

The evolution of the environment and human population of the Adige basin at the end of the late Ice Age and in the early Holocene

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ABSTRACT – The Authors present an overview about the evolution of the environment and human population of the Adige basin at the end of the Last Ice Age and in the early Holocene.

Key words: Late Ice Age, Adige basin.

Parole chiave: Tardiglaciale, Valle dell'Adige.

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1. INTRODUCTION

According to chronological conventions of the Upper Pleistocene, the coldest period of the Wurmian Ice Age ended 18,000 years ago and was followed by the Late Ice Age, a period of climatic improvement that preceded the definite affirmation of the temperate climates of the Holocene that started 11,000 B.P. cal. (BROGLIO & IMPROTA, 1994-1995). Finds from the late Ice Age and early Holocene are relatively common in the Alpine area. Several rock shelters, such as Riparo Dalmeri and Cogola, respectively situated on the mountain plateaus of Sette Comuni and Tonezza-Folgaria, as well as the more recent rock shelters at Romagnano, Vatte, Pradestel and Gaban, present stratigraphic series, that are also continuous, and which, together, cover an chronological interval between 13,300 and 7,300 years B.P. cal.. They describe a period of time, from the end of the Ice Age to the Neolithic, during which the Alpine region was populated. This phenomenon is chronologically outlined on the basis of more than a hundred radiometric datings of sites in Trentino Alto Adige. Interpretation of the environment has been formulated from analysis carried out on sediments and soil, pollen associations and vegetal macro-remains, micro-mammal, mammal, bird and fish associations. The multi-stratified sites with radiometrically dated series provided a chronological framework for the sequence based on lithic industries. Using this it was also possible to date numerous deposits, especially open air sites and those in mountain areas, which would not otherwise be datable as they do not have enough biostratigraphical information for paleoecological comparison.

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The lithic industry reference sequence would appear to be almost uninterrupted. It comprises the Late Epigravettian, the Sauveterrian and the Castelnovian, up to the Neolithic (Gaban Group). The geographic distribution of the sites over time has also been defined. This latter shows a progressive penetration of human groups into the Alps and indicates from the beginning the establishment of a system of sites that were occupied on a seasonal basis, which involve the valley floor and Alpine grasslands. The paleoecological data, the diverse geomorphologic contexts that characterize the distribution of the sites and the functional characteristics of lithic industries that allow their use to be interpreted, have led to the formulation of an hypothesis regarding subsistence strategies concerning the different Alpine environments.

2. CLIMATIC MODIFICATIONS AND ECOLOGY DURING THE ALPINE LATE ICE AGE

There exists a large number of studies regarding the Alpine area that concentrate their attention on the geomorphology and evolution of the terrain of the areas involved in glaciation, as well as numerous pollen series, originating from lake or marsh sediments, that have recorded the succession of the various vegetational phases (CATTANI, 1977; KOFLER, 1992; OEGGL &

WAHLMÜLLER, 1992; AVIGLIANO *et al.*, 2000; OROMBELLI & RAVAZZI, 1996). This data, with the support of radiometric dating, has led to the identification of a sequence of climatic events and paleoenvironmental situations. Comparison of this data with that from anthropic deposits, especially regarding bone remains of hunted animals, makes the outline of paleoenvironmental evolution even more accurate.

For the Piave glacier, and by extension, also for the other glaciers that face on to the Pianura Padana, the beginning of its retreat is dated to about 17,000 B.P. (BONDESAN, 1999). In the period that follows deglaciation, which allowed the recolonisation of mountain areas by plants, fauna and man. The oldest traces of anthropisation of the late glacial and the environmental modifications associated with them are documented in the Pre-Alpine area, where a large number of settlements have been identified. In this first phase the site of reference is Riparo Tagliente, situated at an altitude of 250 m on the southern margins of the Lessini mountain range. In deposits that date back to the Early Dryas and dated around 16,000 B.P. cal. (BROGLIO & IMPROTA, 1994-1995), archaeological evidence indicates hunting as the prevalent activity, while fishing seems to have played a secondary role. The landscape is that of a cold steppe. Amongst the mammals hunted, ibex dominates with 80% of the remains, auroch and bison (15%), with a sporadic presence of elk (BROGLIO, 1984); hunting of marmot and hares is also documented. As in all the Pre-Alps area, the Bølling and Allerød interstadials saw a profound modification of the landscape as a consequence of the rapid warming of the whole boreal hemisphere, which brought the Würmian glaciers to an end. It is in this environmental context that Epigravettian groups began the progressive exploitation of areas inside the Alps.

In the series at Riparo Tagliente the interstadials see the formation of a grassland with conifer and caduceous leaved trees, while the hunted mammal remains replace the preceding faunistic associations typical of areas above the tree line. This composition reflects a more temperate and forested environment, as shown by the drastic reduction of ibex, wild bovines and elk and their replacement by red deer, wild boar, roe deer and chamois.

At Riparo Soman, situated on the floor of the Adige Valley above Chiusa di Ceranio, at an altitude of 100 m, where the oldest episode of occupation dates back to 14,000 years B.P. cal., there is a high presence of ibex, although it is accompanied by forest species such as red deer, roe deer, wild boar, wolf, marten and lynx. The presence of elk indicates the vicinity of open humid areas, very probably the same Adige valley floor (TAGLIACCOZZO & FIORE, *in press*; BROGLIO & LANZINGER, 1985; CASSOLI & TAGLIACCOZZO, 1992).

Attributed to the interstadials, most probably the Allerød, are most of the Epigravettian mountain sites situated between an altitude of 1000 and 1500 m on Monti Lessini, the Tonezza and Asiago plateaus and, with regards the Trento area, the sites at Viotte di Monte Bondone, Terlago and Andalo, this latter being attri-

buted on a techno-typological basis to Dryas III (GUERRESCHI, 1984). In the Allerød, a forest association of pines and larch is already at the height of the marsh at Viotte di Monte Bondone at an altitude of 1550 m, while the Late Dryas signals the thinning out of the forest (KOFER, 1992). The Epigravettian camp system found on the morainic front of the local glacier of the Tre Cime, situated in dominant position above the underlying Viotte marsh, is above the tree line. In the same period, but further within the Alpine chain, the environmental context is markedly mountainous. With regards the fauna at Ripari Villabruna, situated on the floor of Val Cismon, at an altitude of 500 m, two distinct phases have been identified: in the older (pre-Allerød), ibex and chamois prevail, in the second (Allerød) red deer (AIMAR & GIACOBINI, 1995; CASSOLI *et al.*, 1999).

At Riparo Dalmeri, situated at an altitude of 1240 m, the biological remains, which include hunted fauna and charcoal fragments from hearths, permit the description of the environment during the Allerød. Anthracological analysis shows that the area around the site was sparsely forested. The upper limits of the forest consisted of larches and *Pinus*. The very rich hunted fauna was dominated by ibex with more than 90% of the remains and describes a plateau that was still characterised by open areas above the tree line. The environmental outline drawn by this very important site also comprises hunted fauna from the woods below, represented by red deer and small carnivores. Finds of numerous fish scales and bones (barbel, cavedano, grayling, trout and pike) testifies to the practise of fishing in the Brenta Valley, which at that time was still occupied by lakes (CASSOLI *et al.*, 1999; BASSETTI & DALMERI, 1993).

With regards the mobility – settlement strategies of Epigravettian groups, it has been observed that where it has been possible to identify the season when the camp was occupied, as in the case of Riparo Dalmeri, it does not go beyond late Autumn (CASSOLI *et al.*, 1999). Due to snow cover it would not seem very probable that Riparo Dalmeri, as is the case with other mountain settlements, even more so open air sites, could be occupied during the winter months. All this describes a system characterised by a certain degree of seasonal nomadism between summer hunting camps in the mountains and winter quarters in the Pre-Alps. For the Late Ice Age the only valley floor sites known are Riparo Tagliente in Valpantena and Riparo Soman at the mouth of the Adige Valley, just north of Chiusa di Ceraino. No other sites are known to be situated further north, along the main valleys and this could be due to climatic reasons. It could also be related to the fact that during the Allerød the valley floor of the Adige was 130 m below its present level and that during that period the rate of the alluvial sedimentation process was almost 15 cm per year (in the area of Trento). Similar considerations, although less well documented, can be made for the Brenta Valley.

The second phase of the Epigravettian levels at Riparo Soman and the base portion of the Riparo La

Cogola sequence, situated near Carbonare (DALMERI *et al.*, 2000) is attributed to the late Dryas. At Riparo Soman, an increase in the remains of ibex and chamois and a reduction in forest animals (red deer, roe deer, wild boar), indicates a temporary colder climate. The presence of auroch must be mentioned, which is no longer found in the Preboreal and Boreal series of the Alpine area.

With regards the location of campsites in an alpine morphological context, of note is the recurring association of open-air sites with lakes, or with their vestiges in the form of marshes. This is true of Viotte del Monte Bondone (1550 m), as at that time the marsh of today was still a lake, Terlago (450m), Andalo (1000 m), Fonte del Palo (1350 m) on Piana della Marcesina at a distance of 3 km from Riparo Dalmeri and Pian dei Laghetti at San Martino di Castrozza (1300 m). The argument becomes more complex for the rock shelters, even if those on the valley floor (Tagliente, Soman and Villabruna) are situated in the vicinity of watercourses (BROGLIO & LANZINGER, 1990).

3. CLIMATIC CHANGES AND ECOLOGY DURING THE EARLY HOLOCENE IN THE ALPS

Between the end of the late Ice Age and the beginning of the Holocene the physical environment of the area is already free of the direct action of the Würmian glacial morphoclimatic system. In the mountains the glacier fronts are at altitudes comparable with those of the Small Ice Age, while the slopes are stable enough to allow dense forests to form.

In the Early Holocene, the wide lake formed during the Late Ice Age in the Adige Valley began to evolve into a system of small modestly deep lakes and marshlands, intercalated by alluvial cones. A considerable number of Mesolithic sites have been found along the margins of this rich eco-mosaic. The Mesolithic sites in the Trento basin are situated at the base of small rock shelters on the slopes of the valley at altitudes between 210 and 250 m and were occupied repeatedly between the Preboreal and Atlantic periods, beginning in 9,300 – 9,200 B.C. The subsistence economy was based on hunting, fishing, the gathering of freshwater shellfish and turtles from lakes, eggs and the hunting of small animals (BOSCATO & SALA, 1980). In the stratigraphic series in the valley floor sites the environmental changes during the course of the Holocene are reflected in the changes in the composition of pre- and palaeovegetational data deduced from pollens conserved in the same series. In the Preboreal layers the climate is of the arid-mountain type, the vegetation is arboreal and is dominated by Scotch pines. Amongst the mammals hunted, ibex prevails. In the Boreal there is an association of thermophile caducous leaved trees and red deer becomes the most frequent quarry. It must be mentioned that the three series at rock shelters Roma-

gnano-Loc III, Pradestel and Vatte, have been radiometrically dated (ALESSIO *et al.* 1983), and other than providing precious environmental data, they have allowed the formulation of a Mesolithic industry sequence that can be used as a reference (BROGLIO & KOZLOWSKI, 1983), the validity of which has also been confirmed in mountain sites that have not been radiometrically dated.

The Preboreal and Boreal mountain sites are distributed between the alpine watershed and the northern margins of the Veneto Pre-Alps, at altitudes between 1900 and 2300 m, with a maximum concentration in the Dolomites. The study of the pollens conserved in sedimentary traps such as lakebed sediments or marshes, indicate that in the central-eastern Alps (OEGGL & WAHLMÜLLER, 1992) the upper tree line during the Preboreal progressively rose to an altitude about one hundred metres above the present limit (at the end of the Preboreal). During the course of the Boreal and Atlantic the limit does not seem to have moved even if the vegetal associations change in relation to the different degree of humidity: around 2000 m woods were characterised by the association cembran pine – larch – Scotch pine towards the end of the Preboreal, by the association spruce – cembran pine – larch in the Boreal and by the association spruce – cembran pine in the Atlantic.

Currently in only two deposits, inside rock shelters, have the remains of hunted animals been found: at the Mondeval de Sora site (in the Belluno Dolomites at an altitude of 2150 m) from the Boreal, in which red deer remains prevail over ibex, and at the Plan de Frea IV site (upper Val Gardena), with several levels of occupation between Preboreal and Boreal, where hunting was mainly centred on ibex and red deer. The study of the fauna identified the months between July and November as being the period the site was occupied each year (ALCIATI *et al.*, 1992; ALESSIO *et al.*, 1994; ANGE- LUCCI *et al.*, 1995).

The warm – humid climatic change of the Atlantic brought about important environmental changes in the distribution of the sites. In the Trento basin the sites situated in the rock shelters that were already frequented in the Boreal persist. The vegetal landscape is dominated by mixed oak and hazel nut woods, while hunting is still concentrated on species typically found in temperate woods. Indeed amongst the mammals one can observe the rarefaction and then the disappearance of ibex, a phenomenon that corresponds with an increase in red and roe deer. Beavers are numerous and other forest fur animals are present, such as martens, foxes, bears, lynx and wildcats. Evidence of bird hunting, fishing, swamp turtle hunting and the gathering of freshwater shellfish and eggs becomes more consistent.

Mesolithic mountain sites referable to the Atlantic are relatively rare, so much so as to suggest the hypothesis that there was a gradual abandonment of the practise of seasonal occupation of high mountains. Indeed finds are few, probably date back to the initial phase, and are almost always located at the upper limit of the altitudes frequented during the course of the whole

Mesolithic. Indirect proof, would seem to be, the expansion of the forest to an altitude greater than today's and the consequent drastic contraction of the alpine grassland environment. However, worthy of mention, is the fact that the extraordinary Castelnovian burial ground at Riparo di Mondeval de Sora dated to 8002-8133 years B.P. is attributable to this period. Although Castelnovian mountain sites are rare (especially in comparison with the very numerous Sauveterrian sites), in the Atesina region no Early Neolithic mountain sites have been documented. On the contrary, in the Atlantic there was a spread of sites in the Pre-Alpine hill area and on the Veneto – Friuli plain, where there is a lack of Preboreal finds and those of the Boreal are rare.

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