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THE ROCK ART OF THE CÔA VALLEY (PORTUGAL) AND ITS ARCHAEOLOGICAL CONTEXT: FIRST RESULTS OF CURRENT RESEARCH

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1. Introduction

The Côa is a tributary of the Douro that flows from south to north through a deeply incised valley. In the terminal part of its course, where elevations rise to 800 m along the right bank and to 500 m along the left bank, it runs through the Alto Douro region of Portugal, which lies at the western border of the northern Meseta (Fig. 1).

Today, the climate of this region is characterised by a significant thermal amplitude. The winter is cold and the summer is very hot, often with temperatures above 30°C. Rainfall presents a similar seasonal pattern: the winter is moderately rainy and the summer is very dry, to the extent that many of the tributaries of the Douro, including the Côa, often dry up. The microclimate of the region is thus considered to be of Mediterranean type, as in southern Portugal. The natural vegetation reflects these characteristics of the climate. Olive and almond tree groves, together

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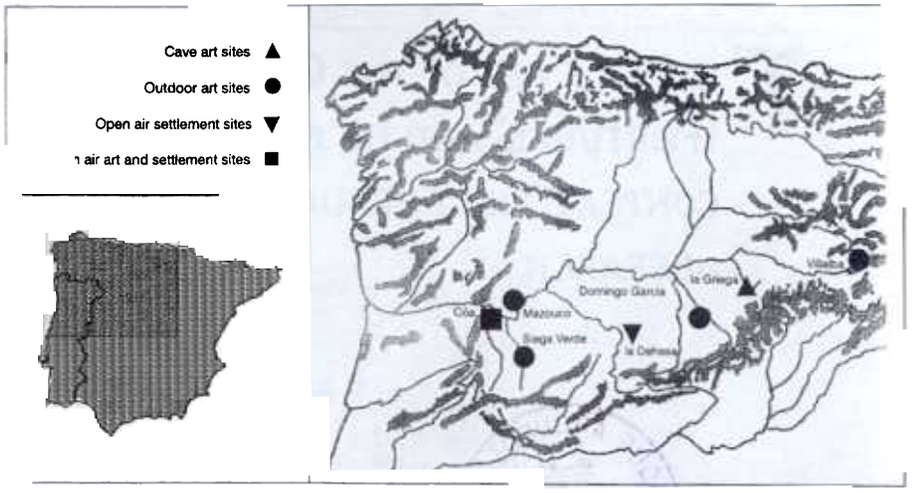


Figure 1. *Upper Palaeolithic sites of the Douro basin. Côa valley and Mazouco are located Portugal, the others in Spain.*

with extensive vineyards, dominate the landscape and their produce constitutes the agricultural basis of the traditional economy of the region ever since cereal production was almost entirely abandoned in the 1960s.

Another characteristic feature of the landscape are the rocky formations outcropping through the predominantly low and open vegetation: granites predominate in most of the river's drainage but in its last 15 km the valley is incised in schist terrain. Erosion acts upon these different bedrocks in different ways. The granitic plateaux, cut by deep ravines, feature spaced accumulations of large round boulders. The schist landscapes are characterised by impressive vertical escarpments which, in the valley bottoms, may alternate with fluviatile beaches that are sometimes quite extensive.

In 1983, a dam was built on the Douro, at Pocinho, a few kilometres downstream from the confluence of the two rivers. The terminal part of the Côa was flooded and, at the mouth, the rise in water level was of about a dozen metres. In 1991, it was decided that a second large dam would be built on the Côa itself, near the confluence with the Douro. As work proceeded, several finds of stylistically Palaeolithic rock art were made by the archaeologist in charge of the salvage work commissioned by EDP, the Portuguese electric power company behind the dam project (Rebanda

- first, in the summer of 1992, a single panel was located near the construction site, at Canada do Inferno;
- subsequently, in the late summer of 1993, the river bed was completely exposed to begin construction of the two small coffer-dams that would dry the area where

the wall of the new dam was to be implanted; as a result, the submerged parts of the river banks became visible and several new finds were made at Canada do Inferno, engraved on rock surfaces that had been hidden under water for a decade.

These finds were not made public until November 1994, when construction of the new dam was already well under way. In the next couple of months, many other locations were found in the valley (both by archaeologists and by local inhabitants), all of which would be submerged under more than 100 m of water if construction had continued as planned.

Passionate controversy immediately followed the public announcement of the existence of this soon-to-disappear complex of rock art sites. Massive national and international protest eventually forced the Portuguese government of the time to slow down construction work, which almost came to a halt in May 1995. Then, in early July, two Australian researchers hired by EDP (Robert Bednarik and Alan Watchman) claimed they had 'scientifically' dated the supposedly Palaeolithic art of the Côa to recent times (to only some 100 years ago, according to Alan Watchman) which, according to them, 'dramatically diminished' its importance (for details of the 'direct dating' argument, cf. Bednarik 1995 and Zilhão 1995a, 1995b).

Fortunately, the new Portuguese government coming out of the 1 October 1995 elections had the good sense to place more trust in common sense than in bad science. It formally decided to create an Archaeological Park in the area and to abandon the dam project altogether, in spite of the huge financial loss, estimated to lie between 100 and 150 million dollars. In the framework of that decision, published in the official journal of the Portuguese Republic on 17 January 1996, a thorough scientific investigation was ordered and the authors of the present paper, following-up on work they had begun in the summer of the previous year (Baptista and Gomes 1995; Zilhão *et al.* 1995), were committed the task of substantiating on solid archaeological grounds the arguments relating to the age and significance of the art that had led to the abandonment of the dam project. The results obtained, which this paper summarises, were presented in a report to the Portuguese government, dated 2 January 1997 (Zilhão 1997).

This unprecedented decision was entirely justified by the equally unprecedented nature of the archaeological situation. For almost a century, the orthodox view of Palaeolithic art has been that it represents a phenomenon restricted to caves and, in Leroi-Gourhan's synthesis, which is still the most influential interpretation of parietal art, their decoration was viewed as part of a religion where such caves played the role of sanctuaries (cf., for instance, Leroi-Gourhan 1964). After 1981, when the Portuguese site of Mazouco (Fig. 2), only a few km east of the Côa, was identified (Jorge *et al.* 1981), researchers came to realise that Palaeolithic art also existed outdoors (cf., for instance, Bahn and Vertut 1988). However, Mazouco and similar finds made since its discovery, such as Domingo Garcia (Martín and Moure 1981) and Piedras Blancas (Martínez 1992), in Spain, or Fornols-Haut, in

gure 2. *The Mazouco horse, the first open air Palaeolithic figure to be recognised as such by chaeologists (Jorge et al.* 1981).

:ance (Sacchi 1988) were single-figure or single-panel sites that appeared as ldities, as exceptions that confirmed the rule.

Subsequent work at Domingo Garcia (Ripoll 1992) has significantly increased the ımber of panels and figures but, meanwhile, a more substantial find had already :en made in Spain, in the late 1980s: Siega Verde, a site corresponding to a cluster f rock art panels spreading some 1500 metres along the banks of the Águeda river, ear Ciudad Rodrigo, across the border from Portugal (Balbín *et al.* 1991, 1995). After :veral years of extensive work, some 300 animal motifs were recorded. This was not ıough, however, to debunk the cave sanctuary paradigm. Siega Verde was inter- :eted by many as akin to a cave in a region where the true thing was entirely lack- ıg. Consequently, the river and its margins were viewed as playing the role of the ndergound tunnel and its walls, with decoration following the same conventions, ı terms of style, location and associations, that Leroi-Gourhan had identified in :anco-Cantabrian cave sites.

The Côa rock art marked a qualitative change in this panorama, given the size of ıe territory involved – the art, comprising thousands of figures, spreads along some 7 km of the valley and extends into the left bank slopes of the Douro downstream om the confluence of the two rivers. These finds dramatically illustrated that, rather ıan being the exception, outdoor art must have been the rule in Upper Palaeolithic mes, much as is the case among present day hunter-gatherers. This world wide sig- ificance, from a scientific as well as from a heritage point of view, of the Côa valley nds, immediately received, once they were made public, almost unanimous recog- ition (cf. Bahn 1995, for instance). The results of our 1995/96 research, which we ill now proceed to report, have fully confirmed previous expectations.

. GEOLOGY AND ARCHAEOLOGY

1. Chronology of the valley's incision

ı the terminal section of its valley, where all the rock art sites are located, the Côa ıts some 50 m into bedrock: at Faia, it flows at about 150 m above modern sea level nd, at the confluence with the Douro river, the elevation of the river banks was of bout 100 m before the Pocinho dam was built. The average elevation of the adja- :nt plateaux, discontinuously covered with conglomerate deposits of the *raña* type, hich are thought to be of Pliocene age (Silva and Ribeiro 1991; Ferreira 1993), is 50 m. The Quaternary incision of the valley is, therefore, of at least 300 m.

The highest Pleistocene fluviatile terrace identified in this section of the valley lies t an elevation of 40 m above river level. It is represented at Quinta da Barca and Quinta da Ervamoira and can be correlated with deposits at a comparable elevation)und on the Douro, at Quinta da Granja, a few km upstream from the mouth of the Côa, and at Quinta do Vale do Meão, downstream from the confluence of the two ivers (Fig. 3). Survey and excavation at the two Douro sites resulted in the collection f Acheulian industries, whose manufacture, in Iberia, ceased about 90,000 years go. Even admitting for these assemblages the most recent possible age, it is still uite clear that the incision of the valley to elevations below this terrace level nust have taken place well before the beginning of the Upper Pleistocene.

Two lower levels of fluviatile terracing were identified in connection with the :xcavation of Upper Palaeolithic camp sites: the Salto do Boi platform, 25 m ıbove river level, and the Quinta da Barca platform, 6 m above river level (Fig. 3). Both platforms are fossilised under Pleistocene colluvial sequences containing mportant and well stratified human occupation remains (Fig. 4). The Gravettian ıge of the earliest occupation of Salto do Boi and the thickness of the deposits ınder the Terminal Magdalenian occupation of Quinta da Barca Sul imply that he incision of the valley down to its current elevation must have taken place well)efore the beginning of the Last Glacial.

This conclusion is supported by available radiometric results for geomorphologic :eatures. OSL dating of the sandy beach accumulated at Penascosa, on the right)ank of the Côa, provided results of *ca* 1000 BP for a sample collected 1 m below surface and of 4000 to 6000 BP for a sample collected at a depth of 2.5 m, that is, some 50 cm above bedrock (Watchman 1995). The first result is identical to that obtained through radiocarbon for a charcoal sample collected in an organic horizon located at the same elevation in a 46 m long geological profile that we opened in the same beach, *ca* 200 m downstream from Watchman's sampling location: 1000 ± 60 BP (Sac-1322).

Hence, it seems safe to infer that the accumulation of the modern alluvial deposits presently filling the valley bottom in this location began some 6000 years ago, pro- viding an absolute minimum age for the valley's incision. Astonishingly, however, Watchman's conclusion had been exactly the opposite:

Transversal profiles of the valley in the lower Côa

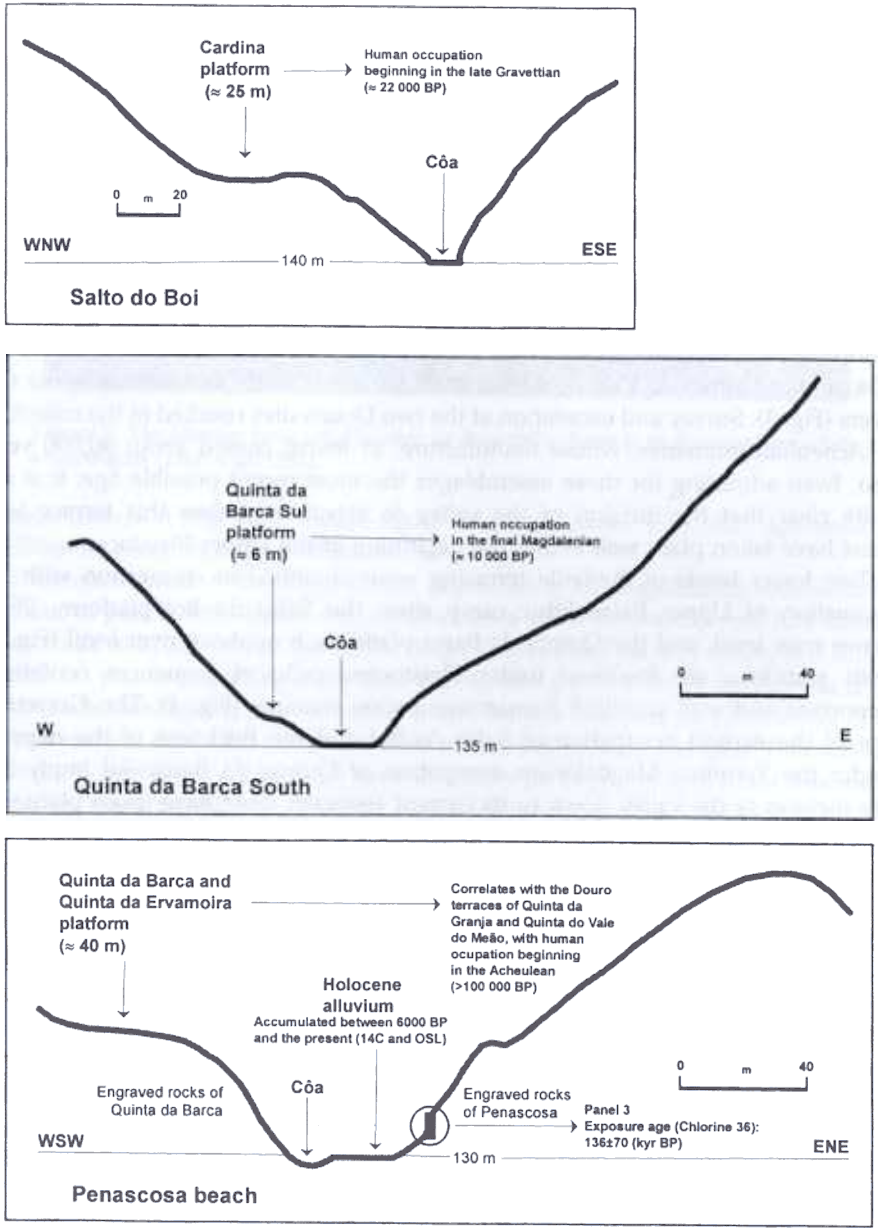
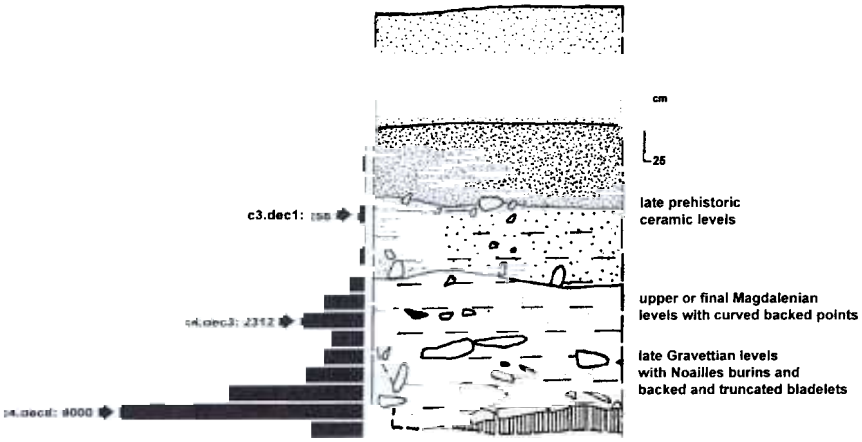


Figure 3. *Terraces of the lower Côa and chronology of the valley's incision (see Fig. 7 for the location of the sites where the schematic profiles were obtained).*



Salto do Boi (Cardina I)

Stratigraphic profile in square Q16 and vertical distribution of artifact weight (g) per 5 cm excavation spit

Figure 4. *Salto do Boi (Cardina I). Stratigraphy and density of finds in square Q16. In this section of the site, the lowest Gravettian can be subdivided in two different levels featuring slightly different lithic tool assemblages.*

Figure 5. *Salto do Boi (Cardina I). Cobble pavement at the base of the late Gravettian levels in squares L/15–16.*

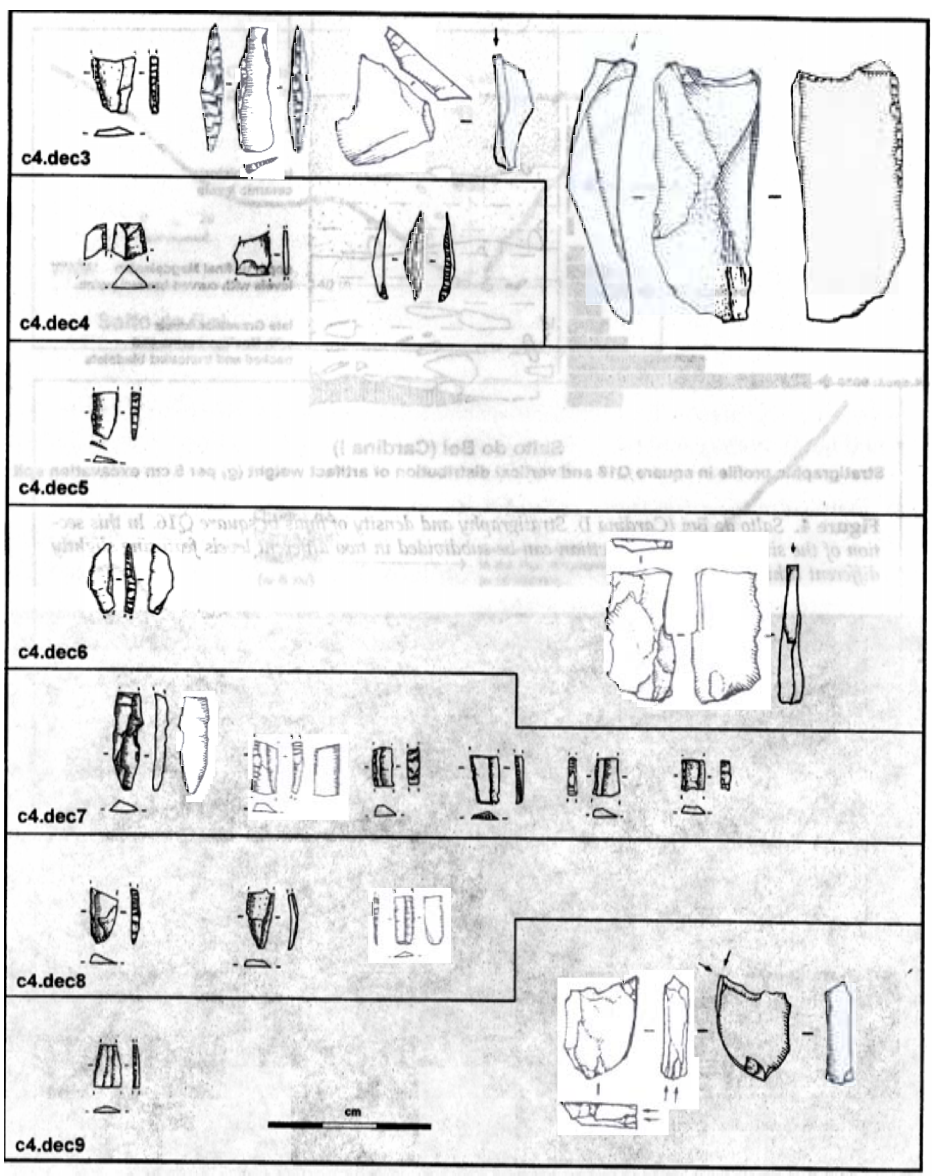


Figure 6. *Salto do Boi (Cardina I), squares Q/15–16. Diagnostic tools (microliths and burins) in the 5 cm thick excavation units in which layer 4 was subdivided. In this section of the site, the following occupations were identified:* dec 1–3, *Terminal Magdalenian;* dec 4–6, *Late Gravettian with backed and truncated bladelets;* dec 7–9, *Gravettian with Noailles burins.*

This means that the river had cut down to a base level close to the engraving site at Penascosa by about 6000 years ago, perhaps 8000 years ago if errors in the preliminary analysis are made larger. Schists at Penascosa can therefore only have been exposed for about that length of time, given the height of the engraved rocks above the present river level. Palaeolithic sediments therefore do not exist in the valley, so stone tools of that age cannot possibly be found close to the engraved rocks.

The results also indicate that joint planes in Penascosa were probably exposed from a maximum of about 8000 years ago, so engravings on those surfaces cannot possibly be any older than a maximum of 8000 years.

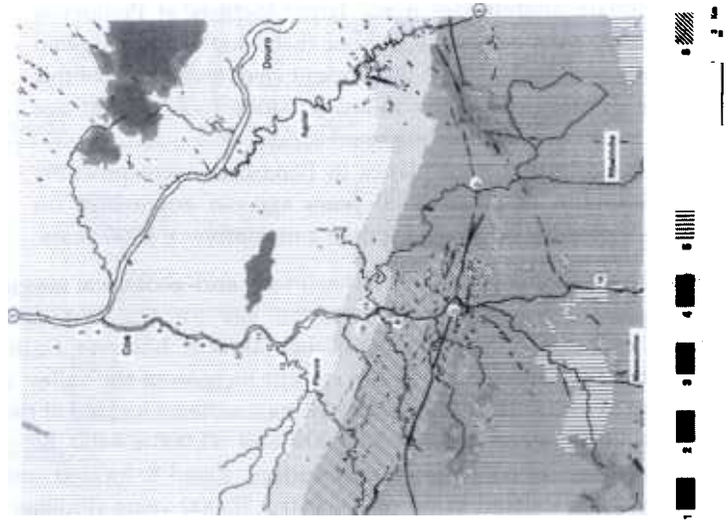
Watchman, seconded by Bednarik (1995), used this utterly anti-geological reasoning as part of his argument favouring a very recent age for the Côa valley petroglyphs. The results of the Chlorine-36 dating of rock surfaces, however, further reinforce the notion of the very ancient age of the current incision of the valley. At Ribeira de Piscos, the age of exposure of three different rock surfaces located at river level was calculated to lie between 170,000 ± 34,000 and 91,000 ± 9400 BP; at Penascosa, the age of exposure of a decorated rock surface, Panel 3, located some 10 m above river level, was calculated to be of 136,000 ± 70,000 years (Phillips *et al.* 1997).

These results are fully coherent and lead to the following conclusions:

- the incision of the Côa valley down to its current level is at least 100,000 years old;
- the valley has since had a depositional history characterised by alternating episodes of accumulation and erosion;
- the last erosional episode must have taken place after 10,000 BP, given the non-preservation of Upper Palaeolithic archaeosedimentological contexts in the Penascosa beach;
- the accumulation of sediments in the valley bottom began again *ca* 6000 years ago, as indicated by the age of the basal deposits of that beach;
- when the Upper Palaeolithic period began in Portugal, which was no more than 30,000 years ago, the schist surfaces that were to be decorated had already been exposed for a long time.

2.2. *History of human occupation*

As mentioned above, the earliest evidence of human settlement of the Alto Douro region, the Acheulian assemblages from Quinta da Granja and Quinta do Vale do Meão, are of Lower Palaeolithic age, dating to more than 90,000 years ago. The Middle Palaeolithic is as yet unknown, although a workshop site located near a rhyolite outcrop may date to the period. The first Upper Palaeolithic settlement found in the area was that of Salto do Boi (Cardina), located and tested in the summer of 1995 (Zilhão *et al.* 1995), which is now known to contain Gravettian, Proto-Solutrean and Magdalenian occupations (Figs 4–6).



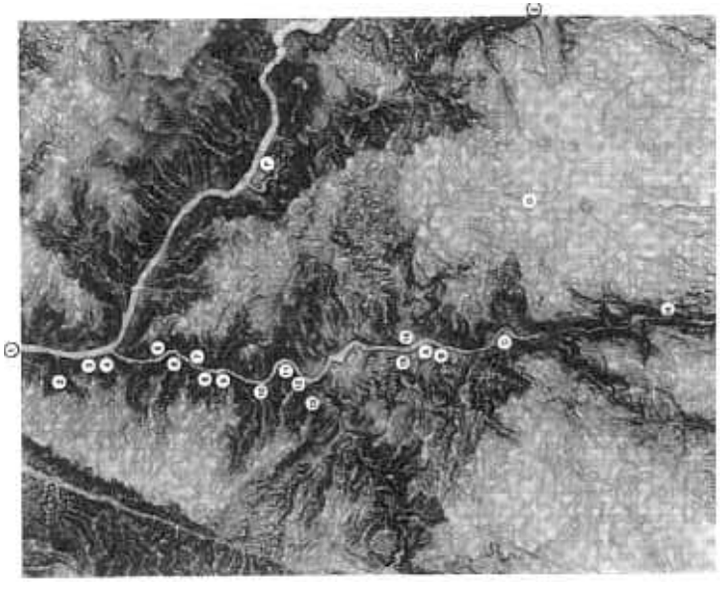


Figure 7. *Upper Palaeolithic sites in the Côa region: left, slope chart (the darker areas, with steep slopes, show the valley's incision into the light coloured surrounding plateau, which corresponds to the westernmost part of the Northern Meseta); right, geology and main rivers (1, intrusions of harder rocks; 2. quartzites; 3. cover deposits; 4. granites; 5. Ribeira de Massueime granites; 6. Desejosa schists; 7. Pinhão schists; 8. Rio Pinhão schists). Art sites: 1. Vale da Casa; 2. Vale de Cabrões; 3. Vermelhosa; 4. Vale de José Esteves; 5. Broeira; 6. Vale de Moinhos; 7. Canada do Amendoal; 8. Rego da Vide; 9. Canada do Inferno; 10. Vale de Figueira; 11. Fariseu; 12. Foz de Piscos; 13. Ribeira de Piscos; 14. Penascosa; 15. Quinta da Barca; 16. Faia. Camp sites: A. Quinta da Barca; B. Quinta da Barca Sul; C. Salto do Boi (Cardina); D. Olga Grande; E. Ínsua; F. Quinta da Granja.*

The number of sites has since increased significantly (Fig. 7). Five other occurrences were also identified in 1996 and early 1997: Quinta da Granja, Quinta da Barca, Quinta da Barca Sul, Ínsua and Olga Grande. Chronologically, the occupations represented at these sites range from the Gravettian (found at Salto do Boi and Olga Grande) to the Magdalenian (found at all the sites). The Solutrean is represented only at Olga Grande Sul, where an upper Solutrean context with Cantabrian-type shouldered points (Fig. 8) was found in an intermediate stratigraphic position, between a surficial Magdalenian and a basal Gravettian. Together, these sites substantiate an Upper Palaeolithic settlement of the region beginning at least 22,000 years ago, when the Gravettian period came to an end, and continuing until the end of the Magdalenian, between 12,000 and 10,000 years ago.

No Mesolithic sites have so far been found in the Côa valley. The same is true for most of the interior lands of Iberia, where resettlement seems to take place only around 6000 BP, in association with the expansion of the agro-pastoral economies of middle-eastern origin established after 6800 BP in the littoral, both Mediterranean and Atlantic, fringes of the Peninsula (Zilhão 1993a). In Trás-os-Montes, the north-easternmost part of Portugal, such a resettlement is documented by the Neolithic levels of the rock-shelter of Buraco da Pala, near Mirandela, radiocarbon dated to 5860 ± 30 BP (GrN-19104) and 5840 ± 140 BP (ICEN-935) (Sanches *et al.* 1993).

In the Côa valley, the open air site of Quebradas, located and tested in 1996, contained a ceramic assemblage identical to that of the early Neolithic levels of Buraco da Pala and is likely to date, therefore, to the same time period. The establishment of such farming communities in the Côa valley coincides with the onset of the current phase of alluvial accumulation and is likely to represent its cause. Forest clearance must have destabilised the soils formed in the steep valley slopes during the early Holocene and, as a consequence, sediments accumulated at their base, as colluvial deposits overlying the Pleistocene ones, or were washed into the valley bottoms, and subsequently deposited as *alluvium* in favourable locations, such as at Penascosa. This process must have continued and intensified in later prehistoric times, when settlement is well documented by such Chalcolithic and Bronze Age sites as Castelo Velho (Jorge 1993) and Fumo, the latter found and tested in the framework of the research reported here.

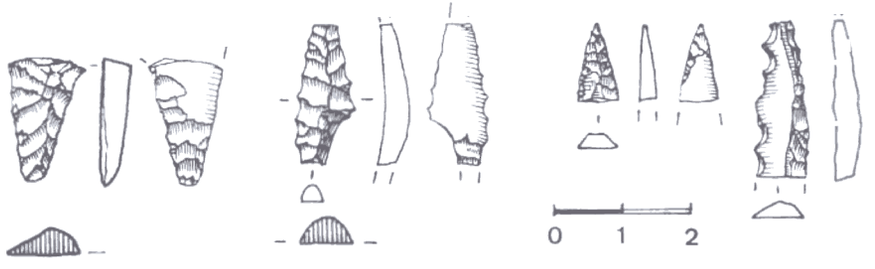


Figure 8. *Olga Grande Sul. Diagnostic Upper Solutrean tool types: 1. stem of shouldered point; 2. shouldered point; 3. tip of shouldered point; 4. denticulated backed bladelet.*

The distribution of the Upper Palaeolithic rock art and settlement sites presently known (Fig. 7) forms a pattern of concentration along the main rivers, the Douro and its left bank tributaries, the Côa and the Aguiar. Olga Grande, however, shows that the interfluvial granitic plateau that extends eastwards of the Côa was also exploited by Last Glacial hunters. In late prehistoric times, the Upper Palaeolithic pattern is reversed. Habitation sites are found in plateau locations and the use of the valley bottoms is documented by isolated finds or very low density contexts which probably indicate, much as in the recent historical past, activity specific occupations related to fishing, hunting, herding or cultivation of small agricultural parcels.

In the Côa valley itself, all Upper Palaeolithic settlements known are located in the section between Quinta da Barca and Salto do Boi. This distribution, although not random, is not a genuine reflection of past reality either. Most likely, it is conditioned by the softer nature of the bedrock (the metagreywackes of the Rio Pinhão formation), which has made it possible for river erosion to create horizontal platforms. These, in turn, after the river's incision progressed to lower elevations, made it possible for slope deposits to accumulate, preserving the remains of human occupation in good stratigraphic contexts.

Further downstream, the different lithology, the important erosion undergone by the oldest terraces and the modern anthropic impacts (especially in the last 20 years, when extensive vineyards began to replace the traditional use of land for cereal agriculture) have not allowed for a similar good preservation of the sedimentary evidence of the valley's Pleistocene landscapes. Isolated finds made at several places (such as at Colmeal, opposite Quinta da Ervamoira), however, confirm that the section between Quinta da Barca and the confluence with the Douro was also frequented by humans during the Upper Palaeolithic. Northwards of the mouth of Ribeira de Piscos, in the most densely decorated section of the valley (Fig. 7), the submersion of the bottom caused by the construction of the Pocinho dam has made it impossible to survey for settlement sites.

The characteristics of those presently known, particularly as inferred from the richest and most extensive, Salto do Boi, suggest:

- a recurrent occupation of the Côa valley by small-sized human groups, originating sites containing dense palimpsests of lithic remains and often presenting lateral variations of their archaeological stratigraphies; at Salto do Boi (Cardina) and Quinta da Barca Sul, the occupation levels are characterised by habitation features – horizontal pavements built of river cobbles and large schist slabs (Fig. 5); soil acidity, however, has not enabled the preservation of organics, so neither charcoal nor animal bones have been recovered (although a few very small fragments of burnt bone recovered in the Gravettian levels of Salto do Boi, where the use of fire is attested by burnt flint, may indeed be coeval with the Upper Palaeolithic occupation of the site);

- the carrying out of domestic activities (carcass processing, hide and wood working, stone knapping) as well as of activities related to the collection of food, particularly as regards the maintenance of hunting equipment; given the non-preservation of organics, these activities are inferred from the nature of the thousands of stone tools recovered;
- the existence of raw-material procurement territories, or of exchange networks, covering extensive geographic ranges; recovered flints are all of Mesozoic or Cenozoic age and their sources are necessarily located, therefore, some 200 km away, to the east or to the southwest; the distant location of flint sources is also indirectly confirmed by the fact that this raw-material, common, although intensively reduced, in the Upper Palaeolithic, is extremely rare in the archaeological contexts created by the late prehistoric (Neolithic to Bronze Age) sedentary communities of the region.

3. CHRONOLOGY OF THE ROCK ART

3.1. Periods represented

Art begins with the Upper Palaeolithic, which, in the Iberian regions located south of the Ebro, did not begin before 30,000 years ago, at the earliest (Vega Toscano 1990; Villaverde and Fumanal 1990; Zilhão 1993b, 1995c; Raposo 1995). All subsequent periods of occupation documented in the archaeological record are also represented in the rock art.

The oldest figures, which are also the more abundant, are of Upper Palaeolithic age. All criteria currently used in Art History studies agree in dating to this period the animal figures of the Côa valley whose naturalistic depiction closely matches the representation style found in the more than 300 Palaeolithic cave art sites recognised in south-western Europe since the discovery of Altamira in 1879. The age of the latter has already been independently confirmed by direct accelerator radiocarbon dating of the organic components present in the utilised pigments or, in the case of mobiliary art made of bone and antler, of the object itself (Lorblanchet 1995). Among others, the open air Palaeolithic art of the Côa shares the following features with that found in caves and rock-shelters:

- the animals represented (horses, aurochs, ibex, red deer) are exactly the same found in the cave art of palaeoecological identical regions, such as Andalucia (Cortés *et al.* 1996); furthermore, not a single example of unequivocally domestic animals, belonging to species absent in the Pleistocene faunas of the Peninsula – sheep or chicken, for instance – has so far been documented;
- similar conventions are used in the representations, namely as regards the size of the figures (most around 50 cm, with some being as large as *ca.* 2 m), the lateral view of the body, the twisted rendering of the horns, the sinuous cervico-dorsal lines, the 'pregnant' bellies, the absence of a ground line, etc.;

- plants, stars, mountains, rivers and other landscape features, as well as scenes with participating humans (hunting or dancing, for instance), are completely absent.

The patina of the engraved lines, identical to that of the rock faces, as well as the numerous fractures occurred after the execution of the petroglyphs that are patent in most of the engraved surfaces, are further evidence of an ancient age and preclude the possibility of a modern fraud. On the other hand, there are a few instances of superposition between stylistically Palaeolithic figures and others whose later age can be securely established by the nature of the motifs represented. In these cases, it is possible to test stylistic predictions of age against the stratigraphic order of execution. Among others, those shown in Figure 9 are quite illustrative examples:

- in Panel 22, Canada do Inferno, the superposition is between modern religious motifs (anthropomorphic figures and Christian crosses) and a stylistically Palaeolithic horse's head;
- in a Vermelhosa panel, the superposition is between a knight carrying Iron Age weaponry and a stylistically Palaeolithic deer.

In these two instances, as well as in every other instance where such superpositions have been documented, it was verified that:

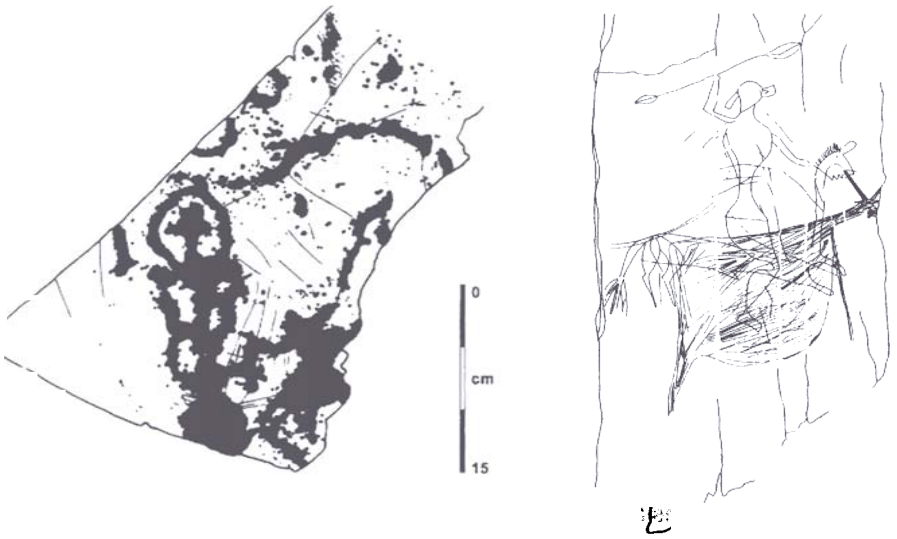


Figure 9. *Figurative stratigraphies featuring Modern and Iron Age figures on top of Palaeolithic ones. Left: Canada do Inferno, Panel 22, with Christian motifs superimposed on a Palaeolithic pecked horse. Right: Vermelhosa, Panel 1, with an Iron Age warrior on horse back superimposed on a Palaeolithic fine line cervid.*

- the stylistically Palaeolithic figures were always under the later ones;
- the stylistically Palaeolithic figures were deeply patinated, while those of more recent age were only slightly, if at all, patinated;
- superpositions only occurred when the degree of patination or degradation of the Palaeolithic representations made their recognition difficult; more often, when a surface was redecorated in post-Palaeolithic times, the composition of the panel indicated that the later artists were using the space left empty by their Palaeolithic predecessors.

The Vermelhosa panel is especially important in this regard. In spite of being at least 2500 years old, the Iron Age figure is extremely fresh: the grooves are still whitish, making it easy to read the motif against the reddish brown background colour of the rock face. The lines defining the Palaeolithic deer, in contrast, are so patinated that the colour of the rock inside the grooves cannot be differentiated from that of the background. This differential patina implies a much earlier age for the cervid, in good accord with its stylistic attribution to the early Magdalenian, *ca* 16,000 years ago.

These observations are also in good accord with the Chlorine-36 results, which imply a great stability of the regional landscape and zero erosion rates for the engraved rock faces (Phillips *et al.* 1997). These authors explain the durability of these faces as a result of the very fine texture of the schists, of the fact that the surfaces exposed by slabbing episodes are perpendicular to the lamination of the mother rock, and of the thermodynamic balance between the clay minerals in the schist and the surface environment of the rock face. In such a context of negligible erosion and great chemical stability, the marked patination of the stylistically Palaeolithic figures is by itself a sufficient indicator of their great antiquity.

The same comparative criteria allow us to date to later prehistoric or protohistoric times several other art clusters, comprising both painting and engraving, that are also found in the valley. The schematic anthropomorfic and the deer figures painted in the Faia granitic rock-shelters have known counterparts, both in Portugal and in southern Spain, in Neolithic impressed pottery, in megalithic art and in decorated rock-shelters containing radiocarbon dated occupation levels (Jorge and Jorge 1995).

3.2. *'Direct dating'*

Watchman (1995) and Bednarik (1995) have denied that a Palaeolithic rock art existed in the Côa valley, basing their position in the results of 'direct dating' techniques they applied to the Côa rock art in 1995, at the invitation of EDP, the company building the Foz Côa dam. The refutation of those results has already been made elsewhere, particularly as regards the non-applicability of Bednarik's micro-erosion technique (Zilhão 1995a, 1995b). Subsequently, Dorn (1997) has produced experimental evidence for the validity of the methodological objections raised, in the framework of that refutation, against Watchman's use of radiocarbon techniques

for petroglyph dating. In the Côa situation, such dating was undertaken indirectly, via the determination of the age of the silica skins covering the rock surfaces that had been cut by the engraving episodes. Dorn's study has confirmed that:

- establishing the chronology of such skins is irrelevant for the dating of the petroglyphs; their development is the result of extremely complex geochemical processes and, as a rule, begins inside the rock, long before the occurrence of the slabbing episodes that finally realise the exposure of the surfaces that they were already covering; in other words, the formation of silica skins predates the aerial exposure of the covered surfaces;
- once exposed, the silica skins undergo geochemical weathering caused by the colonisation of the rock surfaces by different types of micro-organisms (lichen, fungi, etc.); as a result, in what regards the chemistry of carbon, they do not behave as closed systems, and the ratio between the ^{12}C and ^{14}C carbon isotopes contained in samples collected from them has no direct chronological significance;
- the application of experimentally derived corrective parameters to the ^{14}C content of samples from these open systems shows that apparent 'maximum ages' of *ca* 5000 BP, such as were obtained for Panel 1 from Ribeira de Piscos, actually correspond to true 'maximum ages' of more than 20,000 BP, in total accord with the Chlorine-36 results and the chronological predictions derived from stylistic analysis.

4. PALAEOLITHIC ART

4.1. Distribution patterns

The distribution of currently known Palaeolithic rock art sites (Fig. 7) shows three well defined clusters, separated by sizeable empty stretches. Faia is the southernmost and is entirely made up of a few occurrences in a particular geomorphic setting (granitic rock-shelters). Quinta da Barca and Penascosa, 8 km downstream from Faia, already in schist terrain, occupy an intermediate position. The northernmost cluster, beginning at Ribeira de Piscos, corresponds to the terminal canyon of the Côa; downstream from the confluence, however, all of the small side valleys of the left bank of the Douro already surveyed also contain Palaeolithic art.

The empty stretch between Faia and Penascosa/Quinta da Barca is most certainly an artefact of geology. Penascosa and Quinta da Barca lie at the southern end of the phyllites from the Desejosa and Pinhão formations. Upstream, the Rio Pinhão metagraywackes no longer offer the landscape of discontinuous vertical escarpments with erosion-resistant surfaces that is so characteristic of the valley in the sections with phyllite bedrock. The absence of engraved rocks must be a direct consequence of this change in geology: either because the artists did not have adequate surfaces available and, therefore, the landscape in this empty stretch was never the object of artistic intervention, or because the rock surfaces that may indeed have been decorated in the past did not resist the action of weathering agents.

Two facts suggest that the second hypothesis best fits the empirical evidence:

- the discovery, in the Gravettian levels of Salto do Boi (Cardina), of mineral colorants identical to those used for cave art elsewhere in south-western Europe is secure, albeit indirect, evidence of artistic activity in the sections of the valley located upstream from Penascosa/Quinta da Barca;
- with the exclusion of Faia, where the prehistoric art known is not strictly open air and where the conditions that determined preservation and destruction were, therefore, totally different, the distribution of rock art of all ages currently known in the lower Côa valley and adjacent stretches of the Douro is confined to the schists of the Desejosa and Pinhão formations.

The situation at Faia further strengthens the concept that the present day distribution of rock art occurrences in the valley is primarily controlled by geology. The Côa cuts through granites throughout most of its course but Faia is the only granite section of the valley where rock art has been found. In the geological map, this section coincides with a stretch of terrain where bedrock is formed by a special kind of granite, the 'Rio Massueime formation'. Here, erosion originated the slabbing of prismatic volumes, which created overhangs that provided favourable environments for the creation and preservation of rock art. It is precisely in such sheltered locations that both the Neolithic paintings and the Palaeolithic engravings from Faia have indeed been found.

Analysis of distribution patterns in the terminal 6 km of the valley is made difficult by the submersion of its bottom. It is not yet clear whether we are facing a continuous distribution, where the clusters currently known (Piscos, Fariseu, Vale de Figueira, Canada do Inferno, Rego da Vide, Canada do Amendoal, Vale de Moinhos, Broeira) would represent the tip of an iceberg, or a discrete distribution, in which the discontinuities observed above the Pocinho level genuinely reflect the situation at lower elevations.

A solution for this problem must wait a future emptying of the Pocinho lake. Meanwhile, observations made in October 1995, when water was completely pumped out upstream from the coffer-dam built in preparation for the construction of the big Foz Côa dam, do suggest a discontinuous pattern. The abundant vertical escarpments known in this stretch of the valley, however, were intensively quarried in the recent past, which may have had a strong impact in the present distribution patterns. The need to consider the anthropic factor is also well illustrated by the situation downstream from the confluence with the Douro, where all Palaeolithic art known is located in slopes cultivated with olive and almond trees. No finds have been made in contiguous areas of similar lithology and topography now planted with vineyards. The explanation is simple: traditional vine plantation requires terracing, which destroys all outcrops and, with them, the rock art they may have contained.

Even if we account for such important anthropic impacts on the landscape, there is a major feature of the Palaeolithic art of the Alto Douro that does not seem likely

to change with future studies: its absence from the interfluves or, put another way, its exclusive concentration along the major water lines.

4.2. Regional insertion

When only the Desejosa and Pinhão phyllites are considered and once the anthropic factor is accounted for, the distribution pattern of Palaeolithic rock art in the Alto Douro region cannot be explained taphonomically: its clusters and voids must be a genuine reflection of past human behaviour. Preliminary surveys already carried out in this vast area seem to indicate that such art is confined to the valley of the Douro, with small appendages penetrating some of its tributaries. This is confirmed by the following two facts:

- local inhabitants testify that the now submerged valley bottom between Pocinho and the mouth of Ribeira de Aguiar was full of 'tattooed rocks'; the identification of Palaeolithic art above the Pocinho level at Vale da Casa, Vale de Cabrões, Vermelhosa and Vale de José Esteves gives credit to such assertions, although they remain to be independently confirmed by archaeologists;
- no Palaeolithic rock art was found in the relevant stretch of the valley of the Ribeira de Teja (a left bank tributary of the Douro downstream from Pocinho that cuts through Pinhão schists) when it was surveyed in 1995, in the framework of an environmental impact study conducted by local archaeologist A. Sá Coixão, in preparation for the construction of a small hydroelectric dam; the same is true for the Ribeira de Aguiar, where an Upper Palaeolithic camp site has already been found, but no art.

In Portuguese territory, the only exception to this panorama seems to be, thus, the valley of the Côa, where Palaeolithic rock art penetrates 17 km upstream from the confluence with the Douro and cannot, therefore, be considered an appendage to that found in the latter. The other exception, already in Spain, is the valley of the Águeda, with the important site of Siega Verde, with its 300 animal figures spread along 1.5 km of schist terrain (Balbín *et al.* 1991, 1995).

If this pattern is confirmed by future research, that would suggest that the Douro, the Águeda and the Côa would have had a similar great significance for Upper Palaeolithic human groups of the region. If one considers the palaeoenvironmental conditions of the epoch, it is possible to put forward an explanation for the differential importance of these three rivers.

Available climatic models for the last pleniglacial period (Gates 1976; Guiot *et al.* 1989) indicate that average rainfall was less than 50% of present. In the Alto Douro and adjacent regions of the Meseta this must have meant a reduction to values in the range of 150 to 300 mm per year. Consequently, only the rivers that were fed by glaciers or snow melting in the high mountains, such as the Cantabrian and Iberian Central ranges, in Spain, and the Serra da Estrela, in Portugal, would have water all year round. Those would have been, therefore, vital migratory routes for large herbivore herds and, consequently, structural axes for the human settlement of the regions they traversed.

Of all the tributaries of the Douro that cut across the schist terrain of the Alto Douro region, only the Côa drains the north-eastern foothills of the Serra da Estrela, which rise above 1000 m. It was precisely on this side that glaciers coming down from the ice covered summit plateau were longer and attained lower elevations (Daveau 1971). In marked contrast with today's situation, when it has a Mediterranean-type regime and is often fully dry in the summer, the pleniglacial Côa would have been a permanent river that carried substantial amounts of water in a region that, paradoxically, would have been much drier than today. Hence, its vital importance for the hunters living in the area, of which the rock art lining its banks wherever geology enabled preservation is but the most obvious symptom.

4.3. Engraving techniques

Palaeolithic artists used a set of different engraving techniques (Fig. 10):

- fine line incision, which was executed with a pointed and resistant tool; repetition of the gesture often resulted in outlines made of several parallel lines and in striated body fills;
- pecking, which was executed through direct or indirect percussion; it was used to draw outlines and, in a few instances, also to render some details of the body cover;
- abrasion, which consists of the wearing of the rock surface by attrition and was executed with the purpose of regularising and accentuating outlines previously drawn with any of the above techniques;
- scraping, a variant of incision whereby the rock surface is extensively, although superficially, abraded and the figure is brought out by the colour contrast between the original intact surface and the area that was scraped (a kind of reverse painting in which pigment was removed instead of added).

Often, these techniques represented successive stages in the manufacture of a single petroglyph. In numerous examples, fine line incision was used to sketch the outline of the animal, which was then enhanced through pecking and, finally, abrasion, which turned the rows of single dots into deeply grooved continuous lines. Sometimes, this enhancement is restricted to particular body parts, generally the horns, the head and the forequarters.

4.4. The role of painting

The readability of paintings derives from the colour contrast established between the background rock and the pigment applied on top of it. With engraving, readability derives from the different colour acquired by the rock inside the grooves. Today, the problems of perception encountered when trying to read the surfaces engraved in the Palaeolithic derives from the action of the weathering agents, which patinated the grooves and erased the original colour contrast. As a result, it is only through the

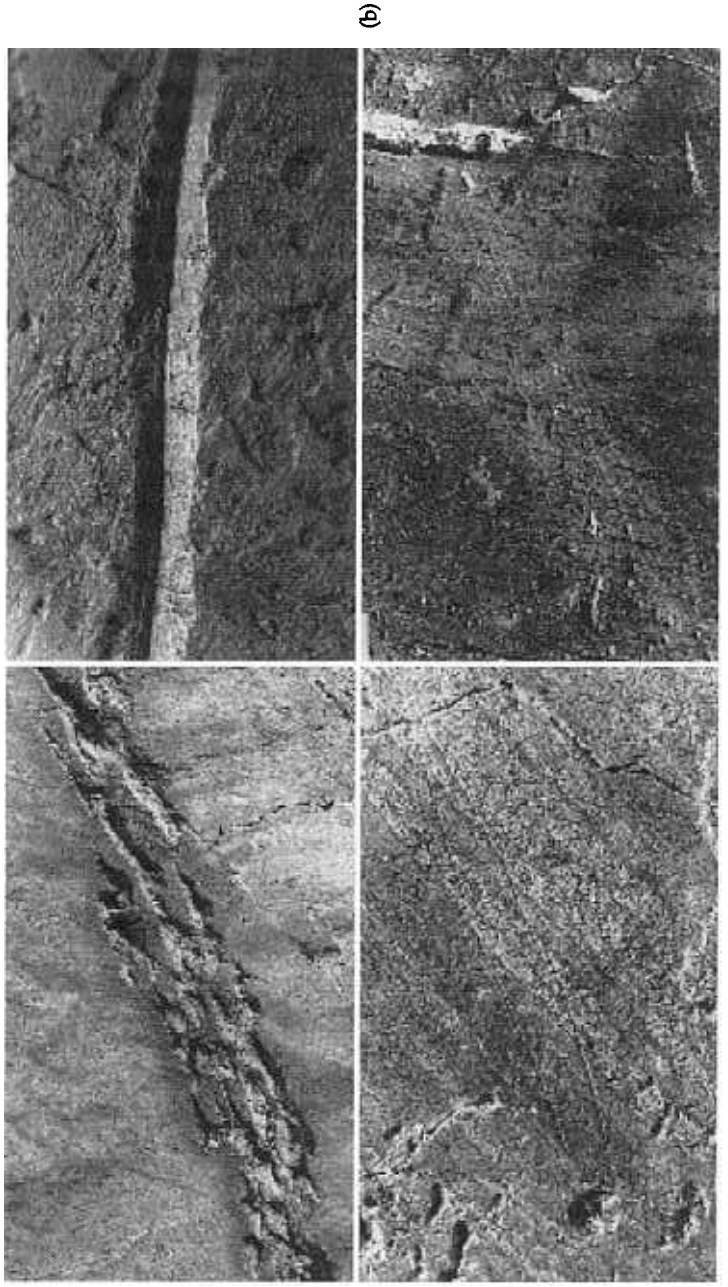


Figure 10. *Engraving techniques: (a) pecking; (b) abrasion; (c) fine line incision; (d) scraping.*

play of light and shade that the grooves recover their former prominence. Even so, in most cases, it is only at close range that the figures can be recognised.

Given the considerable investment represented by the incision-pecking-abrasion sequences and the visibility from afar that originally characterised the figures treated in this way, it does not seem likely that such figures were mere outlines produced with the single purpose of preparing the subsequent application of paint. This conclusion is also brought forward by the fact that such outlines were often filled with recourse to techniques of engraving – scraping and multiple incision. As a rule, the latter was used to enhance the rendering of the head and the neck but there are also examples where the whole body was affected. The ibex in Panel 1, Rego da Vide, further substantiates this reasoning: the details of hair cover in the forequarters were given through the application of extensive, dense pecked dots (Fig. 11).

Figure 11. *Ibex from Rego da Vide, Panel 1.*

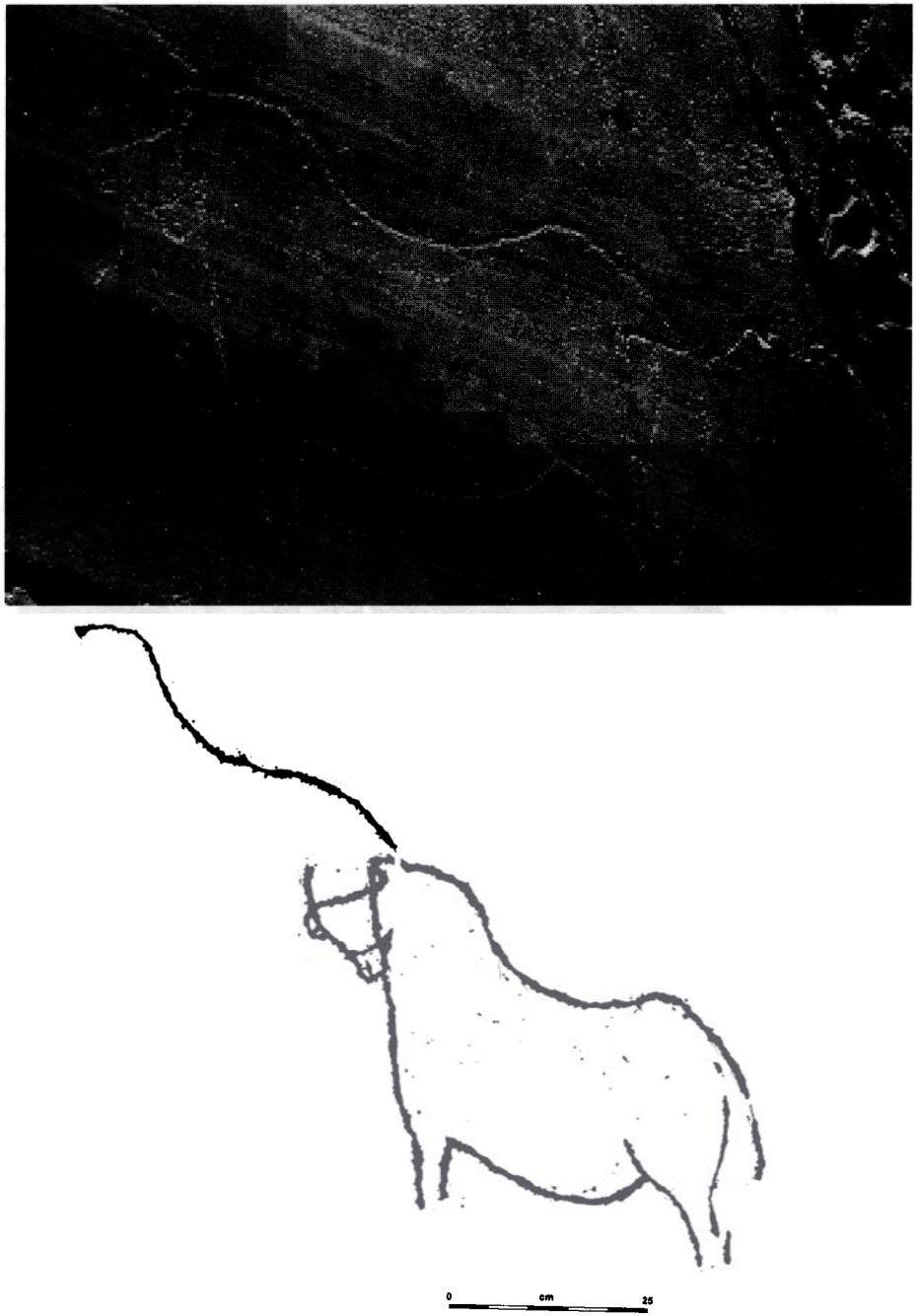


Figure 12. *Horses from Ribeira de Piscos, Panel 1.*

There are, however, many instances of fine line figures in the size range of the more elaborate ones that were never enhanced through abrasion or pecking. These figures also lack any kind of body fill and, in most cases, also lack anatomical details commonly represented in the finished depictions. Overall, they convey the impression of corresponding to preliminary sketches. It is quite likely that, in such instances, we may be dealing with representations where, following a pattern very common in cave art, fine line incision played an accessory role in the drawing, which was to be completed through the application of pigments, that is, through painting.

When such was the case, the swift degradation of pigments in aerial situations subsequently deleted the finished figure leaving only, engraved on the stone, a most elementary sketch of it. It is interesting to note that, in many of the figurative stratigraphies already documented in the Côa valley (of which Panel 1, Canada do Inferno, is an excellent example), such elementary figures represent the first episode of decoration. Although it needs to be confirmed by future work, this pattern naturally brings to mind the hypothesis that, initially, the Côa rock art was dominated by painting and that it was only later, perhaps when the artists realised the perennity or, at least, greater longevity of engraved petroglyphs, that the latter became the preferred vehicle of artistic expression. The fact that mineral colorants normally used in Palaeolithic painting (red and yellow ochre, black manganese) have been recovered from the Gravettian and upper Solutrean levels of Salto do Boi (Cardina) and Olga Grande, but not from any of the Magdalenian contexts so far known (including those at Quinta da Barca and Quinta da Barca Sul), further strengthens this hypothesis.

4.5. Specificities and innovations

The non-representation of the cold-adapted species found in Franco-Cantabrian cave art (bison, woolly rhino, mammoth and reindeer) is within normal expectations. In the Côa valley, as in most of Iberia, such species were not present and, therefore, could not have been depicted.

With the exception of Faia, we are dealing with a fully outdoor art, as is usually the case in later prehistoric times but was extremely rare, until now, for the Palaeolithic. The engraved panels are always found on vertical rock surfaces, although it cannot be excluded that horizontal panels also existed but did not survive the passage of time. Following the Palaeolithic canon, extensive use of the natural microtopography of the rock surfaces is used to enhance the volumetry of the figures. The complete horse from Panel 1, Ribeira de Piscos (Fig. 12), and a fish from Panel 5A, Penascosa, are excellent examples of this.

In what regards issues of aesthetics and style, the Palaeolithic art of the Côa sets itself apart from the rest of south-western Europe in the frequent use of a very specific convention: the association of two or even three heads with a single

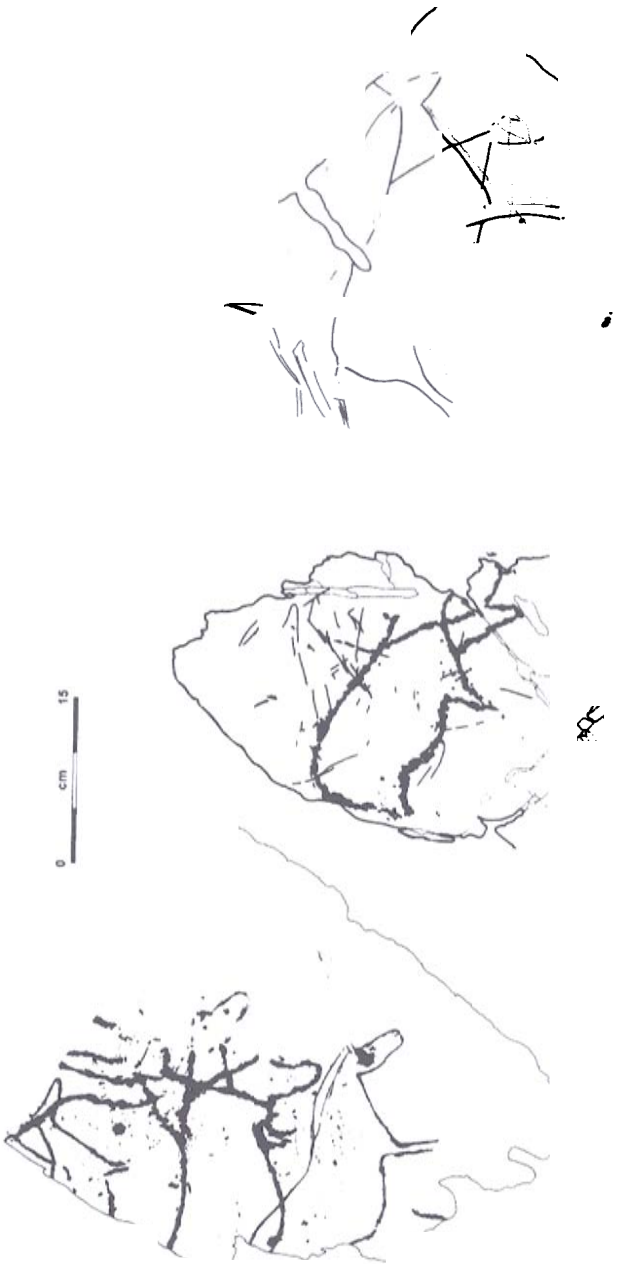


Figure 13. *Multi-headed figures featuring a downward movement of the heads. From left to right: pecked male horse mounting an abraded female from Penasoosa, Panel 4; unidentified pecked herbivore from Canada do Inferno, Panel 1; finely incised cervid from Canada do Inferno, Panel 31.*

body, in an attempt to convey the impression of movement (Fig. 13). Sometimes, the artist tried to represent the downward movement of the head when the animal grazes or drinks but, in one instance – the bottom scene of Panel 4, Penascosa – he depicted the three positions of the head of a stallion in the process of mounting a mare. This kind of animation is found mostly in representations of horses but there are also a few examples where it was used in figures of aurochsen. Another approach was that of showing the backward twisting of the animal's neck, a technique used almost exclusively in ibex figures (Fig. 14), although we also know of at least one auroch and one red deer treated in the same way. The utilisation of these animation techniques is most common at Penascosa and Quinta da Barca, although a few good examples have also been documented at Canada do Inferno, and seems to be exclusively applied to the larger, more elaborate figures.

These examples also shed some new light on the main figure of the Mazouco panel, which might be interpreted as the depiction of two superimposed animals. An alternative view can be offered, however, according to which the duplication of the ventral line and hindquarters would have been purposefully made to convey the movement of a jumping animal landing on its front legs, in good accord with the raised position of the head and the extremely sinuous rendering of the cervico-dorsal line (Fig. 2).

If this new interpretation of the Mazouco panel is accepted, the use of these particular animation techniques would not have been confined to the Côa but, instead, may have been a specific regional characteristic of the Palaeolithic art of all the Alto Douro. What is certain, however, is that, so far, it has not been recorded in the Mesetan sites across the Spanish border, not even at Siega Verde, which is only some 60 km south-east of the mouth of the Côa. If this difference is confirmed by future research, the use of these iconographic techniques may be taken as an important cultural marker, perhaps with ethnic significance. Whichever is the case, it certainly represents, as is also the case with the relatively frequent occurrence of scenes illustrating aspects of the social life of the large herbivores represented, one of the most original features of the Côa rock art and one of its major contributions to the renewal of our knowledge on European Palaeolithic art as a whole.

4.6. *Quantitative estimates*

In the Côa valley proper and in the adjacent slopes of the left bank of the Douro, 22 different rock art clusters have already been identified, totalling 214 decorated panels; 15 of these clusters, totalling 194 decorated panels, contained Palaeolithic art. In the sites that have already been the object of some recording work (Canada do Inferno, Ribeira de Piscos and Penascosa), it was found that about 80% of the panels had Palaeolithic representations and that the average number of Palaeolithic zoomorphs per panel was about eight. Thus, the number of Palaeolithic animal figures represented in the currently known panels can be inferred, at first glance, to be *ca* 1200.

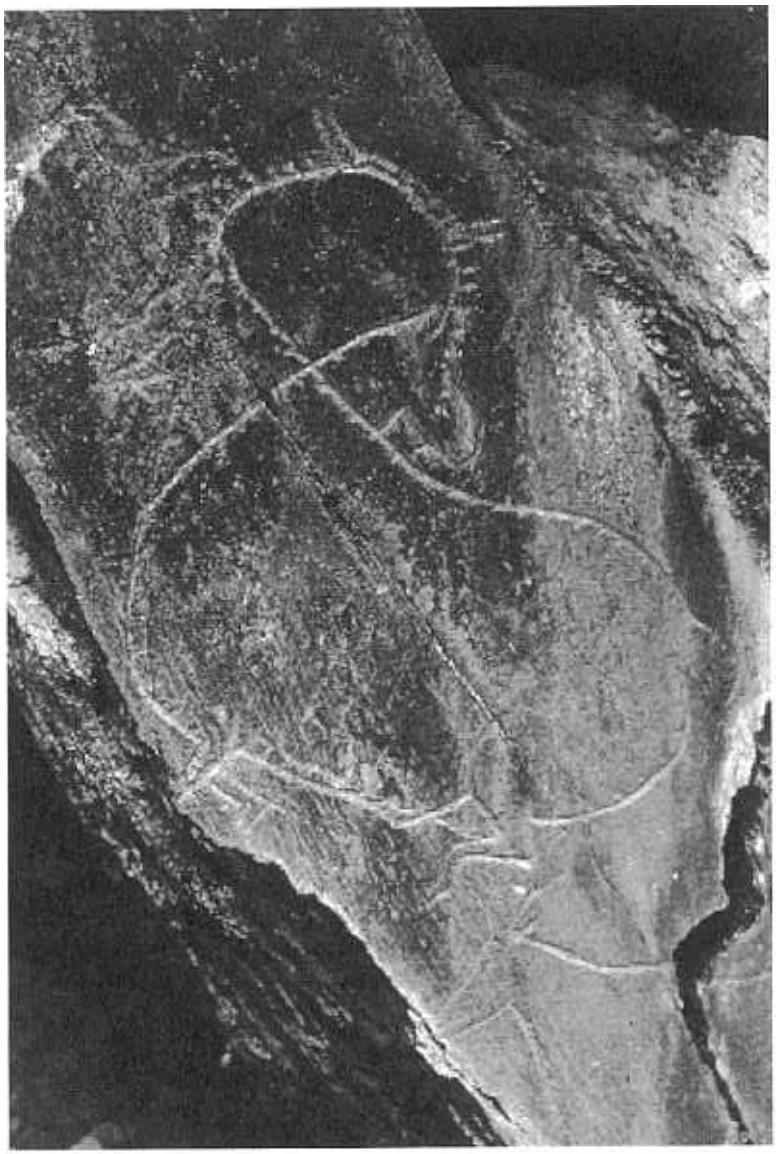


Figure 14. *Double-headed male ibex from Quinta da Barca featuring a backward movement of the head (the head and fore quarters of a complete female can be observed in the lower part of the image).*

It must be borne in mind, however, that only Ribeira de Piscos and Penascosa have been the object of systematic surveys oriented to the identification of the fine line engravings, extremely difficult to recognise due to patination and lichen growth. In both cases, such surveys more than doubled the inventories. Furthermore, the schist outcrops likely to contain rock art have not yet been systematically inspected. So far, work has been focused in documenting the main clusters discovered until the summer of 1995 by archaeologists and local people. On the other hand, the submersion of the valley bottoms downstream of Ribeira de Piscos and along the Douro hides an unknown amount of decorated panels. In these circumstances, the total number of Palaeolithic animal figures engraved in the schists of the region most likely exceeds the above mentioned estimate of 1200, which should only be considered, thus, as a minimum number.

Aurochs, horses, ibex, red deer and fish (plus the single human caricature in Panel 2, Ribeira de Piscos) are the species represented. The proportions vary from panel to panel and from site to site. Table 1 concerns work carried out at Canada do Inferno in 1995. It summarises the data available for the panels containing Palaeolithic figures that have already been recorded, in which:

- the number of pecked engravings is almost identical to that of incised ones;
- bovines dominate, followed by equids; a large majority of the representations of both animals are obtained through pecking, especially so in the case of bovines;
- cervids and caprines are represented in similar frequencies; almost all cervids are drawn through incision, while more than one third of the caprines are pecked.

These numbers, however, should not be considered as reflecting a general pattern. At Penascosa, for instance, pecked engravings are twice as numerous as abraded and incised ones, and caprines are overwhelmingly dominant, followed by equids; bovines and cervids are represented in similar proportions, although bovines are almost exclusively pecked and cervids almost exclusively incised. An internal differentiation of the site is also apparent in the distribution of the deer, which dominate the site's northern cluster of panels but are extremely rare in the southern cluster.

4.7. Diachronic trends

It is possible that this internal differentiation of Penascosa is related to the fact that figures in the northern cluster seem to belong to the later stages of the Upper Palaeolithic (Magdalenian); the other cluster, in contrast, while containing also stylistically Magdalenian images, features many figures depicted in styles typical of the earlier Gravettian and Solutrean periods. Evaluation of this hypothesis requires the construction of a detailed internal stylistic periodization, which is still in its initial stages of development. However, attributions such as those suggested above, which are based on external comparisons, are not illegitimate and already provide some interesting clues.

Table 1 Canada do Inferno
Palaeolithic animal motifs and engraving techniques (P = pecked); I = incised, fine line or abraded)

	Equids		Bovines		Cervids		Caprines		Fish		Undetermined zoomorphs		Total		
PANEL	P	I	P	I	P	I	P	I	P	I	P	I	P	I	TOTAL
1	2	1	3	2			1	1				3	6	7	13
2	1	2					1	1			1	1	3	4	7
3		3	1	4							1	1	2	8	10
4						1					1		1		1
10					1	1	1						1	1	2
11AB		1	17			1					5		22	2	24
12	2		1	2				1					3	3	6
13		–		1		1		–				1		3	3
14	2	3		1		7				1		10	2	22	24
15			3	1						–		2	3	3	6
19		1						2				1		4	4
20				1		2						2	–	5	5
22	5		1	–		1		1				1	6	3	9
26AB	2		2				4				2		10		10
28	1					2		1					1	3	4
30								4						4	4
31			–				1	1					1	1	2
32			1								1		2		2
33		2			1	1					1		2	3	5
34	1			1				1					1	2	3
35				1									1	1	2
TOTAL	16	13	29	14	1	16	8	13		1	12	23	67	79	146

The geographically closest chrono-stylistical yardstick currently available upon which preliminary periodisation schemes for the Palaeolithic art of the Côa can be built is that provided by the Parpalló sequence. This Valencian site contained a 6 m deep stratigraphy spanning the time period between the Gravettian and the end of the Magdalenian. Mobiliary art – thousands of painted and engraved stone slabs – was found throughout the different levels and the changes in stylistic patterns have recently been thoroughly examined and described by Villaverde (1994). The logical validity of using this yardstick in a first attempt at dating the Côa figures is further substantiated by the remarkable similarity in conventions of representation revealed by a cursory comparison between the two sets of artistic manifestations.

Analysis of the different instances of superpositions found in the Côa rock art independently confirms the chronological inferences derived from a comparison with Parpalló. In the Parpalló slabs, the horses' heads featuring a stepped mane, forwardly inclined and forming a marked angle with the front, associated with a very convex mandible and a duckbill muzzle, are characteristic of the archaic moments of the sequence: the Gravettian and the Solutrean. In the Côa panels, whenever the analysis indicated that different episodes of decoration were represented, the figures with these stylistic traits should occupy, therefore, a basal position in the figurative stratigraphies.

The recording work already carried out has fully verified this expectation (Fig. 15). In Panel 3, Penascosa, an absolutely typical example of an archaic horse's head belongs to the second engraving stage; it was drawn after a series of ibexes and before three different stages where only aurochsen were represented. In Panel 5A from the same site, a similar situation occurs: another stylistically archaic horse was engraved over an ibex and below two aurochsen and a very large horse; the mane of the latter was represented with a completely different convention, delimited by two curbed lines. In both panels, the two archaic horses were drawn with a similar technique of large and irregular pecked dots, while the figures on top of them were engraved with a more regular pecking followed by abrasion. On the other hand, whenever present, the two lines convention for the manes of horses tends to be used in figures that lie in the upper levels of the palimpsests. In Panel 5A, Penascosa, the above mentioned large horse was the last figure drawn; in Panel 1, Canada do Inferno, the two-headed horse whose lowest head features the same convention was the penultimate figure executed.

On the basis of these criteria, and including in the comparison the conventions used in the representation of the heads of aurochsen (Fig. 16), it can be inferred that the diachrony of the Palaeolithic art of the Côa runs in parallel with that of Parpalló. Therefore, all periods of the Upper Palaeolithic, from the Gravettian onwards, are probably represented in the valley. This means that we are dealing with a cycle that lasted for some 15,000 years, that is, that the amount of time elapsed between its first and last manifestations was larger than that separating the latter from the present.

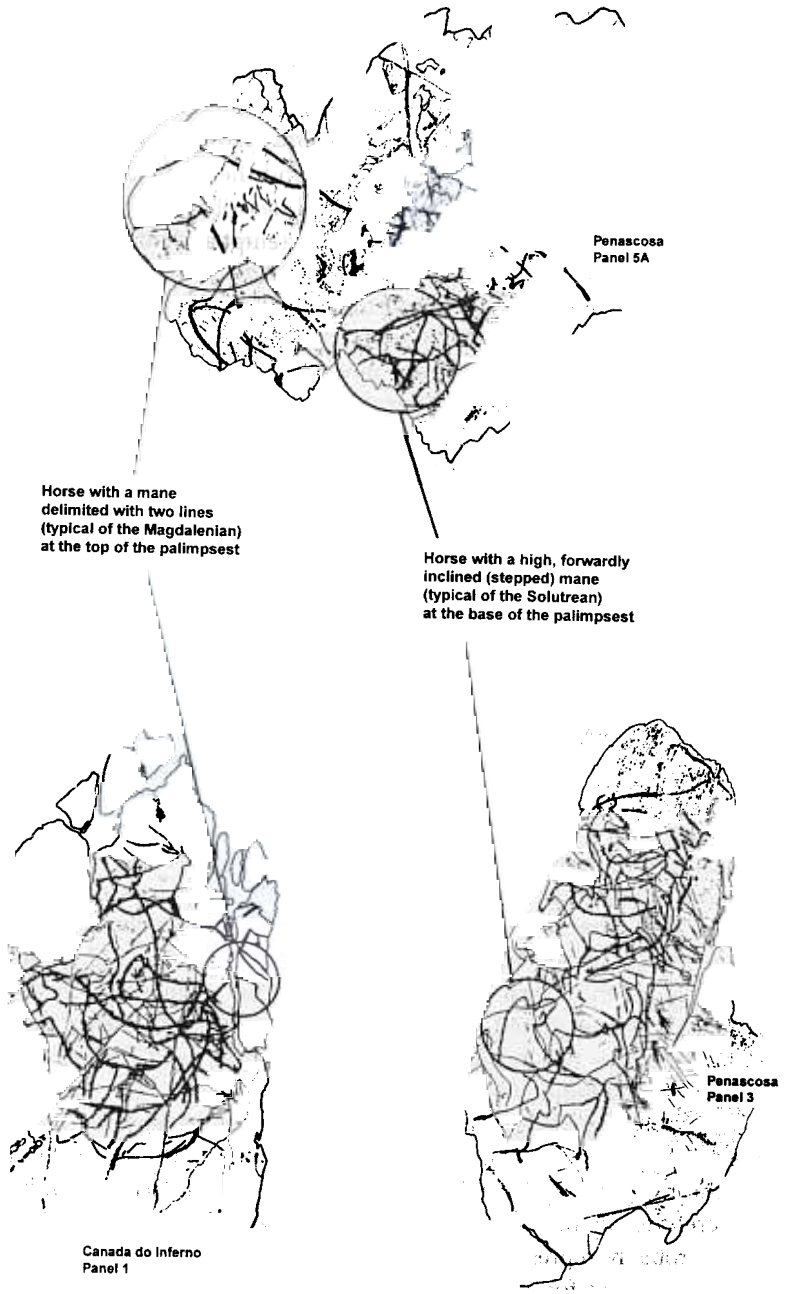
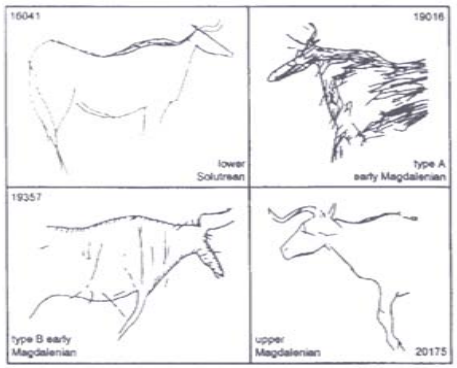


Figure 15. *Figurative stratigraphies featuring horses with raised manes at the base of the engraving sequences and horses with two-lined manes at the top.*



Stylistical evolution of the representations of aurochs and horse in the engraved stone slabs from Parpalló cave (Valencia)

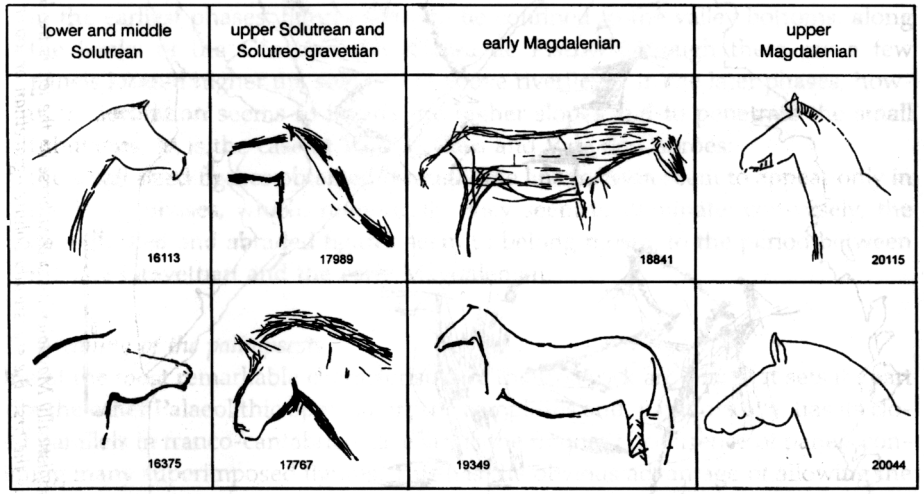


Figure 16. *Conventions used in the representations of aurochsen and horses in the mobiliary art of the Parpalló sequence.*

In this context, one should expect that, in the panels containing figures belonging both to the earliest and to the latest periods of the cycle, the former should display a stronger degree of patination. This expectation is fully matched in Panel 14, Canada do Inferno (Fig. 17), where the stylistically upper Magdalenian pecked horse on the left is much fresher than the other pecked horse on the right, which, stylistically, should date to the late Gravettian or the Solutrean. The chronological meaning of this differential patination is confirmed by the stratigraphic analysis of the palimpsest: the stylistically archaic horse was executed before the series of fine line incised figures in the centre of the panel which, in turn, are older than the stylistically recent horse. This sequence of engraving stages is in total accord with the chronological predictions that would be derived from pure stylistic arguments

Figure 17. *Canada do Inferno, Panel 14. [illegible] stically Magdalenian pecked horse on the left is the last figure of the engraving sequence; the stylistically Solutrean pecked horse on the right is the first; the stylistically Solutreo-gravettian or lower Magdalenian fine lined figures (cervids, one fish, undetermined anim ls) are stratigraphically intermediate.*

based on a comparison with the Parpalló slabs, where the fine line figures with striated bodies are typical of the upper Solutrean and of the early Magdalenian.

Using this approach to date the figures, some diachronic trends become immediately apparent (although, given the embryonic stage of research, confirmation of their validity must await the results of future study):

- ibex, aurochs and horses dominate the earliest phases of the Palaeolithic cycle; before the Magdalenian, when that role is played by red deer, these are also the most abundant species in the Portuguese Upper Palaeolithic herbivore archaeofaunas (Aubry and Moura 1995; Zilhão 1995c). Accordingly, in the more recent phases of the Côa Palaeolithic art cycle, red deer representations increase significantly, particularly among the fine line incised figures that are stylistically Magdalenian;
- in the earliest phases, figures seem to be confined to the valley bottoms, along the banks of the Côa and the Ribeira de Piscos, although there are a few panels located higher up, some 40 m above river level; in the later phases, however, decoration seems to invade the higher slopes and to penetrate the small tributaries, as is the case at Vale da Casa and Vale de Cabrões;
- the small sized figures obtained through fine line incision seem to appear only in the latest phases, which, numerically, they seem to dominate; conversely, the large pecked and abraded figures seem to belong mostly to the period between the late Gravettian and the early Magdalenian.

4.8. Meaning of the palimpsests

One of the most remarkable characteristics of the Côa rock art, one that sets it apart from the other Palaeolithic open air artistic complexes and, paradoxically, has its closest parallels in franco-cantabrian cave art, is the frequent occurrence of panels containing many superimposed figures. This has the obvious advantage of allowing the establishment of figurative stratigraphies, which are of vital importance in the chronological interpretation of representation styles. Notwithstanding, this also has the no less obvious disadvantage of making it difficult to read what, some times, look like indecipherable doodles. At first glance, this repeated used of the same space is hard to explain, particularly since the artists had at their disposal, in the same surface, a lot of adjacent room to expand the decoration of the panel. That room, however, was never used, as is well exemplified by Panel 1, Canada do Inferno, and Panel 6, Penascosa (Fig. 18).

The search for an explanation of these palimpsests must start from the realisation that, as discussed above, the interval between different engraving episodes may have been of a few thousand years. In that case, one has to bear in mind that the recently engraved figures would be much more visible than the old ones, which would have already developed some degree of patination. What, in the eye of the present day observer, looks like a palimpsest of figures where, as a rule, only the superimposition of the lines indicates which was the order of their execution, is,

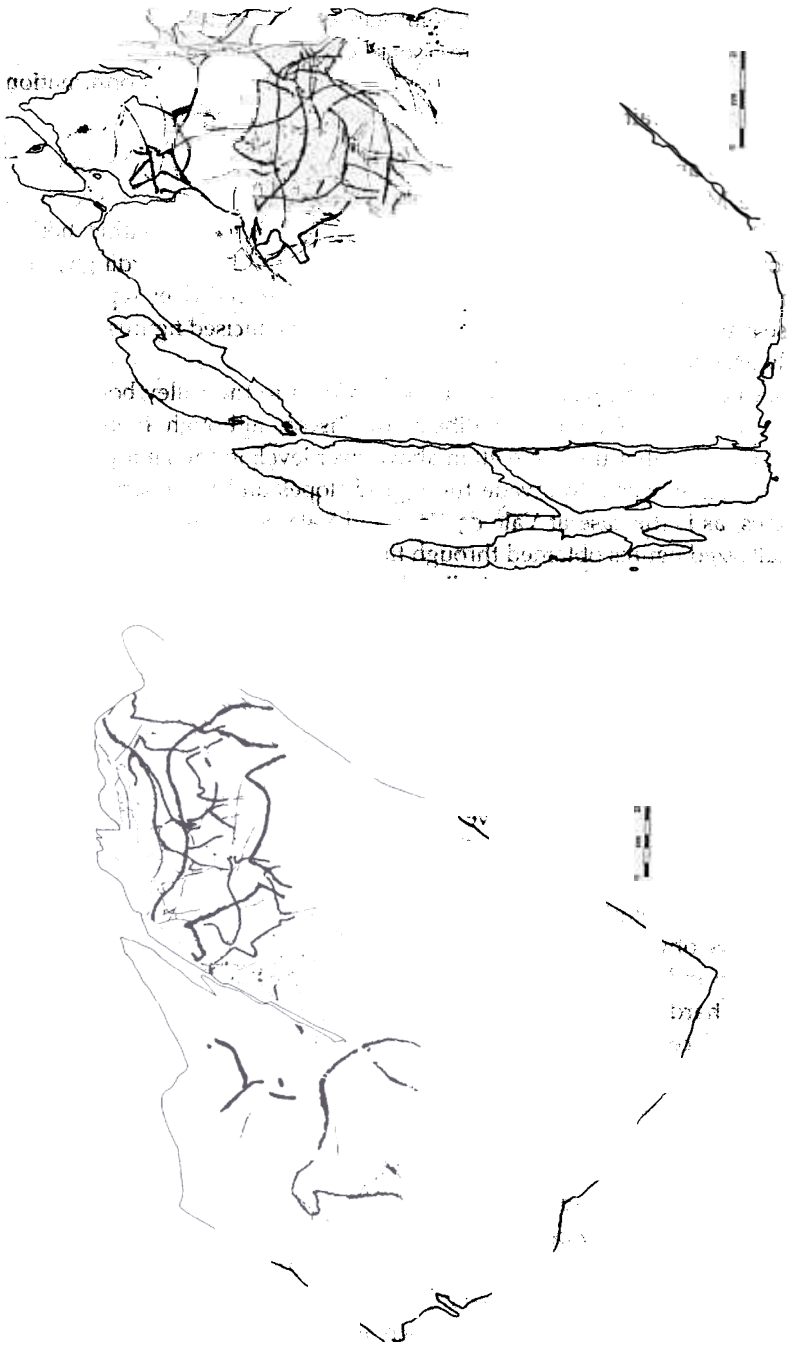


Figure 18. *Superpositions in rock surfaces with plenty available space. Left: Panel 6, Penascosa. Right: Panel 1, Canada do Inferno.*

therefore, the outcome of the last 10,000 or 15,000 years of increased weathering, which has homogenised the appearance of the ensemble. In the past, however, coeval observers must have been able to differentiate between the old figures, which would already have begun to become chromatically indistinguishable from the background, and those that, in each stage, would be functionally operative.

Bearing this in mind, it becomes clear that, for the Palaeolithic artist and for his 'public':

- the presence of old patinated figures was not an obstacle to a good reading of the fresh ones;
- such a presence constituted additional evidence of the symbolic importance of the space where the new figures were placed;
- engraving the new figures over the old ones established a link with the ancestral traditions that gave meaning (mythological, social or economic) to the place and to the panel.

In this regard, it should also be stressed that the long period encapsulated in some panels (such as Panel 14, Canada do Inferno) is in marked contrast with the scarcity of situations where Palaeolithic figures are superimposed by later prehistoric or historic motifs. Any interpretation of this pattern cannot forget that the time interval corresponding to the deployment of the first artistic cycle of the valley is of some 15,000 years. Even so, that contrast suggests that the Palaeolithic artistic cycle corresponds to a tradition whose most important feature was not so much the diachronic change in representation styles but rather the perennial nature of the deepest meanings underlying the behaviours that led to the engraving of certain places with zoomorphic symbols – the only material evidence of those behaviours that survived until the present.

4.9. Diversity of topographic location

In a conceptual framework where the interpretation of Palaeolithic art has been dominated by global, all-encompassing explanations featuring single causes ('art for art's sake', 'magic art', 'totemic art', 'religious art', 'shamanistic art', etc.), one of the most promising avenues of research opened by the discovery of the Côa is that of the analysis of the topographic location of the panels, of their relations with the surrounding landscape and of whether their figurative composition varies with the different kinds of settings. Once diachronic and taphonomic factors are duly isolated, these analyses may allow us to approach issues of variability in regard to the multiple functional meanings that most certainly were originally associated with the art, as is implied by evidence from ethnographic studies of hunter-gatherers (Layton 1992).

From the work already carried out at Côa, a few clear, albeit preliminary patterns, emerge, such as:

- the two richest ensembles (Penascosa/Quinta da Barca and Canada do Inferno) correspond to decorated outcrops located around the two best fluvial beaches of the schist sector of the valley (Fig. 19); in spite of the fact that early Holocene erosion washed away all other remains of occupation that might have been left behind in the two places, the conclusion that, in locations such as these, the art must have had some relation with residential camping is hard to avoid;
- there are several instances of very large figures whose execution could not have been achieved without scaffolding and that are located in places where the inclination of the slope did not enable their full observation at close range; in one case, a several metres high vertical escarpment, the first such surface available

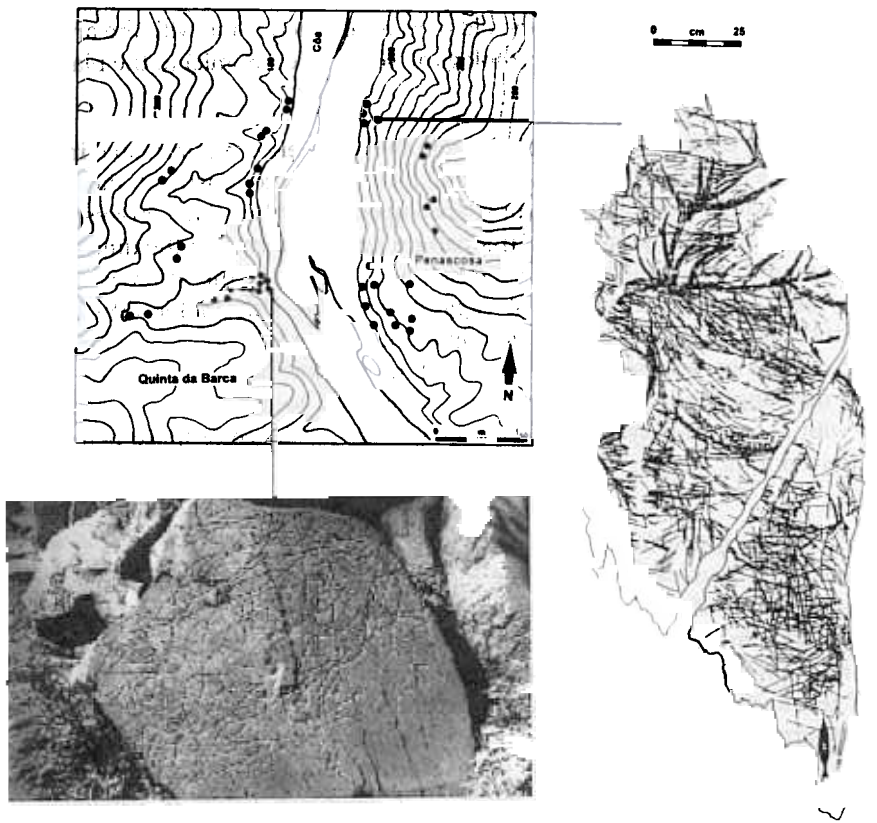


Figure 19. *Distribution of known engraved rocks in Penascosa and Quinta da Barca. Palaeolithic art clusters in two main groups marking, on both sides of the river, the limits of a large sand beach, which coincide with outcrops of harder rocks. At the northern end, Panel 10 features a large number of incised and scraped figures, among which the large deer is illustrated on the right. At the southern end, the 'spaghetti rock', illustrated below the map, features an almost indecipherable superposition of a large number of pecked and abraded figures, among which a few horses and aurochsen are more easily recognisable.*

for decoration after the mouth of the Ribeira de Piscos, when the Côa enters its terminal canyon, three large aurochsen, each measuring almost 2 m, have been successively engraved on top of each other; the setting of these figures suggests they played the role of territorial markers, perhaps signals to be seen from afar, displayed to inform the traveller walking downstream along the valley bottom of the existence of paths, boundaries, resources or religious meanings that needed to be accounted for;
- the small size incised figures, in contrast, seem to be scattered up and down the slopes, in no apparent order, indiscriminately 'decorating' all the outcrops; their dimensions and their location suggest they are related with less 'public' behaviours than those one can infer from the setting of the two categories discussed above.

Some concentrations are located in the vicinity of important geological features, such as transversal faults (mouth of the Ribeira de Piscos) or bands of harder rocks outcropping with a similar orientation (Penascosa/Quinta da Barca). These accidents probably affected the flow of the water in ways that the modifications suffered by the river in historic times do not allow us to appreciate fully. As is suggested by the fact that they were systematically selected for the construction of weirs related to the functioning of water mills, some of these places may have been fords and, therefore, focal points for hunting.

In the mouth of Piscos, the submersion of the valley bottom precludes testing of this hypothesis, although the 1:2500 property maps do indicate an old weir. However, at the southern end of Penascosa, where the river cuts across one of these outcrops of harder rock, there is indeed a ford, which is still used nowadays. It is certainly not a coincidence that the small creek in the opposite bank is profusely decorated. The panel closest to the river can be interpreted as marking the entry to the small valley that gives access to the flater terrain found at higher elevation in Quinta da Barca. This panel, which is also the first engraved rock found on the left bank of the Côa since Faia, presents the most dense and most spectacular palimpsest so far discovered in the valley, so much so that we informally baptised it as the 'spaghetti rock' (Fig. 19). Facing it, on the right bank, in Penascosa proper, there is another dense cluster of decorated surfaces, including another remarkable palimpsest, Panel 3 (Fig. 15).

Bearing in mind the observations on the possible meaning of these palimpsests reported above, the characteristics and location of the 'spaghetti rock' suggest that it was marking a place of particular and lasting importance that was remembered as such throughout the millennia encompassed in the several episodes of decoration recorded on its surface. This importance may have been related to the use of the ford for hunting or, as previously suggested, it may be related instead to the residential use of the beach. Incidentally, the northern end of the latter features a similar concentration of figures on both sides of the river (Fig. 19), in close association with a thin outcrop of white quartz that marks the ground as clearly as the white stripes

used in modern football pitches. One of the rocks in this concentration is also heavily decorated and contains one of the most admirable figures in the valley's rock art: a 90 cm long male red deer scraped silhouette, featuring a large armature, that, when fresh, must have been visible from very far.

5. CONCLUSION

In the recent past, most researchers (cf. Davidson 1986, for instance) have accepted that the concentration of Upper Palaeolithic sites along the littoral of Iberia represented a genuine reflection of past settlement patterns: their scarcity, or altogether absence, from the archaeological record of the interior regions of the Peninsula would have been due to human abandonment caused by the deteriorated climatic conditions of Last Glacial times. This view, however, has not gone unchallenged. Zilhão (1992:153), for instance, explicitly suggested that such a pattern was an artefact of the traditional research bias towards caves, which are far less common in the interior than along the coasts: cave art sites (Bécares 1987), such as La Griega, Segovia, and open air settlements, such as La Dehesa, Salamanca (Fabián 1986), clearly indicated a human use of the northern Meseta during the Upper Palaeolithic, further substantiated by the then known outdoor locations with Palaeolithic art, Domingo García and Siega Verde.

However, given the paucity of settlement sites, these examples could be disregarded as indicating short unsuccessful attempts at settlement soon followed by abandonment or extinction, or as evidence of the seasonal incursions of groups residentially based in the littoral areas. The first hypothesis is clearly contradicted by the Côa valley finds. The art styles as well as the lithic assemblages recovered in occupation sites demonstrate that Upper Palaeolithic humans were continuously present in the upper Douro basin since at least 22,000 years ago. As for the second hypothesis, some support for it might be found in the extra-regional sources of the flints used in stone tool production: the distances traversed by such raw-materials would be a proxy for the itineraries of highly mobile bands shifting between alternatively exploited coastal and interior territories.

The Côa rock art, however, has marked stylistical specificities, such as the extensive use of animation techniques to convey the movement of the head, unknown in the rock art of neighbouring regions. Furthermore, lithic assemblages are dominated by local high-quality raw materials, such as rock crystal, not by flint. As extensively argued elsewhere (Zilhão 1995c), in the Portuguese Upper Palaeolithic the average size of raw-material procurement territories would have been similar to that documented in south-western France (Aubry 1991; Geneste 1992); that is, their radii would have been of about 30 km. Subsistence territories, on the other hand, were probably in the range of 500 to 5000 km^2, much smaller than the 40,000 km^2 implied by the hypothesis that the upper Douro basin was only seasonally occupied.

Thus, available data suggest that human groups inhabited the Alto Douro all year round and that the rock art they left behind is the product of a regional cultural

tradition. This tradition, however, was not isolated. Exogenous raw materials materially document long distance travelling or down-the-line exchange with neighbouring groups; similarities in art and stone tool typology express the participation in information exchange networks encompassing all of south-western Europe. Actually, the identification of such interior populations makes it possible, at last, to understand the remarkably parallel developmental paths followed by lithic technologies in littoral Portugal and in south-western France, more than 1000 km apart (Zilhão and Aubry 1996). The explanation for this pattern in terms of the diffusion of ideas across geographically extensive social networks required the existence of 'missing links' inhabiting interior Iberia. The human groups who made the Palaeolithic cave and open air rock art of the upper Douro basin provide those links.

Siega Verde and Domingo García are, with the Côa sites, the most visible part of this new world – the tip of an iceberg of finds that will most certainly play a key role in Iberian Upper Palaeolithic research of the 21st century. The recognition of this fact, however, has a more far-reaching implication. The coexistence in the northern Meseta of both cave and open air art sites precludes the interpretation of the latter as a geologically determined cultural specificity, a deviation from the cave sanctuary rule developed as a *succedaneum* in non-karstic areas of south-western Europe. The opposite is probably true. The vertical exposures of the hard schists of the Douro basin which, in the very dry environment that characterised the interior of Iberia during the last Ice Age, were not destroyed by weathering, are survivors of what, in Last Glacial times, must have been extensively decorated landscapes. As soon as we realise that we have been looking at Ice Age rock art upside down, it becomes immediately apparent that it is the action of differential preservation, conditioned by local geology and climate, that must explain why, with the single exception of Fornols-Haut, it is only in Portugal and Spain that such art, which must once have covered all of Palaeolithic Eurasia, seems to have survived until the present.

Today, the Côa valley finds represent the most outstanding evidence substantiating this Copernican change of perception. To conclude, we will now summarise its most important features, as derived from the results of our research:

> the Côa valley contains prehistoric and historic rock art sites forming an almost uninterrupted sequence initiated more than 20,000 years ago; put another way, it is one of the largest outdoor Art History museums known in the whole world and the only one whose 'collections' display such a time depth and such a continuity;
>
> the large majority of figures date from the earliest stages of the sequence, those corresponding to the Upper Palaeolithic; stylistic comparison indicates that the oldest rock art in the valley may be of late Gravettian age, that is, more than 20,000 years old, and that this first artistic cycle lasted until the end of the Magdalenian, some 10,000 years ago; human presence in the valley in this time range has already been independently confirmed by the location and excavation of characteristic and well preserved settlement sites;

3. the size of the territory covered by the phenomenon and the number of Palaeolithic panels and of animal figures engraved in the Côa valley and the adjacent slopes of the Douro is of an unprecedented scale; the larger similar sites known before were Domingo García (Ripoll 1992), with seven decorated rocks featuring a few tens of figures, and Siega Verde, with 94 decorated rocks spread along some 1500 m and featuring 300 figures (Balbín *et al.* 1991, 1995); at Côa, where work has just begun and survey is still very partial, Palaeolithic art is spread along some 17 km and the minimum numbers of decorated panels and of zoomorphic figures can be nonetheless estimated to be in excess of 150 and of 1200, respectively;
4. the aesthetic quality of many of the Côa Palaeolithic petroglyphs is unmatched; in the realm of representation, some of its features correspond to absolute novelties, particularly as regards animation, where movement is often suggested with recourse to drawing techniques that were not to be rediscovered until the advent of 20th century comics.

The preservation of this complex of rock art and associated archaeological sites is now to be assured through its inclusion in UNESCO's World Heritage List. As a cultural resource of humankind, research in the Côa valley is open to all those interested, nationally and internationally. We hope that colleagues will join us in the exploration of its riches in the same spirit of unselfish professional solidarity that made possible its rescue from destruction.

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ABSTRACTS

The rock art of the Côa valley (Portugal) and its archaeological context. First results of current research

The Côa rock art covers 17 km of the river valley and extends along the banks of the Douro, downstream of the confluence between the two rivers. A total of 194 different panels with Palaeolithic zoomorphic motifs have already been identified. Later prehistoric and historic periods, especially the Iron Age, are also represented. Settlement of the valley in Upper Palaeolithic times is documented by residential sites dating to the Gravettian, the Solutrean and the Magdalenian periods. Results of stylistic analysis, whose chronological predictions have been independently confirmed by superposition patterns derived from the figurative stratigraphies observed in the numerous palimpsests known, indicate that all these periods are also represented in the art. The outdoor location of the Palaeolithic art, the size of the territory, the number and aesthetic quality of the motifs represented and the almost uninterrupted continuity to the present of the artistic use of the region's rock faces concur to the uniqueness of this complex of sites. Accordingly, an Archaeological Park was established in the area , the construction of the dam that threatened to flood the rock art has been abandoned and the valley is to be included in UNESCO's World Heritage List.

L'art rupestre de la vallée de la Côa (Portugal) et son contexte archéologique: premiers résultats des recherches actuelles

L'art rupestre s'étend sur 17 km. le long de la rivière qui coule dans la vallée de la Côa et continue sur les rives du Douro, en aval du confluent des deux rivières. On a déjà identifié 194 panneaux différents comportant des motifs zoomorphes du Paléolithique. Des périodes historiques et préhistoriques plus récentes, l'Âge de Fer en particulier, y sont aussi représentées. Des sites résidentiels datant de la période gravettienne, solutréenne et magdalénienne confirment que la vallée était habitée pendant le Paléolithique supérieur. Des résultats d'analyse stylistique, dont les prédictions chronologiques ont été confirmées de manière indépendante, à l'aide de modèles de superposition provenant de stratigraphies figuratives observées dans de nombreux palimpsestes déjà connus, indiquent que toutes ces périodes sont aussi représentées dans cet art. Le fait que cet art paléolithique se trouve sur un site à ciel ouvert, la taille du territoire qu'il occupe, le nombre et la qualité esthétique des motifs représentés, ainsi que la continuité jusqu'à présent quasi ininterrompue de l'utilisation artistique des parois rocheuses de la région, tout concourt au caractère unique de cet ensemble de sites. En conséquence, on a créé un Parc Archéologique dans la région et on a abandonné la construction du barrage qui menaçait de submerger l'art rupestre. La vallée de la Côa va aussi intégrer la Liste du Patrimoine Mondial.

Die Felskunst des Côatals (Portugal) im archäologischen kontext. Erste ergebnisse der laufenden untersuchungen

Die Felszeichnungen erstrecken sich 17 km entlang des Côatals und dehnen sich weiter entlang der Ufer des Douro, flußabwärts des Zusammenflusses der beiden Flüsse, aus. 194 verschiedene Felsflächen mit paläolithisch-zoomorphen Darstellungen konnten bisher identifiziert werden. Spätere prähistorische und historische Perioden, insbesonders die Eisenzeit, sind auch vertreten. Im Tal wurde jungpaläolithische Siedlungsaktivität in Form von Lagerplätzen die ins Gravettien, Solutrean und Magdalénien datieren, nachgewiesen. Die Ergebnisse der Stilanalyse zeigen, daß alle diese Epochen auch in den Felsbildern repräsentiert sind. Die vermutete chronologische Abfolge der Zeichnungen fand zusätzlich unabhängige Unterstützung durch die Überschreibmuster die anhand der Stratigraphien figuraler Motive in den zahlreichen schon bekannten Felskunstpalimpzesten beobachtet wurden. Die Lage der paläolithischen Kunst in der Landschaft, die Größe des Gebiets, die Anzahl und ästhetische Qualität der vorhandenen Motive sowie die fast ununterbrochene Kontinuität der künstlerischen Gestaltung der Felsoberflächen in der Region bis in die Gegenwart tragen zur Einmaligkeit dieses Komplexes bei. Gemäß seiner Bedeutung wurde das Gebiet zum archäologischen Park erklärt. Das Bauvorhaben einer Staustufe, wodurch die Überflutung der Felszeichnungen gedroht hätte, wurde aufgegeben und das Tal wird nun in die Liste des Weltkulturerbes der UNESCO aufgenommen werden.