Preistoria Alpina - Museo Tridentino di Scienze Naturali	Vol. 28 (1992)	pagg. 293-310	Trento 1994

ALBERTO BROGLIO

Mountain sites in the context of the North-East Italian Upper Palaeolithic and Mesolithic

ABSTRACT

BROGLIO A., 1993 - Mountain sites in the context of the North-East Italian Upper Palaeolithic and Mesolithic. [I siti montani nel contesto del Paleolitico superiore e del Mesolitico dell'Italia nordorientale]. *Preistoria Alpina, 28:* 293-310.

The characteristics of the late glacial (recent Epigravettian) and early postglacial (Sauveterrian) mountain sites in the Eastern Alps are presented. Hypotheses are proposed concerning the possible role of mountain sites within the logistical system of these two periods.

Parole chiave: Paleolitico superiore, Mesolitico, siti montani.

Key words: Upper Palaeolithic, Mesolithic, mountain sites.

Alberto Broglio, Dipartimento di Scienze Geologiche e Palentologiche dell'Università di Ferrara, Corso Ercole I d'Este 32, I-44100 Ferrara.

1. Introductory considerations

1.1. Premise

The discovery of the Epigravettian site of Riparo Battaglia on the Altipiano di Asiago (BROGLIO, 1964) and of the Sauveterrian sites of Colbricon (BAGOLINI, 1972) marked the beginning of the research which in the last decades has brought to light numerous late Palaeolithic and Mesolithic sites on the southern slopes of the eastern Alps and in the Venetian Pre-Alps. Today there are some tens of sites known for the

Epigravettian, while for the Mesolithic there are several hundreds. Some of these have been the object of systematic excavations, others of test excavations; for the majority only their presence has been noted. The group of Epigravettian sites on the one hand, and the group of Mesolithic sites on the other, show consistent characteristics: age; distribution within determinate altitudinal fascia; collocation in recurring morphological situations; provenance of the lithic raw material used for the manufacture of artifacts; and typology and structure of the lithic assemblages. Unfortunately information on the vegetation and fauna and radiometric dates are very scarce. For these reasons north-east Italy constitutes a favourable area for the study of the processes of diffusion of late Palaeolithic hunter-gatherers in the Alpine region and their adaptation to mountain environments. The physical configuration of the territory also favours observations: relatively brief distances separate the upper Adriatic coastline and the high plain from the low plain, from the hills and from the low-middle mountains of the Pre-Alps (with peaks rarely higher than 2000 m) from the southern Alps (whose peaks sometimes reach 3500 m). Important valleys interrupt the watersheds (Passo di Resia 1508 m, Passo del Brennero 1375 m, Sella di Dobbiaco 1209 m, Passo di Camporosso 812 m). In the chronological time span which concerns us here the area was larger: in the Würm late glacial and in the early Holocene the low plain extended partially onto the upper Adriatic; the present coastline was reached only in the Atlantic.

2. The recent Epigravettian

2.1. Chronology and sequence of the recent Epigravettian

In the Veneto-Trentino-Friuli area some rockshelters present various occupation levels in stratigraphic succession with radiometric dates which allow us to establish a reference sequence for the recent Epigravettian (1) in the region.

The series from Riparo Tagliente in the Valpantena (Monti Lessini) covers a chronological span which begins with the older Dryas and ends with the Alleröd. The typological analysis (Guerreschi, in Bisi *et al.,* 1983) has revealed two phases: an older one, corresponding with levels 16-11, and a more recent one, corresponding with levels 10-4. Here we underline the differences which we think to be most important. Among the tools (2) the elongated frontal endscraper types are prevalent over the short types in the first phase (87-93% in levels 16-12; 55% in level 11) while short types predominate in the second phase (50-77%), when very short nail-like, sub-circular and semicircular forms appear. Among the armatures, together with the microgravettes, backed points with a gibbosity and shouldered pieces are present in the deepest levels (16, 15 and 13), even if they are very rare, and proximal backed points with natural bases are present in the second phase; rare segments, triangles and rhomboids also appear in the second phase. The naturalistic data (pollen spectra, land molluscs, micromammals, large mammals) and the radiometric dates concord with the attribution of the lower part of the sequence to the older Dryas. Between levels 14 and 12 modifications of the pollen spectra and the faunal associations (malacofauna and large mammals) begin, which are affirmed in level 10. The attribution of levels 10-8 to the Bölling interstadial, which was suggested by B. Sala (Bartolomei *et al.*, 1982), has today been confirmed by recent radiometric dates of level 10e (13,270±170 BP), level 10c (13,070±170 BP), and level 10a

(12,650±170 BP), which are added to that which was already known for levels 10-8 (12,040±70 BP). In the overlying levels 7-5, which are as yet undated, a climatic change observed in the malacofauna and in the large mammals has been attributed to Dryas II; the beginning of the Alleröd interstadial would thus be represented by levels 4. The typological and structural modifications of the lithic sequence therefore seem to occur in the Bölling interstadial.

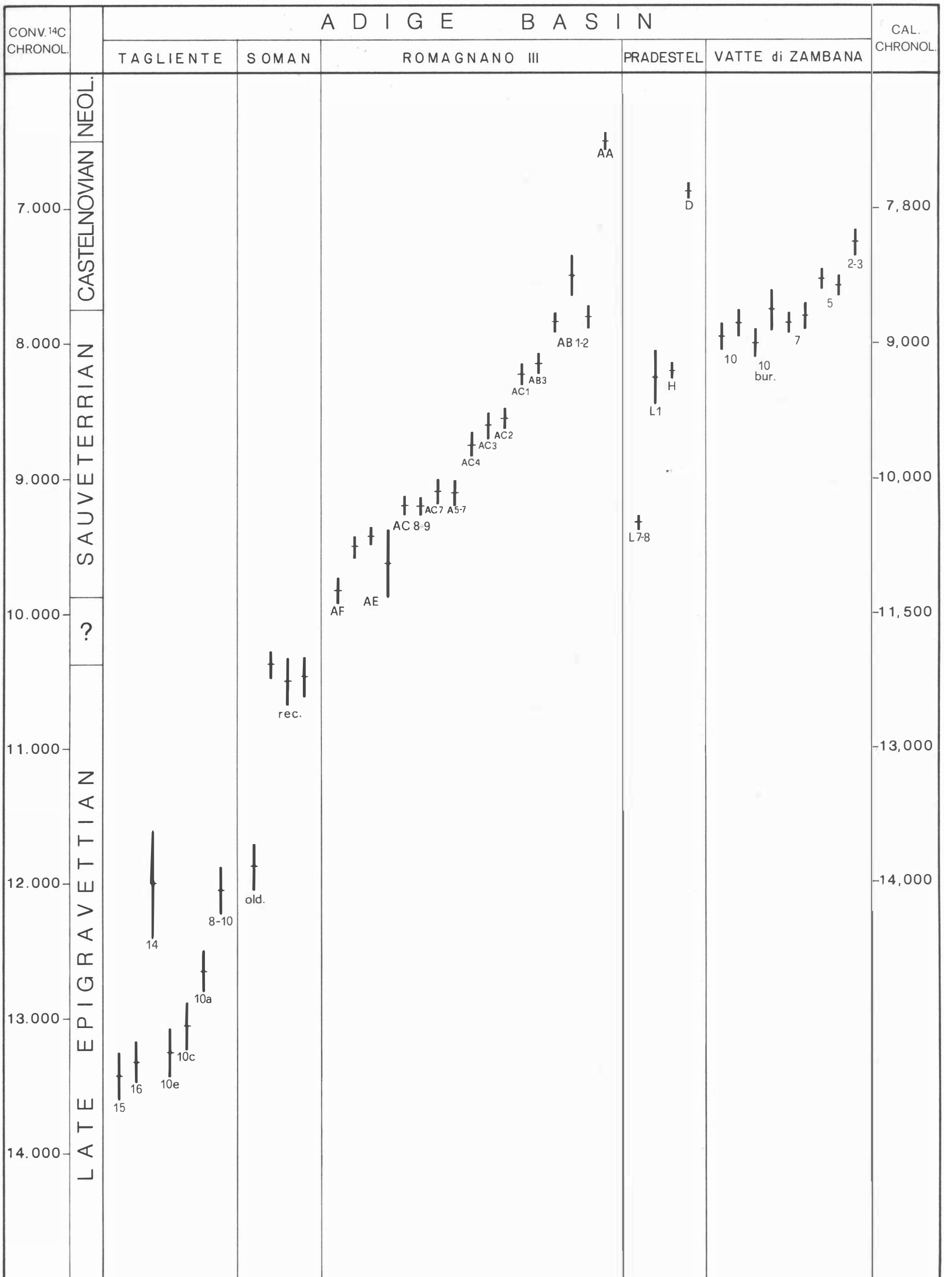
The series from Riparo Soman in the Val d'Adige, on the mountain side of the Ceraino gorge (Tagliacozzo *et al.,* 1993) is articulated in two principal phases, the oldest of which is collocated between the end of Dryas II and the beginning of the Alleröd interstadial (Gd-6158: 11,880 ±170 BP), and the most recent in Dryas III (Gd-4511: 10,510±180 BP; Gd-4491: 10,470±180 BP; Gd-6159: 10,450±150 BP; Gd-6163: 10,370±110 BP). The cores are mostly small with laminar removals (82-78%). The tools represent 23-27% of the retouched pieces; among these endscrapers (52-51%) are dominant, represented predominantly by short forms and among these nail-like, semicircular, subcircular and fan-shaped types. Burins are rare (4-8%), and truncations more frequent (12%); backed knives are present only in the oldest phase (6%). The armatures are represented above all by microgravettes obtained by means of direct or bipolar steep retouch; a type of small backed point with the base tapered by means of bipolar retouch opposite the backed edge is also present (6 examples in the first phase, 1 in the second). The truncated backed bladelets are of various types: backed with normal truncation, backed with two normal truncations, backed with oblique acute or obtuse angle truncation (3), and backed with two oblique symmetrical (4) or asymmetrical truncations. Backed bladelets with piquant-trièdre and truncated backed points are rare. Triangles, segments and trapezes are also rare (3% of each class), as are microburins which are represented only by ordinary types (microburin/armature ratio: 4-6%). Among the assemblages of the two phases there are no significant differences.

The terminal phase of the Epigravettian is not actually known in the stratigraphic series of the valley-bottom rockshelters, with the possible exception of Riparo Villabruna A in the Cismòn Valley (Venetian Dolomites); however, in this site the lithic assemblages from levels which may appertain to Dryas III and the beginning of the Preboreal are represented by only a few pieces (Aimar *et al.,* 1993). On the other hand there are some mountain open-sites, which are still undated radiometrically, such as Andalo (Guerreschi, 1984) and Piancavallo (Guerreschi, 1975) which seem to represent a final phase of the Epigravettian, characterised by a development of the microlithic geometric armatures (segments, scalene triangles, and isosceles triangles obtained by means of the microburin technique).

In these two assemblages, which we presume to be homogeneous, the flaking technique (which is reflected in the cores and blanks) repeats that of the recent Epigravettian, and is oriented towards the production of blades and bladelets. Although the typology of the tools does not differ from that of the Epigravettian tradition, the frequency indices of some classes seem to be significant (for example the ratio between short frontal endscrapers and long frontal endscrapers, which is greater than 3). Among the armatures we find both forms of the Epigravettian tradition (microgravettes, truncated backed bladets) and forms which seem to prelude the Sauveterrian (such as truncated points on laminar flakes, double backed pieces, segments and triangles). Among the armatures a clear tendency towards microlithisation is observable, which is particularly accentuated among the truncated backed bladets, the segments and triangles: for

Tab. I - Radiometric dates for the recent Epigravettian and Mesolithic in the Adige basin.

RIPARO TAGLIENTE Veneto Prealps, Valpantena, valley bottom, altitude 250 m					
layers	8-10	ST	charcoal	R-371	12,040±170
layer	10a	SMA	charcoal	OxA-3530	12,650±160
layer	10c	SMA	charcoal	OxA-3531	13,070±170
layer	10e	SMA	charcoal	OxA-3532	13,270±170
layer	14	ST	charcoal	R-604	12,000±400
layers	15-16	ST	charcoal	R-605	13,330±160
layers	15-16	ST	charcoal	R-605	13,430±180
RIPARO SOMAN Adige valley, valley bottom, altitude 100 m					
upper level			charcoal	Gd-6159	10,470±150
upper level			charcoal	Gd-4511	10,510±180
upper level			charcoal	Gd-6163	10,370±110
lower level			charcoal	Gd-6158	11,880±170
RIPARO ROMAGNANO III Adige valley, valley bottom, altitude 220 m					
layer AA		ST	charcoal	R-1136	6480±50
layer AB1.2		ST	charcoal	R-1137	7850±60
layer AB1.2		ST	charcoal	R-1137A	7500±160
layer AB1.2		ST	charcoal	R-1137B	7800±80
layer AB3		ST	charcoal	R-1138	8140±80
layer AC1		ST	charcoal	R-1139	8220±70
layer AC2		ST	charcoal	R-1140	8560±70
layer AC3		ST	charcoal	R-1141	8590±90
layer AC4		ST	charcoal	R-1142	8740±90
layer AC5.6		ST	charcoal	R-1143α	9090±90
layer AC7		ST	charcoal	R-1144α	9100±90
layer AC8.9		ST	charcoal	R-1145	9200±60
layer AC8.9		ST	charcoal	R-1145α	9200±60
layer AE1.4		ST	charcoal	R-1146A	9580±250
layer AE1.5		ST	charcoal	R-1146α	9420±60
layer AE		ST	charcoal	R-1146B	9490±80
layer AF		ST	charcoal	R-1147	9830±90
RIPARO PRADESTEL Adige valley, valley bottom, altitude 225 m					
layer D1.3		ST	charcoal	R-1148	6870±50
layer H.H2		ST	charcoal	R-1149	8200±50
layer L1		ST	charcoal	R-1150	8240±200
layer L7.8		ST	charcoal	R-1151	9320±50
RIPARO VATTE DI ZAMBANA Adige valley, valley bottom, altitude 220 m					
layer 2.3		ST	charcoal	R-487	7250±110
layer 5		ST	charcoal	R-488	7540±75
layer 5		ST	charcoal	R-488α	7585±75
layer 7		ST	charcoal	R-489	7860±75
layer 7		ST	charcoal	R-489α	7810±95
layer 10		ST	charcoal	R-490	7860±110
layer 10		ST	charcoal	R-490α	7960±100
layer 10 bur.		ST	charcoal	R-491	8000±110
layer 10 bur.		ST	charcoal	R-491α	7740±150



CONV. 14C CHRONOL.
A D I G E B A S I N
TAGLIENTE
SOMAN
ROMAGNANO III
PRADESTEL
VATTE di ZAMBANA
CAL. CHRONOL.
NEOL.
CASTELNOVIAN
SAUVETERRIAN
?
LATE EPIGRAVETTIAN
7.000
8.000
9.000
10.000
11.000
12.000
13.000
14.000
7,800
9,000
10,000
11,500
13,000
14,000
15
16
10e
10c
10a
14
8-10
old.
rec.
AF
AE
AC 8-9
AC7
A5-7
AC4
AC3
AC2
AC1
AB3
AB 1-2
AA
L7-8
L1
H
D
10
10 bur.
7
5
2-3

TAB. I

Tab. II - Radiometric dates for the recent Epigravettian and Mesolithic in the Brenta-Cismon basin, the Altipiano di Asiago and the Dolomites.

RIPARO VILLABRUNA A Cismon valley, valley bottom, altitude 500 m

layer 10A	SMA	charcoal	UtC-1771	11,910±160
layer 13	SMA	charcoal	UtC-1979	11,910±120
layer 14	SMA	charcoal	UtC-1770	12,150±110
layer 16	ST	charcoal	R-2022	12,040±125
layer 17 bur.	ST	charcoal	R-2023	12,040±150

COLBRICON Dolomites, open site on the shores of a lake, altitude 1930 m

site 1	ST	charcoal	R-895	9370±130

LAGO DELLE BUSE Dolomites, Lagorai Group, open site on the shores of a lake, altitude 2050 m

site 1	ST	charcoal	Gd-6156	7500±130
site 2	ST	charcoal	Gd-6160	8220±110
site 3	ST	charcoal	KI-3636.01	8540±180
site 3	ST	charcoal	KI-3636.02	9020±190

RIPARO DALMERI Prealps, Altipiano di Asiago, rockshelter, altitude 1050 m

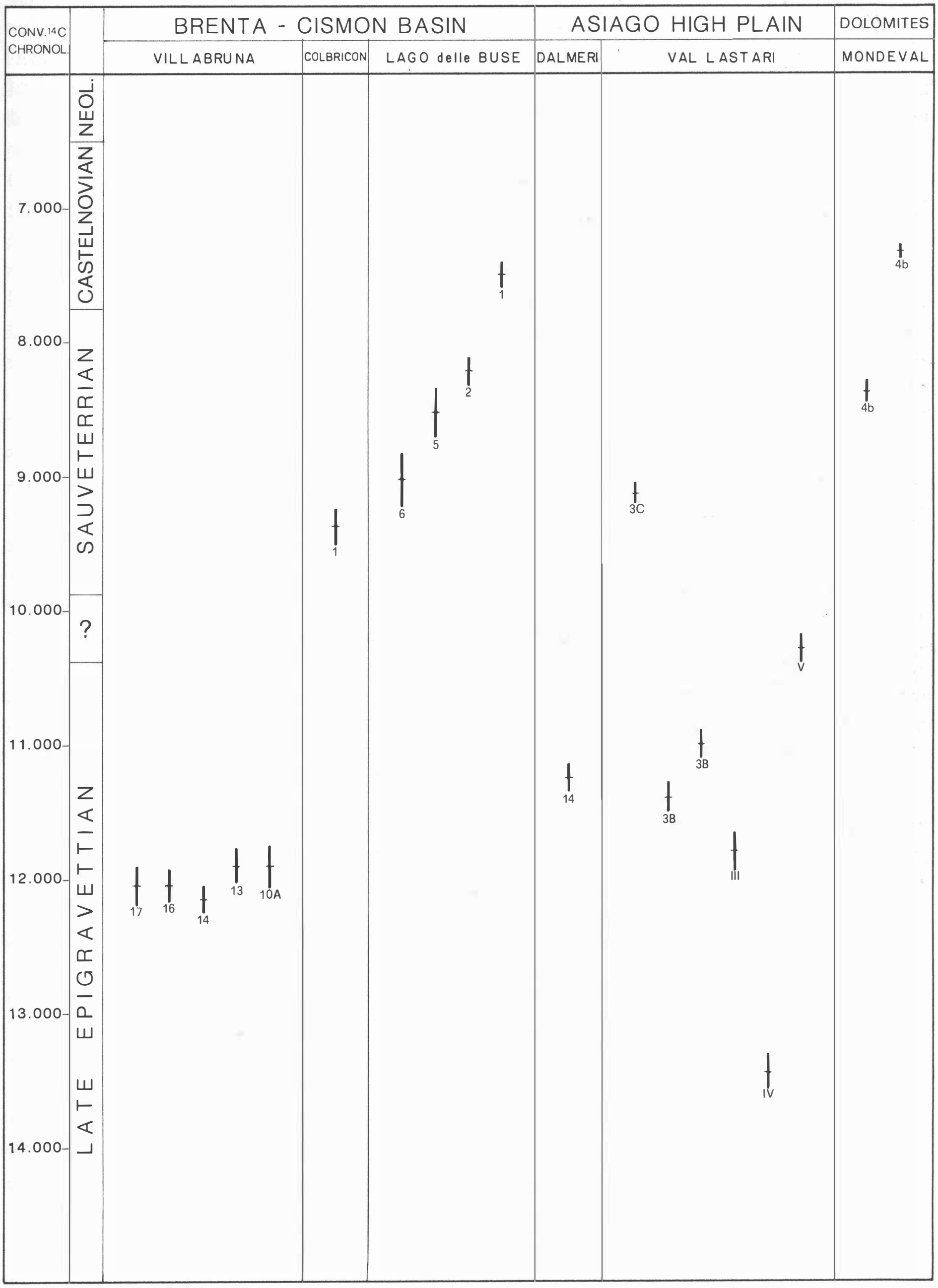
layer 14	ST	charcoal	KI-3634	11260±100

VAL LASTARI Prealps, Altipiano di Asiago, open site next to a rock wall, altitude 1060 m

layer 3B	SMA	charcoal	UtC-1773	11,390±110
layer 3B	SMA	charcoal	UtC-2041	11,010±90
layer 3C	SMA	charcoal	UtC-2040	9130±80
structure III	SMA	charcoal	UtC-2687	11,800±150
structure IV	SMA	charcoal	UtC-2686	13,450±130
structure V	SMA	charcoal	UtC-2685	10,280±110

MONDEVAL DE SORA Dolomites, Cordevole basin, rockshelter, altitude 2150 m

layer 4b bur.	ST	charcoal	R-1937	8380±70
layer 4b bur.	ST	charcoal	R-1939	7330±50


CONV. 14C CHRONOL.
BRENTA - CISMON BASIN
ASIAGO HIGH PLAIN
DOLOMITES
VILLABRUNA
COLBRICON
LAGO delle BUSE
DALMERI
VAL LASTARI
MONDEVAL
NEOL.
CASTELNOVIAN
SAUVETERRIAN
?
LATE EPIGRAVETTIAN
7.000
8.000
9.000
10.000
11.000
12.000
13.000
14.000
17
16
14
13
10A
1
6
5
2
1
14
3C
3B
3B
III
IV
V
4b
4b

TAB. II

example, in the assemblage from Piancavallo the length of the truncated backed bladelets varies between 10 and 27 mm, the segments between 10 and 18 mm, and the triangles between 11 and 22 mm, while for every class the mode concentrates around lower values. Both backed and ordinary microburins are abundant. This terminal phase of the Epigravettian should thus be collocated towards the end of Dryas III or the beginning of the Preboreal. Therefore we can propose a periodization of the recent Epigravettian in the region in three phases. The first phase, well documented in levels 16-11 of Riparo Tagliente, is collocated in the older Dryas and is characterised by a prevalence of long frontal endscrapers over short (made both on laminar and flake supports) and of the microgravettes over the other armatures. The second phase, documented at Riparo Tagliente in levels 10-4 and at Riparo Soman, is collocated between the end of the Bölling interstadial and the beginning of the younger Dryas, and is characterised by the inversion of the ratio between the two classes of endscrapers, by the development of the truncated backed bladelets among the armatures, and by the appearance of segments and triangles obtained by means of the microburin technique. The third phase, documented only in mountain sites (Andalo and Piancavallo) and characterised by the microburin technique and the microlithisation of all the armatures, seems to be collocated between the end of Dryas III and the beginning of the Preboreal; however it precedes the oldest phase of the Sauveterrian, which in the series from Romagnano in the Adige valley is dated to 9830±70 BP, 9580±250 BP, 9540±80 BP and 9420±80 (R-1147, R-1146B, R-1146 and R-1146A).

The lithic industry of the first phase without any doubt represents the results of an evolution of the ancient Epigravettian, of which the flaking techniques and the forms of both the tools and the armatures remain. The industries of the two successive phases are in fact influenced by technical and typological modifications which increasingly affect the lithic assemblages, but which do not manifest themselves only in the Epigravettian tradition. The diffusion of particular forms of short frontal endscrapers, of backed knives and of geometric armatures obtained by means of the microburin technique is a phenomenon which supercedes the Epigravettian and which in cultural ambits of different traditions marks the establishment of relationships made possible only with the change of environmental conditions in the course of the interstadials.

2.2. Distribution and characteristics of the sites. Economy

The only site of the first phase (Riparo Tagliente) is situated under a wide rockshelter on the bottom of a Pre-Alpine valley, close to a stream, at 250 metres above sea-level. The pollen spectrum of levels 16-15, referred to the older Dryas, reflects a steppe landscape with a pioneer vegetation, in a cold and arid climate; among the large mammals, ibex (80%) and bovids (aurochs and bison, 15%) are dominant (Cattani & Sala in Bartolomei *et al.*, 1982).

The second phase is also represented (at least the older part, corresponding to the Bölling interstadial, Dryas II, and the beginning of the Alleröd interstadial) at Riparo Tagliente. The Bölling interstadial corresponds with a climatic modification which led to the formation of pasture wooded with conifers and broadleaves; the change is particularly marked among the remains of large mammals, with a drastic reduction of ibex, bovids and elk, which were substituted by red deer (70-77), wild boar (5-16%), roe deer (4-9%) and chamois (1-10%).

In this phase a process of penetration by the Epigravettian hunters in the Alpine area began. Two valley-bottom sites are significant: Riparo Soman, in the Adige valley, on the mountain side of the Ceraino gorge at 100 metres above sea-level, and Riparo Villabruna in the Cismòn valley at 500 metres above sea level. In these two sites the oldest occupation episodes are collocated between the end of the Bölling interstadial and Dryas II, as is suggested by the radiocarbon dates from Riparo Soman (Gd-6158: 11,800±170 BP) and from Riparo Villabruna A levels 17 and 16 (R-2022: 12,040±125 BP and R-2023: 12,040±150 BP). At Riparo Soman a second period of occupation which is well documented archaeologically is referred to Dryas III (Gd-4511: 10,510±180 BP; Gd-4491: 10,470±180 BP; Gd-6159: 10,450±150 BP; and Gd-6163: 10,370±110 BP); a third and more recent phase presents a lithic assemblage which seems to have been contaminated by overlying Sauveterrian elements which do not even appertain to the most ancient Sauveterrian phase!

Riparo Soman is particularly interesting for its location along the left side of the Adige Valley, on the mountain side of the Ceraino gorge: it lies on the bottom of a valley excavated by glacial exaration during the Würm pleniglacial which was occupied, after the retreat of the glacier, by a lake (in the same valley, at the edge of the same lake, other sites apart from Riparo Soman were occupied in the Preboreal). The large mammals do not show any evident variations between the first two episodes of occupation: chamois is prevalent (34-42%), followed by ibex (22%), red deer (23-18%), wild boar (9-2%) and roe deer (6-2%); elk (3-8%) and aurochs (2-6%) are still present. The diminution of wild boar, red deer and roe deer in the second episode probably reflects the climatic recrudescence of Dryas III (Cassoli & Tagliacozzo, in Battaglia *et al.*, 1992).

At Riparo Villabruna A two chronological phases have been distinguished on the basis of the faunal remains: a first phase, pre-Alleröd, in which ibex predominates (57%) associated with chamois (21%), red deer (18%) and wild boar (4%), and to which the three dates already quoted appertain, in addition to another three (obtained with SEM) relative to level 14 (UtC-1770: 12,150±110 BP), level 13 (UtC-1979: 11,910±120 BP) and level 10A (UtC-1171: 11,910±160 BP); and a second phase, which seems to correspond to the Alleröd interstadial and possibly to a more recent date, although it has not been dated radiometrically, in which red deer (70%) predominates over ibex (14%), chamois (10%) and roe deer (3%). It is, in our opinion, to this second chronological interval that the majority of the mountain sites with Epigravettian industries should be attributed. Epigravettian sites are fairly numerous at altitudes of between 1000 and 1500 metres on the Monti Lessini, Altopiano di Asiago, Altopiano del Cansiglio and Piancavallo in the Venetian and Friulan Pre-Alps. Others are situated in the Alpine area proper, in the Adige basin (Le Viote del Bondone at 1570 m; Terlago at 1450 m; and Andalo at (1000 m). The highest and most northern site discovered so far that of Cionstoan in the Siusi Alps at 1850 m, represented by a few armatures only. These sites are rarely found under rockshelters (Riparo Dalmeri on the Altopiano di Asiago); instead they are normally open-sites in humid zones, close to small lakes and often close to rock walls (Val Lastari on the Altopiano di Asiago; Terlago).

The mountain Epigravettian sites are usually marked by the presence of dense concentrations of flint artifacts, often distributed chaotically in silty deposits; only rarely have habitation soils and structures been discovered (Val Lastari, Riparo Dalmeri). A first problem arises from the interpretation of these concentrations; are lithic assemblages related to a single episode of occupation, or rather to various different occupations which are not recognisable archaeologically? Until now only at the open-sites of Val Lastari and Riparo Dalmeri, both on the Altopiano di Asiago, has it been possible to recognize distinct episodes. At Riparo Dalmeri the presence of faunal remains may also give an indication of the season of occupation.

The lithic assemblages from the mountain Epigravettian sites present typological characteristics which are similar to those of the lowland sites, but differ from a structural point of view. We have made a comparison between the lithic assemblage from Val Lastari, on the Altopiano di Asiago, which is dated to the Alleröd interstadial, and the two Epigravettian lithic assemblages from Riparo Soman, one older and one more recent than that from Val Lastari: with respect to these, the assemblage from Val Lastari has a greater number of burins and truncated blades among the tools, and a greater number of backed points (especially microgravettes) among the armatures. Analogous observations have been made for other mountain assemblages (Riparo Battaglia, Fiorentini).

Only at Riparo Dalmeri, situated on the Altopiano di Asiago at 1240 metres above sea-level, have faunal remains been preserved: ibex, red deer and small carnivores, beaver, marmot and fish (Dalmeri & Lanzinger, 1989). When we posed the question of why the Epigravettian hunters would have begun to frequent the mountain zone in the late glacial, we hypothesized that it may in fact have been the migration of the ibex towards the Alpine pastures that determined the movement of the hunting territory towards the internal part of the Alpine region and towards the mountain pastures (Broglio, 1980).

The picture of the economy of the valley-bottom Epigravettian sites (Riparo Soman and Villabruna) is actually quite complex: apart from hunting there is evidence for fishing and the collection of honey, but among the large mammals open environment species predominate (ibex and chamois) which had already disappeared from the Pre-Alpine sites (Riparo Tagliente). Riparo Dalmeri also presents a picture of the economy in which fishing played an important role; the large mammals suggest the exploitation of extensive territories of the vegetational fascia of conifer woodland and Alpine pastures. Among the mountain Epigravettian sites only that of Val Lastari, on the Altopiano di Asiago at 1060 metres, has been dated radiometrically using SEM (UtC-1773: 11,390±110 BP; UtC-2041: 11,010±90 BP). The two dates refer to a period of occupation of the site that was probably distinct, and which is more recent than another, with habitation structures, as yet undated. It would therefore seem that the frequentation of the mountain zone in the late glacial began at least during the Alleröd interstadial.

The study of the lithic assemblage from Val Lastari (Broglio *et al.*, 1992; Peresani, 1993) suggests that the site was also related to the exploitation of local flint, which would have been used not only at the site but also exported to be used at other sites as yet unidentified. In fact the blocks of flint, which derive from the outcrops and especially from the detrital deposits in the area, were tested before they were exploited, and the flaking techniques were oriented essentially towards the manufacture of blades and bladelets. The number of cores with blade or bladelet removals is too high with relation to the blade and bladelet products used as such or as blanks for tools and armatures on the site: this makes us think that a part of the blades and bladelets was exported to be used elsewhere. The resources of the mountain zone were therefore well known to Epigravettian hunters.

3. The Mesolithic

3.1. The Sauveterrian-Castelnovian sequence

The Mesolithic sequence of the region is well known as a result of the important series revealed in the rockshelters on the valley floor of the Adige Valley and in the environs of Trento, and above all at Riparo Soman (Broglio & Kozlowski, 1983), Pradestel and Vatte di Zambana, which have all been dated radiometrically (Alessio *et al.*, 1983). The sequence from Romagnano III represents a continuous phenomenon, without abrupt interruptions, and can thus be divided schematically.

a - Ancient Sauveterrian phase (Romagnano III AF-AE, dated radiometrically between 9900 and 7300 BP). The characteristic elements of the Sauveterrian appear already in this phase. The flaking techniques are oriented towards the production of blanks with predominantly irregular forms, without any clear distinction between flakes and blade or bladelet products. Among the tools the following are present: burins on large blanks; endscrapers on rectangular and oval blades; fan-shaped, short, very short, oval, shouldered and nosed endscrapers on flakes; and backed knives cfr. Rouffignac. The armatures have a hypermicrolithic aspect; their form is usually independent of the morphology of the blank, and standardised. In the ancient phase triangles are dominant (42%) associated with laminar flakes (11%), segments (11%), truncated backed bladelets (12%) and double-backed points (15%). Among the triangles isosceles types predominate, and among them those with all three sides retouched.

b - Middle Sauvetterian phase (Romagnano III AC9-AC3 with dates comprised between 9300 and 8500 BP; Pradestel L14-L1). It is characterised, among the armatures, by the association of segments (28-15%), triangles (22-49%), double-backed points (26-30%) and points on laminar flakes (17-10%). Among these segments, triangles and double-backed points with elongated forms dominate over short forms.

c - Recent Sauveterrian phase (Romagnano III AC2-AC1, with dates comprised between 8600 and 8200 BP; Pradestel H2-H1). This differs from the middle phase by the appearance of Montclus triangles which represent 20% of all the triangles, and by the presence of short double-backed points with natural bases, associated with elongated forms.

d - Final Sauveterrian phase (Vatte tt. 10 and 7 with dates comprised between 8000 and 7800 BP; Pradestel F). The tendencies observed in the preceding phase are accentuated; symmetrical trapezoidal forms appear.

e - Castelnovian phase (Romagnano III AB1-2, with dates later than 7800 BP; probably Pradestel E). The Castelnovian differs above all in the flaking techniques, which are oriented towards the production of regular blades (with sub-parallel sides, of trapezoidal or flattened triangular section, and facetted platforms), which were used both as blanks for tools (endscrapers, retouched blades) and for the manufacture of trapezoidal armatures using the microburin technique. Among the armatures the characteristic forms of the Sauveterrian (segments, triangles, double-backed points, etc.) experience a strong diminution, and these were replaced by trapezoidal armatures. Around 6500 BP the first pottery appears in the local Castelnovian.

This Mesolithic sequence has found many comparisons in north-east Italy, and especially in the Adige basin. The first part of the sequence, which develops in the Preboreal and Boreal, is grafted onto the Epigravettian tradition of the region, but also shows some important modifications with respect to this. While in the recent Epigravettian the flaking techniques were oriented especially towards the production of bladelets, in the Sauveterrian the production of small flakes was established, made from subdiscoidal cores which represent about half of all the cores. A clear distinction is observed between the tools and the armatures: the latter have forms which are independent of the morphology of the blank (which explains, at least partially, the innovations in the flaking processes) and are highly standardised. Forms unknown in the Epigravettian appear among the tools, such as the backed knives with tapered bases cfr. Rouffignac, and among the armatures, such as the microlithic and hypermicrolithic forms characteristic of the Sauveterrian (segments, various forms of triangles, various types of double-backed points). Forms which have a larger area of diffusion also appear, such as the points on laminar flakes. The second part of the sequence, which develops in the Atlantic until the Neolithic period, shows modifications in the flaking techniques, with the establishment of the production of blades with regular forms which were either used as such, or as blanks for long endscrapers, or for the manufacture of trapezoidal armatures. The latter repeats the characteristic forms of the Castelnovian.

In this region the Sauveterrian and Castelnovian constitute a linear sequence and together the installation of relationships between the last hunter-gatherers of the Po Plain and those of the Mediterranean region of France.

3.2. Distribution and characteristics of the sites. Economy

The distribution of the Mesolithic sites in north-east Italy (excluding the Carso Triestino, which is considered to be a separate region because of its particular morphological and environmental characteristics) is well differentiated between the ancient phase of Preboreal and Boreal age, characterised by a Sauveterrian industry, and the recent phase of Atlantic age, characterised by a Castelnovian industry. With only a few exceptions we can ascertain that:

a - in the ancient phase the sites are distributed both on the Alpine valley-bottoms, and in the mountains in an altitudinal fascia comprised between 1900 and 2300 m;

b - in the recent phase the sites on the Alpine valley-bottoms remain, while the mountain sites become rarer; other sites are found in the Pre-Alpine hill zone and on the plains.

The Adige basin represents the best explored area so far, by means of both survey and excavation; however, research has recently been extended to other river basins, such as those of the Cismòn and the Piave. On the bottom of the Adige Valley various Mesolithic sites have been discovered in small rockshelters, in the tract which stretches from Chiusa di Ceraino to Mezzocorona. In the postglacial the Adige Valley, excavated by Würm glaciers, hosted a large lake basin which is documented by the silty sediments found by various prospections under the recent alluvium of the Adige. The Mesolithic hunter-gatherers settled at the edge of this basin, and developed a mixed economy based on hunting large mammals (ibex, red deer, chamois, roe deer, wild boar, etc.) and marsh turtles, fishing, collecting eggs and fresh water molluscs (Boscato & Sala, 1980). Among the animals that were hunted, during the Boreal there was a rarefaction of the ibex, which is related to open environments, and a corresponding increase in red deer and roe deer, which tallies with the transformation in the vegetal landscape which was first dominated by Scotch pine and then by mixed oak wood and hazel-nut (CATTANI, 1977).

All of the Mesolithic sequence, but especially the ancient part with Sauveterrian industries, is documented in the mountain sites, distributed over a vast area which streches from the northern margin of the Pre-Alps (Altopiano di Asiago, M. Pasubio) to the Alpine watershed, with a maximum concentration in the Dolomites. Few of the sites have radiometric dates: Colbricon 1 (9370±130 BP); Mondeval de Sora, with a date of around 8200 BP for the oldest habitation structure, and of around 7300 BP for the overlying burial (GUERRESCHI, 1992); Grotta di Ernesto (a site which represents an occasional campsite for hunters, anomalous for its low altitude (1130 m) at the edge of the Altopiano di Asiago) with a series of dates which fall in the Boreal (DALMERI, 1991); and the sites of Lago delle Buse, in the Lagorai chain, with two dates which collocate the sites between the end of the Boreal and the beginning of the Atlantic (Gd-6160: 8220±110 BP and Gd-6156: 7500±130 BP; DALMERI & LANZINGER, 1989).

The majority of the sites are represented by concentrations of flints, which are found in recurrent morphological situations: at the edges of small lakes (Colbricon 1, 3, 5 and 7); in dominating positions (Colbricon 6 and 8); in small rockshelters formed by the jutting edges of large boulders (Frea I, III and IV; Mondeval de Sora, etc.). The abundance of artifacts and the ratios between tools and armatures and between armatures and microburins suggest a distinction between the lithic assemblages which appertain to residential sites (artifacts more numerous, with ratio between tools and armatures not very different to that of the valley-bottom sites), and hunting stations (artifacts less numerous, with very few tools) (LANZINGER, 1985).

The relationships between the mountain sites and those of the valley-bottoms is revealed by the materials used (BROGLIO & LUNZ, 1983; BROGLIO, LUISE & LUNZ, 1987). These raw materials consist of quartz which comes from the area to the north of the Val Pusteria, flint from the Dolomites (from the Marne del Puez or the Livinallongo Formation), and flint from Jurassic and Cretaceous formations in the southern Alps, probably from the southern Trentino. In the assemblages one notices that the latter represents everywhere the most widely used material, up to 100% in the majority of the valley-bottom sites around Trento; that the dolomitic flint is present exclusively in the sites in the Dolomites, and in quite low frequencies probably as a result of its poor quality for flaking; that quartz is present exceptionally in the valley-bottom sites around Trento (Riparo Gaban), and present with low frequencies in some in the Dolomites (Plan de Frea I, III and IV; Mondeval de Sora, etc.) and is in fact abundant (up to about 50%) in the sites close to the provenance area, to the north of the Val Pusteria. However, it is necessary to point out that these observations on the raw material have not yet been controlled by rigorous analysis. These data suggest that the mountain sites and those of the valley-bottoms constituted systems, and that the Alpine territory was exploited from the valley-bottoms (100-200 metres above sea-level in the Adige Valley) up to the mountain pastures; however, the absence of intermediate discoveries leads us to conclude that the activities of the Mesolithic hunters took place in two distinct environments, the valley-bottoms and the middle-high mountain zone, which were frequented seasonally. The seasonality of occupation could be proved by an analysis of the faunal remains from the valley-bottom sites.

Only in the Sauveterrian occupation level dated to the Boreal at Riparo di Mondeval de Sora, at 2150 m in the Venetian Dolomites, have faunal remains been preserved; these are of red deer (prevalent) and ibex (Guerreschi, 1992). Unfortunately there are no indications for the older sites of Preboreal age.

The collocation of many hunting stations in valleys or in dominating positions on crests would seem to suggest that the prey was ibex rather than red deer, although only archaeological evidence can offer more precise indications.

As has already been said, the majority of the Mesolithic sites in the Dolomites are attributed to the Sauveterrian; even when trapezoidal armatures are present, these are associated with triangles, segments and double-backed points, which makes one think of an initial phase of the Castelnovian. Mountain sites of the earliest Neolithic are known, which derive from the local Castelnovian (Bisi *et al.*, 1987). We must therefore conclude that in the Atlantic the occupation of the mountain zone diminished and then ceased; the interest of the hunters moved towards the Pre-Alpine hills and plains.

4. Considerations

The data which have been presented here highlight two different situations, one related to the late glacial and recent Epigravettian, and the other to the early postglacial and Sauveterrian. In both, systems developed which presuppose an extension of the territories to the mountain zone, and consequently an adaptation to that environment and an exploitation of its resources. Further research, especially of the lithic material (which in this region must be realized using rigorous methods) and of the archaeozoology, will probably offer more precise indications.

Acknowledgements

The work was funded by the Consiglio Nazionale delle Ricerche, Comitato Nazionale per la Scienza e la Tecnologia dei Beni Culturali.

SUMMARY

Research carried out in the last thirty years in north-east Italy has led to the discovery of various late Upper Palaeolithic and Mesolithic sites in the mountain zone. The chronostratigraphic position of these sites can be established by means of a reference sequence for the recent Epigravettian, Sauveterrian and Castelnovian, established in the same region on the basis of stratigraphic series from valley-bottom rockshelter sites (especially in the Adige valley); this is sometimes also confirmed by radiometric dates obtained for the mountain sites.

The Epigravettian sites are situated on the Pre-Alpine plateaus (Monti Lessini, Altipiano di Tonezza, Altipiano di Asiago, Cansiglio, Piancavallo) and in the Alpine zone proper (Bondone, Terlago, Andalo) within an altitudinal band comprised between 1000 and 1600 metres above sea level, and nearly always close to small lakes. The age of these sites is collocated in the Alleröd interstadial; however, some of them seem to represent a more recent Epigravettian phase, which

would thus be collocated between the end of Dryas III and the beginning of the Preboreal. Various indications suggest that these discoveries represent residential sites related to hunting activities and, at least in some of them, also to activities of extraction and preliminary working of the lithic raw material.

The Mesolithic sites are situated in the area comprised between the Alpine watershed and the northern margin of the Pre-Alpine plateaus, within an altitudinal band comprised between 1900 and 2300 metres above sea level. They are found in recurrent morphological situations: close to small bodies of water; under the shelters formed by the jutting edges of large erratic blocks; on mountain passes; and in dominating positions. Their age is collocated between the Preboreal and the beginning of the Atlantic. The structure of the lithic assemblages, and above all the tool-armature and armature-microburin ratios, suggests a differentiation between residential sites and hunting stations.

At the current state of research, if one takes into account the archaeological evidence and if one also wants to attribute significance to negative data, one has to admit that the occupation of the mountains in the late glacial and early postglacial occurred in well defined moments (Alleröd interstadial, an as yet unidentified subsequent chronological period, a period comprising the later part of the Preboreal, the Boreal and beginning of the Atlantic), but according to two different models. In the late glacial the Epigravettian hunters established their seasonal residential sites in the vegetational zone of sparse woodland immediately below the lower limit of the Alpine pastures, and exploited the resources of both the mountains and the valleys. In the postglacial the Sauveterrian hunters established their seasonal residential sites in the same vegetational zone, and from these sites they left for the hunting stations which they occupied for very short periods of time. The occupation of the mountain zone brought the Epigravettian and Sauveterrian hunters to know and exploit its resources, as is widely demostrated by the lithic raw material (flint, quartz).

RIASSUNTO

Le ricerche condotte negli ultimi trent'anni nell'Italia nord-orientale hanno portato al ritrovamento di vari siti della fine del Paleolitico superiore e del Mesolitico ubicati in ambiente montano. La posizione cronostratigrafica di questi siti può essere stabilita grazie a sequenze di riferimento dell'Epigravettiano recente, del Sauveterriano e del Castelnoviano, stabilite nella medesima regione sulla base di serie stratigrafiche di ripari sotto roccia di fondovalle (soprattutto della Val d'Adige); essa trova conferma in alcune datazioni radiometriche ottenute per i siti montani.

I siti epigravettiani sono collocati sugli altipiani prealpini (Monti Lessini, Altipiano di Tonezza, Altipiano di Asiago, Cansiglio, Piancavallo) e in area più propriamente alpina (Bondone, Terlago, Andalo) entro una fascia altitudinale compresa tra 1000 e 1600 m di quota, quasi sempre in prossimità di piccoli laghi. L'età di questi siti si colloca nell'interstadio di Alleröd; tuttavia alcuni di essi sembrano rappresentare una fase epigravettiana più recente, che dovrebbe collocarsi tra fine del Dryas III e inizio del Preboreale. Varie considerazioni suggeriscono che questi ritrovamenti rappresentino siti residenziali legati ad attività di caccia e, almeno alcuni di essi, anche ad attività di estrazione e di prima lavorazione dei materiali litici.

I siti mesolitici si trovano nel territorio compreso tra lo spartiacque alpino e il margine settentrionale degli altipiani prealpini, entro una fascia altitudinale compresa tra 1900 e 2300 m di quota. Sono collocati in situazioni morfologiche ricorrenti: in prossimità di piccoli specchi d'acqua; sotto ripari formati dalle pareti aggettanti di grandi massi di frana; sui passi; in posizioni dominanti. La loro età si colloca tra il Preboreale e l'inizio dell'Atlantico. Le strutture degli insiemi litici, e soprattutto i rapporti strumenti-armature e armature-microbulini, suggeriscono una differenziazione tra siti residenziali ed appostamenti di caccia.

BIBLIOGRAPHY

AIMAR A., ALCIATI G., BROGLIO A., CASTELLETTI L., CATTANI L., D'AMICO C., GIACOBINI G., MASPERO A. & PERESANI M., 1993 - Les Abris Villabruna dans la Vallée du Cismòn. *Preistoria Alpina*, 28/1, pp. 227-254.

ALCIATI G., CATTANI L., FONTANA F., GERHARDINGER M. E., GUERRESCHI A., MILLIKEN S., MOZZI P. & ROWLEY CONWY P., 1993 - Mondeval de Sora: a high Altitude Mesolithic Campsite in the Italian Dolomites. *Preistoria Alpina* 28/1, pp. 351-366.

ALESSIO M., ALLEGRI L., BELLA F., BROGLIO A., CALDERONI G., CORTESI C., IMPROTA S., PREITE MARTINEZ M., PETRONE V. & TURI B., 1983 - 14 C Datings of three mesolithic series of Trento Basin in the Adige Valley (Vatte di Zambana, Pradestel, Romagnano) and comparisons with Mesolithic series of other regions. *Preistoria Alpina,* 19, pp. 245-254.

BAGOLINI B., 1972 - Primi risultati delle ricerche sugli insediamenti epipaleolitici del Colbricon (Dolomiti). *Preistoria Alpina*, 8, pp. 107-149.

BAGOLINI B., BARBACOVI F., CASTELLETTI L. & LANZINGER M., 1975 - Colbricon (scavi 1973-1974). *Preistoria Alpina*, 11, pp. 201-235.

BAGOLINI B. & BROGLIO A., 1985 - Il ruolo delle Alpi nei tempi preistorici (dal Paleolitico al Calcolitico). In Liverani M., Palmieri A., Peroni R. (eds.), *Studi di paletnologia in onore di S. M. Puglisi*, Roma 1985, pp. 663-705.

BAGOLINI B., BROGLIO A. & LUNZ R., 1983 - Le Mésolithique des Dolomites. *Preistoria Alpina,* 19, pp. 15-36.

BAGOLINI B. & DALMERI G., 1983 - Site Paléolithique du Lac de Terlago (Trento). *Preistoria Alpina*, 19, pp. 189-196.

BAGOLINI B. & DALMERI G., 1985 - Grotta d'Ernesto - Val d'Antenne (Grigno Valsugana - Trento). *Preistoria Alpina*, 21, pp. 225-233.

BAGOLINI B. & DALMERI G., 1987 - I siti mesolitici di Colbricon (Trentino). Analisi spaziale e fruizione del territorio. *Preistoria Alpina*, 23, pp. 7-188.

BAGOLINI B. & GUERRESCHI A., 1978 - Notizie preliminari sulle ricerche 1977-1978 nell'insediamento paleolitico delle Viotte di Bondone (Trento). *Preistoria Alpina*, 14, pp. 7-31.

BAGOLINI B. & PASQUALI T., 1983 - Le Mésolithique dans la Chaine du Lagorai. *Preistoria Alpina,* 19, pp. 197-200.

BAGOLINI B., PASQUALI T. & ZAMPEDRI M., 1985 - Testimonianze epigravettiane nella Piana della Marcesina - Altopiano dei Sette Comuni. *Preistoria Alpina*, 21, pp. 11-20.

BARTOLOMEI G. (ed.), 1984 - L'evoluzione dell'ambiente del Quaternario. In Aspes A. (ed.), *Il Veneto nell'antichità - preistoria e protostoria*. B.P.V., Verona, I, pp. 43-141.

BARTOLOMEI G. & BROGLIO A., 1967 - Il giacimento dei Fiorentini sull'altopiano di Tonezza-Folgaria. *Origini,* 1, pp. 11-36.

BARTOLOMEI G., BROGLIO A., CATTANI L., CREMASCHI M., GUERRESCHI A., MANTOVANI E., PERETTO C. & SALA B., 1982 - I depositi würmiani del Riparo Tagliente. *Ann. Univ. Ferrara*, n.s. sez. XV, III, pp. 61-105.

BARTOLOMEI G., BROGLIO A. & GASPARDO D., 1971 - Un insediamento epigravettiano sul Pian Cavallo. *Riv. Scienze Preistoriche*, XXVI, pp. 393-401.

Bartolomei G., Broglio A. & Palma di Cesnola A., 1979 - Chronostratigraphie et écologie de l'Epigravettian en Italie. In de Sonneville Bordes D., (ed.), *La fin des tempes glaciaires en Europe - Chronologie et écologie des cultures du Paléolithique final. Coll. Int. du C.N.R.S. n. 271*, pp. 297-324.

Tagliacozzo A. & Cassoli P.F., 1993 - La macrofaune de l'Abri Soman (Val d'Adige - Italie). *Preistoria Alpina*, 28/1, pp. 181-192 .

Bisi F., Broglio A., Dalmeri G., Lanzinger M. & Sartorelli A., 1987 - Les bases mésolithiques du Néolithique ancien au Sud des Alpes. In Kozlowski J. K. & Kozlowski S. K. (eds.), *Chipped Stone Industries of the Early Farming Cultures in Europe. Archaeologia interregionalis*, Warsaw 1987, pp. 381-422.

Bisi F., Broglio A., Guerreschi A. & Radmilli A. M., 1983 - L'Epigravettien évolué et final de la zone Haute- et Moyenne Adriatique. *Riv. Scienze Preistoriche*, XXXVIII, pp. 229-265.

Boscato P. & Sala B., 1980 - Dati paleontologici e cronologici di tre depositi epipaleolitici in Valle dell'Adige (Trento). *Preistoria Alpina*, 16, pp. 45-61.

Broglio A., 1964 - Il Riparo «Raffaello Battaglia» presso Asiago. *Riv. Scienze Preistoriche*, XIX, pp. 129-174.

Broglio A., 1971 - Risultati preliminari delle ricerche sui complessi epipaleolitici della Valle dell'Adige. *Preistoria Alpina*, 7, pp. 135-241.

Broglio A., 1972 - I più antichi abitatori della Valle dell'Adige. *Preistoria Alpina*, 8, pp. 157-176.

Broglio A., 1973 - La preistoria della Valle Padana dalla fine del Paleolitico agli inizi del Neolitico: cronologia, aspetti culturali e trasformazioni economiche. *Riv. Scienze Preistoriche*, XXVIII, pp. 133-160.

Broglio A., 1973a - L'Epipaléolithique de la Vallée de l'Adige. *L'Anthropologie*, LVII, pp. 5-33.

Broglio A., 1975 - Le passage du Paléolitique supérieur au Néolithique dans la région Vénétie-Trentin-Frioul. *Actes Coll. Int. «L'Epipaléolithique méditérranéen»*, Aix-en-Provence, pp. 5-21.

Broglio A., 1976 - L'Epipaléolithique de la Vallée du Po. IX Congrès U.I.S.P.P., Coll. XIX *«Les civilisations du 8.e au 5.e millénaire avant notre ère en Europe»*, pp. 9-31.

Broglio A., 1980 - Culture e ambienti della fine del Paleolitico e del Mesolitico nell'Italia nord-orientale. *Preistoria Alpina*, 16, pp. 7-29.

Broglio A. (ed.), 1984 - Paleolitico e Mesolitico. In Aspes A. (ed.), *Il Veneto nell'antichità - preistoria e protostoria.* B.P.V., Verona, pp. 165-319.

Broglio A., 1981 - De la fin du Paléolithique au commencement du Néolithique au Sud des Alpes. *Archaeologia interregionalis*, I, pp. 9-41.

Broglio A., Castelletti L., Frigo G., Martello G., Maspero A. & Peresani M., 1993 - Le site épigravettien de Val Lastari sur l'Haut Plateau d'Asiago (Préalpes de la Vénétie). *Preistoria Alpina, 28/* 1, pp. 207-225.

Broglio A., Corai P. & Lunz R., 1983 - Risultati preliminari delle prospezioni nei siti mesolitici della Val Gardena e degli scavi al Pian de Frea. *Bull. Soc. Etudes Préhist. Alpines, Aosta*, XV, pp. 19-53.

Broglio A. & Kozlowski S.K., 1983 - Tipologia ed evoluzione delle industrie mesolitiche di Romagnano III. *Preistoria Alpina*, 19, pp. 93-148.

Broglio A. & Lanzinger M., 1990 - Considerazioni sulla distribuzione dei siti tra la fine del Paleolitico superiore e l'inizio del Neolitico nell'Italia nord-orientale. In Biagi P. (ed.), *The Neolithisation of the alpine region, Monogr. Natura Bresciana*, 13, pp. 53-69.

Broglio A., Luise M. & Lunz R., 1987 - Lithic Materials and their Use during the Mesolithic within the Catchment Area of the Adige. In Biro Katalin T. (ed.), *International Conference on Prehistoric Flint Mining and Lithic Raw Material identification in the Carpathian Basin*, Budapest-Sumeg 1986, pp. 201-209.

Broglio A. & Lunz R., 1978 - Eine epipalaeolithische Niederlassung auf Jochgrimm in den Dolomiten. Vorgeschichtliche Siedlungsspuren in Raum zwischen Eggental und Fleimstal. *Der Schlern*, LII, pp. 489-498.

Broglio A. & Lunz R., 1983 - Osservazioni preliminari sull'utilizzazione del cristallo di rocca nelle industrie mesolitiche del Bacino dell'Adige. *Preistoria Alpina*, 19, pp. 201-208.

Cattani L., 1977 - Dati palinologici inerenti ai depositi di Pradestel e di Vatte di Zambana nella Valle dell'Adige. *Preistoria Alpina*, 13, pp. 21-29.

Cattani L., 1983 - Il paesaggio postglaciale del Colbricon (Passo Rolle, Trento) in base alle analisi polliniche dell'insediamento mesolitico. *Preistoria Alpina*, 19, pp. 255-277.

Dalmeri G., 1985 - La Grotta di Ernesto: un insediamento preistorico di grande interesse per la conoscenza del paleolitico finale nell'area trentino-veneta (Colle dei Meneghini-Val D'Antenne, Trentino sud-orientale). *Natura Alpina*, 36 (2-3), pp. 31-39.

Dalmeri G., 1991 - Gli insediamenti della Grotta d'Ernesto e della Marcesina (Grigno). *Natura Alpina*, 42 (1), pp. 1-34.

Dalmeri G. & Lanzinger M., 1989 - Il Mesolitico del Lagorai nell'area del Lago delle Buse, prospezioni e sondaggi. *Preistoria Alpina*, 25, pp. 219-222.

Dalmeri G. & Lanzinger M., 1989a - Ricerche paletnologiche e paleoambientali al Riparo Dalmeri (Trento). *Preistoria Alpina*, 25, pp. 223-229.

Frigo G. & Martello G. V., 1991 - Testimonianze mesolitiche a sud di Cima XII (Altopiano dei Sette Comuni). *Preistoria Alpina*, 27, pp. 163-171.

Guerreschi A., 1975 - L'Epigravettiano di Piancavallo (Pordenone). *Preistoria Alpina,* 11, pp. 255-293.

Guerreschi A., 1984 - Il sito epigravettiano di Andalo (Trento) ed alcune considerazioni sull'Epigravettiano finale del Nord-Italia. *Preistoria Alpina,* 20, pp. 15-38.

Kofler W., 1993 - Die Vegetationsentwicklung im Spätpaläolithikum und Mesolithikum im Raume Trient. *Preistoria Alpina*, 28/1, pp. 83-103.

Lanzinger M., 1985 - Ricerche nei siti mesolitici della Cresta Siusi (Auf der Schneide, siti XV e XVI dell'Alpe di Siusi) nelle Dolomiti. Considerazioni sul significato funzionale espresso dalle industrie mesolitiche della regione. *Preistoria Alpina*, 21, pp. 33-48.

Oeggl K. & Wahlmüller N., 1993 - Vegetation and climate history of a high alpine mesolithic camp site in the Eastern Alps. *Preistoria Alpina*, 28/1, pp. 71-82 .

Peresani M., 1993 - Flint Exploitation at Epigravettian Sites in the Asiago Plateau (Venetian Prealps). *Preistoria Alpina*, 28/1, pp. 193-205.