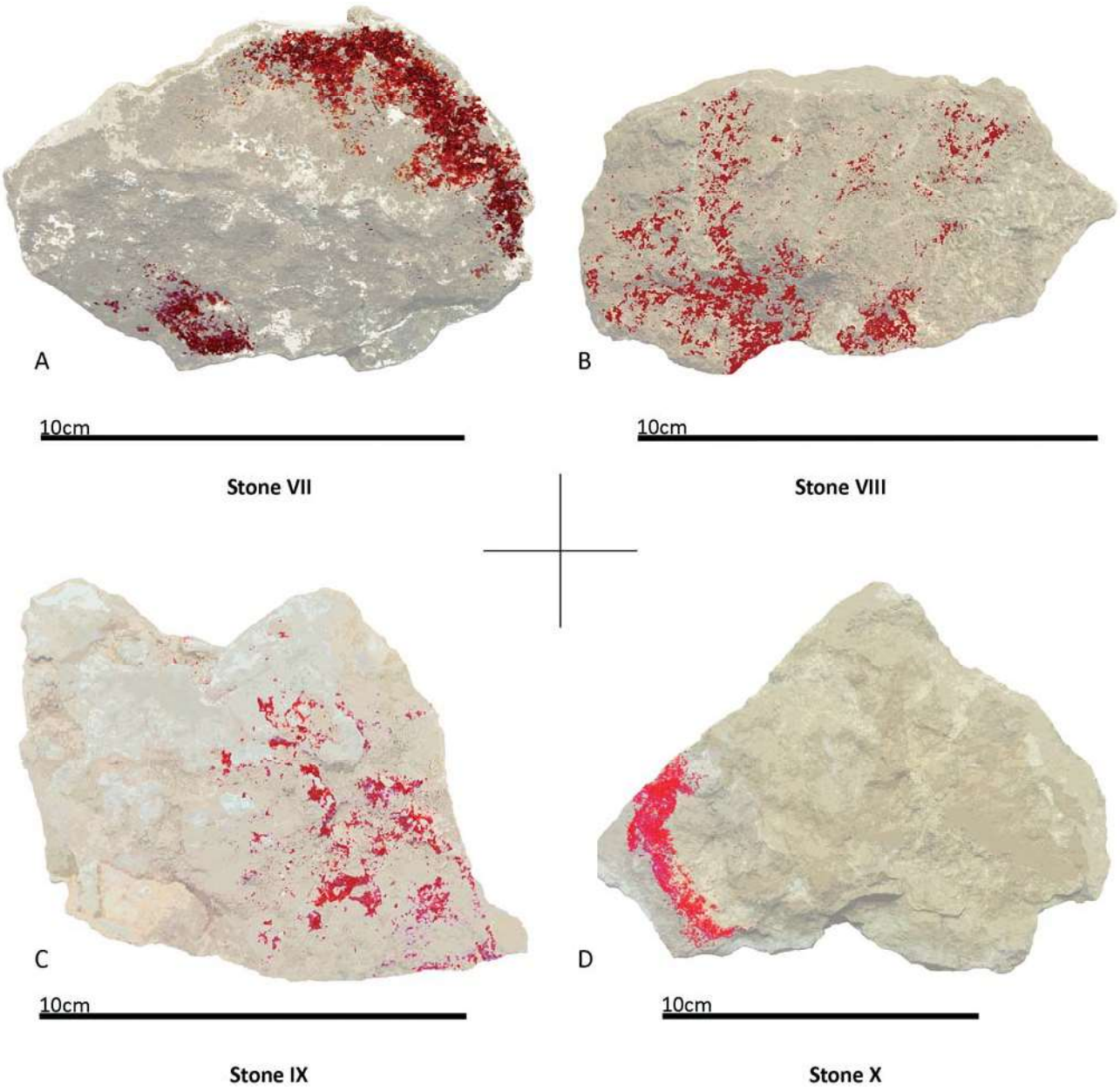

FIGURE 5: Tracing of the faces A of the ochred Stones VII (A), VIII (B), IX (C), X (D).

Dalmeri shelter (Dalmeri *et al.* 2009) (*Figure 5C*). However, the very poor preservation condition of the decoration obliges tuning down these interpretations, though inviting to further deepen the investigation and considering a possible restoration of the stone. The red spot on the face B was possibly left by ochre on the hands of the person who painted the rock flake.

X. A geometric sign was enhanced on this stone. It is a curved line 6.4 cm long and 4 cm large positioned close to the surface limit (*Figure 5D*). The red mark width ranges between 1–1.5 cm.

Though Stone VIII shows a main painted face (A), pigment covers the fracture edges of the fragment as well, differently from what described for the rock fragments I, II and V that have only one painted face (Bertola 2005, Broglio 2005, Broglio *et al.* 2009). Therefore, the extension of the colouring substance on more than one side without interruptions, despite the change of the surface shape, fosters the hypothesis that pigmentation occurred after the detachment of the stone from the cave wall.

The decoration of portable artefacts shows that the whole surface of the support, e.g. pebble, rock or bone fragment could be painted or engraved. A number of examples of rock fragments with more sides painted can be found in Dalmeri shelter (Dalmeri *et al.* 2009) and Parpallò cave (Villaverde 1994), more engraved examples come from a more conspicuous number of sites, e.g. Parpallò Cave (Villaverde 1994), Laraux shelter (Airvaux *et al.* 1983), Romanelli Cave (Acanfora 1967), La Ferrassie shelter (Delluc, Delluc 1978), Rochefort Cave (Pigeaud, Hinguant 2016) and more (see: Delluc, Delluc 1989). Nevertheless, the existence of only one decorated surface and the fracture of a stone, and so of a graphic unit made on it, is not a sufficient element to state that the stone comes from a decorated wall (Delluc, Delluc 1978, Pigeaud, Hinguant 2016, Guerreschi 2005). The examples from the Parpallò Cave in Spain, La Marche and Enlène caves in France, or Dalmeri shelter in Italy witness in this sense the possibility of intentional fractures made *a priori* (Dalmeri *et al.* 2009, Villaverde 1994, Mélard 2008).

The pieces described here were found with in different layers: two, Stones IX and X, are from Aurignacian layers D6 and D6-base, increasing the total number of the studied pieces from the levels of this phase up to six. Differently, the Gravettian record still remains in the minority with only three findings in total: a trend that is in line with the more sporadic presence of human groups in the cave in this phase (Falcucci, Peresani 2019) (*Figure 6*). Looking into the horizontal distribution of the stones, four of them, VII-X, are from the entrance of Gallery B, similarly to Stones IV and V, further suggesting the idea of specific area dedicated to the painted stones that probably lasted for as long as the cave was inhabited (*Figure 7*). However, further studies may provide more secure information about the persistence of a productive area during the different occupation stages of the cave.

Stereomicroscope observation revealed the presence of a microstratigraphy on the stone surface similar to that on the Stones I–V as reported in the previous literature (see: Colombini *et al.* 2005). Remarkable evidence is provided by Stone IX, whose superficial detachments exposed a microsection of the surface coatings showing that the pigment lays on an alteration veil of concretion and is extensively covered by a second thin concretion of sediment (*Figure 8*).

Furthermore, stereomicroscope observation of Stone VIII led to recognise the presence of parallel striae inside the red marks, confirming the use of tools to spread the pigment on the rock surface (*Figure 9*). Striations witness the application of a dense substance with a brush and or with a crayon (see: Grapp 1993, Múzquiz Pérez-Seoane 1994, 1998, Aujoulat *et al.* 2010). Further supporting the interpretation about the use of a tool to spread the colour is the regular width of the red marks on Stones VII, VIII and X. Unfortunately, the thin calcite crust covering the painted surface of Stone X precludes the exact understanding of the tool used.

Concerning the pigment recipes and binders important suggestions (Clottes 1993) come from the analysis carried out by (Colombini *et al.* 2005) who recognised the use of red ochre on Stones I, II, IV and

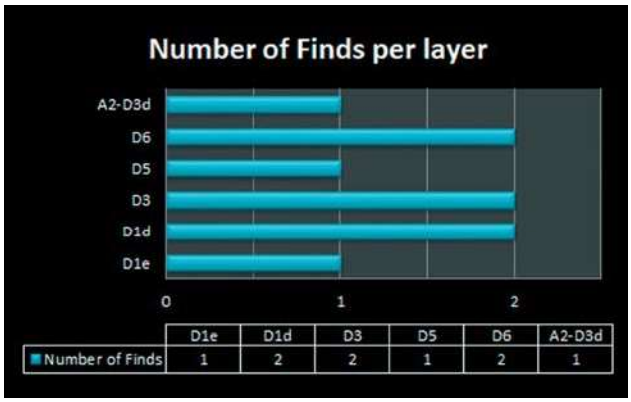

FIGURE 6: Indication of the stratigraphical position of the ochred stones.

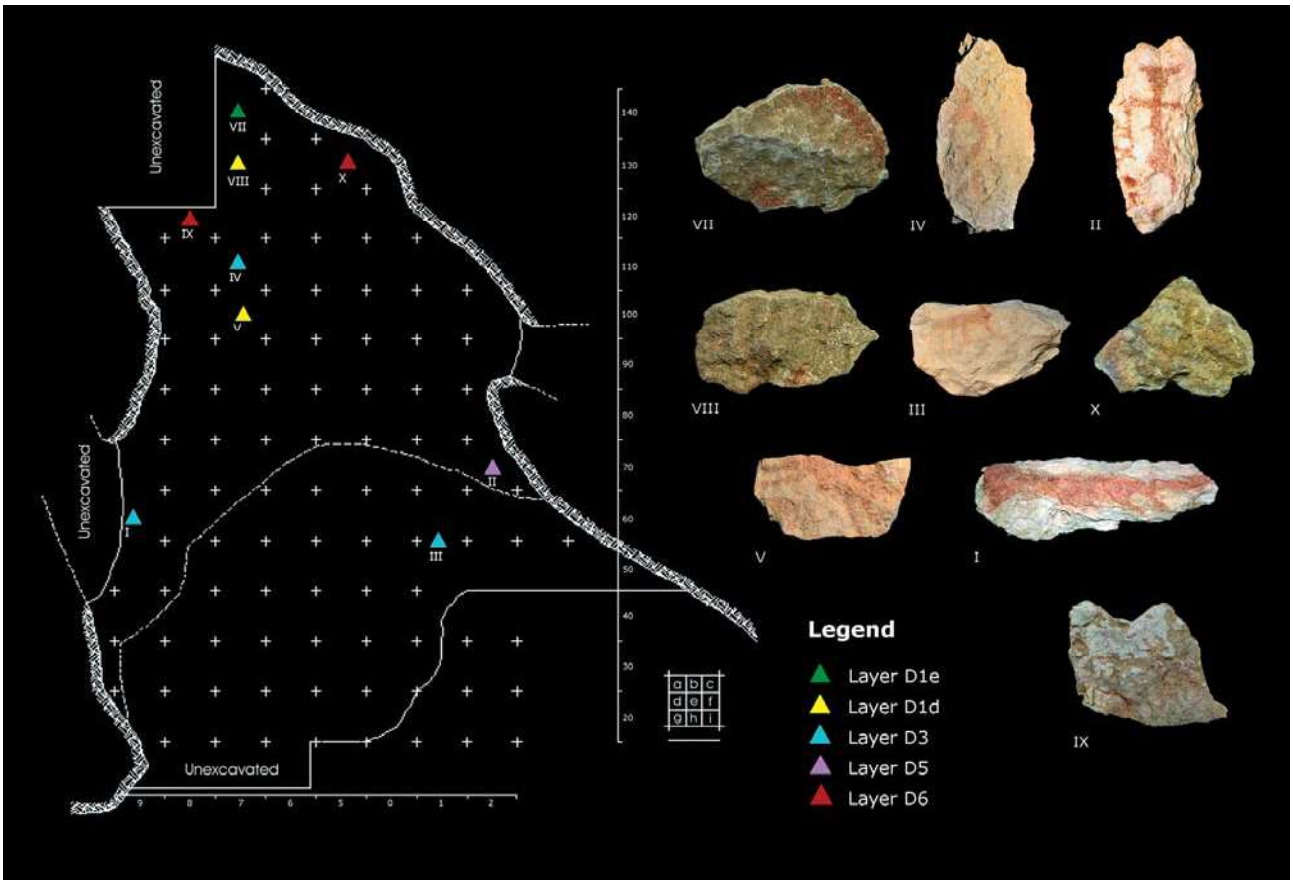

FIGURE 7: The spatial distribution of the ochred stones within the Fumane cave space. The differently coloured triangles indicate the provenance layer of the findings.

V, and hematite on Stone III. Furthermore they proposed that organic elements, such as lipids and proteins, have to be tied to the natural deposit and not to organic binders. Therefore, according to (Colombini *et al.* 2005), pigment was possibly mixed only with water and then spread on the stones. However, the presence of ochre mixed with bone fragments as revealed by (Cavallo *et al.* 2017) on two samples from layer A2R, reminds that the practice of mixing red colouring substance with crushed bone fragments was not rare in Palaeolithic art (García-Diez, Ochoa 2013) and we cannot exclude this hypothesis for the ochred stones of Fumane as well. So, both studies support the idea that a liquid pigment may have been spread on the stones by using a brush that left those marks recognised on Stone VII.

Probable indications about the pigment origin can be establish considering the stratigraphical association between the ochre sample D6-125c that belongs to the ochre Type 1 (Cavallo *et al.* 2017) and the painted Stones IX and X that come from the same layer and close squares.

The new record of graphic units of the Fumane Cave is composed by two clear geometrics and two doubtful graphic marks. The recognised technique is exclusively painting, similarly to the already published five painted stones (Broglio 2005, Broglio *et al.* 2009). Both themes and graphic trend in remarking the natural features of the rock still match with the already documented evidence and further increase the number of painted stones. Nevertheless, the Stones VII–X are fragments of an ancient vault that were painted after falling down and being selected for their shapes, e.g. the round edges (Stone VII), and regular surfaces (Stones VII–X), to be painted. To further reinforce this hypothesis is the presence of the pigment on a fracture side of Stone VIII and the applied ochre on both faces A and B on Stone IX.

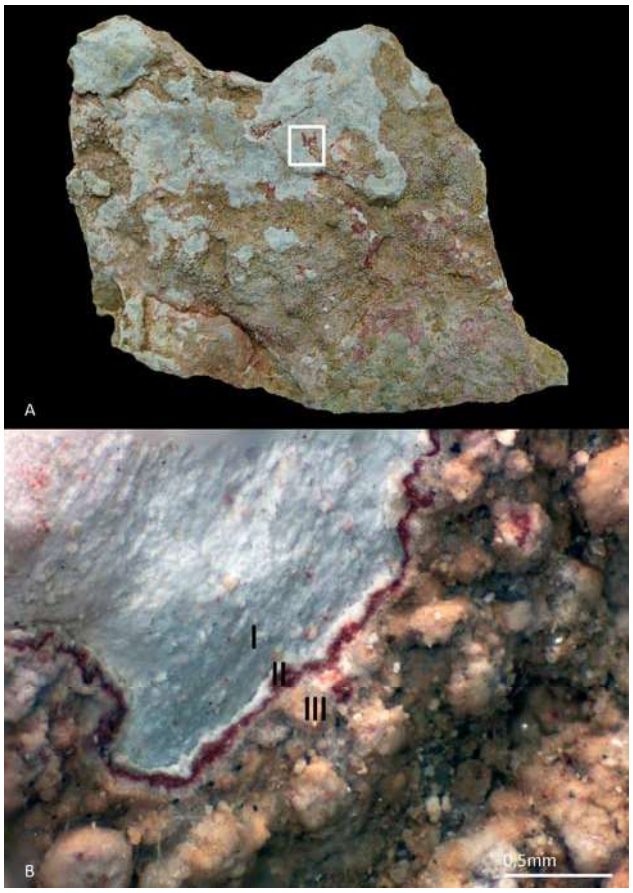

FIGURE 8: Face A of Stone IX: the area analysed by stereomicroscope outlined in white (A). Microscopic photography of the face A of Stone IX: I) the rock bedrock; II) the red pigment; III) the concretion (B).

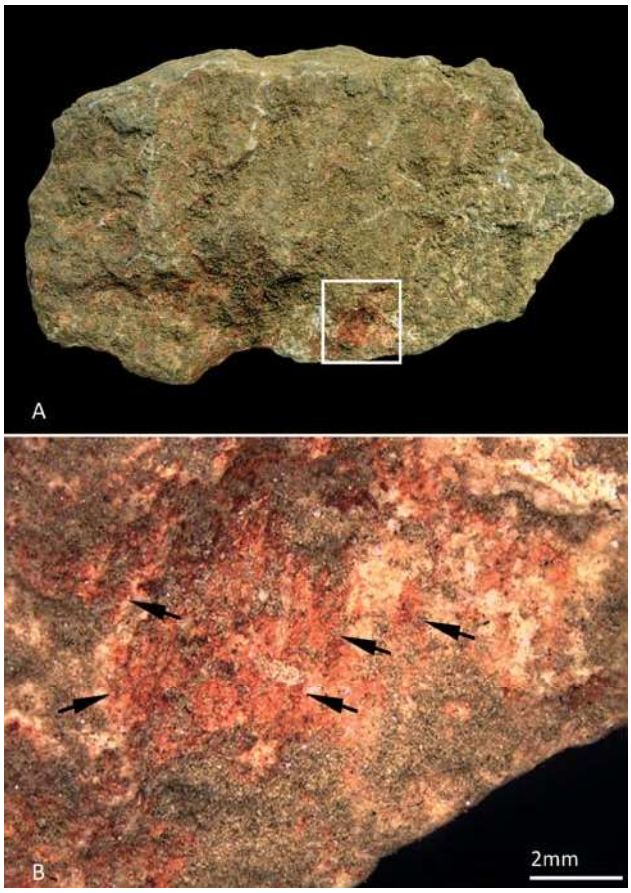

FIGURE 9: Face A of Stone VIII: the zoomed red mark where the parallel striations were recognised is outlined in white (A). Microscopic photography of the striations indicated by arrows (B).

The presence of non-figurative elements makes hard to establish links with other coeval graphic evidence. Indeed this graphic category is ubiquitous in Upper Palaeolithic art studies, being not definitively diagnostic (Sauvet 2014). Comparisons of the Fumane paintings within other Aurignacian paintings are very few and do not show any common element, not even with other kinds of graphic expressions in Europe (see: Bourrillon, White 2015). Aurignacian sites with both portable and parietal art are the ones of Aldène, Baume-Latrone, Blanchard, Castanet, Cellier, La Ferrassie and Chauvet in France (Clottes 2010, Azéma *et al.* 2012, Bourrillon, White 2015, Combier, Jouve 2014, Alcolea-González, de Balbín Behrmann 2007), Hohle-Fels, Geissenklösterle and Vogelherd in Germany (Wolf *et al.* 2018), Altxerri B, Tito Bustillo, Altamira and Castillo in Spain (González-Sainz *et al.* 2013, García-Diez *et al.* 2013). However, almost none of them provides valid comparable graphic elements with the documented record of Fumane, neither the figurative, nor the non-figurative themes although, for instance, there are red painted geometric signs in Altamira or Castillo caves (García-Diez *et al.* 2013, Pike *et al.* 2012) or the painted stone from Geissenklösterle (Wolf *et al.* 2018, Conard, Floss 1999). Therefore, for its both non-figurative and figurative graphic ensemble, the Fumane record still appears as a unique example of the Aurignacian art in Europe.

Same limitation in establishing comparisons is faced when analysing the red painted stones VII and VIII, respectively unearthed in the Gravettian layers D1e and D1d. The Italian record does not provide any possible comparable element because of the paucity of portable art finds discovered so far . Moreover, there is a striking

difference with the very few Gravettian items currently known which are the engraved ibex and chevrons motif of Paglicci Cave (Palma di Cesnola 2003), the engraved pebble from San Sebastiano Cave (Belluomini *et al.* 2007) and the so called Gravettian 'Venuses' from the Balzi Rossi (Mussi *et al.* 2004).

Differently, a richer record of red paintings can be found in a number of western Europe sites, especially in the parietal art with numerous red painted figures, e.g. Covalanas and La Haza caves in Spain (García-Diez, Eguizabal Torre 2007, García-Diez *et al.* 2011). However, the available finds from Fumane Cave are too fragmentary and scarce at the moment to fix solid and valid links, so even the curved lines painted on Stone VII are not sufficient elements to be used as diagnostic parameters.

Aside the above mentioned difficulties in establishing comparisons, we consider the possibility of searching for shared elements between the Fumane red graphics with the later graphic production in the Alpine area, especially with the one of Dalmeri shelter (Dalmeri *et al.* 2009; Dalmeri *et al.* 2005). Specifically, the red circular motifs of Stones VII and X recall the red painted stones No. 9 and 102 from Dalmeri (Dalmeri *et al.* 2005a, 2009). We are fully aware that the comparison between two or more sites with a strong chronological difference can be highly hasty (Sauvet 2014), even in such a small region of Eastern Alps with a gap of data for the Gravettian-Early Epigravettian. This is mostly due to a too sparse distribution of sites and findings across the Great Adriatic-Po Region, a vast land crossed by hunter-gatherers during the Last Glacial Maximum. However, continuity in the use of red pigment is recorded at Romualdova Cave in Istria, where red cave painting have been recognised in recent times (Ruiz-Redondo *et al.* 2019), and in Romanelli Cave in southern Italy as well where a red painted slab was found (Sigari 2020). The artistic tradition consisting in strong schematisation and red painted figures would be further confirmed in another Alpine Epigravettian site, i.e. Villabruna shelter (Broglio 1992, 1998). So, the recalled examples based on the graphic production of Fumane may witness a durable practice in the Alpine area in terms of artistic choice both for the support and the technique and in a general sense for the styles, from the Aurignacian to the Epigravettian. Supporting the idea of a thematic or stylistic tradition that may last for long time, affinities can be found in what is recognised in the Altamira Cave, where calcite crusts covering red claviform signs confirmed how they had been produced at different times within the same site (García-Diez *et al.* 2013). Unfortunately, the still limited record from Fumane Cave does not help in identifying any consistent morphological or stylistic variability, but we do not exclude that the progress of the research can definitively solve this issue.

CONCLUSION

The newly here presented decorated stones from Fumane Cave provide an update in our knowledge about the artistic activity in this site, enriching also the record of the paintings made by early Upper Palaeolithic populations of both Italy and Europe.

More specifically, the painted Stones VII–X offer new thematic, technological and productive perspectives.

Thematic elements to the general record of the figurative and non-figurative graphic units of this site are provided by three new geometric signs and a possible anthropomorphic figure on Stone IX. However, still scarce or completely absent are the comparisons with other contemporaneous sites, but on the other hand the connections with more recent evidence, i.e. Epigravettian Dalmeri and Villabruna shelters portable art, reinforce the possibility of a graphic expression that lasted for long time in the pre-Alpine area.

At a macroanalysis scale it was possible to note how pigment was spread on one or more faces, as the fracture side of Stone VIII and the two ochred faces of Stone IX witness. This evidence suggests that the stones were ochred after their fall from the cave vault. To further support this interpretation is the homogeneous microstratigraphy of the Stones surface recorded by using the microscope analysis. Indeed it shows how pigment lays on an alteration veil of concretion which has later been covered by a second thin concretion of sediment.

Furthermore, microscope observation provided information about the painting technique, revealing how a dense pigment was applied on the stone flakes by using a brush, specifically on Stone VIII and X.

Further research activities may provide the identification of more pieces and information to understand the relationship between art production and site use. In this view it will become crucial the definitive understanding of the presence of an ancient painted cave or not. In other words, answering the question: have the painted stones from Fumane Cave to be considered parietal or not? Moreover, they can provide more data towards the definition of specific graphic trends in the early Upper Palaeolithic and so to sketch

a more valid evolutionary stylistic scheme for the Palaeolithic art.

To conclude, we can state that the ochred stones from Fumane Cave still represent a unique case in the artistic production of the early AMH in Europe. In this perspective, the study on more painted stones of this site can provide new significant data to understand any consistent morphological and stylistic variability and semiotic transformations of the earliest forms of art in the European continent. This can represent a key to interpret those cultural dynamic processes occurred within the site itself between Aurignacian and Gravettian, and within a wider territory, not only during the early upper Palaeolithic, but even during a longer time frame, especially in the Alpine area and beyond.

ACKNOWLEDGMENTS

Research and fieldwork at Fumane is coordinated by the Ferrara University (M.P.) in the framework of a project supported by the Ministry of Culture - SAPAB Archaeological Superintendence, public institutions (Lessinia Mountain Community - Regional Natural Park, B.I.M. Adige, Fumane Municipality), Foundations (Leakey Foundation, Spring 2015 Grant), and private associations and companies. We finally thank Gabriele Berruti for allowing us to take pictures with his stereomicroscope.

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