

## **Cry wolf! The engraved pebble of Grotta Polesini (central Italy).**

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### **Abstract**

Canids are extremely rare in the in the artistic record of the Palaeolithic, as Leroi-Gourhan (1992) remarked. Here we describe an engraved wolf on a pebble from Grotta Polesini near Rome, discovered in the middle of last century by A.M. Radmilli, a professional archaeologist of the time. Not only is it an exceptional depiction, but ever since Radmilli (1954, 1957, 1974) described it as an outstanding example of hunting magic, it has been often quoted recurrently as supporting evidence of this magic activity, and even as a “smoking gun” validating the theory itself. We discuss how this theory arose, some of its critics, and why the engraved wolf in question is not a case of hunting magic.

### **Grotta Polesini**

Grotta Polesini opens at Tivoli, some 20 km east of Rome, not far away from Villa Adriana, on the right bank of the Aniene River, a tributary of the Tiber River. A.M. Radmilli (1954, 1974) started digging there in 1952. After an explorative trench during that year, from 1953 to 1956 he directed larger operations over ca. 145 m<sup>2</sup>. Radmilli (1974: 16-17) underlines that digging was difficult, as the water table was soon reached at a depth of just 2.5 m. Furthermore, river floods seasonally affect the cave. The uppermost part of the archaeological deposits was disturbed, and these included remains of the Chalcolithic, of the Bronze and Iron Age, and of the Roman period. At 5 m below datum, where the excavation ended, a substantial part of the lowermost levels were submerged, i.e. most of those of Pleistocene age. The characteristics of the stratigraphy were just sketchily reported (Radmilli 1974: 20). Spades were used to produce 20 cm-thick artificial spits, with pumps to empty the waterlogged trenches. The abundant archaeological record was damaged by the digging procedures, in addition to having been recovered in water-soaked deposits. Radmilli himself, in his final publication (1974: 17), warns about the impact of the high water table on taphonomic processes. He mentions that some 500 pebbles, which were discarded and are not available anymore for comparative analysis, displayed a

completely abraded surface because of water dissolution; some even had pitted surfaces.

The lithic industry (nearly half a million lithic remains) are attributed to the Final Epigravettian, which fits with the available date, from spit 7: 10,090 ± 80 uncal BP (R-1265, Belluomini 1980), corresponding to 11,900 - 11,450 cal BP (with 68% confidence, Mussi & Peresani 2011). With 45,025 mammal remains determined at species level, red deer accounts for more than 70% of the total (Radmilli 1974). Cold species, such as the wolverine, the marmot and the ptarmigan, are also documented; further suggesting that at least part of the deposit is of Younger Dryas age (Mussi & Peresani 2011).

Mobile art was abundant. Radmilli (1974: 76) mentions (i) ochre-painted pebbles; (ii) items with geometric decoration; (iii) items with naturalistic figures. No further information is available, however, which allows us to determine the specific stratigraphic context of the engraved pebbles discussed below.

### **Materials and methods**

The pebble (Fig. 1) is kept in Rome, in the collections of Museo Preistorico Etnografico Luigi Pigorini, inventory n° 107740. It is a small-sized limestone of 52 x 42 x 18 mm, rather flattish, weighing 60 gr, overall greyish brown in colour (Munsell 10YR 5/2).

The examination was made both macroscopically and microscopically, with magnification up to x300 using a microscopic camera (XLoupe G20, Lumos Technology Co. Ltd.). In addition, a Fuji EX-2 mirrorless camera was used for general photographic documentation, on which we then used Reflectance Transformation Imaging (RTI, Mudge *et al.* 2008 and 2010).

RTI is a computational photographic method that captures a subject's surface shape and color and enables the interactive re-lighting of the subject from any direction. RTI also permits the mathematical enhancement of the subject's surface shape and color attributes. The enhancement functions of RTI reveal surface information that is not disclosed



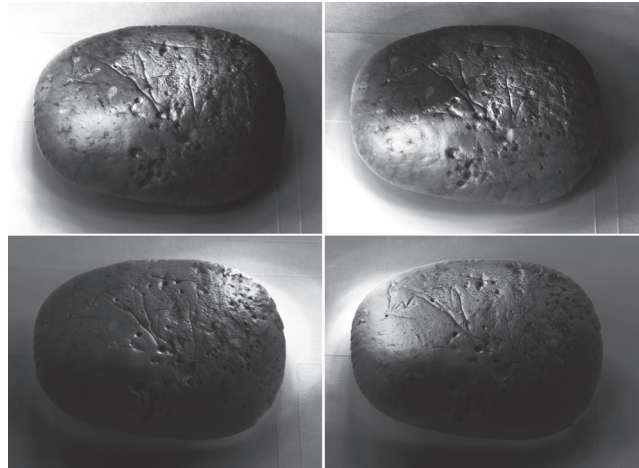
**Figure 1:** The engraved pebble of Grotta Polesini. Photo by GdM.

under direct empirical examination of the physical object» (<http://culturalheritageimaging.org/Technologies/RTI/> retrieved Nov. 2016).

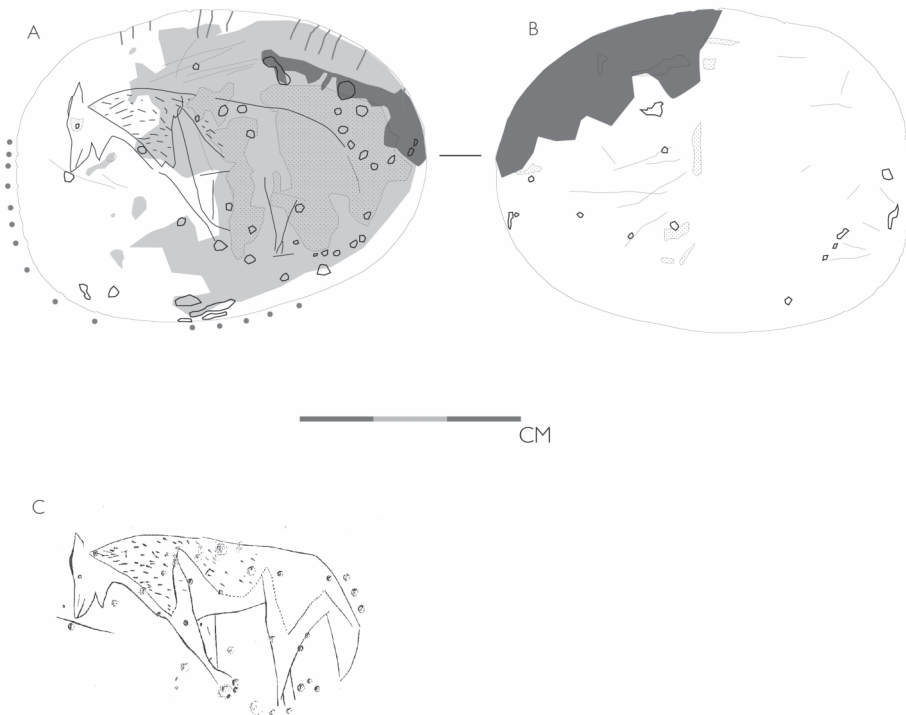
RTI helped us in identifying the state of degradation of specific parts of the (Fig. 2) and also allowed us to virtually illuminate the pebble from any desired angle.

### The engraving

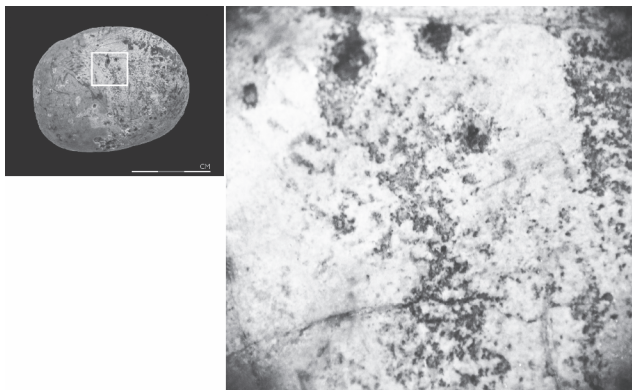
On one side of the pebble (Fig. 3.B), which is slightly more convex than the other side, a few short straight lines are visible but which do not provide any recognizable pattern. They are more or less parallel to the main axis of the pebble. Some 30 notches are rather evenly distributed all around the edges. Here we will describe into detail the main figure, on the other side.



**Figure 2:** Four snapshots of the RTI model. The pictures are purposely dark, to highlight small portions of the pebble surface. Clockwise from top-left: the central area, the lower-left, the upper-left and the upper-right corners. Photos and RTI processing by GdM.



**Figure 3:** The engraved pebble of Grotta Polesini, tracing of the front (A) and back (B): the lighter and deeper alteration of the surface are light and dark grey respectively. Holes and wear marks are also reported. The dots around the border point to notches which can be seen only on the profile. Drawing by GdM. (C), the engraved wolf after Radmilli (1954).

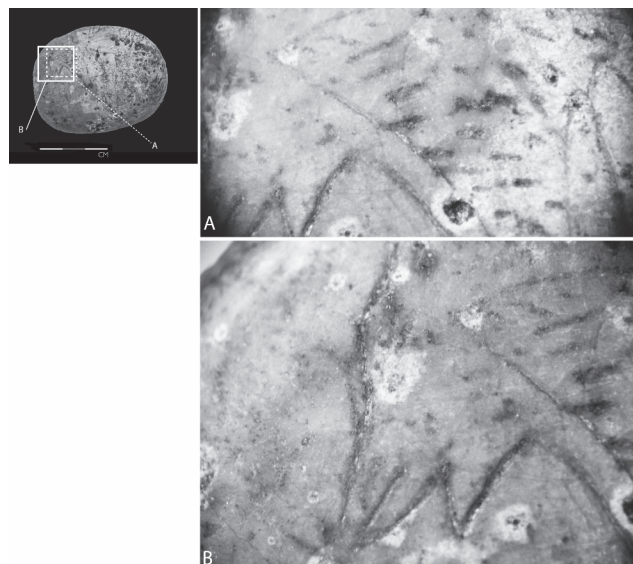


**Figure 4:** Close-up of the central area of the engraved pebble, with both distinct holes and tightly packed microscopic holes. Photo by GdM.

On this face (Fig. 3.A); the profile of a mammal is accurately engraved. A pointed muzzle split in two by a line detailing a closed mouth characterizes the head. A very thin line corresponds to the nostril. A pointed shape protrudes from the lower jaw and throat. The ear is erect, narrow and pricked. The emplacement of the eye is damaged, which does not allow us to say with certainty if the little hole there is either artificial or natural (cfr. below). The back gently slopes down towards a hardly distinguishable tail, which is straight, directed downwards, which looks rather thick and hairy. The forequarters are well drafted, with a flat forechest and two straight legs close to each other. Two diverging lines suggest the left forepaw, while the right one hides behind the latter one. The chest and flank are firmly delineated by a continuous line. The hindquarters are poorly detailed with the left rear leg rendered by a pointed triangular contour. A short line, diverging from this shape, possibly suggests the right hind leg or hind paw. The pelage is carefully detailed by tiny sub-parallel lines from the neck to the back of the shoulder. This well-delineated part is encircled by a line continuing towards the hindquarters, where it slopes down the flank, without any further infilling motif. Some short straight lines develop near the muzzle, and below the hindquarters, apparently not directly related to the animal, as well as at hip level. Overall, the rear part of the figure is badly preserved (cfr. below).

### Conservation of the surfaces

On both sides of the pebble, there are superficial scratches which are probably due to use wear (Figs. 1, 2). Alteration by water is far more marked, with



**Figure 5:** Close-up of the engraved mane (A) and of the muzzle area (B). Photo by GdM.

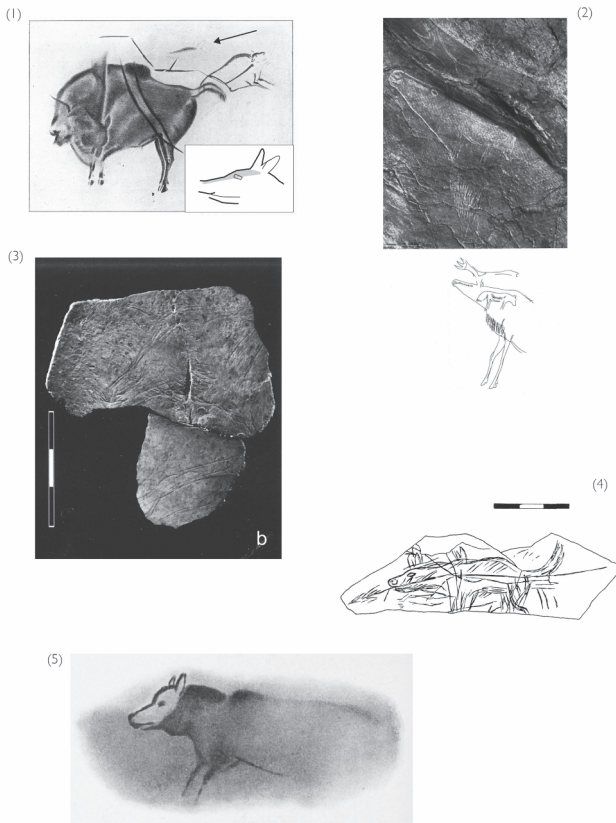
dissolution pitting and tens of tiny holes. A lightly coloured ring surrounds many of them, suggesting further dissolution at an initial stage. A little hole also corresponds to the eye. It could have been either man-made and enlarged by dissolution, or entirely natural and positioned by chance in the right place. Elsewhere (Fig. 4), microscopic and tightly packed holes, barely visible with a naked eye, form a continuous irregular surface.

Overall the preservation is worse in the area corresponding to the wolf hindquarters, where the holes are more numerous. Slightly less damage can be found in the middle part of the body, but the surface there has started changing colour and turning lighter. The head and forequarters are relatively well preserved, and perfectly visible on a mostly compact and shining surface, also extending in front of the engraving.

We will never know how the specimen was originally laying in the ground. However, the different state of conservation is better understood assuming that the pebble was found slightly inclined at the interface between two sediment lenses, one water-soaked and the other one better drained. This would allow understanding why part of the pebble is badly preserved whereas another part is in a relatively good state.

### Identifying the represented species

While a canid is definitely represented, Radmilli was at first unsure of the species. In the 1954 publication, he suggests either a fox, because of the tail, or a wolf, because of the general proportions, the skull shape and the withers height. Later, in 1957,

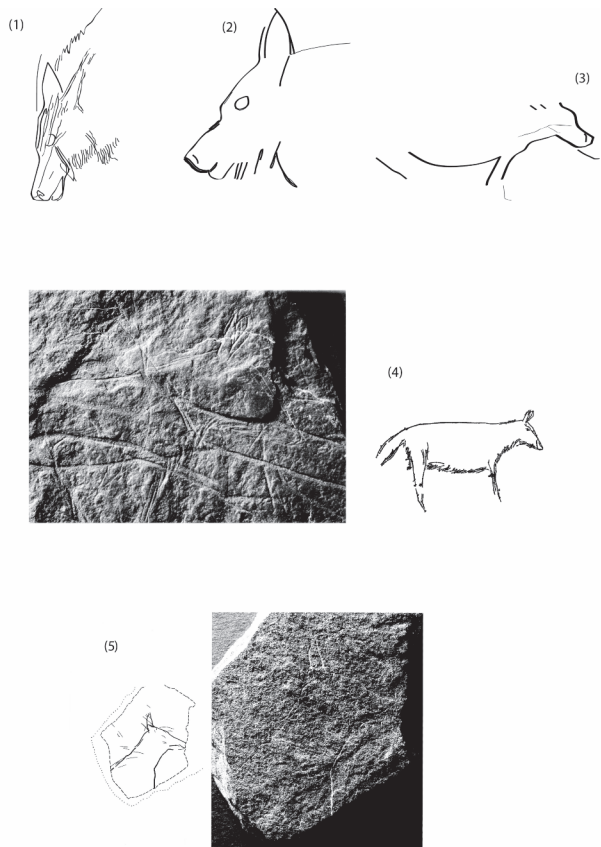


**Figure 6:** (1), Altamira (Cartailhac & Breuil 1906, retraced in vectorial by GdM and enlarged for visualization purposes); (2) Altxerri, (photo and explanatory tracing after Altuna and Appellainz 1976 and Sieveking 1979); (3), Isturitz (Rivero 2015); (4), Isturitz (de Saint-Périer 1936); (5), Font-de-Gaume (Capitan et al. 1910).

he mentions the wolf as the only and obvious species. He stresses once again that the surface of the pebble, deposited in a water-soaked sediment, had deteriorated (1974: 93) - hence some uncertainty in the interpretation of the engraved lines. In his fig. 30 (here Fig. 3.C), he rendered part of the hindquarters with a dotted line.

There is little doubt that it is a wolf. The pointed muzzle, forehead producing a step-like profile, pricked ear, tail, elongated legs are quite typical and allows differentiating it from a fox, which has wider ears and shorter legs. The erect ears and sloping tail are those of an alert but relaxed animal, in a normal posture (Mech 1981). Neither is the mouth open to bare the teeth, nor the hackles raised, both signalling aggressive behaviour in wolves (Range *et al.* 2015).

The rendering of part of the pelage, on the neck and shoulders, provides further information. The coat of a wolf is thick across the shoulders. “Wolves (...) have a special tract of long, erectile hairs, the mane, which extends along the center of the back from the neck to the back of the shoulders” (Mech 1981: 18). In the engraving, this specific area is filled with a motif suggesting a wolf in full winter coat



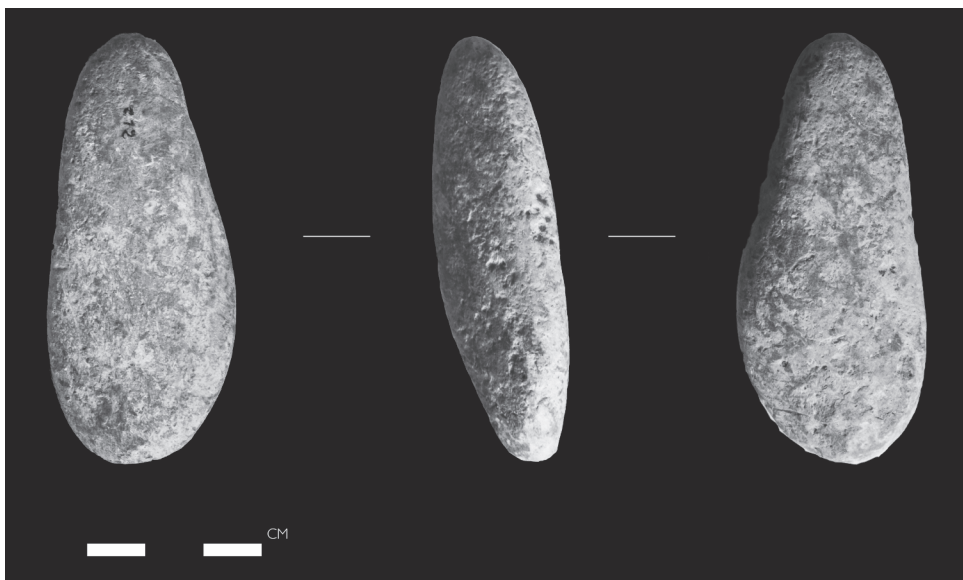
**Figure 7:** (1) and (2), Les Combarelles (L. Capitan et al. 1924, retraced in vectorial by GdM); (3), Laugerie Basse (reported by Radmilli 1954, without indication of original bibliography; retraced in vectorial by GdM); (4) and (5), Gönnesdorf (Bosinski et al. 2008).

(L.D. Mech, pers. com. to MM in 2016) (Fig. 5.A). In our opinion the pointed appendix under the jaw is a tuft of long hair (Fig. 5.B), which is consistent with the winter coat. It is also present in other pre-historic representations of wolves (cfr. below).

### Canidae depictions in the Palaeolithic record

Radmilli (1954) compares the canid of Grotta Polesini to ten more depictions or engravings, all of them from French Magdalenian sites. Not all are wolves. We will first review the figures, numbered sequentially, for those commonly accepted as being wolf representations, eventually adding a few more recent findings (Figs. 6 and 7). We present them in geographic order, from West to East, starting with Spain, continuing with France and ending with Germany. Those that could be either a wolf or a wolverine or fox are also included, for comparison purposes. The figures in Radmilli’s inventory that we reject are then cited, starting with those which are simply too incomplete for any conclusive categorization.

Altamira (Fig. 6.1). This is possibly the earliest mention of a wolf in Palaeolithic art, from 1906, in the well-known description of Altamira by Car-



**Figure 8:** One of several limestone pebbles from Polesini devoid of any engraving and with obvious dissolution marks all over the surface.

tailhac and Breuil: «Aux dépens du Bison, on a commencé un autre animal, qui semble être un Loup; il est pratiqué par raclage, gravure et lavage de la couleur du Bison sous-jacent; la ligne dorsale est gravée et raclée; l'oreille, partiellement gravée; les contours supérieurs de la tête raclés, les mâchoires, gravées, et la gorge raclée. Le reste n'est pas exécuté» (Cartailhac & Breuil 1906: 100). The rendering is a credible wolf profile, with a pointed muzzle, erected pointed ears, and the eye in the correct frontal position. However, this specific engraving is not found in more recent inventories. Accordingly, we only tentatively include it, for the sake of completion of the inventory.

Altixerri (Fig. 6.2) is most likely a representation of a fox (Leroi-Gourhan 1995<sup>2</sup>, 554), given the wide and furry tail which is more characteristic of foxes than wolves. Nevertheless, a wolf attribution should not be completely overruled (overall shape, legs length, ears).

Isturitz. The engraved head of a canid (Fig. 6.3), with a pointed muzzle and erect, narrow ears, is quite convincingly a wolf, as suggested by de Saint-Périer (1952). Figure 6.4 is interpreted by Barandarian (1974) as a wolverine. However, it has some characteristics consistent with a wolf representation, like the markedly erect tail.

Font-de-Gaume (Fig. 6.5). This well-known wolf, which has been beautifully illustrated by Abbé Breuil (Capitan *et al.* 1910), is, unfortunately, now almost totally covered by calcite and barely visible (<http://font-de-gaume.monuments-nationaux.fr>, accessed on November 14, 2016). We accept it as a wolf *vide* Breuil. In his rendering of historical value, the

mane is underlined, as at Grotta Polesini. Possibly there is also a tuft of hair slightly protruding from the throat.

Les Combarelles (Fig. 7.1 and 7.2). Two engravings in Capitan and Breuil's (1924) publication are fine examples of wolf heads, with the characteristic muzzle, pointed ears, step-like nose/front line and the detailed hair, especially in the throat area.

Laugerie Basse (Fig. 7.3). This is just an outline, but some details, like the muzzle, correspond to a wolf. We have tentatively accepted it into our list (reported by Radmilli 1954, without indication of original bibliography).

Gönnedorf. The complete figure of a wolf, and a partially preserved second one, are engraved on two plaquettes, i.e. respectively on plaquette 14 (Fig. 7.4) and plaquette 291 (Fig. 7.5) (Bosinski *et al.* 2008). Both heads display the characteristics which are typical of a wolf, while on plaquette 14 the body, legs and tail are also those of this species.

Some figures mentioned by Radmilli in 1954 are too incomplete to allow any firm attribution. This is the case of two figures from Gourdan (Radmilli 1954, Fig. 3, nos. 5 and 8), respectively headless and bodiless, and of another one from Bruniquel (Radmilli 1954, Fig. 3, no. 7) also headless. More determinations are inconclusive because they lack the characteristics typical of a wolf, like the muzzle shape, nose-front line, ears shape. This is the case of another figure from Gourdan (Radmilli 1954, Fig. 3, no. 1), as well as from Les Combarelles (Radmilli 1954, fig. 3, no. 4) and Lourdes (Radmilli 1954, Fig. 3, no. 10).

A few more figures discovered after Radmilli's time are also quite indeterminate. This is the case of the Gravettian clay figurines of Dolní Věstonice. Klima (1984) mentions 5 wolves, illustrating 3 of them, supposedly the best ones. Those, however, are either incomplete, or shapeless, or rather resembling the big cats that he also identifies within the clay record.

Plaque 292 of Gönnesdorf, also discovered later (Bosinski *et al.* 2008), with an isolated head, should be dismissed, because of the lateral position of the eye, which is typical of herbivores; furthermore the eye is elongated and not round as in wolves.

The figures from a few more sites look more like wolverines than wolves. Despite similar names in English, wolves (*Canis lupus*) and wolverines (*Gulo gulo*), being respectively Canidae and Mustelidae, are actually quite different in anatomy. In its natural environment, a live wolverine cannot be mistaken for a wolf: the legs are shorter, the head lacks the marked step between nose and front of canids, the ears are rounded and the tail is never erect. Nonetheless, it is a medium-sized animal, and when depicted at small scale, on an uneven surface and sketchily, it can be mistaken for a canid. This is also true of foxes, which are recognized when the legs are short and/or the ears wide. Grotte de la Vache (Radmilli 1954, Fig. 3, no. 2) is a wolverine, according to the shape of head and muzzle, as well as the rather short leg. Los Casares (Barandarian 1974: 188 Fig. 7, 191) is interpreted as a wolverine by some and as a fox by Leroi-Gourhan (1995<sup>2</sup>: 556). The tail, the line from the nose to the back, and the ears rather suggest a wolverine.

This is also the case of the figure on a pendant from an unspecified site of Dordogne, recorded by Capitan *et al.* (1910), and reproduced by Bandaradian (1974: 190, table I,1). The carnivore from Saulges or Lorthet, also in Bandaradian (1974: Fig. 5, interpreted as a wolverine) is even a more dubious case, because of the atypical shape of the muzzle.

All in all, including Grotta Polesini, we are left with 11 representations of wolves which are reasonably well determined.

## Discussion

### Hunting Magic: review and critiques

From Radmilli's time to the present (Graziosi 1956, 1973; Martini 2016; Minellono 1982) the engraved wolf has been quoted as evidence of "hun-

ting magic", a long-lasting theory in the study of Palaeolithic art which originated more than a century ago.

James Frazer in his "The Golden Bough" (citations are from the abridged edition of 1922, chapter III; the first edition was in 1890) describes the two «principles of thought on which magic is based [...]: first, that like produces like, or that an effect resembles its cause. [...] From the first of these principles, namely the Law of Similarity, the magician infers that he can produce any effect he desires merely by imitating it». To reach this conclusion, Frazer quotes extensively from XIX century field reports, making "The Golden Bough" a true *summa* of the anthropological, ethnological, folkloristic and religion-historical knowledge of the time.

The researchers involved in rock art studies also started to use ethnographic and anthropological evidence when trying to interpret the earliest known art production. Hirn, in 1900, acknowledges the importance of ethnography («There is scarcely a single book on ethnology or folklore which does not present some illustrations of the belief that by acting upon a part of a given whole we may influence this whole as well as all its other parts», p. 279). Then he lays the basis for connecting prehistoric art (the "beginning" of art) with this magic and the "like affects alike" formula: «To how great an extent works of art derive their material from old magical practices, the real meaning of which has gradually fallen into oblivion, may be shown in all the various departments of art. There is not a single form of imitation which has not been more or less influenced by this principle» (p. 283).

One year after Cartailhac's well-known *mea culpa* (1902), that eventually recognized cave art as produced in prehistoric times, Reinach published a paper (1903: 265) subscribing to Hirn's ideas and further developing them: «C'est, en effet, cette idée mystique d'évocation par le dessin ou le relief, analogue à celle d'invocation par la parole, qu'il faut chercher à l'origine du développement de l'art à l'âge du Renne. Cet art n'était donc pas, ce qu'est l'art pour les peuples civilisés, un luxe ou un jeu; c'était l'expression d'une religion très grossière, mais très intense, faite de pratiques magiques ayant pour unique objet la conquête de la nourriture quotidienne. Une peinture, une sculpture représentant des animaux comestibles assurait le succès de la chasse ou de la pêche non moins que les harpons barbelés ou les sagaies».

This theory was later supported by Bégouën (1924, 1929, 1939) and Breuil (1952). It was retained

as the best explanation on the table for Palaeolithic art until at least the middle of last century. In modern times, it has remained «firmly entrenched in the popular imagination» (Bahn 1991: 1) and is frequently quoted in the media.

Bahn (2016), summarizes as follows what made this theory so successful:

1. Palaeolithic art primarily depicts animals.
2. Marks and lines close to, or crossing the figures were interpreted as arrows or blood or vomit, all of them an effect of hunting and killing.
3. Broken plaquettes with engravings were understood to be part of magic rites.
4. Multiple figures on the same item or wall supported the idea that specific parts of the cave walls, bones or plaquettes were more effective than others in producing a good outcome of the hunt.
5. Apparently conclusive comparisons were made with modern ethnological sources, just as in Frazer's time.

This rather intuitive theory, supported by the modern “primitive” behaviour, apparently provided a decent explanation and fitting interpretation of most of the record.

However, little by little, cracks started to appear in this picture (Ucko & Rosenfeld 1967), and critics arose against this theory, which was intended to be a universal one: «Les critiques ont porté sur la futilité des analogies ethnologiques ponctuelles, sur les interprétations biaisées, sur les contradictions et les absences d'explications pour une conception de l'art qui se voulait globale. Parmi les contradictions, on a relevé que les animaux marqués de flèches ou de blessures étaient rares [...]. En outre, les vestiges d'animaux chassés mis au jour lors des fouilles d'habitats ne correspondaient pas, dans leur nature ou leurs proportions, avec les représentations animales. Selon les termes de Claude Lévi-Strauss, souvent repris, certains animaux étaient donc “bons à manger” et d'autres “bons à penser”» (Clottes 2003).

As underlined by Bahn (2016: 279), just 3-4% of Palaeolithic animal figures actually have «‘missiles’ on or near them»; and «the subjectivity, presupposition and wishful thinking that permeated this theory led to many errors: one of the most blatant concerns the clay bear of Montespan» (Bahn 2016: 278). In this case, the very nature of the clay, with its imperfections -holes, cracks and pores- had been interpreted as evidence of the rite of throwing spears to the figure. More recently, holes and cracks were rather explained as the natural texture of the

raw material, with no need of fantasy-boosted rites (Garcia 1987, Bahn 1991).

However, pockets of resistance frequently survive decades after a theory has been disavowed, as in the case of the wolf discussed here. The “hunting magic” scenario, as supposedly recorded at Grotta Polesini, was never supported by any experimental archaeology, to test how (tiny?) bone or flint projectiles hitting a small pebble could possibly produce round or rounded holes without any cracks or nicks in the limestone. Furthermore, the supposed missiles would have quite oddly mostly hit a specific marginal area of the pebble, outside the wolf. This characteristic was concealed in the available rendering of the figure made by Radmilli (Fig. 3.C), which selectively records the holes on the wolf, or close to it, overlooking the many mores clustering outside it (Figs. 1 and 3.A).

The direct association of holes with the engraved animal was taken at face value, notwithstanding the appreciation by Radmilli himself of the damage caused by water. A warning on their natural origin is already found in Mussi and Zampetti (1983). Limestone dissolution is described in countless papers, mostly in the field of geology, architecture and engineering, as well as in heritage studies. At Grotta Polesini pitting is conspicuous on limestone fragments devoid of any animal figure, i.e. it is not restricted at all to this specimen (Fig. 8). This natural process fully accounts for the holes and altered surface of the engraved pebble.

### **Wolf, lions and bears in the Upper Pleistocene record**

Overall, not just wolves, but all large carnivores, as well as bears, are not numerous in Paleolithic art. Nonetheless, Fritz *et al.* (2011) reckon 112 bears and 202 lions as part of the repertoire from the Aurignacian onwards. Even if carnivores constitute just 2-3% of a total dominated by herbivores (Fritz *et al.* 2011), bears and lions are vastly more frequent than wolves: only 7 wolves are positively identified in a recent review (Lombo Montañés 2016), in good accordance with our own discussion, as we just retain 11 specimens. This is in contrast with the paleontological record. Fossil wolf remains are not uncommon, notably all over the Upper Pleistocene of Italy, including the central part of the peninsula where Grotta Polesini opens (Fiore and Tagliacozzo 2008; Gatta *et al.* 2016; Mussi, 2001). At Grotta Polesini itself Radmilli (1974) identifies 180 wolf remains.

Furthermore, contrasting with other species representation, most if not all the wolf figures are of Lateglacial age. This is the period when lions and

other large carnivores, as well as the cave bear, become extinct in Europe (Pacher and Stuart 2009; Stuart 1991; Stuart and Lister 2011), while retaining importance at symbolic level, as reflected by art (Fritz *et al.* 2011).

### Concluding remarks

In Leroi-Gourhan's words, «la quasi-absence du loup est frappante» (1992: 377). Whatever the value of the wolf in late Upper Palaeolithic societies, and the reason why it was eventually part of the figurative record, there is little doubt that the pebble of Grotta Polesini is no evidence of “hunting magic”. The sheer numbers and chronology suggest that the wolf could have taken in imagery the place of other powerful animals fading away from direct observation. As far as symbolism is concerned, it is possibly not by chance that an engraved pebble from the Madgalenian levels of La Madeleine depicts a fe-

male being with a canid head, in sharp contrast with the therianthropic figurine with a lion head from the much earlier Aurignacian of Hohlenstein-Stadel.

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GdM recorded the pebble and wrote the section about the hunting magic, while MM wrote the general presentation and the description. Comparisons and conclusions are by both authors. We also would like to thank Artur Ribeiro for reviewing the English.

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