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THE HUMAN POPULATION OF THE SOUTHERN SLOPES OF THE EASTERN ALPS IN THE WÜRM LATE GLACIAL AND EARLY POSTGLACIAL*

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RIASSUNTO - *Il popolamento umano del versante meridionale dell Alpi orientali nel Würm Tardiglaciale e Postglaciale antico* - Il Quaternario *Italian Journal of Quaternary Sciences* , 9(2), 1996, 499-508 - Gli insediamenti umani del Tardiglaciale e del Postglaciale antico del margine meridionale delle Alpi sono relativamente numerosi. Alcune serie del Tardiglaciale che coprono l'intervallo di tempo da 13.500 a 6.550 anni B.P. (in termini di cronologia del Carbonio non calibrata) sono note sui fondovalle. Si dispone di indagini paleoambientali basate su: sedimenti, associazioni polliniche, macroresti vegetali, associazioni di mammiferi e micromammiferi e infine un discreto numero di datazioni col metodo del radiocarbonio. E' così possibile anche costruire una serie cronologica di industrie litiche di riferimento praticamente ininterrotta che copre l'intervallo cronologico dal Dryas antico all'Atlantico e che raccoglie la serie di industrie dal Paleolitico finale (Epigravettiano recente), al Mesolitico (Sauveterriano e Castelnoviano), fino alla neolitizzazione (Neolitico Antico). Sulla base di questa serie è possibile attribuire anche quelle industrie che provengono da situazioni per le quali non si dispone di datazioni assolute. La distribuzione dei siti nelle varie fasi mostra una penetrazione progressiva all'interno dell'ambiente alpino e la costituzione, sia nel Tardiglaciale e sia nel Postglaciale antico, di sistemi di insediamenti che si estendevano dai fondovalle fino alle praterie alpine.

ABSTRACT - *The human population of the southern slopes of the Eastern Alps in the Würm Late Glacial and early Postglacial* - Il Quaternario *Italian Journal of Quaternary Sciences* , 9(2), 1996, 499-508 - Discoveries of human settings of Late Glacial and early Postglacial age on the southern slopes of the Alps are relatively frequent. Some rockshelters on the valley-bottoms (Riparo Tagliente in the Valpantena in the Lessini mountains; Riparo Soman at the mouth of the Adige Valley and Ripari Villabruna in the Cismon Valley; Ripari di Romagnano, Pradestel and Vatte in the Trento basin) have Late Glacial and early Postglacial series which cover the chronological span between 13,500 and 6500 years B.P. (in terms of uncalibrated radiocarbon chronology). The sediments, soils, pollen associations, vegetal macroremains, micromammal and large mammal associations and birds from these series have all been studied, and many samples of charcoal have been dated using the radiocarbon method. It has thus been possible to construct a nearly uninterrupted chronological sequence of reference industries which cover the chronological span between the Older Dryas and the Atlantic, thus embracing the sequence of industries of the late Palaeolithic (recent Epigravettian) and Mesolithic (Sauveterrian and Castelnovian) up to the Neolithisation (early Neolithic, "Gruppo del Gaban"), and thereby allowing a chronological attribution to be given to many sites which otherwise are undatable and maps to be drawn of the distribution of the sites in the various phases (Older Dryas, Bølling/Allerød, end of the Late Glacial, Preboreal/Boreal, beginning of the Atlantic). The distribution of the sites in the various phases shows a progressive penetration into the Alpine environment and the construction, both in the Late Glacial and in the early Postglacial, of settlement systems which extended from the valley-bottoms up to the Alpine grasslands. The southern slopes of the Eastern Alps can therefore be considered as a sample-area for the study of the human settlement of the Prealpine and Alpine region after the definitive retreat of the Würm glaciers.

Key words: Late-glacial, early Holocene, palaeoenvironment, human settlements, Upper Palaeolithic, Mesolithic, Early Neolithic
Parole chiave: Tardiglaciale, Olocene antico, paleoambiente, insediamenti umani, Paleolitico superiore, Mesolitico, Neolitico antico

1. INTRODUCTION

In the 2nd Würm Pleniglacial the southern slopes of the Eastern Alps were intensely glaciated: at the height of the pleniglacial the snow line descended down to 1450 m a.s.l., thus determining the formation of an ice cap from which only the highest peaks emerged and from which thick tongues of ice descended along the valleys and onto the plains. The regression of the coastline resulted in the emersion of the upper Adriatic, such that the Po Plain extended as far as the Julian and Dinaric Alps.

The traces of anthropogenic presence during the pleniglacial are very rare in the Alpine-Po valley area. At the site of Fumane in the Lessini mountains the "upper pedocomplex" (D1d) revealed a fragment of a bipolar backed bladelet which suggests a sporadic Gravettian presence; in the upper part of the detrital deposit no other artifacts were found (Bartolomei *et al.*, 1994). At Riparo Tagliente, also in the Lessini mountains, the lower series which at the top presents a deposit of interpleniglacial age with an Aurignacian industry, is eroded; it is covered by an alluvional deposit and then by a Late Glacial series with Epigravettian industries. Only in three caves of the Berici hills have homogeneous assemblages of artifacts been found which are referrable to the 2nd Pleniglacial on the basis of biostratigraphic data, the typology of the artifacts and the radiometric dates (Bartolomei *et al.*, 1988). These occupation levels are probably attributable to hunting stations, as this is suggested by their scarce number and, at least at Grotta di Paina, by the typological structure of the assemblage

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Fig. 1 - Distribution map of the camp sites of the considered region: Late Glacial (Upper Peleolithic-Recent Epigravettian).
Distribuzione dei siti della regione considerata: Tardiglaciale (Paleolitico superiore-Epigravettiano recente).

which is characterised by the exclusive presence of microlithic pointed backed bladelets and shouldered points (Broglio *et al.*, 1992).

Discoveries of Late Glacial and early Postglacial age are on the other hand relatively frequent. Some rockshelters on the valley-bottoms (Riparo Tagliente in the Valpantena in the Lessini mountains; Riparo Soman at the mouth of the Adige Valley and Ripari Villabruna in the Cismon Valley; Ripari di Romagnano, Pradestel and Vatte in the Trento basin) have Late Glacial and early Postglacial series which cover the chronological span between 13,500 and 6500 years B.P. (in terms of uncalibrated radiocarbon chronology). The sediments, soils, pollen associations, vegetal macroremains, micromammal and large mammal associations and birds from these series have all been studied, and many samples of

Fig. 2 - Distribution map of the camp sites of the considered region: Preboreal/Boreal (Mesolithic Sauveterrian).
Distribuzione dei siti della regione considerata: Preboreale/Boreale (Mesolitico Sauveterriano).

charcoal have been dated using the radiocarbon method. It has thus been possible to construct a nearly uninterrupted chronological sequence of reference industries which cover the chronological span between the Older Dryas and the Atlantic, thus embracing the sequence of industries of the late Palaeolithic (recent Epigravettian) and Mesolithic (Sauveterrian and Castelnovian) up to the Neolithisation (early Neolithic, "Gruppo del Gaban"), and thereby allowing a chronological attribution to be given to many sites which otherwise are undatable and maps to be drawn of the distribution of the sites in the various phases (Older Dryas, Bølling/Allerød, end of the Late Glacial, Preboreal/Boreal, beginning of the Atlantic) (Figs. 1-5). The distribution of the sites in the various phases shows a progressive penetration into the Alpine environment and the construction, both in the Late Glacial

Fig. 3 - Distribution map of the camp sites of the considered region: Boreal and Early Atlantic (Mesolithic Castelnovian).
Distribuzione dei siti della regione considerata: Boreale e Atlantico inferiore (Mesolitico Castelnoviano)).

and in the early Postglacial, of settlement systems which extended from the valley-bottoms up to the Alpine grasslands. The southern slopes of the Eastern Alps can therefore be considered as a sample-area for the study of the human settlement of the Prealpine and Alpine region after the definitive retreat of the Würm glaciers.

2. ENVIRONMENTAL CHANGES AND THE DISTRIBUTION OF SITES (Fig. 6)

During the Würm Late Glacial the Alpine-Po valley region was influenced by profound changes which marked the passage from the physical and environmental

Fig. 4 - Distribution map of the camp sites of the considered region: Mesolithic *s.l.*
Distribuzione dei siti della regione considerata: Mesolitico s.l.

conditions of the 2nd Pleniglacial to the current ones. On the Alps the end of the deglaciation, which is marked by "stadial" moraines, constituted the premise for the colonization of the mountain areas by vegetation, fauna and therefore also Man. The corresponding rise in sea-level brought about widespread changes in the landscape, especially in the upper Adriatic area; however the current configuration of the region was reached only in the Atlantic, around 6000 years ago.

The environmental changes in the Late Glacial and the evidence of human settlement can be seen especially in the Prealpine area, where a group of important prehistoric sites have been excavated. A consistent archaeological documentation of repeated human occupation is revealed at Riparo Tagliente, a valley-bottom site in the Valpantena at 250 metres above sea-level in the Lessini

Fig. 5 - Distribution map of the camp sites of the considered region: Atlantic (Early Neolithic).
Distribuzione dei siti della regione considerata: Atlantico (Neolitico inferiore).

mountains, in Older Dryas deposits dated (in terms of uncalibrated radiocarbon chronology) to around 13,500 years ago (Bartolomei *et al.*, 1982). The archaeological data indicates hunting as the most important activity; fishing seems to have played a secondary role. As in almost all Epigravettian sites, food gathering activities have not been identified and therefore cannot be evaluated. The landscape was that of a cold steppe; among the mammals hunted, ibex dominates (80% of the bones) along with aurochs and bison (15%), and elk is present.

As in all the Prealpine area, the Bølling and Allerød interstadials mark a profound change in the landscape. According to the most recent chronological indications, in the Alpine area these two interstadials were separated by a very short, cold and arid oscillation; the beginning of the Younger Dryas would therefore be collocated after

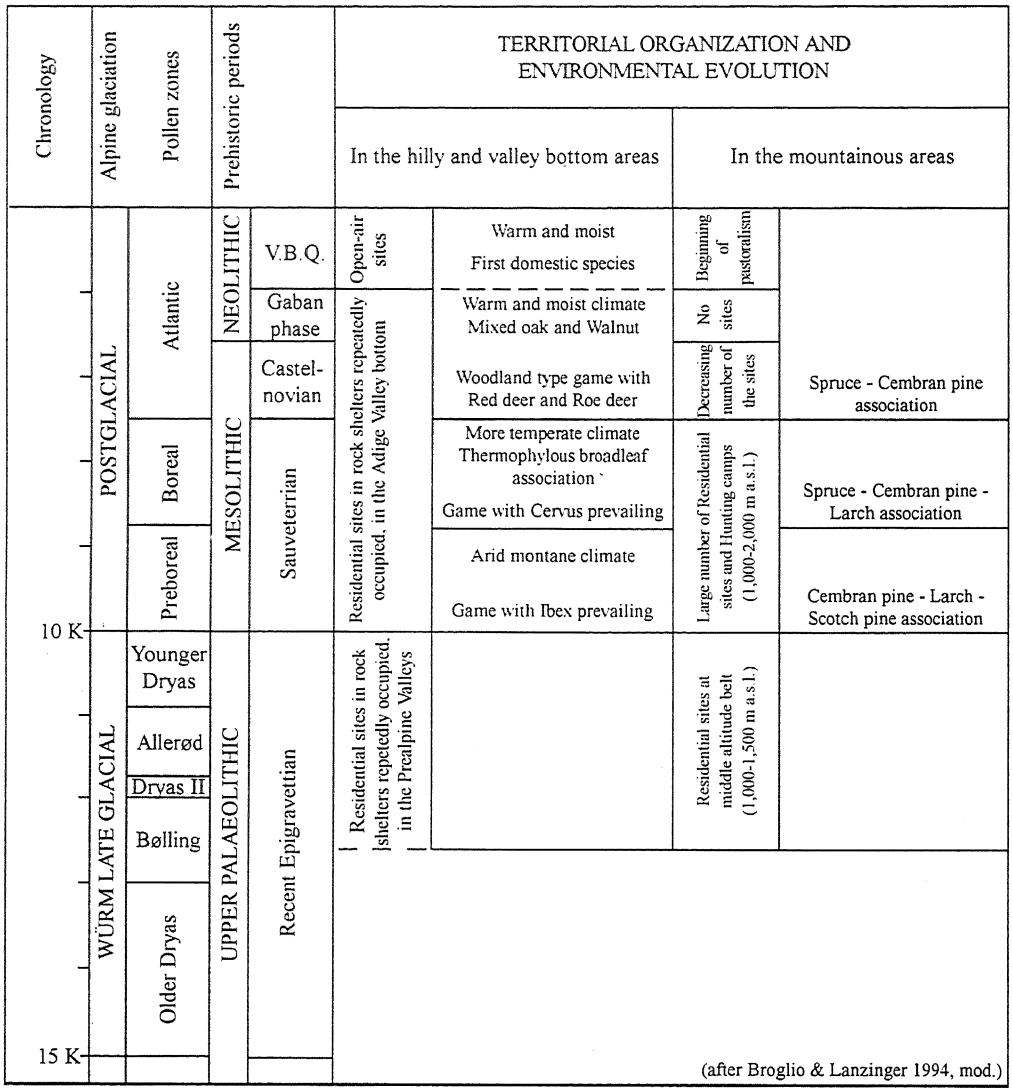

Fig. 6 - Chronological framework with references to the settlement patterns and the palaeoenvironment of the region.
Quadro cronologico con riferimenti ai tipi di insediamenti e al paleoambiente della regione.

10,800 B.P. (Kaiser, 1994). In the series from Riparo Tagliente (where a *lacuna* may exist between the Older Dryas deposits and those of the interstadial), the interstadials see the formation of a grassland wooded with conifers and broadleaves; among the remains of the animals hunted one observes a drastic reduction in ibex, bovids and elk, which are substituted by red deer (70-77%), wild boar (15%), roe deer (4-9%) and chamois (1-10%).

In the course of the interstadials, Epigravettian groups penetrated the Alpine valleys and reached the Prealpine plateaus. Two valley-bottom sites are particularly significant: Riparo Soman, located on the bottom of the Adige valley up-river of the Ceraino gorges at 100 m above sea-level, and Ripari Villabruna in the Cismon valley at 500 m above sea-level (Battaglia *et al.*, 1992; Aimar *et al.*, 1992). The oldest occupation episodes are dated radiometrically to around 11,900 years ago at Riparo Soman and around 12,000 years ago at Ripari Villabruna. Both sites were repeatedly occupied in even more recent periods; in particular at Riparo Soman some occupation episodes dating to around 10,500 years ago, and therefore to the Younger Dryas, are well documented. In the series from Riparo Villabruna A, two phases have been identified on the basis of the fauna: in the oldest phase (pre-Allerød) ibex (57%) and chamois (21%) prevail, while in the second phase (Allerød?) red deer (70%) is predominant. In the series from Riparo Soman the mammals hunted fail to show any significant variations between the two main occupation phases; chamois prevails (34-42%) along with ibex (22%) and red deer (23-18%), associated with wild boar (9-2%) and roe deer (6-2%); elk and aurochs are still present.

The majority of the mountain Epigravettian sites located between 1000 and 1500 metres above sea-level on the Lessini mountains, the Altipiano di Tonezza, the Altipiano di Asiago, the Altipiano di Cansiglio (Venetian Prealps) and in the Alpine area proper in the Adige basin date to the interstadials (probably that of the Allerød). Of these, Riparo Dalmeri and Val Lastari, both on the Altipiano di Asiago, have been radiometrically dated to the Allerød interstadial. These sites are rarely found under rockshelters (Riparo Dalmeri); usually they are open-sites

in wet environments, close to small lakes or depressions, and sometimes next to a rock wall. The data from Riparo Dalmeri (the only one of these sites to have preserved faunal remains) suggest a seasonal campsite from which it was possible to exploit a vast territory extending from the Alpine grassland, where it would have been possible to hunt ibex and marmots, to the woods below where they hunted red deer as well as small carnivores which were hunted for their fur. Fishing may have been practised in the Brenta valley below (Dalmeri & Lanzinger, 1991). Among the remains of the mammals hunted at Riparo Dalmeri ibex is predominant: this is probably the result of the altitudinal location of the site, close to the upper limit of the tree-line (Angelucci *et al.*, 1994). The data from Val Lastari on the other hand demonstrate the importance assumed at this site by activities related to the exploitation of the local flint, both from the outcrops of *Biancone* and *Scaglia Rossa* and from the detrital deposits around the site (Broglio *et al.*, 1992; Peresani, 1994). The local flint was not only used *in situ* but was probably also exported in the form of blade and bladelet blanks, as is suggested by the high quantity of bladelet cores with respect to the number of tools and microliths made on blade and bladelet blanks.

After the retreat of the Würm glaciers from the Alpine valleys which had been excavated by the glacial erosion, large lacustrine basins formed, some of which still exist today. At the margins of the basin formed in the Adige valley, up-river of the Ceraino gorges, a considerable number of Mesolithic sites have been found, and these are relatively numerous on the Trento basin. They are small rockshelters located at between 200 and 250 m a.s.l., and were repeatedly occupied between the Preboreal and the Atlantic from 9800-9500 B.P. (in terms of uncalibrated radiocarbon chronology). At these sites, which on the basis of their consistency and the quality of the archaeological data can be retained to be residential sites, the subsistence economy was based on hunting (in different environments, both on the valley-bottom and along the slopes), on fishing, on the collection of eggs and of freshwater molluscs from the lucustrine basin, and on the hunting of marsh turtles. In the stratigraphic series one observes variations in the frequency of the different species of mammals hunted which reflect the environmental changes: in the levels of Preboreal age the climate was of an arid-montane type, the vegetation arboreal and dominated by Scotch pine, and among the mammals hunted ibex prevails. In the Boreal a thermophilous broadleaf association was established, and red deer becomes the most frequent prey (Cattani, 1977; Boscato & Sala, 1980). The three series from the rockshelters of Romagnano, Pradestel and Vatte, to which three groups of radiometric dates are referred (Alessio *et al.*, 1983), enable us to propose a sequence of Meso-lithic reference industries (Broglio & Kozlowski, 1983), the validity of which has found confirmation in many other areas.

The mountain sites of Preboreal and Boreal age are distributed along the Alpine watersheds and the northern margins of the Venetian Prealps, at altitudes comprised between 1900 and 2300 m a.s.l., and with a maximum concentration in the Dolomites. Recent research in the Eastern Alps (Oeggl & Wahlmüller, 1992) demonstrates how the upper limit of the tree-line in the Preboreal was progressively raised until it exceeded the present limit by a hundred metres at the end of the Preboreal. During the course of the Boreal and the Atlantic the tree-line does not appear to have moved, even though the vegetal associations changed in relation to the different degrees of humidity (at around 2000 m the woods were characterised by an association of cembran pine-larch-Scotch pine towards the end of the Preoboreal, by an association of spruce-cembran pine-larch in the Boreal, and by an association of spruce-cembran pine in the Atlantic). The sites are represented by concentrations of artifacts which are found in morphologically recurrent situations, and which furthermore suggest a collocation according to precise models: there are sites protected by rockshelters formed by large blocks, open sites close to small lakes or on mountain passes and sites in naturally dominating positions. The abundance of lithic artifacts and the ratio between the tools and the microliths enables us to distinguish between residential sites and hunting stations (Lanzinger, 1985). The location of the latter seems to be limited to the mountain passes and to dominating positions. In a few cases research has consented the recognition of habitation structures. Currently the skeletal remains of hunted animals have been found in two deposits within rockshelters: at Mondeval de Sora, of Boreal age, at which the remains of red deer predominate over those of ibex (Guerreschi, 1994), and at the site of Plan de Frea IV, which has various occupation levels dating between the Preboreal and the end of the Boreal, and which are currently under study.

In the Adige basin the relationships between the Mesolithic mountain sites and those on the valley-bottoms are clear, as a result of the lithic raw materials used (rock crystal coming from the Alpine watershed; flint from the Dolomites; flint from the Jurassic and Cretaceous formations of the southern Alps). While the rock crystal and flint from the Dolomites are present only at some sites, normally those closest to the outcrops and only exceptionally at other sites, the flint from the Trento province is present everywhere up to the Alpine watershed.

These data suggest that in the Preboreal and Boreal settlement systems were established which extended from the Alpine valley-bottoms up to the middle-high mountains, and that the Mesolithic groups moved on a seasonal basis between the two areas. The discovery of two human milk teeth at Frea IV allows us to advance the hypothesis of the movement of the whole group, and not only of the hunters.

The beginning of the Atlantic corresponds to important changes in the distribution of the sites. In the Trento basin the sites located under rockshelters which were already occupied during the Boreal persist; the vegetational landscape is dominated by mixed oak and walnut woods, while hunting is more oriented towards species of a woodland-forest type: among the mammals one observes a further rarification and then the disappearance of ibex, and a corresponding increase of red deer and roe deer. Beavers are numerous, and species of forest environments such as marten, fox, bear, lynx and wild cat are present (Cattani, 1977; Boscato & Sala, 1980). The archaeological evidence for hunting birds, marsh turtles,

fishing and collecting eggs and freshwater mol-luscs become more consistent.

The Mesolithic sites in the mountains referrable to the Atlantic (on the basis of the characteristics of the lithic assemblages) are relatively rare; the group of discoveries suggests that the practise of hunting among the higher woods and the Alpine grasslands was progressively abandoned. Proof of this is provided by the total absence of early Neolithic sites (which in the Adige basin formed from the local Mesolithic substrate: Bisi *et al.*, 1987) and middle Neolithic sites in the mountain regions over 900 metres above sea-level (Bagolini & Pedrotti, 1992). The exceptional Castelnovian burial from Riparo di Mondeval de Sora at 2150 m a.s.l. in the Venetian Dolomites has been dated radiometrically to 7330±50 B.P. (R-1939) (Guerreschi, 1992) and therefore to the Atlantic. The grave goods of the burial included a pin made from an elk metapodial and a wild boar canine, objects which were certainly made on the valley-bottom.

In the Atlantic, on the other hand, one witnesses a diffusion of sites in the Prealpine hilly area and in the Veneto-Friuli plain, where Preboreal age sites are lacking and those of Boreal age are exceptional (Broglio, 1992).

3. CONCLUSIONS

The southern slopes of the Eastern Alps were therefore colonised by Epigravettian and Sauveterrian hunters, who penetrated the Alpine environment by means of the principal valleys. In favourable environmental conditions (that is during the Allerød intrestadial and the Preboreal/Boreal) they also frequented the mountain environments, creating settlement systems which extended from the valley-bottoms up to the Alpine grasslands. In the Late Glacial the valley-bottom sites and mountain sites were located further south, and the mountain sites are found within an altitudinal band comprised between 1000 and 1500 m a.s.l. In the Postglacial the valley-bottom sites and the mountain sites were located further north, and the mountain sites are found within an altitudinal band comprised between 1900 and 2300 m a.s.l., up to the Alpine watershed. The distribution of the mountain sites during the two periods therefore covers two distinctly different areas: it is thus probable that we are not dealing with a continuous occupation which began in the Allerød interstadial and continued into the Younger Dryas, Preboreal and Boreal, and concluded at the beginning of the Atlantic, but rather with at least two different occupation phases, the first developing in the Allerød and the second in the Preboreal and Boreal. As we have pointed out, the chronological collocation of some mountain sites which have Epigravettian lithic assemblages characterised by a marked development of geometric microliths, such as Andalo and Piancavallo, is unclear: they may appertain to a third and distinct phase of occupation.

Many problems remain unresolved as regards the settlement systems and in particular as regards the relationships between the valley-bottom and mountain sites: the seasonality of occupation; the differentiation of activities and in particular hunting techniques; the complementarity of the economies. Between the valley-bottom sites and the mountains no intermediate sites which could be interpreted as brief rest-stations have been found, except possibly for Grotta di Ernesto on the edge of the Altipiano dei Sette Comuni which may have been used as a rest-stop on the route from the Valsugana to the Mesolithic sites on the northern part of the plateau at 2000-2100 m a.s.l.; in this case the small number of artifacts and their typology (no common tools) induce us to think that it was a very short rest. We must therefore hypothesise relatively rapid journeys. As we have seen, the discovery of human teeth at Plan de Frea IV suggests that it may have been the whole group that moved, and not only the hunters. The archaeological data suggest that the occupation of the mountains induced a good knowledge of the Prealpine and Alpine region. Both in the Late Glacial and in the early Postglacial some mountain sites (Colbricon, Plan de Frea, Mondeval) were repeatedly frequented. In the different settlement episodes at Plan de Frea and at Mondeval, both in the Dolomites, different lithic raw materials were used such as flint collected from the valley-bottoms, flint from the Dolomites and rock crystal coming from north of the Val Pusteria. We must therefore presume that between the valley-bottom sites and the mountain sites, and between the mountain sites and the raw material provisioning sites, there were fixed routes which were well known by the groups of hunters. The act of hunting itself, for which in the Postglacial bivouacs of short duration were established in dominating positions or on mountain passes, must have led to the formation of networks of routes around the sites.

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