2006 lisboa uispp XV congresso

INTERNATIONAL UNION FOR PREHISTORIC AND PROTOHISTORIC SCIENCES
Proceedings of the XVth world congress (Lisbon, 4-9 september 2006)

2009 # 1

http://www.palethnologie.org
ISSN 2108-6532

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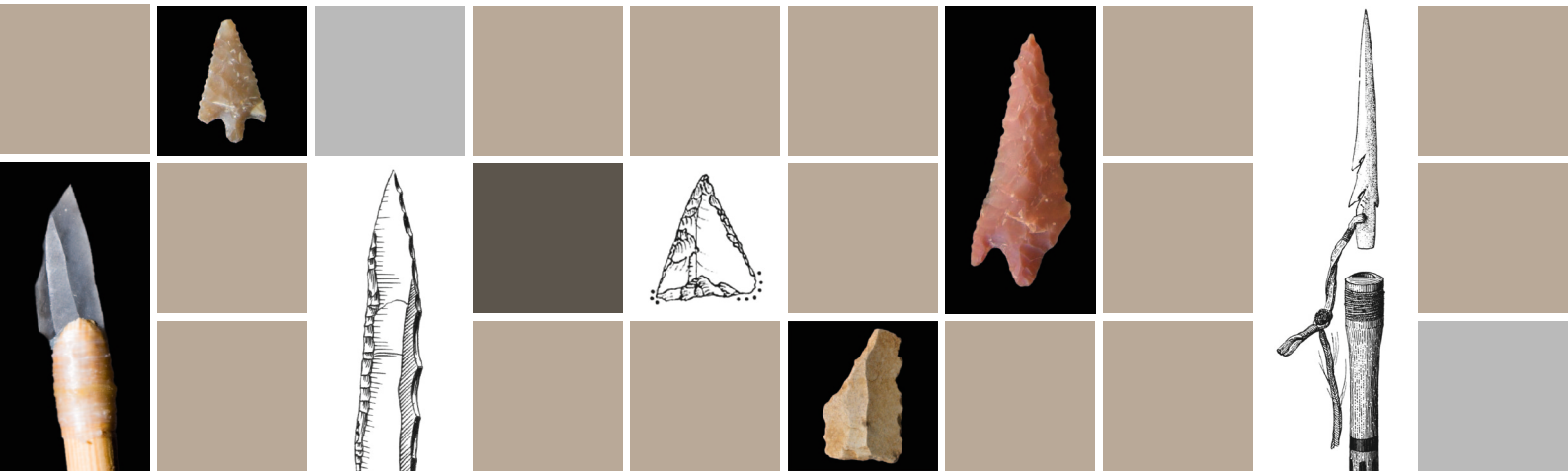
PROJECTILE WEAPON ELEMENTS
FROM THE UPPER PALAEOLITHIC TO THE NEOLITHIC

Proceedings of session C83



PALETHNOLOGY
Bilingual review of prehistory

P@LETHNOLOGY
Bilingual review of prehistory

Review published by the P@lethnologie association, created and supported by the TRACES laboratory, the Ethnologie Préhistorique laboratory, the University of Liège and the Ministry of Culture and Communication.

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This event and its proceedings received support from

ANCIENT GRAVETTIAN IN THE SOUTH OF ITALY : FUNCTIONAL ANALYSIS OF BACKED POINTS FROM GROTTA PAGLICCI (FOGGIA) AND GROTTA DELLA CALA (SALERNO)

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P@lethnologie / 2008.1
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Abstract

This study is concentrated on the modalities of use of the Gravettian backed tools, considering the Adriatic side and that Tyrrhenian of southern Italy.
A first part of the work has regarded the functional analysis of the backed instruments found in the Ancient Gravettian layers of Grotta Paglicci (Foggia).The methodological proposal derived from this study, based on the association of the techno-typometric and typological analysis with the use-wear analysis, has been extended for a comparison to the backed tools from a Gravettian site, almost coeval, on the opposite side of our peninsula: Grotta della Cala (Salerno).

Key-words : Grotta Paglicci, Grotta della Cala, Southern Italy, Gravettian, backed points, functional analysis.

Introduction

The present work regards the comparative examination of the Gravettian backed points coming from two important Italian sites: Grotta Paglicci (layers 23 and 22) and Grotta della Cala (layer GL11), both localized in the south of the Italian peninsula, but on opposite sides (Fig. 1). A first part of this work, the one regarding Grotta Paglicci, has been carried out as a PhD project by the author (Borgia, 2006).

fig. 1 : Location of the archaeological sites

The twofold objective of the research has been to understand the ways of use of these tools and, particularly, to know if they had been used or not. For this purpose, various methodologies of analysis have been adopted:

- study of the technological, typological and typometrical characteristics of the artifacts, in the belief that information about prehistoric tools use come from the study of production methods sooner than from use-wear analysis;

- experimentation with controlled parameters, necessary part of every functional study since it allows the interpretation of the archaeological data;

- observation of tools under the microscope, according to the use-wear analysis methodologies, both low and high power magnification.

The same methodological approach has been also adopted for the analysis of the backed tools found in layer 11 of Grotta della Cala, referable to a cultural phase between the Ancient and the Evolved Gravettian. The aim was to identify analogies and differences between the artifacts of the two sites, and therefore to better identify the main functional characteristics, discriminating them from those dependant on available resources or cultural traditions.

The archaeological contexts

Grotta Paglicci, layers 23 and 22 (Fig. 2).

Part of the rich Upper Paleolithic series of the cave, layers 23 and 22 have been dated between 28.100±400 BP (layer 23 A) and 26.800±300 BP (layer 22B) (Palma di Cesnola, 1993). In accordance with the radiocarbon datings, the study of faunal remains and charcoals (Palma di Cesnola, 2004) allows to insert these levels to cold and dry oscillations that should correspond to the interpleniglacial and the beginning of the II pleniglacial (isotopic stage 2).

Big mammals are dominated by urus (*Bos primigenius*, up to 50 %, NISP) and horse (*Equus ferus*, up to 19%): these ungulates evidently were the preferred hunting game; another highly represented ungulate is ibex (*Capra ibex,* up to 33%) (Boscato, 1994 et 2004). Inside layer 22 (levels F-D) it is possible to distinguish an euthermic climatic oscillation, that could fit in the interstadial of Kesselt (Maisière), characterized by an increase of urus at the expense of caprinae, and the contemporary increase of forest micromammals (*Apodemus*).

The typological analysis of lithic industry, according to the method of Laplace (Laplace, 1964), has led to attribute these complexes to the oldest phase of the Italian Gravettian, which is known as 'of backed points' or 'indifferentiated' (Laplace, 1966; Palma di Cesnola, 2004). In the lithic complexes entire and fragmented backed tools make up to 80% (Level 22E) of the retouched tools.

Grotta della Cala, layer GL11 (Fig. 3).

The layer, dated 25.720±240 BP, is part of the series recovered in the atrium of the cave (Benini *et al*., 1997; Borgia and Wierer, 2005; Boscato *et al*., 1997 ;

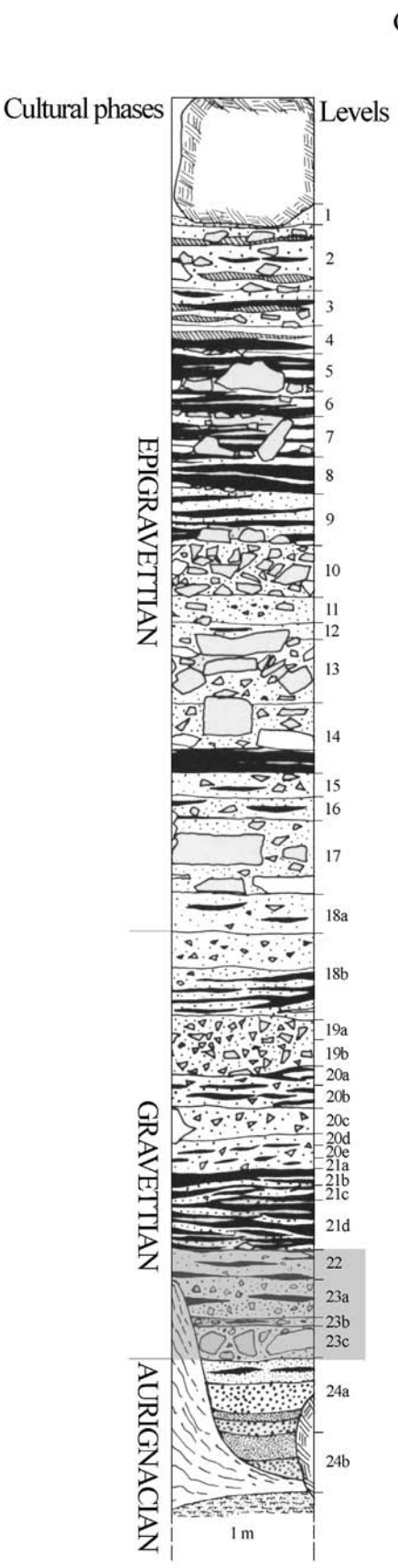

fig. 2 : Stratigraphy of the Upper Paleolithic sequence of Grotta Paglicci

Gambassini, 1993; Palma di Cesnola, 1971). The faunal association found in this horizon indicates, compared to the Gravettian layers of Paglicci, a more humid and temperate environment. Among ungulates, red deer prevails (74.5%, NISP), followed by roe deer (14.4%); wild boar (*Sus scrofa*), urus (*Bos primigenius*), ibex (*Capra ibex*) and chamois (*Rupicapra sp*.) have been identified as well (personal communication of Dr. Paolo Boscato). The remarkable difference between the big mammals of the two sites is probably due not so much to the temporal hiatus that elapses between them nor to different hunting targets, as for the climatic diversity between the Tyrrhenian coast and that Adriatic of Italy; on this side less frequent precipitations cause a more dry environment with scarce arboreal cover (Boscato *et al.*, 1997). As for lithic industry, layer 11 has been inserted in a moment of transition between the Ancient and the Evolved Gravettian, with characteristics that preannounce the burins of *Noailles* phase. Also in this case backed tools dominate the industry, with percentage up to 50%.

Typometric and morphological analysis of the archeological material

Despite the fragmentariness that characterizes this type of tools, the intact backed points coming from the considered levels (Grotta Paglicci: 80 intact elements on 1100; Grotta della Cala: 14 intact elements on 169) allow us to have a statistically important sample for being able to face some morphometrical remark.
In order to facilitate the exposition of data, we have taken as reference the values of only the richest of the nine levels in which layers 23 and 22 of Grotta Paglicci are subdivided: the 22 F (27 intact elements). As for Grotta della Cala, where layer GL 11 has been divided in 3 levels (11 upper, 11 lower, 11 indistinct), we will consider here the data of level 11 indistinct (6 elements).

A first observation, regarding the typometric data of the table above, concerns the great variability in the length of the points, while width and thickness are more homogeneous, as it can be seen from the median and the mode that coincide almost always with the average. The points of Grotta della Cala appear smaller; this data reflects the whole lithic industry and it is probably explicable with the characteristics of the raw materials: flint or jasper pebbles of small dimensions and not exceptional quality. At the site of Paglicci, instead, there is abundant and good quality flint.
Another important datum concerns the profile of the supports, because it is closely linked with the hafting of the points and the shooting ballistics (Tab 2).
In both lithic assemblages this profile is usually rectilinear, and this is a characteristic evidently pursued, but probably it is not an essential requirement, since a large percentage of pieces (100%, in level 22D of Paglicci) does have concave, sinuous or twisted profile.
It should be underlined, however, that these features are never very accentuated (and at times corrected by retouch), and the longitudinal axis, even in these cases, can remain rectilinear. As regards the edge delineation of the points (Tab. 3), we notice a difference between the two sites: in Paglicci the rectilinear delineation of the back, opposite to a convex delineation, prevails (and always beginning from the level 22 D, the concave delineation appears); in Grotta della Cala we find instead a convex delineation (or lightly sinuous) of the back, opposite to a convex edge. (Fig. 4-5).

The points are formed therefore from a rectilinear or convex edge, created by means of an abrupt retouch, and by a convex shearing/cutting edge, often not retouched. These characteristics provide the tools with a transversal section shaped like a right angled triangle, less often like an equilateral triangle (the latter case often determined by a bilateral backed retouch)
Within points without bilateral retouch, in 92% of the cases the edge opposite to the back has been modified by a secondary retouch which, depending on its position, has the function of creating the necessary convergence to make the point, or both the points in the recurrent case of the bi-points (simple direct retouch or abrupt, sometimes also inverted), to narrow the apexes, or, more often, the bases (inverted flat retouch), to correct the profile of the support (direct or inverse

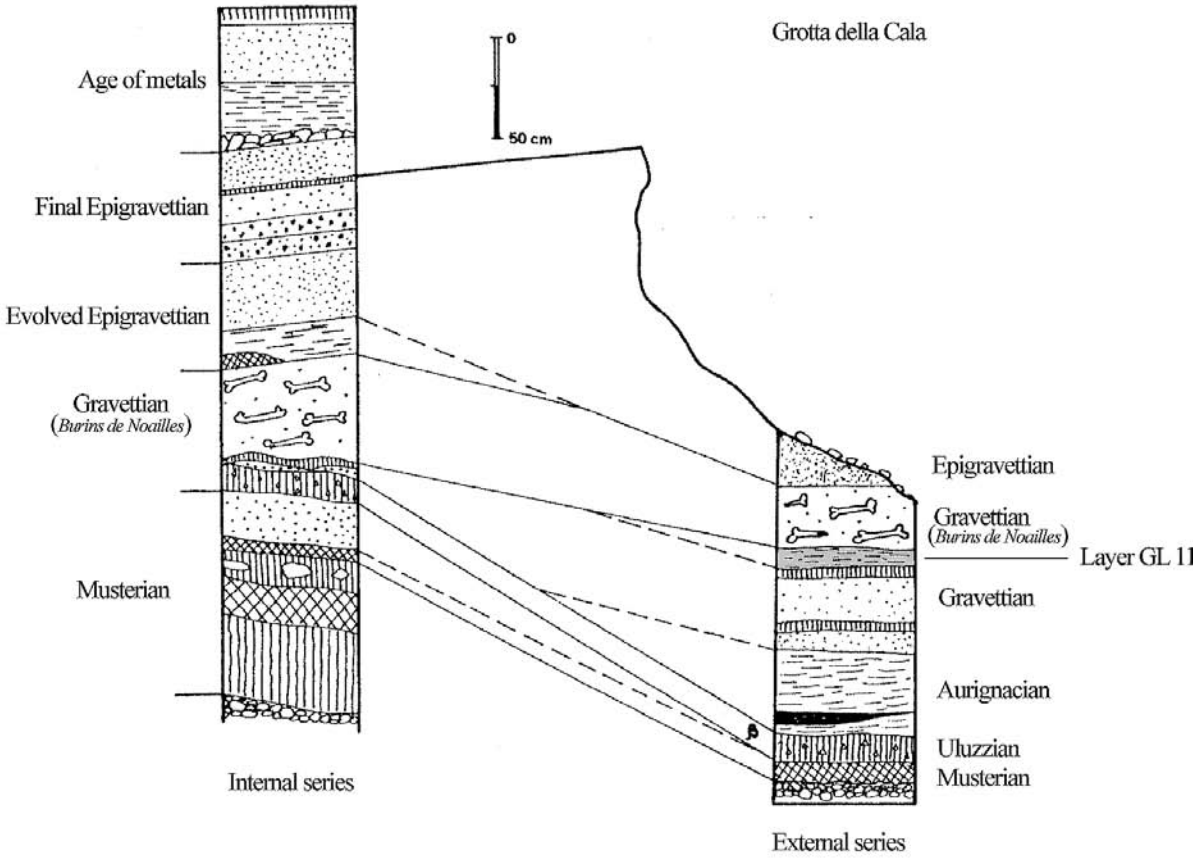

fig. 3 : Stratigraphy of Grotta della Cala

Grotta Paglicci (22F)	*lenght*	*width*	*thickness*
Average (mm)	34,4	5,1	3,1
Min (mm)	16	3	1
Max (mm)	72	9	7
Median (mm)	35	5	3
Mode (mm)	27	5	3
Standard dev.	11,6	1,7	1,2

Grotta della Cala (11)	*lenght*
Average (mm)	20,5
Min (mm)	12
Max (mm)	28
Median (mm)	21,5
Mode (mm)	26
Standard dev.	6,9

tab. 1 : Intact points dimensions

Grotta Paglicci %	*23 C*	*23 B*	*23 A*	*22 F*	*22 E*	*22 D*	*22 C*	*22 B*	*22 A*
Rectilinear	100	83,3	65,0	44,4	30,0	-	50,0	100	60,0
Convex	-	-	-	-	-	-			
Concave	-	-	10,0	25,9	10,0	100			40,0
Sinuous	-		20,0	22,2	40,0	-	50,0		
Twisted	-	16,6	5,0	7,4	20,0				
Total specimens	1	6	20	27	10	4	6	1	5

Grotta della Cala %	*11 inf.*	*11 sup.*	*11*
Rectilinear	75,0	100	66,6
Convex	-	-	-
Concave	-	-	16,6
Sinuous	25,0	-	-
Twisted	-	-	16,6
Total specimens	4	4	6

tab. 2 : Longitudinal profile of the ventral face

Grotta Paglicci %	*23 C*	*23 B*	*23 A*	*22 F*	*22 E*	*22D*	*22 C*	*22 B*	*22 A*
Rect - conv	100	100	85,0	88,8	80,0	25,0	83,3	-	100
Rect - sin	-	-	-	-	10,0	-	-	-	-
Sin - conv	-	-	5,0	3,7	10,0	25,0	-	100	-
Conv - conv	-	-	5,0	7,4	-	-	-	-	-
Conc - conv	-	-	5,0	-	-	50,0	16,6	-	-
Total specimens	1	6	20	27	10	4	6	1	5

Grotta della Cala %	*11 inf.*	*11 sup.*	*11*
Rect - conv	25,0	-	33,4
Rect - sin	-	-	-
Sin - conv	-	-	-
Conv - conv	75,0	100	66,6
Total specimens	4	4	6

tab. 3 : Edge delineation of the backed points

fig. 4 : Intact points of Grotta Paglicci (level 22F)

fig. 5 : Intact points of Grotta della Cala

flat retouch) and, finally, to calibrate the width of the piece (simple retouch or flat in mesial position). Independently of the typological classification, various recurrent morphologies have been identified, representing very similar percentages in all the levels (Fig. 6). On the base of the data listed here, despite the typometric and typological differences noticed within the points, it has been possible to insert the points of Paglicci, and later on those of Grotta della Cala, in a scheme of morphologies (Montoya, 2002).

The most frequent form at Paglicci (77.7%) is the bi-point with a rectilinear back opposite to an unretouched convex edge. Within this group there is a standardization of the forms despite a notable variety in dimension (Fig. 6 a).

A different morphology of bi-point (7.4%) presents a transversal section shaped like an equilateral triangle (sometimes trapezoidal isosceles) in that the retouch is bilateral or the supports used have a trapezoidal form (Fig. 6 b). These last points show more standardized dimensions (L = 28/35 mm, w = 3 mm).

Both these morphologies can have, moreover, a truncated base (Fig. 6 c).

In Grotta della Cala we find morphologies that can be assimilated to those described above (Fig. 7).

An example of bi-points with rectilinear back and convex edge is not present within the intact points, but this morphology can be recognized between fragments.

The bi-points with convex back, those distinction seemed uncertain, have been comprised in this same category.

Also the morphology without shearing edge is present to Grotta della Cala, with dimensions very exiguous. The truncated point is completely absent. This last one could be considered a "regional" factor, independent from functional reasons: following the Ancient Gravettian phase, the truncated tools spread only on the Adriatic coast, while are not diffused on the Tyrrenic. Another particularity of this "parallel" evolution of the Italian Gravettian is the diffusion, this time only on the Tyrrenic coast, of the burins of *Noailles* (Palma di Cesnola, 1993).

In both lithic complexes a small number of backed tools is not insertable in the categories described above. These tools, even though provided with a backed retouch, have distinctive morphological features which would exclude them from the main group of points conceived as throwing weapons elements [1].

The experimental phase [2]

Preliminarily to the functional analysis of the backed points of Paglicci, an experimentation on approximately 70 points has been carried out. Points have been realized on the base of the morphologic characteristics of the more recurrent model in the industry: a bi-point of small dimensions (average length from 25mm to 40 mm) with a rectilinear abrupt retouch opposite to a non retouched, more or less convex, shearing edge. The transversal section is triangular and the profile nearly always perfectly rectilinear (Fig. 8). The presupposition of departure of this study, and therefore of the experimentation, was that at least one, and probably the main function of the backed points were that one of point of projectile. The experimental phase has been lead therefore on this base, proceeding to produce only tools making part of a throwing weapon. Part of the tools (n. 35), reproduced using a raw material as close as possible to the archaeological one, have been hafted in several positions (Fig. 9) in viburnum haft (lenght. 80 mm, diam. 8 mm) using sinew lashes and glue, and fired with a bow towards an animal target and towards the ground (shooting distance: 6m), the latter to simulate an error on the part of the hunter. Another portion of the experimental points (n.16) were hafted and hurled against a wall with a 90° angle, or broken by hand or with the aid of a percussion (n. 18) so as to obtain a greater variety of fracture types. Following

[1] - Well-developed use-wear due to hide working have been determined on some "atypical" backed points of Grotta Paglicci.

[2] - It is necessary to underline that this experimentation, conducted with own means by the author , has been carried out in order to have at disposal a case records of flint fractures. Data obtained, even though are not coming from a faithful reproduction of a hunting context (the target was constituted by a heap of animal pieces), are presented here as they show many analogies with other studies (Fisher *et al*.,1994; Odell and Cowan, 1986, 0' Farrell, 2000; Plisson and Geneste, 1989; Soriano, 1999) and they have however allowed to create a comparison with the archaeological material.

Grotta Paglicci %	23 C	23 B	23 A	22 F	22 E	22 D	22 C	22 B	22 A	*Grotta della Cala* %	11 inf.	11 sup.	11
▲	-	-	30,0	11,2	10,0	15	-	-	-	▲	16,6	-	60
◺	100	100	70,0	88,8	90,0	75	100	100	100	◺	83,4	100	40

tab. 4 : Transversal section of the backed points

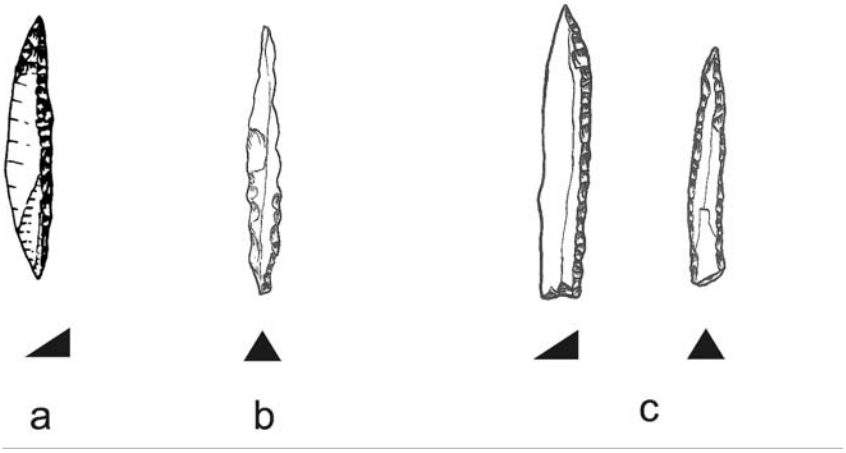

fig. 6 : Morphologies of backed points of Grotta Paglicci

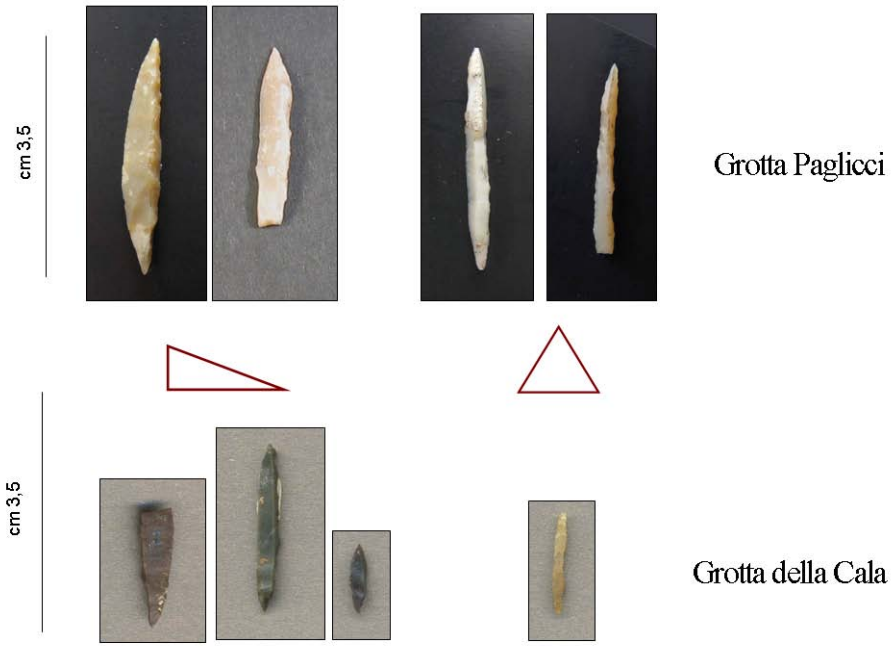

fig. 7 : Morphologies of backed points of Grotta Paglicci and Grotta della Cala

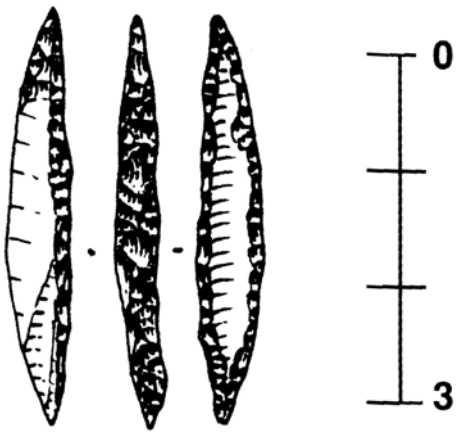

fig. 8 : Morphology of bi-point reproduced in the experimental phase

the impact, the points that had been hafted in lateral position (Fig. 9,d) did not sustain any macroscopic damage (but microscopical); the others broke, in 70% of the cases above halfway of their length from the base. As a consequence, according to this method of hafting, the base fragments (always functionally orientated) are longer than the apical fragments. In 4 cases the points literally disintegrated.

As far as the analysis of the fractures caused by impact on the points is concerned, a classification scheme was created, based on the terminology forwarded by various authors on the principal functional studies on projectile points (Ho Ho Committee, 1979; Fischer *et al*. 1984; Plisson and Geneste 1989; Soriano 1999; Perpère 2000). The scheme is based on the position of two main types of complementary fractures, cone and bending (Fig. 10, n°1 a-b), which are formed in the moment of the impact and tend to have a determined disposition: the fractures cone involve the part of the instrument turned towards the impact, those bending the part of the instrument turned towards the base. Whilst in the *cone* fractures no sub groups were identified, the *bending* fractures were divided in 4 sub groups on the basis of their endings (step, feather, hinge, snap, Fig. 10, n° 2), Among these sub groups some have been identified as highly diagnostic of their projectile function: the *bending* fractures with step ending, and especially the *spin-off* fractures, in which tiny splinters are removed starting from a *bending* fracture for the inflection produced by the impact. Other elements considered as diagnostic of the impact are the *enlèvements burinants* and the *fissurations,* indicative of a violent force (Fig. 10, n°5 -7).

The type of the fractures, as can be seen in the table below (Tab.5), largely repeats the alternating scheme proposed *cone/bending*, in which the *cone* fractures involve the proximal part of the apexal fragments and the *bending* fractures involve the distal part of the base fragments (Fig. 11 a).

On the tips one notes many cases of *enlévèment burinants* and the *bending* fractures, frequently of step type (50%), present *spin-off* (Fig. 11 b-e). It should be noted however, and this data is of extreme importance, that in some pieces (13%) the typical position of the *cone/bending* fractures is inverted.

As far as the macrotraces on the lateral margins of the experimental tools are concerned, despite the fact that many authors (in particular: Odell, 1981) have noted how, following impact, microfractures are created obliquely to the longitudinal axis, on the points used in this experimentation (as on the points of the Gravettian of Paglicci) these microfractures have an orientation and a disposition of a chaotic nature, and therefore it has been impossible to establish a regular relationship between these and the impact itself.

A separate notation should be made concerning the microtraces on the experimental pieces; it is particularly interesting to note the differences between the points hafted in an apexal position and those in a lateral position. On the latter (Fig. 12) one frequently notes, albeit light, shining linear traces, called linear polishes (or linear features) (Moss, 1983; Fischer *et al*., 1984; Plisson and Geneste, 1989), positioned perpendicularly to the margin on the extremities of the pieces, probably caused by the abrasion which occurred at the moment of the insertion of the handle. Also present, on the lateral margins, extremely light polishes or longitudinal linear features, which are caused by the contact with the animal target (Fig. 11 f-g).

In contrast, on the points hafted in an apexal position (Fig. 13), the traces are almost absent and only on the

Typology of fractures	*%*	*None (intact)*	*Cone*	*Bending*	*Enlèvement burinant*	*Spin-off*
Apex	dist	28,5	14,2	-	57,1	-
	prox	-	83,3	16,6	-	-
Base	dist	-	17,6	70,5	11,7	22,7
	prox	90,9	-	-	9,1	-

tab. 5 : Type of fractures on experimental tools

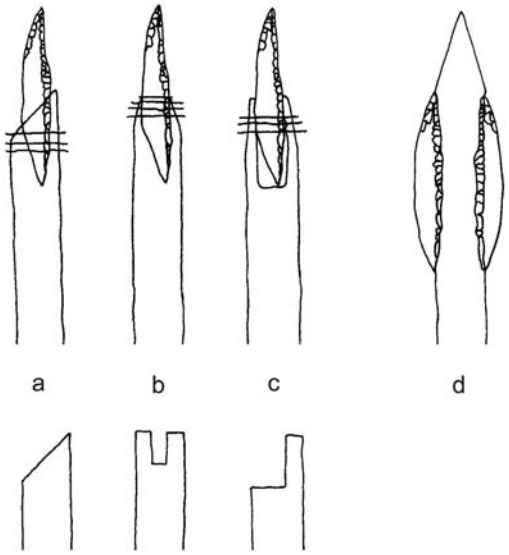

fig. 9 : Different experimented positions of hafting

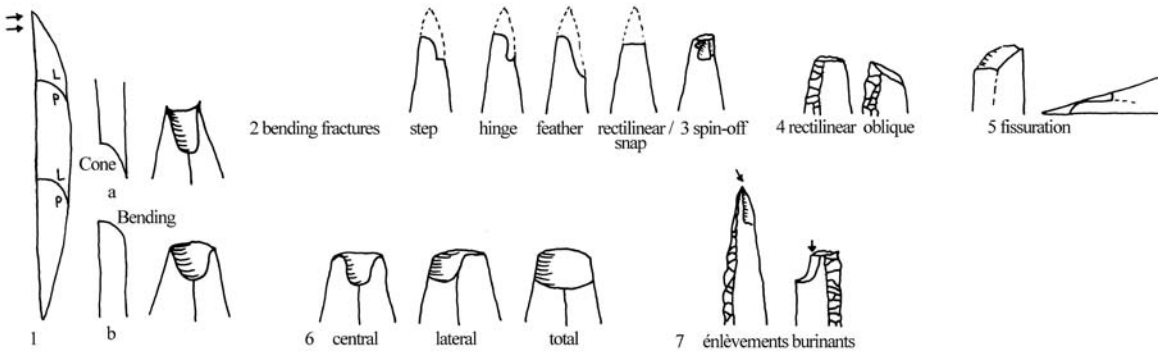

fig. 10 : Scheme for the classification of fractures

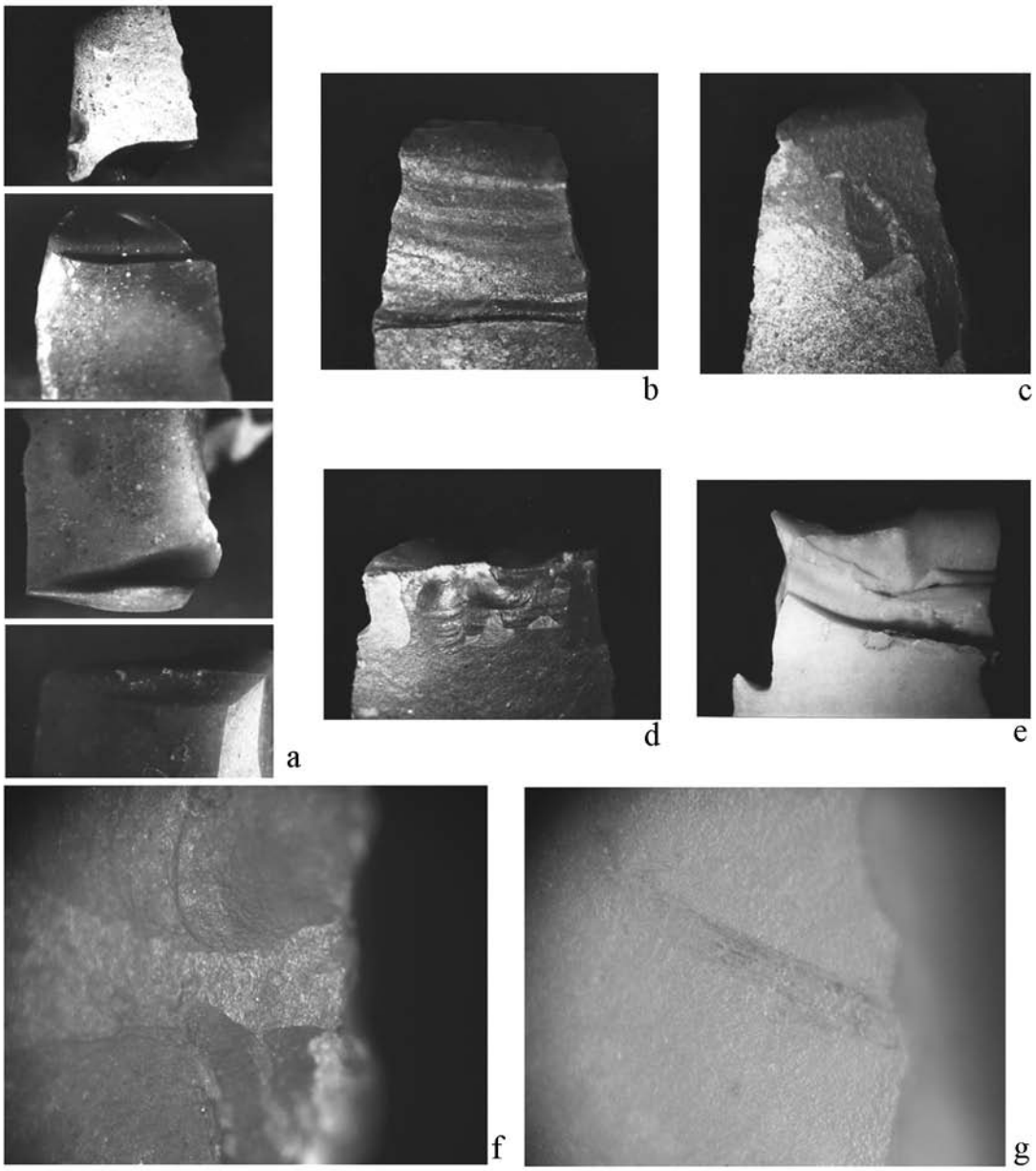

fig. 11 : Experimental phase; a: reconstruction of a fragmented point with the typical disposition of bending/cone fractures; b-c: bending fractures; d-e: bending fractures with spin-off (20X); f-g: microwear on lateral edges (100X)

base portions of some of the pieces thrown towards the ground, this was caused by the less firm hafting of these pieces, used in the very first phase of experimentation.
As for pieces hurled against a wall, or broken by hand, this additional experimental phase produced positive results in that, if the fractures present on the hurled pieces reveal precisely the percentages cited in table 1 as far as the position of the *cone* and *bending* is concerned, the points broken by hand leave no traces of anything which can be diagnosed as resulting from impact: the fractures are almost always rectilinear (or Snap), and the percussion point is often recognizable (Fig. 14)

Classification of the fragments

In order to be able to make typometric and morphological evaluations, as well as traceological ones, on the fragments of backed tools, it has been necessary to divide these specimens in three principal categories, in relation to there presumed functional orientation: apex fragments, base fragments and median fragments (Tab. 6).
Because of the high incidence of the bi-points within the intact specimens, the main problem has been that one to distinguish apexes from the pointed bases. Within the intact points of Paglicci it has been noticed that in 20% of the cases they shows both perfectly pointed apex and base, while in the other specimens there is a marked difference between the two ends: the end less pointed (40%), flatter (16%), somewhat angled (8%), or with the retouch failing to arrive right at the very tip (16%) was considered as the base. Naturally these characteristics, rather evident in intact pieces, sometimes have not been recognized among fragments, considering also that the position of the secondary retouch is not associated in an univocal way to an extremity rather than to the other. For this precise reason a non classifiable category was created among the fragments.
In the case of Grotta della Cala this division has been easier as many fragments were clearly recognizable like fragments of base: decidedly not pointed and often *dejétées*.
According to this division we noticed that in Paglicci (22 F) apexal fragments prevail (but the single levels percentages are variable), whilst in Grotta della Cala fragments of base clearly predominate (Tab. 6). Median fragments have identical percentages in the two sites.

%	*Paglicci (22F)*	*Cala*
Fr. apex	38,5	13,0
Fr. base	12,4	47,3
Fr.apex/base	23,4	13,6
Median	25,7	26,0
N. of elements	338	169

tab. 6 : Fragments of backed tools

From a typometric point of view, in both site we note that fragments of base, in line with the experimental data, are longer and wider than the fragments of apex. As regards median fragments, the analysis of the material of Paglicci has allowed to propose that at least a part of these instruments were distinct functional elements, probably conceived as lateral elements of an arrow or a javelin. This possibility, that it does not exclude that many median elements were the result of points fragmentation, would seem confirmed from some characteristics: the very similar dimensions, a perfectly rectangular form (Fig. 15), a flat direct lateral retouch, which is extremely rare in the intact specimens and the presence of some intact elements (Fig. 16) morphologically assimilable to fragments. In the material of Grotta della Cala, the median fragments seem to have the same morphologic characteristics and the same particularity regarding the lateral secondary retouch.

Fractures analysis

Fractures analysis of the fragmentary elements has brought to light some problematic. In the archaeological material fractures do not shows the same alternation of cone and bending noticed in the experimental phase. In both the sites, within apexal fragments (Tab. 7) cone fractures (proximal) prevails, as in the experimental points, but it continues to prevail also in the fragments of base. Moreover, removals length of bending fractures is higher than 3 mm only in the 1% of cases and many rectilinear fractures, totally absent in the experimental points, are found in the archaeological material.

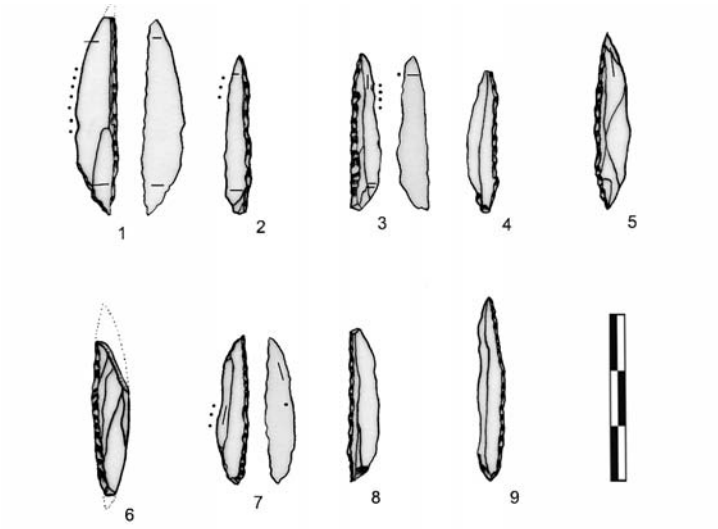

fig. 12 : Microwear on laterally hafted points

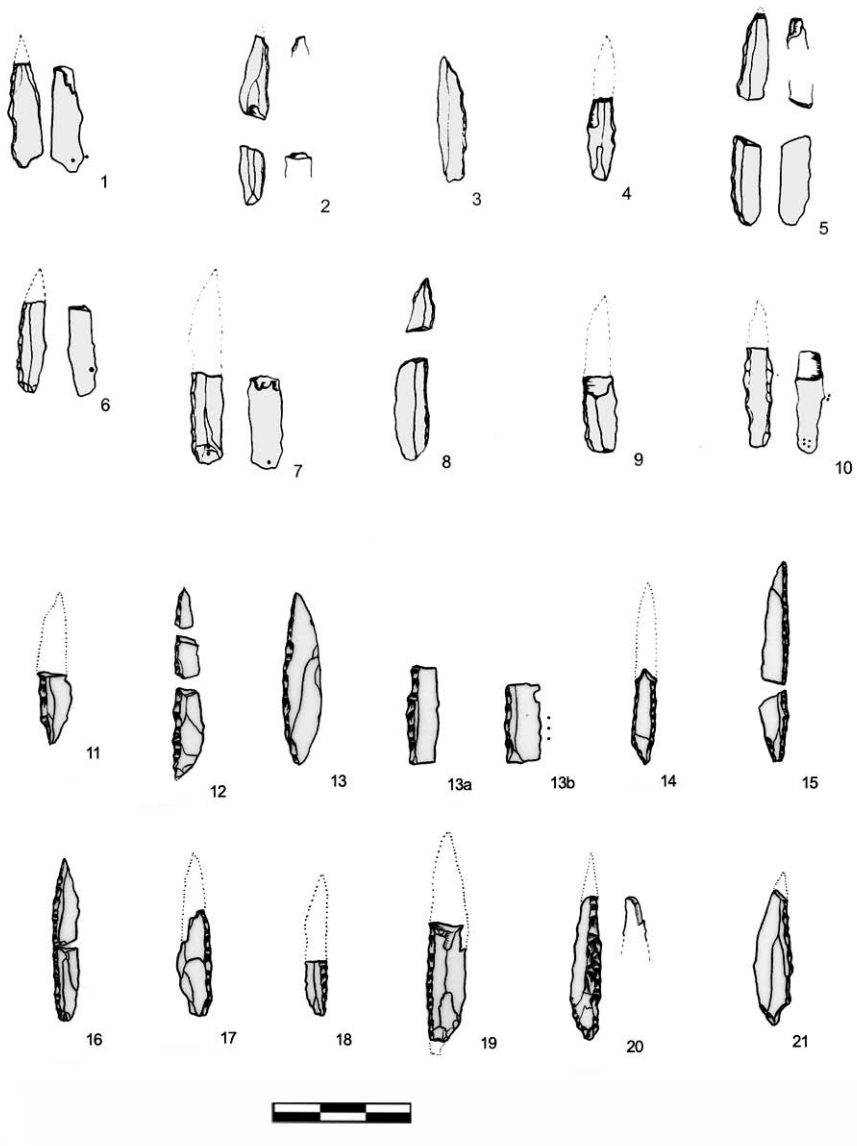

fig. 13 : Microwear on points hafted in a apical position

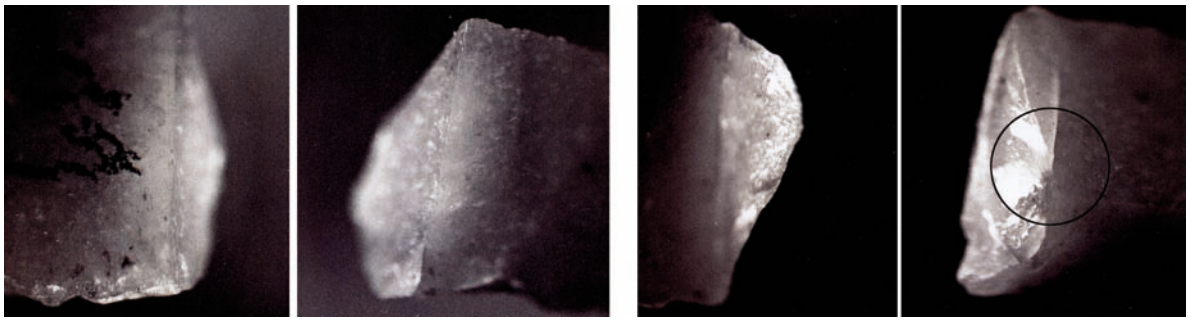

fig. 14 : Fractures on a point broken with the aid of a percussion (20X)

fig. 15 :– Median fragments of Grotta Paglicci (level 22F)

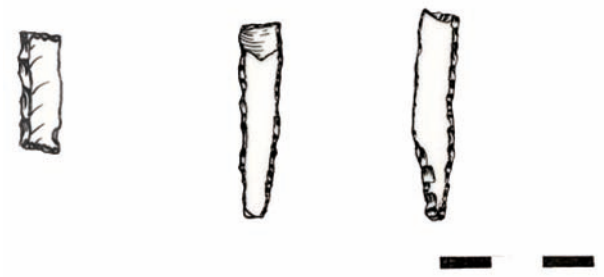

fig. 16 : Truncated blades of Grotta Paglicci

Grotta Paglicci (22F) %		*None (intact)*	*Cone*	*Bending*	*Rect.*	*Enlèv. burinant*	*Spin-off*
Apex	dist	98,3	-	-	-	1,6	-
	prox	-	44,1	17,5	29,1	-	-
Base	dist	-	38,4	33,3	30,7	-	2,5
	prox	100	-	-	-	-	-

Grotta della Cala %		*None (intact)*	*Cone*	*Bending*	*Rect.*	*Enlèv. burinant*	*Spin-off*
Apex	dist	90,4	-	-	4,7	4,7	-
	prox	-	47,6	23,8	28,3	-	-
Base	dist	-	46,1	30,7	23,0	-	1,9
	prox	100	-	-	-	-	-

tab. 7 : Classification of fractures on the archaeological material

This data lead us not so much to criticize the methodology of classification of fractures, that seems confirmed from many experimentations, as to think that it is not simple to distinguish, in the whole archaeological assemblage, the utilized points from those fragmented for post-depositional causes. If we take into consideration analogous studies on the Gravettian backed points, we notice that two characteristics are assumed as essentials in order to determine the use of projectile of these instruments: the higher percentage of base fragments and/or the presence of diagnostic fractures, in particular bending with removals higher than 3 mm (Derndarsky, 2003, site of Stillfried; O' Farrell, 2000, site of Corbiac; Perpère 2000, site of Abri Pataud; Soriano, 1999, site of Rabier).

Except for Paglicci (where nonetheless the apex-base distinction is difficult), in all the other sites fragments of base prevail (Tab. 8). This datum is associated by researchers with the common employment of the tools as projectiles, supposing that the proximal part of the point, remaining in the haft, could return to the camp with the hunters' equipment, whilst the distal part might be easily lost following the impact. In the Abri Pataud site, moreover, unlike what we notice at Paglicci and la Cala, bending fractures prevail on base fragments, and in a complementary way the cone fractures are found on fragments of apex (in conformity with the suggested scheme, Fig. 10 n°1). At Paglicci and la Cala, cone fractures, however, seem to be prevailing by far. On the other hand, the complementariness of cone and bending fractures as a result of the impact, and the prevalence of base fragments, implies that the points have been hafted in the apexal position (Fig. 9 a-c), while perhaps the bi-points with a shearing edge fit better in a lateral position (Fig. 9 d).

That would explain the concavity or the torsion of the profile of many specimens of bi-points, because it does not cause any particular problems in the lateral hafting, and their dimensional variability (in particular in their length). The specimens without a shearing/cutting edge instead, with an equilateral triangle section, always present extremely rectilinear profiles and axes and more standardized dimensions: these instruments, with characteristics that seem more calibrated with the entire system of the throwing weapon, could have an apexal position.

For the tiny points of Grotta della Cala, it is difficult to suggest a type of hafting, unless we classify them as apexal elements of very thin hafts (Fig. 17).

The scarcity of diagnostic elements of an impact is particularly obvious if we translate the data of Paglicci and la Cala in conformity with the scheme proposed by Magen O' Farrell (2000) for the study of the backed points of the site of Corbiac (Tab. 9).

%	*Intact points*	*Fragments of apex*	*Fragments of base*	*Median fragments*	*Undetermined fragments*
Paglicci	6,7	27,2	16,6	28,7	20,6
Cala	7,6	11,4	43,7	24,0	12,5
Rabier	-	27,1	38,3	30,9	-
Abri Pataud	7,0	15,0	46,0	31,0	-
Stillfried	25,6	12,1	51,3	10,8	-
Corbiac	19,0	24,0	31,0	26,0	-

tab. 8 : Intact points and fragments percentages

In this scheme the material is not divided between fragments of apexes and bases, but the types of fractures are considered as a whole.

In the three sites the outcome is that of a substantial homogeneity, due to the fact that the percentages of the diagnostic fractures of an impact are always very small.

In particular we can see the very high percentage of rectilinear/*nette* fractures (never produced as a result of the impact in the course of experimentation); cone fractures in Corbiac come out instead decidedly in an inferior number than bending fractures.

We can undertake a comparison as regards the totality of the simple and complex fractures also with the sites of Rabier (Soriano, 1999) and Stillfried (Derndarky, 2003); the majority (75%) of the points of Rabier present simple fractures, and in the material from Stillfried only 8 elements with diagnostic fractures from the impact have been determined, therefore approximately 90% of the fractures would turn out to be simple (Tab. 10).

A particularly interesting datum derives from the analysis of the fractures of the median elements of Paglicci and la Cala. In both sites the greater part of the fractures seems to have a post-depositional or voluntary origin. In fact, in the case of an impact on median fragments we should find both a bending fracture and a cone fracture, whereas in the material taken into consideration this case occurs only rarely (Tab. 11). The propagation axis of the fractures, often (over 20% of the cases) does not coincide, to demonstrate that two distinguished events have generated these fragments.

Microtraces analysis

The microtraceological analysis, carried out on a sample (n. 106) of intact and fragmentary points from Grotta Paglicci [3], has not been helpful in characterizing the traces due to the impact. On 31% of the pieces examined microwears are present, but in this calculation also pieces with very light polishes have been included. It is not possible to determine only on the basis of use-wears if an instrument has been used as an element of a weapon for throwing, but the position of the microwears can instead be helpful to understand the modalities of hafting. In the case of Paglicci, traces on the intact points are positioned in the shearing edge, without having an apparently recurrent position (Fig. 18). The point with a truncated base and a equilateral triangle section shows polishes on the base (Fig. 18, n. 3).

Contrary to what has been observed in the study of the backed points coming from other complexes (not only Gravettian: Gurova, 1998; Derndarsky, 2003; Donahue, 1988; Lemorini and Rossetti 1989-99, O' Farrell, 2000; Plisson and Geneste, 1989), on the material from Paglicci we haven't found any traces that can induce us to think that these instruments were used as drills or knives.

Conclusions

The comparative study of backed points from Grotta Paglicci and Grotta della Cala has allowed us to make some considerations regarding the Gravettian hunting weapons. The observation derived from the analysis of the points of Paglicci, concerning two main morphologies of tools, with or without a shearing/cutting edge, seems to be applicable also to Grotta della Cala, in spite of the differences that regard the dimensions of the points.

[3] - A bad condition of tools has made difficult the use-wear analysis of backed points coming from Grotta della Cala.

%	Simple							Complexes					
	cone		Flexion- face				Flex lat.	Flexion-face			Flexion-latérale		
	trans	obl	FN	P	C	M		P	C	M	P	C	M
Corbiac	7,2	1,7	46,0	3,1	23,1	-	1,3	1,0	4,4	5,8	1,7	3,7	1,3
Paglicci	31,9	4,8	32,5	-	-	13,2	9,0	1,8	-	6,0	-	0,6	-
Cala	43,0	1,2	35,4	-	-	15,1	2,5	-	1,3	-	1,2	-	-

tab. 9 : Proposed scheme for the classification of backed points fractures (O'Farrell, 2000). Legenda: Simple/simple bending fractures not diagnostic of an impact (removals < 3mm); Complexe/complex: bending fractures with removals > 3mm; FN: fracture rectilinear/nette; P: plume/ bending feather; C: charnière/bending hinge; M: marche/bending step

Site	*Simple fractures*
Paglicci	91,4 %
Cala	97,2 %
Corbiac	82,4 %
Rabier	75 %
Stillfried	90 %

tab. 10 : Simple fractures percentages

%	*Paglicci 22F*	*Cala*
Cone/cone	22,9	28,2
Bending/bending	6,9	5,1
Rettilinea/rettilinea	9,6	10,2
Bending/cone	13,9	23,0
Rettilinea/cone	23,2	15,3
Rettilinea/bending	23,2	17,9

tab. 11 : Fractures on median fragments

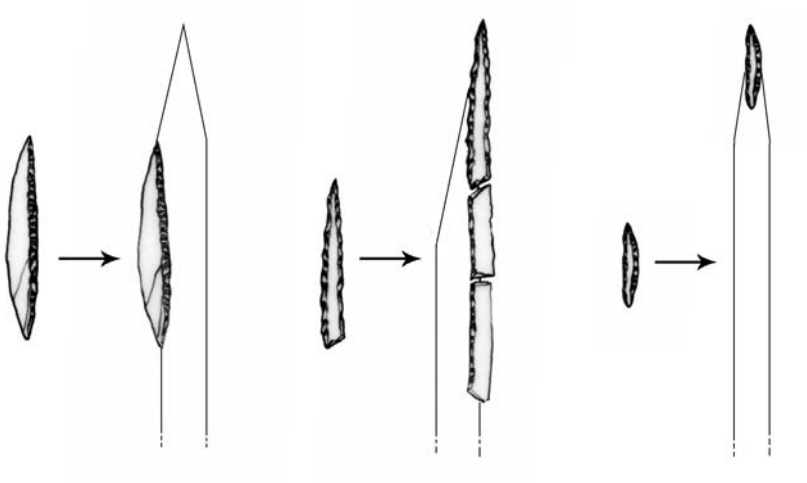

fig. 17 : Reconstruction of hafting of backed points

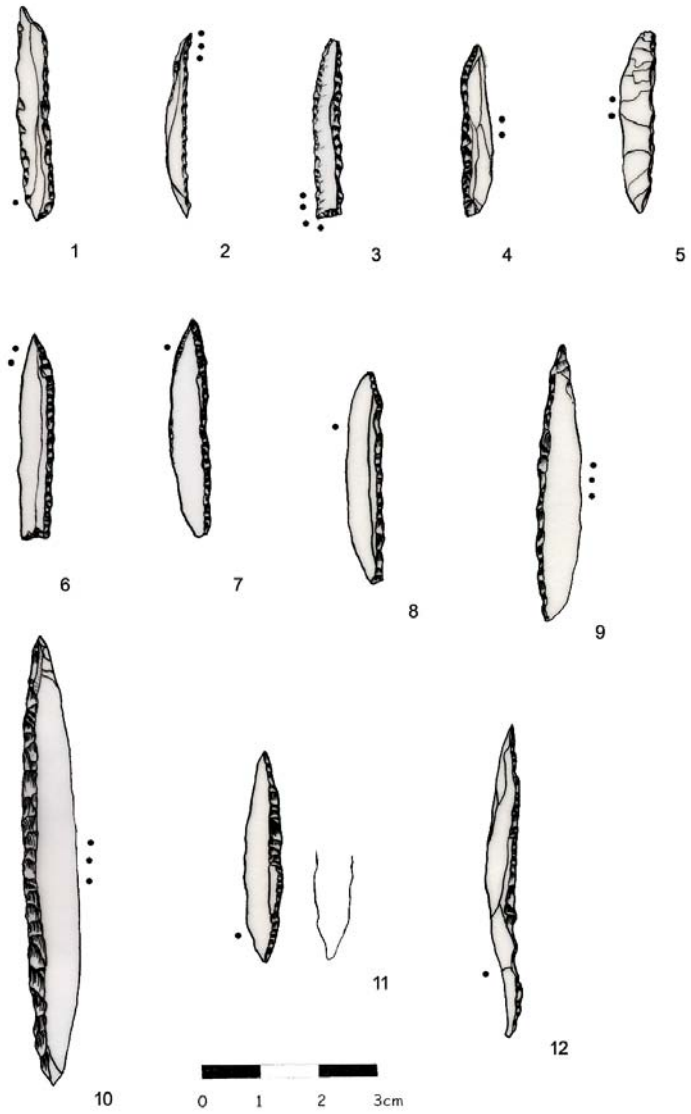

fig. 18 : Microwear on intact backed points of Grotta Paglicci

A remarkable dimensional variability, concerning essentially the length, is however present also within the elements from Paglicci (Fig. 11), and the smaller dimensions of the points from Grotta della Cala could be only due to the morphology of the raw material. It remains to be explained whether the dimensional variations in apparently similar and standardized tools did have a functional meaning or not , whether we are in the presence, contemporarily in the same site, of elements conceived for different weapons, maybe for preys of different sizes.

Other differences between the two sites, such as the profile of the back, nearly always convex at la Cala and rectilinear at Paglicci, as well as the presence of truncated tools only in Paglicci, seem to be due to variations of a "regional" kind. We shouldn't forget that the Appennines, even though not particularly high and with numerous passes at a low altitude, seem to have created a barrier between the Adriatic and Tyrrenian areas.

Finally, as far as the analysis of the fractures is concerned, the comparison between the two sites has brought to light the same problems: it is clear that only a small number of points have got diagnostic fractures from an impact, therefore it is difficult to quantify the percentage of instruments actually used, being unable, moreover, to rely on the support supplied from the microwear analysis.

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To quote this article

BORGIA V. (2008) - Ancient Gravettian in the South of Italy : functional analysis of backed points from Grotta Plagicci (Foggia) and Grotta della Cala (Salerno). In : J.-M. Pétillon, M.-H. Dias-Meirinho, P. Cattelain, M. Honegger, C. Normand, N. Valdeyron (coord.), Projectile weapon elements from the Upper Palaeolithic to the Neolithic (Proceedings of session C83, XVth World Congress UISPP, Lisbon, September 4-9, 2006), *Palethnologie*, 1, p. 45-65.

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