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Trmun and the Emergence of Hillforts in Karst and Istria during the Early Bronze Age

Trmun in pojav gradišč na Krasu in v Istri v zgodnji bronasti dobi

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Izvleček

V prispevku predstavljamo zgodnjebronastodobno gradišče Trmun, ki se nahaja v skrajno severnem delu Istrskega polotoka, južno od Trsta. Najdišče je bilo raziskano leta 2022, najprej z neinvazivnimi metodami (lidarskim in georadarskim snemanjem), nato pa še z arheološkimi izkopavanji. Neinvazivne metode so razkrile obseg gradišča z obrambnim obzidjem; georadarsko slikanje je poleg ruševin obzidja zaznalo tudi oglati novoveški stolp. Arheološka izkopavanja, ki so zajela približno 300 m² na samem vrhu vzpetine Trmun, so odkrila zgodnjebronastodobno gradišče, obdano z obzidjem, grajenim v suhozidni tehniki. Najdbe so primerljive z najzgodnejšimi keramičnimi najdbami z bližnjih gradišč na Krasu in v Istri. Radiokarbonske analize vzorcev kosti so pokazale časovno opredelitev v zgodnjo bronasto dobo, z razponom datacij med približno 1900 in 1550 pr. n. št., ter so skupaj s keramičnimi najdbami nakazale, da je bilo gradišče poseljeno približno 200–300 let. Te zgodnje datacije, skupaj z nekaj datacijami z drugih najdišč v okolici, nakazujejo, da so se gradišča pojavila hkrati s tistimi v južni Istri, kar pomembno prispeva k razumevanju oblikovanja kulture kaštelirjev.

Ključne besede: Tržaški Kras; zgodnja bronasta doba; kaštelirska kultura; gradišče; obrambni zid; keramika

Abstract

This paper presents the hillfort of Trmun, located in the northernmost part of the Istrian peninsula, southeast of Trieste/Trst. Investigated in 2022, the site was first surveyed using non-invasive methods (LiDAR and ground-penetrating radar), followed by targeted excavations. The surveys identified the extent of the hillfort and its defensive wall; radar also detected the remains of a square modern tower. Excavations covering approximately 300 m² at the summit of the Trmun hill established the presence of an Early Bronze Age hillfort enclosed by a dry-stone wall. The finds are comparable to the earliest ceramics from nearby Karst and Istrian sites. Radiocarbon dating of bone samples confirmed attribution to the Early Bronze Age, with dates ranging from ca. 1900 to 1550 BCE. Combined with pottery characteristics, the data suggests an occupation span of 200–300 years. These early dates, together with the few from other sites in the Trieste area, indicate that such hillforts emerged concurrently with those in southern Istria, contributing to the research on the origins of the Castellieri culture.

Keywords: Trieste Karst; Early Bronze Age; Castellieri culture; hillfort; fortification wall; pottery

The Istrian Peninsula and the Karst region play a key role in the study of Bronze Age settlement in the northern Adriatic, as they contain a dense network of fortified hilltop settlements known as *castellieri*, which define the so-called Castellieri culture. These often multi-phase hillforts emerged during the Bronze Age, many continued to be inhabited in the Iron Age, and some show traces of occupation or use even during the Roman times and later periods.

The appearance of *castellieri* remains at the centre of scholarly debate, particularly in connection with theories of population movement or colonization, and the impact of climate change during the transitional period between the 3rd and 2nd millennia BCE.[1] Among the most prominent sites for investigating the origins of the Castellieri culture is undoubtedly the fortified settlement of Monkodonja near Rovinj in Istria. If only the reliable ^{14}C dates are considered – excluding those from human bones in cist graves near the western gate due to concerns about their accuracy[2] – the settlement appears to have been founded and enclosed by dry-stone limestone fortifications around 1800 BCE. These fortifications were significantly expanded in the 16th century BCE. The developed architecture – such as the western gate and the acropolis – as well as specific types of finds, indicate connections with the Aegean. Monkodonja was violently destroyed around the 15th century BCE, as evidenced by destruction layers and weapons including a spearhead, a bronze axe, and sling stones. According to Hellmuth Kramberger, the emergence of the Castellieri culture around 2000 BCE could be possibly associated with abrupt climate changes linked to the 4.2-kiloyear event and/or the Avellino eruption of Mount Vesuvius. Although such events are thought to have contributed to population movements in parts of the Mediterranean, the available data – particularly regarding demographic developments and the possible foreign origin of new populations in Istria – does not yet allow for definitive conclusions about causality.[3]

In this context, archaeological research carried out in 2022 at the Trmun hillfort – a small elevation near the village of Caresana/Mačkovlje in the Province of Trieste/Trst[4] – revealed a short-term occupation during the Early Bronze Age only (or Br A2 according to the Central European chronological scheme). The settlement was relatively short-lived, providing important insight into the earliest phase of the Castellieri culture development in the region. This paper presents the key results of these excavations and their broader interpretation within the framework of Early Bronze Age fortified settlement in Istria and the Karst region.

GEOGRAPHICAL AND ARCHAEOLOGICAL OVERVIEW

The Trmun site lies in northeastern Italy, on the Monte d'Oro/Dolga krona ridge composed of marly-arenaceous deposits belonging to the Eocene Flysch formation.[5] This ridge descends gradually from its highest point near the Slovenian village of Socerb to the Stramare/Štramar landing area in Italy (*Fig. 1, 2*). Extending roughly east to west, it marks the northernmost edge of the Istrian peninsula and overlooks the Gulf of Trieste, forming a natural divide between the Rosandra/Glinščica Valley to the north and the Ospo Valley/Osapska dolina to the south. The ridge is traversed by key communication routes, both in an east–west direction from the coast inland, and north–south from the Trieste area toward Istria.

Recent investigations at Trmun revealed that the hilltop with a known sub-circular rampart[6] represents only a small, elevated part of a much larger hillfort.[7] Traces of collapsed walls and additional ramparts extend westward, outlining a complex of fortifications covering a relatively flat area of about 5 hectares. These structures suggest a broader and more articulated settlement, with the hilltop likely serving a strategic role in terms of visibility and territorial control (*Fig. 3*).

Trmun is situated in close proximity to several other protohistoric hillforts. Just 1 km to the west lies the Monte d'Oro hillfort, which was occupied from the Early Bronze Age through the Iron Age. Approximately 3 km to the east are two additional major sites: the Prebeneg and Socerb hillforts,[8] located where the Monte d'Oro ridge connects to the Mali Kras plateau, which extends east of the Socerb site (*Fig. 2*). Due to the lack of stratigraphic excavations, Socerb is attributed to the Bronze and Iron Ages mainly on the basis of surface pottery finds. A necropolis associated with this hillfort, covering about 0.5 hectares, has been dated between the 6th century BCE and the 1st century CE.[9] Although no chronological data is available for Prebeneg, its close proximity to Socerb suggests a likely connection between the two sites.

[1] See e.g. Hänsel, Mihovilić, Teržan 2015, 493–495 and most recently Hellmuth Kramberger 2024, 4–6.

[2] Hänsel, Mihovilić, Teržan, Weninger 2015, 400–445, 452; Hellmuth Kramberger 2024, 9, Fig. 7.

[3] Hellmuth Kramberger 2024, 20–21.

[4] Place names in bilingual areas are given in both languages at first mention; thereafter, only the primary name is used.

[5] Jurkovšek et al. 2016; Figs. 1–3.

[6] Flego, Rupel 1993, 199–200; Flego, Župančič 1991, 61.

[7] Bernardini et al. 2023, 4–5, Fig. 3.

[8] Flego, Rupel 1993, 199; Marchesetti 1903, 60–61.

[9] Dugulin 2002.

Fig. 1: View of the archaeological excavation site at Trmun. In the background, the Monte d'Oro and Elleri hillforts and the Gulf of Trieste are visible.
Sl. 1: Pogled na območje arheoloških izkopavanj na najdišču Trmun. V ozadju sta vidni gradišči Dolga krona in Jelarji ter Tržaški zaliv.

ARCHAEOLOGICAL RESEARCH

The excavation, carried out during the summer of 2022, focused on an area of approximately 20 × 15 m in the northwestern sector of the Trmun hilltop (Figs. 1, 3, 4). It revealed around thirty stratigraphic units, most of which are related to the construction of the perimeter wall and the occupation phases of the protohistoric settlement, as well as to its later transformation in the Modern period with the construction of a tower and associated structures. This article will focus exclusively on the prehistoric layers.[10]

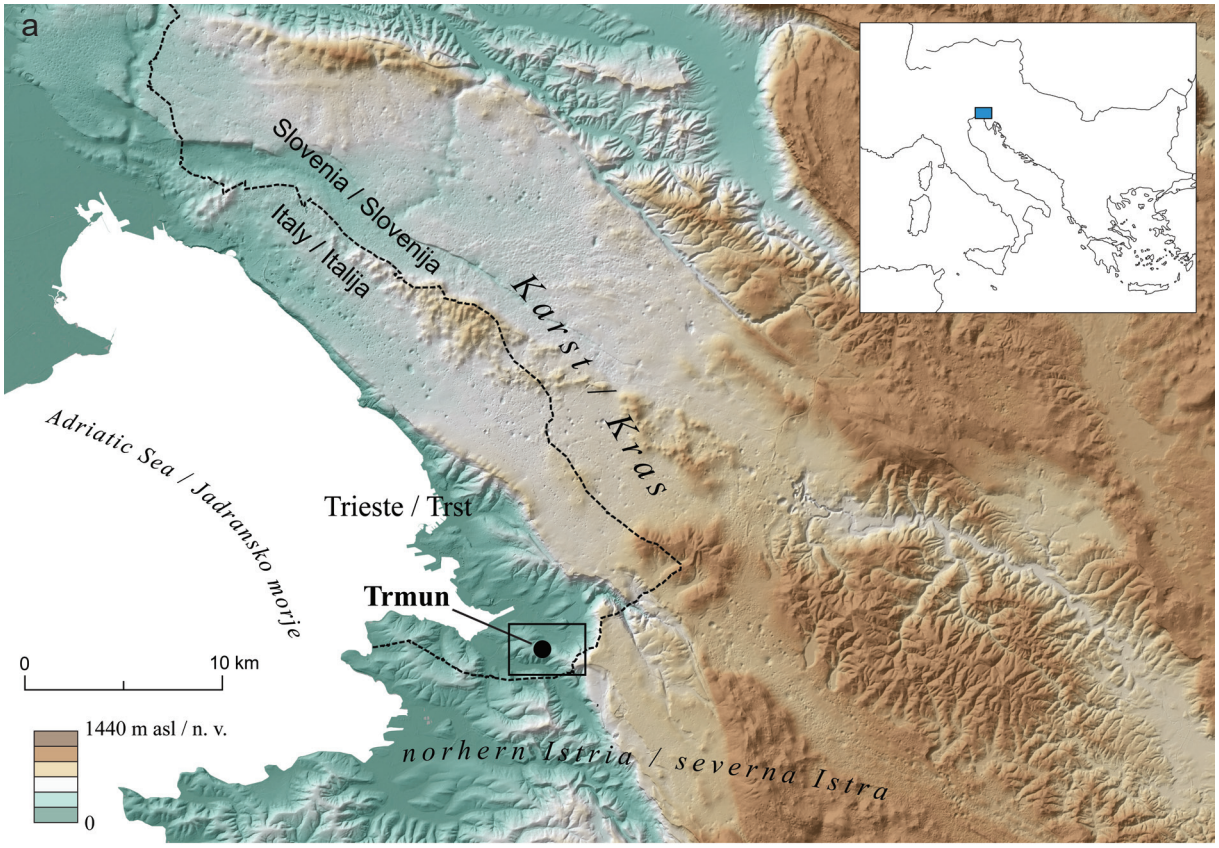
The Trmun hilltop, part of a much larger settlement extending west of the investigated area (Fig. 3), was fortified with a perimeter wall (SU 11) built with two rows of large blocks and a core of smaller stones and soil, measuring approximately 1.6 m in width (*Fig. 5*). The wall was built directly on the geological Flysch bedrock (SU 9), composed of parallel sandstone layers (NW–SE orientation) alternating with more erodible marl bands, which appear slightly lower in elevation. Only a few finds were discovered in the fill of the wall. Based on the collapse of the rampart towards the inside and the outside (SU 12 and SU 15, respectively), the structure was likely not particularly tall and may have been reinforced with wooden elements.

The space between the fortification wall and the central part of the hilltop – characterized by shallow outcrops of Flysch bedrock (SU 9) – was levelled using a fill rich in ceramic material, extending along the entire length of the excavated section of the wall (SU 21, SU 24, SU 31 beneath the tower). Most of the ceramic finds come from these layers and are key for dating the settlement (a selection of ceramic finds in *Pl. 1* and *2*). A few faunal remains and flaked stone tools were also recovered.

Sub-parallel sandstone beds oriented NW–SE (SU 9) have been exposed in the central area within the fortification, just a few centimetres below the ground surface. These alternate with more erodible marl layers, emerging at depths of around 40–50 cm. While some protohistoric pottery was also found within these bands (SU 3), it was far less abundant than in areas near the fortification wall.

The Trmun hilltop, standing a few metres higher than the rest of the site, seems to have played a primarily defensive and territorial control role.

[10] The finds discovered during archaeological excavations at the Trmun site are temporarily stored at the Multidisciplinary Laboratory of ICTP in Trieste. They will be transferred to the Soprintendenza Archeologia, belle arti e paesaggio per il Friuli Venezia Giulia in Trieste for permanent storage. An extensive publication presenting all the results of the archaeological excavations is currently in preparation.



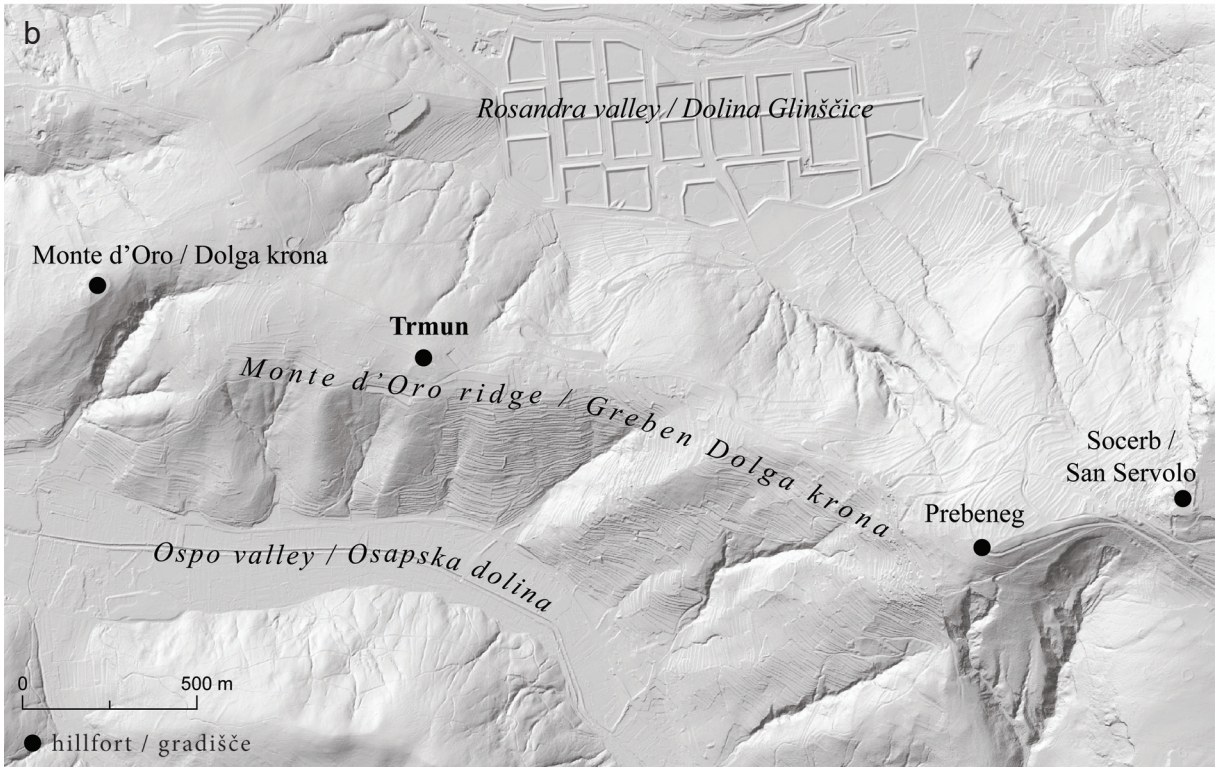


Fig. 2: Trmun: **a** – position of the site; **b** – protohistoric hillforts along the Monte d'Oro ridge (modified after Bernardini et al. 2023. Fig. 2).
Sl. 2: Trmun: **a** – lega najdišča; **b** – prazgodovinska gradišča vzdolž grebena Dolga krona (posodobljeno po Bernardini et al. 2023, Fig. 2).

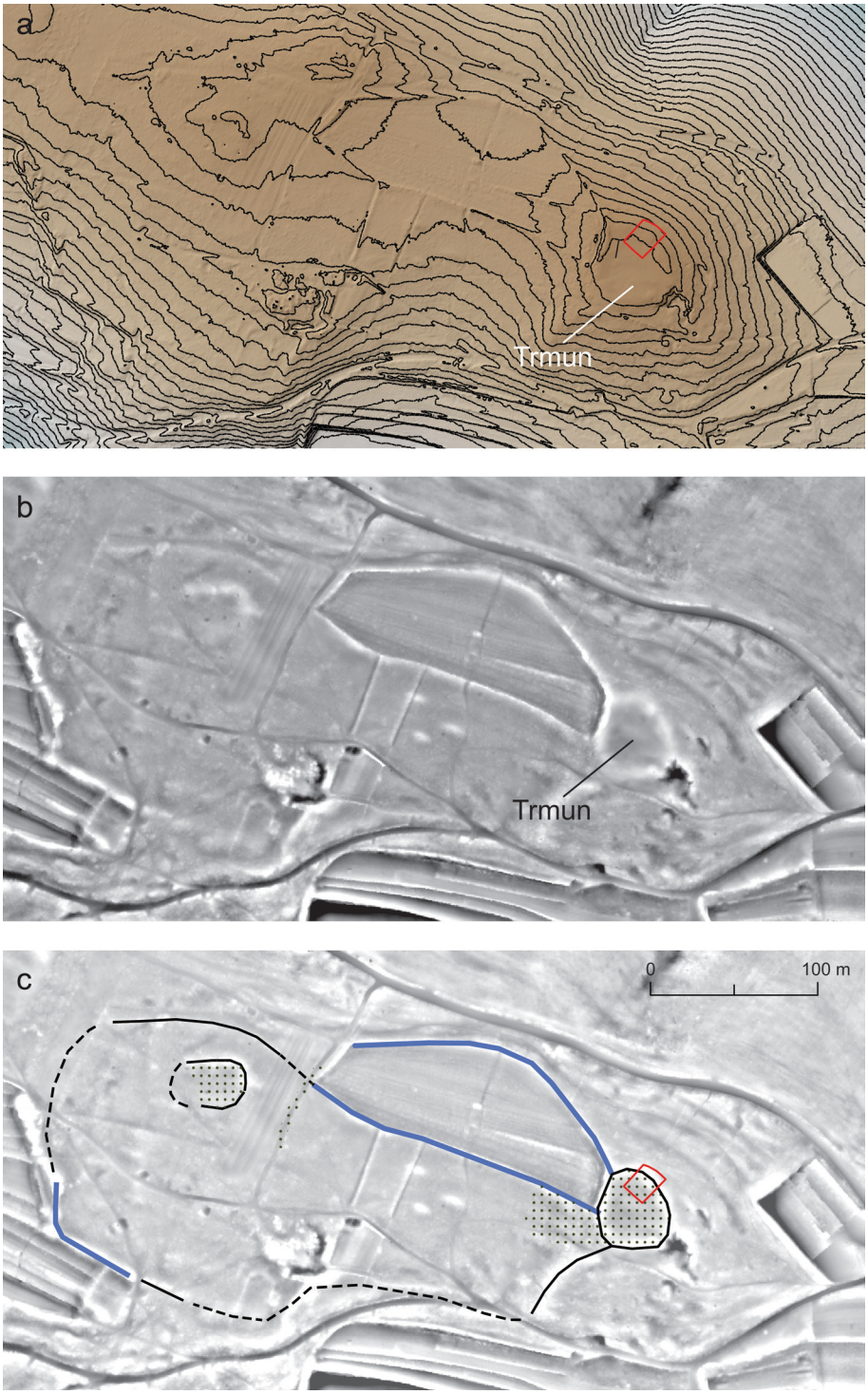


Fig. 3: The protohistoric site of Trmun: **a** – ALS-derived hill shaded image combined with DTM and 1-metre contour lines with the position of the excavated area; **b** – local relief model; **c** – local relief model with the interpretation of archaeological features. Black lines: preserved ramparts; blue lines: probable ramparts covered by modern walls; dashed black lines: hypothetical position of ramparts; dotted areas: areas where protohistoric shards have been found on the surface (modified after Bernardini et al. 2023, Fig. 3).

Sl. 3: Prazgodovinsko najdišče Trmun: **a** – senčeni prikaz reliefa na osnovi ALS v kombinaciji z DTM in plastnicami na 1 m z označenim izkopnim poljem; **b** – model lokalnega reliefa; **c** – model lokalnega reliefa z interpretacijo arheoloških elementov. Črne črte: ohranjeni nasipi; modre črte: verjetni nasipi, prekriti z novoveškimi zidovi; črtkane črne črte: domnevni potek nasipov; pikčasta območja: območja, kjer so bile na površju najdene prazgodovinske keramične črepinje (posodobljeno po Bernardini et al. 2023, Fig. 3).

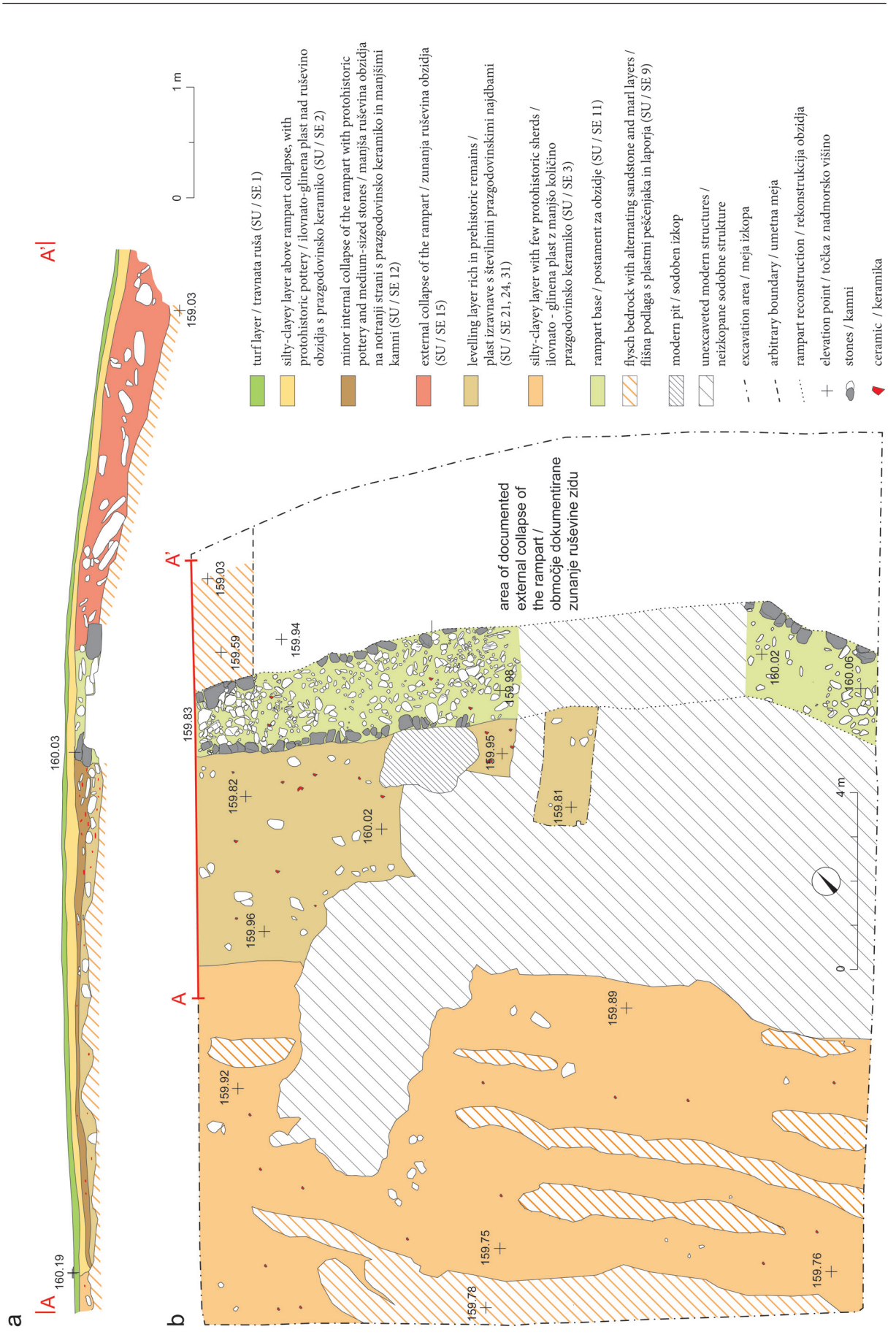

a
A
160.19
160.03
A'
159.03
0
1 m
b
A
A'
159.83
159.03
159.59
159.94
159.82
159.96
160.02
159.95
159.98
159.81
159.89
159.92
159.75
159.78
159.76
160.02
160.06
area of documented external collapse of the rampart / območje dokumentirane zunanje ruševine zidu
0
4 m
turf layer / travnata ruša (SU / SE 1)
silty-clayey layer above rampart collapse, with protohistoric pottery / ilovnato-glinena plast nad ruševino obzidja s prazgodovinsko keramiko (SU / SE 2)
minor internal collapse of the rampart with protohistoric pottery and medium-sized stones / manjša ruševina obzidja na notranji strani s prazgodovinsko keramiko in manjšimi kamni (SU / SE 12)
external collapse of the rampart / zunanja ruševina obzidja (SU / SE 15)
levelling layer rich in prehistoric remains / plast izravnave s številnimi prazgodovinskimi najdbami (SU / SE 21, 24, 31)
silty-clayey layer with few protohistoric sherds / ilovnato - glinena plast z manjšo količino prazgodovinsko keramiko (SU / SE 3)
rampart base / postament za obzidje (SU / SE 11)
flysch bedrock with alternating sandstone and marl layers / flišna podlaga s plastmi peščenjaka in laporja (SU / SE 9)
modern pit / sodoben izkop
unexcaveted modern structures / neizkopane sodobne strukture
excavation area / meja izkopa
arbitrary boundary / umetna meja
rampart reconstruction / rekonstrukcija obzidja
elevation point / točka z nadmorsko višino
stones / kamni
ceramic / keramika

Fig. 5: View of part of the early Bronze Age wall at the Trmun site (view towards the east).
Sl. 5: Pogled na del zgodnjebronastodobnega obzidja na najdišču Trmun (pogled proti vzhodu).

Fig. 6: View of the ruins of the stone wall at the Trmun site. Note how most of the blocks appear to have collapsed in a single sudden episode (view towards the east).
Sl. 6: Pogled na ruševine kamnitega zidu na najdišču Trmun. Opaziti je, da je večina kamnov verjetno zrušena v enem samem nenadnem dogodku (pogled proti vzhodu).

←

Fig. 4: Trmun site: **a** – stratigraphic section in the immediate vicinity of the rampart; **b** – plan of the excavation area with the prehistoric rampart and levelling layers from the period of hillfort use indicated, as well as visible flysch substrata; outside the rampart, the external wall collapse was excavated only in the northern section next to the profile.
Sl. 4: Najdišče Trmun: **a** – presek plasti v neposredni bližini obzidja; **b** – tloris izkopnega polja z vrisanim prazgodovinskim obzidjem ter izravnalnimi plastmi iz časa uporabe gradišča in vidnimi flišnatimi podlagami; zunaj obzidja je bila zunanja ruševina zidu raziskana le v severnem delu ob preseku.

Other areas of the settlement, which were broader, flatter, and more sheltered from the wind, were likely better suited for domestic activities.

The collapse of the wall, mostly falling outward (SU 15), and the sub-vertical positioning of many blocks suggest a rapid and singular event (*Fig. 6*), raising the question of whether it may have been the result of deliberate demolition.

CERAMIC FINDS

During the archaeological excavations, the majority of finds consisted of ceramic material. These were primarily fragments of prehistoric pottery, mostly found in close proximity to the inner side of the prehistoric wall (SU 12) (*Pl. 3, 4*) and within the rubble layers of the wall, both on its inner and outer sides (SU 21 and SU 15) (*Pl. 1:* 3–11; *2*).

Most of the recovered pottery displays homogeneous characteristics in terms of fabric, clay composition, surface treatment, and firing technique. The majority of vessels were made from fine- to coarse-grained pottery clay, with a smaller number of fragments made from fine-textured ware. Among the temper materials added to the clay, local marl, sandstone and grog are most commonly present, while calcite seems entirely absent. Some of the temper inclusions are of relatively large size, up to a few mm. The pottery was mostly fired in an oxidizing atmosphere, though incomplete oxidation is also evident in some cases.[11]

The finds were generally in a very fragmentary state. Some vessels could be partially reconstructed. Pots dominate among the identified vessel types, followed by bowls and cups. A large number of wall sherds could not be more specifically assigned to a particular form.

The best parallels for the ceramic finds from Trmun can be found in the ceramic repertoire of the Early and Middle Bronze Age Castellieri culture, widely distributed across present-day Istria, the Karst region, and northeastern Italy.[12]

The most common type of pottery found consists of pots of various sizes. They represent vessels that were used for cooking, and some, significantly larger in size, were most likely used for storage. The most numerous are those with a funnel rim (e.g. *Pl. 1:* 3–6; *3:* 1–3). Vessels with similarly shaped rims[13] are typical Castellieri type. This form of pots is comparable to vessels from the site of Monkodonja in Istria, dated to the Early and Middle Bronze Age.[14] They were also found numerously in the Karst and northern Istria, at the near hillfort of Elleri/Jelarji[15] and other Bronze Age hillforts.[16] Similar vessels have also been found in Karst caves, but their precise chronological determination is not possible.[17] A few examples also include pots with a conical neck and a rounded rim (e.g. *Pl. 1:* 7; *3:* 4–5), for which the closest parallels can be found at the hillfort of Elleri.[18] Additionally, part of a small vessel with a funnel rim was found in the ground levelling layer near the prehistoric wall (*Pl. 1:* 11). It is comparable to a small jar from Zemono near Vipava, discovered in a pit and dated between the 19th and 17th centuries BCE based on ^{14}C analyses.[19] Similar small vessels with everted rims and a globular shape, frequently with angular handles, remain in use even in the later periods of the Bronze Age in the area of Caput Adriae.[20]

Among the pots and storage vessels, a variety of wall fragments have been preserved, most frequently featuring tongue-shaped lugs, often with fingerprint impressions (e.g. *Pl. 2:* 7–9; *4:* 9,11), various applied knobs (e.g. *Pl. 1:* 7,8; *2:* 10–12; *4:* 16,17), and applied smooth ribs (e.g. *Pl. 2:* 13–15; *4:* 12–15). A few wall fragments also exhibit surfaces treated with barbotine decoration (e.g. *Pl. 4:* 18). Lugs, mostly decorated with finger impression, fall within the typical forms of lugs of the Bronze Age *Castellieri* culture and indicate

[11] Archaeometric research of ceramic finds from Trmun is being conducted by Manca Vinazza from the Department of Archaeology, Faculty of Arts, University of Ljubljana. Her findings will be presented in a forthcoming monograph on the Trmun site. This article presents only the preliminary observations from a macroscopic examination.

[12] See e.g., Marchesetti 1903; Cardarelli 1983; Mihovilić 2013; Borgna et al. 2018.

[13] In ital. 'a tesa', everted or funnel rims.

[14] E.g., Hellmuth Kramberger 2017b, Pls. 4: 1, 3–4; 5: 2.

[15] Lonza 1981, Pls. 7: 4–6, 18; 13: 5; 14: 5; 15: 5; Maselli Scotti (ed.) 1997, Pls. 1: 9; 4: 4–8; The village of Jelarji was renamed Elerji in 2018. In this article, we retain the Slovenian toponym *Jelarji* for the archaeological site, as it appears in scientific and professional publications.

[16] E.g., Lonza 1977, Pl. III: 2; IV: 13; Borgna et al. 2018, Fig. 5: 2.

[17] E.g., Gilli, Montagnari Kokelj 1993; Turk et al. 1993, Pl. 17: 2.

[18] Lonza 1981, Pls. 9: 1–2; 10: 1.

[19] Bratina 2014a, 565, 567, Fig. 35.4.: 1.

[20] E.g., Lonza 1981, Pl. 5: 1–15; Forenbaher, Rajić Šikanjić, Miracle 2006, 43, Pl. 10: 4, 6.

the early development phases of this culture.[21] They are also present among the material found in Bronze Age layers of Karst and Istrian caves and other sites.[22] Together with other ceramic finds, such tongue-shaped lugs with impressions represent one of the most common elements pointing to the influence of the Castellieri culture in the area of present-day western and, to some extent, central Slovenia.[23]

Among common vessel forms at Trmun site are also bowls, mostly of conical shape (*Pl. 1:* 9–10; *4:* 1–6). Many examples feature a carinated rim-to-wall transition on the inner side (*Pl. 1:* 10; *4:* 1,2,5). Such bowl forms are likewise frequent at nearby hillforts[24] as well as at sites in Istria, Croatia.[25] A bowl with a carinated rim-to-wall transition from Trmun has an interesting X-handle located below the rim of the vessel (*Pl. 4:* 5). Such handles are known from Early and Middle Bronze Age sites in Istria and Karst.[26]

Interesting is also a high bowl with an everted rim, decorated with a small knob and with a part of an application that is most likely a part of butterfly-shaped handles (*Pl. 3:* 8). These handles are also a characteristic form of the Castellieri culture, which is known from numerous hillforts in Istria and Karst.[27] A characteristic form of the Castellieri culture are also other shapes of handles. One of those are for example handles with a triangular cross-section that tapers towards the top (*Pl. 2:* 3; *4:* 8). Such handles already appear in the Early Bronze Age and become widespread in the Middle and Late Bronze Ages in the area of Istria and Trieste Karst.[28] Similar analogies can also be found for the handles with a trapezoidal (*Pl. 2:* 1–2) or semicircular overhand plate (*Pl. 4:* 7). According to the chrono-typological development of this type of handles, handles with a trapezoidal overhand plate are considered a precursor of this type of handle and belong to the earliest forms and are dated to the Early Bronze Age, while handles with semicircular plates are more characteristic of the Middle and Late Bronze Age.[29]

The pottery discovered at the Trmun site is modestly decorated. Among the decorative elements are the already mentioned applied knobs and smooth ribs, as well as finger impressions, which appear almost exclusively on tongue-shaped handles (*Pl. 1:* 7–8; *2:* 7–15; *3:* 8; *4:* 9,11–16). Notably, the ceramic assemblage lacks ribs with impressions, which are commonly found at other hillfort sites; only smooth ones are present. This choice of decoration may be chronologically sensitive and potentially limited to the Early Bronze Age, as will be discussed in the following chapter on radiocarbon dating.

Among the more interesting vessels are several examples of conical bowls with a smoothed inner surface, while the outer surface is roughly abraded or irregularly roughened (e.g. *Pl. 2:* 4,5).[30] These vessels could belong to the so-called repertoire of 'briquetage' vessels, which refers to vessels used to harden salt during the last phase of salt extraction.[31] Similar were found for example at the Elleri site.[32]

Two other fragments are interpreted as parts of tripods (one on *Pl. 2:* 5), more specifically legs,[33] which were used as hearth wares. Such vessels – tripods or three-legged plates – represent a characteristic element of Bronze Age hillfort settlements in Istria and the Trieste Karst, and are thought to derive from Eastern Mediterranean prototypes. Traces of heat exposure on the surfaces of tripod plates from sites such as Monkodonja suggest they were

[21] See Borgna et al. 2018, Fig. 5 and also e.g., Lonza 1981, Pls. 11: 2–4, 7; 17: 3; Maselli Scotti 1997, Pl. 1: 10; Flego, Rupel 1993, 76; Hellmuth Kramberger 2017a, 259, Fig. 226; Hellmuth Kramberger 2017b, Pls. 33: 1; 76: 2, 3; 102: 3; etc.

[22] See e.g., Gilli, Montagnari Kokelj 1993, Figs. 59: 615; 60: 620; 62: 640–641; 64: 666; Čuka 2009, Pls. IV: 23; V: 24, 25; Bratina 2014b, Fig. 36.6.: 16, 17.

[23] See most recently Leghissa, Plestenjak 2025, 342, 343.

[24] E.g., Elleri – Lonza 1981, Pl. 27; Maselli Scotti (ed.) 1997, Pl. 1: 19–20; Mali Kras – Flego, Rupel 1993, 192; Čelo – Flego, Rupel 1993, 197.

[25] E.g. Monkodonja – Hellmuth Kramberger 2017a, 141–143; Monbrodo – Hellmuth Kramberger, Müller, Čuka 2022, Pl. 1: 6, 8, 9

[26] Hellmuth Kramberger 2017a, 240–242, Figs. 211 and 212; see also e.g., Cardarelli 1983, 91; Čuka 2009, Pl. V: 26; Hellmuth Kramberger 2017b, Pls. 20: 1, 2; 74: 7, 8, 101: 3; Zendron 2017, 215, Fig. 108.

[27] See Hellmuth Kramberger 2017a, 160–161, 260–261, Figs. 226g, 227; see also Müller, Čuka, Hellmuth Kramberger 2017, 33.

[28] Hellmuth Kramberger 2017a, 244–248, Sl. 215; see also Čović 1983, 127, Pl. XIV: 4, 6–7; Lonza 1977, Pls. II: 3–7, 8–11; V: 1, 3, 5; XIV: 4, 6–7; Cardarelli 1983, Pl. 18: 111; Zendron 2017, Fig. 114.

[29] E.g., Čović 1983, 238, Pls. XIV: 1a; XXXV: 10; Borgna et al. 2018, 83–84, Fig. 6: I, II–V.

[30] Bernardini et al. 2023, Fig. 10: 7, 8.

[31] Càssola Guida, Montagnari Kokelj 2006; Montagnari Kokelj 2007; Zendron 2017, 224, Fig. 121.

[32] Lonza 1977, Pl. XXXIX, XL.

[33] Bernardini et al. 2023, Figs. 9: 9; 10: 9.

Sample / Vzorec	Lab. No. / Lab. Št.	Type of sample / Vrsta vzorca	US / SE	^{14}C age / starost	Calibrate date / Kalibriran datum (2σ)
Trmun 1	Poz-157435	Bos taurus (metacarpus proks.)	12 (Int. collapse of the wall structure / *ruševina zidu na notranji strani*)	3345 ± 30 BP	1736 (5.1%) 1716 cal. BC 1692 (90.4%) 1532 cal. BC
Trmun 2	Poz-157436	Bos taurus (dens inf.)	21 (Levelling layer and surface consolidation within the enclosed area / izravnava in utrditev znotraj obzidja)	3465 ± 35 BP	1888 (95.4%) 1686 cal. BC

Fig. 7: List of the radiocarbon dated Bronze Age samples from the Trmun site.
Sl. 7: Seznam radiokarbonsko datiranih bronastodobnih vzorcev z najdišča Trmun.

used in food preparation following preheating.[34] Numerous fragments of such vessels, including legs and plate parts, have been recovered in both surface and deeper cultural layers at several sites in the region.[35]

RADIOCARBON DATING

At the Trmun site, two animal bone samples were analysed.[36] The analyses were conducted at the Poznań Radiocarbon Laboratory (Poland). Calibration was carried out using the OxCal online program (v4.4.4). Both samples date to the Early Bronze Age. The sample recovered from the bottom of the levelling layer SU 21 (Trmun 2) is slightly older, with a calibrated date range of 1888–1686 BCE. In contrast, sample Trmun 1, taken from the interior collapse of the wall, dates to 1692–1532 cal. BCE and may already reflect the abandonment phase of the hillfort (*Fig. 7*).

For the purposes of studying the emergence of hillforts in the Istria and Karst regions, radiocarbon dates from the nearby hillforts of Elleri and Slivia/Slivno on the Trieste Karst, as well as from the hillfort of Monkodonja in Istria, were also considered (*Figs. 8, 10*). This paper also presents, for the first time, previously unpublished radiocarbon dates from the Vrčin/Monte Ursino[37] cemetery site in southern Istria. The analyses were conducted at the Centro di Datazione e Diagnostica (CEDAD)

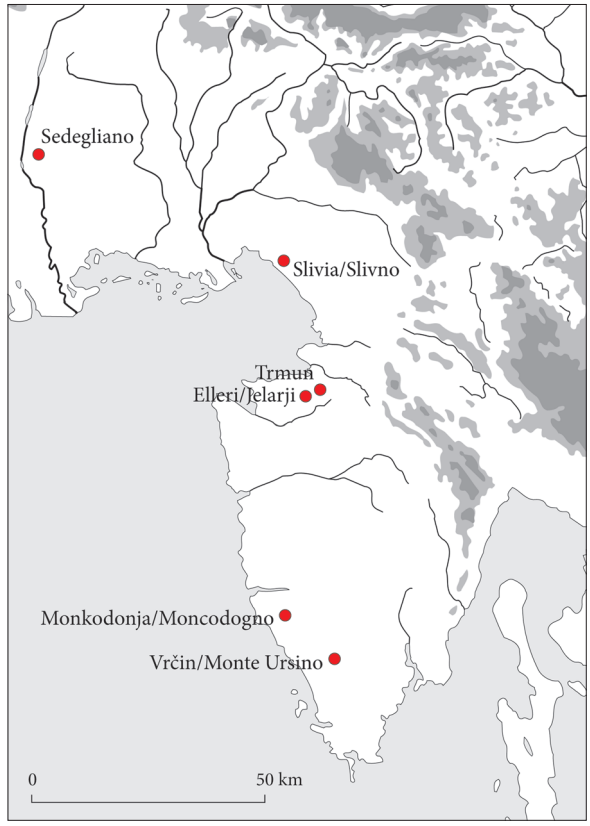


Fig. 8: Sites dated by ^{14}C analysis discussed in the text.
Sl. 8: Najdišča, datirana z radiokarbonskimi (^{14}C) analizami, obravnavana v besedilu.

of the University of Salento on behalf of the Trieste Natural History Museum (*Fig. 9*).[38] The samples from Vrčin consist of parts of human skulls and teeth from the 'Sepolcreto Gentilizio', a monumental cist grave cemetery at the southern entrance of the settlement, excavated by R. Battaglia in the thirties of the last century.[39] The results indicate

[34] Hellmuth Kramberger 2017a, 215–220; see also Fig. 15A–B.

[35] See e.g. Lonza 1981, Pls. 41:1–6; 42:1; Maselli Scotti (ed.)1997, Pl. 3:4; Hellmuth Kramberger 2017b, Pls. 11:2–4; 23:5; 58:3; 71:5.

[36] Study of animal bones was conducted by Borut Toškan. The results of the analysis will be published in the forthcoming monograph on the Trmun site.

[37] The site of Vrčin is also known in the literature under the names Montursino, Montorcino, Monte Orsino and Monte Orcino.

[38] We sincerely thank Deborah Arbulla from the Trieste Natural History Museum for granting permission to publish the radiocarbon dates from the Vrčin/Monte Ursino site.

[39] See Cupitò et al. 2018; Mihovilić 2022, 204–208.

Sample / Vzorec	No. lab. sample / Št. lab. vzorca	Type of sample / vrsta vzorca	^{14}C age / starost	Calibrate date / Kalibriran datum (2σ)
Montursino 19	LTL19509A	human scull fragment / fragment človeške lobanje	3374 ± 45	1866 (1.5%) 1852 cal. BC 1769 (94.0%) 1532 cal. BC
Montursino 9	LTL19505A	human scull fragment / fragment človeške lobanje	3356 ± 45	1746 (95.4%) 1516 cal. BC
Montursino 2	LTL19503A	2 human teeth / 2 človeška zoba	3325 ± 45	1736 (4.1%) 1716 cal. BC 1692 (91.4%) 1504 cal. BC
/	LTL14813A	human left femur / leva človeška stegnenica	3312 ± 50	1738 (3.7%) 1714 cal. BC 1694 (90.1%) 1496 cal. BC 1475 (1.7%) 1459 cal. BC
Montursino 20	LTL19510A	human scull fragment / fragment človeške lobanje	3293 ± 45	1686 (90.8%) 1492 cal. BC 1482 (4.6%) 1451B cal. BC
Montursino 12	LTL19506A	2 human teeth / 2 človeška zoba	3260 ± 45	1621 (95.4%) 1435 cal. BC
Montursino 8	LTL19504A	human scull fragment / fragment človeške lobanje	3210 ± 45	1609 (3.4%) 1576 cal. BC 1562 (0.7%) 1554 cal. BC 1546 (91.4%) 1401 cal. BC
Montursino 14	LTL19507A	1 human teeth / 1 človeški zob	3175 ± 45	1532 (89.4%) 1380 cal. BC 1343 (6.0%) 1308 cal. BC
/	LTL14814A	human right femur / desna človeška stegnenica	3102,50	1495 (2.7%) 1476 cal. BC 1458 (90.1%) 1256 cal. BC 1248 (2.7%) 1226 cal. BC
Montursino 21	LTL19511A	human scull fragment / fragment človeške lobanje	2927 ± 45	1266 (95.4%) 998 cal. BC

Fig. 9: List of the radiocarbon dated Bronze Age samples from the Vrčin/Monte Ursino site (the dates LTL14813A and LTL14814A are from Cupitò et al. 2018, Table I).
Sl. 9: Seznam radiokarbonsko datiranih bronastodobnih vzorcev z najdišča Vrčin/Monte Ursino (dataciji LTL14813A in LTL14814A po Cupitò et al. 2018, tab. I).

a long period of use of the necropolis, beginning no earlier than approximately the middle of the 18th century BCE – apparently slightly later than the establishment of Monkodonja and Trmun – and continuing until the last centuries of the 2nd millennium BCE.

DISCUSSION AND CONCLUSION

Among the ceramic assemblage recovered from the layers corresponding to the period of the hillfort's occupation and that from the collapse layer, no significant differences can be observed. The repertoire includes most types of vessels associated with everyday use – from cooking pots to bowls and cups. Fragments of larger vessels, indicative of storage ceramics, are also present. The preliminary analysis indicates distinctly local production, with no perceptible differences in clay preparation across functional categories, whether the vessels were intended for cooking or serving. Coarse pottery with large inclusions of flysch and grog strongly predominates in the assemblage. Only a few small vessels – mostly bowls and small vessels (e.g. *Pl.1:* 7,9; *3:* 6; *4:* 1–6) – stand out for their finer texture and sometimes darker colour.

The homogeneity of the ceramic repertoire and manufacturing techniques may be attributed to the relatively brief duration of the settlement itself. Based on the available radiocarbon data, the site likely remained occupied for a limited period, at most spanning from 1900 to 1550 BCE. This range includes the full extent of the ^{14}C dates (Poz-58831: 1888–1686 cal. BCE at 95.4% probability; Poz-58814: 1736–1716 cal. BCE at 5.1% probability and 1692–1532 cal. BCE at 90.4% probability), though the actual occupation likely covered a shorter timespan.

Interestingly, the decorative elements on the pottery from the Trmun site consist exclusively of smooth ribs and applied knobs, with no examples of impressed ribs. Whether this reflects an early phase of the Castellieri culture remains to be investigated in greater detail.

According to the available radiocarbon dates, the emergence of hillforts in the Karst region of Trieste and northernmost Istria occurred contem-

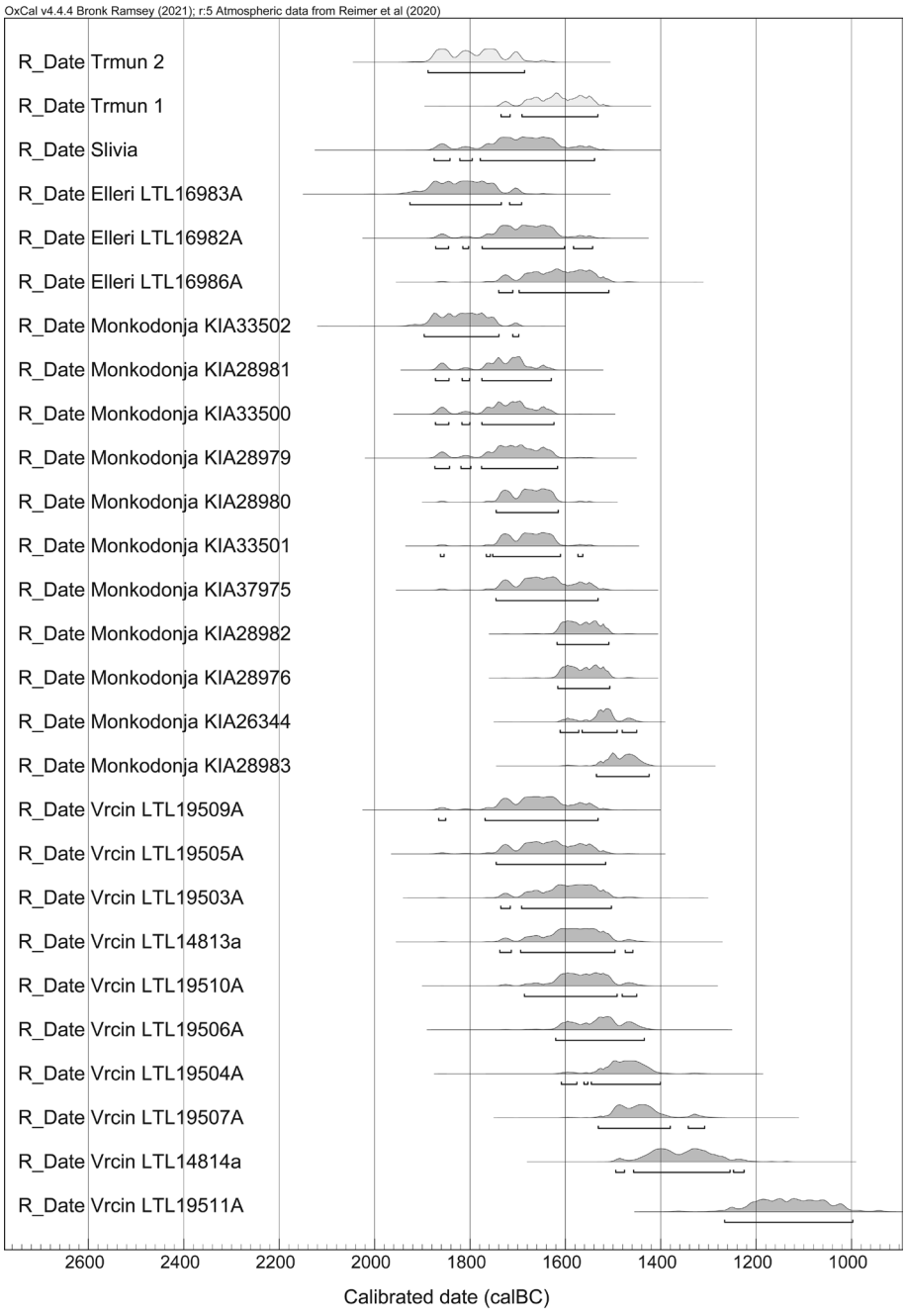


Fig. 10: Radiocarbon dates from the Trmun site (light grey) and a selection of radiocarbon dates from Slivia/Slivno and Elleri/Jelarji in Trieste Karst and northern Istria and Monkodonja and Vrčin in Istria (the ^{14}C from Slivia, Elleri and Monkodonja are from Simeoni 2024 and Hänsel, Mihovilić, Teržan 2015).
Sl. 10: Radiokarbonski dataciji z najdišča Trmun (svetlo sivo) in izbor radiokarbonskih datacij z najdišč Slivno in Jelarji na Tržaškem Krasu in iz severne Istre ter gradišč Monkodonja in Vrčin v Istri (datacije za Slivno, Jelarji in Monkodonja po Simeoni 2024, Hänsel, Mihovilić, Teržan 2015).

poraneously with the earliest fortified settlements in southern Istria, such as Monkodonja and Vrčin (*Fig. 10*). Additional ^{14}C evidence from burials at the Sedegliano hillfort[40], located in the Friulian plain, further suggests that at least some fortified sites in this area were likely established within the same chronological horizon. Monkodonja, Vrčin and other early hillforts in Istria and Sedegliano in Friuli also shared certain funerary practices, namely the presence of inhumation graves closely

[40] Canci, Saccheri, Travan 2018; Simeoni 2024.

associated with the fortification walls and located near the entrances.[41]

The available ^{14}C dates, together with the recurrence of similar burial practices in roughly contemporary early fortified settlements from Friuli to southern Istria, raise important questions about the nature and dynamics of the contacts between these regions during the initial phase of the Castellieri culture.

Although several archaeological evidence has led to the hypothesis that the emergence of the Castellieri culture in the southern Istrian peninsula may have involved a colonization process[42], possibly related to wider population movements from the eastern Mediterranean or elsewhere[43], the new data from Trmun, while compatible with an origin connected to such movements, does not provide conclusive support for the colonization hypothesis. [44] So far, neither architectural models showing links with distant regions nor imports from those areas have been identified at the site. Future genetic analyses will likely provide important new insights into the scale and character of possible migration to the northern Adriatic area.

At the same time, the Trmun assemblage and other archaeological evidence suggest that the pre-Castellieri groups may have played a role in the formation of the Castellieri culture. This is suggested by some ceramic types that persist across the transition from the late 3rd to the early 2nd millennium BCE. Among these are bowls with flat, thickened rims (e.g. *Pl. 4:* 3). Such bowls were widespread from the Late Copper Age into the Early and Middle Bronze Age, initially within the Ljubljana culture and later within the Cetina culture.[45] A further element possibly reflecting traditions present in communities predating and/or overlapping with the earliest phases of the Castellieri culture is the angular handle with overhanging plates (*Pl. 2:* 1–2), a diagnostic feature of the Castellieri culture. Similar forms may be connected to the Early Bronze Age prototypes known from the Polada and Wieselburg–Gáta pottery assemblages of northeastern Italy.[46] Rare Wieselburg–Gáta vessels with angular handles and trapezoidal 'plates' have been found in the Karst region, specifically in some cave sites.[47] Among these is a one-handled biconical jug from Grotta delle Ossa,[48] a sealed context likely representing a single depositional event, probably predating the emergence of the Castellieri culture. Another possible indicator of continuity is ceramic technology. In the Neolithic, and likely the early Copper Age, in the Karst and eastern Adriatic regions, pottery production was characterised by the widespread use of sparry calcite as the primary temper[49]. During the Late Copper Age (3rd millennium BCE), ceramic technology using grog as the main tempering material emerged and, based on preliminary data, continued through much of the 2nd millennium BCE. Archaeometric analyses of Castellieri pottery[50] indicate the use of grog throughout the Bronze Age, followed by a notable shift in the Iron Age, when pastes rich in sparry calcite became common once again.

[41] Borgna et al. 2018, 82. Despite these general similarities, it is important to emphasize that the burials at Sedegliano are characterized by skeletal remains in anatomical connection, placed in a supine position and lacking grave goods (Canci, Saccheri, Travan 2018, 531–532) within simple pit graves. In contrast, in Istria, the remains are arranged in a secondary deposition within stone cists set inside rectangular stone platforms (see also Mihovilić, Teržan 2022a, 299–301) .

[42] Hänsel, Mihovilić, Teržan 2015, 493–495; Hellmuth Kramberger 2017a, 409–410; Mihovilić, Teržan 2020, 571–572.

[43] Already Marchesetti pointed out the possibility of migration waves from the Mediterranean area; see, for example, Marchesetti 1903, 11–12, 123–125, and, more recently, Mihovilić, Teržan 2022b, 394, as well as Hellmuth Kramberger 2024, 4–6.

[44] Colonization is generally understood as a specific form of migration or mobility, involving the settlement of foreign groups in a region away from their place of origin, often accompanied by asymmetrical socio-economic relationships with the local population, whereas migration more broadly refers to the movement of people without necessarily establishing new settlements or social hierarchies (van Dommelen 2012, 397–398).

[45] See e.g. Leghissa 2021, 13; Gilli, Montagnari Kokelj 1993, Fig. 50; and see also the more detailed discussion of elements of Cetina culture within the context of the Castellieri culture in Hellmuth Kramberger 2017a, 340–345; see also Mihovilić, Teržan (eds.) 2022.

[46] Hellmuth Kramberger 2017a, 179–182; Borgna et al 2018, 80, 85, fn. 8, Fig. 6 – a similar handle, with a triangular/trapezoidal upper part, was also discovered at the early Bronze Age pile dwelling site of Mali Otavnik in the Ljubljansko barje area in central Slovenia (see Hellmuth Kramberger 2017a, 182, Fig. 149: e).

[47] Bernardini et al. 2024a.

[48] Marzolini 1992.

[49] Bernardini et al. 2024b.

[50] Hellmuth Kramberger 2017a, 60–63; Vinazza 2025, 45–46; a similar view was expressed by Manca Vinazza and Tomaž Fabec during the lecture *Kras – analiza tehnologije 'kaštelirske keramike' in stanje raziskav* at the symposium *Gabrovčev dan 2024: Nove raziskave o bronasti dobi na območju Slovenije, Bronasta doba na Notranjskem in Primorskem* held in Ljubljana in 2024.

Overall, these observations highlight the complexity of the Castellieri culture's formation in the northern Adriatic.[51] While population movements and external stimuli – possibly originating from the wider eastern Mediterranean – may have contributed to the formation of the Castellieri cultural horizon, the evidence from Trmun and other sites also suggests that local traditions were not entirely displaced. The persistence of certain technological and typological traits inherited from pre-Castellieri contexts indicates that, alongside the appearance of new settlement types, elements of a pre-existing cultural substrate may have continued to play a role in shaping regional developments. The emergence of the hillfort phenomenon thus appears to have been influenced by multiple inputs, combining external impulses with local trajectories. Future interdisciplinary research, particularly integrating archaeometric and bioarchaeological approaches[52], will be essential for assessing the relative significance of these different factors and for better understanding the complex dynamics underlying the rise and development of the Castellieri culture.

[51] See also e.g. Borgna, Cassola Guida 2009, 92; Mihovilić, Teržan 2022b, 394; Hellmuth Kramberger 2024, 3–4.

[52] See also the already published preliminary results of the ongoing research examining mitochondrial haplogroups from Monkodonja and other Bronze Age sites in Istria by Villalba-Mouco and Haak (2022).

CATALOGUE

The finds from the archaeological excavations at the Trmun site are temporarily stored at the Multidisciplinary Laboratory of the ICTP in Trieste. They will eventually be transferred for permanent storage to the offices of the Soprintendenza Archeologia, Belle Arti e Paesaggio per il Friuli Venezia Giulia. The catalogue presents preliminary inventory numbers that were assigned during the excavation and the post-excavation processing of the material (RR; *Reperto registrato* – 'registered find').

The descriptions of the morphological and technological characteristics follow the guidelines developed by Milena Horvat.[1] For ceramic finds, information is provided on surface treatment (rough or coarse surface – wiping; smooth surface – smoothing; polished surface – polishing), pottery clay granularity (very fine-grained – grain size up to 0.25 mm; fine-grained – 0.26 to 0.5 mm; medium-grained – 0.51 to 2.0 mm; coarse-grained – 2.01 to 3.0 mm; very coarse-grained – over 3.01 mm), firing technique (oxidizing, incomplete oxidizing, reducing, incomplete reducing, etc.), and surface colour (descriptive only; if the surface colours differ, the colours of the inner and outer surfaces are listed separately). The drawings were prepared by Brina Svet and Tamara Korošec.

[1] Horvat 1999.

Abbreviations / okrajšave:
frag. = fragment / odlomek
d. = diameter / premer
l. = length / dolžina
w. = width / širina
h. = height / višina
surv. = surviving / ohranjen
SU = stratigraphic unit / stratigrafska enota
RR = recorded artefact / zabeležena najdba

Table 1

1. Frag. vessel neck; smoothing; medium-fine-grained; imcomplete oxidation; light brown inside and outside. Surv. h. 3,2 cm; SU 11, RR 169.
2. Frag. of handle; smoothing; fine-grained; oxidation; light brown. L. 3,1 cm; w. 1,4 cm; SU 11, RR 168.
3. Frag. vessel rim; smoothing; coarse-grained; incomplete oxidation; red-yellow on the outside and inside, black spots on the surface and fracture (post-depositional process). Surv. h. 6,06 cm; d. 31,9 cm; SU 24; RR 198.
4. Frag. vessel rim; smoothing; coarse-grained; oxidised; light reddish yellow on the outside and inside. Surv. h. 5,1 cm; d. 28,2 cm; SU 21; RR 76.
5. Frag. vessel rim; polishing; medium-grained; incomplete oxidation; brown on the outside and inside. Surv. h. 3,2 cm; d. 24,1 cm; SU 21; RR 66.
6. Frag. vessel rim; wiping; fine-grained; incomplete oxidation; brown on the outside and inside. Surv. h. 3,1 cm; d. 12,4 cm; SU 21; RR 80.
7. Frag. vessel rim; smoothing inside, wiping outside; medium-grained; incomplete oxidation; brown inside and outside, black spots on the surface and fracture (post-depositional process); knob. Surv. h. 5,7 cm; d. 19,2 cm; SU 31; RR 183.
8. Frag. vessel rim; smoothing; fine-grained; incomplete oxidation; light brown inside and outside, very rare remains of black spots on the surface and fracture (post-depositional process); knob. Surv. h. 3,4 cm; d. 11,2 cm; SU 21; RR 88.
9. Frag. bowl; smoothing; medium-grained; incomplete oxidation; red-yellow on the outside and inside. Surv. h. 2,8 cm; d. 23,6 cm; SU 21; RR 47.
10. Frag. bowl; smoothing; fine-grained; incomplete oxidation; brown on the outside and dark brown inside. Surv. h. 3,1 cm; d. 23,6 cm; SU 21; RR 49.
11. Frag. bowl; smoothing; medium-grained; incomplete reduction; dark brown-grey on the outside and inside. H. 10,3 cm; d. 14 cm; SU 21; RR 54.

Table 2

1. Frag. of a vessel with a handle with a trapezoidal overhand plate; smoothing; coarse-grained; incomplete oxidation; pink-red on the outside and inside. L. 7,4 cm; w. 7 cm; SU 21; RR 31.
2. Frag. of a vessel handle with a trapezoidal overhand plate; smoothing; coarse-grained; incomplete oxidation; light brown inside and outside, rare remnants of black spots on the surface and fracture (post-depositional process). L. 3,6 cm; w. 3,2 cm; SU 21; RR 181.
3. Frag. of a vessel handle; smoothing; coarse-grained; oxidation; light brown on the outside and inside, very rare remnants of black spots on the surface and fracture (post-depositional process). Surv. h. 5,7 cm; w. 3,2 cm; SU 21; RR 97.
4. Frag. of vessel; smoothing inside, wiping outside; coarse-grained; oxidation; red-yellow. Surv. h. 3,4 cm; w. 4,5 cm; SU 21; RR 51.
5. Frag. of vessel botton; smoothing inside, wiping outside; coarse-grained; oxidation; red-yellow. Surv. h. 4,1 cm; d. 5,3 cm; SU 21; RR 52.
6. Frag. of tripod; smoothing; coarse-grained; oxidation; light brown; vertical groove. L. 3,8 cm; w. 2,9 cm; SU 21; RR 50.
7. Frag. of vessel with a tongue-shaped lug; wiping; coarse-grained; oxidation; red-yellow inside and outside; fingerprint impression. Surv. h. 5,9 cm; w. 8,7 cm; SU 21; RR 123.
8. Frag. of vessel with a tongue-shaped lug; smoothing; coarse-grained; oxidation; red-yellow inside and outside; fingerprint impression. Surv. h. 5,3 cm; w. 7 cm; SU 24; RR 194 (180).
9. Frag. of vessel with a tongue-shaped lug; smoothing; coarse-grained; incomplete oxidation; red-yellow with black spots on the outside and inside; fingerprint impression. L. 6,5 cm; w. 3,5 cm; SU 31; RR 176.
10. Frag. of vessel; smoothing inside, wiping outside; coarse-grained; oxidation; light brown inside and outside, traces of black spots on the surface and fracture (post--depositional process); knob with impression. Surv. h. 9,1 cm; w. 8,25 cm; SU 21; RR 124.
11. Frag. of vessel wall; smoothing; coarse-grained; oxidation; light brown inside and outside, very rare traces of black spots on the surface and fracture (post-depositional process); knob. L. 6,5 cm; w. 5,1 cm; SU 21; RR 100.
12. Frag. of vessel; smoothing; medium-grained; oxidation; light brown on the outside and inside, with rare black spots on the inside (post-depositional process); knob. L. 5,2 cm; w. 4,6 cm; SU 21; RR 75.
13. Frag. of vessel; smoothing; coarse-grained; oxidation; light brown on the outside and inside, traces of black spots on the inner surface and fracture (post-depositional process); horizontal rib. Surv. h. 6,1 cm; w. 8,2 cm; SU 21; RR 179.
14. Frag. of vessel; smoothing; medium-grained; oxidation; light brown outside and inside; horizontal rib. Surv. h. 6,5 cm; w. 5,9 cm; SU 21; RR XX1.
15. Frag. of vessel; smoothing; medium-grained; incomplete oxidation; dark grey on the outside, light brown on the inside, traces of black spots on the inner surface and fracture (post-depositional process); horizontal rib. Surv. h. 3,4 cm; w. 6,3 cm; SU 21; RR 178.

Table 3

1. Frag. vessel rim; smoothing; coarse-grained; incomplete oxidation; light brown on the outside and dark brown on the inside. Surv. h. 6,03 cm; d. 37,2 cm; SU 21; RR 41.
2. Frag. vessel rim; smoothing; coarse-grained; incomplete oxidation; light brown on the outside and inside, rare remnants of black spots on the surface and fracture (post-depositional process). Surv. h. 5,7 cm; d. 31,1 cm; SU 21; RR 38.
3. Frag. vessel rim; smoothing; coarse-grained; incomplete oxidation; light grey-brown on the outside, red-yellow on the inside. Surv. h. 4 cm; d. 29,3 cm; SU 12; RR 132.
4. Frag. vessel rim; smoothing; fine-grained; oxidation; light brown with black spots on the outside and inside. Surv. h. 5 cm; d. 30,7 cm; SU 12; RR 129.
5. Frag. vessel rim; smoothing; very coarse-grained; incomplete oxidation; grey on the outside, reddish yellow on the inside. Surv. h. 5 cm; SU 12; RR 148.
6. Frag. vessel rim; smoothing; finely grained; reduction firing; very dark grey on the outside and inside. Surv. h. 5 cm; d. 7,7 cm; SU 12; RR 152.
7. Frag. vessel rim; smoothing; medium coarse-grained; incomplete oxidation; light brown on the outside and inside, very rare remains of black spots on the outer surface (post-depositional process?). Surv. h. 6,6 cm; d. 14,9 cm; SU 12; RR 33.
8. Frag. of bowl rim; smoothing; coarse-grained; oxidation; light brown on the outside and inside, rare remains of black spots on the outer surface (post-depositional process?); knob, butterfly-shaped handle. Surv. h. 12,8 cm; d. 38,4 cm; SU 12; RR 5.

Table 4

1. Frag. of bowl rim; smoothing; fine-grained; oxidation; brown inside and outside, very rare remains of black spots on the inner surface (post-depositional process?). Surv. h. 2,9 cm; d. 17,6 cm. SU 12; RR 6.
2. Frag. of bowl rim; smoothing; fine-grained; incomplete oxidation; red-yellow on the outside and inside. Surv. h. 3,6 cm; d. 19,4 cm. SU 12; RR 134.
3. Frag, of bowl rim; polishing; fine-grained; reduction; dark gray. Surv. h. 2 cm. SU 12; RR 32.
4. Frag. of bowl rim; smoothing; fine-grained; incomplete oxidation; light grey-brown on the outside, dark grey--brown on the inside. Surv. h. 3,4 cm. SU 12; RR 131.
5. Frag. of bowl rim with X-shaped handle smoothing; medium-grained; incomplete oxidation; dark brown on the outside and brown-reddish brown inside. Surv. h. 5,4 cm; w. 4,4 cm. SU 21; RR 15.
6. Frag. of bowl rim; smoothing; fine-grained; incomplete oxidation; red-yellow on the outside and inside. Surv. h. 3,5 cm. SU 12; RR 133.
7. Frag. vessel with a handle with semicircular plate; smoothing; medium coarse-grained; incomplete oxidation; red-yellow on the outside and inside. L. 5 cm; w. 3,9 cm. SU 12; RR 142.
8. Frag. of a handle; smoothing; medium-coarse-grained; incomplete oxidation; red-yellow on the outside and inside. Surv. h. 6,8 cm; w. 4,9 cm. SU 12; RR 35.
9. Frag. of vessel with a tongue-shaped lug; smoothing; coarse-grained; incomplete oxidation; red-yellow on

the outside and inside; fingerprint impression. Surv. h. 6 cm; w. 9,2 cm. SU 12; RR 150.

10. Frag. of a vessel with a handle; smoothing; fine-grained; oxidation; red-yellow on the outside and inside; very rare remains of black spots on the outer surface and fracture (post-depositional process?). Surv. h. 2,9 cm; w. 3,7 cm. SU 12; RR 157.
11. Frag. of vessel wall with a tongue-shaped lug; smoothing; medium-grained; incomplete oxidation; red-yellow on the outside and inside; fingerprint impression. L. 5,7 cm; w. 3,7 cm. SE 12; RR 159.
12. Frag. of vessel rim; smoothing; medium-grained; oxidation; light brown on the outside and inside; knob, horizontal ribs. L. 7,7 cm; w. 5,8 cm. SU 21; RR XX2.
13. Frag. of vessel; smoothing; medium-grained; incomplete oxidation; brown on the outside, red-yellow on the inside; horizontal rib. Surv. h. 5,6 cm; w. 6,6 cm. SU 12; RR 146.
14. Frag. of vessel; smoothing; fine-grained; incomplete oxidation; brown outside and inside, dark brown-black spots; horizontal rib. Surv. h. 4,9 cm; w. 7,2 cm. SU 12; RR 145.
15. Frag. of vessel; smoothing; coarse-grained; incomplete oxidation; light brown on the outside and brown-gray on the inside; diagonal grooves. L. 5,7 cm; w. 5,3 cm. SU 12; RR 144.
16. Frag. of vessel; smoothing; medium-grained; incomplete oxidation; light brown inside and outside; applied knob. L. 4,1 cm; w. 3,1 cm. SU 12; RR 136.
17. Frag. of wall; smoothing; fine-grained; oxidation; light brown inside and out; applied knob. L. 4,2 cm; w. 3,9 cm. SU 12; RR 138.
18. Frag. of vessel; smoothed; coarse-grained; oxidation; light brown inside and out; barbotine. L. 7,6 cm; w. 5,5 cm. SU 12; RR 156.

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Trmun in pojav gradišč na Krasu in v Istri v zgodnji bronasti dobi

Povzetek

Prispevek predstavlja nove rezultate arheoloških raziskav na gradišču Trmun, ki leži v bližini naselja Mačkovlje/Caresana[1] v Tržaški pokrajini (severovzhodna Italija). Najdišče se nahaja na severnem robu Istrskega polotoka, v strateško izpostavljenem območju med dolinama Glinščice/Rosandra in Osapske reke/Ospo. Rezultati raziskav dopolnjujejo dosedanje poznavanje najzgodnejših bronastodobnih utrjenih naselij na območju severnega Jadrana.[2]

GEOGRAFSKI IN ARHEOLOŠKI KONTEKST

Najdišče Trmun leži na grebenu Dolga krona/Monte d'Oro, ki poteka v smeri vzhod–zahod in se dviga nad Tržaškim zalivom, med dolinama Glinščice na severu in Osapske reke na jugu (*sl. 1*). Greben je zgrajen iz eocenskega fliša, kar se odraža v izraziti plastovitosti ter ustvarja naravne terase in izpostavljene skalne police.[3] Od Socerba proti zahodu teren počasi pada, kar omogoča pregled nad obema dolinama in nad ključnimi potmi, ki so jih prazgodovinske skupnosti uporabljale za premike med Istro, Krasom in zaledjem Furlanije.

Novejše terenske analize, združene z interpretacijo LiDAR-posnetkov, so pokazale, da je vrh Trmuna le najvišji, najbolje utrjen segment precej večjega prazgodovinskega kompleksa. Zahodno se razprostira obsežna, približno 5 ha velika, rahlo valovita terasa, obdana z ohranjenimi sledovi obzidnih linij in razvalin.[4] To nakazuje obsežnejšo poselitev, pri čemer je imel vrh hriba pomembno strateško vlogo (*sl. 3*). V neposredni bližini Trmuna se nahajajo tudi druga prazgodovinska gradišča, med temi Dolga krona, Prebeneg in Socerb (*sl. 2*).[5]

ARHEOLOŠKA IZKOPAVANJA

Izkopavanja leta 2022 so bila osredotočena na severozahodni rob vršnega platoja, kjer je bilo mogoče jasno razločiti prazgodovinsko obzidje (*sl. 1, 3, 4*). Odprta površina približno 20 × 15 m je razkrila okoli trideset stratigrafskih enot, od katerih se večina nanaša na prazgodovinsko fazo gradnje in rabe ter nekaj na kasnejše novoveško preoblikovanje, povezano z gradnjo stolpa. Članek se bo osredotočil le na prazgodovinske plasti.[6]

[1] Imena krajev na dvojezičnih območjih so ob prvi omembi navedena v dveh jezikih.

[2] Glej npr. Hänsel, Mihovilić, Teržan 2015, 493–495 in nazadnje Hellmuth Kramberger 2024, 4–6.

[3] Jurkovšek et al. 2016; sl. 1–3.

[4] Flego, Rupel 1993, 199–200; Flego, Župančič 1991, 61; Bernardini et al. 2023, 4–5, sl. 3.

[5] Flego, Rupel 1993, 199; Marchesetti 1903, 60–61; Dugulin 2002.

[6] Najdbe, odkrite med arheološkimi izkopavanji na lokaciji Trmun, so začasno shranjene v Multidisciplinary laboratory ICTP v Trstu. Za trajno hrambo bodo prenesene v Soprintendenza Archeologia, belle arti e paesaggio per il Friuli Venezia Giulia v Trstu. Trenutno se pripravlja obsežnejša publikacija, ki bo predstavila vse rezultate arheoloških izkopavanj.

Hrib Trmun, del veliko večjega naselja, ki se razteza zahodno od raziskanega območja (*sl. 3*), je bil utrjen z obzidjem (SE 11), zgrajenim iz dveh vrst velikih blokov in jedra iz manjših kamnov in zemlje, širokim približno 1,6 m (*sl. 5*). Obzidje je zgrajeno neposredno na naravni flišni podlagi (SE 9), sestavljeni iz vzporednih plasti peščenjaka (usmerjenih v smeri SZ–JV). V nasipu zidu je bilo odkritih le nekaj najdb. Glede na to, da se je nasip sesul navznoter in navzven (SE 12 oziroma SE 15), struktura verjetno ni bila posebej visoka in je bila morda ojačena z lesenimi elementi. Medtem ko so sledovi gradnje skromni, je zelo izstopajoč obseg porušitve: številni kamni so se ob porušitvi posedli navzven, kar nakazuje enkraten, verjetno nenaden dogodek (*sl. 6*).

Notranjost med obzidjem in osrednjim delom vrha je bila izravnana z nasutji, ki so vsebovala izjemno veliko količino keramičnega materiala in so se raztezala po celotni dolžini izkopanega zidu (SE 21, 24, 31 pod stolpom). Večina keramičnih najdb, ključnih za datiranje naselbine, izvira iz teh plasti (izbor keramičnih najdb je na *t. 1* in *2*). V njih je bilo najdenih tudi nekaj živalskih ostankov in kamnitih orodij. Nasutja za izravnavo so najverjetneje nastala v fazi urejanja notranjega prostora gradišča. V osrednjem delu se je pokazala plastovita flišna podlaga (SE 9), ponekod le nekaj centimetrov pod površjem, ki verjetno ni omogočala intenzivne gradnje, zato se zdi, da je imel vrh predvsem obrambno in nadzorno vlogo. Bivalni del gradišča se je najverjetneje nahajal na zahodni terasi, ki je bila širša, bolj ravna in bolje zaščitena pred vetrom.

KERAMIČNE NAJDBE

Večino arheoloških najdb s Trmuna predstavlja keramično gradivo, predvsem fragmenti prazgodovinskih posod. Najdeni so bili zlasti v izravnavi tik ob notranji strani prazgodovinskega zidu (SE 12) (*t. 3, 4*) ter v ruševinah zidu na notranji in zunanji strani (SE 21, SE 15) (*t. 1:* 3–11; *2*).

Keramika je po tehnoloških značilnostih razmeroma enotna. Izdelana je iz fine do grobe gline, z dodanimi primesmi lokalnega fliša, peščenjaka in groga, medtem ko kalcit ni prisoten. Nekateri vključki so veliki tudi do nekaj mm. Posode so bile žgane večinoma oksidacijsko, ponekod z znaki nepopolne oksidacije.[7] Najdbe so močno fragmentirane, le nekatere posode je bilo mogoče delno rekonstruirati. Med oblikami prevladujejo lonci, sledijo sklede in skodelice, številni fragmenti sten pa niso bili tipološko opredeljivi.

Najboljše primerjave za keramični sklop s Trmuna najdemo v repertoarju kaštelirske kulture zgodnje in srednje bronaste dobe, razširjene v Istri, na Krasu in v severovzhodni Italiji.[8]

Najpogostejši so lonci različnih velikosti, namenjeni kuhanju in shranjevanju, zlasti primerki z lijakastim robom (*t. 1:* 3–6; *3:* 1–3), značilni za kaštelirsko kulturo in primerljivi z najdbami iz Monkodonje ter drugih gradišč v Istri in na Krasu.[9] Prisotni so tudi manjši lončki s stožčastim vratom in zaobljenim robom (*t. 1:* 7; *3:* 4–5), za katere najbolj podobne primerke najdemo na gradišču Jelarji/Elleri.[10] V izravnalni plasti tal blizu prazgodovinskega obzidja je bil najden tudi del majhne posode z lijakastim robom (*t. 1:* 11), ki ji najdemo primerjavo na najdišču Zemono blizu Vipave, in sicer v jami, na podlagi analiz ^{14}C datirani med 19. in 17. st.[11], ter tudi na drugih najdiščih iz poznejših obdobij bronaste dobe na območju Caput Adriae.[12]

Med lonci in posodami za shranjevanje se je ohranilo več fragmentov sten, najpogosteje z jezičastimi ročaji, pogosto z odtisi prstov (npr. *t. 2:* 7–9; *4:* 9,11), različnimi aplikami (npr. *t. 1:* 7,8; *2:* 10–12; *4:* 16,17) in apliciranimi gladkimi rebri (npr. *t. 2:* 13–15; *4:* 12–15). Redko se pojavlja barbotin (npr. *t. 4:* 18). Držaji, okrašeni z odtisi prstov, sodijo med tipične elemente kaštelirske kulture.[13] Najdemo jih tudi v bronastodobnih plasteh

[7] Arheometrične raziskave keramičnih najdb s Trmuna izvaja Manca Vinazza z Oddelka za arheologijo Filozofske fakultete Univerze v Ljubljani. Izsledki bodo predstavljeni v prihajajoči monografiji o najdišču Trmun. Ta članek predstavlja le predhodne ugotovitve makroskopske preiskave.

[8] Glej npr. Marchesetti 1903; Cardarelli 1983; Mihovilić 2013; Borgna et al. 2018.

[9] V italijanščini "a tesa", izbočeni ali lijakasti robovi; glej npr. Hellmuth Kramberger 2017b, t. 4: 1,3–4; 5: 2; Lonza 1981, t. 7: 4–6,18; 13: 5; 14: 5; 15: 5; Maselli Scotti 1997, t. 1: 9; 4: 4–8; glej tudi Lonza 1977, t. III: 2; IV: 13; Borgna et al. 2018, sl. 5: 2, in Gilli, Montagnari Kokelj 1993; Turk et al. 1993, t. 17: 2.

[10] Vas Jelarji je bila leta 2018 preimenovana v Elerji. V tem članku ohranjamo slovenski toponim *Jelarji* za arheološko najdišče, kot se pojavlja v znanstvenih in strokovnih publikacijah; Lonza 1981, t. 9: 1–2; 10: 1.

[11] Bratina 2014a, 565, 567, sl. 35.4: 1.

[12] Npr. Lonza 1981, t. 5: 1–15; Forenbaher, Rajić Šikanjić, Miracle 2006, 43, t. 10: 4,6.

[13] Glej Borgna et al. 2018, sl. 5 in tudi npr. Lonza 1981, t. 11: 2–4,7; 17: 3; Maselli Scotti 1997, t. 1: 10; Flego,

kraških in istrskih jam ter na drugih najdiščih.[14] Tovrstni držaji so pogosti tudi v današnji zahodni in osrednji Sloveniji in kažejo na vpliv kaštelirske kulture na to območje.[15]

Sklede so večinoma stožčaste oblike (*t. 1:* 9–10; *4:* 1–6), pogosto s klekastim prehodom na notranji strani (*t. 1:* 10; *4:* 1,2,5), ki jih najdemo tako na bližnjih najdiščih kot na tistih v Istri.[16] Posebej izstopa skodelica s t. i. X-ročajem pod robom (*t. 4:* 5), znanim iz zgodnje in srednje bronaste dobe v Istri in na Krasu.[17] Med zanimivejšimi primerki je tudi visoka skleda z izbočenim robom in aplikacijo, verjetno delom metuljastega ročaja oziroma držaja (*t. 3:* 8), prav tako značilnim za kaštelirsko kulturo.[18] Prisotni so še ročaji s trikotnim prerezom (*t. 2:* 3; *4:* 8), ki se pojavljajo na območju Istre in Tržaškega Krasa že v zgodnji bronasti dobi in se močno razširijo v srednji in pozni bronasti dobi,[19] ter ročaji s trapezno ali polkrožno ploščico (*t. 2:* 1–2; *4:* 7). Ročaji s trapezno nadročajno ploščo veljajo za predhodnike ročajev s polkrožno ploščo. Datirani so v zgodnjo bronasto dobo, medtem ko so ročaji s polkrožnimi ploščami bolj značilni za srednjo in pozno bronasto dobo.[20]

Okras je skromen in obsega predvsem gladka rebra, bradavice in prstne odtise na držajih (*t. 1:* 7–8; *2:* 7–15; *3:* 8; *4:* 9,11–16). V keramičnem sklopu niso prisotna razčlenjena rebra, ki so sicer pogosta na bronastodobnih najdiščih.

Med posebnimi oblikami so stožčaste sklede z gladko notranjo in grobo obdelano zunanjo površino (*t. 2:* 4–5),[21] ki bi lahko sodile v repertoar posod tipa *briquetage*, povezanih s pridobivanjem soli. Primerljive so z najdbami z gradišča Jelarji.[22]

Dva fragmenta sta interpretirana kot nogi trinožnikov (eden na *t. 2:* 5), značilnih ognjiščnih posod bronastodobnih gradišč v Istri in na Krasu.[23]

RADIOKARBONSKE DATACIJE

Na najdišču Trmun sta bila analizirana dva vzorca živalskih kosti.[24] Analize je opravil laboratorij v Poznanju (Poljska), kalibracija pa je bila izvedena z uporabo spletnega programa OxCal (v4.4.4). Oba vzorca izvirata iz zgodnje bronaste dobe. Vzorec, pridobljen z dna nasutja za izravnavo (SE 21 – vzorec Trmun 2), je nekoliko starejši, s kalibriranim časovnim razponom 1888–1686 pr. n. št. Vzorec Trmun 1, odvzet iz notranjega porušenega dela obzidja (SE 12), sega v obdobje 1692–1532 pr. n. št. in morda že odraža fazo opustitve gradišča (*sl. 7*).

Datacije s Trmuna smo primerjali z rezultati z najdišč Jelarji, Slivno, Monkodonja in z novimi, doslej neobjavljenimi datacijami z nekropole Vrčin/Monte Ursino (*sl. 8 –10*).[25] Rezultati z Vrčina kažejo na dolgo obdobje uporabe nekropole, ki se je začelo okoli sredine 18. st. pr. n. št. – očitno nekoliko pozneje kot ustanovitev Monkodonje in Trmuna – in je trajalo do zadnjih stoletij 2. tisočletja pr. n. št.

Rupel 1993, 76; Hellmuth Kramberger 2017a, 259, sl. 226; Hellmuth Kramberger 2017b, t. 33: 1; 76: 2,3; 102: 3; itd.

[14] Glej npr. Gilli, Montagnari Kokelj 1993, sl. 59: 615; 60: 620; 62: 640–641; 64: 666; Čuka 2009, t. IV: 23; V: 24,25; Bratina 2014b, sl. 36.6: 16,17.

[15] Glej nazadnje Leghissa, Plestenjak 2025, 342, 343.

[16] Npr. Jelarji – Lonza 1981, t. 27; Maselli Scotti 1997, t. 1: 19–20; Mali Kras – Flego, Rupel 1993, 192; Čelo – Flego, Rupel 1993, 197; npr. Monkodonja – Hellmuth Kramberger 2017a, 141–143; Monbrodo – Hellmuth Kramberger, Müller, Čuka 2022, t. 1: 6,8,9.

[17] Hellmuth Kramberger 2017a, 240–242, sl. 211 in 212; glej tudi npr. Cardarelli 1983, 91; Čuka 2009, t. V: 26; Hellmuth Kramberger 2017b, t. 20: 1,2; 74: 7,8, 101: 3; Zendron 2017, 215, sl. 108.

[18] Glej Hellmuth Kramberger 2017a, 160–161, 260–261, sl. 226: g; 227; glej tudi Müller, Čuka, Hellmuth Kramberger 2017, 33.

[19] Hellmuth Kramberger 2017a, 244–248, sl. 215; glej tudi Čović 1983, 127, t. XIV: 4,6–7; Lonza 1977, t. II: 3–7,8–11; V: 1,3,5; XIV: 4,6–7; Cardarelli 1983, t. 18: 111; Zendron 2017, sl. 114.

[20] Npr. Čović 1983, 238, t. XIV: 1a; XXXV: 10; Borgna et al. 2018, 83–84, sl. 6: I,II–V.

[21] Bernardini et al. 2023, sl. 10: 7,8.

[22] Càssola Guida, Montagnari Kokelj 2006; Montagnari Kokelj 2007; Zendron 2017, 224, sl. 121; Lonza 1977, t. XXXIX, XL.

[23] Bernardini et al. 2023, sl. 9: 9; 10: 9; Hellmuth Kramberger 2017a, 215–220; glej tudi sl. 15A–B; glej tudi npr. Lonza 1981, t. 41: 1–6; 42: 1; Maselli Scotti 1997, t. 3: 4; Hellmuth Kramberger 2017b, t. 11: 2–4; 23: 5; 58: 3; 71: 5.

[24] Arheozoološko študijo je opravil Borut Toškan. Rezultati bodo objavljeni v prihajajoči monografiji o najdišču Trmun.

[25] Analize vzorcev iz Vrčina so bile opravljene v Centro di Datazione e Diagnostica (CEDAD) Univerze v Salentu v imenu Prirodoslovnega muzeja v Trstu (*sl. 9*). Gre za dele človeških lobanj in zob iz t. i. "Sepolcreto Gentilizio", ki ga je v tridesetih letih prejšnjega stoletja izkopal R. Battaglia. Najdišče Vrčin je v literaturi znano tudi pod imeni Montursino, Montorcino, Monte Orsino in Monte Orcino. Glej Cupitò et al. 2018; Mihovilić 2022, 204–208. Iskreno se zahvaljujemo Deborah Arbulla iz Naravoslovnega muzeja Trst za dovoljenje objave radiokarbonskih datacij z najdišča Vrčin/Monte Ursino.

RAZPRAVA IN SKLEP

Med keramičnimi najdbami iz slojev, povezanih z uporabo gradišča, in iz plasti ruševin večjih razlik ni. Repertoar obsega posode za vsakodnevno uporabo, od loncev do skled in skodelic. Najdeni so tudi fragmenti večjih posod za shranjevanje. Preliminarna analiza kaže na jasno lokalno proizvodnjo, brez vidnih razlik v pripravi gline glede na funkcijo posode. Prevladuje groba keramika z velikimi vključki fliša in groga; le redki manjši primerki, predvsem sklede in manjše posode (npr. *t. 1:* 7,9; *3:* 6; *4:* 1–6), izstopajo po fini fakturi in temnejši barvi.

Homogenost repertoarja in tehnik izdelave je verjetno posledica relativno kratkega obdobja poselitve, ocenjenega med 1900 in 1550 pr. n. št. na podlagi radiokarbonskih analiz (Poz-58831: 1888–1686 cal. BCE, Poz-58814: 1736–1716 cal. BCE pri 5,1-% verjetnosti in 1692–1532 cal. BCE pri 90,4-%).

Okras na keramiki je omejen na gladka rebra in aplicirane bradavice ali aplike; razčlenjena rebra niso prisotna, kar lahko nakazuje zgodnjo fazo kaštelirske kulture. Razvoj gradišč na Tržaškem in v severozahodni Istri sovpada z najzgodnejšimi utrjenimi naselbinami v južni Istri (Monkodonja, Vrčin, *sl. 10*) ter nekaterimi lokacijami v Furlaniji (naselbina Sedegliano).[26] Podobne pogrebne prakse, kot so pokopi v bližini vhodov in ob ali v obzidjih, nakazujejo povezave med regijami že v zgodnji fazi kaštelirske kulture.[27]

Številni dosedanji arheološki dokazi so vodili do hipoteze, da je nastanek kaštelirske kulture na južnem delu istrskega polotoka morda vključeval proces kolonizacije,[28] ki je bil verjetno povezan z migracijami iz vzhodnega Sredozemlja ali od drugod,[29] vendar novi podatki iz Trmuna ne zagotavljajo dokončne podpore tej hipotezi.[30] Doslej na najdišču niso prepoznali arhitekture, ki bi kazala na povezave z oddaljenimi regijami, niti uvozov iz teh območij. Prihodnje genetske analize bodo verjetno prinesle pomembne nove ugotovitve o obsegu in značilnostih morebitne migracije v severnojadransko območje.

Nekatere najdbe, odkrite na Trmunu in drugih gradiščih, kažejo, da so na razvoj kaštelirske kulture morda vplivale tudi starejše zgodnjebronastodobne kulture. Nekatere keramične oblike, kot so sklede z ravno odrezanimi odebeljenimi robovi (npr. *t. 4:* 3), so bile v uporabi že od pozne bakrene dobe in so jih uporabljali vse do srednje bronaste dobe.[31] Ročaji z nadročajno ploščico (*t. 2:* 1–2) so primerljivi z zgodnjebronastodobnimi ročaji posod iz kulture Polada ter s primerki posod Wieselburg–Gáta in podobnimi, odkritimi v jamskih najdiščih Tržaškega Krasa.[32] Povezavo s starejšimi kulturnimi fenomeni kaže tudi tehnologija keramike: v neolitiku in zgodnji bakreni dobi je bil glavni dodatek v glini kalcit, medtem ko se od pozne bakrene dobe uporablja predvsem grog, kar se nadaljuje skozi večino 2. tisočletja pr. n. št. Šele v železni dobi se ponovno pojavlja glina, bogata s kalcitom.[33]

[26] Canci, Saccheri, Travan 2018; Simeoni 2024.

[27] Borgna et al. 2018, 82. Kljub tem splošnim podobnostim je treba poudariti, da so pokopi v Sedeglianu zaznamovani s skeletnimi ostanki v iztegnjeni legi, položenimi na hrbet in brez grobnih pridatkov (Canci, Saccheri, Travan 2018, 531–532) v preproste grobne jame. Nasprotno pa so v Istri posmrtni ostanki urejeni v sekundarni depoziciji v kamnitih cistah, postavljenih znotraj pravokotnih kamnitih ploščadi (glej tudi Mihovilić, Teržan 2022a, 299–301).

[28] Hänsel, Mihovilić, Teržan 2015, 493–495; Hellmuth Kramberger 2017a, 409–410; Mihovilić, Teržan 2020, 571–572.

[29] Že Marchesetti je opozoril na možnost migracijskih valov iz sredozemskega območja; glej na primer Marchesetti 1903, 11–12, 123–125, in nedavno Mihovilić, Teržan 2022b, 394, ter Hellmuth Kramberger 2024, 4–6.

[30] Kolonizacija se na splošno razume kot posebna oblika migracije ali mobilnosti, ki vključuje naselitev tujih skupin v regiji, oddaljeni od njihovega kraja izvora, pogosto pa jo spremljajo asimetrični družbeno-gospodarski odnosi z lokalnim prebivalstvom, medtem ko migracija v širšem smislu pomeni gibanje ljudi, ki ne vključuje nujno ustanavljanja novih naselij ali družbenih hierarhij (van Dommelen 2012, 397–398).

[31] Glej npr. Leghissa 2021, 13; Gilli, Montagnari Kokelj 1993, sl. 50; glej tudi podrobnejšo razpravo o elementih Cetinske kulture v kontekstu kaštelirske kulture v Hellmuth Kramberger 2017a, 340–345; glej tudi Mihovilić, Teržan (ur.) 2022.

[32] Hellmuth Kramberger 2017a, 179–182; Borgna et al. 2018, 80, 85, opomba 8, sl. 6 – podoben ročaj s trikotnim/trapezastim zgornjim delom je bil odkrit tudi na naselbini Mali Otavnik iz zgodnje bronaste dobe na Ljubljanskem barju v osrednji Sloveniji (glej Hellmuth Kramberger 2017a, 182, sl. 149: e); za Tržaško pokrajino glej Bernardini et al. 2024a; Marzolini 1992.

[33] Bernardini et al. 2024b; Hellmuth Kramberger 2017a, 60–63; Vinazza 2025, 45–46; podobno mnenje sta izrazila Manca Vinazza in Tomaž Fabec med predavanjem *Kras – analiza tehnologije "kaštelirske keramike" in stanje raziskav* na simpoziju *Gabrovčev dan 2024 Nove raziskave o bronasti dobi na območju Slovenije, Bronasta doba na Notranjskem in Primorskem*, ki je potekal v Ljubljani leta 2024.

Te ugotovitve poudarjajo kompleksnost nastanka kaštelirske kulture v severnem Jadranu. [34] Čeprav so bile migracije in zunanji vplivi pomembni, lokalne tradicije niso popolnoma izpodrinili. Ohranitev določenih tehnoloških in tipoloških značilnosti pred-kaštelirskih kontekstov kaže, da so verjetno tudi lokalne skupnosti soustvarjale razvoj gradišč. Fenomen gradišč se je morda oblikoval kot kombinacija zunanjih impulzov in lokalnih tradicij. Prihodnje interdisciplinarne raziskave z vključitvijo arheometričnih in bioarheoloških metod[35] bodo tako ključne za razumevanje dinamike nastanka in razvoja kaštelirske kulture.

[34] Glej npr. tudi Borgna, Cassola Guida 2009, 92; Mihovilić, Teržan 2022b, 394; Hellmuth Kramberger 2024, 3–4.

[35] Glej tudi že objavljene predhodne rezultate tekoče raziskave, v kateri Villalba-Mouco in Haak (2022) preučujeta mitohondrijske haplogrupe iz Monkodonje in drugih bronastodobnih najdišč v Istri.

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llustrations: Fig. 1 (photo: Massimo Calosi). – *Fig. 4* (map: Massimo Calosi and Drago Valoh, ZRC SAZU). – *Fig. 8.* (map: Mateja Belak, ZRC SAZU). – *Pl. 1–4* (drawing: Brina Svet and Tamara Korošec, ZRC SAZU).
Slikovno gradivo: Sl. 1 (foto: Massimo Calosi). – *Sl. 4* (načrt: Massimo Calosi in Drago Valoh, ZRC SAZU). – *Sl. 8* (karta: Mateja Belak, ZRC SAZU). – *T. 1–4* (risba: Brina Svet in Tamara Korošec, ZRC SAZU).

The data underlying this article will be shared on reasonable request to the corresponding author. / Podatki, na katerih temelji ta članek, bodo na razumno zahtevo posredovani interesentu.

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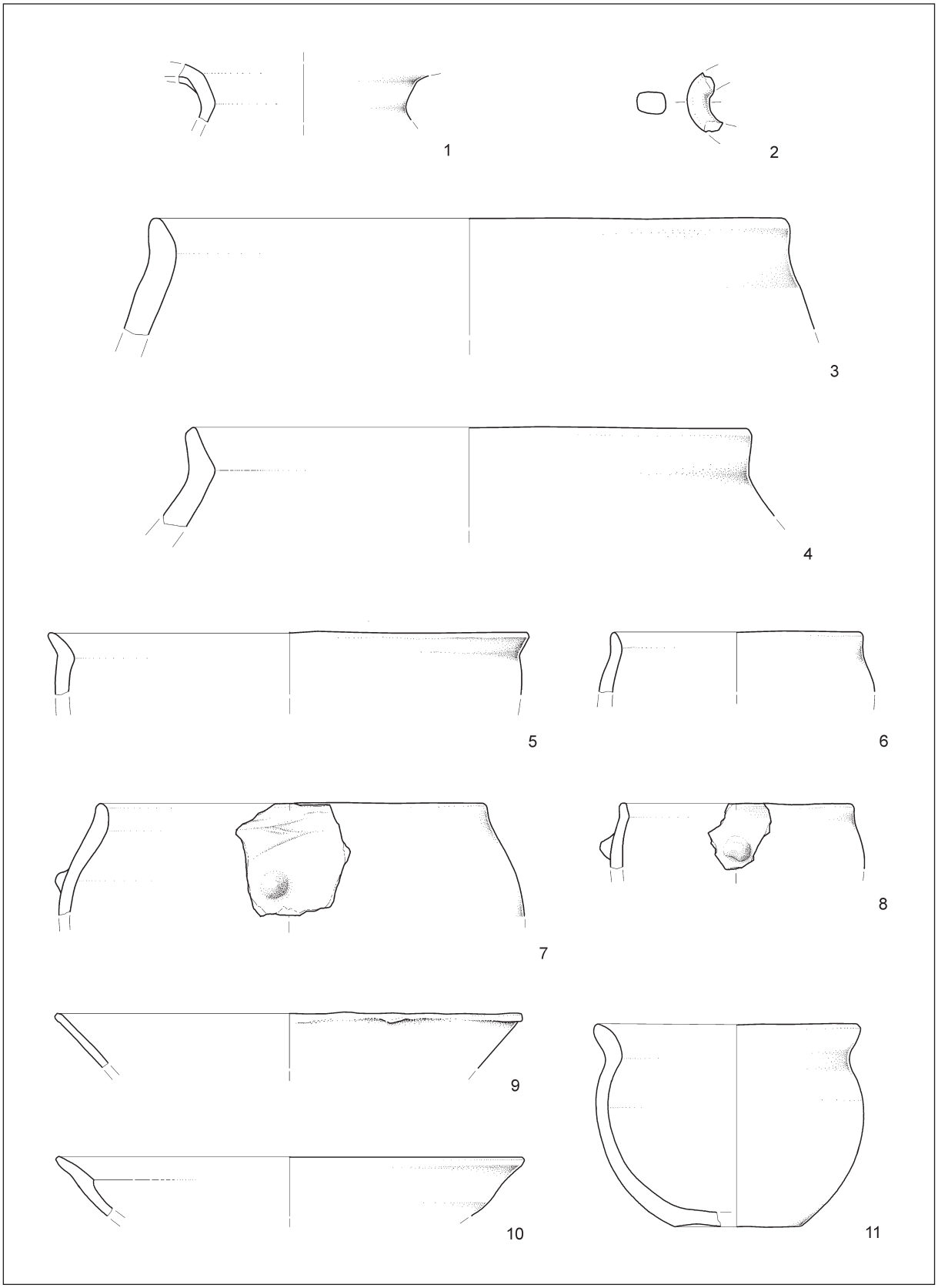
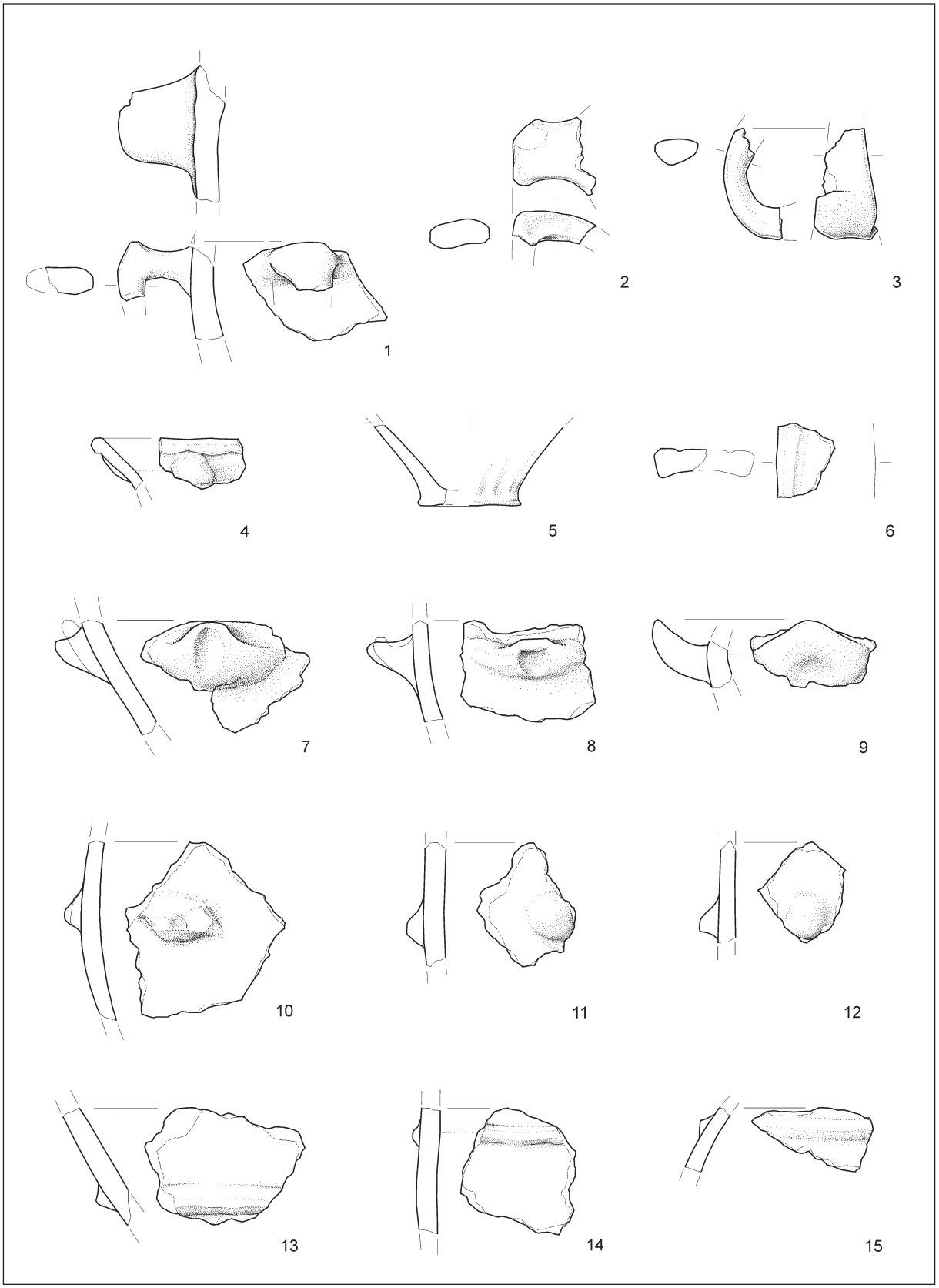
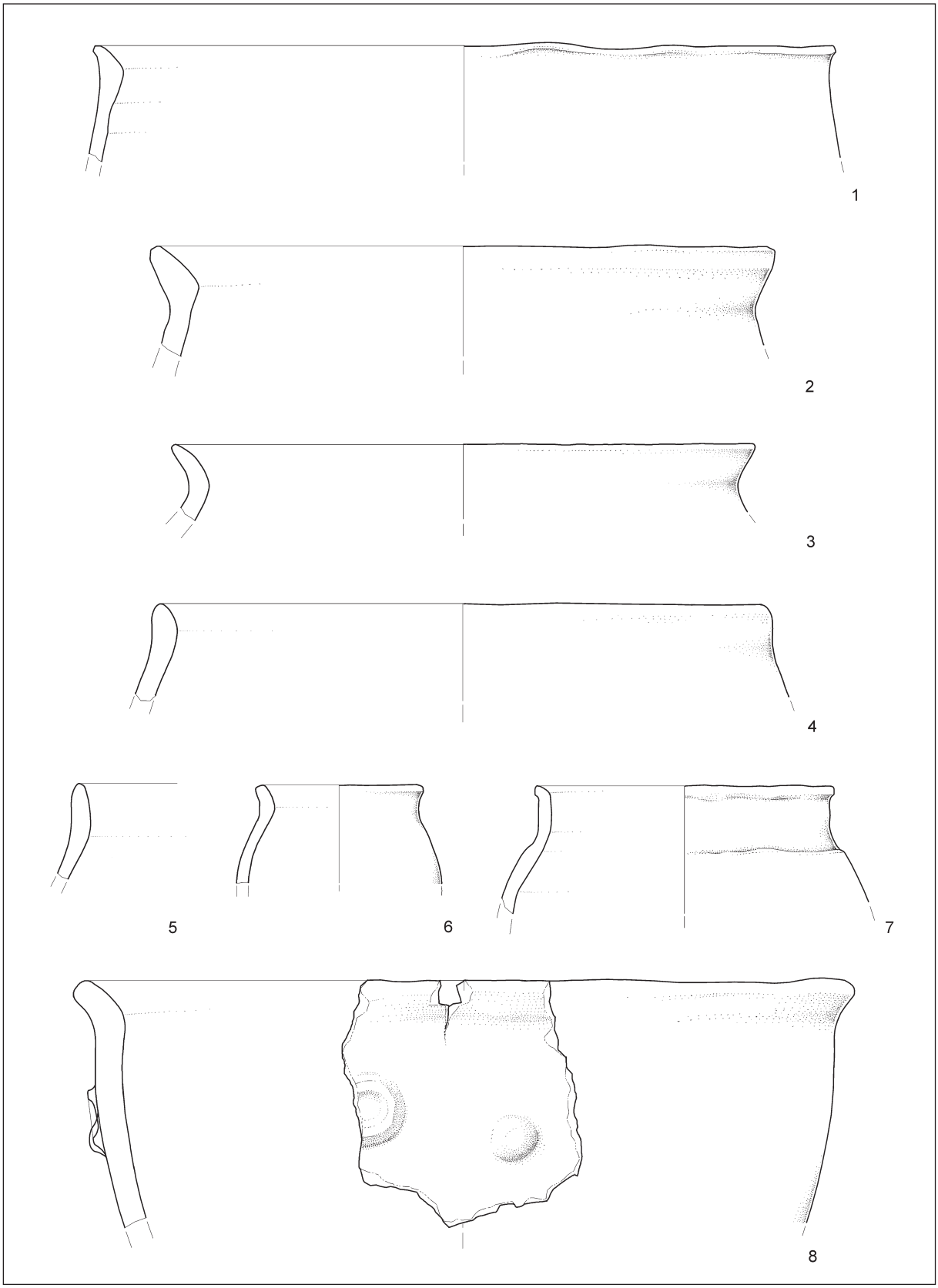


Pl. 1: Trmun: selection of ceramic finds discovered in the rampart base (SU 11; 1,2) and in the levelling layer (SU 21; 4–12). Scale = 1:3.

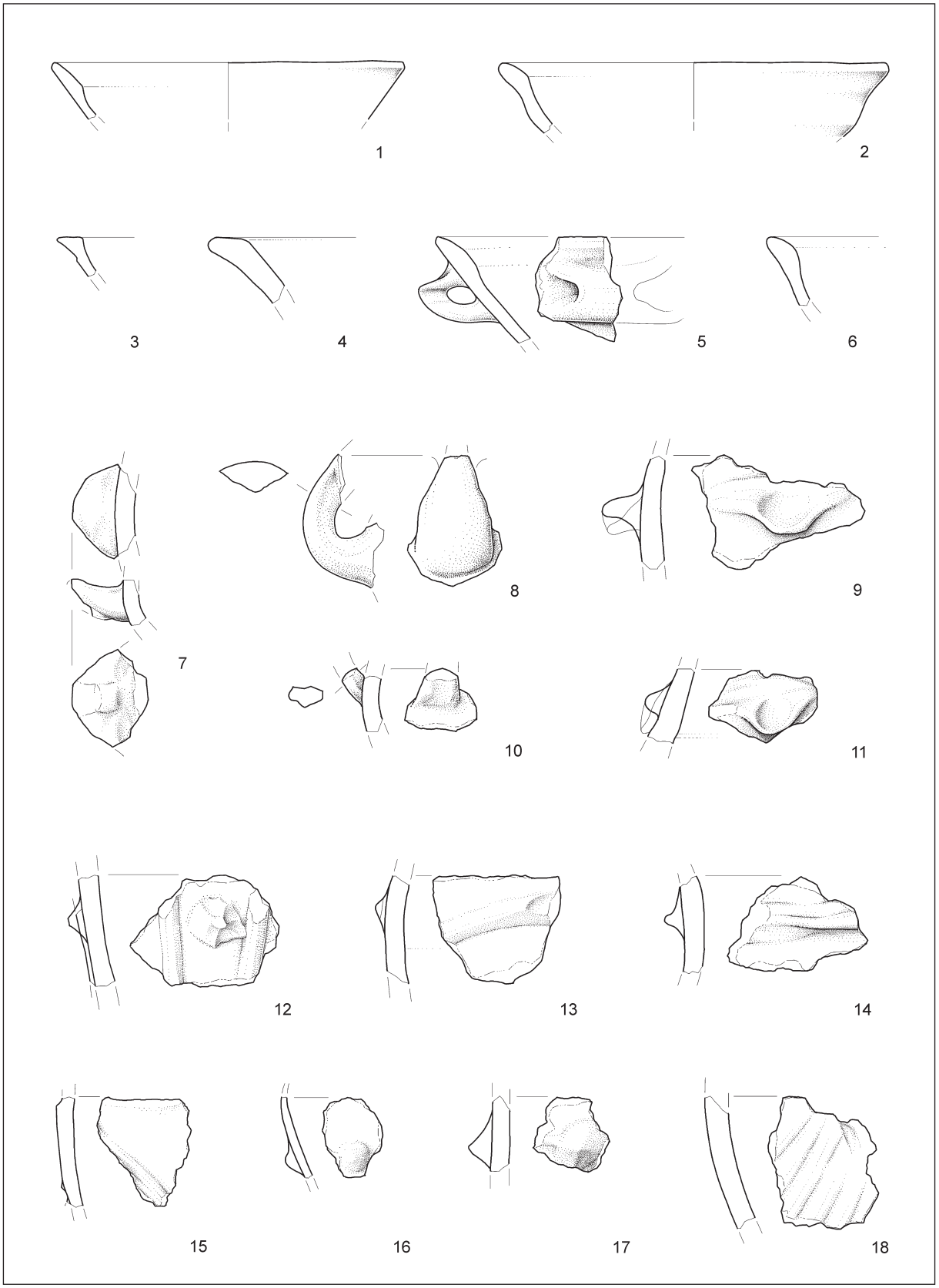
T. 1: Trmun: izbor keramičnih najdb, odkritih v postamentu za obzidje (SE 11; 1,2) in v izravnavi (SE 21). M = 1 : 3.



Pl. 2: Trmun: selection of ceramic finds discovered in the levelling layer (SU 21). Scale = 1:3.
T. 2: Trmun: izbor keramičnih najdb odkritih v izravnavi (SE 21). M = 1 : 3.



Pl. 3: Trmun: selection of ceramic finds discovered in the collapse of the rampart (SU 15). Scale = 1:3.
T. 3: Trmun: izbor keramičnih najdb, odkritih v prazgodovinski ruševini obrabnega zidu (SE 12). M = 1 : 3.



Pl. 4: Trmun: selection of ceramic finds discovered in the collapse of the rampart (SU 15). Scale = 1:3.
T. 4: Trmun: izbor keramičnih najdb, odkritih v prazgodovinski ruševini obrambnega zidu (SE 12). M = 1 : 3.