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The Late Palaeolithic and Mesolithic Settlement of Northern Italy: Problems and Perspectives

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Abstract: This paper considers some problems of the Late Palaeolithic and the Mesolithic periods in Northern Italy. More precisely, it deals with chronology, settlement pattern, techno-typological characteristics of knapped stone assemblages, and climatic changes that have taken place in the region from the discovery of the first sites in the 1960s and the excavations that soon followed to the present state of research. The Italian Alps, the Piedmont, and the valleys that descend from the high massifs have yielded important traces of Late Palaeolithic (Final Epigravettian) and Mesolithic (Sauveterrian and Castelnovian) sites and findspots, some of which are rock shelters that were settled throughout several millennia. This paper describes and discusses the evidence available mainly from two regions of the western and eastern Alpine arc, which are characterised by very different landscapes and yielded a great variety of archaeological features.

Keywords: northern Italy; late palaeolithic; final epigravettian; mesolithic; alpine chain; settlement pattern; radiocarbon chronology

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1. Introduction

Research and excavations carried out during the last fifty years have greatly improved our view of the Late Pleistocene and Early Holocene archaeology of Italy. Little was known of these two periods in the decades preceding the outbreak of the Second World War when our knowledge was based on the results of excavations at just a few sites [1,2]. In those years, debate regarding the terminology used to subdivide the different periods of Italian prehistory [3], and the existence or nonexistence of some of these periods, the Upper Palaeolithic for example, was quite intense [4].

The first summary paper regarding the Mesolithic in Italy was written in 1960 [5]. It was followed, a few years later, by the discovery of an important Mesolithic sequence in the Riparo Blanc, in the Circeo Promontory, ca 80 km southeast of Rome [6]. The terminology that we use nowadays to describe the Late Palaeolithic and Mesolithic cultures of Italy was introduced in the 1970s, when the archaeology of these two periods began to develop in some regions of northern Italy, thanks to the results achieved from new excavations and surveys organised by a few universities and local natural history museums.

The history of the Late Palaeolithic Epigravettian [7] is quite different from that of the Mesolithic Sauveterrian and Castelnovian [8]. Regarding the Epigravettian, previously called Tardigravettian, we must refer to the seminal works written by G. Laplace [9–11], which focused on the subdivision of the Italian Upper Palaeolithic as it was conceived [12], shaped [13], and soon after adopted by many Italian prehistorians with just a few changes [14]. From a chronological point of view, the Final Epigravettian is radiocarbon-dated to ca 14,000–10,000 uncal BP yrs (ca 15,000–9500 cal BC yrs). It is followed by the beginning of the Holocene, after the Younger Dryas cold event, which marks the end of the Pleistocene.

So far, only a few regions of northern Italy have yielded Final Epigravettian sites. Many have been discovered in Liguria and Veneto-Trentino-Friuli [15] (Figure 1). They are less represented in other regions, Piedmont for example, most probably because of the

geomorphological characteristics of the territory and the scarcity of good-quality knappable chert sources. Their location and altitude are variable, as are the characteristics of the sites, among which are rock shelters, caves, and open-air stations.

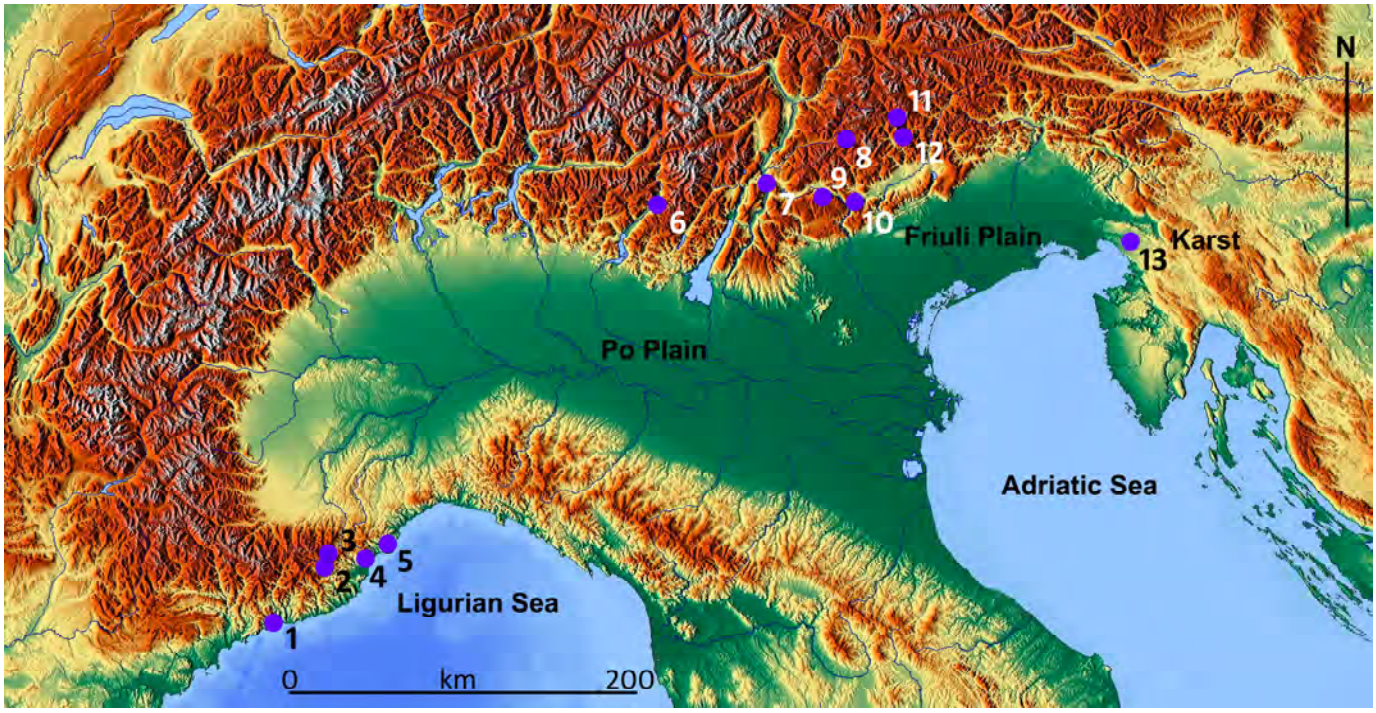

Figure 1. Distribution map of the most important sites reported in the text: Balzi Rossi (1), Bàsura (2), Val Pennavaira (3), Arma Veirana (4), Arene Candide (5), Cividate Camuno (6), Trento Basin (Vatte di Zambana, Romagnano, Pradestel), (7), Colbricon (8), Riparo Dalmeri (9), Val Cismon (10), Mondeval de Sora (11), Pian de la Lóra (12), and Trieste Karst (13) (drawing by P. Biagi).

The geography of northern Italy includes the Alpine arc, which is altogether very inhomogeneous, with a wide variety of landscapes. Among these are steep, narrow valleys incised between the high peaks of the western Alpine range, and the more walkable U-shaped valleys of the central and eastern chain, some of which lead to central and eastern Europe through high- and middle-altitude passes surrounded by glaciers, which nevertheless have always been crossed, at least since the Neolithic [16,17].

The central part is occupied by the Po Plain, a territory that has yielded very scarce evidence of Epigravettian occupation for reasons that are probably to be found in the recent Quaternary geology of the area [18] and intensive agricultural exploitation which lasted at least 4500 years [19]. However, this pattern contrasts with that available from other countries of Western Europe [20]. The Friuli Plain opens farther to the east. It is crossed by rivers which flow from the north. East of the plain rises the limestone Trieste and Slovene Karst Plateau. Many caves open in the Karst, though none has ever yielded evidence of Epigravettian occupation [21]. The western and eastern sides of this wide region are bounded by the Ligurian and Adriatic Seas. This description of northern Italy gives just an oversimplified idea of the complexity of a territory the extent of which has been greatly affected by the Final Pleistocene sea-level rise [7].

Regarding the Mesolithic, the late 1960s saw a dramatic improvement in the study of Early Holocene hunter-gatherers. This was due mainly to the results of the excavations carried out in three Adige Valley rock shelters whose long sequences, buried below metres of alluvial deposits, were uncovered in the Trento Basin: Vatte di Zambana, Romagnano, and Pradestel [22]. The results had a strong impact on the prehistorians of those years. However, even more unexpected was the discovery of high-altitude Mesolithic stations at

the Colbricon Pass in the Trentino at around 2000 m of altitude [23,24]. This was followed a few years later by the discovery of other high-altitude camps in South Tyrol [25,26].

Until the 1970s, the Late Pleistocene and Early Holocene cultural sequence of most of Italy was based almost exclusively on the typological characteristics of knapped stone assemblages and their "evolution" [27,28]. In Italy, where Mesolithic sites were believed to be very few, or non-existent [5], many prehistorians studied the knapped stone artefacts following the taxonomic method of G. Laplace [8]. This approach changed only a few years later [22,29], when the lithic assemblages of the last hunter-gatherers of the Trentino began to be analysed according to the sites' locations, altitudes, functions, and structures, the provenance of the raw material employed for their manufacture [30–32], and the characteristics of the complementary activities carried out within different areas of the same site [33]. In addition, new anthropological and ethnographic approaches began to be applied to the study of the archaeological sites, especially the high-altitude stations [34,35] and the material culture remains.

Around the same time, pollen cores extracted from peat bogs located close to the Mesolithic sites began to be studied [36]. The scope was to interpret the altitude reached by the upper tree line during the progressive deglaciation of the Alpine chain between the Preboreal and Atlantic periods and the vegetation cover of the highland zones during the climatic oscillations of the end of the Last Glaciation [37,38]. The results conflicted with the ideas that were then in fashion in those years, according to which high altitudes were never settled before the Bronze and Iron Ages [39,40].

Moreover, while the anthropological–ethnographic approach to the study of prehistoric hunter-gatherers had been undertaken in several other countries from the 1960s onwards [41–44], in Italy, the new methods started to be applied a few years later [45,46]. However, high-altitude archaeology attracted only a few archaeologists despite its importance, novelty, and complexity [47,48].

The discoveries made in the Trentino were followed by several international round tables whose scope was to discuss the prehistoric peopling of the Alpine world and place Italian Alpine archaeology in its wider European context [49–52]. The important contributions of a few European colleagues [53–57], and the first systematic use of radiocarbon dating, led to the adoption of the term Mesolithic [58] to describe the Early Holocene cultural aspects which previously had been called Epipalaeolithic, following the French terminology which was widely employed in those years in Italy [59].

2. Key Sites and Sequences

2.1. The Ligurian Sites

This paper considers, almost exclusively, two regions of northern Italy (Liguria and Veneto-Trentino-Friuli) that have provided important data regarding the Early Holocene and the first 1300 years of the Northgrippian stage [60], during which the last hunter-gatherers became extinct.

Liguria is squeezed between high mountains and the Ligurian (part of the Tyrrhenian) Sea. The north-westernmost Apennines meet the south-easternmost fringes of the Alps at the Colle di Cadibona (459 m a.s.l.) in western Liguria (Liguria di Ponente). The only plain is the small Piana di Albenga in the Savona Province, which extends over ca 10 sq km. It is formed by the alluvial sediments of the Arroscia, Neva, and Pennavaira torrents (Figure 1).

In 1983 A. Palma di Cesnola wrote an important paper in which he described and discussed the knapped stone assemblages retrieved from Final Epigravettian sites excavated in the region and suggested their preliminary seriation according to the techno-typological characteristics of the artefacts [61]. A first glance at the subsistence and environmental aspects of the Ligurian sites of this period was provided only a few years later [15,61].

The excavations carried out in the narrow Pennavaira Valley (Figure 2) between the 1950s and the 1970s led to the discovery of two important Final Epigravettian sequences in the Nasino (246 m a.s.l.) and Stefanin rock shelters (440 m a.s.l.) [62–64]. A few more cave sites occupied during other periods of prehistory were discovered along

the sides of the same valley. The knapped stone assemblages from the lower layers of the Nasino and Stefanin rock shelters have been attributed to the Final Epigravettian on purely techno-typological grounds. However, one of the Final Epigravettian layers of the Stefanin sequence has been dated from charcoal to 12,700 ± 300 BP, 14,029–12,111 cal BC (HAR-6915) [61] (Figure 2). No radiocarbon dates are available for Nasino, the assemblages from which have been attributed to the very end of the Final Epigravettian. Following the study of the bone remains, Stefanin has been interpreted as a winter camp exploited by ibex hunters "*who spent most of the year at lower elevations*" [61].

Figure 2. The Pennavaira Valley (Liguria) near the village of Alto (ca 630 m a.s.l.) where Arma dello Stefanin opens (white dot) (**top**). Arma dello Stefanin: profile of the Epigravettian–Neolithic sequence excavated in 1982 with the location of the Epigravettian radiocarbon date (white rectangle) (**bottom**) (photograph by P. Biagi, 1986 and 1982).

Two burials excavated in the outer part of the Nasino rock shelter have been radiocarbon-dated to the Boreal Mesolithic [65]. The bones of a child discovered in the Arma (cave) Veirana, which opens along the neighbouring Neva River Valley, have been dated to the same period [66]. These discoveries show that Mesolithic Sauveterrian groups moved along the narrow valleys of western Liguria during the Boreal. Most probably they aimed to reach the watershed to enter the Po Plain following an easy route. Mesolithic sites are almost unknown in western Liguria [67]. This fact contrasts with that of eastern Liguria (Liguria di Levante), where several middle- and high-altitude knapped stone concentrations of different Mesolithic periods were discovered mainly in the 1970s [68]. However, Final Epigravettian findspots are still unrecorded from this region. All the Mesolithic assemblages so far discovered are from the surface. None of them has ever been radiocarbon-dated because of the absence of organic material, bones, and charcoal.

Returning to the Final Epigravettian, two important Palaeolithic sequences are known from the Balzi Rossi caves and rock shelters that open close to the French border [69]. The coastal area is very rich in caves and rock shelters. Two of them have yielded evidence of Final Epigravettian occupation: the Mochi rock shelter and the Fanciulli cave. In both cases, the Final Epigravettian horizon has been found partly eroded at the very top of the sequences. No radiocarbon dates are available from the topmost layers B and A of the Mochi rock shelter [63] (Figure 3). The Fanciulli layer B has been dated to 12,200 ± 400 BP, 13,614–11,394 cal BC (MC-402) from marine shells, while burial GE1 has been dated directly to 11,130 ± 100 BP, 11,287–10,836 cal BC (GifA-94197) [70]. Besides these, two radiocarbon dates (12,310 ± 60 BP, 12,873–12,125 cal BC (GrA-69598) and 12,370 ± 60 BP, 12,902–12,199 BC (GrA-69597)) tell us that the well-known Bàsura cave, which opens in western Liguria, was visited around this time. Although the cave did not yield any knapped stone artefact, the footprints left by five individuals tell us that some corridors of the cave were explored by members of a Final Epigravettian community [71].

Figure 3. Riparo Mochi at the Balzi Rossi (Liguria): Profile of the old sequence (photograph by P. Biagi, 1990).

More impressive Younger Dryas discoveries have been made in the Arene Candide cave (Savona Province) [72] (Figure 4). The excavations carried out in 1940–1942 revealed a "cemetery" at the top of the Palaeolithic sequence with evidence of complex, unique funerary rituals (Figure 5) [73]. According to the radiocarbon results the "cemetery" was in use between ca 10,820 ± 40 BP, 10,876–10,776 cal BC (GrM-16978) and 10,245 ± 40 BP, 10,479–9807 cal BC (GrM-22252) [74].

Figure 4. Arene Candide (Liguria): cave entrance in the 1980s (photograph by P. Biagi, 1986).

Figure 5. Arene Candide (Liguria) burials, grave goods, and ochre staining from the Final Epigravettian cemetery (photographs by P. Biagi, 2000).

To sum up, in Liguria, our knowledge of this crucial period of prehistory is fragmentary and highly differentiated between the two zones (western/Ponente and eastern/Levante) into which the region is commonly subdivided. This may be due to landscape characteristics, coastal uncontrolled urban development and road construction, the limited number of surveys, alluvial deposits, and dense forestation in some areas. Most discoveries are from caves, some of which have been known for at least a century [63,70,74]. However, Mesolithic Sauveterrian and Castelnovian findspots have been discovered at different altitudes, mainly in eastern Liguria [68].

2.2. The Veneto-Trentino-Friuli Sites

The problems related to the end of the Late Palaeolithic in north-eastern Italy have been summarised in a few papers in which many aspects of the Late Glacial period have been discussed [75–77]. Surveys and excavations carried out during recent decades have greatly improved our knowledge regarding settlement patterns, raw material supply and circulation [75,78–80], vegetation history, and exploitation of faunal resources [81–83]. Moreover, a good series of radiocarbon dates have helped us interpret the events that took place in the region from the 14th to the beginning of the 10th millennium BP (ca 15,000–9500 cal BC) [74].

An important aspect is the location of the archaeological sites [75,84–86] and the chronology of the earliest peopling of this part of the Alpine chain. Undoubtedly, the sites' distribution has been affected by the Late Pleistocene, Adriatic sea-level rise which dramatically reduced the extent of the territory available to the last Palaeolithic hunters [87,88], changed the sites' distribution pattern [7], and led to the present situation most probably around the beginning of the Atlantic or soon after [89].

The impressive amount of data collected in recent decades also includes mobile art [90]. The Riparo Dalmeri has yielded the remains of a hut structure ca 5.5 m in diameter and inside which many cobbles with red ochre painted animal, shamanic, and other naturalistic representations were recovered. The shelter opens at ca 1240 m above present sea level (a.s.l.) in a narrow valley, which descends from the northernmost edge of the Marcesina Plateau (Trento) [87,88]. According to the available eight radiocarbon dates the site was repeatedly occupied between 11,550 ± 70 BP, 11,634–11,309 cal BC (UtC-5040) and 10,800 ± 110 BP, 11,107–10,556 cal BC (R-425) [91,92].

Another important rock shelter, Riparo Villabruna, was settled a few centuries earlier than Riparo Dalmeri. Riparo Villabruna opens at ca 500 m a.s.l. at the bottom of the Cismon Valley between the Veneto and Trentino regions (Figure 6). The sequence has been radiocarbon-dated between 12,040 ± 150 BP, 12,846–11,536 cal BC (R-2023) and 11,910 ± 120 BP, 12,103–11,562 cal BC (UtC-1979). A male burial was found at the bottom of the sequence. The skeleton was covered with stone blocks, some of which were decorated with red ochre naturalistic patterns and one with a dancing shaman [93].

An important, still-debated subject concerns the "continuity" or "discontinuity" between the Younger Dryas and Preboreal Mesolithic. The problem was already being addressed in the 1980s following analysis of the knapped stone assemblages of the two periods. According to some authors, they show some clear differences in the techno-typological characteristics of the cores, tool types, presence of hypermicrolithic geometric armatures, and debitage dimension [94] (p. 672). Other authors suggest a "continuity" between the two periods, which is reinforced by a small set of new radiocarbon results [95–98]. However, the number of radiocarbon dates currently available for the south alpine Preboreal sites is limited [26,99–101].

Another problem concerns the distribution of the sites relative to the deglaciation of the region and the practicability of the valley bottoms and watersheds. The data at our disposal show that the distribution of the valley bottom sites is conditioned by several natural and anthropic factors, among which are slope stability and vegetation cover, which have hidden the sites below metres of alluvium. Consequently, the discovery of valley bottom sites is "*often the result of road construction and quarrying at the base of the limestone cliffs*

in the valleys" [12] (p. 61). This is the case in the Adige Valley, where the most important Holocene sequences, radiocarbon-dated from the Preboreal onwards, have been excavated in the Trento Basin [102]. However, the discovery of an important Late Epigravettian site at Cividate Camuno, in neighbouring central Valcamonica, ca 45 km from the northernmost edge of the Po Plain [103], radiocarbon-dated to 13,805 ± 440 BP, 16,117–13,627 cal BC (GX-17273), shows that some of the alpine valley bottoms were already accessible many centuries before the end of the Late Glacial.

Figure 6. Val Cismon (Veneto/Trentino): the Villabruna rock shelter along the left side of the valley, where industrial quarrying has removed the alluvial fan (photograph by P. Biagi, 1989).

The first Mesolithic valley bottom site of the south Alpine arc was discovered by chance in February 1968 during industrial quarrying at Vatte di Zambana, along the right bank of the Adige Valley, ca 10 km north of Trento. The excavations that followed brought to light an important Mesolithic sequence, at the bottom of which the burial of a mature woman was found just below layer 10 [104], radiocarbon-dated on charcoal to 8000 ± 110 BP, 7309–6601 cal BC (R-491) and 7740 ± 150 BP, 7047–6266 cal BC (R-491α) [105]. The dates attribute the burial to the end of the Boreal Sauveterrian Mesolithic and confirm the results of typological analysis of the lithic assemblages [102]. The skeleton was placed supine, without grave goods, inside a burial pit that was later covered with limestone blocks, a ritual similar to that of the Final Epigravettian burial of Riparo Villabruna [93].

The discovery of two more important rock shelters in the Trento Basin, Romagnano III and Pradestel (Figure 7), followed a few months later. The three sites yielded long Mesolithic sequences. Their study led to a preliminary assessment of the Mesolithic cultures of northern Italy [22]. These were subdivided into Preboreal and Boreal Sauveterrian (previously called Sauveterroid) and early Atlantic Castelnovian (previously called Tardenoid) and were compared with those of the Trieste Karst caves [21,102]. In broad terms, the analysis of the knapped stone assemblages showed that the three periods mentioned above were characterised by assemblages with well-defined geometric hypermicrolithic or microlithic tools of triangular or trapezoidal shape, which changed throughout the three periods: hypermicrolithic isosceles triangles in the Preboreal, scalene triangles in the Boreal, and microlithic trapezes of different shapes in the Early Atlantic [57,102]. Radiocarbon dating of the three Trentino sequences confirmed the reliability of the subdivision suggested by the analysis of the knapped stone assemblages [99].

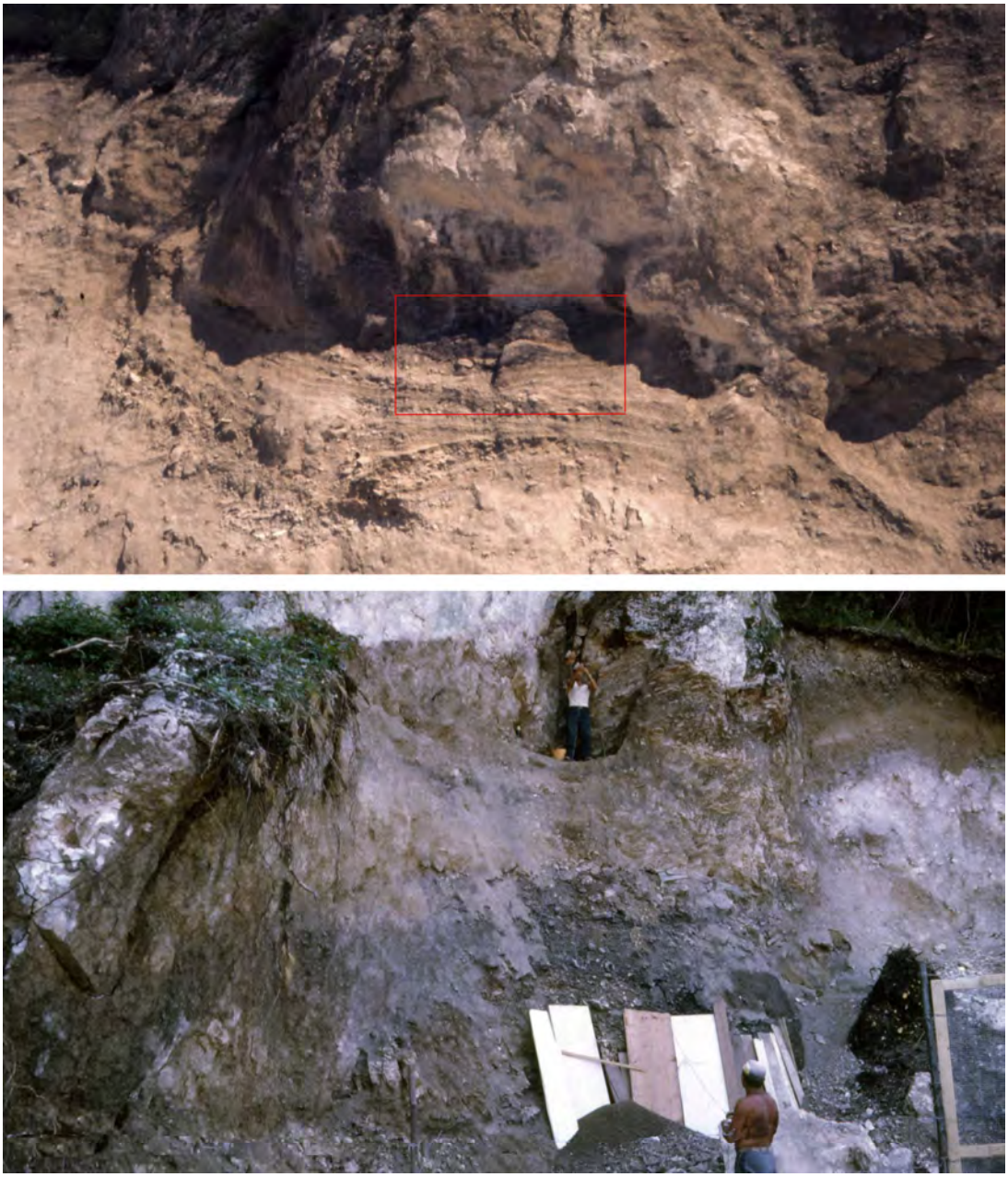

Figure 7. The rock shelter sequences of Romagnano III (**bottom**) and Pradestel (**top**) (Trentino) when they were discovered in 1969 during industrial quarrying. The red square shows the location of the Mesolithic sequence under excavation (photographs by P. Biagi, 1969, 1973).

In 1970, occasional research led to the discovery of the first high-altitude Mesolithic sites at the Passo Colbricon in the southern Alps of the Trentino (1925 m a.s.l.) (Figure 8) [23,24,106]. Hundreds of other sites of this period were discovered in the following years [85]. They showed that many high-altitude stations had been settled during the Boreal, and less so during the early Atlantic [8]. However, the precise chronology of the latter is often uncertain. The available distribution pattern would suggest a variable dislocation of the sites of the three different periods. They broadly reaffirm the impression that the Early Holocene peopling of the southern Alps took place gradually from the Preboreal, through the Boreal to the early Atlantic [8,85], though recently this view has been called into question [107].

Figure 8. One of the two Colbricon lakes (Trentino) where the first high-altitude Mesolithic sites were discovered (photograph by P. Biagi, 1983).

A unique discovery was made in the Veneto Dolomites in the 1980s. The burial of a Late Mesolithic Castelnovian hunter was discovered beneath a huge erratic boulder at 2150 m a.s.l. during the excavation of the Boreal site of Mondeval de Sora. Direct dating of the supine skeleton yielded a date of 7425 ± 55 BP, 6425–6095 cal BC (OxA-7468). The discovery is unique because all the bones were perfectly preserved despite the acidity of the mountain soil. Moreover, the grave goods have provided us important information about the possible routes followed by the Mesolithic hunter to reach the Dolomites, the artefacts he used to repair his hunting weapons, and the symbolic meaning of certain items found in association with the skeleton [108]. The presence of Castelnovian hunters in the Dolomites has been confirmed by the discovery of a Late Mesolithic camp at Pian de la Lóra in the Civetta Valley (1930 m a.s.l.), radiocarbon-dated on charcoal from a fireplace to 7920 ± 50 BP, 7035–6651 cal BC (GrN-31265) [109]. However, Mondeval de Sora is not an isolate burial case. Another Late Mesolithic supine individual was found in 1991 in the Adige Valley bottom near Mezzocorona, ca 25 km north of Trento [108].

Moving east, the Trieste Karst is the region of northern Italy that has yielded the first evidence of Mesolithic occupation. All the sites known so far are caves, the investigation of which started in the early 1960s [110]. The importance of the Karst caves in the definition of the Italian Mesolithic was stressed by A.M. Radmilli from the beginning [5], but emphatically revoked many years later [111]. The excavations carried out at the Edera Cave near Aurisina, close to the border with Slovenia, have yielded a long sequence with superposed Mesolithic layers, which were radiocarbon-dated, respectively, to the Preboreal, Boreal, and Early Atlantic [112] (Figure 9). All the Trieste Karst Mesolithic sequences are discontinuous and show long gaps between the aforementioned three periods [113]. For example, the Edera sequence shows a gap of ca 1500 years between the Preboreal (GrN-14108: 9810 ± 70 BP, 9647–8932 cal BC) and the Boreal (GrN-25139: 8350 ± 120 BP, 7588–7078 cal BC) (Figure 10).

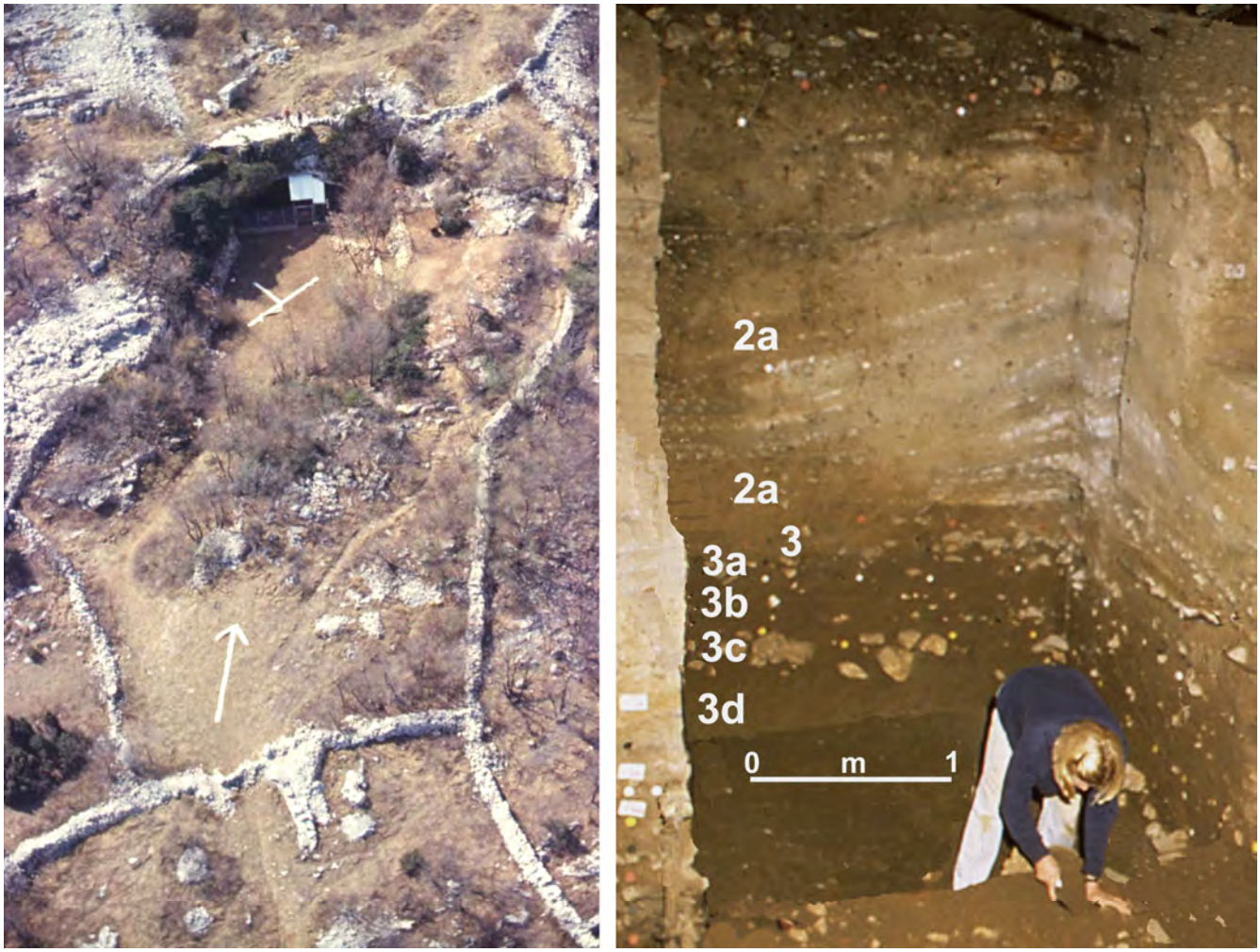

Figure 9. Edera (Trieste Karst): the cave from the air (**left**) and the sequence brought to light during the 1992–1999 excavations with the radiocarbon-dated Mesolithic layers from 3d to 3a (**right**) (photographs by G. Marzolini, 1964 and P. Biagi, 1999).

Figure 10. *Cont.*

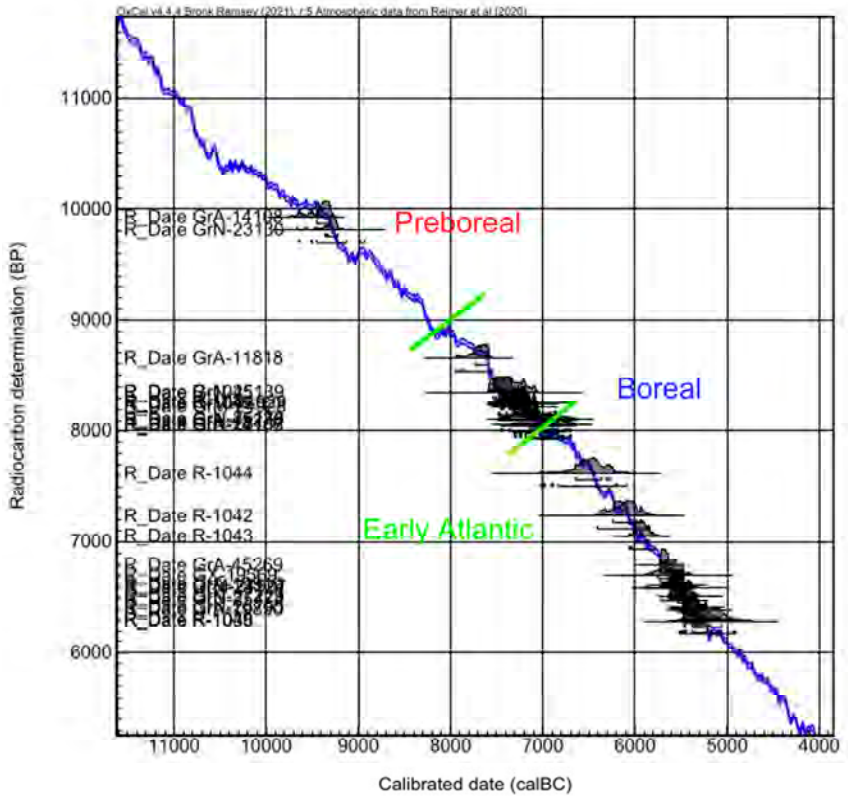

Figure 10. Distribution map of the Trieste Karst caves with radiocarbon-dated Mesolithic sequences: Benussi (1), Ciclami (2), Azzurra di Samatorza (3), Edera (4), and Zingari (5) (**top**). Plot of the available radiocarbon dates from the five cave sequences (**bottom**) (after Biagi, Spataro, 2024, Figure 1 [113]).

3. Discussion

The problems presented in the preceding section show how complex and fragmentary our knowledge of Final Pleistocene–Early Holocene archaeology is in the two regions considered in this paper. This is due mainly to their different landscapes, geologic and climatic characteristics, and research history.

Our knowledge of the Final Epigravettian in Liguria is restricted to a few cave sites, most of which were already known in the 19th century when the earliest pioneering research started to be conducted in the region [114]. Study of the Pennavaira Valley, Balzi Rossi, Bàsura, and Arene Candide caves has shed new light on this period of Ligurian prehistory and has improved our knowledge of the burial rituals and chronology of the Final Epigravettian and Mesolithic sites of the Ponente. At present, we know that Mesolithic hunter-gatherers also lived in the western part of the region. This evidence contrasts with that of the Levante, where Boreal and Early Atlantic middle- and high-altitude lithic concentrations have been found in the Apennines, close to good raw material outcrops. They are particularly numerous in the interior of the Tigullio Gulf [67].

However, despite the presence of Final Epigravettian sites and burials, so far we have no evidence for Preboreal stations. The Arene Candide cave sequence described by L. Cardini [73] tells us that the Final Epigravettian cemetery, which he imprecisely attributed to the Mesolithic, is sealed by a stalagmite layer above which are the Neolithic deposits [67].

For Veneto-Trentino-Friuli, our knowledge has greatly improved during recent decades thanks to the discovery of hundreds of high-altitude lithic concentrations and sites [85]. The first high-altitude Final Epigravettian sites were excavated in the Trentino in the early 1970s. Theories regarding the earliest peopling of this part of the Alpine chain were suggested soon after the excavations carried out at Andalo, Terlago, and Bondone [115,116]. They were followed by preliminary considerations of the lithic raw material supply and circulation. This subject was later developed in greater detail [33,75] as were territorial-

ity [32] and mobility [117,118], settlement location at the upper limit of the tree line, and seasonality [119], comparing the complexity of spatial and altitude patterning observed in other zones of the Alps [120,121]. However, the Mesolithic peopling in this region [122] can be compared to that known in the Swiss and French Jura Alps [123], where the number of Boreal stations is greater than that of the Preboreal, while the Late Mesolithic ones are even fewer. The latter is still, nowadays, the lesser-known Mesolithic period [8], despite the great number of characteristic trapezoidal geometric armatures found isolated all over northern Italy [8]. We know almost nothing of the internal chronology of the Castelnovian in northeastern Italy, the way the knapped stone assemblages developed or changed, or how and when it disappeared. Only one high-altitude site excavated in the central Alps has yielded information regarding these aspects [46].

Regarding the Trieste Karst, chronological discontinuities are evident in the five Mesolithic radiocarbon-dated sequences (Figure 10 bottom). This fact has been reported from other European countries, where long Final Palaeolithic and Mesolithic stratigraphies have been systematically dated [124,125]. This consideration opens up new perspectives on the interpretation of the Mesolithic sequences and, consequently, on the study of the knapped stone assemblages.

The discovery of a high-altitude Late Mesolithic burial in the Dolomites is unique. It does not fit into the general pattern, according to which caves and rock shelters are preferred places for burying Final Epigravettian and Mesolithic hunters not only in the study regions but in Europe in general [126].

4. Conclusions

Many questions are still to be answered to achieve discrete knowledge of the Final Epigravettian and Mesolithic periods in northern Italy. Our current view is very fragmentary, though it has greatly improved in recent decades thanks to new surveys, improved excavation methods, and new series of radiocarbon dates. However, we still know very little of the characteristics of the sites' features. Just a few high- and middle-altitude Alpine sites excavated in South Tyrol and Lombardy have yielded different types of structural remains [8,45,46,101,119], which are in most cases difficult to interpret. This is also due to the mountain soil that, with very few exceptions, does not favor the preservation of bone remains. The Riparo Dalmeri has yielded bone remains of several mammal species, though the most important hunted for meat is ibex, followed by red deer [127]. The Sauveterrian site of Mondeval de Sora in the Dolomites was settled during the summer months. This is shown by the faunal assemblage, among which there are red deer and ibex juvenile bones [128]. Overall, the few data at our disposal from the two study regions show that the economic strategy of the Final Epigravettian and Early Mesolithic hunters was based on ibex [82].

Regarding the techno-typological characteristics of the lithic assemblages, we still know very little about the reasons for the hypermicrolithisation of the knapped stone artefacts that reached its apex during the Preboreal, similar to the pattern observed in other countries of Europe [129,130]. We know about differences between the Preboreal and Boreal assemblages, especially as regards the techniques employed in manufacturing triangular micro-armatures [131]. Another important problem concerns the dramatic climatic changes that took place at the end of the Boreal and beginning of the Atlantic, when the lithic assemblage characterised by trapezoidal geometrics took over [8,132,133] and slightly varied throughout ca one millennium, roughly from the beginning of the eighth to the beginning of the seventh millennium BP (ca 7000–6000 cal BC). Did hunting methods change not only in northern Italy, but throughout most of Europe, as the varieties of microlithic geometric tools would suggest? [134–136]. The Mesolithic sequences excavated in the Crimea [137] and radiocarbon-dated pollen cores from the same region [138] are indicative in this respect, though a North African origin for the Late Mesolithic blade and trapeze complexes has also been proposed [139].

Mobility is another topic of major importance in hunter-gatherer studies [120], as are the locations and functions of individual campsites, which can help us interpret mobility patterns, foraging radius and raw material exploitation [140]. The discovery of burials and cemeteries of different periods with varied ritual characteristics can help us in the interpretation of mobility. This is the case not only for the Late Mesolithic hunters of Mondeval de Sora but also for the Sauveterrian Val Pennavaira and Arma Veirana burials. Moreover, the impressive Final Epigravettian cemetery of the Arene Candide cave shows that social complexity was already emerging in that period, as the variety of rituals and grave goods would suggest [141].

To conclude, despite the progress made during recent decades, we can still direct the debate towards what has recently been published regarding Central European hunter-gatherer archaeology: "*Although hundreds of scientific publication deal with the Mesolithic . . .., there are still only few high-quality excavations of Mesolithic sites with good preservation conditions. . . .. This starts with the still incomplete chronology, continues with the poor preservation of organic finds and ends with the rarity of secure archaeological contexts*" [126]. This also describes very well the situation in northern Italy.

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