

Reassessing the Architecture and Spatial Organization of Lasinja Culture Settlements in the Southeastern Alpine Region. Insights from Northeastern Slovenia

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Abstract

Excavations at Zgornje Radvanje in Maribor (NE Slovenia) between 2007 and 2008 uncovered an Early Copper Age Lasinja Culture settlement with a distinctive circular layout. This study re-examines the settlement's topography and architecture, placing it within the broader Early Copper Age context to achieve a better understanding of Lasinja Culture settlements in the southeastern Alpine region. The settlement's central area, situated on higher ground, featured predominantly post-in-ground structures, while larger pits and sunken-featured structures ('pit houses') dominated the outer zones. Radiocarbon dating confirms that these architectural forms were contemporaneous, yielding some of the earliest known Lasinja Culture dates. This provides the first radiocarbon-dated evidence of two distinct architectural types coexisting in the region during this period. Comparisons with contemporaneous sites in the southeastern Alpine region, the western Pannonian Plain, and northern Croatia reveal shared traits, such as the prevalence of post-in-ground structures of rectangular ground plan (though without foundation ditches in the southeastern Alpine region), alongside regional variations. These findings advance understanding of Lasinja Culture settlement patterns and architectural diversity.

Keywords

Early Copper Age, Lasinja Culture, prehistoric architecture, post-in-ground structures, pit houses, settlement organization, radiocarbon dating

Zusammenfassung – *Eine Neubewertung der Architektur und räumlichen Organisation von Siedlungen der Lasinja-Kultur im südöstlichen Alpenraum. Erkenntnisse aus Nordostslowenien*

Die Ausgrabungen in Zgornje Radvanje in Maribor (Nordostslowenien) in den Jahren 2007 und 2008 brachten eine Siedlung der Lasinja-Kultur aus der frühen Kupferzeit mit einer charakteristischen kreisförmigen Anordnung zutage. Diese Studie untersucht die Topographie und Architektur der Siedlung erneut und ordnet sie in den breiteren Kontext der frühen Kupferzeit ein, um ein besseres Verständnis für die räumliche Organisation der Siedlungen der Lasinja-Kultur im südöstlichen Alpenraum zu gewinnen. Der

zentrale Bereich der Siedlung, der auf höher gelegenem Gelände lag, wies überwiegend Pfostenbauten auf, während in den äußeren Zonen größere Gruben und eingetiefte Strukturen (Grubenhäuser) dominierten. Radiokarbondatierungen bestätigen, dass diese architektonischen Formen zeitgleich entstanden, und liefern einige der frühesten bekannten Daten für die Lasinja-Kultur. Dies stellt den ersten radiokarbondatierten Nachweis dar, dass zwei unterschiedliche Bautypen in dieser Region gleichzeitig existierten. Vergleiche mit zeitgleichen Fundorten im südöstlichen Alpenraum, der westlichen pannonischen Tiefebene und Nordkroatien zeigen gemeinsame Merkmale, wie die Vorherrschaft von Pfostenbauten (im südöstlichen Alpenraum jedoch bisher ohne Fundamentgräben) sowie regionale Unterschiede. Diese Ergebnisse erweitern das Verständnis der Siedlungsmuster und architektonischen Vielfalt der Lasinja-Kultur.

Schlüsselbegriffe

Frühe Kupferzeit, Lasinja-Kultur, prähistorische Architektur, Pfostenbau, Grubenhäuser, Siedlungsorganisation, Radiokarbondatierung.

1. Introduction

The development during the last third of the 5th millennium BC in the continental regions of present-day Slovenia, Austrian Carinthia and Styria, western Transdanubia and northern Croatia is characterized by short-lived open settlements with distinctive ceramic assemblages. These settlements are collectively attributed to the Balaton-Lasinja Culture, Kanzianiberg-Lasinja Culture, or simply the Lasinja Culture.¹ In Austria and Slovenia, they are dated to the Early Copper Age, whereas in western Hungary and northern Croatia, they correspond to the Middle Copper

1 KALICZ 1973. – DIMITRIJEVIĆ 1979. – RUTTKAY 1994.

Age, between approximately 4350 and 3900 BC in absolute terms.²

More than 250 sites of the Lasinja Culture are currently known. Interestingly, most of the sites have yielded settlement remains, while only a small number have revealed burial evidence (for a map of the sites mentioned in the text, see Fig. 1; for a list of the sites, see Appendix 1). Among the most significant finds are a mass grave from Potočani³ (No. 107⁴), groups of partial human skeletal remains from the Ajdovska jama cave site (No. 59),⁵ three inhumations at the Veszprém-Jutasi út site (No. 213),⁶ one burial at Balatonmagyaród-Homoki-dűlő (No. 263)⁷ and partial skeletal remains of at least twenty individuals from two features at Keszthely-Fenékpuszta (No. 199).⁸

Due to the small number of graves and the unusual nature of these burials, several researchers have proposed different interpretations of mortuary practices in the Lasinja Culture.⁹ According to these studies, both inhumation and cremation of single or multiple individuals are documented, as well as foundation sacrifices, secondary burials of partial human remains or manipulation of human bones – particularly from Keszthely-Fenékpuszta (No. 199)¹⁰ and possibly from other settlements such as Ozalj-Stari grad (No. 85).¹¹

Mortuary practices in the Lasinja Culture of the southeastern Alpine region are similar to those in Transdanubia and northern Croatia. In addition to the Ajdovska jama cave, which yielded partial skeletal remains of at least 31 individuals, a human skull fragment was found in a ceramic bowl of the Lasinja Culture at the site of Bockberg bei Wildon, both of which have been radiocarbon dated (Nos. 59, 241).¹² Human bones have been discovered alongside Copper Age ceramic finds in several other caves, including Ciganska jama

(No. 72),¹³ Levakova jama (No. 66),¹⁴ Lukenjska jama,¹⁵ and Koblarjeva jama;¹⁶ however, these sites have not been fully excavated, and the dating of the human bones remains uninvestigated.

Our understanding of the settlements and material culture of the Lasinja Culture's inhabitants is far more developed. While differences among settlements, particularly in pottery, are evident, it remains to be clarified whether these reflect chronological developments or variations within contemporary regional pottery production.¹⁷ Variations in architecture are also noteworthy. For example, typical Lasinja settlements in Transdanubia, along with contemporaneous sites of the Ludanice group and the Epi-Lengyel horizon in present-day Slovakia, Hungary and Lower Austria, are characterized by a small number of rectangular houses built with posts set in foundation ditches distributed over a larger area.¹⁸ Similar structures have been uncovered at Lasinja settlements in what is now northern Croatia, mostly built parallel to one another in small groups,¹⁹ a pattern absent in the southeastern Alpine region.

At least 77 Lasinja Culture sites are known today from the territory of present-day Slovenia (Nos. 1–77) and 26 from Austrian Styria and Carinthia (Nos. 225–250), the area corresponding broadly to the southeastern Alpine region and to some extent to the westernmost fringes of the Dinaric Mountains and the Pannonian Plain. These sites are predominantly located in lowland areas, often on small elevations (48 sites; Nos. 1–2, 9, 14–18, 20, 22–25, 37–51, etc.), with several situated in caves (seven sites; Nos. 58–59, 66, 72, 80, 81, 84), one identified as a pile-dwelling on the shore of an Alpine lake (No. 248) and others located on hilltops (43 sites; Nos. 3–6, 8, 10–12, 225, 227–234, 236, 237, 247, etc.). Lowland settlements frequently feature pits of various shapes and dimensions, commonly interpreted as the remains of pit houses (large pits) or post-in-ground

2 E.g. BÁNNFY 1995a. – KREEN-LEEB 2006. – VELUŠČEK 2011a. – SRAKA 2014. – ČATAJ 2016. – TIEFENGRABER 2018. – KRAMBERGER et al. 2020, 107.

3 JANKOVIĆ et al. 2017.

4 The numbers in the text refer both to Fig. 1 and Appendix 1.

5 HORVAT 1989. – HORVAT 2009.

6 REGENYE et al. 2022.

7 BÁNNFY 1994.

8 SZÉCSÉNYI-NAGY et al. 2019.

9 E.g. BÁNNFY 1994. – HORVÁTH, SIMON 2003, 109–110. – ZOFFMANN 2005. – REGENYE 2006, 13. – ČATAJ 2018, 31–33.

10 SZÉCSÉNYI-NAGY et al. 2019, 178–181.

11 ČATAJ 2018, 32.

12 BONSALE et al. 2007. – GUTJAHR 2020, 174–175 and Fig. 12, Pl. 3/28.

13 VELUŠČEK 2011b, 34–35.

14 GUŠTIN 1976, 260–263.

15 OSOLE 1983, 7–25.

16 JAMNIK et al. 2002.

17 E.g. RUTTKAY 1994. – VIRÁG 2005, 46. – STRAUB 2006. – ČATAJ 2020, 387–407. – KRAMBERGER 2020a. – KRAMBERGER 2020b.

18 E.g. NÉMETH 1994, 242 and Fig. 5. – VIRÁG 2003. – VIRÁG, BONDÁR 2003. – BARNA, KREITER 2006, 56–57 and Fig. 1/14–15, 17. – VIRÁG, FIGLER 2007. – OROSS et al. 2010, 167–170.

19 E.g. KALAFATÍĆ 2009, 21–22 and Fig. 5. – MINICHREITER, MARKOVIĆ 2011. – MINICHREITER, MARKOVIĆ 2013, 63–64. – ČATAJ 2018. – BALEN 2020, 113–119.

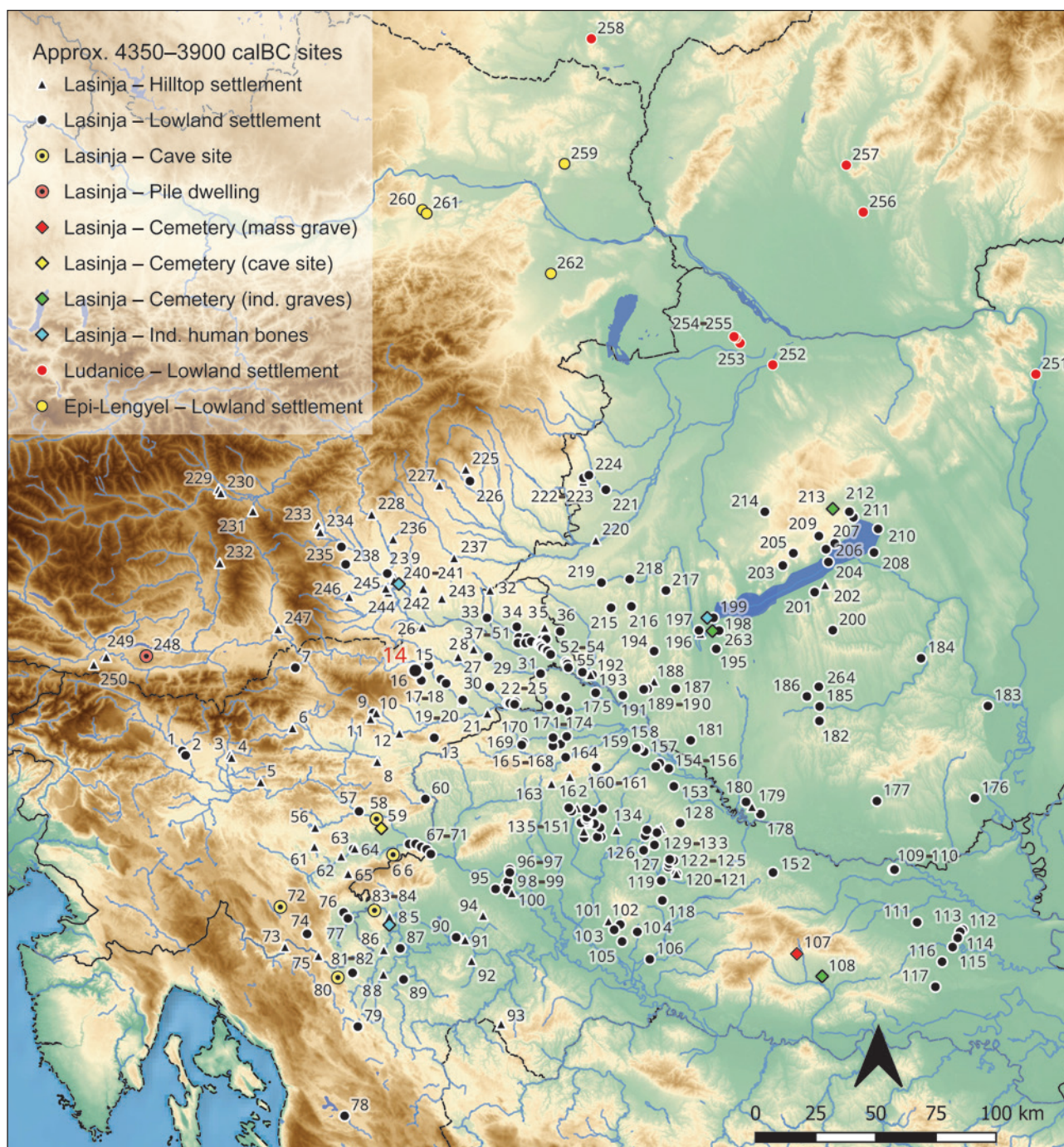


Fig. 1. The Lasinja Culture sites in the southeastern Alpine region, western Hungary and northern Croatia. – For the list of archaeological sites, see Appendix 1 (Graphic: B. Kramberger; basemap: © EEA EU-DM version 1.1, © OpenStreetMap contributors and © eurostat).

structures (clusters of postholes).²⁰ However, these large pits exhibit considerable variability in their form and size, while the ground plans of post-in-ground structures remain

largely unknown.²¹ Notably, at better-preserved settlements in Transdanubia and northern Croatia, clusters of large

²⁰ E.g. PAHIČ 1983, – PLESTENJAK 2010, 32. – ŠAVEL, SANKOVIČ 2011, 28. – ŠAVEL, KARO 2012, 23–29. – TOMAŽ 2012, 25–27, 58, 62.

²¹ Cf. PAHIČ 1983, App. 2–4. – PLESTENJAK 2010, Figs. 20, 21a–c, 22. – ŠAVEL, SANKOVIČ 2011, Figs. 17, 18A–18D, 23. – ŠAVEL, KARO 2012, Figs. 28–30. – TOMAŽ 2012, Figs. 19, 20A–D, 30A–B.

pits are found adjacent to standardized houses constructed with posts set in foundation ditches. These pits are typically interpreted as clay extraction sites, waste disposal areas or structures used for various economic activities.²² This gives rise to certain key research questions: Were pit houses present in the southeastern Alpine settlements attributed to the Lasinja Culture? What architectural forms existed? What was their function? And how were the settlements organized in terms of the use of space?

The settlement at Zgornje Radvanje in Maribor (NE Slovenia, Drava Plain), excavated between 2007 and 2008, provides fresh insights into the architecture and organization of Lasinja Culture settlements in the southeastern Alpine region. Characterized by a circular layout, this site features some well-preserved plans of settlement structures.²³ The distinctive circular layout and architectural features stand out for this time period and region, prompting further examination.

To enhance our understanding of the settlement, we analysed the palaeotopography and re-evaluated the available field documentation for various types of settlement structures, correlating these findings with the radiocarbon dating results²⁴ and statistical comparisons of the composition of ceramic assemblages.²⁵ This dataset served as a starting point to explore the variability of structures in the southeastern Alpine region, investigate the spatial organization of settlements and situate our findings within the broader context of the Early Copper Age Lasinja Culture.

2. The Settlement at Zgornje Radvanje

The Zgornje Radvanje site is situated on the northeastern periphery of the Drava Plain, near the Radvanje stream, at the base of the Pohorje Massif in northeastern Slovenia. It was discovered during the construction of Maribor's western bypass in 2007, with initial excavations conducted in 2007 and 2008 during the construction of a large roundabout (No. 14; Fig. 2). This led to the excavation of approx. 0.42 hectares in the area where the roundabout would later be constructed, carried out in small sections. Further investigations in 2009 and 2010 took place southeast of the roundabout during the construction of two residential buildings,²⁶

and again in 2024 in relation to the construction of Maribor's southern bypass.²⁷ To date, our understanding of the Early Copper Age settlement is based almost exclusively on the area excavated during the 2007–2008 excavation seasons, which remain the only part of the site published in monographic form.²⁸

The Early Copper Age settlement represents the earliest phase of occupation uncovered at the Zgornje Radvanje site during the 2007 and 2008 excavations. Subsequent phases of occupation include the Late Iron Age, the Roman period and the early Middle Ages, though these later phases are represented to a much smaller extent.²⁹ While most of the material culture from this part of the site has been published,³⁰ the stone tools and implements remain an exception. These are particularly noteworthy due to their sheer volume (over 500 kg) and the presence of numerous unfinished polished tools and raw material finds, indicating that stone tool production was a significant activity within the settlement.³¹

Various pits and the remains of constructions belonging to the Early Copper Age settlement were found in the 2007 and 2008 excavation season, distributed in three (or perhaps four) concentric circles around an empty space in the centre. Based on their size, the pits discovered can be categorized into four distinct size groups: large pits (3.7 × 3 m to 7 × 6 m), medium-sized round or oval pits (0.9–2.2 m in diameter), ditches, and small round or oval pits (0.15 × 0.15 m to 0.45 × 0.45 m). In total, around³² 25 large pits, 60 medium-sized pits, 31 ditches, and 350 small pits were identified.³³ Most small pits likely functioned as postholes, indicated by their shape and size, though they rarely contained remains of posts or stabilizing stones. They were either found within or near large pits³⁴ or they were arranged at some distance from them.³⁵

27 Excavations in 2009, 2010, and 2024 were conducted by the company PjP, d.o.o., in the first two years under the direction of Miha Murko and in 2004 under the direction of Primož Predan, while those in 2007 and 2008 were undertaken by the Institute for the Protection of Cultural Heritage of Slovenia, OE Maribor, under the direction of Mira Strmčnik Gulič. The results of the 2024 excavation are still in the initial evaluation phase.

28 KRAMBERGER 2021a.

29 KRAMBERGER 2010, 311. – KRAMBERGER 2014, 241. – KRAMBERGER 2021a, Fig. 10.

30 KRAMBERGER 2021a, 13–91.

31 KRAMBERGER 2015a, 245.

32 Many of the pits extended beyond the excavation area, consequently their dimensions are not known.

33 KRAMBERGER 2021a, 34–35, 134–259.

34 E.g. KRAMBERGER 2021a, 134–135, 140–141, 154, 156, 174–180, 215–216.

35 E.g. KRAMBERGER 2021a, 168–173, 239–242, 244–256.

22 VIRÁG 2003, 380. – VIRÁG, BONDÁR 2003, 127–129. – MINICH-REITER, MARKOVIČ 2013, 34–52.

23 KRAMBERGER 2014, Fig. 15. – KRAMBERGER 2015b, Fig. 1. – KRAMBERGER et al. 2020, Fig. 7. – KRAMBERGER 2021a, Figs. 10, 41a–b.

24 KRAMBERGER 2014, Figs. 22–23. – KRAMBERGER 2021a, Figs. 73–74.

25 KRAMBERGER 2015a, Figs. 15–16.

26 ARH 2012. – MURKO 2012.



Fig. 2. Location of Zgornje Radvanje in Maribor (Graphic: M. Mori; basemap: DMV1 © GURS, Hidrografija © DRSV).

The pottery was mostly found in the fills of various pits, and it closely resembles that from contemporaneous sites in the Podravje, Dravinjske Gorice, Dolenjska and Gorenjska regions, as well as Raababerg in Austrian Styria, both in terms of the ceramic shapes and the decorative motifs, particularly those on pots, pitchers and pintaderas.³⁶ Notably, some pots from Zgornje Radvanje show comparisons to sites in the southeastern Alpine region, which are classified within the Sava group of the Lengyel Culture.³⁷ These vessels likely represent a pottery tradition from the later phase of this culture (Sava group II), which slightly precedes the Lasinja Culture settlement at Zgornje Radvanje,³⁸ although some scholars have proposed that certain features at the settlement may predate the Lasinja Culture.³⁹

2.1. Prehistoric Topography at the Settlement

The area surrounding the settlement is now almost entirely flat, likely due to sediment deposition from torrential flooding after the Early Copper Age and subsequent agricultural activities. However, archaeological excavations indicate that the settlement, characterized by a circular ground plan, originally occupied a more diverse terrain.⁴⁰

For the first time, the Early Copper Age settlement topography at Zgornje Radvanje was analysed using a digital terrain model (DTM) derived from measurements taken

during the excavations, as detailed documentation of the prehistoric topography was not available. The upper and lower boundaries of each stratigraphic unit (SU) were recorded using a total station, capturing their location and elevation above sea level. The measurements of the upper boundaries of Early Copper Age SUs were used to reconstruct a DTM, with the understanding that the preservation of uncovered settlement features and original topography remains uncertain. That is to say, the upper part of the settlement has been eroded and lost due to modern ploughing, and only a few sunken-featured structures remain at the level of the original floors. Consequently, as such, the DTM represents the preserved upper boundary of the Copper Age topography.

Figure 3 illustrates the settlement overlaid on the digital terrain model (DTM) created from the recorded heights of the Early Copper Age stratigraphic units (SUs). The DTM was created using 6334 points from the upper boundaries of the SUs across an excavation area of 4258 m², yielding an average point density of 1.5 points per m². However, the distribution of these points was irregular, prompting the use of Triangulated Irregular Network (TIN) interpolation.⁴¹ This method resulted in a jagged DTM due to the uneven point distribution and low density in certain areas. To enhance readability, we applied bicubic spline interpolation,⁴² which, while sacrificing some accuracy, allowed for a smoother representation of the prehistoric topography.

The reconstructed digital terrain model (DTM) indicates that the settlement at Zgornje Radvanje was likely situated on slightly sloping terrain, with preserved altitudes of the Early Copper Age stratigraphic units (SUs) ranging from 281.932 to 283.617 m asl. Notably, the central part of the settlement, or the first circle, which includes eight structures, is positioned slightly higher than the northern and northeastern areas (Fig. 3/21–22, 31–36). The entire second circle (Fig. 3/6–20, 26–27, 37–38), along with most of the firepits between the first and second circles and between the second and third circles, exhibits a higher elevation, except for Structure 5 (Fig. 3/5), which aligns with the lower terrain. Further pits and a posthole on the westernmost part of the settlement were located on even higher terrain. Only structures 2, 3 and 4 from the third circle of the settlement,

³⁶ KRAMBERGER 2021a, 52–59, 61–63, 78–80.

³⁷ KRAMBERGER 2021a, 55–57 and Fig. 57.

³⁸ KRAMBERGER 2014, 257–260. – KRAMBERGER 2020a, 63–64, 66–76 and Figs. 4, 7, App. 2. – KRAMBERGER 2020b, 87–90. – KRAMBERGER, TOŠKAN, TOLAR 2024. – See also RAVNIK, TICA 2018.

³⁹ HORVAT 2020, 42–44 and Fig. 26a.

⁴⁰ KRAMBERGER 2021a, 13–33.

⁴¹ QGIS Documentation, 3.16, A Gentle Introduction to GIS, Spatial Analysis (Interpolation), https://docs.qgis.org/3.16/en/docs/gentle_gis_introduction/spatial_analysis_interpolation.html (last access 8.6.2025).

⁴² GRASS GIS 7.8.9dev Reference Manual, <https://grass.osgeo.org/grass78/manuals/r.resamp.bspline.html> (last access 8.6.2025).

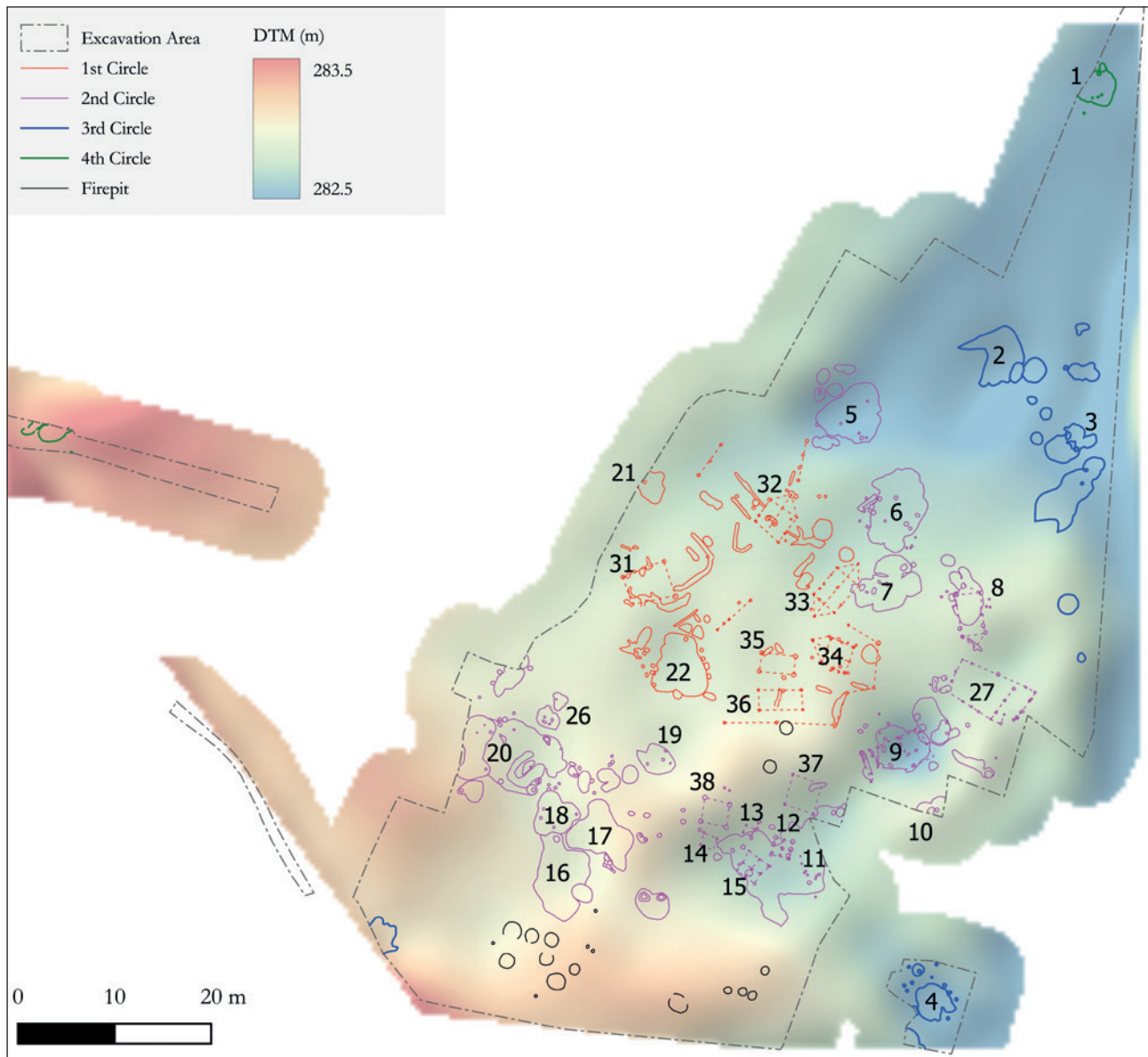


Fig. 3. Ground plan of the Lasinja Culture settlement in Zgornje Radvanje, showing the circular layout, overlaid on a digital terrain model. Settlement features, including structures, are colour-coded by position (Graphic: M. Mori; basemap: derived from excavation measurements; data: adapted from KRAMBERGER 2021, Figs. 10, 41b).

with associated medium-sized and large pits, and sunken-featured Structure 1 lying in the northeasternmost part of the settlement (potential fourth circle) were situated on significantly lower terrain (Fig. 3/1, 2–4).

The arrangement of various sizes and types of pits and structures in a circular layout underscores the importance of the DTM in interpreting the spatial organization of the settlement. Topographical variations may have influenced the placement of pits, postholes, and other features, potentially affecting patterns of activity areas and social interaction. The elevated central and second circles may have functioned as focal points for communal activities, enhancing

both visibility and accessibility. The location of the first two settlement circles on a higher plateau may also have been a practical choice, as this area was elevated above the lower-lying terrain, which may have been wetter and subject to seasonal flooding from a stream that probably flowed near the settlement.

Understanding these topographical nuances is essential, as they provide insights into how prehistoric communities adapted their settlement to the natural landscape. While the DTM is valuable for reconstructing prehistoric topography, it is crucial to recognize that it is based on preserved data; the original landscape may have been more complex.

2.2. Types of Structures and their Distribution within the Settlement

Although the types of structures identified at the Early Copper Age settlement of Zgornje Radvanje have already been analysed and published,⁴³ a detailed re-examination of the field documentation, combined with insights gained from a newly developed digital terrain model (DTM) of the topography and a review of both recent and earlier publications on contemporary sites from the southeastern Alpine region, western Pannonian Plain and northern Croatia, makes a re-assessment of these earlier interpretations necessary.

In describing the settlement features at Zgornje Radvanje, we use the neutral term 'structure' to encompass any built feature. We avoid the term 'house' due to the range of features, which made it difficult to ascertain which structures served as residences and which had other functions. The presence of structures is indicated by the distribution of postholes arranged in rows, either within large pits, around them, in ditches, or separately.

The structures uncovered at the Early Copper Age settlement of Zgornje Radvanje can be broadly classified into two main types: sunken-featured structures (also known as 'pit houses') and post-in-ground structures.⁴⁴ It is important to clarify that in this study, the term 'pit house' does not refer exclusively to an underground dwelling used for shelter or habitation; instead, it denotes any structure with a floor that has been dug into the ground. Several lines of evidence suggest that some of the larger pits at the settlement represent the remains of sunken-featured structures. These include a recurring pattern of pits with similar shapes and sizes, the presence of postholes beneath one or more layers of fill, the discovery of hearths in such pits and the remains of walls, which appear as linear clusters of charcoal, clusters of burnt clay, clay deposits in linear formations or ditches with postholes. By contrast, post-in-ground structures refer to constructions without a sunken floor, in which vertical timbers (or posts) are embedded directly in the ground, supporting the walls and roof of the structure.

A key finding from the research on the Early Copper Age settlement at Zgornje Radvanje is that the various sizes and types of pits were not distributed randomly. At the core of the settlement lies a central area (first circle of the settlement) featuring sunken-featured Structure 22 and post-in-ground structures 31–36, which are not associated with any large pits (Figs. 3/22, 31–36; 4/32–36). This central zone probably also includes a smaller sunken-featured

Structure 21 (Fig. 3/21), along with three rows of postholes and several medium-sized pits and ditches. Additionally, six postholes and a ditch may indicate a fence that separated these structures from the open space between the first and second circles of the settlement (Fig. 3).

In the second circle, a total of 20 structures were identified, mostly related to large pits (Figs. 3/5–20, 26, 27, 37, 38; 5/5–8). Among them is a post-in-ground structure (Fig. 3/27), while seven smaller post-in-ground structures were found within and around one of the largest pits (Fig. 3/11–15, 37, 38), with large pit SU 930 identified as a potential sunken-featured structure (Fig. 3/16) based on the fireplace discovered within it.⁴⁵

The third circle revealed sunken-featured structures 2–4 (Fig. 3/2–4), along with medium-sized and larger pits (e.g. SU 802/803).⁴⁶ The partially explored fourth circle may represent sunken-featured Structure 1 in the extreme north-eastern part of the excavated area, along with smaller pits and a posthole found in the extreme western part of the site (Fig. 3/1).⁴⁷

2.2.1. Sunken-Featured Structures

Eighteen large pits from the Early Copper Age settlement at Zgornje Radvanje were found to contain postholes (Fig. 3/1–10, 16–22, 26),⁴⁸ with some also featuring hearths or fireplaces⁴⁹ and/or remnants of wooden walls.⁵⁰ However, a key finding from the research at Zgornje Radvanje is that not all of these large pits can be classified as sunken-featured structures; in fact today fewer can be reliably defined as such.

The first type of sunken-featured structure is characterized by a trapezoidal pit with the longest sides measuring approx. 6.2–6.5 meters and the third longest spanning between 5.5 and 6 m (Fig. 6/1a–3c). Four pits of this shape and size were identified at Zgornje Radvanje, located in the first, second and third circles of the settlement, indicating that it is a repetitive form (Fig. 3/2, 5, 17, 22). These pits were unevenly sunk into the geological base to a depth of 0.5–1m, and all contained a hearth. A few postholes were found near the edge of the pits, suggesting that the roof structure may have been supported directly on the pit's

⁴³ KRAMBERGER 2021a, 35–51, 134–259.

⁴⁴ KRAMBERGER 2021a, 34–51.

⁴⁵ KRAMBERGER 2021a, 205, SU 1031.

⁴⁶ KRAMBERGER 2021a, 137–149.

⁴⁷ KRAMBERGER 2021a, 134–137.

⁴⁸ KRAMBERGER 2021a, 140–141, 146–148, 161–167, 210–212, 215–216, 227–228, 230.

⁴⁹ KRAMBERGER 2021a, 138, 182–183, 224, 230–235.

⁵⁰ KRAMBERGER 2021a, 134–135, 149–150, 156–157, 160, 174–180, 206–210.



Fig. 4. View from the northwest of the first circle of the settlement during excavation with post-in-ground structures 32–36 and parts of the sunken-featured structures 5, 7, 9 and 22 (Photo: A. Bizjak).

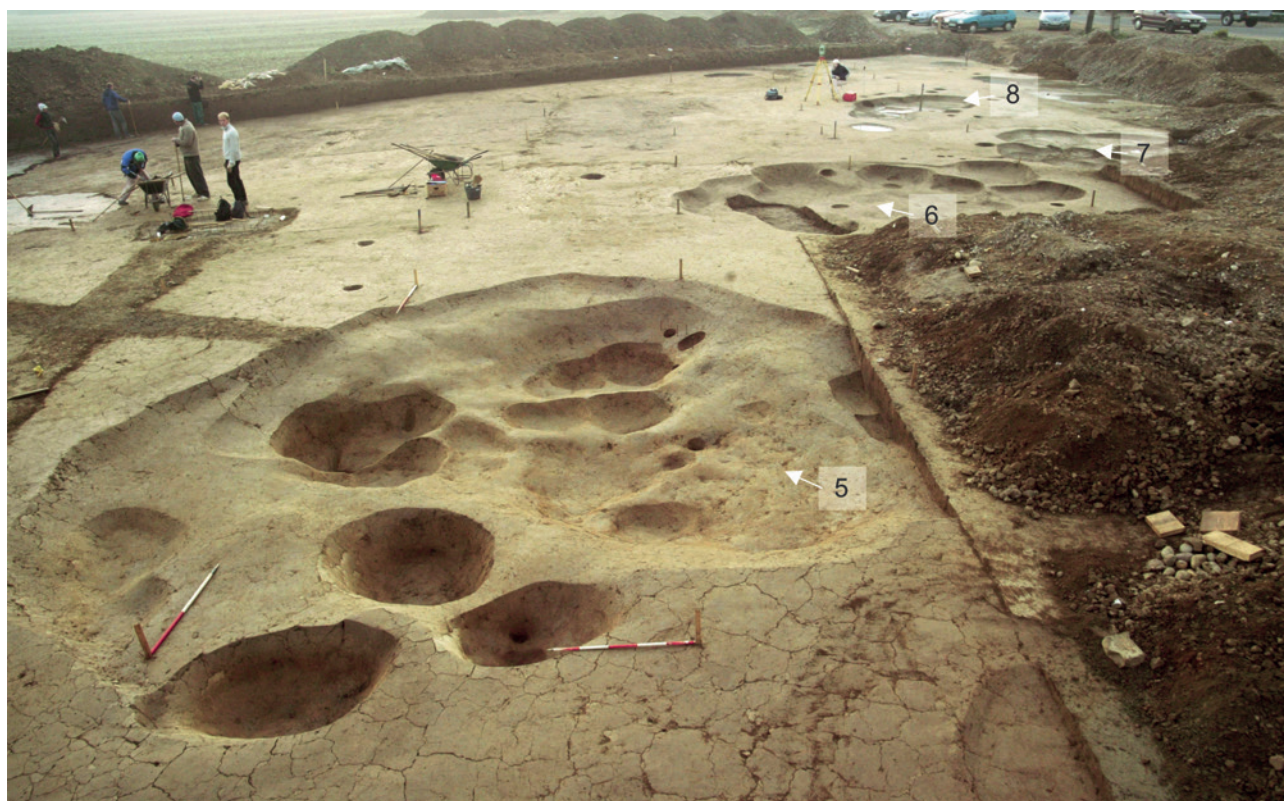


Fig. 5. View from the northwest of the second circle of the settlement during excavation with sunken-featured structures 5–8 (Photo: A. Bizjak).

edge or that the walls were constructed with horizontally laid logs.⁵¹ Notably, two structures provided evidence of wooden parts of constructions and walls. In Structure 5, a linear cluster of charcoal was found between three postholes in the southeastern corner, along with a posthole approx. 4 m away, located near the centre of the southwestern side of the pit (Fig. 6/2b–c). By contrast, Structure 17 featured a ditch with posts at the southwestern corner of the pit, surrounding a linear 20–45 cm-high clay formation at the edge of the pit and two clusters of burnt clay within it (Fig. 6/3a–c).⁵²

In addition to the basic type of sunken-featured structure presented above, which appears multiple times in the settlement, the sunken-featured Structure 9 was found, characterized by a larger number of postholes arranged at short intervals, clearly indicating that the walls were built using the post-in-ground technique (cf. Fig. 6/4a–c). The postholes were primarily positioned along the edge of a large trapezoidal pit, which had steep walls on three sides. On the northern side, the edge of the pit was partly flat. This is the only part where the postholes were not arranged along the pit's steep edge, suggesting a strong connection between the structure and the pit itself. The southern part of the pit is less well preserved, as it was partially intersected by the Late Iron Age pit house (see Fig. 3),⁵³ and the absence of postholes in the southeastern corner may be due to the course of and methodology used during the excavations: the northern half of the pit was excavated in 2007 (Fig. 6/4a), while the southern half (located beneath the modern road) was excavated in 2008, and missing postholes would be expected on the border of excavated areas.

Despite some missing postholes in the southern part, Structure 9 contained several features that provide new insights into the architecture of the Lasinja Culture in the southeastern Alpine region. The structure appears to have been a two-roomed building, with the smaller room located in the northeastern part and separated from the larger space by a partition wall on the southwestern and southeastern sides. Near the southwestern wall of the structure, a ditch with postholes was uncovered, parallel to the shorter side of the house and of equal width, reminiscent of the foundation ditches at the contemporary sites in neighbouring

Hungary⁵⁴ and northern Croatia.⁵⁵ Based on its location, shape, size, orientation and the distribution of postholes, it is likely that this ditch functioned to construct the outer wall of the structure. A small space between the parallel walls may have been part of the entrance construction, potentially serving as a windbreak. Similar ditches were also identified next to other large pits (Fig. 6/3a–3c, 5a–5c, 6a–6c).

The hearth was located at the northeastern corner, outside of the sunken-featured Structure 9, while the roof itself was additionally supported in the central part by two stronger posts than those located in the walls of the house, which is suggested by their size. Additionally, the remains of the wall were presented as two roughly equal rectangular thickening layers of burnt clay – one extending from the northern edge outward from the house, and the other, similarly sized, adjacent to it, extending inward (cf. Fig. 6/4a–4b). Both thickening layers of burnt clay clearly show that the walls of the house were plastered or constructed with clay.

Other large pits in the first, second, third and fourth circles of the settlement at Zgornje Radvanje were mostly without fireplaces or hearths. Some of these were similar in size to the sunken-featured structures described above, while others were smaller. The presence of postholes indicates that structures were associated with at least some of them. This is highly probable, especially for structures 1 (size 3.55 × 3.3 m), 19 (3.4 × 3 m), 18 (4 × 4 m), 3 (size 4.69 × 2.9 m) and 21 (3.2 × 2.7 m), which were the smallest of the sunken-featured structures at the settlement (Fig. 7/1a–1c, 2a–2c, 3a–3c, 4a–4c).⁵⁶ The pit plan was rectangular or trapezoidal with rounded edges (structures 1, 18, 19, 21) or oval (Structure 3), and the pits were between 0.17 and 0.4 m deep. Cultural layers with a high density of charcoal (Structure 1) or burnt clay (structures 21, 3) were discovered in them, or pieces of charcoal and burnt clay were scattered in the fill of the layer. The postholes were found both on the bottom of the pits or at their edge.

Structure 19 also stands out in terms of the type of finds. This structure had an almost rectangular pit, 3.5 × 3.1 m in size and 0.38 m deep. It contained at least twelve weaving weights, indicating that the former building was probably used for weaving.⁵⁷ The postholes discovered at the bottom

⁵¹ KRAMBERGER 2021a, 138 and Figs. 51–52.

⁵² See also KRAMBERGER 2021a, 206–209.

⁵³ KRAMBERGER 2021a, 268–271.

⁵⁴ Cf. NEMÉTH 1994, Figs. 5, 10–12. – VIRÁG, BONDÁR 2003, Figs. 6–11. – VIRÁG, FIGLER 2007, Figs. 1.1, 2, 6–7. – OROSS et al. 2010, Figs. 3–9.

⁵⁵ E.g. KALAFATÍĆ 2009, Fig. 5. – NODILO 2012, 12–13. – MINICH-REITER, MARKOVIĆ 2013, Figs. 35–36, 45–50, 53, 55, etc. – BALEN 2020, Figs. 3–4.

⁵⁶ See also KRAMBERGER 2021a, 227–228, 230.

⁵⁷ KRAMBERGER 2015a.

Larger sunken-featured structures

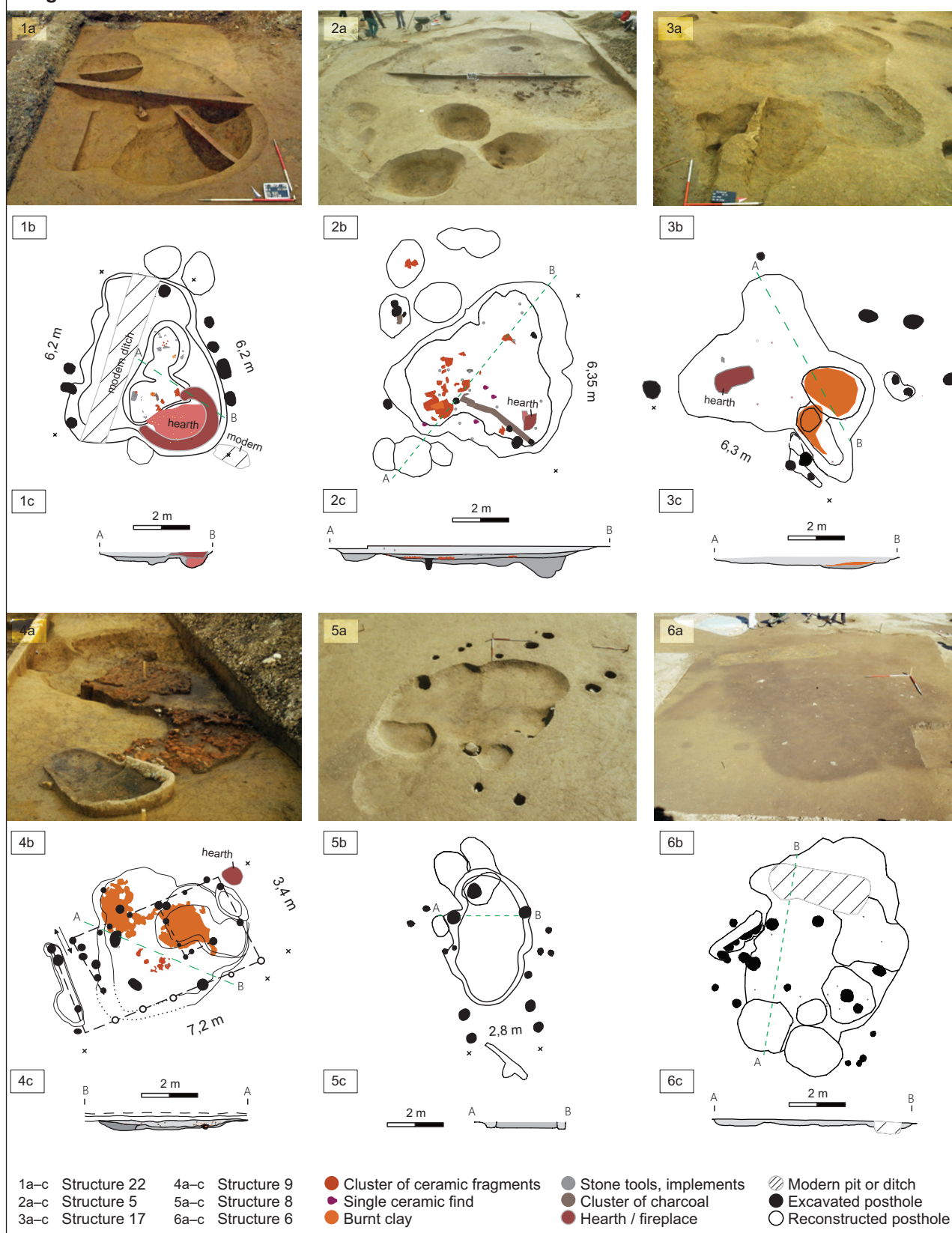


Fig. 6. Larger sunken-featured structures from Zgornje Radvanje (adapted from KRAMBERGER 2021, 149–161, 163–167, 174–180, 206–210, 230–235), scale 1:200.

of the pit and the deep part of the pit may therefore be related to a wooden loom construction (Fig. 7/2a–2c).

2.2.2. Smaller Square Structures within the Large Pit

Particular attention should be directed to a large, irregularly shaped pit (SU 787), measuring 14.1 m in length, up to 7.8 m in width and between 0.31 and 0.62 m in depth (including smaller pits at the bottom) in the excavated section (Fig. 7/5c–5d). This feature contained deposits of burnt clay associated with Early Copper Age artefacts,⁵⁸ a cultural layer rich in numerous Early Copper Age finds⁵⁹ and a significant number of postholes.

Similar large pits with irregular ground plans at Lasinja Culture settlements have sometimes been interpreted as pit houses.⁶⁰ This represents the first documented example within a Lasinja settlement of several small, square-shaped structures with mostly well-defined ground plans positioned side by side, both inside and adjacent to one large pit. All structures had an almost square ground plan, except in the case of Structure 11, for which the ground plan is not clearly discernible. Structure 13 was only 1.17 × 1 m large; the largest structure within the pit, Structure 15, measured 2.54 × 2.65 m. Somewhat larger were the structures northwest of the large pit (Structure 37 was 3.5 × 3.5 m and Structure 38 about 3 × 3 m). Notably, the postholes at the edge of the pit, part of the same structures, were up to 0.3 m higher than those on the bottom of SU 787 but of similar depth. This could indicate that they are the remains of wooden structures on poles, whereby the central postholes found in the middle of two structures (15 and 12) could have additionally supported the wooden floor or roof.

Most of the postholes for structures 11–15 were uncovered beneath compacted layers of burnt clay at the bottom of a single large pit. Only a few were discovered above the cultural layer in which they were dug.⁶¹ These posts were probably a later addition, used to repair structures, and show that the cultural layer situated in the pit SU 787 (SU 786) was deposited during the lifetime of the structures. The presence of charcoal within the postholes, together with compacted layers of burnt clay above them, appears to be associated with the final phase of the structures. Additionally, clusters of burnt clay found above the cultural layer further support the interpretation that clay was employed as a construction material, likely for walls and/or floors.

The discovery of several structures within a single large pit is significant, as it shows that postholes discovered in a specific large pit do not necessarily indicate that this pit functioned as a sunken-featured structure. On the contrary, several different structures may appear within one pit which are not related to the shape of the pit and probably also not to its original function. Why the pit SU 787 was formed is not clear; since it had a clearly irregular ground plan, it could have been a natural depression or a clay extraction pit. However, it is clear that after it was created, the first human activity in it was the erection of wooden structures, which remained in use until the pit was more than half filled with a cultural layer. After that, the structures were burnt down and then covered with the alluvium SU 1180.⁶² Numerous ceramic finds and stone tools found in the cultural layer SU 786 under the deposits of burnt clay (Fig. 7/5a) probably constitute refuse associated with various everyday activities that took place during the life of the structures.

Based on the evidence associated with the large pit SU 787, care must also be taken when interpreting large pits with postholes (e.g. Fig. 6/5a–c, 6a–c). These are not necessarily sunken-featured structures but could also be post-in-ground structures which were built at a later date in the area occupied by large pits.

2.2.3. Post-in-Ground Structures

Structures built with posts and without sunken floors can be defined as post-in-ground structures. At least 14 were found – including the structures 11–15 mentioned above (Fig. 3/31–36, 11–15, 37–38, 27) – but the original number could be higher if we consider the already mentioned problem that some of the structures located in the areas of the large pits could actually be post-in-ground structures and not sunken-featured ones (e.g. Fig. 3/4, 6–8, 10).

Structure 27 in the settlement's second circle stands out among the buildings without sunken floors due to its distinctive design (Figs. 3/27 and 8/1). With a rectangular ground plan, it measured 7.9 m in length, 3.65 m wide on the northwest side, and 4.6 m on the southeast. The structure had a similar ground plan to the neighbouring sunken-featured Structure 9 (Fig. 6/4a–c). It consisted of two rooms: a larger central room (approx. 5.85 × 4.1 m) in the northwest and a smaller room (4.5 × 2 m) in the southeast. The arrangement of postholes at the southeastern corner suggests that the house was probably entered via a smaller room. Two trenches and two postholes were discovered, suggesting a

⁵⁸ KRAMBERGER 2021a, Find nos. 631–640.

⁵⁹ KRAMBERGER 2021a, Find nos. 589–630.

⁶⁰ E.g. MINICHREITER, MARKOVIĆ 2013, 71–78 and Figs. 70–73, 77–78.

⁶¹ E.g. KRAMBERGER 2021a, 189–190, SU 1285/1286.

⁶² KRAMBERGER 2021a, 26, 133, 183–198 and Figs. 10, 22, 30.

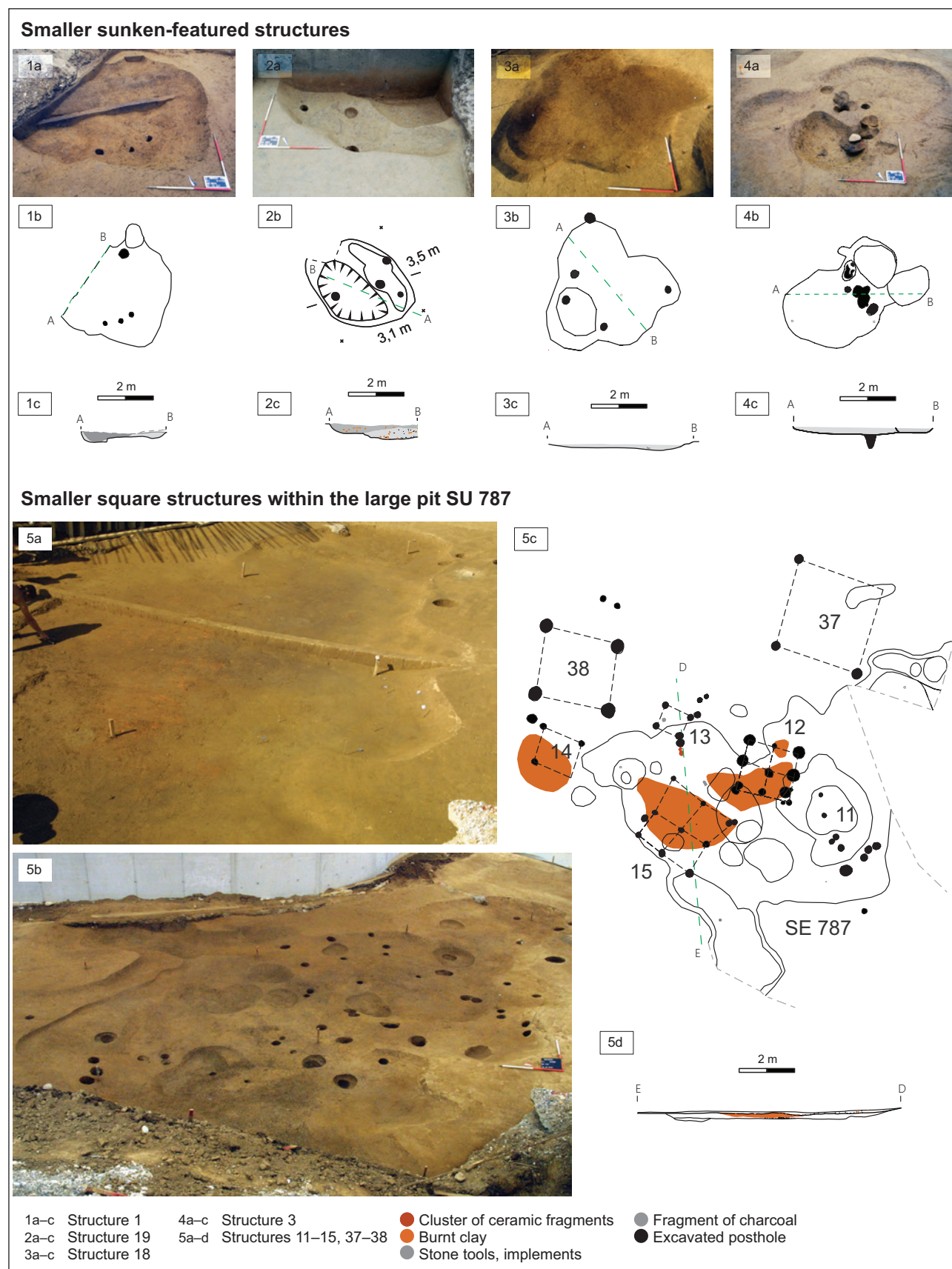


Fig. 7. Smaller sunken-featured structures and smaller square structures from Zgornje Radvanje (adapted from KRAMBERGER 2021, 134–135, 140–141, 183–199, 210–212, 215–216), scale 1:200.

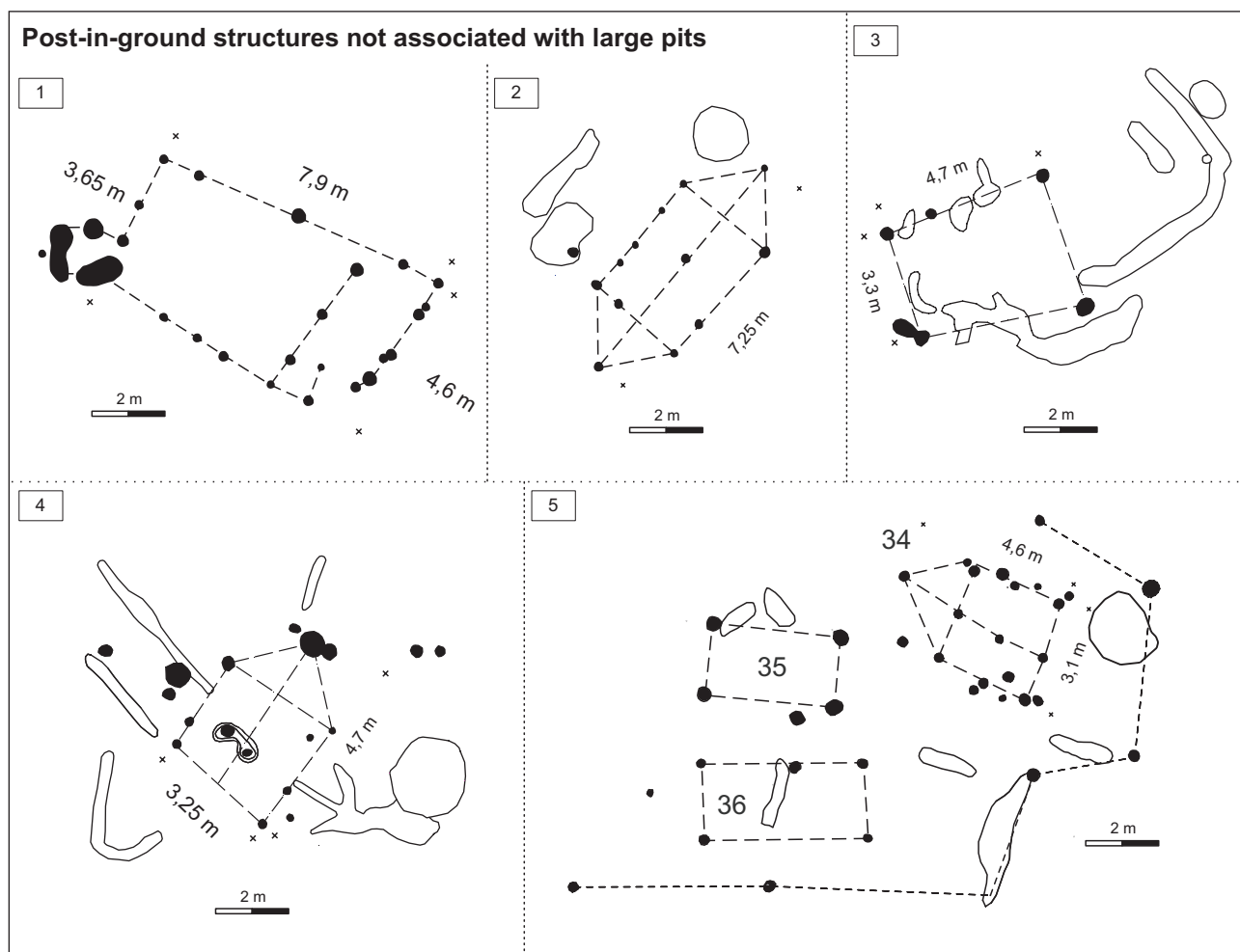


Fig. 8. Post-in-ground structures not associated with large pits from Zgornje Radvanje (adapted from KRAMBERGER 2021, 168, 238, 240, 248, 251), scale 1:200.

rectangular structure measuring 1.3×1.8 m abutting the southwest corner of the building.

In the settlement's first circle, structures exhibited different ground plans: pentagonal (Fig. 3/32, 34) or hexagonal (Fig. 3/33) and rectangular (Fig. 3/31, 35, 36). The hexagonal or pentagonal structure may also have resembled Structure 8 in the second circle, discovered within and near the large pit SU 61 (Figs. 3/8; 6/5a–c).

The pentagonal structures were similar in size, measuring 4.6–4.7 m in length and 2.9–3.35 m in width (Figs. 3/32, 34; 4/32, 34). Structure 31 was comparable in dimensions (4.6–4.8 m long and 3.3–4 m wide; Fig. 3/31), while the hexagonal Structure 33 was longer due to its distinctive shape (Figs. 3/33; 4/33; 8/2–5). These houses likely featured gable roofs, with structures 32, 33 and 34 incorporating additional central supports, as suggested by the distribution of postholes.

Structures 34 and 35–36, located on the southern side of the settlement's first circle, may have been enclosed by a

fence marking the boundary with the second circle (Figs. 3; 8/5). This hypothesis is supported by the presence of evenly spaced postholes and the absence of other postholes in this area. Structures 35 and 36 were relatively small, measuring 4×2.3 m and 4.6×2.2 m, respectively, comparable to structures found in pit SU 787 in the second circle but rectangular (Fig. 3/35–36, 11–15, 37–38).

The first circle of the settlement at Zgornje Radvanje is also distinguished by the presence of numerous ditches (Fig. 3). Unlike those associated with the sunken-featured structures in the second circle of the settlement, these ditches lack evidence of postholes. Some appear to run parallel to post-built houses, suggesting their potential use as clay extraction trenches for construction materials and/or as drainage features (e.g. Figs. 3; 8/2–3, 5). Others may represent remnants of ancillary structures, such as the L-shaped ditch attached to the rectangular post-in-ground structure (Fig. 8/3).

2.3. Results of Radiocarbon Dating

The presence of diverse types of structures within the Early Copper Age settlement, along with their circular arrangement in the space, initially prompted inquiries regarding the chronological relationships among these structures. Due to the absence of preserved cultural layers or the floors in the post-in-ground structures, their dating relied on radiocarbon analysis of charcoal samples recovered from the fill of their postholes. This chapter reviews these radiocarbon dates, which currently constitute the only method for dating the above-ground houses at Zgornje Radvanje. Notably, this study presents the first radiocarbon-dated wooden houses from the Early Copper Age in the southeastern Alpine region on the territory of present-day Slovenia. When combined with radiocarbon dates derived from organic materials in various pits, these results provided a solid base for establishing the settlement's absolute chronology and for understanding the temporal relationships among its types of structures.

Seventeen radiocarbon dates have been obtained and published from a part of the Zgornje Radvanje settlement associated with the Lasinja Culture, excavated in 2007 and 2008 (Tab. 1). Most of the charcoal samples were collected from large pits initially interpreted as sunken-featured structures (structures 1, 4, 5–7, 10, 22). Among these, two structures (structures 5, 22) feature trapezoidal pits and hearths, one (Structure 1) is identified as a small sunken-featured structure, and the remainder may also represent large pits in which post-in-ground structures were built at a later date (structures 4, 6–7, 10).

Additionally, three charcoal samples were retrieved from postholes associated with two distinct types of post-in-ground structures (structures 34, 27). One radiocarbon-dated sample corresponds to a charred bone from a rectangular sunken-featured structure (Structure 9), while another represents a charred seed from a medium-sized pit (SU 1268/1269) identified as belonging to the bean family (Fabaceae; cf. *Pisum*).⁶³ Contexts selected for radiocarbon dating are distributed across different parts of the circular settlement (Fig. 3).

The radiocarbon analysis results revealed a key finding: two dates are unexpectedly old (Fig. 9a). One corresponds to charcoal from the posthole of a post-in-ground structure of pentagonal ground plan (Structure 34), and the other to charred bone from sunken-featured Structure 9. These dates fall well within the first half of the 5th millennium BC,

a period which is associated with the Late Neolithic settlements of the Sava group of the Lengyel Culture and Late Lengyel Culture in the southeastern Alpine region.⁶⁴ However, no artefacts from this time period were identified at Zgornje Radvanje, suggesting that both dates are too early to represent the settlement's occupation. The reasons behind these anomalously old dates remain unclear. It is possible that the charcoal entered the posthole as part of the backfill during a later phase, while in the case of the charred bone, the dating results raise questions about the origin of the carbon used for dating.⁶⁵ Specifically, the bone was found in the cultural layer (SU 468) beneath the remains of sunken-featured Structure 9, in a pit containing a significant number of ceramic fragments attributed exclusively to the Lasinja Culture (Fig. 6/4a–4c).⁶⁶

The analyses revealed that large pits and sunken-featured structures were contemporaneous with post-in-ground structures, with small deviations detectable within the resolution limits of the radiocarbon dating method. The charred seed recovered from pit SU 1268/1269 in the second circle⁶⁷ of the settlement represents the oldest known evidence for dating the settlement. The radiocarbon age of this short-lived botanical material aligns closely with the date of a charcoal sample from another posthole of the above-mentioned pentagonal post-in-ground structure (Structure 34) located in the settlement's first circle. Based on these data, Structure 34 is believed to have been constructed within the time span 4450–4350 calBC. This period corresponds in part to the final phase of the Sava group in the region encompassing modern-day central and southeastern Slovenia⁶⁸ and to the earliest radiocarbon dates from Ptuj-Šolski center in northeastern Slovenia, which are associated with pits containing pottery linked to older ceramic types from Zgornje Radvanje.⁶⁹ It also overlaps with the latest radiocarbon dates for the Late Lengyel Culture in Transdanubia,⁷⁰ as well as the local variant of the Lengyel Culture in Austrian Styria, as demonstrated by numerous radiocarbon-dated animal bones from the Wildon-Schlossberg site.⁷¹ It is

⁶³ KRAMBERGER 2021a, 225–226 and Fig. 41b. – TOLAR 2021, 109–110.

⁶⁴ E.g. GUŠTIN 2005, Fig. 2. – VELUŠČEK 2011a, Tab. 5.1. – REGENYE et al. 2022, Tab. 3. – TOMAŽ 2022, Fig. 13. – KRAMBERGER, TOŠKAN, TOLAR 2024, 355–360 and Figs. 14–17, Tabs. 4–5.

⁶⁵ E.g. ZAZZO et al. 2009. – ZAZZO et al. 2012. – OLSEN et al. 2013.

⁶⁶ KRAMBERGER 2021a, 177.

⁶⁷ KRAMBERGER 2021a, Fig. 41b.

⁶⁸ RAVNIK, TICA 2018, Figs. 123–124. – KRAMBERGER, TOŠKAN, TOLAR 2024, Figs. 16–17.

⁶⁹ KRAMBERGER 2014, Figs. 13–14, Pls. 5–6. – KRAMBERGER 2021a, 55–57 and Fig. 57.

⁷⁰ REGENYE et al. 2022, Tab. 3.

⁷¹ TIEFENGABER 2018, 137–146 and Figs. 180–188.

Lab code	Material	Context	Settlement circle	Age (BP)	SD ($\pm a$)	CalBC (68.2 %)	CalBC (95.4 %)	References
LTL17770A	Charcoal	Struct. 34, SU 392	First	5834	45	4781–4615 BC	4795–4550 BC	KRAMBERGER 2021
LTL17769A	Charcoal	Struct. 34, SU 406	First	5551	45	4444–4350 BC	4492–4331 BC	KRAMBERGER 2021
Beta-305860	Charcoal	Struct. 22, SU 853	First	5350	40	4317–4062 BC	4327–4051 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305859	Charcoal	Struct. 22, SU 820	First	5410	40	4329–4246 BC	4348–4076 BC	KRAMBERGER 2014. – KRAMBERGER 2021
LTL19354A	Charred seed (Fabaceae; cf. <i>Pisum</i>)	Medium-sized pit SU 1268	Second	5633	45	4532–4370 BC	4549–4355 BC	KRAMBERGER 2021
Beta-305853	Charcoal	Struct. 7, SU 20	Second	5450	40	4346–4257 BC	4361–4174 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305855	Charcoal	Struct. 5, SU 324	Second	5370	40	4326–4069 BC	4333–4054 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305856	Charcoal	Struct. 5, SU 330	Second	5420	40	4335–4250 BC	4352–4070 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305854	Charcoal	Struct. 6, SU 250	Second	5360	40	4332–4247 BC	4347–4065 BC	KRAMBERGER 2014. – KRAMBERGER 2021
LTL17772A	Charred bone	Struct. 9, SU 468	Second	5879	45	4797–4702 BC	4881–4612 BC	KRAMBERGER 2021
Beta-305861	Charcoal	Struct. 10, SU 1027	Second	5370	40	4326–4069 BC	4333–4054 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305862	Charcoal	Struct. 10, SU 1039	Second	5190	40	4044–3962 BC	4221–3817 BC	KRAMBERGER 2014. – KRAMBERGER 2021
LTL17765A	Charcoal	Struct. 10, SU 1004	Second	5282	45	4228–4001 BC	4243–3986 BC	KRAMBERGER 2021
LTL17768A	Charcoal	Struct. 27, SU 111	Second	5283	45	4229–4003 BC	4243–3986 BC	KRAMBERGER 2021
Beta-305863	Charcoal	Struct. 4, SU 1102	Third	5430	40	4339–4252 BC	4355–4082 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305857	Charcoal	Struct. 1, SU 623	Fourth	5430	40	4339–4252 BC	4355–4082 BC	KRAMBERGER 2014. – KRAMBERGER 2021
Beta-305858	Charcoal	Struct. 1, SU 625	Fourth	5320	40	4238–4055 BC	4319–4002 BC	KRAMBERGER 2014. – KRAMBERGER 2021

Tab. 1. Zgornje Radvanje, list of ^{14}C AMS-dated samples (cf. Fig. 3). Dates inconsistent with the archaeological data are marked in italics (adapted from KRAMBERGER 2021, Fig. 73).

therefore more likely that the settlement began toward the later part of this interval, between 4400 and 4350 calBC.

The remaining radiocarbon dates from the settlement are derived exclusively from charcoal, which introduces the potential for an old wood effect and therefore less precise dating. Despite this limitation, these dates are slightly younger than those obtained for the charred pea seed and the post-in-ground structure 34, suggesting the possibility that the rectangular post-in-ground structures and sunken-featured structures in the outer circles of the settlement were established later than the pentagonal and hexagonal post-in-ground structures in the first circle.

A single-phase Bayesian model was created (Fig. 9b) to calculate the possible time span of the settlement at Zgornje Radvanje using the span and interval functions in the OxCal v4.4.4. program and an IntCal20 calibration curve.⁷² The single-phase Bayesian model was constructed with the assumption that all dated samples, except for the two

problematic ones (one of the two from Structure 34 and one from Structure 9), pertain to remains of wooden constructions and various settlement activities within the settlement. According to the chronological model, the settlement was established shortly before 4350 calBC (with 68.3 % probability) and was abandoned between the end of the 43rd and the end of the 42nd century BC. With 68.2 % probability, the settlement's duration is estimated to be between 148 and 277 years (span function) or between 170 and 338 years (interval function). This estimate, however, remains provisional and could change if more dates from short-lived materials were available.

3. Architecture and Spatial Organization in Contemporary Lasinja Culture Settlements

The results of the analysis of the architecture and spatial organization of the settlement at Zgornje Radvanje can be now situated within the broader context of Early Copper Age developments in the southeastern Alpine region, the westernmost Dinaric mountain and the western Pannonian Plain. Current research generally agrees that at Lasinja

⁷² REIMER et al. 2020.

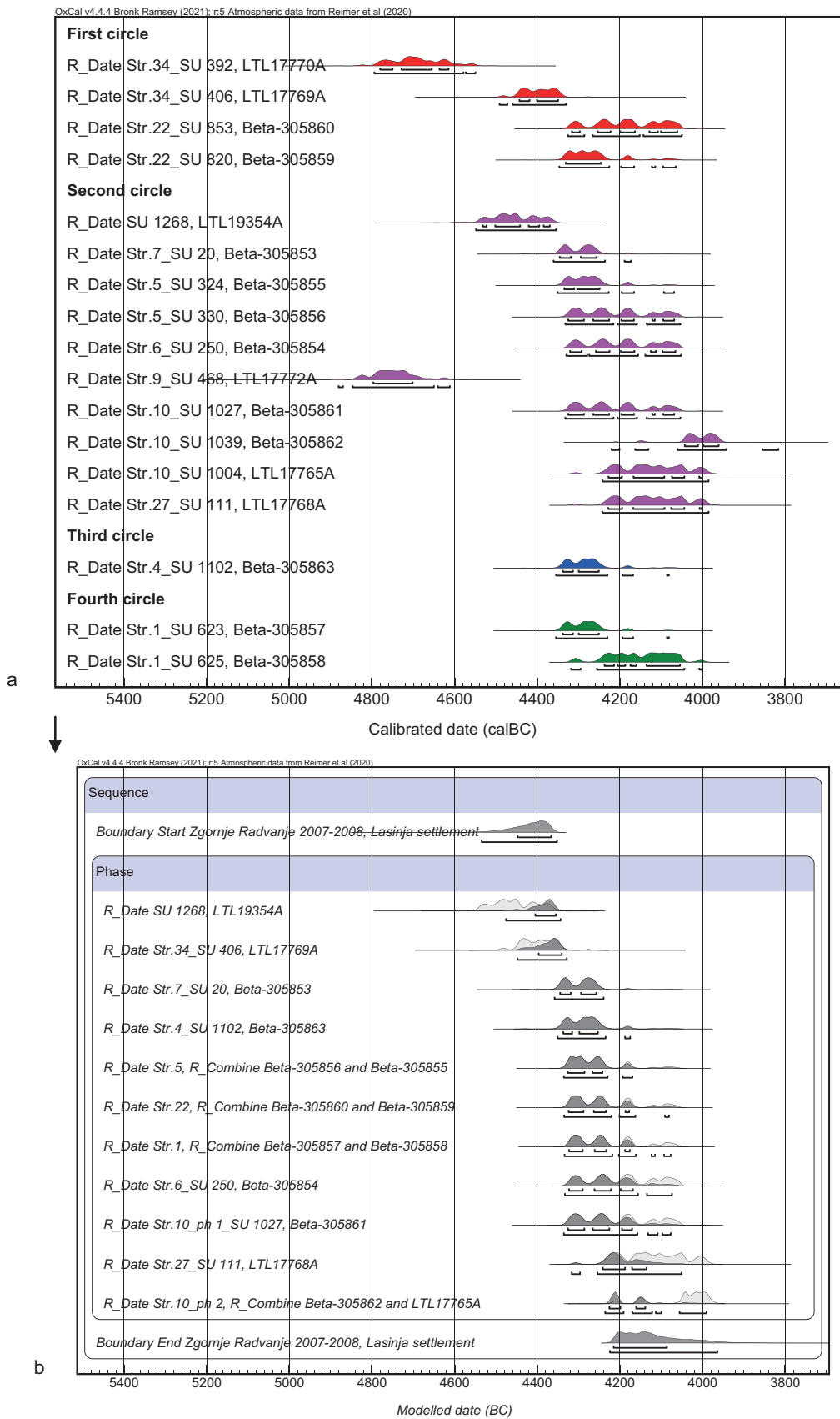


Fig. 9. Plot of radiocarbon dates (a) and single-phase Bayesian model (b) applied to the Lasinja Culture settlement in Zgornje Radvanje (Graphic: B. Kramberger).

settlements, rectangular bipartite structures – comprising a larger northern and a smaller southern room – constructed with posts and foundation ditches were used as houses. Large and medium-sized pits, by contrast, served a variety of non-residential purposes: some may have functioned as auxiliary structures for specific tasks, while others were likely clay extraction pits and/or waste disposal pits.⁷³ At Zgornje Radvanje, a notable feature is the arrangement of structures and pits in concentric circles around an open central space, along with the diversity of structural forms (Figs. 4–8). Predominantly pentagonal or hexagonal post-built structures occupied the settlement's core (Fig. 3/32–34), with smaller square structures (Fig. 3/12–15, 37–38), along with a rectangular double-roomed structure, located in the second circle (Fig. 3/27). Large pits, including sunken-featured ones, were by most distributed across the outer circles, while rounded firepits were located between the first and second, and the third and fourth circles (Fig. 3: firepit). This internal organization is, so far, without direct parallel, though this may simply be a reflection of the current state of research.

As mentioned in the introduction, evidence for the architecture and spatial organization of settlements from the latter half of the 5th millennium BC in the southeastern Alpine region and the westernmost outskirts of the Pannonian Plain – corresponding to present-day Slovenia and Austrian Styria – is relatively sparse. This scarcity is primarily due to the limited scope of excavations and poor preservation conditions, with only a few sites offering detailed insights into settlement layouts. One of the most significant sites is Stoperce in Haloze (No. 13).⁷⁴ Excavations at Stoperce revealed at least four post-in-ground constructions, ranging in size from 6.3 × 4.1 m to 9.7 × 3.8 m, along with three smaller rectangular structures interpreted as auxiliary buildings. Additionally, three storage pits with postholes along their edges and a small sunken-featured structure with associated postholes were uncovered, all dating to this period.⁷⁵ The settlement appears to have been spatially constrained, as it did not extend to the north or south, and expansion to the west was limited by the presence of a steep hill at the edge of the excavated area. This suggests that the settlement comprised a relatively small number of structures.

In contrast to the Zgornje Radvanje site, the post-in-ground structures at Stoperce were consistently arranged

along northwest-southeast and northeast-southwest orientations, with similar distances between them (Fig. 10/2). Notably, structures II and III exhibited ground plans comparable to those of the post-in-ground Structure 27 and the sunken-featured Structure 9 at Zgornje Radvanje. Both included two rooms: a larger main area and a smaller adjoining space near the presumed entrance (Fig. 10/2: II, III; Fig. 11/1–2; cf. Figs. 8/1 and 6/4a–c). Another structure at Stoperce, Structure IV (Fig. 10/2: IV), aligns with structures 32 and 34 from Zgornje Radvanje. These were characterized by a central row of posts, likely supporting a ridge beam (Fig. 8/4–5). Yet due to its position near the edge of the excavation area, the precise shape of Structure IV – whether pentagonal or rectangular – remains uncertain.

The rectangular pit, measuring 3.16 × 2.5 m and 0.3 m deep, of the sunken-featured structure at Stoperce (SU 150) was situated near the above-ground Structure III. Its size and layout are comparable to smaller sunken-featured structures documented at Zgornje Radvanje (cf. Fig. 7/1a–4c).⁷⁶ In this case, the sunken-featured structure differed in that it contained a hearth and exhibited a greater number of postholes. Based on the arrangement of these postholes, it may have been connected to the larger rectangular Structure III (Fig. 10/2).

Further significant findings come from Hardek, near Ormož, approximately 43 km southeast of Zgornje Radvanje, where a complex of post-in-ground structures with square and rectangular layouts was uncovered. These structures were accompanied by hearths both inside and near them, as well as what is likely a double fence (Fig. 10/3; No. 24). The floor plans of structures⁷⁷ have been partially reinterpreted based on results from Zgornje Radvanje, Stoperce and other comparable sites in northern Croatia and western Pannonia, which are discussed below. Notably, this reinterpretation primarily concerns the two larger rectangular structures,⁷⁸ while the double fence has been recognized but not marked.⁷⁹

The post-in-ground structures, oriented northeast-southwest, appear non-contemporaneous at the Hardek site, as overlapping ground plans were observed. Notably, the two large square structures, each measuring approximately 7.5 × 7.5 m, were not contemporaneous (Fig. 10/3: I, V), while the larger rectangular structures

73 VIRÁG 2003, 380. – VIRÁG, BONDÁR 2003, 127–129. – BARNA, KREITER 2006, 61. – OROSS et al. 2010, 381–388. – ČATAJ 2018, 28–30. – REGENYE et al. 2022, 282–283.

74 KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023, Fig. 4.

75 KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023, 88–93.

76 KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023, Fig. 11/Jama SU 150.

77 ŽIŽEK 2006a. – ŽIŽEK 2017, 15–19.

78 Cf. ŽIŽEK 2017, Fig. 18.

79 ŽIŽEK 2006a, 130. – ŽIŽEK 2017, 15.



Fig. 10. Ground plans of the contemporary Lasinja Culture settlements in the southeastern Alpine region and western Pannonian Plain (Graphic: B. Kramberger). – 1. Zalavár-Basasziget (adapted from VIRÁG 2003, Fig. 2). – 2. Stoperce (adapted from KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023, Fig. 4). – 3. Hardek (adapted from ŽIŽEK 2017, 494). – Scale 1:400.

(Fig. 10/3: III, IV) could have been contemporaneous with one of the larger square structures (Fig. 10/3: I). This square structure also had a smaller square structure leaning against its northwest wall (Fig. 10/3: II), suggesting a functional relationship between the two.

In Hardek medium-sized rounded pits and large irregular-shaped pits were mainly scattered around the post-in-ground structures, a pattern also observed at the Sodolek site in the Ščavnica Valley, located on the eastern edge of Slovenske Gorice (No. 29),⁸⁰ and in Obrežje in southeastern Slovenia (No. 71).⁸¹ However, both sites feature fewer large and medium-sized pits, and the dating of the above-ground structures remains unclear.⁸² While no associated finds were recovered at Obrežje, the overlapping floor plans of the post-in-ground structures can generally be attributed to prehistory based on their stratigraphic context. Given their location, these structures may be contemporaneous with the large Lasinja pit, which is the closest feature with identifiable archaeological material within the investigated area.

When examining the forms of post-built structures from the best-preserved Early Copper Age lowland settlements in the southeastern Alpine region (Zgornje Radvanje, Stoperce and Hardek), three basic types of post-in-ground structures can be identified based on the distribution of postholes. These include structures with rectangular, square and hexagonal or pentagonal floor plans. Rectangular structures of various sizes are documented at all three sites: Zgornje Radvanje (Fig. 8/1, 5), Stoperce (Fig. 11/1–2) and Hardek (Fig. 11/3–4). Square floor plan structures are found in both larger and smaller forms at Hardek (Fig. 10/3), and in smaller forms at Zgornje Radvanje (Fig. 7/5c–b), whereas hexagonal and pentagonal floor plans have so far only been documented at Zgornje Radvanje (Fig. 8/2, 4, 5).

As it turns out, structures with hexagonal and pentagonal floor plans are, to date, unique to Zgornje Radvanje, with no parallels known from Lasinja Culture settlements in the western Pannonian Plain or northern Croatia. By contrast, rectangular and square post-in-ground structures can be compared to single-room and bipartite houses built using a combination of foundation ditches and postholes, which are a well-known architectural type at settlements in the western Pannonian Plain. These houses typically exhibit a northwest-southeast alignment and have been dated to the Late Lengyel, Lasinja and Ludanice cultures, with

no significant differences in their architectural sequence.⁸³ Such structures have been documented at several sites associated with the Lasinja and Ludanice cultures in Hungary, including Lébény-Bille-domb (Fig. 11/6; No. 255),⁸⁴ Zalavár-Basasziget (Fig. 10/1: 4–6; No. 196),⁸⁵ Zalaegerszeg-Andráshida, Gébárti-tó II (No. 218),⁸⁶ Győr-Szabadrétdomb (No. 252),⁸⁷ Mosonszentmiklós-Pálmajor (No. 253),⁸⁸ Balatonszárszó-Kis-erdei-dűlő (Fig. 11/7; No. 202)⁸⁹ and Magyaregres (No. 264).⁹⁰ On the other hand, Beketinci-Bentež (Fig. 11/5; No. 114), Tomašanci-Palača (No. 116), Čepinski Martinci-Dubrava (No. 113), Đakovački Selci-Pajtenica (No. 117), Donji Mihaljac-Mlaka (No. 110) and Donji Mihaljac-Đanovci (No. 109) can be mentioned as the most important sites yielding such structures in neighbouring northern Croatia. While some Lasinja houses in Hungary are comparable in size to the rectangular post-in-ground structures in the southeastern Alpine region, many others are notably larger, suggesting that while their ground plan is similar, their dimensions and possibly also their construction methods diverged. Furthermore, it is important to note that, similarly to Hardek (Fig. 10/3; No. 24) and possibly in one or two cases at Zgornje Radvanje (Fig. 8/3, 5; No. 14), some houses featured a fence leaning against the wall on one side or running close to it. Such cases have been discovered at the sites Donji Mihaljac-Mlaka (Fig. 11/8; No. 110), Tomašanci-Palača (Fig. 11/9; No. 116), and Beketinci-Bentež (No. 114),⁹¹ with an example of a double fence being found at Čepinski Martinci-Dubrava (No. 113; cf. Fig. 10/3).⁹²

Additionally, a generally characteristic type of post-in-ground structure at Lasinja Culture settlements is the square ground plan, typically single-roomed. At one of the best-preserved settlements, Zalavár-Basasziget, at least three structures with a rectangular floor plan and three with a square floor plan were discovered (Fig. 10/1: 1–3; No. 196).⁹³ The ground plans partially overlap, suggesting that not all structures were contemporaneous. Between the structures, many medium-sized rounded pits and

⁸⁰ KAVUR, TOMAŽ, MILEUSNIĆ 2006. – KAVUR 2018, 22–24.

⁸¹ MASON, KRAMBERGER 2022, 27–29 and Fig. 15.

⁸² KAVUR 2018, 73–76 and Find nos. 1–4. – KRAMBERGER 2022a, 30–35 and Fig. 16.

⁸³ E.g. PAVÚK 2003, 464–465. – VIRÁG, FIGLER 2007. – OROSS et al. 2010, 385–388. – REGENYE et al. 2022, 283.

⁸⁴ NÉMETH 1994, 242–243.

⁸⁵ VIRÁG 2003, 377–380. – VIRÁG 2005, 61–63.

⁸⁶ BARNA, KREITER 2006, 56–57.

⁸⁷ VIRÁG, FIGLER 2007, 352–354, 348.

⁸⁸ VIRÁG, FIGLER 2007, 357–359.

⁸⁹ OROSS et al. 2010.

⁹⁰ HORNOK, KISS 2017.

⁹¹ MINICHREITER, MARKOVIČ 2013, Figs. 69–70.

⁹² Cf. KALAFATIĆ 2009, Fig. 5.

⁹³ VIRÁG 2003, 377–380. – VIRÁG 2005, 46 and Fig. 1.

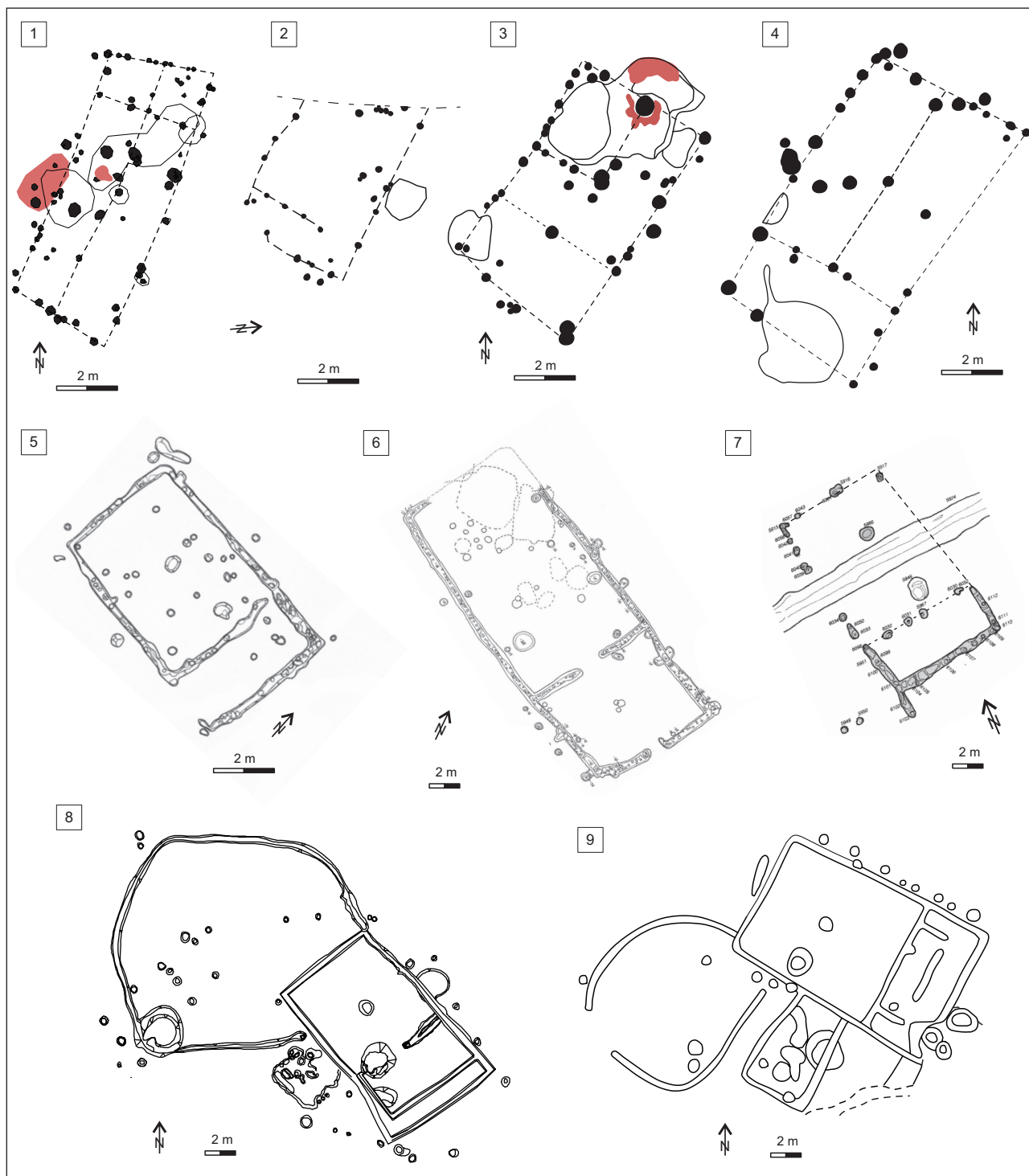


Fig. 11. Ground plans of the rectangular bi-partite post-in-ground structures of Lasinja Culture settlements in the southeastern Alpine region, northern Croatia and western Pannonian Plain (Graphic: B. Kramberger). – 1–2. Stoperce (adapted from KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023, Fig. 4). – 3–4. Hardek (adapted from ŽIŽEK 2017, 494). – 5. Beketinci-Bentež (adapted from MINICHREITER, MARKOVIĆ 2013, Fig. 54). – 6. Lébény-Bille-domb (adapted from NÉMETH 1994, Fig. 12). – 7. Balatonszárszó-Kis-erdei-dűlő (adapted from OROSS et al. 2010, Fig. 7). – 8. Donji Miholjac-Mlaka (adapted from NODILO 2012, 12). – 9. Tomašanci-Palača (adapted from BALEN 2020, Fig. 4). – 1–5. Scale 1:200; 6–9. Scale 1:400.

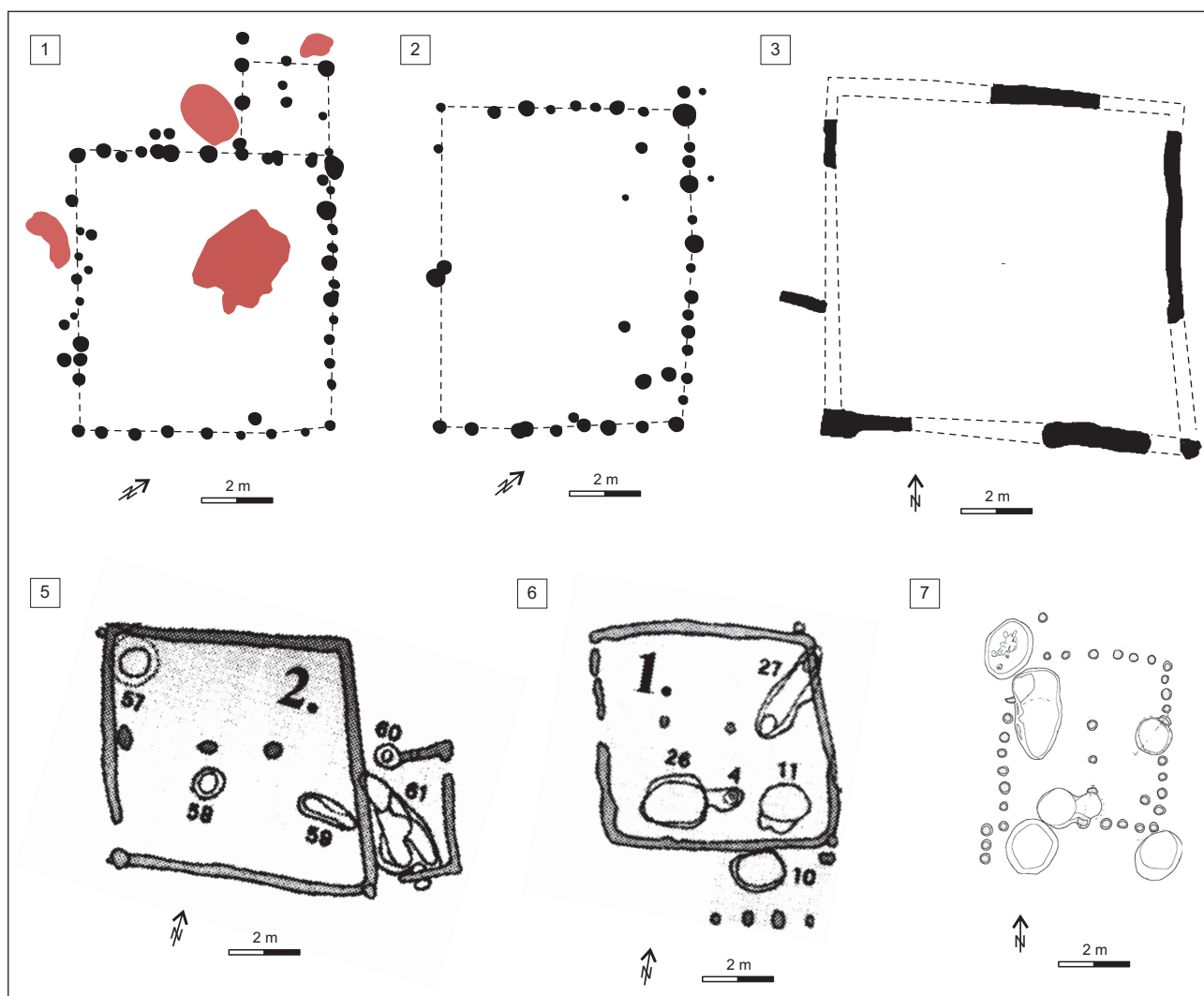


Fig. 12. Ground plans of the square post-in-ground structures of Lasinja Culture settlements in the southeastern Alpine region and the western Pannonian Plain (Graphic: B. Kramberger). – 1–2. Hardek (adapted from ŽIŽEK 2017, 494). – 3. Zalaegerszeg–Andráshida, Gébárti-tó (adapted from BARNA, KREITER 2006, Fig. 15). – 5–6. Zalavár-Basasziget (adapted from VIRÁG 2003, Fig. 2). – 7. Budapest-Nánási út (adapted from VIRÁG 2013, Fig. 17). – Scale 1:200.

some larger, irregularly shaped pits were found, though no sunken-featured structures. All the structures were single-roomed, although two of the three houses with square floor plans had an additional smaller structure attached on the outside against the wall (Fig. 12/5–6), similarly to one of the houses at Hardek (Fig. 12/1). Several such large post-in-ground structures of square ground plan are also known from the site Zalaegerszeg-Andráshida, Gébárti-tó II (Fig. 12/3; No. 218),⁹⁴ and again, contemporary rounded medium-sized pits and large pits of irregular ground plan were located in their vicinity. Another similar

structure of square ground plan can be mentioned from the settlement Budapest-Nánási út (Fig. 12/7; No. 251).⁹⁵ This house, like those at Hardek and Zgornje Radvanje, does not have foundation ditches, while the other houses do.

Large and medium-sized pits found in the vicinity of standardized house types exhibit a variety of shapes. Large pits often have uneven bottoms and irregular outlines, frequently being made up of smaller interconnected pits. Post-holes are rarely found within or near these pits, and their function remains debated. Some are interpreted as waste

⁹⁴ BARNA, KREITER 2006, Figs. 1, 14–15.

⁹⁵ VIRÁG 2013, Figs. 1, 16.

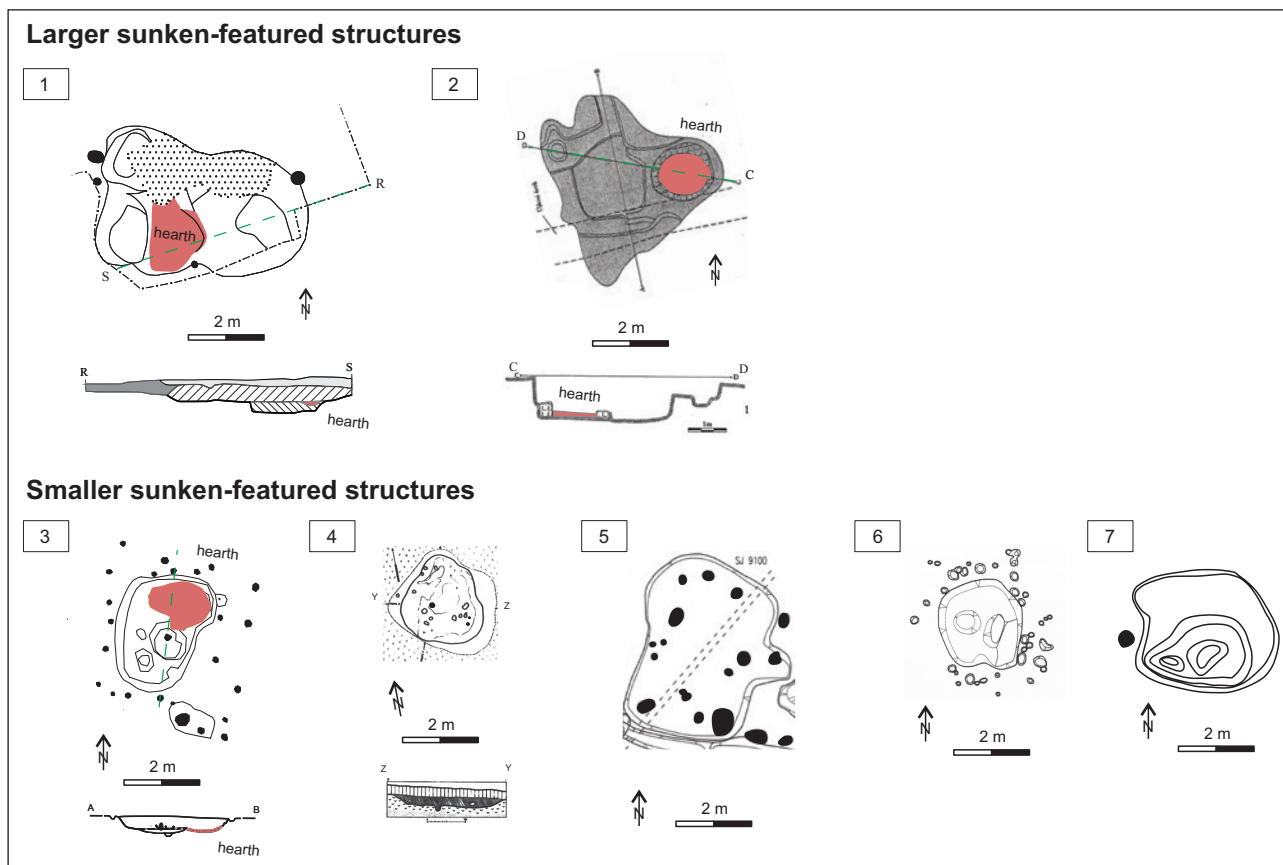


Fig. 13. Ground plans of the sunken-featured structures of Lasinja Culture settlements in the southeastern Alpine region, northern Croatia and western Pannonian Plain (Graphic: B. Kramberger). – 1. Spodnje Hoče (adapted from KRAMBERGER 2020, Fig. 6). – 2. Sormás (STRAUB 2006, Fig. 2/1). – 3. Stoperce (adapted from KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023, Fig. 11). – 4. Zbelovo (adapted from PAHIČ 1983, App. 2). – 5–6. Beketinci-Bentež (adapted from MINICHREITER, MARKOVIĆ 2013, Figs. 24, 67). – 7. Turnišče (TOMAŽ 2012, 62). – Scale 1:200.

disposal areas or clay extraction pits.⁹⁶ However, certain pits display more regular ground plans and cross-sections. For instance, a notable example from Sormás, described as a ‘working pit’, measures 4.9×5.15 m with a trapezoidal floor plan.⁹⁷ This pit featured a posthole in its northwestern corner and an oval hearth (1.6×1.8 m) in its southeastern corner, drawing comparisons to several trapezoidal houses at Radvanje (Fig. 13/2; cf. Fig. 6/1a–3c). A similarly shaped and sized pit with a hearth was also found at Spodnje Hoče, located in the Drava Plain (No. 16). Called ‘Zemljanka III’, it measured 5.5×4.6 m and contained four postholes around the edges of the pit, suggesting a structure related to it (Fig. 13/1).⁹⁸

⁹⁶ VIRÁG 2003, 380. – HORVÁTH, SIMON 2004, 55. – BARNA, KREITER 2006, 61.

⁹⁷ STRAUB 2006, 34.

⁹⁸ STRMČNIK GULIČ 1989. – STRMČNIK GULIČ 1990. – KRAMBERGER 2020b, 107–108 and Fig. 6.

More common at Lasinja settlements are pits with a rectangular ground plan and postholes located on or near their edges, resembling the smaller sunken-featured structures at Zgornje Radvanje. In Dravinjske gorice, near the village of Zbelovo in northeastern Slovenia (No. 12), Stan-ko Pahič documented three pits attributed to the Lasinja Culture during excavations.⁹⁹ Two of the pits were fully excavated, revealing distinct differences in dimensions and form. The smaller feature, ‘seliščni prostor A’ (settlement unit A), was almost rectangular with rounded corners, measuring 2.4×2.8 m and 40–50 cm deep. A smaller pit containing postholes near its centre and edges shows parallels to the smaller sunken-featured structures observed at Zgornje Radvanje (Fig. 13/4; cf. Fig. 7/1a–4c). In addition to the previously mentioned pit SU 150 at Stoperce (Fig. 13/3; No. 13), similar structures can also be found at

⁹⁹ PAHIČ 1983.

the settlement at Beketinci-Bentež (Fig. 13/5–6; No. 114), Tomašanci-Palača (No. 116)¹⁰⁰ and Tornyiszentmiklós (No. 193) in westernmost Transdanubia.¹⁰¹ For the latter site, it has been suggested that it may represent a temporary settlement due to the absence of houses with foundation ditches; the sole structure identified is the aforementioned sunken-featured structure, which has been interpreted as a dwelling.¹⁰²

Architectural remains attributed to the Lasinja Culture have also been documented in settlements across the Pomurje region, the northeastern part of present-day Slovenia. However, due to intensive ploughing over the last few centuries, the ground plans of houses are often only fragmentarily preserved. At Šafarsko near Ljutomer (No. 31), for example, excavations within a 24 × 28 m area revealed over 60 postholes clustered around small pits and hearths.¹⁰³ At other sites in Prekmurje, including Bukovnica (No. 35),¹⁰⁴ Pri Muri pri Lendavi (No. 53),¹⁰⁵ Popava pri Lipovcih 1 (No. 40),¹⁰⁶ Turnišče (No. 45),¹⁰⁷ Kalinovnjek pri Turnišču (No. 46),¹⁰⁸ Zagonce (No. 44)¹⁰⁹ and Ivankovci pri Lendavi (No. 54),¹¹⁰ large and medium-sized pits were uncovered in proximity to groups of postholes. These features, interpreted as remains of pit houses, were predominantly irregular or oval in shape, mostly lacking postholes or hearths.

Notable exceptions exist, such as at Turnišče, where a rectangular pit (PO 24), measuring 4.2 × 3.69 m and featuring a single posthole along its edge, was identified (Fig. 13/7).¹¹¹ This feature is comparable to smaller sunken-featured structures observed at Zgornje Radvanje (Fig. 7/1b–4c), Zbelovo (Fig. 13/4), Beketinci-Bentež (Fig. 13/5–6), Stoperce (Fig. 13/3) and other sites mentioned earlier, suggesting their use within certain Lasinja Culture settlements.

4. Discussion

The Lasinja Culture of the Early Copper Age in the southeastern Alpine region is primarily represented by lowland settlements, although hilltop sites and cave sites are also

common, with one notable site being a pile-dwelling. Most settlements are located on slightly elevated terrain in the lowlands of northeastern Slovenia, at the edges of the plains surrounding the Drava and Mura rivers (Fig. 1). Despite the generally poor preservation conditions across many sites, which limits our ability to fully reconstruct settlement organization, a few well-preserved examples offer valuable insights into the architecture and spatial arrangements of these lowland settlements dating to the last third of the 5th millennium BC.

There is significant variation among the settlements, both in their spatial organization and in the architectural forms discovered. Two main types of structures are present: sunken-featured structures and post-in-ground structures without sunken floors. Not all settlements, though, feature both types of structures. For example, at Hardek (Fig. 10/3) only a small group of parallel non-contemporaneous post-in-ground structures was found (without sunken-featured structures) – along with medium-sized pits of oval or rounded ground plan and large pits of irregular ground plan, a pattern that is comparable to contemporaneous settlements in Hungary (cf. Fig. 10/1).¹¹² This suggests that these settlements were composed of a small number of structures that were not in use at the same time. A notable feature at Hardek was a double fence, likely associated with a large rectangular above-ground structure, which is also seen in contemporaneous settlements in northern Croatia¹¹³ and western Transdanubia.¹¹⁴

By contrast, at the settlement of Stoperce in Haloze, post-in-ground structures of varying sizes were accompanied by medium-sized pits, some of which are likely to have served as storage features, as they were surrounded by postholes – probably the remains of small wooden constructions that once covered the pits. Additionally, at least one nearly rectangular sunken-featured structure was uncovered (Fig. 10/2).

The settlement at Zgornje Radvanje, on the other hand, stands out due to its more sophisticated layout (Fig. 3). Both post-in-ground and sunken-featured structures were discovered, along with several medium-sized rounded pits and large irregularly shaped pits. These features were arranged in concentric circles, with the central circle either left open or partly surrounded by a fence. This arrangement may have been influenced by the natural terrain, as the central part of the settlement is situated slightly higher (about 0.5 m) than

¹⁰⁰ BALEN 2020, 7.

¹⁰¹ BARNA 2003, Figs. 2–3.

¹⁰² BARNA 2003, 52.

¹⁰³ ŠAVEL 1984, 41–49. – ŠAVEL 1994, 31–33 and App. 7.

¹⁰⁴ ŠAVEL 1992, 57–59 and App. 3. – ŠAVEL 1994, 39–43 and App. 17.

¹⁰⁵ ŠAVEL, SANKOVIČ 2011, 28–29, 69–70, 72, 76–77.

¹⁰⁶ ŠAVEL, KARO 2012, 23–29.

¹⁰⁷ TOMAŽ 2012, 25–27, 58, 62.

¹⁰⁸ KERMAN 2013, 23–25.

¹⁰⁹ KAVUR 2006, 109–110.

¹¹⁰ TUŠEK, KAVUR 2011, 15, 28–29, 120.

¹¹¹ TOMAŽ 2012, 57–63.

¹¹² VIRÁG 2003, Fig. 2. – BARNA, KREITER 2006, Fig. 1.

¹¹³ KALAFATIĆ 2009, Fig. 5.

¹¹⁴ HORNOK, KISS 2017, Figs 1–2.

the structures in the outer circles. The distribution of settlement features appears to have been deliberate, suggesting a more organized settlement plan.

At the settlements from the last third of the 5th millennium BC in the southeastern Alpine region, post-in-ground structures were the most common. These structures typically had rectangular or square floor plans, with the exception of the pentagonal and hexagonal floor plans found only at Zgornje Radvanje. The rectangular post-in-ground structures generally yielded one or two rooms and are comparable to contemporary houses in the western Panonian plain, though the rectangular structures in the southeastern Alpine region do not display preserved foundation ditches (compare Fig. 11/1–4 with Fig. 11/5–9). These structures vary in size, with larger examples ranging from 7.9 × 4.6 m to 10.2 × 5.6 m, while smaller ones measure between 1.9 × 1.3 m and 4.6 × 2.2 m.

Square post-in-ground structures, present at both Hardek and Zgornje Radvanje, also show variation in size. At Hardek, these structures are approximately 7.5 × 7.5 m and include a smaller room attached to the outer wall (Fig. 12/1), comparable to similar structures in southwest Transdanubia (Fig. 12/5–6). At Zgornje Radvanje, these square structures are smaller, measuring between 1.17 × 1 m and 3.5 × 3.5 m (Fig. 7/5a–5d). A particularly important discovery was the multiple square structures located within a large pit at Zgornje Radvanje (Fig. 7/5a–5d), suggesting that in some cases postholes found within the large pits may not have been related to the original formation of the pits but could be connected to subsequent activities.

When it comes to sunken-featured structures, large pits often exhibit certain common features. These structures generally have a regular, angular shape, often with a hearth in one corner, postholes along the edges, and sometimes remnants of walls (e.g. structures 5, 9 and 17 at Zgornje Radvanje). Based on their shape and other features, these structures can be classified into three types: 1) large trapezoidal pits with hearths and a few postholes (Fig. 6/1a–3c), 2) large rectangular pits densely packed with postholes (Fig. 6/4a–4c), and 3) smaller rectangular or trapezoidal pits with postholes along the edges (Fig. 7/1a–4c). Structure 9 at Zgornje Radvanje is the best-preserved example, with plastered or clay-built walls and two rooms, one sunk deeper into the ground than the other (Fig. 6/4a–4c). This structure may resemble a similar form found in Hardek (Fig. 11/3), although in the Hardek structure only the smaller room was sunk into the ground.

The function of the different types of structures in the southeastern Alpine region can be inferred from the overall settlement organization. Larger post-in-ground structures,

similar to those with foundation ditches found at contemporary sites in Hungary and northern Croatia, probably served as residential buildings.¹¹⁵ Smaller and larger sunken-featured structures, along with large irregular and medium-sized rounded pits, appear to have had auxiliary functions. At Zgornje Radvanje, the settlement's layout suggests a clear division of space (Fig. 3), with different types of structures serving distinct purposes.

The absence of preserved house floors complicates our understanding of the specific functions of the pentagonal, hexagonal and different rooms of two-room rectangular post-in-ground structures. However, sunken-featured structures, particularly those of a trapezoidal shape, appear to have been associated with food preparation, as evidenced by the presence of hearths. The ceramic assemblages from these structures are standardized, further supporting this interpretation.¹¹⁶ Conversely, large irregular pits and smaller sunken-featured structures, such as those found in Zgornje Radvanje, lack standardized ceramic assemblages, suggesting that these features may have served other functions.¹¹⁷ Large irregular pits may be related to clay extraction and waste disposal, and in some cases, they could even have formed naturally.¹¹⁸ A more comprehensive analysis of stone tools from Zgornje Radvanje, which has yet to be completed, may provide additional clarity regarding the functions of various types of sunken-featured structures and pits.

Another factor that must be taken into account when interpreting different types of settlement structures is the chronological factor. Radiocarbon dating results from Zgornje Radvanje provide a clearer timeline for the settlement's development (Tab. 1; Fig. 9). The structure with a pentagonal floor plan in the first circle of the settlement appears to be the earliest, followed by the two-room rectangular post-in-ground structure in the second circle. The radiocarbon dates of samples of charcoal from sunken-featured structures in the first and second circle, as well as a sunken-featured structure in the northernmost part of the

¹¹⁵ VIRÁG 2003.

¹¹⁶ KRAMBERGER 2015a, 243, 245 and Fig. 15.

¹¹⁷ KRAMBERGER 2015a, 243, 245 and Fig. 16.

¹¹⁸ As an example, courtyard 3 in front of houses 4 and 5 at the Beketinci-Bentež site (MINICHREITER, MARKOVIĆ 2013, 65–71 and Figs. 59, 69) was surrounded by a fence, a feature also observed at several other Lasinja sites (e.g. Figs. 10/3; 11/8, 9). However, in other cases, such courtyards are not sunken. It seems unlikely that such a large area would have been excavated solely for a yard. Perhaps the enclosure was used for livestock, and the large pit-like depression formed over time due to continuous animal trampling and ground compaction.

settlement, show overlap. These dates are also similar to radiocarbon dates from Lasinja sites in Croatia. In contrast, the dates of the pentagonal structures and charred *Pisum* seed are among the oldest known so far for the Lasinja Culture.¹¹⁹ This indicates that the pentagonal and hexagonal post-in-ground structures, currently attested only at the site of Zgornje Radvanje, may predate the more widely distributed two-room rectangular post-in-ground structures.

5. Conclusion

The study of Lasinja Culture settlements in the southeastern Alpine region during the Early Copper Age highlights significant diversity in settlement patterns, architectural forms, and spatial organization, despite the challenges posed by poor preservation.

The predominance of post-in-ground structures and the presence of diverse sunken-featured structures underline regional practices in the spatial organization of settlements. Rectangular and square floor plans dominate, but the pentagonal and hexagonal ground plans identified at Zgornje Radvanje point to specific local characteristics within this broader cultural horizon. Differences in the size and form of structures, coupled with the concentric spatial organization observed at Zgornje Radvanje, suggest a degree of functional differentiation within some settlements that remains underexplored.

Comparative analysis with contemporary sites in the western Pannonian Plain and northern Croatia highlights both shared elements and localized specifics. While certain architectural features align with broader traditions, such as two-room rectangular structures, specific local features – like their smaller dimensions and lack of foundation ditches – mark the southeastern Alpine region as distinct. These findings point to dynamic interactions between communities while underscoring the region's unique contributions to Early Copper Age settlement practices.

The role of sunken-featured structures within Lasinja Culture settlements is better understood, with their multifunctionality – spanning shelter, workshop, storage and food preparation – supported by ceramic assemblages and hearth features. However, incomplete artefact analyses and the absence of preserved floors in post-in-ground structures continue to constrain interpretations of settlement use and organization.

In conclusion, Lasinja Culture settlements in the southeastern Alpine region reveal a complex picture, inviting further detailed investigation. Future research focusing on underexplored material categories, including systematic analyses of stone tools, radiocarbon dating of short-lived materials from varied contexts, and geophysical prospection, promises to provide critical insights into the settlements of these communities and their lifeways during the Early Copper Age.

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¹¹⁹ KRAMBERGER 2014, Fig. 36. – SRAKA 2014, App. – ČATAJ 2020, Tab. 5. – REGENYE et al. 2022, Tabs. 1–2. – KRAMBERGER, TOŠKAN, TOLAR 2024, Figs. 16–17.

Appendix 1: List of archaeological sites dated to between c. 4350 and 3900 BC

This list includes sites of the Lasiinja Culture in the southeastern Alpine region, western Hungary and northern Croatia, presented holistically based on the author's review of the literature. Sites of the Ludanice group and the Epi-Lengyel horizon in Lower Austria, Slovakia, and Hungary are limited to those with the most significant architectural remains. The literature references are restricted to those used for mapping. Coordinates are provided using the EPSG 3912 coordinate system.

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
1	450679	121592	Kranj-Trubarjev trg	Lowland settlement	Lasiinja	YES	Large pit	DOLINAR 2016
2	452012	119778	Drulovka-Na Špiku	Lowland settlement	Lasiinja	/	/	KOROŠEC 1960
3	470387	120116	Kamniki-Mali grad	Hilltop settlement	Lasiinja	/	/	SAGADIN 2005
4	471098	118911	Kamniki-Kratna	Hilltop settlement	Lasiinja	/	/	VELUŠEK 2005
5	483193	108723	Dešen-Gradišče	Hilltop settlement	Lasiinja	YES	/	PAVLIN, DULAR 2007
6	496834	130643	Nazarje-Gradišče	Hilltop settlement	Lasiinja	/	/	unpublished
7	497999	155703	Ravne na Koroškem-Javornik	Lowland settlement	Lasiinja	/	/	unpublished
8	531702	117179	Rifnik	Hilltop settlement	Lasiinja	/	Posthole	BOLTA 1963
9	530063	137416	Zreče	Lowland settlement	Lasiinja	/	/	PAHIČ 1955
10	531313	137416	Brezje-Podraškova domačija, Zimrajhovi	Hilltop settlement	Lasiinja	/	Large pits, medium-sized pits	PAHIČ 1956. – KRAMBERGER 2018
11	529235	134488	Bukovlje-Nad Štrklo	Hilltop settlement	Lasiinja	/	/	unpublished
12	540910	128961	Zbelovo	Hilltop settlement	Lasiinja	/	Large pits; sunken-featured structure	PAHIČ 1983
13	555383	127067	Stoperce	Lowland settlement	Lasiinja	YES	Large pits, medium-sized pits, postholes; post-in-ground structures, sunken-featured structures	KRAMBERGER, LUBŠINA TUŠEK, TOLAR 2023
14	547538	155027	Zgornje Radvanje	Lowland settlement	Lasiinja	YES	Large pits, medium-sized pits, postholes	KRAMBERGER 2021a
15	553094	157208	Malečnik	Lowland settlement	Lasiinja	YES	Large pits, medium-sized pits, postholes	KRAMBERGER 2021b
16	549997	150906	Spodnje Hoče	Lowland settlement	Lasiinja	/	Large pits, postholes	STRMČNIK GULIČ 1989. – STRMČNIK GULIČ 1990. – KRAMBERGER 2020b
17	558151	151421	Spodnji Duplek	Lowland settlement	Lasiinja	/	Large pit	PAHIČ 1976
18	560314	149683	Vumpah	Lowland settlement	Lasiinja	/	/	PAHIČ 1976
19	567133	142225	Pruijski grad-Turnirski prostor	Hilltop settlement	Lasiinja	/	/	KOROŠEC 1965
20	567230	142728	Pruijski center	Lowland settlement	Lasiinja	YES	Large pits, postholes	KRAMBERGER 2014
21	577526	137248	Grad Borl	Hilltop settlement	Lasiinja	YES	Ditch	KRAMBERGER 2022b
22	586310	141055	Mihovci	Lowland settlement	Lasiinja	/	Large pits	PAHIČ 1973
23	587189	140929	Hajndl	Lowland settlement	Lasiinja	/	Large pits	ŽIŽEK 2006b
24	589380	141950	Hardek	Lowland settlement	Lasiinja	YES	Large pits, medium-sized pits, postholes	ŽIŽEK 2006a. – ŽIŽEK 2017

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
25	588803	140988	Ormož-Škoršičev vrt	Lowland settlement	Lasinja	/	Large pit	TOMANIČ-JEVREMOV, TOMAŽ, KAVUR 2006
26	550427	173007	Ceršak-Novine	Hilltop settlement	Lasinja	YES	Posthole	VINAZZA et al. 2015
27	565363	160761	Spodnji Porčič	Hilltop settlement	Lasinja	/	/	PAHČ 1976
28	572135	163483	Negova-Castle	Hilltop settlement	Lasinja	/	/	unpublished
29	577806	160687	Sodolek	Lowland settlement	Lasinja	YES	Large pits, medium-sized pits, postholes; post-in-ground structures	KAVUR, TOMAŽ, MILEUSNIĆ 2006. – KAVUR 2018
30	578433	148171	Bratislavci	Lowland settlement	Lasinja	/	/	LUBŠINA TUŠEK 1991
31	599593	153752	Šafarsko	Lowland settlement	Lasinja	/	Ditch, large pits, medium-sized pits, postholes	ŠAVEL 1984. – ŠAVEL 1994
32	578609	188404	Sotinjski breg	Hilltop settlement	Lasinja	/	Large pits, postholes	unpublished
33	577356	176895	Korovci	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
34	589709	173209	Puconci	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
35	601294	172911	Bukovnica	Hilltop settlement	Lasinja	YES	Large pits, medium-sized pits, postholes	ŠAVEL 1994
36	607792	171260	Kobilje	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
37	590577	168799	Murska Sobota-Na Plesi	Lowland settlement	Lasinja	YES	/	SANKOVIČ 2020
38	590180	166439	Murska Sobota-Nova tabla	Lowland settlement	Lasinja	/	Medium-sized pits	GUŠTIN et al. 2017
39	594183	168670	Mlajtinci	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
40	593404	166463	Popava pri Lipovcih 1	Lowland settlement	Lasinja	YES	Large pits, postholes	ŠAVEL, KARO 2012
41	595742	167116	Gančani	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
42	600022	167892	Filovci	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
43	601902	168077	Dobrovnik	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
44	598808	165855	Zagonce	Lowland settlement	Lasinja	/	Large pits, medium-sized pits	KAVUR 2006
45	598956	165941	Turnišče	Lowland settlement	Lasinja	YES	Medium-sized pits, postholes	TOMAŽ 2012
46	599354	165544	Kalinovnjek pri Turnišču	Lowland settlement	Lasinja	YES	Medium-sized pits	KERMAN 2013
47	599754	165163	Gorice pri Turnišču	Lowland settlement	Lasinja	YES	Medium-sized pits, postholes	PLESTENJAK 2010
48	600491	164297	Brezje pri Turnišču	Lowland settlement	Lasinja	/	Medium-sized pits, postholes	NOVŠAK, TOMAŽ, PLESTENJAK 2013
49	602330	162818	Gomilica-Peščare	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
50	602867	162783	Nedelica pri Turnišču	Lowland settlement	Lasinja	/	/	ŠAVEL, SANKOVIČ 2013
51	603776	161733	Brezovica pri Mali Polani	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
52	610201	158591	Lendava-Kapitan domb	Lowland settlement	Lasinja	/	/	ŠAVEL 1994
53	610892	156153	Pri Muri pri Lendavi	Lowland settlement	Lasinja	YES	Large pits, medium-sized pits, postholes	ŠAVEL, SANKOVIČ 2011
54	611152	156216	Ivankovci pri Lendavi	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes	TUŠEK, KAVUR 2011
55	616999	154315	Pod Grunti-Pince pri Pincih	Lowland settlement	Lasinja	YES	Large pits, medium-sized pits, postholes	KERMAN 2018
56	505882	89798	Gradec pri Mirni	Hilltop settlement	Lasinja	YES	Stone wall, medium-sized pit	DULAR et al. 1991. – DULAR 2001
57	524111	96521	Sevnica	Lowland settlement	Lasinja	/	/	BUDJA 1991
58	531362	93371	Jeranova jama na Pijavškem	Cave site	Lasinja	/	/	KOROŠEC, URŠIČ 1965
59	533391	89424	Ajdovska jama pri Nemški vasi	Cemetery, cave site	Lasinja	YES	Graves	HORVAT 1989. – HORVAT 2009

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
60	551687	101631	Bistrica ob Sotli	Lowland settlement	Lasinja	/	Large pit	unpublished
61	505577	81864	Sv. Ana nad Vrhpečjo	Hilltop settlement	Lasinja	/	/	DULAR 2001
62	516674	77897	Zagrad pri Otočcu-Stari grad	Hilltop settlement	Lasinja	/	/	DULAR 2001
63	522075	80397	Draga pri Beli Cerkvi	Lowland settlement	Lasinja	/	Medium-sized pits	UDOVČ 2022
64	522305	81150	Vihra nad Drago	Hilltop settlement	Lasinja	/	/	DULAR 2001
65	519594	70612	Sela pri Zajčjem Vrh-u-Grac	Hilltop settlement	Lasinja	/	Posthole	PAVLIN 2006
66	538285	78511	Dol pri Šutni-Levakova jama	Cave site	Lasinja	/	/	GUŠTIN 1976
67	544959	82962	Velike Malence	Lowland settlement	Lasinja	/	/	BAVEC, MASON 1998
68	547682	82979	Čatež-Sredno polje	Lowland settlement	Lasinja	/	Large pits	TOMAŽ 2022
69	549983	81686	Col 1 pri Podgračnem	Lowland settlement	Lasinja	YES	Pos holes	HORVAT 2020
70	552235	80717	Ribnica na Dolenjskem	Lowland settlement	Lasinja	/	Medium-sized pit, postholes	BEKIĆ 2006
71	554149	78561	Obrežje	Lowland settlement	Lasinja	YES	Large pit	KRAMBERGER 2022a. – MASON, KRAMBERGER 2022
72	491395	56770	Ciganska jama	Cave site	Lasinja	/	/	VELUŠČEK 2011b
73	493334	40245	Kostel	Hilltop settlement	Lasinja	/	/	VELUŠČEK 1996. – DULAR 2001
74	502550	45590	Spaha nad Brezovico	Lowland settlement	Lasinja	/	Stone wall	VELUŠČEK 2011a
75	507261	36519	Straža nad Gorenjimi Radenci	Hilltop settlement	Lasinja	/	/	DULAR 2001
76	517683	54505	Movernas vas	Lowland settlement	Lasinja	YES	Postholes	BUDJA 1995. – TOMAŽ 1999
77	519487	52022	Gradac-Grajski park	Lowland settlement	Lasinja	/	Large pits, postholes	MASON 1995
78	518101	30019	Otočac-Stari grad	Lowland settlement	Lasinja	/	Medium-sized pit	ČATAJ 2018
79	523609	7079	Čakovac Oštarijski	Lowland settlement	Lasinja	/	/	ČATAJ 2018
80	515324	27454	Veliki Jadre-špilja Frašče	Cave site	Lasinja	/	/	ČATAJ 2018
81	521701	29149	Hrsina-Boduli	Lowland settlement, cave site	Lasinja	/	/	ČATAJ 2018
82	521415	29408	Hrsina-Gorica	Lowland settlement	Lasinja	/	/	ČATAJ 2018
83	530549	55327	Vrlovka-iznad špilje	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes	ČATAJ 2018
84	530536	55362	Vrlovka-špilja	Cave site	Lasinja	/	/	ČATAJ 2018
85	536715	52811	Ozalj-Stari grad	Hilltop settlement	Lasinja	/	Large pit, human bones	ČATAJ 2018
86	534414	38922	Vinski Vrh-Mali Kučer	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
87	541273	39585	Dubovac-Stari grad	Lowland settlement	Lasinja	/	/	ČATAJ 2018
88	534248	28776	Crkvišče-Bukovlje	Hilltop settlement	Lasinja	YES	Large pits, medium-sized pits, postholes	ČATAJ 2018
89	542614	26673	Barilović-Stari grad	Lowland settlement	Lasinja	/	Large pit	ČATAJ 2018
90	564501	44175	Lasinja-Perčiči	Lowland settlement	Lasinja	/	/	ČATAJ 2018
91	568257	43118	Lasinja-Talijanovo/Vidakovo brdo	Hilltop settlement	Lasinja	YES	Large pits, medium-sized pits, postholes	ČATAJ 2018
92	570911	34431	Kiringrad	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
93	583186	8182	Bojna-Brekinjova kosa	Hilltop settlement	Lasinja	/	/	ČATAJ 2018

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
94	575682	53252	Dubranec	Hilltop settlement	Lasinja	/	Medium-sized pit	ČATAJ 2018
95	580877	64253	Šepkovića	Lowland settlement	Lasinja	/	Large pits, medium-sized pits	ČATAJ 2018
96	586793	71099	Šitarjevo-Župna crkva	Lowland settlement	Lasinja	/	/	ČATAJ 2018
97	585272	66031	Kobilic I	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes	ČATAJ 2018
98	586015	67419	Kobilic II	Lowland settlement	Lasinja	/	Large pits	ČATAJ 2018
99	585683	63891	Novo Čiče	Lowland settlement	Lasinja	/	Medium-sized pit	ČATAJ 2018
100	587622	62644	Staro Čiče-Gradišće	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
101	627841	50922	Popovača-Šalkovićevo/Raičevac/Pajkov jarak	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
102	632693	49477	Donja Paklenica	Lowland settlement	Lasinja	/	/	ČATAJ 2018
103	630184	47277	Volodarski bregi	Lowland settlement	Lasinja	/	Medium-sized pits	ČATAJ 2018
104	639838	46435	Čaire-Horvatov brijeg	Lowland settlement	Lasinja	/	Large pit	ČATAJ 2018
105	633485	42418	Gornja Gračenica-Čretes	Lowland settlement	Lasinja	/	/	ČATAJ 2018
106	645011	35058	Piljenice-Grede II	Lowland settlement	Lasinja	/	Medium-sized pits, postholes	ČATAJ 2018
107	706163	37297	Poročani	Cemetery, mass grave	Lasinja	YES	/	ČATAJ 2018
108	716672	27975	Jakšić	Cemetery, individual graves	Lasinja	YES	Pit	ČATAJ 2018
109	746202	72374	Donji Miholjac-Đanovci	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes; post-in ground structures with foundation ditches	NODILO 2012
110	746766	72324	Donji Miholjac-Mlaka	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes; post-in ground structures with foundation ditches	TKALČEC 2016
111	756151	50410	Koška-Cer, Pjeskana II	Lowland settlement	Lasinja	/	/	MARKOVIĆ 1977
112	775167	47343	Čepin	Lowland settlement	Lasinja	/	/	DIZDAR 2009
113	774071	46511	Čepinski Martinci-Dubrava	Lowland settlement	Lasinja	/	Post-in-ground structures with foundation ditches	KALAFATić 2009
114	773043	43919	Beketinci-Bentež	Lowland settlement	Lasinja	YES	Large pits, medium-sized pits, postholes; post-in-ground structures with foundation ditches	MINICHREITER, MARKOVIĆ 2011. – MINICHREITER, MARKOVIĆ 2013
115	770938	40105	Jurjevac-Stara Vodenica	Lowland settlement	Lasinja	YES	/	BALEN, ĐUKIĆ, ŠPOLJAR 2017
116	766539	34019	Tomašanci-Palača	Lowland settlement	Lasinja	YES	Large pits, medium-sized pits, postholes; post-in-ground structures with foundation ditches	BALEN 2020
117	763747	23602	Đakovački Selci-Pajtenica	Lowland settlement	Lasinja	YES	Large pits, medium-sized pits, postholes	BALEN 2016
118	650192	59498	Velika Mlinska-okučnice Lugarić i Bogdan	Lowland settlement	Lasinja	/	Medium-sized pits	ČATAJ 2018
119	649799	67715	Nova Plošćica-Šprakov bent	Lowland settlement	Lasinja	/	/	ČATAJ 2018
120	656081	70507	Donja Kovačica-Kirinov brijeg	Lowland settlement	Lasinja	/	/	ČATAJ 2018
121	656086	70568	Donja Kovačica-Ograda Javorski Zdravka/Benićev brijeg	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
122	652653	73389	Nova Rača-šuma Jasenova	Lowland settlement	Lasinja	/	/	ČATAJ 2018

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
123	653017	74788	Drjanovac-ograda Magulac/ograda Jakeković Đure/Gornja ograda	Lowland settlement	Lasinja	/	/	ČATAJ 2018
124	654918	76188	Drjanovac-Popovka	Lowland settlement	Lasinja	/	/	ČATAJ 2018
125	653280	76568	Bulinac-Staro groblje	Lowland settlement	Lasinja	/	/	ČATAJ 2018
126	642438	80344	Malo Korenovo-Vojvodinac, Galovac, Dabravine	Lowland settlement	Lasinja	/	/	ČATAJ 2018
127	646955	82550	Ždralovi-Dolina	Lowland settlement	Lasinja	/	Medium-sized pit	ČATAJ 2018
128	657613	91699	Sirova Katalena-Lipik	Lowland settlement	Lasinja	/	/	ČATAJ 2018
129	649679	89493	Veliko Trojstvo-Blažekovića/Kameniti jarak	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
130	648092	88725	Grginac-šuma Bukvik	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
131	647994	87661	Grginac-ograda Grbačić Milana	Lowland settlement	Lasinja	/	/	ČATAJ 2018
132	643114	86399	Bjelovar-šetalische dr. Ivše Lebovića	Lowland settlement	Lasinja	/	/	ČATAJ 2018
133	643824	88835	Zvijerci-Grmovi	Lowland settlement	Lasinja	/	/	ČATAJ 2018
134	631145	88724	Majur	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
135	624762	85943	Kapelsko polje	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes	ČATAJ 2018
136	623154	85822	Haganj-šuma Navakuša	Lowland settlement	Lasinja	/	Large pit	ČATAJ 2018
137	617693	85628	Barbarsko I	Lowland settlement	Lasinja	YES	Large pit, medium-sized pit	ČATAJ 2018
138	617552	88238	Lubena-Salajci II	Hilltop settlement	Lasinja	/	Large pits, medium-sized pits, postholes	ČATAJ 2018
139	624297	89797	Škrinjari I	Lowland settlement	Lasinja	/	Large pits, medium-sized pits	ČATAJ 2018
140	621976	91372	Brezovljani	Lowland settlement	Lasinja	/	/	ČATAJ 2018
141	619084	91639	Buzadovac-Husarine	Lowland settlement	Lasinja	/	/	ČATAJ 2018
142	618796	92119	Buzdanovac-Donje Brdarine I	Lowland settlement	Lasinja	/	/	ČATAJ 2018
143	616405	91757	Festinec	Lowland settlement	Lasinja	/	/	ČATAJ 2018
144	618737	93042	Poljana Križevačka I	Lowland settlement	Lasinja	/	Large pits, postholes	ČATAJ 2018
145	618913	94073	Poljana Križevačka II	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes	ČATAJ 2018
146	625373	97582	Grabrovec-Zvonarica	Lowland settlement	Lasinja	/	Large pits	ČATAJ 2018
147	621213	96145	Bukovje Križevačko-Mladine	Lowland settlement	Lasinja	/	Large pit	ČATAJ 2018
148	618598	97537	Karane-Belavine	Lowland settlement	Lasinja	/	/	ČATAJ 2018
149	614815	97915	Lemeš Ravenski-Gradina	Hilltop settlement	Lasinja	/	/	ČATAJ 2018
150	612505	96612	Pavlovec-Šarutanov brijeg	Lowland settlement	Lasinja	/	/	ČATAJ 2018
151	611309	97968	Beketinec-Imbralovec/Topolje	Lowland settlement	Lasinja	/	Large pit, medium-sized pit	ČATAJ 2018
152	695107	69515	Pepelana	Lowland settlement	Lasinja	/	Posthole	MINICHREITER 1990

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
153	654993	106889	Virje-Trnje	Lowland settlement	Lásinja	/	/	ČATAJ 2018
154	652880	114346	Hlebine-Kozarice	Lowland settlement	Lásinja	/	/	ČATAJ 2018
155	649134	116557	Sigetec-Mošćanci	Lowland settlement	Lásinja	/	/	ČATAJ 2018
156	647467	115169	Koprivnički Bregi-Seče	Lowland settlement	Lásinja	/	/	ČATAJ 2018
157	642658	121357	Peteranec-Cerine III, Vratnec II	Lowland settlement	Lásinja	/	Large pits	ČATAJ 2018
158	640438	123046	Koprivnički Ivanec-Vojnik I	Lowland settlement	Lásinja	/	Medium-sized pit	ČATAJ 2018
159	639401	122801	Koprivnički Ivanec-Zasek I	Lowland settlement	Lásinja	/	Medium-sized pits, postholes	ČATAJ 2018
160	623218	114646	Ludbreški Ivanec-Polje II	Lowland settlement	Lásinja	/	Large pit	ČATAJ 2018
161	622739	114820	Ludbreški Ivanec-Polje I	Lowland settlement	Lásinja	/	Large pit	ČATAJ 2018
162	611756	110927	Kalnik-Igrišće	Hilltop settlement	Lásinja	/	Large pits	ČATAJ 2018
163	604144	107975	Čanjevo-Gradišće	Hilltop settlement	Lásinja	/	/	ČATAJ 2018
164	610021	118973	Varaždinske Toplice-Gromače II	Lowland settlement	Lásinja	YES	Large pits	ČATAJ 2018
165	607912	124505	Jakopovec-Bllizna	Lowland settlement	Lásinja	YES	Large pits, medium-sized pits, postholes	ČATAJ 2018
166	604720	123686	Gornji Knežinec-Cukavec II	Lowland settlement	Lásinja	/	Large pit	ČATAJ 2018
167	610496	127638	Zbelava-pod lipom	Lowland settlement	Lásinja	/	/	ČATAJ 2018
168	604789	127173	Brezje	Lowland settlement	Lásinja	YES	Large pits, medium-sized pits, postholes	ČATAJ 2018
169	592419	125240	Cerje Tužno-Krč	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	ČATAJ 2018
170	591768	124115	Cerje Novo-Draguševac	Lowland settlement	Lásinja	/	Large pit	ČATAJ 2018
171	611111	138065	Čakovec-Gornji Pustakovec	Lowland settlement	Lásinja	YES	Large pits, medium-sized pits, postholes	ČATAJ 2018
172	607812	139251	Nedelišće-Stara Ves	Lowland settlement	Lásinja	/	Medium-sized pit	ČATAJ 2018
173	603056	140676	Črečan	Lowland settlement	Lásinja	YES	Large pits	ČATAJ 2018
174	610003	144058	Mačkovec-Balogovec	Lowland settlement	Lásinja	/	/	ČATAJ 2018
175	622517	145768	Domašinec-Krtinjak	Lowland settlement	Lásinja	/	/	ČATAJ 2018
176	780211	101997	Lánycsók	Lowland settlement	Lásinja	/	/	KALICZ 1991
177	739421	100802	Zók-Várhegy	Lowland settlement	Lásinja	/	/	KALICZ 1991
178	691000	95390	Barcs-Dráva-meder	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
179	687481	98493	Drávaszentes-Malom-domb	Hilltop settlement	Lásinja	/	/	SOMOGYI 2000
180	685034	100442	Komlós-Reszula and Szőlőhegy	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
181	661992	126019	Csurgó-Télapó pihenőhelye	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
182	715529	134089	Zselickislak	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
183	785597	140288	Szeksárd	Lowland settlement	Lásinja	/	/	KALICZ 1973. – KALICZ 1991
184	757791	160092	Szakály	Lowland settlement	Lásinja	/	/	KALICZ 1991
185	715625	140071	Kaposvár-Deseda-part	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	SOMOGYI 2000. – SOMOGYI 2002
186	710359	144256	Juta-Gagarin	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
187	655804	147420	Nagykanizsa-Inkey Kápolna	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	KALICZ 2003
188	646793	150565	Sormás	Hilltop settlement	Lásinja	/	Large pits, medium-sized pits	STRAUB 2006

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
189	644072	147399	Eszteregnye-Ojtó-dűlő	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	TOKAI 2007
190	642475	147188	Rigyác-Alsó-mező	Lowland settlement	Lásinja	/	Large pits, medium-sized pits, postholes	TOKAI 2007
191	633807	144734	Letenye	Lowland settlement	Lásinja	/	/	KALICZ 1991. – KALICZ 1995
192	621144	153204	Dobri-Alsó-mező	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	HORVÁTH, SIMON 2004
193	620390	153302	Torniszentmiklós	Hilltop settlement	Lásinja	/	Large pits, medium-sized pits, postholes	BARNA 2003
194	646812	163075	Zalaszentbalázs-Pusztatető	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	BÁNYFI 1995b
195	672638	164002	Sávoly-Babócsa	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
196	666059	170445	Zalavár-Basasziget	Hilltop settlement	Lásinja	/	Ditches, large pits, medium-sized pits, postholes; post-in-ground structures with foundation ditches	VIRÁG 2003. – VIRÁG 2005
197	665434	171732	Zalavár-Mekenye	Lowland settlement	Lásinja	/	/	KALICZ 1973
198	673851	171595	Vörs-Papkert	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
199	671510	176920	Keszthely-Fenekpuszta	Lowland settlement	Lásinja	/	Large pits, medium-sized pits, postholes; pit containing human remains	KALICZ 1973. – KALICZ 1991. – SZÉCSÉNYI-NAGY et al. 2019
200	721091	171784	Andocs-Nagytoldipuszta	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
201	713560	187597	Balatonőszöd-Temetői-dűlő	Lowland settlement	Lásinja	YES	Medium-sized pits	HORVÁTH 2014
202	717916	190656	Balatonszárszó-Kiss-erdei-dűlő	Hilltop settlement	Lásinja	YES	Large pits, medium-sized pits, postholes; post-in-ground structures with foundation ditches	OROSS et al. 2010
203	700311	198694	Monoszló	Lowland settlement	Lásinja	/	/	REGENYE 2020
204	719281	200149	Tihany	Lowland settlement	Lásinja	/	/	REGENYE 2020
205	704693	203790	Óbudavár	Lowland settlement	Lásinja	/	/	REGENYE 2020
206	718263	205445	Balatonfüred	Lowland settlement	Lásinja	/	Large pits, medium-sized pits	REGENYE 2020
207	721942	207901	Csopak	Lowland settlement	Lásinja	/	/	REGENYE 2020
208	738240	204090	Balatonszemes-Landler J. u.	Lowland settlement	Lásinja	/	/	SOMOGYI 2000
209	715307	210913	Hidegkút-Linzacker	Lowland settlement	Lásinja	/	/	KALICZ 1973
210	739938	213883	Balatonakarattya	Lowland settlement	Lásinja	/	/	REGENYE 2020
211	729701	218708	Balatonfűzfő	Lowland settlement	Lásinja	/	/	REGENYE 2020
212	727984	221025	Litér	Lowland settlement	Lásinja	/	/	REGENYE 2020
213	721087	222222	Veszprém-Jutasi út	Cemetery, individual inhumations	Lásinja	/	Medium-sized pits (graves)	REGENYE 2006. – REGENYE 2020
214	692836	221015	Ajka	Lowland settlement	Lásinja	/	/	REGENYE 2020
215	628887	181087	Becsölgye-Tollesalja	Lowland settlement	Lásinja	/	/	HORVÁTH, SIMON 2003
216	637350	181663	Gellénháza-Városerőd	Lowland settlement	Lásinja	/	/	HORVÁTH, SIMON 2003
217	651728	188298	Nagykapornak	Lowland settlement	Lásinja	/	Post-in-ground structures with foundation ditch?	HORVÁTH 1991, 113
218	636665	192979	Zalaegerszeg-Andráshida, Gébárti-tó II	Lowland settlement	Lásinja	/	Large pits, medium-sized pits, postholes; post-in-ground structures with foundation ditches	BARNA, KREITER 2006
219	624886	191565	Keménfa-Szentegyházi-dűlő	Lowland settlement	Lásinja	/	Large pits	ORHA, SAVANYÚ 2017

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
220	622584	209164	Körmend-Várkert	Hilltop settlement	Lasinja	/	Large pits, medium-sized pits	KÁRÓLYI 1992. – OROSS 2002
221	626724	230167	Újperint-Kavicsbánya	Lowland settlement	Lasinja	/	/	KÁRÓLYI 1992
222	617343	233916	Sé-Doberdó	Hilltop settlement	Lasinja	/	Large pit/medium-sized pit	OROSS 2002
223	617426	233512	Sé-Malomai dűlő	Lowland settlement	Lasinja	/	/	KÁRÓLYI 1992
224	619671	236200	Szombathely-Metro, Reiszig erdő	Lowland settlement	Lasinja	/	Large pits, medium-sized pits; post-in-ground structure with foundation ditch	ILON 2004
225	568499	238696	Wartberg bei Gnas	Hilltop settlement	Lasinja	/	/	RINDER 2005
226	570235	233759	Kopfinger bei Hartberg	Lowland settlement	Lasinja	/	Large pit	ARTNER, OBEREDER 1999
227	557526	232089	Kulm bei Weiz	Hilltop settlement	Lasinja	/	/	KRAMER, URBAN 1987
228	529331	219923	Kanzel bei Graz	Hilltop settlement	Lasinja	/	/	ARTNER et al. 2012
229	465740	230476	Greith	Hilltop settlement	Lasinja	/	/	unpublished (see https://www.hlk.steiermark.at/cms/beitrag/12922998/155982178/)
230	466639	228830	Pölsbals bei Judenburg	Hilltop settlement	Lasinja	/	/	PITTONI 1953
231	479978	221290	Eppenstein-Burgberg	Hilltop settlement	Lasinja	/	/	BERTHA 2020
232	466210	199749	Knappenberg	Hilltop settlement	Lasinja	/	/	EBNER-BAUR 2019
233	507178	215514	Piber	Hilltop settlement	Lasinja	/	/	STERING 2004
234	507977	212661	Rosental an der Kainach-Betenmacherkogel	Hilltop settlement	Lasinja	/	/	EINWÖGERER, LINDER 2002
235	516772	206415	Dietenberg	Lowland settlement	Lasinja	/	/	HEBERT 1990a
236	538311	209693	Raababerg	Hilltop settlement	Lasinja	/	Large pits, medium-sized pits	OBEREDER 1989
237	563646	201848	Saazkogel	Hilltop settlement	Lasinja	/	/	LIPPERT 2011
238	518542	199143	Sankt Stefan ob Stainz	Lowland settlement	Lasinja	/	/	RUTTKAY 1996
239	535880	195372	Weitendorf bei Wildon	Lowland settlement	Lasinja	/	/	unpublished
240	539985	193986	Wildon-Schlossberg	Hilltop settlement	Lasinja	/	/	TIEFENGABER 2018
241	538256	192540	Wildon-Bockberg	Hilltop settlement	Lasinja	/	Vessel containing human remains	GUTJAHN 2020
242	550821	189051	Tessernriegel	Hilltop settlement	Lasinja	/	/	FUCHS, EINWÖGERER 2000
243	558544	185003	Kalvarienberg	Hilltop settlement	Lasinja	YES	/	FUCHS 2002
244	536314	187558	Flamberg	Hilltop settlement	Lasinja	/	/	HEBERT 1990b
245	535265	189214	Spiegelkogel	Hilltop settlement	Lasinja	/	Medium-sized pits	BRANDL, EHRENREICH, FUCHS 2006. – WILDING 2015
246	520006	185685	Freidorf an der Laßnitz	Hilltop settlement	Lasinja	YES	Large pits	WILDING 2015
247	490491	172324	Rabenstein	Hilltop settlement	Lasinja	/	/	TIEFENGABER 2004
248	435664	161015	Keutschacher See	Pile dwelling	Lasinja	YES	Wooden posts	SAMONIG 2003
249	419027	160697	Wauberg am Faaker See	Hilltop settlement	Lasinja	/	/	BERTHA, TIEFENGABER 2020
250	413810	157494	Kanzianiberg	Hilltop settlement	Lasinja	/	/	DOLENZ 1938

No.	X Coordinate	Y Coordinate	Site	Type of site	Cultural attribution	¹⁴ C AMS	Features	Literature
251	805556	278160	Budapest-Nánási út	Lowland settlement	Ludanice	/	Large pits, medium-sized pits; post-in-ground structure	VIRÁG 2013
252	696148	282053	Győr-Szabadrét-domb and Ménfőcsanak	Lowland settlement	Ludanice	YES	Large pits, medium-sized pits, postholes; post-in-ground structures with foundation ditches	VIRÁG, FIGLER 2007
253	682545	291089	Mosonszentmiklós-Egyéni földék	Lowland settlement	Ludanice	YES	Large pits, medium-sized pits; post-in-ground structures with foundation ditches	EGRY 2003
254	680848	293348	Mosonszentmiklós-Pálmajor	Lowland settlement	Ludanice	YES	Large pits, medium sized pits, postholes; post-in-ground structures with foundation ditches	VIRÁG, FIGLER 2007
255	680563	293505	Lébény-Bille-domb and Kaszás-domb	Lowland settlement	Ludanice	/	Post-in-ground structures with foundation ditches	NEMETH 1994, 241–261
256	733754	345508	Branč	Lowland settlement	Ludanice	/	Post-in-ground structures with foundation ditches	VLADÁR, LICHARDUS 1968, 263–352
257	726707	365039	Jelšovice	Lowland settlement	Ludanice	/	Post-in-ground structures with foundation ditches	PAVUK, BATORA 1995, 12–25
258	620696	417557	Dolní Věstonice	Lowland settlement	Ludanice	/	Post-in-ground structures with foundation ditches	KOŠTURIK, ŠEBELA 1994, Figs. 1–3
259	609547	365602	Schleibach	Lowland settlement	Epi-Lengyel	/	Post-in-ground structures with foundation ditches	SCHWAMMENHÖFER 1984, 169–202
260	550464	346457	Unterradlberg	Lowland settlement	Epi-Lengyel	/	Post-in-ground structures with foundation ditches	NEUGEBAUER et al. 1991, 49–51. – CARNEIRO 2003, 50
261	552221	344932	Portenbrunn	Lowland settlement	Epi-Lengyel	/	Post-in-ground structure with foundation ditch	RUTTKAY 1995
262	603886	319983	Münchendorf-Drei Mahden	Lowland settlement	Epi-Lengyel	YES	Large pits, medium-sized pits; post-in-ground structure with foundation ditch	CARNEIRO, STADLER 2004
263	667106	163453	Balatonmagyaród-Homoki-dűlő	Foundation sacrifice	Lasinja	/	Medium-sized pits	BÁNYFY 1994
264	713132	148628	Magyaregres	Lowland settlement	Lasinja	/	Large pits, medium-sized pits, postholes; post-in-ground structure with foundation ditch	HORNOK, KISS 2017

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