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# Water Supply and Water Management in the Metal Ages

Edited by

Dirk Brandherm and Thomas Zimmermann

UNION INTERNATIONALE DES SCIENCES
PRÉHISTORIQUES ET PROTOHISTORIQUES

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# Water Supply and Water Management in the Metal Ages

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Cover: Aerial view of the motilla of Azuer (Daimiel, Ciudad Real) in 2013 – Luis Benítez de Lugo Enrich and Miguel Mejías Moreno



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# Current Research in the Metal Ages

# Typological examination of Middle and Final Bronze Age (1625–800 BC) pottery from the Eremita Cave in Borgosesia (Vercelli, Italy)

Lekë Shala, Eve Derenne and Marie Besse

The Eremita Cave is located in the northwest of Italy, in the province of Piedmont, in the Monte Fenera Massif. Ten years of excavations (2012–2021) conducted by the Laboratory of Prehistoric Archaeology and Anthropology of the University of Geneva, under the direction of one of us (MB), revealed that the cave was used for burials during the Middle and Final Bronze Age (1625–800 BC) and yielded pottery, fauna, bronze artefacts, lithic industry, and cremated human remains. The ceramic assemblage consists of 2982 sherds. The study of the pottery revealed the minimum number of vessels and their main morphological characteristics. Together with an overview of the stratigraphic and chronological sequences, the study provides further information on the function of the cave and the chrono-cultural context. Through comparisons with other sites, this study explores the movement of people, ideas and artefacts.

Keywords: Eremita Cave, Bronze Age, pottery typological examination, archaeometry

La Grotte de l'Eremita est située au nord-ouest de l'Italie, dans la province du Piémont, dans le massif du Monte Fenera. Dix années de fouilles (2012–2021) menées par le Laboratoire d'archéologie préhistorique et anthropologie de l'Université de Genève, sous la direction de l'une d'entre nous (MB), ont révélé que la grotte était utilisée pour des sépultures durant l'âge du Bronze moyen et final (1625–800 av. J.-C.) et a livré des poteries, de la faune, des objets en bronze, une industrie lithique et des restes humains incinérés. L'assemblage céramique se compose de 2982 tessons. L'étude de la poterie a révélé le nombre minimum de récipients et leurs principales caractéristiques morphologiques. Outre un aperçu des séquences stratigraphiques et chronologiques, des informations supplémentaires sont fournies sur la fonction de la grotte et le contexte chrono-culturel. À travers des comparaisons avec d'autres sites, cette étude explore le mouvement des personnes, des idées et des objets.

Mots-clés : Grotte de l'Eremita, âge du Bronze, étude typologique de la céramique, archéométrie

Eremita Mağarası, İtalya'nın kuzeybatısında, Piedmont ilinde, Monte Fenera masifinde yer almaktadır. Cenevre Üniversitesi Prehistorik Arkeoloji ve Antropoloji Laboratuvarı tarafından, içimizden birinin (MB) başkanlığında yürütülen on yıllık kazılar (2012-2021), mağaranın Orta ve Son Tunç Çağı'nda (MÖ 1625-800) mezarlar için kullanıldığını ve çanak çömlek, fauna, bronz eserler, taş endüstrisi ve yakılmış insan kalıntıları içerdiğini ortaya çıkarmıştır. Seramik topluluğu 2982 parçadan oluşmaktadır. Çanak çömleklerin incelenmesi, minimum kap sayısını ve bunların ana morfolojik özelliklerini göstermektedir. Stratigrafik ve kronolojik sıralamaya genel bir bakışla birlikte, mağaranın işlevi ve krono-kültürel bağlam hakkında daha fazla bilgi sağlanmıştır. Bu çalışma, diğer yerleşimlerle karşılaştırmalar yaparak insanların, fikirlerin ve eserlerin hareketini araştırmaktadır.

Anahtar Kelimeler: Eremita Mağarası, Tunç Çağı, çanak çömlek tipolojik inceleme, arkeometri

## Introduction

This paper presents the results of the typological study of the pottery recovered from Eremita Cave, located in northern Italy, in the Piedmont region, in the territory of Borgosesia municipality. The site represents an important archaeological context for analysing the social and ideological development of the Middle and Final Bronze Age in the southern Alpine region of Central Europe. This work focuses on the typological features of the pottery collected from Eremita Cave.

Pottery is an integral part of everyday life, from the sacred to profane, regardless of status. As pottery often plays an important role in communication and religious life, it can also provide insights into deeper and less tangible aspects of past cultures, such as belief systems, ritual activities and identity (Quinn 2013; Skibo 2013: 1–25). As such, it is an important resource for interpreting the activities of past peoples and reconstructing aspects of their cultures. Pottery interpretation is therefore a method of attempting to answer research questions relating to the chrono-cultural context, economy, and use of the site.

The analytical process for this study unfolded in three steps: first, the archaeological and geological background of the cave were specified. Secondly, the minimum number of vessels was reconstructed on the basis of macroscopic and morphological observations.

Finally, these vessels were categorized typologically and chronologically, and were projected onto both the stratigraphy and the excavation plans. The analysis of morphological characteristics was an objective, using the orientation of the profile, the type of rim, and other morphological features related to the body shape as indications. Decorative categories were equally important and were distinguished by shape, technique, and position on the vessel. Typological comparisons were made with other sites, in the region and beyond. The results of this study provide important data that helps characterize the function of the cave and discern its significance in a wider cultural and environmental context.

## Archaeological and Geological Background

### *Eremita Cave*

The Eremita Cave (Fig. 1) is located in Piedmont, northern Italy, in the Monte Fenera massif, within the 'San Salvatore' dolomite. It opens on the western slope overlooking the Val Sesia at an altitude of 598m (Derenne *et al.* 2020). The massif lies at the entrance to several valleys, to the north leading to passes that give access to the Upper Rhone Valley in southwestern Switzerland, and to the south towards the Po Plain (Besse and Viola 2013a).

### *Monte Fenera*

Monte Fenera, where the Eremita Cave is located, is the only massif composed of dolomites and limestones in this part of Val Sesia. It is located near two tectonic lines, the Cremosina and the Colma (Fantoni *et al.* 2005). The geological sequence of Monte Fenera consists of a basement of gneissic schists and Precambrian volcanic rocks. It is followed by a major Mesozoic sequence of about 300 meters of dolomite, about 10 meters of red sandstone, and about 250 meters of siliceous and marly limestone (Fantoni *et al.* 2005). The fossil remains of a super-volcano, active 290 million years ago, whose caldera reached a diameter of 13 km, are visible in the regional geology (Quick *et al.* 2003). During the last glacial maximum of the Pleistocene, Alpine glaciers reached Monte Fenera. Their retreat began around 21,000 BC, exposing the massif around 14,000 BC, which may have influenced the formation of cavities in its dolomite (Berruto 2011).

Monte Fenera encompasses about 70 caves. Some of them contain traces of human occupation dating to between the Middle Palaeolithic and the Late Middle Ages (Gambari 2005). Most of these caves were formed during the Messinian period (Bini and Zuccoli 2005), before being modified and enlarged during the climatic changes of the Pliocene to Pleistocene transition (Berruto 2011). Facing west, the view from the entrance of the Eremita Cave overlooks the valley where the Sesia River flows from its source in the Monte Rosa glacier around the low hills of Gattinara and Romagnano Sesia, eventually reaching the plain where it joins the Po at Casale Monferrato (Besse and Viola 2013a). The meandering course of the Sesia River crosses all three topographical areas. Such factors explain the development of important karst phenomena in the river.

Since the 18th century, a significant number of archaeological sites have been identified on Monte Fenera, although the bulk of the discoveries were made during the first half of the 20th century, under the impetus of Carlo Conti (1931). As discussed previously, several human occupations have been documented on

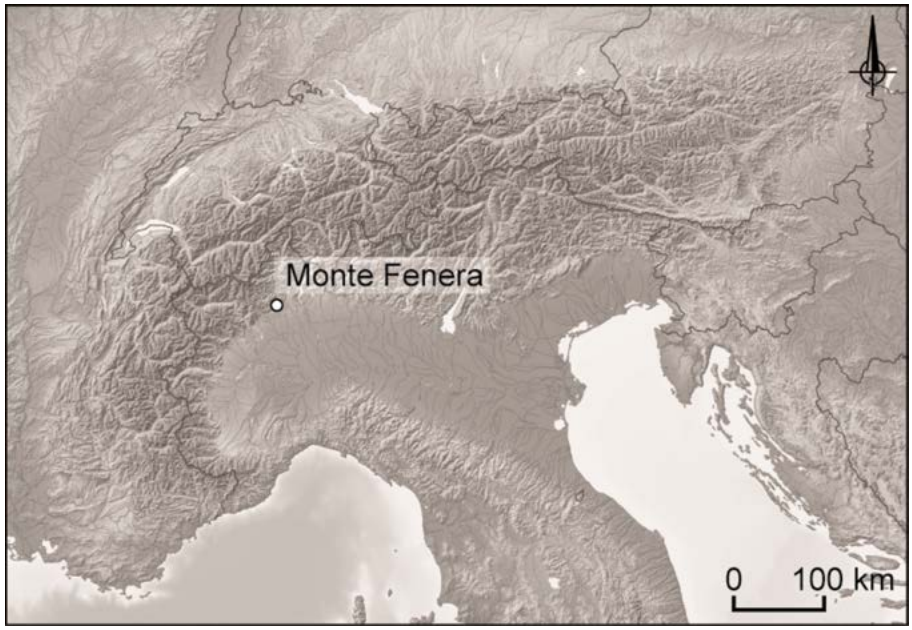


Fig. 1 – Location of Monte Fenera at the scale of the Alps. – (after Derenne et al. 2020: fig. 1).

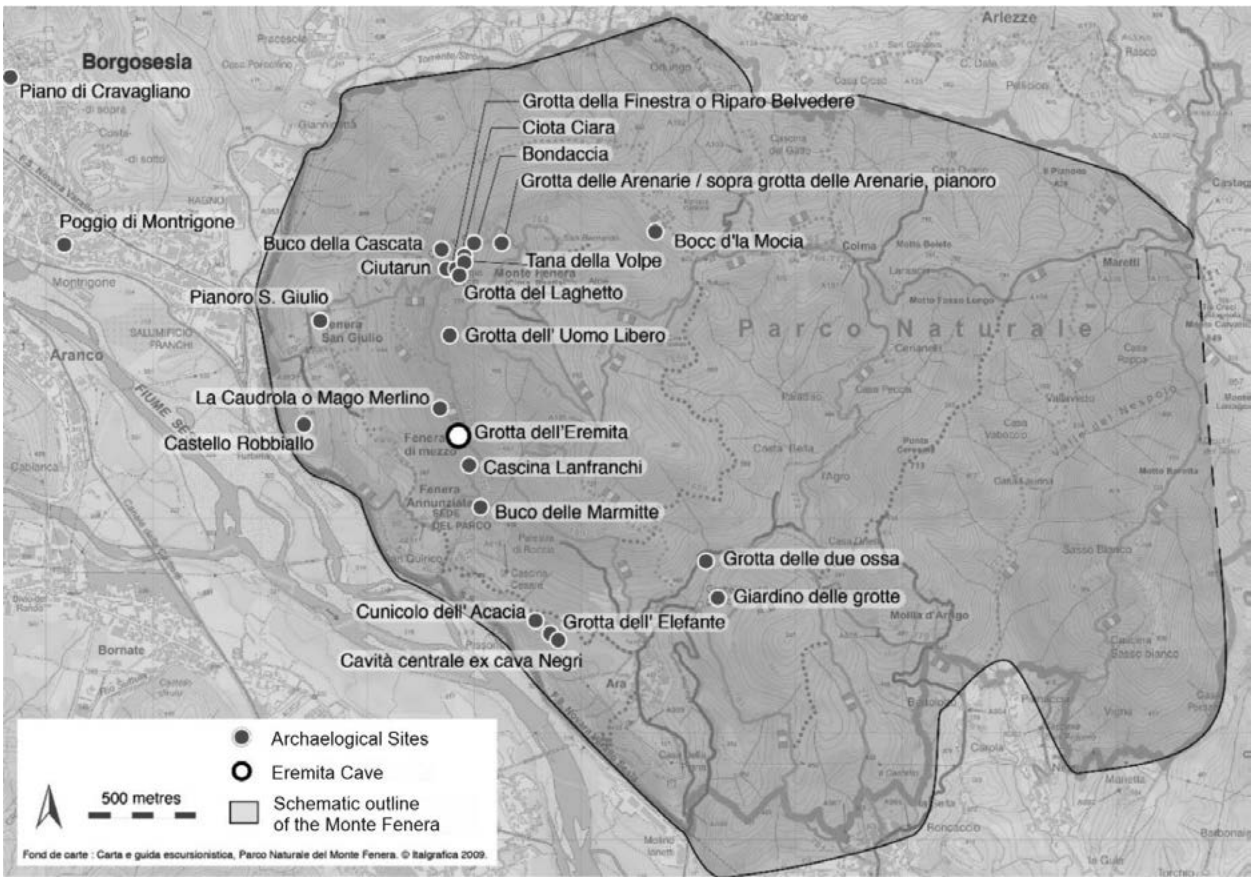


Fig. 2 – Distribution map of the main archaeological and palaeontological sites around and within Monte Fenera. – (after Besse and Viola 2013b, fig. 2).

Monte Fenera and in its immediate surroundings (Fig. 2). The most ancient one, the Ciota Ciara Cave (675m), is the only Middle Palaeolithic site known to date (Arnaud *et al.* 2021), excavated under the direction of Marta Arzarello of the University of Ferrara. Neolithic evidence comes from the terrace of Fenera S. Giulio (414m), and the cave of Riparo del Belvedere (662m). The Chalcolithic, meanwhile, is represented by the Uomo Libero Cave (620m), Ciotarun (635m), and the hill of Montrigone. The terrace of Castello di Robbiallo (354m) shows Chalcolithic and Early Bronze Age occupations, while the Tana del Volpe Cave (661m) yielded only Early Bronze Age material. Early and Middle Bronze Age remains have also been found in the Laghetto Cave (701m) (Besse and Viola 2013a; Derenne 2016).

Monte Fenera is rich in mineral resources, several of which are accessible and offer a variety of different types of raw materials (Berruto 2011). Flint is present in the form of spongolite, both on the summit and on the southern slopes; the limestone layers are accompanied by sandstone, the base of the massif contains quartz deposits, while the western slopes yield jasper. Quartz and jasper can be found along the various streams in the massif, as well as opal (Derenne 2016). Monte Fenera, with its numerous caves and resources, offers a strategic position which allows for temporary stops during north-south Alpine crossings.

### *2.3 History of research in the Eremita Cave*

At the end of the 1980s, the *Gruppo archeo-speleologico di Borgosesia* (GASB) excavated two test trenches, which yielded archaeological material from different historical periods. A bone button, which is on public display at the Carlo Conti Museum in Borgosesia (Derenne 2016), was interpreted by the GASB as dating back to the Copper Age. This same button attracted the interest of the University of Geneva team and led to the organisation of a survey campaign (Besse and Viola 2013a; Besse and Viola 2013b). Thus, in 2012, the Laboratory of Prehistoric Archaeology and Anthropology at the University of Geneva began work in the Eremita Cave. The team, led by one of us (MB), uncovered ceramic and bone remains, as well as a metal pin and spiral beads, justifying a request to the Italian authorities for further excavations (Derenne 2016).

The excavations undertaken in the cave combined two essential approaches: stratigraphic and planimetric. The Eremita cave was investigated from an absolute depth of -185 (120cm below the surface) in 2013 to

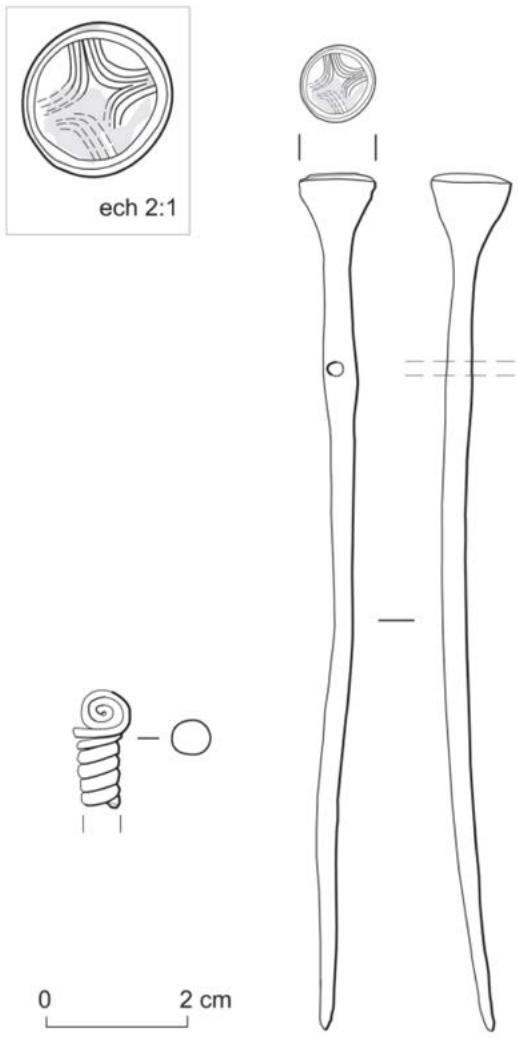


Fig. 3 – Bronze pin and spiralled ornament from the Eremita Cave. – (after Besse et al. 2014, fig. 6).

-306 (198.4cm below the surface) in 2021. A series of 2,982 pottery sherds, associated with fauna, cremated human remains, flint and bronze objects (Fig. 3) were discovered in the excavated layers. All finds were recorded according to their respective stratigraphic unit (hereafter US). The latter were determined from stratigraphic profile no. 1. To specify the absolute chronology of the site, sixteen radiocarbon measurements were made at the Swiss Federal Institute of Technology in Zürich.

### *Chronological sequences of the cave*

Sixteen radiocarbon samples were selected and sent for dating by Dr. Irka Hajdas (Swiss Federal Institute of Technology Zürich) (Figs 4 and 5). Only thirteen of these are presented below, since three of them were not consistent with their stratigraphic position. Anthracological analyses were carried out by Janet Battentier (University of Geneva) on the second batch of samples, to select short-lived species whenever possible. The radiocarbon data obtained from these samples revealed that the cave was used for burial purposes during the Middle (1625–1325 BC) and Final Bronze Age (1250–800 BC) (Besse and Viola 2013a; Besse *et al.* 2014; Derenne *et al.* 2020; Rubat-Borel *et al.* 2022) (Fig. 6).

Two charcoal samples were selected because they belonged to US10, the black layer that sealed the stratigraphic sequence at about -130 cm. One sample each was taken from US16, US17, and US21, respectively; two from US14, and three from US18. Four samples were selected from US19, including two specifically for their relationship to the area where the bronze pin and beads were found. This layer was particularly

| Sample code | US | Sample number | Dating BP | 2 sigma (prob. 95.4%) (IntCal20) | Material | Selection of samples after anthrocological analysis (by J. Battentier) |
|---|---|---|---|---|---|---|
| BE15-F5-prCH4 | 10 | ETH-64659 | 2794 ± 27 BP | 1013–841 cal BC | charcoal | No |
| BE14-E4-prCH14 | 19 | ETH-64658 | 3323 ± 28 BP | 1681–1512 cal BC | charcoal | No |
| BE13-E2-prCH6 | 19 | ETH-64656 | 3334 ± 28 BP | 1729–1520 cal BC | charcoal | No |
| BE14-E4-prCH10 | 19 | ETH-64657 | 3404 ± 28 BP | 1864–1619 cal BC | charcoal | No |
| BE15-F5-prCH2 | 10 | ETH-104336 | 2688 ± 22 BP | 900–804 cal BC | charcoal | No |
| BE16-F3-prCH5 | 19 | ETH-104337 | 3159 ± 22 BP | 1499–1400 cal BC | charcoal | No |
| BE18-F3-prCH105 | 18 | ETH-104338 | 3294 ± 25 BP | 1617–1507 cal BC | charcoal | Yes |
| BE18-F3-prCH106 | 18 | ETH-104339 | 3318 ± 24 BP | 1663–1511 cal BC | charcoal | Yes |
| BE18-G5-prCH111 | 14 | ETH-104340 | 3475 ± 22 BP | 1881–1700 cal BC | charcoal | Yes |
| BE18-F4-prCH118 | 17 | ETH-104341 | 3207 ± 24 BP | 1509–1426 cal BC | charcoal | Yes |
| BE18-F5-prCH131 | 14 | ETH-104342 | 3318 ± 22 BP | 1628–1516 cal BC | charcoal | Yes |
| BE18-F5-prCH136 | 21 | ETH-104343 | 3363 ± 25 BP | 1740–1543 cal BC | charcoal | Yes |
| BE18-G3-prCH137 | 18 | ETH-104344 | 3275 ± 25 BP | 1615–1466 cal BC | charcoal | Yes |

Fig. 4 – Radiocarbon measurements for the Middle and Final Bronze Age occupation of the Eremita Cave.

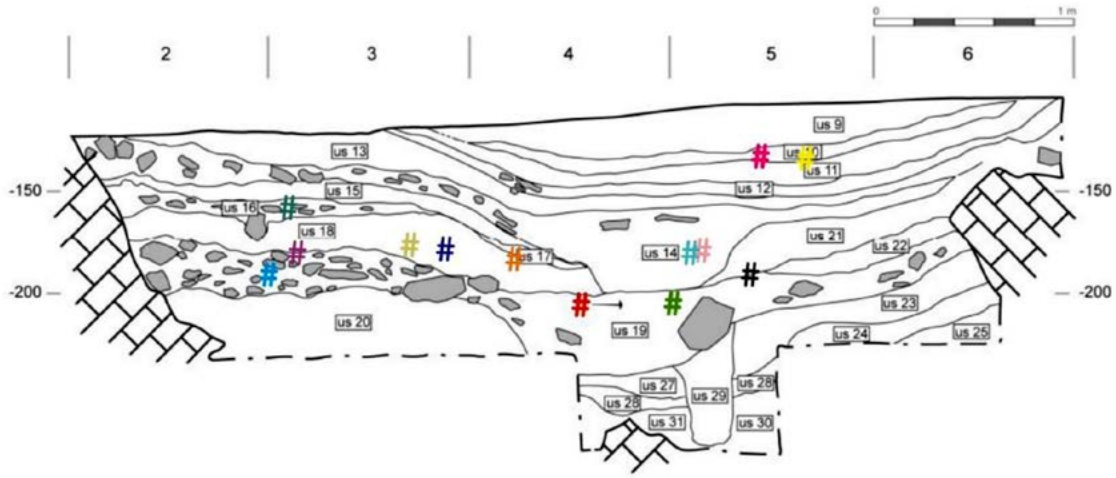


Fig. 5 – Projection of the 13 charcoal samples onto Stratigraphic profile no. 1.

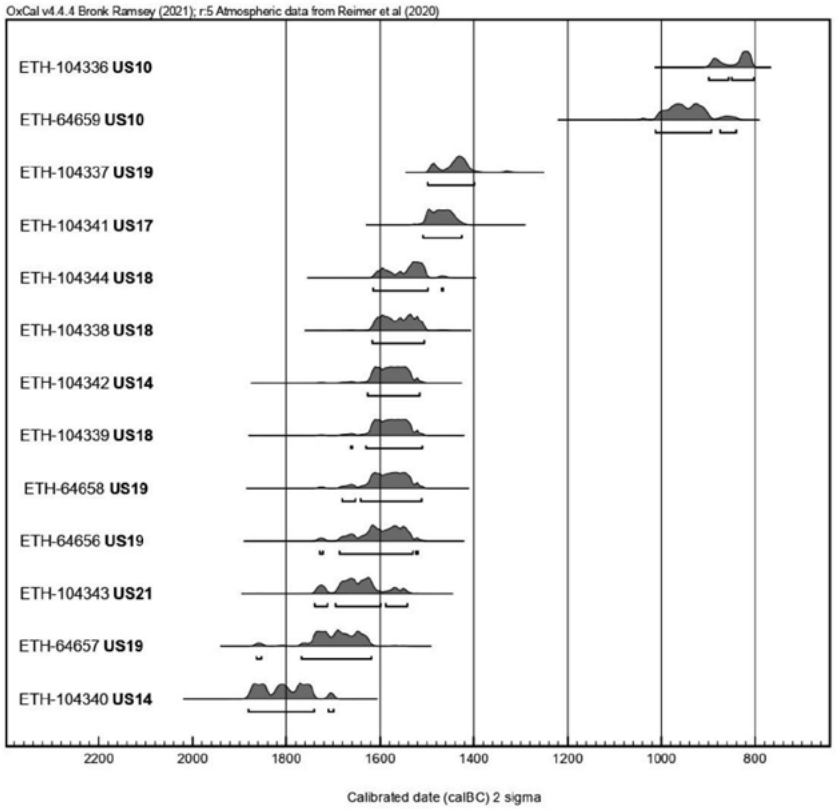


Fig. 6 – Calibration of the 13 radiocarbon dates from the Eremita Cave. – (Calibration with OxCal 4.4.4 [Bronk Ramsey 2021], based on the IntCal20 calibration curve [Reimer et al. 2020]).

important to date, as it yielded most of the pottery from the assemblage, together with a high concentration of lithics, faunal bone fragments, and cremated human remains. Apart from US10, which was dated to the end of the Final Bronze Age, all the samples date to the Middle Bronze Age.

## Methods

A total of 2,982 pottery sherds weighing 35.5kg were recorded in a database. Each sherd was examined and documented recording two distinct types of information: (1) general details such as the inventory number, location, square metre, layer, spit, and chronology, (2) information on the pottery itself, i.e., typology (rim/base/handle/decoration), exact 3D position (x, y, z), length (in cm), width (in cm), thickness (in cm), weight (in grams), state of preservation, colour of the outer surface, colour of the inner surface and colour in cross-section.

### *Laboratory data collection*

In order to determine the minimum number of vessels, general information on the macro-paste and typological information on the pottery was used. Diagnostic sherds


Fig. 7 – Vessel sherds, including a lug, photographed in situ during the 2021 excavation campaign.

(Fig. 7), such as rims, bases, handles, carinations and decorations, made up 13% of the corpus (n = 297) whereas the non-diagnostic pottery sherds — body fragments — represented 87% of it (n = 1997). Out of the 297 diagnostic sherds, 159 were rim fragments, 36 bases, 21 vertical or lug-shaped handles, 27 carinated sherds, and 54 sherds with decorations (cordon, fingerprints, incisions, etc.).

However, 2,124 sherds out of a total of 2,982, for a weight of about 6.4kg, were smaller than 1cm and could not provide sufficient macroscopic and typological data, due to their highly fragmented nature; they were therefore not taken into consideration for the rest of the study.

The remaining sherds (n = 858, *c.* 29.1kg in total weight) were selected for further study, and the minimum number of vessels was determined on the basis of this narrowed-down corpus. Once the corpus for further analysis had been selected, two main processes took place: (1) macro-paste grouping and (2) further sub-grouping based on morphological features.

First, the selected group — 858 pottery sherds — was analysed macroscopically, looking at attributes such as surface treatment, hardness, thickness, and colour in cross-section. The classification of the macro-pastes was defined solely from the characteristics of the inclusion. Following this analysis, the corpus was classified into ten paste groups. For each of them, a schematic diagram was created with the visible characteristics of the most representative sherd, such as colour and size of inclusions. In the classification, each group of recurrent paste characteristics was labelled macro-paste and numbered consecutively (e.g., MP. 1, MP. 2 ... MP. 10). The characteristics defining each group (colour, size, and lustre of inclusions) were recorded in a table. In addition, a close-up photograph of the paste was taken.

In a second step, the typologically diagnostic fragments of each macro-paste group were determined. Of the total number of sherds selected (858 fragments), 289 (33%) were diagnostic sherds. The typological classification process was pursued within the ten macro-paste groups by classifying rims, handles, bases, and carinated sherds according to shape, size and decoration, bringing the number of sub-groups to 26, the minimal number of vessels (MNI).

The positional data (x, y, z) of the sherds — in association with the specific vessels they belonged to — were then processed with the ArcGIS software. This provided their exact location in three dimensions and allowed us to project them onto both the stratigraphic profile (Fig. 8) and the excavation plans (Fig. 9). The layers correlated with changes in typology, manufacturing techniques and depositional processes. This spatial analysis also revealed the differences in the weight distribution of the fragments on the excavation plan.

## Results

### *Vessels and categories*

Based on the selection criteria and sub-groups identified through the petrographic and morphological analysis, a minimum of 26 vessels (MNI) have been identified. Out of the 26 vessels, the rounded-lip type is the most common, with a total of 13, followed by five vessels with a bevelled inner rim. Four vessels have flattened rims and one has a thinned rim. For three vessels, the

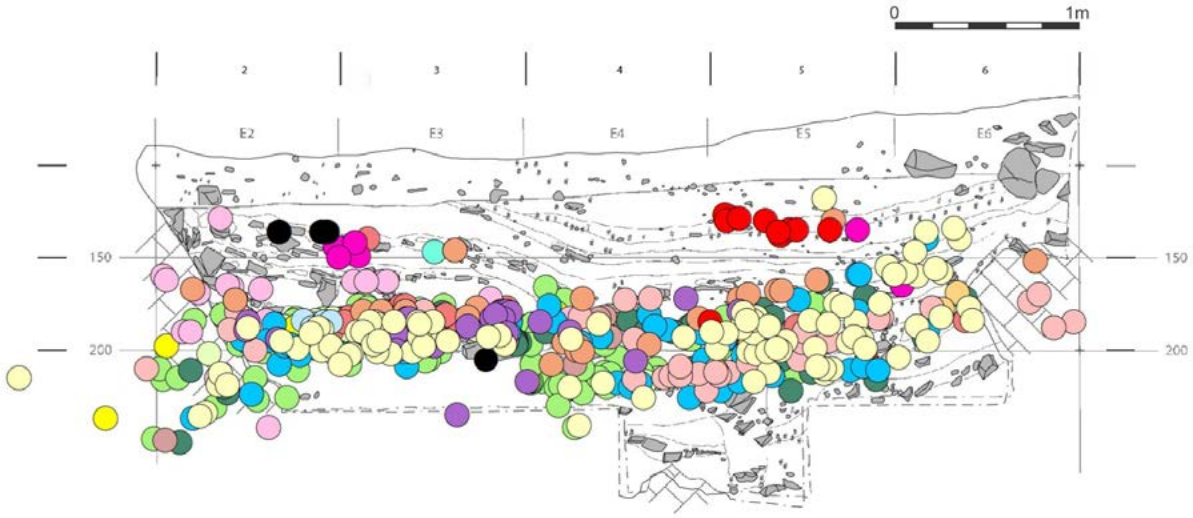


Fig. 8 – Projection of the 26 vessels identified onto Stratigraphic profile no.1. Each colour distinguishes a different vessel.

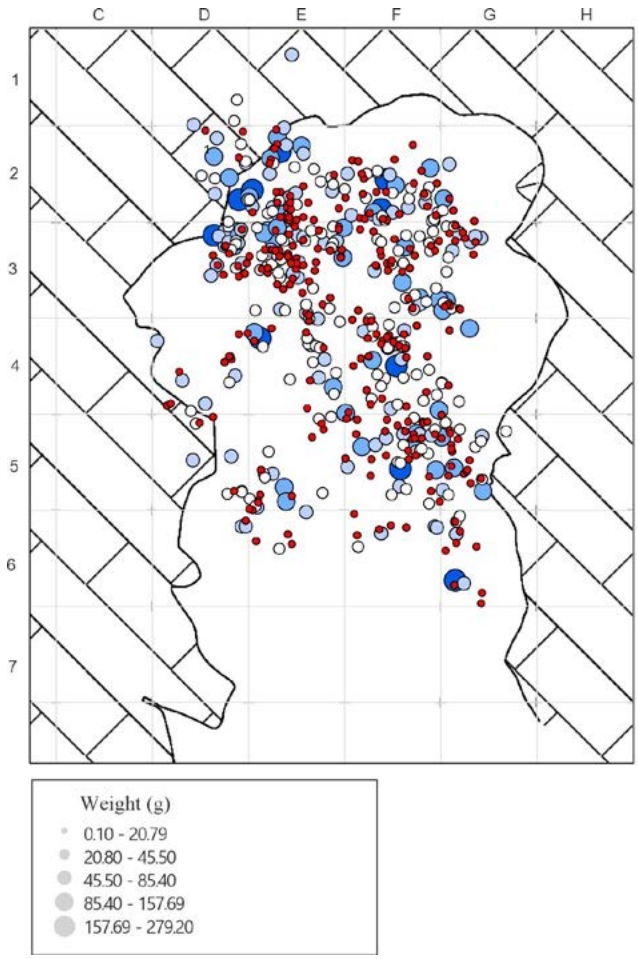


Fig. 9 – Spatial distribution of the 26 vessels. Each sherd's weight (g) is indicated by the size of the dot.

rims are missing and only the lower parts of the vessels are preserved. Regarding rim orientation, 12 of these vessels have an excurved rim, nine of them in the vertical direction. Two of them are curved inside. Six vessels present a prehension element. Three of them belong to the lug category, and the others to the handle category. The majority of the 26 vessels (14 out of 26) lack a surviving base. Eleven of the bases identified are flat, and a single one is rounded.

The vessels found in the Eremita Cave were classified according to their morphological characteristics as cups, pots, bowls, jars, and unidentifiable shapes. Out of the 26 vessels, 11 belong to the cup category, five to the pot category, five to the bowl category, three to the jar category, and two present unidentifiable shapes.

1. *The cups* category encompasses 11 vessels. In terms of shape and decoration, this is the most varied category. The general morphology of the vessels varies, including straight, rounded and carinated profiles. The rims are vertical or curved outwards. Three of the vessels bear no decoration or prehension elements. The linear incised decoration on the rims or lips is characteristic of this category. The main decoration in this category consists of zigzag lines along the rim, diagonal hatches, linear lines, and leaf-like incisions on the body. One of the cups belongs to the category of carinated spherical cups with rounded bases and is decorated with three incised lines running around the body (Fig. 10b).
2. *The pots* category is represented by five vessels, most of which are vertical or slightly curved inward, except for one, which has a rounded body. Most of them have cordons. The cordons

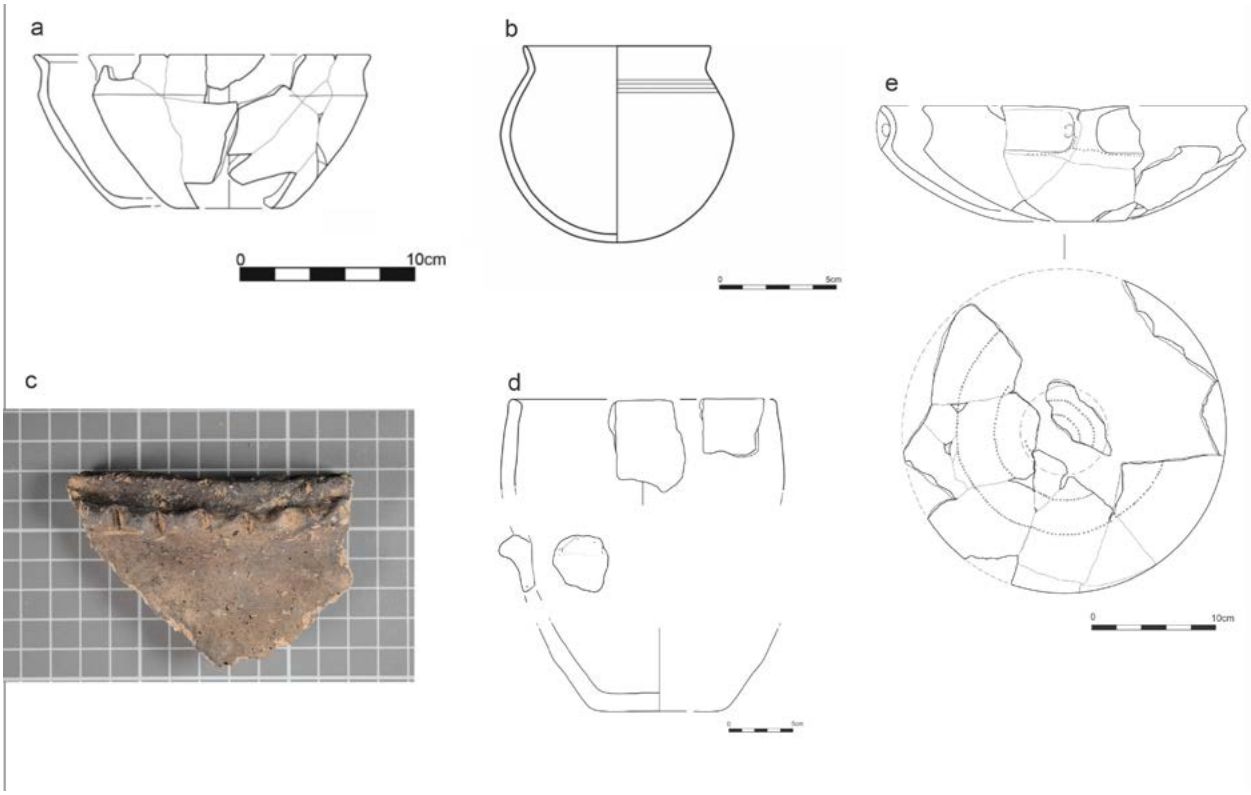


Fig. 10 – The four vessel shape categories identified through this study: bowls (a and e), the second bearing a stamped decoration, globular cups (b), jars (c), pots (d). – (after Derenne 2016: appendix 1: 1; appendix 7: 60–63).

— further decorated with finger impressions or not — are placed under the rim and around the body. In one case, the fingerprint decoration is applied directly to the vase without the addition of clay. In another instance, a lug is applied to the body (Fig. 10d).

3. *The bowls* category includes five vessels. They are all open vessels. Two of them have an S-shaped profile (Fig. 10a). The third one has no decoration at all, while the fourth one is decorated with parallel incisions of blind holes that go all the way around the bowl. It also has a handle that extends from the rim to the carinated part, forming a narrow hole in the shape of a tunnel (Fig. 10e). One of the bowls has fingerprint decoration on the inside, specifically on the lip.
4. *The jars* category is represented by four vessels. Typologically, this category is the most homogeneous. The main characteristic of this group is their vertical or slightly curved profile. Their decoration consists of horizontal alignments of fingerprints under the rim (Fig. 10c), along the body, and on the lip. They have lugs in the form of buttons or a cordon attached to the centre of the body.

***Decoration techniques***

Seventeen of the 26 vessels are decorated, with fingerprints (n = 7), incisions (n = 7), attached cordon(s) (n = 6) or nail imprints (n = 1). These different decoration types are sometimes combined on the same vase. The remaining nine vessels are undecorated. As for the position of the decoration, they are placed on the rim (n = 6), neck (n = 6), shoulder (n = 6) and body (n = 4). There is only one case of decoration at the base of the vessel.

Regarding the technical aspects of decoration, as Roux (2019) explains, the impression technique consists in pressing a hard object against the clay paste or by pressing the clay paste against a hard object to create the desired pattern. In the present corpus, this technique mostly takes the form of fingerprinting, by adding a cordon of clay around the vessel and then pressing a finger into it to create depressions of approximately 90mm in length, one after the other (Figs 11a and 11c). The fingerprint technique was sometimes applied directly to the vessel without the addition of a cordon of clay (Fig. 11b). A cup was also decorated using the fingerprint technique (Fig. 11d), but on the inside of its bevelled rim. In one case, a small pointy tool was stamped onto a carinated bowl to create lines of small dots (Fig. 12b). One of these lines follows the rim, while the lower part of the body is dotted with four circles, each tapering towards the smallest at the base.

Incision is a type of decoration that is also present on several Eremita Cave vessels. This decoration technique consists in drawing patterns on a vessel, in a linear

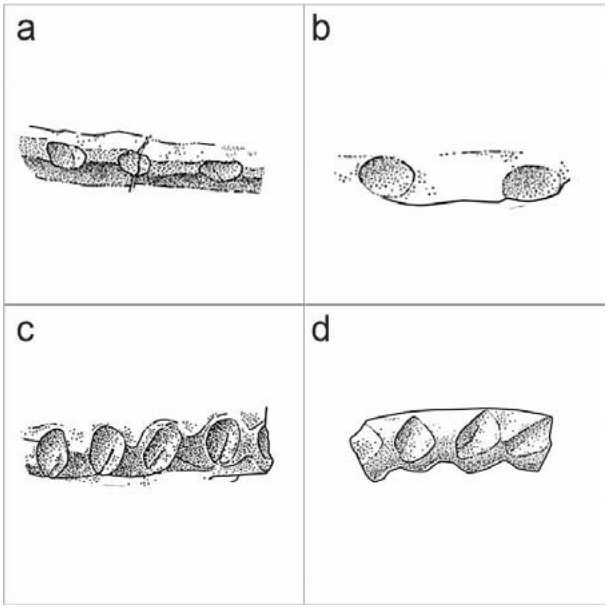


Fig. 11 – Types of fingerprint decoration present in the corpus of the Eremita Cave: Fingerprints applied to the cordon (a, c and d). – Fingerprint applied directly to the vessel (b).

movement, by dragging a tool into its wet or leather-hard paste. It can be performed with different types of tools, in different materials (wood, metal, bone, ceramics, stone, basketry, etc.), and to create different patterns (Roux 2019). Within our corpus, the incisions vary in pattern and position on the vessels. In the case of a globular cup, three lines of incisions were made under the neck, around the body of the vessel (Fig. 12a). Incised zigzag or diagonal hatches on the top of the rim are also present (Figs 12c and 12e). One of the cups presents a line of incised hatches (Fig. 12d), and another cup a line of leaf-shaped incisions (Fig. 12f).

***Vessels' chronological sequences***

The dating of the vessels is based on the 13 radiocarbon dates and their relationship to the position of the sherds in their respective stratigraphic unit (US). The pottery belongs mainly to the Middle Bronze Age (1625–1325 BC) and to a lesser extent to the Final Bronze Age (1325–800 BC). The results show that 23 vessels, two spindle whorls and four ceramic beads belong to the Middle Bronze Age. The majority of these (n = 18) have a strong relationship with US19. This layer yielded the cremated human bones found at the centre of the cave, bronze artefacts, and a high proportion of 'waste' such as fragmented faunal remains. Two vessels were dated to the Final Bronze Age on the basis of the absolute chronology of US10 and of their typology. One of the vessels, known only from a fragment, lacked information, so its date remains unknown.

**Cross-regional comparisons and discussion**

The Eremita Cave pottery assemblage is composed of a variety of vessel types in terms of morphological and decorative characteristics. It should be noted, however, that the corpus of pottery from the cave is essentially coarse and simple in form and decoration, and that with the exception of a few specimens, there are no strong and specific characteristics that could be clearly assigned to any cultural sphere. Another drawback for typological comparisons is the small number of publications on pottery from northwestern Italy — highlighting the importance of an assemblage such as the one presented here. The decoration motifs and techniques, however, allow for a certain degree of comparison with other sites in northern Italy and beyond.

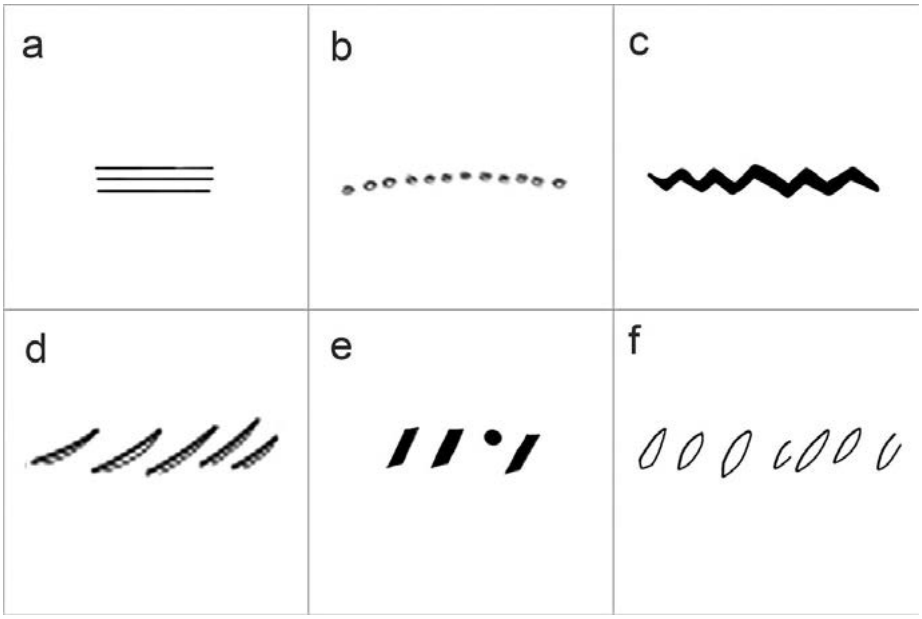


Fig. 12 – Types of decoration found in the Middle and Final Bronze Age corpus of the Eremita Cave: Incised lines (a). – Dotted impressions (b). – Zigzag incision (c). – Diagonal lines incision (d). – Diagonal hatches (e). – Leaf-shaped incisions (f).

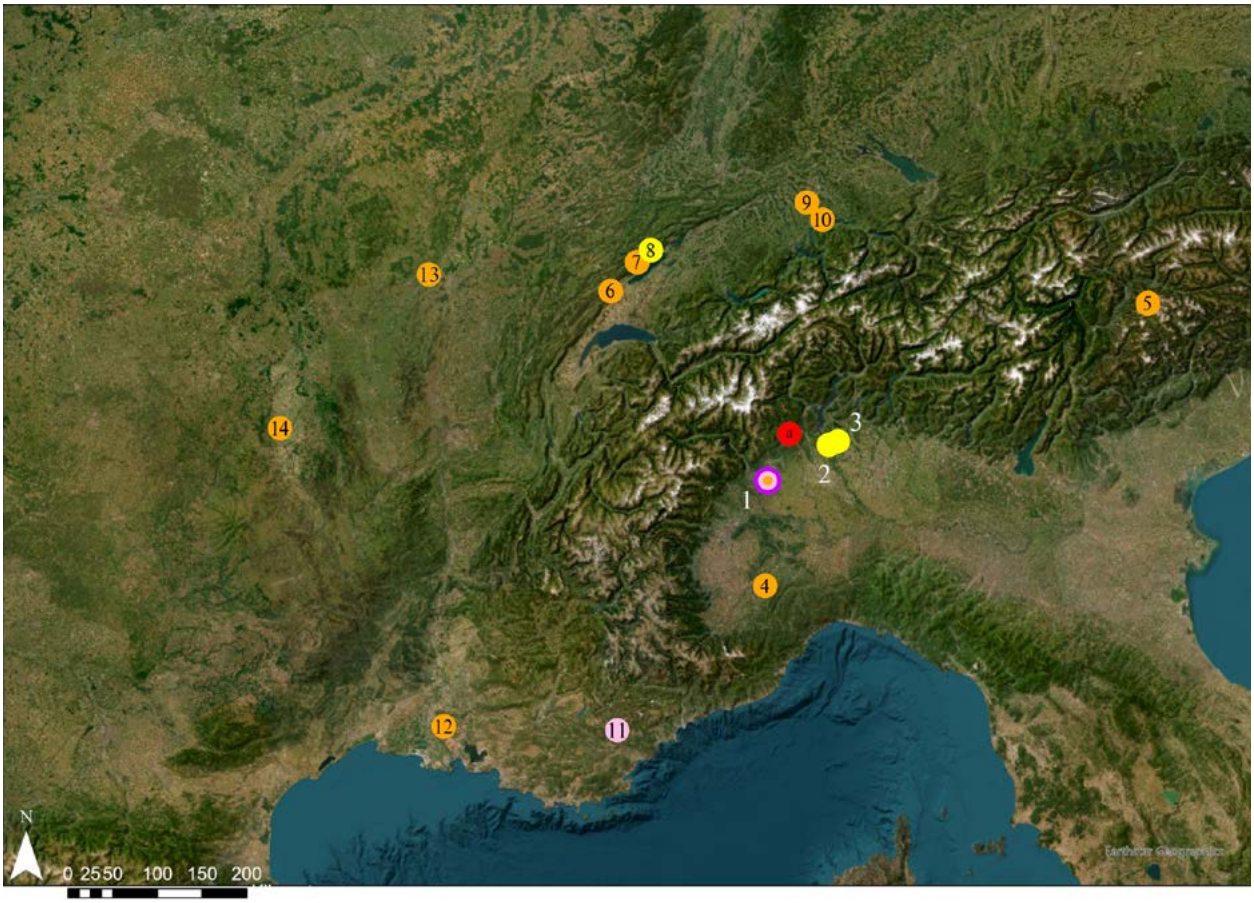


Fig. 13 – Typological comparison of pottery. Each colour corresponds to a type of vessel found in the Eremita Cave: bowls (purple); jars (orange); globular cup (yellow).
a. Eremita Cave (Borgosesia, Vercelli, Italy); 1. Viverone-Vi1 Emissario (Biella, Italy); 2. Golasecca-Sesto Calende (Varese, Italy); 3. Monsorino (Varese, Italy); 4. Alba Site-Saggio C (Piemonte, Italy); 5. Sotciastel (Val Badia, Bolzano, Italy); 6. Rances Champ-Vully (Vaud, Switzerland); 7. Bevaix 'Les Pâquiers' (Neuchâtel, Switzerland), 8. Auvernier (Neuchâtel, Switzerland); 9. Birmensdorf – Stoffel (Zürich, Switzerland); 10. Wädenswil-Vorder-Au (Zürich, Switzerland); 11. Peygros Cave (Mons, France). 12. La Fourbine Cave (Saint-Martin-de-Crau, Bouches-du-Rhône, France); 13. Chassey-Le Camp (Saône-et-Loire, France); 14. Cournon (Clermont-Ferrand, France). – (Base map: Earthstar Geographics).

Based on the morphological characteristics of the corpus, we defined four categories, including the bowl, jar, cup and pot categories. Nineteen vessels belonging to these four categories could not be compared with other contemporary sites due to the aforementioned limitations. Fortunately, a cross-regional comparison with northern Italy, the north of the Alps and southeastern France was still possible. Comparisons are more easily found for the larger vessels of the corpus, which present more specific decoration and general shapes. Two vessels in the bowl category, three in the jar category and two in the cup category can be compared with contemporary sites (Fig. 13).

The bowl category offers three comparisons from Italian and French contexts. A bowl from the Eremita Cave compares with a vessel from the pile-dwelling site of Viverone-Vi1 Emissario (Biella, Italy) (Rubat Borel 2010, fig. 3.8) (Fig. 13, no. 1). Its profile, including the handle, is almost identical to the characteristics of the Viverone example, although the decoration is different, consisting of vertical linear incisions running from the base to the carination (Derenne 2016). Another example corresponding to this bowl type —although lacking the decoration — is found in the Peygros Cave (Mons, Var, France) (Fig. 13, no. 11), not far from the Mediterranean coast (Vital 1999, fig. 7.1). Another bowl from the Eremita Cave also shows similarities with a second bowl from Viverone (Rubat Borel 2010, fig. 3.8), although the decoration is different (Derenne 2016).

The morphological characteristics of three jars from the Eremita Cave can be compared on a larger scale. In particular, the style of decoration — fingerprints on the cordons or on the rim — and the simple types of lugs in the form of buttons were very common within a

wide geographical area at this time. As far as northern Italy is concerned, similar techniques were used on the pottery of Viverone (Rubat Borel 2010, figs 11, 13, 14), at the site of Alba (Piedmont) (Gambari *et al.* 1995, figs 143.10, 144.2) (Fig. 13, no. 4), as well as at the site of Sotciastel (Val Badia, Bolzano) (Fig. 13, no. 5) (Tecchiati 1998, fig. 7). Similarly, Middle Bronze Age pottery from the La Fourbine Cave in Saint-Martin-de-Crau (Bouches-du-Rhône, France) (Fig. 13, no. 12) shares features with the Eremita Cave jars (Lachenal and Vital 2010, tab. 6). The characteristics of the jars from the Eremita Cave are also related to the typological traits of the pottery found at the site of Cournon (Puy-de-Dôme, France) (Fig. 13, no. 14). Although located in the Limagne plain of the Massif Central, this decorated pottery belongs to a very southern *facies* of the Middle Bronze Age: Saint-Vérédème in Languedoc and the lower Rhône valley (Ballut *et al.* 2006).

Decoration techniques and patterns similar to those of the Eremita Cave jars mentioned above can also be compared with pottery from contemporary sites in the northern Alpine regions (*c.* 1600–1500 BC). These include Rances Champ-Vully (Vaud, Switzerland) (Fig. 13, no. 6), Bevaix-Les Pâquiers (Neuchâtel, Switzerland) (Figure 12:7), Birmensdorf-Stoffel (Zürich, Switzerland) (Fig. 13, no. 9), which correspond culturally to the so-called 'Western Tumulus groups' (David-Elbiali and David 2009), and the sites of Wädenswil-Vorder-Au (Zürich, Switzerland) (Fig. 13, no. 10), and Chassey-Le Camp (Saône-et-Loire, France) (Piningre et Vital 2006**)** (Fig. 13, no. 13), which belong culturally to the Rhône culture (David-Elbiali and David 2009). The pottery found in these areas has, among other typological features, straight and recessed necks with flattened and often thickened rims (David-Elbiali and David 2009). Decoration, when present, mostly include finger-impressed cordons placed directly under the rim and horizontal cordons, similar to those found on the jars from the Eremita Cave.

As far as the Late Bronze Age is concerned, among two vessels dated to this period, a globular cup from the Eremita Cave can be compared with three specimens from other sites, one from the site of Auvernier (Neuchâtel, Switzerland) (Fig. 13, no. 8), attributed to the Hallstatt B3 phase, and the other two, from Golasecca-Sesto Calende (Varese, Italy) (Fig. 13, no. 2) and Monsorino (Varese, Italy) (Fig. 13, no. 3), attributed to the 'Golasecca I' phase. All three examples are associated with the Final Bronze Age (David-Elbiali 2013), and in particular with the 9th century BC (Derenne 2016), which is consistent with the absolute chronology of US10.

The petrographic analysis undertaken of the corpus shows that the raw material that was used as an ingredient for the manufacture of the vessels was sourced from a distance of 1 to 5 kilometres around the cave (Igrishta 2023; Igrishta *et al.,* this volume). The pottery therefore was not imported, and the typological similarities with vessels from other sites should be seen as the result of a transfer of ideas or traditions rather than of import. These cultural influences were the result of contact between the northern Alps and southern France on the one hand and northern Italy on the other, from the beginning of the Middle Bronze Age (David-Elbiali and David 2009). J. Vital (1999) pointed out the likelihood that, during this period, decorative themes typical of Italian groups were introduced into the pottery styles of southern France (Provence, Languedoc, Grands Causses).

This highly diverse range of reference sites showing similarities with the Eremita Cave pottery, including cave sites (e.g., La Fourbine Cave, Saint-Martin-de-Crau, France), pile-dwellings (e.g., Viverone-Vi1 Emissario, Italy) and terrestrial sites (Sotciastel, Val Badia, Italy), reflects the dynamics of the circum-Alpine cultural contacts during the Middle Bronze Age, around 1600–1500 BC. This period saw a renewal of cultural entities, a process that impacted the Italian peninsula to a large extent (De Marinis 1981). The fact that these cultural contacts involved large areas, such as the Alpine foothills and highlands, could be an indicator of increased territorial pressure, particularly in relation to the development of pastoral practices, as suggested by Ballut *et al.* (2006).

## Conclusions

This article explored the typological features of the Middle and Final Bronze Age pottery from the Eremita Cave, its relationship with the stratigraphic context of the site, and their connections with other sites, located both close-by and situated north or west of the Alps. This analysis gave us an idea of the pottery styles and cultural exchanges of the communities living in the Lower Sesia Valley during the second half of the 2nd millennium BC and the beginning of the 1st millennium BC.

The excavation of the Eremita Cave yielded a total of 2,982 pottery sherds, for a weight of 35.5kg. A set of 858 sherds weighing approximately 29.1kg was selected to form groups to determine the minimum number of vessels. The ceramic fragments were then classified into subgroups according to their raw material and typological characteristics, as well as refittings. This determination of the macro-paste, combined with the morphological study carried out on a large number of sherds, made it possible to identify the 26 vessels presented in this study and to characterize them typologically.

This assemblage (n = 26) presented a variety of pottery shapes, with 11 cups, five pots, five bowls, four jars, and one vessel of an unidentifiable morphology. The well-individualized stratigraphic distribution of these vessels, combined with the radiocarbon measurements obtained for the US they belonged to, confirms their attribution to the Middle Bronze Age (1625–1325 BC, n = 23) and the Final Bronze Age (1325–800 BC, n = 2). Their decorative styles, made with simple techniques based on linear incisions and circular or oblong impressions, offer opportunities for comparisons with other sites in northern Italy and in regions located north and west of the Alps.

Altogether, this typological study offers indications about the local characteristics of pottery from a cave occupation site associated with cremated bones and evidence for wider cultural influences within a radius of over 350km around this site. In conclusion, the ceramic assemblage from the Eremita cave enriches and opens new questions in the context of the Bronze Age in northwestern Italy and beyond.

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*Water Supply and Water Management in the Metal Ages* gathers papers originally presented at the Metal Ages 2022 colloquium, hosted by the Archaeology Department of Bilkent University, Ankara and bringing together the UISPP's Scientific Commissions 'Metal Ages in Europe and the Mediterranean' and 'Archaeometry of Prehistoric and Protohistoric Inorganic Artefacts, Materials and their Technologies' for their respective annual meetings.

Five of the papers included here focus specifically on water supply and water management. Others cover copper metallurgy, pottery studies and fighting techniques, and overall they range chronologically from the Chalcolithic to the Late Iron Age, and geographically from Iran to Iberia. A significant number of papers cover topics focusing on artefact archaeometry, due to the participation in the Ankara colloquium of many colleagues from the UISPP's Archaeometry commission.

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