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# MESOLITHIC PRESENCE AT TOR DEI PAGÀ: AN EARLY HOLOCENE SETTLEMENT IN EASTERN LOMBARDY (ITALY)

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ABSTRACT: The site of Tor dei Pagà (2,250 m a.s.l.), in the upper Valcamonica (Vione, Brescia), is is notable for its rich archaeological stratigraphic sequence, which includes an Iron Age ritual area (late 7th-5th centuries BC) and the remains of fortified structures from the Late Middle Ages (late 13th-early 14th centuries). The recovery of a small number of knapped lithic artifacts of Mesolithic attribution from within the Medieval layers pushes the earlies human presence at Tor dei Pagà back to the early Holocene. However, the lack of absolute dating and the absence of clearly diagnostic artifacts currently prevent a more precise cultural assignement to either the Sauveterrian or Castelnovian. Despite their scarcity, these elements alone allow to place Tor dei Pagà within the broader framework of Mesolithic settlement in the Lombard Alpine arc, reflecting the exploitation of high-altitude areas tied to subsistence strategies and to the strengthening of social networks and inter-valley connections with the Trentino region by the last hunter-gatherer groups.

Keywords: Mesolithic, Iron Age, Later Middle Ages, High-altitude exploitation, Valcamonica.

## 1. INTRODUCTION

Excavation campaigns carried out since 2011 at the locality of Tor dei Pagà (2250 m a.s.l.), in upper Valcamonica (Vione, BS), have revealed substantial remains of medieval fortifications dating to the late 13th-early 14th century, as well as evidence of ritual activities at the site during the Iron Age (between the late 7th and 5th centuries BC) (Bellandi, 2017; Bellandi et al., 2015). During the excavation of the Medieval layers, however, few knapped lithic artifacts attributable to the Mesolithic were also recovered, likely originating from deposits at the base of the archaeological sequence. Although no additional evidence or absolute dating is currently available, the presence of these artifacts alone pushes the earliest human occupation of Tor dei Pagà back to the beginning of the Holocene, placing the site within the broader framework of Mesolithic settlement across the Lombard Alpine arc by the last hunter-gatherer groups (Lo Vetro et al., 2022a).

## 2. THE GEOGRAPHICAL CONTEXT OF TOR DEI PAGÀ AND THE HISTORY OF RESEARCH

The site of Tor dei Pagà lies at an elevation of 2,250 m a.s.l., approximately 1,000 metres above the village of Vione, in the upper Valcamonica (BS) (Fig. 1).

The action of glaciers during the last glacial phase and the Holocene geomorphological reorganization strongly characterize the area.

The Tor dei Pagà site is located on a steep ridge with the Canè Valley to the east and the Vione Valley to the west. The natural continuation of the morphological ridge on which the site is located establishes a direct connection with the Valtellina to the northwest and Trentino to the northeast.

The area surrounding the site is characterized by glacial geomorphological structures, small moraine ridges, and impressive gravitational phenomena that have led to landslides of large blocks of rock, made unstable by the retreat of glaciers, which broke away from the mountainsides. These large blocks also served as shelters for shepherds until recently.

Geologically, the area is characterized by the presence of basement rocks such as schists, but, locally, there are limited outcrops of white marble (locally called Vezza or Canè marble depending on where it was quarried).

According to seventeenth-century local tradition, the toponym Torre dei Pagà refers to the legendary passage of Charlemagne through Valcamonica, where he is said to have defeated the last pockets of pagan resistance associated with the Lombards (Biancardi, 2022). The archaeological potential of the area, first noted by Ausilio Priuli in 1976, prompted Mario Mirabella Roberti to carry out a brief survey in July of the following year. This investigation confirmed the presence of ancient wall structures, although their precise chronology remained uncertain (Mirabella Roberti, 1987).

In 2011, the Municipality of Vione launched a project to enhance its archaeological heritage, initiating a research programme in collaboration with the Catholic University of Milan. To date, fourteen annual summer excavation campaigns have been carried out, up to 2018 on behalf of SABAP (Soprintendenza Archeologia Belle Arti e Paesaggio) for the Provinces of Bergamo and Brescia, and since 2019 under concession from the Ministry of Culture.

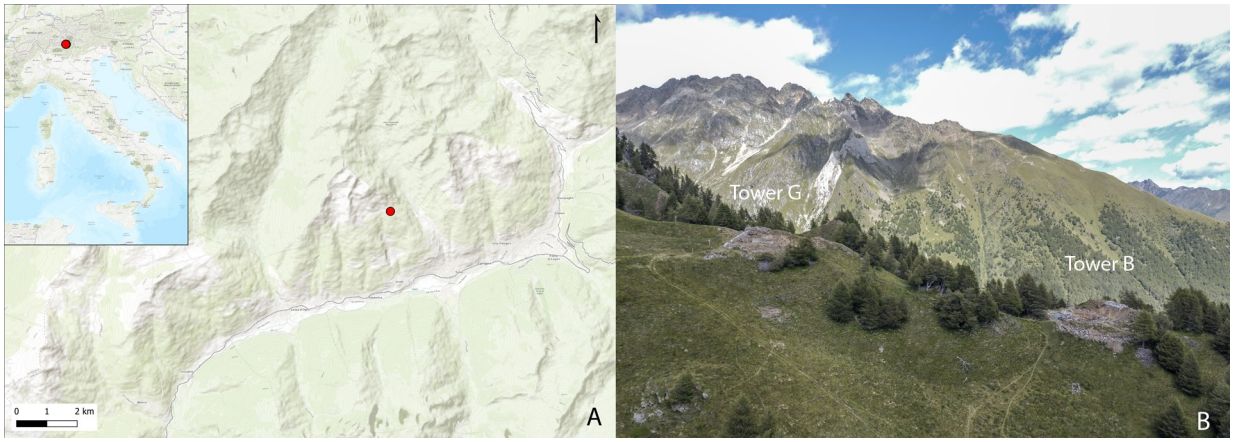


Fig. 1 - A, Positioning of Tor dei Pagà site (basemap: ESRI World Topo). B, Panoramic overview of the site from west. (photo G. Bellandi)

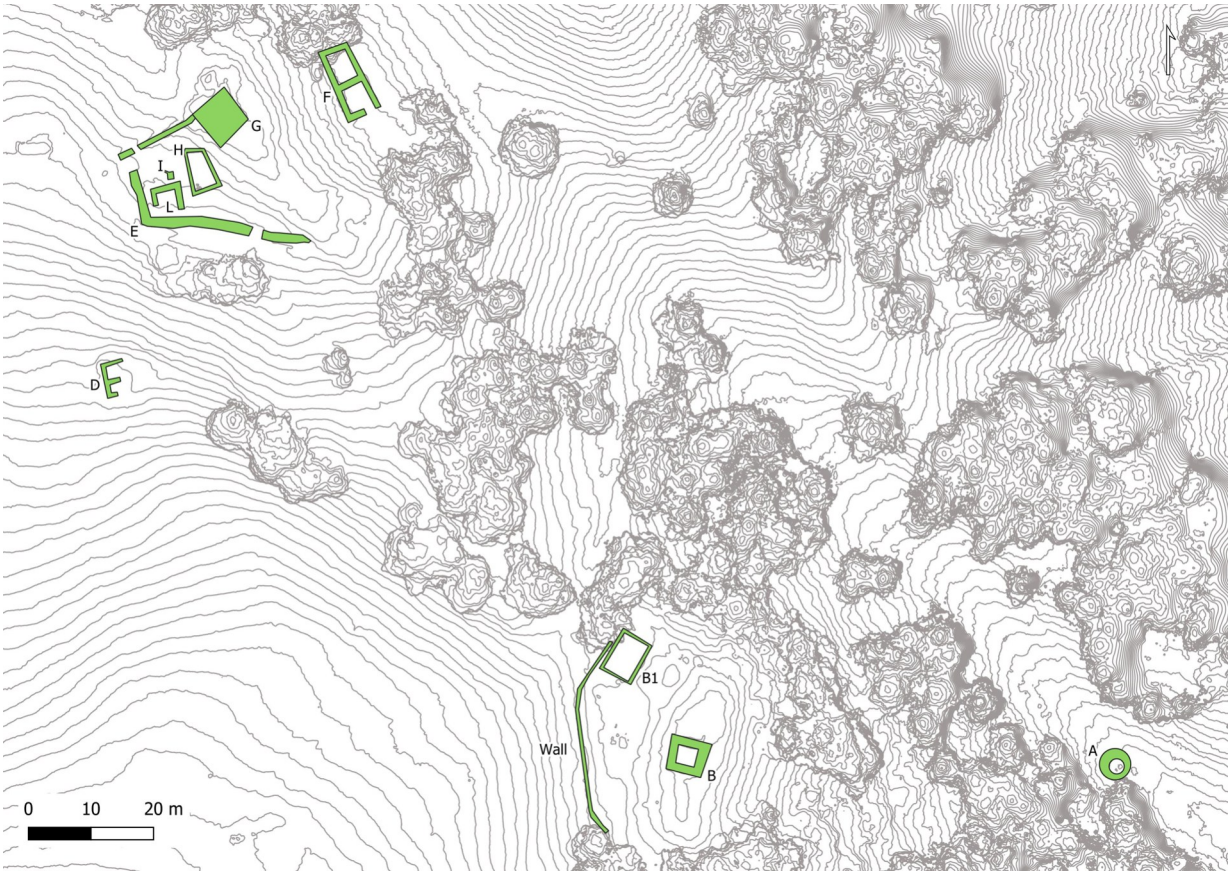


Fig. 2 - Site plan, letters refer to the identified structures: north tower G with the courtyard delimited by the wall E and the internal building H, I and L; south tower B with the area B1 and the wall with no yet name; A, D and F are not yet well defined structures. (Map elaboration by C. Alexander and R. Valente)

Archaeological investigations have uncovered a complex fortified system consisting of two towers (G and B) (Fig. 2), each positioned at the apex of a layout that includes a perimeter wall, internal buildings, and additional associated structures in the surrounding area. The finds, among them several coins and radiocarbon dates of samples obtained from two larch beams, indicate that the fortification was built and occupied for a relatively short period, between the late 13th and early 14th centuries.

In 2015, evidence of an earlier occupation phase was identified beneath one of the late medieval towers (tower B), dating from the late 7th and 5th centuries BC. This layer consists of carbon-rich deposits containing remains of offerings: bronze artefacts, fragments of ceramic jugs, and burnt bones. Such contexts are well


Fig. 3 - The material culture: 1. Copper alloy lyre buckle; 2. Iron D-buckle; 3-4. Circular buckles in copper and iron alloy; 5. Silver alloy floral applique; 6. Vago in glass paste; 7. Bone die; 8. Iron furniture key; 9-12. Iron crossbow bolt projectile points; 13-14: Iron arrowheads (Photo by F. Airoldi).

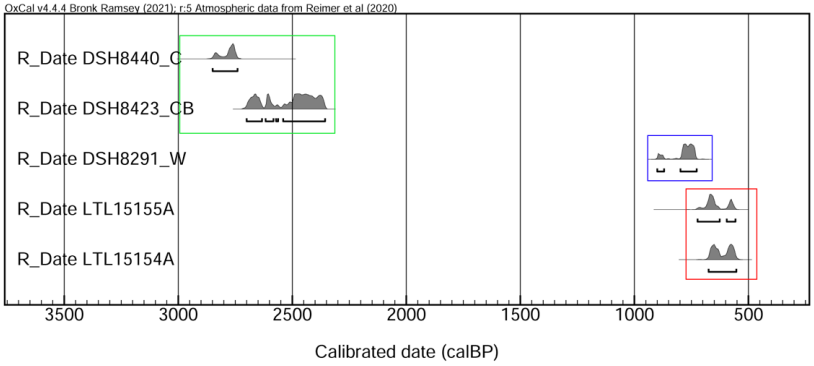


Fig. 4 - $C^{14}$ date of Tor dei Pagà. Red square: Tower G (respectively from a larch beam rings 18-26 and same larch beam rings 39-49); Blue square: Tower B (unspecified wooden beam); Green square: Brandopferplatz (respectively from a calcinated bone and a charred twig).


Fig. 5 - The material culture of the protohistoric phase: 1. Bronze serpentine arch fibula with fold-holding disk; 2. Bronze conical phalera tip; 3. Bronze eyelet strap; 4. Bronze spiral pendant; 5. Bronze double spiral pendant; 6. Metal sheets and various objects partially deformed by the heat of the fire (Photo by G. Vanoglio).

known in Alpine archaeology and widely documented in nearby South Tyrol and Trentino, where they are referred to as a *Brandopferplätze*, or "Alpine-style votive pyre" (Bellandi, 2017; Bellandi et al., 2015).

## 3. CHRONOLOGICAL PHASES OF THE SITE

### 3.1. The Late Medieval phase and material culture

Occupation of the area during the late Middle Ages appears to have been considerably more complex and structured. The site today comprises a system of structures featuring at least two towers. One of these (tower G) occupies the highest point of a complex comprising of a polygonal outer wall (E) and several internal buildings (H, I, and L). The other, tower B, lies approximately 200 metres away along the rocky ridge descending from Cima Bles. This second tower is likewise enclosed by a wall and includes internal rooms (Bellandi et al., 2017; Sannazzaro, 2016) (Fig. 2). The presence of two towers and two very similar structural complexes in such proximity remains the topic of debate. GIS analyses based on a high-resolution DSM generated by UAV mapping have suggested that tower B may have been added to address a tactical flaw in the position of the original com-

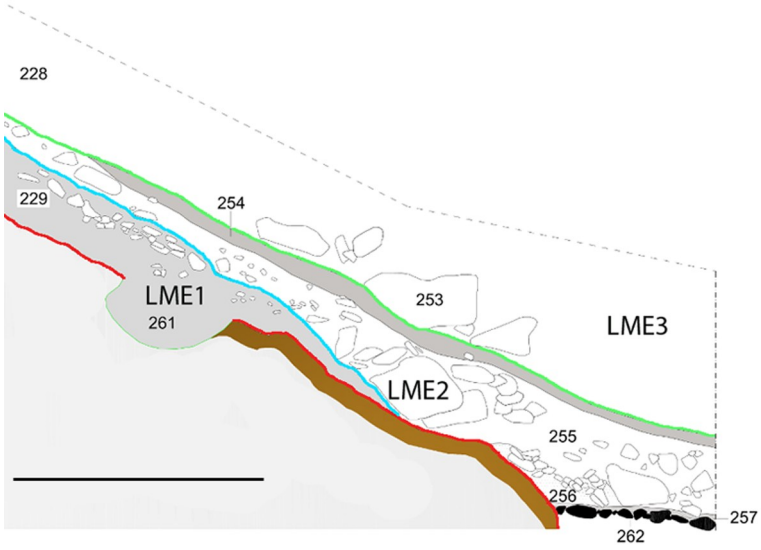


Fig. 6 - Stratigraphic section in ENE-WSW direction, seen from the north. In this section, the contact between the Late Medieval phase (LME) stratification and the soil (brown) is visible. The complete series, including the protohistoric phase, is visible only in some portions at the top of the area directly below or adjacent to Tower B. Scale bar: 1 metre. (Modified by Bassetti & Degasperi, 2017).

plex: an area of non-visible "dead ground" to the west of the original structure, that could have exposed the fortification to direct assault (Alexander, 2017). According to this interpretation, tower B would therefore post-date tower G. This hypothesis is supported not only by the excavation data from area B1, but also by analyses of the mortars from the two towers, which reveal compositional differences between those used in tower B and those in tower G (Bugini & Folli, 2017).

The dating of the finds recovered from the site (Fig. 3), including several coins and the radiocarbon analysis (Martinelli & Pignatelli, 2017), indicates that the fortification was built and occupied for a relatively brief period, between the late 13$^{th}$ century and the early decades of the 14$^{th}$ century (Fig. 4).

### 3.2. The Iron Age phase

Beneath the walls and floor surfaces of one of the medieval towers (tower B), traces of an earlier protohistoric phase were identified and subsequently dated to between the 7$^{th}$ and 5$^{th}$ centuries BC, based on radiocarbon analyses (Bassetti & Degasperi, 2017) and typological comparisons of the objects recovered (Bellandi, 2017; Marzatico, 2017) (Fig.s 4 and 5).

The deposit consists of the remains of repeated burning episodes in two distinct areas identified during the archaeological excavation. Charcoal, mainly from spruce and larch, was recovered together with burned bone and cereal remains, all contained within the dark, ashy soil of the fire (Castiglioni & Cottini, 2017).

Fragmentary metal objects damaged by heat were also found, including fibulae, double spirals, and objects apparently linked to armour, such as a rare phalera tip (Fig. 5). Among the ceramic fragments, vessels with finely smoothed surfaces and occasional linear incisions or cord impressions, there are large and small mugs comparable to forms known from nearby Trentino (accessible via the Tonale Pass and the Val di Sole), as well as cups and bowls. These materials appear to have served a ritual function, either as offerings placed into the fire or as libation vessels intentionally broken afterward.

This context corresponds closely to the *Brandopferplatz* typology: Alpine cult sites characterised by ritual burning practices that developed between the Middle Bronze Age and the Iron Age and in many cases continued in use into the Roman period (Solano, 2017).

### 3.3. The soil (US246)

At the base of the archaeological stratigraphic sequence lies a yellowish-brown (10YR5/8 4/6) soil that originally extended uniformly across the two areas investigated. This soil is characterized by a sandy spodic horizon (Bs), the structure is very fine and well expressed. The soil developed directly from the weathering of the underlying parent material (micaschist and, locally, marble veins). Human activity has reworked and disturbed it in several parts of the site, and in some areas, it has been completely removed. This geological body, originally and still today where not removed by human activity, is distributed across the entire mountain ridge where the visible archaeological structures develop.

The age of this soil formation is unknown, but it unquestionably predates the occupation that took place during the middle of the first millennium BC. The presence of a small yet significant set of knapped lithic artefacts attributable to Early Holocene (see paragraphs 6 and 7), likely originating from this basal layer, allows us to hypothesize that the soil itself dates at least to the Early Holocene (Fig. 6).

## 4. POST-MESOLITHIC ENVIRONMENT: PALAEOBOTANICAL DATA FROM THE IRON AGE AND LATE MIDDLE AGES

In the anthracological remains from the Iron Age ritual fires in Tower B, conifers dominate with *Picea abies, Larix decidua, Pinus cembra* and *Pinus sylvetris/mugo* well represented. The wide ring growth observed in *Picea abies* suggests that the wood derived from trees growing at the forest edge or in relatively open,

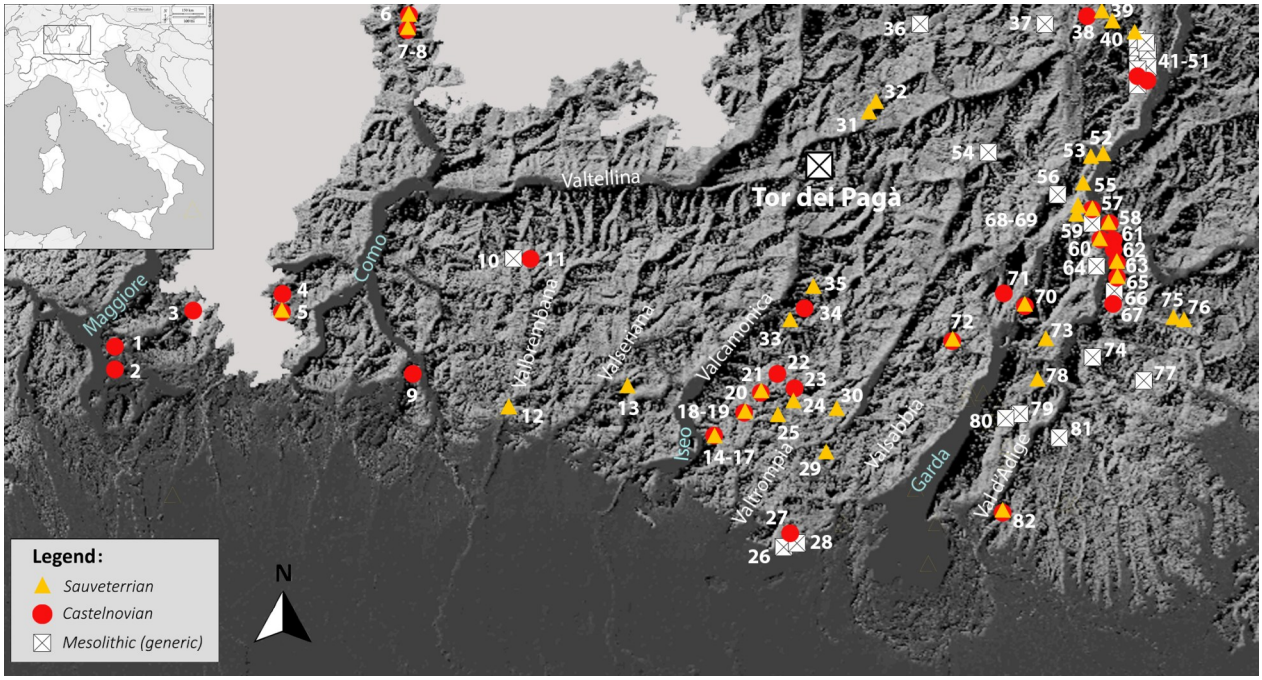


Fig. 7 - Selected Mesolithic sites of Lombard Prealpine-Alpine arc and Western Trentino: 1. Ispra, 2. Baranzini, 3. Valganna-Dosso tra laghi di Torba e Ganna, 4. Tana di Erbonne, 5. Erbonne - Cimitero, 6. Pian dei Cavalli CA15, 7-8. Pian dei Cavalli CA1 and CA13, 8. Pratizagni di Sotto, 9. Monte Cornizzolo, 10. Passo S. Marco, 11. Alpe Azzaredo, 12. Grotta del Pussu, 13. Pizzo Formico, 14. Colle San Zeno, 15. Croce di Marone, 16. Pian del Bene di Sopra, 17. Monte Stalletti, 18-19. Cascina Valmaione 1 e 2, 20. Stanga di Bassinale, 21. Malga Rondaneto, 22. San Glisente, 23. Laghetti del Crestoso, 24. Laghetto di Dasdana, 25. Lago Ovest di Ravènola, 26. Fienile Rossino 2, 27. Sopra Fienile Rossino, 28. Roccolo di Serle, 29. Vaiale, 30. Laghetto di Vaia, 31. Dosso Gavia, 32. Passo Gavia-Malga dell'Alpe-Val di Gavia, 33. Cividate Camuno - Via Palazzo, 34. Foppe di Nadro - Riparo 2, 35. Cemmo, 36. Zufallhtitte, 37. Samerberg, 38. Laugen I, 39. Laugen II, 40. Le Regole 3, 41-51. Passo della Mendola I-II-III-IV-V-VI-VII-VIII-IX-X-XI, 52. Gangelbühel-Doss de la Forca, 53. Mezzacorona-Borgonuovo, 54. Campo Carlomagno, 55. Zambana loc. Vatte, 56. M.te Gazza Passo, 57. Pradestel, 58. Riparo Gaban, 59. Doss Trento, 60. La Vela, 61. Zambana "el Vato", 62. Madonna Bianca, 63. Romagnano Loc III, 64. Viotte Costa dei Cavai, 65. Acquaviva, 66. Bus de la Vecia, 67. Paludei Volano, 68. Vezzano loc. Naran, 69. Terlago lago Montepiana, 70. Moletta Patone, 71. Arco Pra de Gom, 72. Pozza Lavino, 73. Passo S. Barbara, 74. Busa dell' Adamo, 75. Carbonare, 76. Riparo Cogola, 77. M. Pasubio-Rif. Lancia, 78. Malga Campo, 79. Madonna della Neve, 80. Malga Artillione, 81. Passo delle Fittanze-Ala, 82. Riparo Soman (map data from: https://doi.org/10.13127/tinitaly/1.1., graphic elaboration F. Bona & J. Conforti).

isolated positions.

*Ericaceae*, including *Kalmia procumbens* and *Rhododendron ferrugineum/hirsutum*, as well as *Salix* sp. are also present, likely used as fire starters or possibly for other ritual purposes.

The Iron Age environment was therefore very similar to that of today: a coniferous forest dominated by *Picea abies* and *Larix decidua* with *Pinus cembra* occurring more sporadically and *Ericaceae* shrub formations dominated by *Kalmia procumbens* present at higher elevations. (Castiglioni & Cottini, 2017).

Anthracological evidence from the Later Middle Ages similarly reflects a natural landscape dominated by conifers. *Picea abies* appears as the dominant species and was used as firewood, with *Larix decidua* also present and *Pinus cembra* rare.

in the hearth in Structure E, twigs of *Calluna vulgaris*, *Arctostaphylos* sp. and other *Ericaceae* were found. The twigs were collected during the summer season, when the last annual growth ring had fully developed.

Palynological analyses of four mortar and lime samples reveal that human activities at the site does not appear to have left traces. Instead, the results primarily reflect the surrounding vegetation, which again is very similar to that of today: coniferous forests, alder stands in the wettest areas, grasslands and moorland (Castiglioni et al., 2017).

## 5. MESOLITHIC SETTLEMENT BETWEEN PRE-ALPINE LOMBARDY AND WESTERN TRENTINO

Despite the limited number of knapped lithic artefacts recovered at Tor dei Pagà and the absence of absolute dating that would allow a secure chronological contextualisation, the techno-typological characteristics of the assemblage, considered together with the geographical setting of the site, suggest a plausible attribution to the Mesolithic. Within the framework of the present study, this attribution is treated as a working hypothesis that requires contextual evaluation. To this end, it is appropriate to outline the evidence for Mesolithic occupation within the broader geographical area in which Tor dei Pagà is located, namely, the Lombard Pre-Alpine-Alpine arc and the region largely encompassing western Trentino (Fig. 7). This regional overview draws primarily recent synthetic studies that have substantially updated current knowledge of human settlement dynamics in north-eastern Italy during early Holocene (e.g. Lo Vetro et al., 2022a; Fontana et al., 2023).

**5.1. The Mesolithic in Lombard Pre-Alpine-Alpine arc**

Lombardy has yielded numerous indications of human presence during the Mesolithic, across the Alpine sector to the north and the pre-Alpine hills and plains to the south (Lo Vetro et al., 2022a). Over the past thirty years, extensive multidisciplinary research has investigated the paleoenvironmental evolution of Lombardy between the end of the Late Pleistocene and the Early Holocene (Ravazzi et al., 2022) allowing the archaeological evidence related to the settlement of the region's last hunter-gatherer groups to be placed within a broader environmental framework. Much of the currently available Mesolithic evidence derives from investigations begun in the 1970s, especially in the Brescia area (Biagi, 1972, 1976a, 1981, 1986; Fusco, 1982; Castelletti et al., 1984). In subsequent decades, investigations expanded into Valcamonica (Fedele, 1988; Poggiani Keller, 1995, 1999), Valtellina (Poggiani Keller, 1989), Valchiavenna (Fedele et al., 1991), and the Bergamo area (Poggiani Keller, 2006). The data collected made it possible to produce the first micro-regional syntheses (Biagi, 1991, 1997; Poggiani Keller, 1992; De Marinis, 1994), which were later updated with new discoveries after the 2000s (Poggiani Keller, 2007; Baioni, 2012) and through the extension of research into additional areas (Bietti, 2008; Banchieri, 2009; Starnini, 2017; Lo Vetro et al., 2022a).

Evidence of Mesolithic human presence in Lombardy spans a wide variety of environmental contexts and demonstrates a widespread, albeit heterogeneous, settlement pattern, shaped in part by the uneven intensity of research across different areas (Fig. 7). While many findings derive from surface collections, some Alpine contexts have been investigated stratigraphically (Lo Vetro et al., 2022a).

Only rarely archaeobotanical, faunal, and structural remains are preserved, yet the reconstruction of paleoenvironmental and settlement framework remains an important component of regional studies (Scaife & Biagi, 1994; Ravazzi et al., 2012; Pini et al., 2016; Ravazzi et al., 2022; Bona & Poggiani Keller, 2024).

Within the framework of Mesolithic occurrences in the region, the Pre-Alpine and Alpine area is undoubtedly the one that has yielded the largest share of evidence regarding human settlement at the beginning of the Holocene (Lo Vetro et al., 2022a). Mesolithic finds are especially numerous here particularly in the Brescia region (Fig. 7). These sites, occur from valley floors to elevations of 1,700-2,000 m a.s.l. On the valley floor, Sauveterrian occupations are known from Cemmo (400 m a.s.l.) (Martini et al., 2016b) and, notablyl, from Cividate Camuno-Via Palazzo (273 m a.s.l.), which has yielded over one thousand artefacts dated to the Boreal (GX-18843: 8820 ±112 BP) (Poggiani Keller, 1996). Raw materials derive both from the Brescia-Bergamo foothills and Trentino (Lo Vetro et al., 2022b); traceological analyses show predominance of hunting activities (impact fractures) alongsides hides and carcasses processing (Martini et al., 2016a).

Along the Valcamonica-Val Trompia-Val Sabbia watershed, five sites have been stratigraphically investigatigated, revealing Sauveterrian occupations (Vaiale, 830 m a.s.l.; Cascina Valmaione 1, 1780 m a.s.l.; Malga Rondeneto, 1780 m a.s.l.), Castelnovian occupations (Laghetti del Crestoso), or evidence from both periods (Cascina Valmaione 2, 1778 m a.s.l.) (Biagi, 1988, 1992, 1993, 1997; Biagi et al., 1994, 1995; Biagi & Nisbet, 2008; Biagi & Starnini, 2015, 2016; Biagi et al., 2017). Some key radiocarbon dates place the earliest occupation at Valmaione 2 in the Preboreal (GrN-20093: 9410 ±80 BP; GrN-20890: 9630 ±100 BP). Malga Rondeneto represents a short summer frequentation in the Boreal (GrN-19590: 8880 ±150 BP). The high altitude site of Lago Ovest di Ravènola (1957 m a.s.l.), located in a transitional area between the Grigna and Camonica valleys, also dates to the Boreal (GrN-26800: 8160 ±100 BP; GrA-59653: 8725 ±40 BP), shows a small non-local flint assemblage consistent with Sauveterrian complexes (Biagi, 1976b, 1981, 1985, 1997, 1998; Biagi & Starnini, 2015). Castelnovian evidence in the Brescia area includes Riparo 2 di Foppe di Nandro (Biagi, 1981, 1983, 1997), as well as several medium- and high-altitude contexts. In the pre-Alpine area, on the Cariàdeghe Plateau, sites such as Fienile Rossino 2 (903 m a.s.l.), Roccolo di Serle (947 m a.s.l.), and especially Sopra Fienile Rossino (950 m a.s.l.), dated between the Boreal and Atlantic periods (Bln-3277: 6810 ±70 BP) (Biagi, 1972; Accorsi et al., 1987), have yielded structural evidence (a pit and a posthole) and rich lithic industry (approximately 2,000 pieces) combining, among the armatures. Sauveterrian elements and trapezes. The site, located within a broadleaf forest, must have functioned as a hunting station frequented between spring and autumn, as indicated by the presence of hazelnut shells (Accorsi et al, 1987). In Val Trompia, the site of Laghetti del Crestoso. located in an area strongly shaped by glacial activity at 2,000 m a.s.l. (Biagi, 1992; Baroni & Biagi, 1997), produced several structural features (hearths and postholes) and several hundred lithic artefacts, mostly local materials. Based on lithic assemblage and radiometric data, a multi-phase Castelnovian occupation during the has been suggested: an initial occupation at the beginning of the Atlantic (GrN-21889: 7870 ±50 BP; GrN-21889: 7850 ±80 BP), characterized by trapezes with retouched truncations associated with Sauveterrian microliths, and a second phase (GrN-18091: 6870 ±70 BP; HAR-8871: 6790 ±120 BP), where Sauveterrian elements progressively disappeared and the industry was marked by the spread of trapezes with *piquant trièdre* (Baroni & Biagi, 1997). Further Castelnovian evidence in the Brescia area comes from Valmaione 2 (Biagi & Starnini, 2015, 2016), Passo di San Glisente (Biagi, 1998), and Pozza oltre la Stanga di Bassinale (1861 m a.s.l.), though in the latter the association between material and radiometric date is uncertain (GrN-20886: 6330 ±45 BP) (Biagi et al., 1994; Biagi, 1997; Lo Vetro et al., 2022a). Surface finds between Valcamonica, Val Sabbia, and Val Trompia have been recorded in mountain passes, near small lakes, or in dominant topographic positions: at Lago di Dasdana (1875 m a.s.l.) (Biagi et al., 1979), Monte Stalletti (1550 m a.s.l.), Croce di Marone (1160 m a.s.l.), Pian del Bene di Sopra (1520 m a.s.l.), and Colle San Zeno (1434 m a.s.l.) (Biagi, 2002). Colle San Zeno may belong to the Sauveterrian, whereas the few pieces found at the other sites do not allow for an attribution beyond a generic Mesolithic.

Farther into the interior Alpine zone (Fig. 7), significant sites include Passo Gavia-Malga dell'Alpe (Bagolini et al., 1978; Bagolini & Nisi, 1980) and Dosso Gavia (2360 m a.s.l.) (Angelucci et al., 1994) where, a stratigraphic excavation identified a Sauveterrian lithic as-

semblage, over 200 Alpine-Prealpine cherts artefacts, suggesting a base camp or hunting lookout during the Boreal or Atlantic periods. This evidence indicates that the Gavia (2621 m a.s.l.) and Stelvio (2758 m a.s.l.) passes were already traversed between the Preboreal and Boreal (Lo Vetro et al., 2022a).

Further west, Alpine sites in the inner valleys are rarer. In the Bergamo area (Fig. 7), Sauveterrian traces occur in the Brembana Valley near the Grotta del Pusü site (650 m a.s.l.) (Biagi, 1981; Poggiani Keller, 2006) and at Mezzoldo-Alpe di Azzaredo (2000 m a.s.l.) (Longhi et al., 2016). The latter yielded a flint and rock-crystal assemblage and was dated to the final phase of the Castelnovian (LTL14817A: 7564 ±60 BP). On the border between Italy and Switzerland, in Val Chiavenna, the Pian dei Cavalli plateau has yielded around fifteen Mesolithic sites (Fedele, 2014, 2018). Aat Lago Basso (2250 m a.s.l.) (Fedele, 1999), sediments indicate that the area has been ice-free since the Bølling-Allerød interstadial; charcoal particles throughout the lake sequence suggests deliberate burining by Mesolithic hunters between approximately 8500-7850 and 7300-6300 cal BC (Vallé et al., 2022). At Pian dei Cavalli 1 (CA1, 2200 m a.s.l.), around forty hearths and possible temporary structures were found (Fedele, 1999). Lithics include rock crystal and perhaps cherts from the north could suggest contacts with Val Mesolcina (Mesocco Tec Nev, Switzerland) indicating cross-watershed mobility. The assemblage includes Sauveterrian and Castelnovian components, consistent with radiocarbon dates (8800-7400 cal BC and 6300-6000 cal BC) (Lo Vetro et al., 2022a). Although somewhat uncertain, these dates appear to correspond to periods of open vegetation at Pian dei Cavalli (Fedele, 1999). Site CA1, like the other Pian dei Cavalli sites located along the northwestern slope, is interpreted as a hunting camp used for selective hunting of ecotonal fauna, perhaps deer (Fedele, 1999), whereas other plateau sites may relate to specialized hunting (fur-bearing animals or birds). The occupation of Pian dei Cavalli 13 (CA13) has been attributed exclusively to the Castelnovian, at the beginning of the Atlantic (NA-251: 7030 ±750 BP; NA-252: 7610 ±260 BP) (Fedele et al., 1991), while Pian dei Cavalli 15 (CA15, 2258 m a.s.l.) dates to the end of the Boreal (Beta-385447: 8340 ±30 BP; Beta-385446: 8060 ±30 BP) (Fedele, 2014). In the Como area, Monte Cornizzolo (1110 m a.s.l.) (Castelletti, et al., 1984) yielded more than 2,000 artefacts in local cherts, including trapezes, Sauveterre points, and triangles, indicating occupation during both Mesolithic phases. Also in the Como area (Fig. 7), in the upper Breggia Valley, there are Sauveterrian-Castelnovian attestations at Erbonne-Cimitero (940 m a.s.l.) and exclusively Castelnovian evidence at Tana d'Erbonne (1045 m a.s.l.) (Biagi, 1981; Franco, 2011). In the Varese area (Fig. 7), despite the absence of trapezes, the artefacts recovered from Lakes Ganna and Torba, in Valganna (454-457 m a.s.l.), have been attributed to the Castelnovian period, based on the regularity of the bladelets (Biagi, 1981, 1980-81).

Taken together, these data confirm the wide distribution of Mesolithic evidence across Lombardy (Fig. 7), although many sites remain poorly documented, lacking stratigraphic investigation and absolute dating. Consequently, chrono-cultural attribution often relies primarily on techno-typological characteristics of the lithic assemblages (Marchand, 2014; Lo Vetro et al., 2022a). For Sauveterrian complexes, typical elements include the exclusive use of direct percussion for knapping, operational sequences aimed at the production of flakes, laminar flakes, and irregular bladelets, and the presence of triangles, segments, and fusiform backed points (Sauveterre points). Castelnovian complexes, in contrast, reflect more elaborate knapping techniques, such as indirect percussion and pressure, producing more regular blades and bladelets, and are distinguished by the clear presence of trapezes, which progressively replace earlier armatures. However, the continuity of operational sequences between the two phases (Fontana et al., 2023) means that in cases lacking radiometric and represented by very small assemblages, a cautious attribution to a generic Mesolithic may be more appropriate.

The uneven distribution of sites, mostly concentrated in the eastern Lombardy (Fig. 7), cannot be explained by geology or raw material availability (Martino et al., 2016; Bertola et al., 2021, 2022) but primarily reflects research intensity and site visibility. Given the partial and heterogeneous nature of the evidence, reconstructing a comprehensive framework of Mesolithic settlement in Lombardy (Lo Vetro et al., 2022a).

The Alpine zone represents the part of Lombardy where Mesolithic settlement patterns can be reconstructed most clearly (Lo Vetro et al., 2022a), with sites distributed on the valley floors (500-800m), the pre-Alpine plateaus (~ 900m), the inter-valley ridges (1700-2000 m), and the innermost Alpine belt (2200-2350m) (Fig. 7). In one of the most extensively investigated areas, namely Valcamonica, the Valcamonica-Val Trompia-Val Sabbia watershed, and surrounding territories (Accorsi et al., 1987; Biagi, 1992, 1997, 2001; Biagi & Starnini, 2015, 2016; Baroni & Biagi, 1997), recurring settlements near passes, lakes, and lookout points is evident (Fig. 7). Drawing on comparison from Trentino (Broglio, 1980), a logistical relationship has been proposed between valley-floor sites such as Cividate Camuno and the high-altitude site of Lake Ravènola, at the head of the Grigna Valley,a strategic location for reaching the Dasdana Pass and, consequently, Val Sabbia (Biagi et al., 2017). The comparatively lower density of evidence, compared with that of the Trentino and Veneto regions (Lo Vetro et al., 2022a), has led some authors to suggest differing modes of exploiting mountain areas (Fedele, 1999) and a possible chrono-cultural discontinuity in Alpine land use (Biagi & Starnini, 2016; Biagi et al., 2017). However valid, these remain hypotheses that clearly require further confirmation (Lo Vetro et al., 2022a).

Overall, the data from Lombardy highlight the central role of valley systems as hubs of Alpine land use and as corridors for mobility along major watersheds. The onset of the Holocene appears to coincide with a reduction in territoriality among hunter-gatherer groups, reflected in subsistence strategies and operational sequences well adapted to locally available raw materials (Fedele, 1999; Fontana & Visentin, 2016). Equally significant is the evidence suggesting an intensification of social networks and inter-valley contacts within the Lombard Alpine arc during the Mesolithic (Fedele, 1999; Lo Vetro et al., 2022a). The results of raw materials provenance analyses of from Cividate Camuno seem to support this, indicating strong connections with the Trentino

valleys (Lo Vetro et al., 2022b).

### 5.2. The Western Sector of the South-Eastern Alps between the Alta Lessinia and the Val di Non

Starting from the beginning of the Preboreal, Sauveterrian human groups peopled the Trentino region. The early Mesolithic site distribution seems denser compared to the Late Upper Palaeolithic groups, with sites that ranging from the Adige River valley floor and the high-altitude areas situated at around 2000m asl (Dalmeri & Pedrotti 1994; Cavulli et al., 2011; Fontana et al., 2023). Adige and Sarca valleys form the 'backbones' of the region and these valleys, oriented roughly North-South, represent a natural junction that linking the northern slope of the Alps, through East-West oriented valleys such as Valtellina, Valpusteria, and Valsugana, to other segments of the Alpine chain (Cavulli et al., 2011).

The pre-Wurmian drainage pattern was significantly different from the present one and at the Alpine Last Glacial Maximum (ALGM, circa 20,000 BP), Trentino was almost completely subject to glacial and periglacial conditions, with glacial bodies than occupying the main Adige, Sarca and Brenta valleys (Angelucci & Bassetti, 2009). The deglaciation took place between circa 16,000 and 14,500 BP at the Alpine margin, and around 12,000 BP in mountain areas. Human occupation reached the mid-altitude Prealpine plateaux during GI1 but during the GS1 (i.e. Younger Dryas) cold shift caused an interruption of these trends (Angelucci & Bassetti 2009). Starting from the early Holocene, geomorphological surfaces progressively stabilized and the drainage systems re-established equilibrium by infilling of depressions such as those at Trento and Valle dei Laghi in the Sarca drainage (Angelucci & Bassetti 2009). During this time span, Stability and biostasy up to 2000m a.s.l. matching with the increased Mesolithic presence in mountain areas.

The Alpine area roughly corresponding to western Trentino has yielded abundant evidence of human occupation during the Mesolithic (Fig. 7), although numerically far fewer than those known from the eastern sector (e.g., Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana et al., 2023).

In the Alta Lessinia (Fig. 7), several open-air sites have been identified at altitudes between 1181 and 1850 m a.s.l., on the Folgaria Plateau (Bagolini & Pasquali, 1985), at Passo delle Fittanze-Ala (Chelidonio & Solinas, 1978), and on Monte Pasubio near Rifugio Lancia (Dalmeri, 1980). These sites are generally attributed to the Mesolithic (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana et al., 2023).

In the near Vallarsa (Fig. 7), Cogola Rockshelter (1070 m s.l.m.) has yielded important evidence of occupation by Sauveterrian groups dating to Preboreal (Lacogola-RC1: 10736-10563 BP) (Bassetti et al., 2005; Cusinato et al., 2004).

In the area between Lake Ledro and the Sarca Valley (Fig. 7), a series of sites is documented across a wide range of altitudes (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana et al., 2023). Near Arco, the rock shelter of Moletta Patone (95 m a.s.l.) has yielded evidence of human occupation during both the Early and Late Mesolithic (Bagolini et al., 1984). Between 400 and 500 m a.s.l., the sites of Terlago Lago Montepiana (Dalmeri, 1985) and Vezzano (locality of Naran) (Pasquali, 1985) have yielded material securely dated to the Sauveterrian. Mesolithic evidence is also documented at significantly higher altitudes, around 1000 m a.s.l., as at Arco Pra de Gom (Pasquali, 1980), and even close to 2000 m a.s.l., as at Monte Gazza-Passo S. Antonio-Terlago (1896 m a.s.l.) (Dalmeri & Pasquali, 1980) and Pozza Lavino (1800 m a.s.l.). The latter, located in the Ledro area, has yielded evidence of occupation during both the Sauveterrian and Castelnovian phases (Scoz et al., 2015).

Numerous valley-floor sites, mainly rock shelters, have been recorded along the Adige Valley (Fig. 7), generally located at altitudes between 120 and 340 m a.s.l.. An exception is represented by Bus della Vecia (Besenello), which is situated at a higher altitude (600 m a. s.l.) (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana et al., 2023). Several sites -including major ones such as Riparo Soman (Broglio & Lanzinger, 1985 -1986), Romagnano Loc III (Broglio & Kozlowski, 1983; Fontana et al., 2016), La Vela (Bagolini, 1990; Pedrotti, 1990), Pradestel (Dalmeri et al., 2008), Riparo Gaban (Bagolini, 1980; Bisi et al., 1985), Galgenbühel-Dos de la Forca (Bazzanella & Weirer, 2001)-have yielded significant traces of multiple occupation dating to the Sauveterrian (Riparo Soman, Galgenbühel-Dos de la Forca) or to both the Early and Late Mesolithic phases (Romagnano Loc III, La Vela, Pradestel, Riparo Gaban). Romagnano Loc. III, in particular, has yielded one of the most important Mesolithic sequences, documenting multiple Sauveterrian and Castelnovian occupations (Fontana, 2011; Fontana et al., 2016). Early Mesolithic phases are dated to between the Middle Preboreal and the Middle Boreal (ca. 9300-7400 cal BC), while Late Mesolithic layers are dated to between ca. 6800 and 5400 cal BC (Fontana et al., 2016).

In the area between Monte Baldo and Monte Paganella (Fig. 7), several open-air sites have been reported at altitudes between 1100 and 1750 m a.s.l. (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana et al., 2023). The lithic industries recovered from many of these sites (e.g., Madonna della Neve, Malga Artillione, and Viotte Costa dei Cavai on Monte Bondone) can be broadly attributed to the Mesolithic (Bagolini & Nisi, 1976, 1978; Dalmeri & Pasquali, 1980), although at least some, such as Malga Campo, are clearly associated with Sauveterrian groups (Bagolini et al., 1980; Fontana, 2011).

In the area between Val Rendena, Val di Non, and the Maddalene Group, numerous open-air Mesolithic sites are known at altitudes ranging between 1238 and 2350 m a.s.l. (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana, 2011; Fontana et al., 2023). Only a limited number of sites can be attributed to either the Sauveterrian (Le Regole 3, Laugen II, Passo della Mendola IV) or Castelnovian (Passo della Mendola VI-VII, Laugen I), whereas many others merely attest to a generic human presence during the Mesolithic (Niederwanger, 1981; Lunz, 1986; Dalmeri & Pedrotti, 1994; Dalmeri et al, 2004; Cavulli et al., 2011; Fontana, 2011; Fontana et al., 2023).

The lower concentration of sites in western Trentino, compared to the eastern sector of the region, appears to depend mainly-at least regarding high-altitude areas-on the heterogeneity of research and, in particular, of survey activities (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011). As regards the valley floor areas, however, the greater or lesser concentration of sites seems close-

ly linked to their visibility; in fact, these, in most cases covered by meters of sediment, emerge, as in the case of the Trento area, only in conjunction with building expansions or where mining activities are concentrated (Dalmeri & Pedrotti, 1994).

Two of the most problematic issues are the shorter chronological depth of the Castelnovian (ca. 6700-5000 cal BC) compared to the Sauveterrian (ca. 9500-6700 cal BC), and the cultural attribution of sites to one of these technocomplexes, which, for surface lithic assemblages, is exclusively based on techno-typological features (Dalmeri & Pedrotti, 1994; Fontana et al., 2023). Moreover, at sites where both phases are attested, natural and anthropogenic agents could be responsible for erosive processes, which may have mostly affected Castelnovian layers (Fontana et al., 2023).

Analysis of the available evidence suggests that altitude represents a key variable for understanding human settlement trends between the Late Upper Palaeolithic and the Mesolithic. While Palaeolithic sites are generally located at mid-elevations (1000-1600 m asl), Mesolithic sites are distributed across three main elevation ranges: low (95-594 m asl), middle (1000-1238 m asl), and high (1773-2000 m asl) (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011). During both the Early and Late Mesolithic, settlement strategies display substantial continuity, with repeated occupation of the same territories and exploitation of similar ecological niches (Fontana et al., 2023).

Regarding evidence related to game exploitation, a wide variety of species can be observed (Fontana et al., 2023). Valley-bottom sites display the most comprehensive faunal spectra, including species associated with humid environments such as beaver, fish, and molluscs. Ungulates also play a significant role, with a diachronic decrease in *Capra ibex* and a corresponding increase in red deer (Fontana et al., 2023). These two ungulates become increasingly important at high-altitude sites; however, in some valley-bottom contexts red deer is replaced as the dominant species by roe deer and wild boar (Fontana et al., 2023). This pattern is closely linked to the expansion of forested environments during the Boreal and Atlantic periods (Cattani, 1994; Drescher-Schneider, 2009).

Settlement strategies and population patterns, at least during the Sauveterrian, appear to have been primarily linked to subsistence activities and the broad exploitation of resources available in the Alpine environment, rather than to the presence of chert outcrops (Cavulli & Grimaldi, 2009). Indeed, many sites are located more than 40 km from the nearest potential chert source. Sauveterrian raw material exploitation appears flexible and opportunistic, mainly aimed at optimising available lithic resources with relatively few technical constraints (Fontana et al., 2023). In western Trentino, Early Mesolithic groups exploited the numerous chert-bearing formations located along the Adige Valley, between Alta Lessinia and Val di Non (Bertola & Cusinato, 2005; Barbieri et al., 2013), closely linked to seasonal mobility that developed preferentially along this same hydrographic basin (Broglio, 2016; Fontana et al., 2023). While lithic raw material procurement systems have been extensively investigated for Sauveterrian groups in Trentino, far fewer data are available for the Castelnovian, making it more difficult to advance hypotheses regarding raw material supply for this phase (Fontana et al., 2023). If we look at the Belluno Dolomites, the data that emerged for Mondeval de Sora indicate that, whereas during the Sauveterrian raw material exploitation mainly reflects a connection with the Piave valley floor, during the Castelnovian the supply area expanded both eastward and westward (Fontana et al., 2020). This expansion likely aimed at acquiring higher-quality cherts suitable for more sophisticated knapping techniques, such as indirect percussion and pressure flaking (Fontana et al., 2020). Only targeted research will clarify whether similar trends can also be identified at sites surrounding the Atesino basin.

Regarding the techno-typological aspects of knapped lithic industries, Sauveterrian technology persisted into the Late Mesolithic, as shown by the stratigraphic sequence of Romagnano Loc III, where the opportunistic use of direct percussion and bipolar flaking -particularly during the final stages of core reduction-is documented within Castelnovian layers (Fontana et al., 2016). This continuity is also reflected in osseous equipment and settlement choices (Fontana et al., 2023). Evidence related to bladelet production and arrowhead manufacture at Romagnano Loc III indicates the onset of the Late Mesolithic with the layer AB, at the base of the Castelnovian sequence, where the first trapezoidal armatures appear together with the production of more regular bladelets through the adoption of new knapping techniques. Within the same stratigraphic sequence, trapeze manufacturing techniques suggest a possible change between layers AB and AA, while the presence of Sauveterrian microliths decreases over time (Fontana et al., 2023). Open-air sites likewise document the persistence of typical Sauveterrian microliths during the Castelnovian (Fontana et al., 2023). The major innovations associated with the transition between the Early and Late Mesolithic, at the onset of the Atlantic period, correspond to the diffusion of new lithic technologies. Available evidence indicates that these innovations originated outside the region and were progressively incorporated into pre-existing cultural traditions (Fontana et al., 2023).

## 6. MATERIAL

### 6.1. The knapped lithic artefacts of Tor dei Pagà

Only four knapped lithic artefacts have been recovered from Tor dei Pagà (Fig. 8). Although these were recovered from within Medieval layers, they almost certainly originated from the yellowish-brown deposit at the base of the stratigraphic sequence.

The assemblage includes a small, exhausted core, a laminar flake, and two fragmentary products, at least one of which can be securely identified as a bladelet fragment. No retouched tools were recovered, but all pieces were subjected to technological analysis (Inizan et al., 1995) to identify elements useful for their chrono-cultural assessment. To date, none of the Tor dei Pagà knapped lithic artefacts have undergone specific analyses to determine raw material provenance; this information is expected to be obtained through forthcoming petrographic studies aimed at evaluating their possible derivation from one or more of the chert-bearing geological formations of the Lombard Prealpine arc (Bertola et al., 2021, 2022).

The small, exhausted core (26 × 26 × 7 mm) made of grey chert, displays an irregular quadrangular morphology (Fig. 8-1). It appears to result from the opportunistic recycling of a flake blank through bipolar percus-

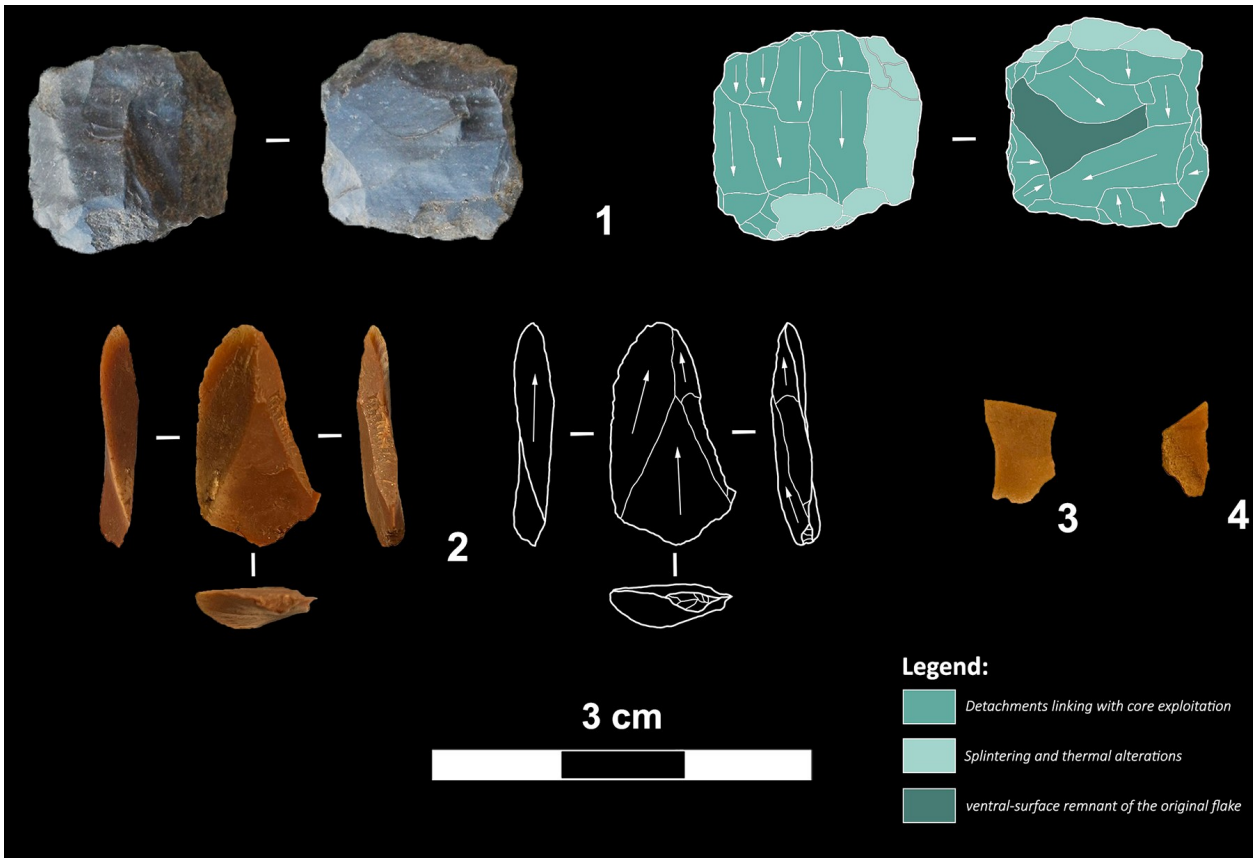


Fig. 8 - Tor dei Pagà lithic industry. n. 1: exhausted core exploited by bipolar knapping, n.2: laminar flake, n. 3 flake/bladelet fragment, n. 4 natural backed bladelet mesial fragment (artefacts photos: F. Bona, graphic elaboration: J. Conforti).

sion, with part of the ventral surface still visible on one of the two faces of the residual core (Fig. 8-1). One face preserves a series of non-standardized unipolar removals, while the opposite face shows at least two series of opposing bipolar negatives (also non-standardized) indicating that the striking and resting platforms were rotated by at least 90°, and possibly up to 180° (Fig. 8-1). Slight discoloration and small thermal detachments suggest that the artifact was exposed to fire. The ridges between the negatives do not show rounding.

The laminar flake (17 × 10 × 2 mm) in red-orange chert is sub-triangular in shape (Fig. 8-2). The thin blank has a small faceted, prepared platform (Fig. 8-2) with a flaking angle between 80° and 90°, and only a weakly developed the bulb. These features indicate production by direct freehand percussion, probably using a soft lithic hammerstone. The negatives are convergent and unipolar, and the profile is slightly twisted (Fig. 8-2) suggesting removal from a core with unipolar detachments and a debitage surface showing some transverse convexity. This flake could derive from a reduction sequence specifically aimed at producing elongated flakes, or it might represent a secondary product from bladelet-oriented reduction that integrated both bladelet and flake production. The piece shows no patinas, edge damage or ridge rounding. The other piece (Fig. 8-3), 2 mm thick and without cortex, is compatible with an elongated blank but is too fragmentary to offer substantial information.

The mesial fragment of a bladelet (4 mm wide, 2 mm thick) in yellow-orange chert is rather irregular (Fig. 8-4). A naturally backed surface with cortical residues along the left edge indicates that it represents a lateral product removed from the side of the core's debitage surface (Fig. 8-4). Both fragments show no patinas, edge damage or ridge rounding.

## 7. DISCUSSION

Although the knapped lithic artifacts found at Tor dei Pagà are extremely few in number and no retouched tools are present, they nonetheless display useful elements for hypothesizing their chrono-cultural attribution and for contextualizing their presence within the site. The four pieces were recovered in secondary position within the medieval occupation layers; however, the absence of physical alterations on the edges and ridges suggests that they underwent only limited spatial displacement from their original context and little to no exposure to processes such as trampling or weathering. By contrast, there is no clear evidence to establish whether the slight thermal alteration-most likely involuntary-observed on the small, exhausted core preceded or followed the redeposition of the artifacts within the medieval layers.

Despite its very small size and the absence of formally diagnostic tools, the Tor dei Pagà lithic assemblage can nonetheless be confidently assigned to the

Mesolithic, and most plausibly to the Sauveterrian tradition (Marchand, 2014; Lo Vetro et al., 2022a; Fontana et al., 2023). The attribution to the Mesolithic rather than to earlier Paleolithic phases or to more recent Holocene human presences, results from the convergence of both contextual and technological indicators. On the one hand, the environmental and geographical setting of the site, its high-altitude position within the Lombard Alpine arc and its proximity to well-documented Mesolithic routes and activity zones, is fully consistent with the spatial patterning documented for Sauveterrian groups in this area (Lo Vetro et al., 2022a).

Technologically, several traits observed in the artefacts, such as the characteristics of the laminar flake, the morphology of the exhausted core, and the production attributes of the bladelet fragment, are consistent with operational sequences commonly associated with early Mesolithic knapping strategies. The evidence of direct and bipolar on anvil percussion, the poor regularity of laminar products, and the absence of indications of more elaborate techniques such as indirect percussion and pressure are insufficient, based on only four artefacts and in the absence of absolute dating, to support a clear attribution to the Sauveterrian (Marchand, 2014; Fontana et al., 2023). The use of direct percussion, soft hammerstones, the production of laminar flakes, and the application of bipolar on anvil percussion during the residual phases of exploitation are, in fact, technological features shared by both the Sauveterrian and Castelnovian (Fontana et al., 2023).

Based on these observations, the few knapped lithic artifacts recovered at Tor dei Pagà most likely date to a Mesolithic occupation of the site. An attribution to the Late-Final Epigravettian (Lo Vetro et al., 2022a) or to more advanced phases of the Holocene, such as the Neolithic or Eneolithic (Scoz et al., 2015; Pedrotti et al., 2022; Poggiani Keller & Baioni, 2022), cannot be entirely excluded; however, it appears highly unlikely in light of the settlement dynamics documented for the Lombard Alpine arc during these periods and the absence of other diagnostic evidence among the materials from Tor dei Pagà. In the absence of absolute dates and more diagnostic techno-typological indicators, while a Sauveterrian attribution remains plausible, it is considered more prudent at present to assign the few knapped lithic artifacts from Tor dei Pagà to a generic Mesolithic framework.

### 7.1. The Mesolithic Presence at Tor dei Pagà within the Early Holocene Human Occupation of the Lombard Pre-Alpine-Alpine Arc and Western Trentino

The small number of knapped lithic artefacts recovered at Tor dei Pagà (2,250 m a.s.l.) in Upper Valcamonica fits well within the broader framework of Mesolithic Alpine settlement known in Lombardy, particularly in the Valcamonica-Val Trompia-Val Sabbia area (e.g., Biagi & Starnini, 2015; Lo Vetro et al., 2022a), where numerous high-altitude sites attributed to both the Sauveterrian and Castelnovian periods have been identified (Fig. 7). Given the extremely small number of artefacts and the lack of absolute dating, these observations cannot, on their own, support a definitive assignment to the Sauveterrian. Nevertheless, the Tor dei Pagà evidence fits perfectly within the high-altitude settlement model reconstructed for the Mesolithic in Lombardy. The location of the site corresponds to the recurrent use of elevated strategic points, passes, lakes, and lookout areas, documented throughout the region (Lo Vetro et al., 2022a). These settings are commonly associated with subsistence hunting activities and possibly also with broader mobility patterns linking different valleys. As suggested by several authors (Fedele, 1999; Lo Vetro et al., 2022a, 2022b) such mobility may reflect the intensification of social networks and inter-valley contacts, including connections with the western sector of Trentino area (Dalmeri & Pedrotti, 1994; Cavulli et al., 2011; Fontana, 2011; Fontana et al., 2023).

In this sense, even a minimal assemblage such as that from Tor dei Pagà provides meaningful evidence, reinforcing the emerging picture of Early Holocene occupation in the Alpine arc between Lombardy and Western Trentino and contributing to our understanding of how Mesolithic groups exploited high-altitude environments.

## 8. CONCLUSION

The data presented in this paper allow a reassessment of the Mesolithic presence at Tor dei Pagà and highlight key directions for future research aimed at clarifying this early phase of occupation:

- The four knapped lithic artifacts with Mesolithic characteristics recovered from within the Medieval levels at Tor dei Pagà undoubtedly attest to the presence of hunter-gatherer groups at the site from at least the beginning of the Holocene.
- Although limited in number, these artifacts nonetheless provide valuable insights into the Mesolithic occupation of the high-altitude areas of Lombardy and fit well within the broader framework of human settlement in the western sector of the Eastern Alps during the Early Holocene.
- It remains possible that subsequent occupations during the Iron Age and the Late Middle Ages may have partially or entirely disturbed, or even destroyed, traces of the Mesolithic presence.
- Given the characteristics of the lithic assemblage and the absence of distinctive techno-typological elements, it is not yet possible to assign the Mesolithic evidence at Tor dei Pagà more precisely to either the Sauveterrian or the Castelnovian cultural facies.
- Continued research at the site will be essential to test the hypotheses regarding the original stratigraphic provenance of the recovered lithic artifacts.
- Further investigations may also expand the available-dataset for this phase, ideally yielding additional lithic artifacts and materials suitable for radiometric dating (e.g., charcoal, hearth resideus), thereby contributing to a more refined chrono-cultural interpretation of the site's Mesolithic occupation.

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