JASs *R*eports
Journal of Anthropological Sciences
Vol. 84 (2006), pp. 137-145

Radiocarbon dating of the early Mesolithic Colbricon site (north-eastern Italian Alps)

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Summary – *Charcoal samples from the Colbricon open air sites 3, 7, 8A and 9 (north-eastern Italian Alps) were dated. The AMS calibrated 14C ages obtained, while confirming the cultural attribution of the sites to the early Mesolithic, indicate an adaptive change between the earliest and the latest sites. Author suggests this change, clearly evidenced by differences in settlement typology, could be linked to the environmental modifications occurred at the Preboreal-Boreal transition. This hypothesis is also supported when evidences from other north-eastern Italian early Mesolithic sites are compared.*

Keywords – *AMS, Mesolithic, Alps, Settlement.*

Introduction

Northeastern Italy, which roughly includes the Provinces of Veneto, Trentino-Alto Adige, and Friuli (Fig.1), has been intensively investigated by archaeologists over the last few decades (see for instance, Bagolini, 1971; Bagolini *et al.*, 1984; Broglio, 1971, 1972, 1982, 1995; Broglio and Lanzinger, 1990, 1996; Dalmeri *et al.*, 2001; Lanzinger, 1988). Today, more than 400 archaeological sites (from stratified deposits to simple surface finds), attributed to the Upper Late Palaeolithic and the Mesolithic, are known (Dalmeri and Pedrotti, 1995).

Several radiometric dates of early Mesolithic sites are currently known. The best information comes from the Trentino rock shelter sites, such as Romagnano, Pradestel, Gaban, located in the river Adige valley at about 200 m.a.s.l.. Most of them have been well dated, providing complete chronological sequences of the early Holocene of this region (Alessio *et al.*, 1977, 1984; Broglio and Improta, 1994-1995). In contrast, only one early Mesolithic high altitude site has been dated in Trentino: the open air Colbricon 1 site (eastern Lagorai mountains, at about 2000 m.a.s.l.; Broglio and Improta, 1994-1995). It is worth to mention that several other undated open air sites, which differ in topographical features as well as settlement typology, have been found in the Colbricon area.

In this work, in order to verify the chronological relationship between Colbricon 1 and the other Colbricon sites, new ^{14}C dates from Colbricon sites 3, 7, 8A and 9 will be presented and discussed. Dates have been obtained from samples of charcoal collected during the excavation activity and stored in the Museo di Scienze Naturali of Trento (Table 1). In 2004, the Author selected the samples by choosing the best preserved charcoals, according to their physical condition and to the information written on the associated labels at the time of the excavation (for example, those collected directly from the ground, i.e. not washed). Special care was taken to select samples stocked in closed plastic bags without organic elements directly connected to the charcoals. The selection activity provided suitable samples from Colbricon 3, 7, 8A, and 9. Charcoals from the remaining Colbricon sites - when present - were not well preserved and, therefore, not selected.

Results will be compared to the chronological and archaeological data coming from the rockshelters Pradestel and Romagnano.

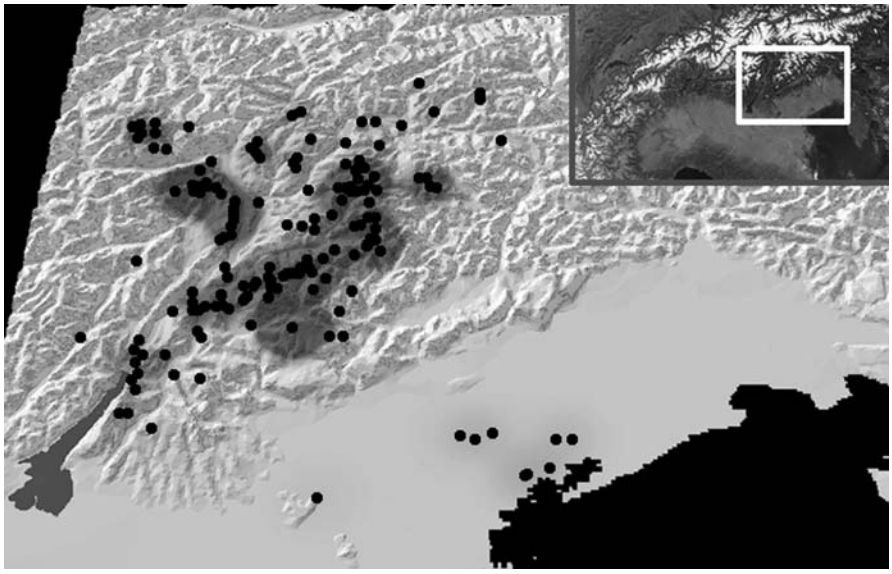

Fig. 1 - Distribution of Mesolithic sites in Veneto and Trentino Alto Adige provinces (northeastern Italy).

Site Description

The Mesolithic site at Colbricon (Bagolini, 1972; Bagolini and Dalmeri, 1988, 1995; Bagolini *et al.*, 1975) is made up of nine concentrations of lithic artefacts, distributed in a more or less restricted area around two small lakes situated at altitudes of 1922 and 1902 metres. Several authors, on the basis of topographical features of the sites and of typological characteristics of the artefacts, have suggested a functional interpretation for the lithic concentrations found around the lakes of Colbricon (see for instance, Bagolini and Dalmeri, 1995). Generalising, lake sites seem to be mainly connected to subsistence activities (notably, butchering and hide processing). To the contrary, the sites situated on crests could have been occupied mainly for hunting purposes.

As described by Bagolini and Dalmeri (1995), Site 1 is situated at the top of a slight rocky rise that separates the two lakes, on the east bank of the larger. It is characterised by the presence of a hearth in central pit and spatially defined areas that have been interpreted as lithic workshops. Site 2 is found on a rise situated between the larger lake and Val Bonetta to the west. Two spatially distinct areas have been identified, considered to be two more or less contemporary settlements. Site 3, situated in a flat area on the southern bank of the larger lake, presents a central area with a large concentration of artefacts around a hearth and a more external area with a smaller quantity of artefacts. The two areas have been interpreted as being chronologically contemporary. Site 4 is located west of the larger lake on the saddle between two small hills. Site 5, near the west bank of the smaller lake, has provided a low quantity of artefacts. Site 6 is situated at an altitude of about 2050 metres in a position that is much higher than the other sites. A fireplace has not been identified but fragments of charcoal and burnt flint are present. Site 7, situated at the northern end of the bank of the smaller lake is isolated by from the other sites and has been disturbed by unauthorised excavations. Site 8 is located on the same crest as Site 6 but lower down. It is characterised by two adjacent occupied areas which can be interpreted as two separate episodes of settlement for the same activity repeated over time. Site 8A, situated near Site 8, is the only one to have provided, at least in part, a stratigraphic sequence in which at least two distinct episodes of settlement can be identified. In conclusion, Site 9 does not present peculiarities in the artefact concentration.

No faunal remains have been found at the

Table 1 - Sauveterrian dates from Colbricon sites (CLBs), Pradestel rockshelter (PRDl) layers and Romagnano rockshelter layers (RMGl).

Layer/Site	Sample	BP	BC	Calib 5.0.2 (2 σ)
CLBs 1	R-895	9370 ±130	7420 ±130	10881 ÷ 10249
CLBs 3	UtC-13425	8833 ±70		10180 ÷ 9664
	UtC-13426	8760 ±60		9939 ÷ 9551
CLBs 7	UtC-13420	8200 ±50		9301 ÷ 9015
CLBs 8	UtC-13423	9550 ±60		11133 ÷ 10692
	UtC-13424	9600 ±60		11170 ÷ 10747
CLBs 9	UtC-13419	9730 ±60		11251 ÷ 11069
PRDl H	R-1149	8200 ±50	6250 ±50	9301 ÷ 9015
PRDl L1	R-1150	8240 ±200	6290 ±200	9548 ÷ 8627
PRDl L4	Climatic change			
PRDl L7-8	R-1151	9320 ±50	7370 ±50	10682 ÷ 10378
PRDl M	Not dated			
RMGl AC1	R-1139	8220 ± 70	6270 ± 70	9411 ÷ 9013
RMGl AC2	R-1140	8560 ± 70	6610 ± 70	9687 ÷ 9443
RMGl AC3	R-1141	8590 ± 90	6640 ± 90	9821 ÷ 9434
RMGl AC4	R-1142	8740 ± 90	6790 ± 90	9957 ÷ 9541
RMGl AC5/6	R-1143	9090 ± 90	7140 ± 90	10511 ÷ 10120
RMGl AC7	R-1144	9100 ± 90	7150 ± 90	10518 ÷ 9934
RMGl AC8/9	R-1145	9200 ± 60	7250 ± 60	10515 ÷ 10236
RMGl AE1/4	R-1146	9420 ± 60	7470 ± 60	10793 ÷ 10497
RMGl AE1/5	R-1146b	9490 ± 80	7540 ± 80	11107 ÷ 10562
RMGl AE	R-1146a	9580 ± 250	7630 ± 250	11645 ÷ 10235
RMGl AF	R-1147	9830 ± 90	7880 ± 90	11617 ÷ 11076

Colbricon sites due to the chemical alteration of the sediments. On the contrary, a pollen analysis has been carried out at Colbricon site 3. This site seems to have been inhabited when montane grassland with *Picea*, *Pinus sylvestris* and *Pinus cembra* characterized the local environment: "the scarse density of woodland also allowed pollen transport from the vegetational zones of lower altitudes which are represented by linden, hazelnut, elm, beech and birch. The herbaceous vegetation of Alpine grassland is associated with shrubs such as alder and rhododendron" (Cattani, 1995:68-69). These results are similar to those obtained from pollen analyses carried out in bog areas near Bressanone (AltoAdige, northeastern Italy) where corresponding stratigraphical layers have been dated to the "Boreal comprised from 8920 ±130 BP and 7870 ±140 BP" (Cattani, 1984:256, personal translation).

Typologically, the episodes of settlement fit chronologically into the early middle phase of the Sauveterrian according to the Mesolithic sequence established for the Adige valley rock-shelter sites. The only exception is Colbricon 3 which may be related to the early Sauveterrian with probable connections with the Late Epigravettian due to the presence of several fragments of baked truncations

recognizable as trapezoidal segments amongst the microlithic tools; "therefore, it is not possible to ignore the fact that in the typometry of the unretouched artefacts, there is a presence, however small, of macroliths" (Bagolini and Dalmeri, 1988: 169, personal translation). Another exception is Colbricon 9 which revealed the presence of some trapezoidal forms that date the assemblage to the final Sauveterrian (Bagolini and Dalmeri, 1988: 169).

To date, only radiometric dating regarding Colbricon Site 1 has been published (Table 1). Samples of charcoal provided the following date: 9370 ±130 BP (Alessio *et al.*, 1984; Broglio and Improta, 1994-1995).

The Pradestel rock shelter is situated about 6 km north of Trento, on the left side of the Adige Valley, at an altitude of 225 metres and about 15 metres above the present valley floor. The excavation carried out in the mid 1970s by the Museo di Scienze Naturali of Trento and the University of Ferrara, involved only a small part of the original deposit which had been mostly destroyed by quarrying work (Bagolini and Broglio, 1975; Bagolini *et al.*, 1973; Dalmeri, 1977). The overall thickness of the deposit is over 4 metres. It is a complex of detritus, with silt and carbon lens intercalations. In the lower part of the complex, which has a thickness of 280 cm, the levels with human settlements (levels M-L-H-G-F), interrupted by a level of sterile sand and lime (level I), provided a Sauveterrian lithic industry.

The Sauveterrian levels dated are L and H (Table 1). Samples are represented by charcoals collected during the excavation and "often pertaining to units identifiable as hearths; being always related with certainty to archaeological findings these samples were extremely reliable as for the cultural identity" (Alessio *et al.*, 1984:246).

Analyses of both pollen (Cattani, 1977, 1995) and bone remains (Boscato and Sala, 1982) evidenced a climatic change in correspondence with level L4: "The oldest part of the deposit (levels M-L6) is characterised by an environment wooded with Scotch pine and some broadleaves. With the fall of the pine curve in level L4, an arboreal association constituted almost exclusively by termophilous broadleaves appears. (...) L4 marks the transition between the Boreal and the Preboreal. This is followed by the development of mixed oak wood and hazel-nut, a development which becomes more marked in the upper levels of the series (levels F-E)" (Cattani, 1995:66-67). In sum, while in the middle-lower part of layer L4 there is an association of relatively arid arboreal grasslands, in the upper part an environment that is more forested and little more humid has been identified.

All of the stratigraphic levels at Pradestel, with the exception of the oldest, contained bone remains. Although less clearly than the pollens, the bone remains also show evidence of the climatic change that took place between the Pre-boreal and Boreal (Boscato and Sala, 1982; Cattani, 1977; Sala, 1977).

The qualitative and quantitative distribution of the faunistic remains evidence behaviour mainly linked to the fragmentation of hooves (Clarke, 2000). With the exclusion of teeth, the fragments of bones of the distal part of the limbs, generally constitute about 90% of the bones found at the various stratigraphic levels. It is interesting to note that this behaviour has also been observed at the other rockshelter sites present in the Adige valley, such as those at Romagnano and Zambana. The predominant presence of the hooves of animals would allow one to suppose that the whole carcass of the animal was not brought to the Pradestel site, but only the hide (Boscato and Sala, 1982).

New dates and Discussion

The new dates from Colbricon perfectly match the typological attribution of the sites to the "Sauveterrian" Early Mesolithic. Nevertheless, some discrepancies may be observed. In particular, the typological attribution of site 3 (very early Sauveterrian) as well as of site 9 (final Sauveterrian) has been suggested by previous authors on the basis of the low presence of trapezoidal blanks among the assemblages. Now, site 3 and 9 are chronologically related to the middle and to the early Sauveterrian, respectively, according to the cultural periodization of Romagnano rockshelter sequence.

More interestingly, the new dates seem to evidence an up-to-now unknown adaptive role of the Colbricon area. The sites that were dated can be divided into the two settlement categories defined

earlier. The first category includes the sites with a limited area of extension, situated on rocky crests and characterised by a small concentration of lithic artefacts, without a differentiated distribution of the artefacts and evidence of habitation structures (Sites 8A and 9). The second category includes sites, generally situated near the lakes, characterised by larger habitation areas than the preceding ones and by large quantities of lithic artefacts that are often spatially distributed in a differentiated manner allowing the occupation areas to be identified, each of which seems to be connected to functional activities (Sites 1, 3 and 7).

On the basis of the dating carried out (Fig. 2), the sites on the crests are older, while those situated near to the lakes are more recent. If we superimpose the dating obtained onto the chronological-cultural sequence of the rock shelter at Romagnano (Broglio and Kozlowski, 1984), the sites on the crest can be chronologically attributed to the Early Sauveterrian, (associable with level M of the Pradestel rock shelter and with levels AE and AF of the Romagnano rock shelter). Sites 1 and 3, both situated on the banks of the larger lake, are chronologically attributable to the Middle Sauveterrian (associable with level H of the Pradestel rock shelter and levels AC9-3 of Romagnano). Site 7, the only one situated on the banks of the smaller lake, is the most recent and chronologically attributable to the Late Final Sauveterrian (associable with level H of the Pradestel rock shelter and levels AC2-1 of the Romagnano rock shelter).

As already mentioned earlier, the stratigraphic series at the Pradestel rock shelter provided evidence of a climatic change which probably took place at the passage between Pre-Boreal and Boreal, in correspondence with level L4. Unfortunately, level L4 at Pradestel has not been dated. An attempt to chronologically date this climatic change, according to the Pradestel stratigraphic sequence, could be made by considering that the time interval between which it is possible to insert level L4 is 9270 BP (i.e. the latest dating of level L7-8) and 8440 BP (i.e. the earliest dating of level L1). It is therefore possible to hypothesise that level L4 could correspond chronologically to the middle of this interval, i.e. 8855 BP. Using a sufficiently wide standard deviation, for example ± 200 years, we obtain a chronological range for the climatic change observed at Pradestel which is from 10415 to 9491 cal. BP (according to Calib 5.0.2 calibration program, see URL: www.calib.org). This chronological interval includes both the latest dating of site 1 and the two dates obtained for site 3 at Colbricon (Fig. 2). Support to this

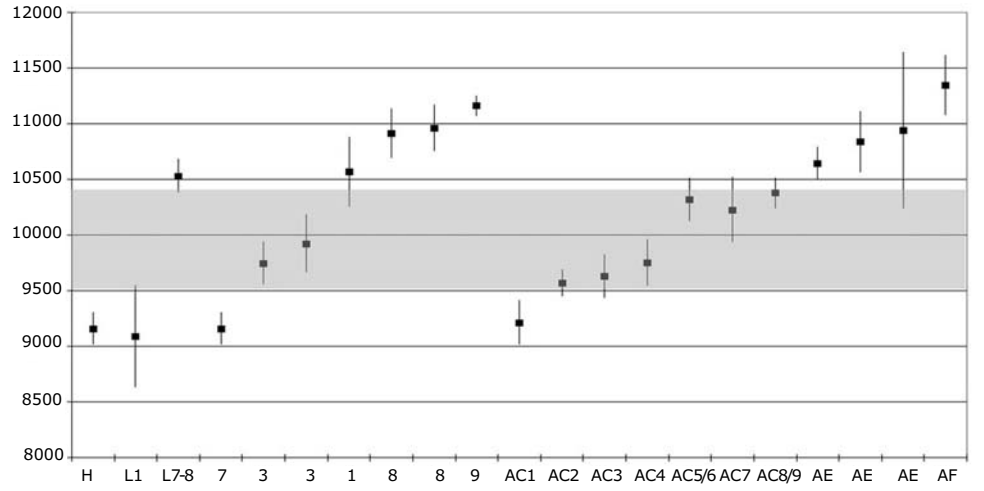

Fig. 2 - Chronological distribution of Pradestel, Colbricon, and Romagnano dates (cal BP according to Calib 5.0.2, 2σ). The gray area indicates the hypotetical chronological range of the climatic change observed in layer L4 at Pradestel rockshelter.

chronological attribution comes from the pollen analysis carried out at Colbricon site 3 where the archaeological level was tentatively associated to an early phase of the Boreal zone.

On the basis of these considerations, it is possible to suggest that the climatic change observed in level L4 at Pradestel caused a change in the settlement models adopted by the human groups that frequented the lakes at Colbricon. The change would seem to be characterised by the abandonment of the sites on the crests, which were probably used by only a few individuals as temporary camp sites to carry out one or more specific activities (for example hunting specific species of animals) during the coldest and most arid phase of the Pre-boreal (following the interpretation of previous authors, see among others Dalmeri *et al.*, 2001). With the change to a relatively more temperate and humid climate, Colbricon seems to have become the destination of more complex groups, for example one or more nuclear families, who moved to high altitudes, leading to the presence of extremely mobile settlements, which in difference to the preceding ones, were more structured and situated closer to the lakes.

If this hypothesis is valid, it could also be possible to find evidence of adaptation changes in the rock shelters of the Adige Valley, and in particular in the complete Mesolithic series studied at Romagnano. During the excavations, stratigraphic distinctions were made, several of which were further subdivided in artificial cuts. The stratigraphic series at Romagnano relative to the Sauveterrian is comprised of units AA, AB, AC1-3, AC4-9, AE and AF, which, as described by Broglio and Kozlowski, were identified during the excavations "on the basis of

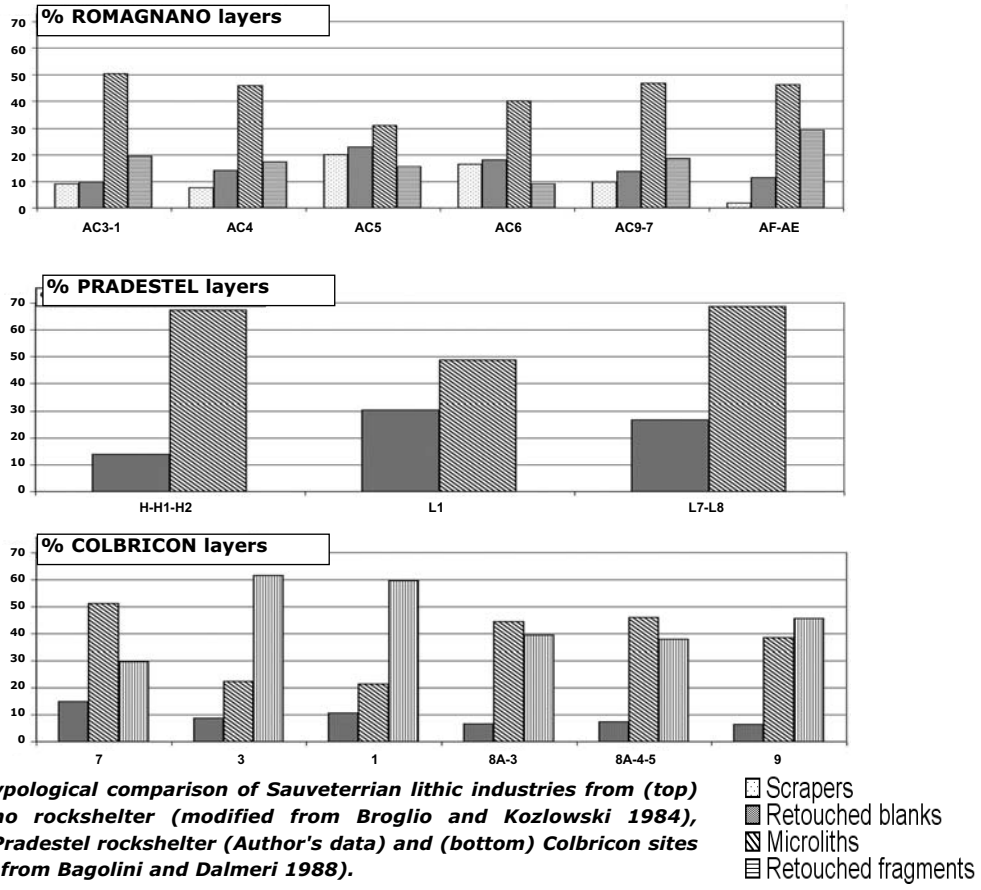

Fig. 3 - Typological comparison of Sauveterrian lithic industries from (top) Romagnano rockshelter (modified from Broglio and Kozlowski 1984), (middle) Pradestel rockshelter (Author's data) and (bottom) Colbricon sites (modified from Bagolini and Dalmeri 1988).

stratigraphic criteria; the further subdivisions are artificial. Therefore the industries of AA, AB1-2, AE and AF represent more or less long periods of occupation, while industries AC1, AC2, AC3, AC4, AC5, AC6, AC7 and AC8-9, represent the lots which do not correspond to distinct occupational phases" (1984:94, personal translation).

If we superimpose the dating of the Mesolithic series of the Romagnano rock shelter (Table 1) over the chronological interval that we hypothesised for the climatic change evidenced in level L4 of the Pradestel rock shelter, we observe that the whole of stratigraphic unit AC4-9 of Romagnano falls within the hypothetic chronological interval (Fig. 2). Therefore of particular interest are the observations made by Broglio and Kozlowski, who, on the basis of the typological characteristics of the lithic artefacts, state that "in the Sauveterrian sequence of Romagnano, the middle phase presents itself as a uniform evolutionary process, which joins with the structure of the early phase and which continues into the recent phase. However in this uniform process one observes an anomalous phenomenon which is the industry of layer AC5" (Broglio and Kozlowski, 1984:146, personal translation). The originality of the industry of level AC5 allows one to suggest "the existence of evolutionary trends in the Sauveterrian sequence" (Broglio and Kozlowski, 1984:143, personal translation). In conclusion, the differentiation observed in the Sauveterrian sequence, "which is typologically homogeneous, without marked evolutionary trends, depends rather on other factors such as a change (…..) connected to the seasonal occupation of the site, or a spatial modification of the functional activities carried out in the site" (Broglio and Kozlowski, 1984:143.

In order to compare the typological details of the lithic artefacts from level AC5 of Romagnano, we have attempted a comparison with the lithic industries from the dated sites at Colbricon and the lithic industries from the dated levels of the Pradestel rock shelter. The graphs (Fig. 3) show only the typological categories with a presence higher than 10%. It is obvious that this methodology must be considered as a course-grain tool for the purpose of verifying a work hypothesis that would be subject to greater study in the future. The observations made by Broglio and Kozlowski (1984) on the originality of the lithic artefacts from level AC5 at Romagnano are evident (Fig. 3a). All the typological categories are characterised by a percentage change in their frequency which reaches a maximum or minimum variability in level AC5. It is therefore interesting to note similar behaviour in the industries directly linked to the beginning/early phase of the Boreal environment such as those of Pradestel at level L1 (Fig. 3b) and sites 1 and 3 at Colbricon (Fig. 3c).

Conclusions

The dates from sites 3, 7, 8A and 9 at Colbricon have allowed the suggestion of a mountain resources exploitation model employed by human groups during the Early Holocene in Trentino (northeastern Italy) which is much more dynamic and complex then previously described. The model, like Broglio and Kozlowski (1984) had already suggested, shows progressive and continuous adaptation. The new Colbricon dates seem to link this change to the climatic variation that took place during the passage between the Pre-boreal and Boreal. This variation could have caused new balances in the existing faunistic and vegetal association in the mountain areas. In particular, we could suppose that the climatic improvement influenced the qualitative and quantitative distribution of the herds of herbivorous animals such as deer and ibex which were the animals most frequently hunted (based on the faunistic remains found in the rock shelters of the Adige Valley). Therefore the settlement strategies employed by human groups in mountain areas would seem to have gradually transformed, abandoning a more specialised model, with the use of high altitudes as hunting areas and valley floor sites as camps, to a less specialised model, with the use of high altitude sites and those on the valley floor as settlements with the purpose of exploiting all the natural resources available in the mountain areas.

Acknowledgements

Research was financially supported by the Fondo Progetti di Ricerca Post-Doc, Provincia Autonoma di Trento. Author gratefully acknowledges Dr. Silvia Frisia and Dr. Andrea Borsato (Museo Tridentino di

Scienze Naturali of Trento, Italy) for helpful discussions. A special thank to Dr. K. van der Borg (R.J. Van de Graaf Lab., Utrecht, The Netherlands) for critical comments and suggestions.

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