

Annales
Instituti
Archeologici

Godišnjak
Instituta za
arheologiju

XXI - 2025

UDK 902/904
ISSN: 1848 6363



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Marko Maras i autori

Lektura / Language editor

Katarina Botić, Marko Dizdar, Marko Maras

(hrvatski jezik/Croatian)

Marko Maras (engleski jezik/English)

Nakladnik / Publisher

Institut za Arheologiju

Institute of Archaeology

Adresa uredništva / Editor's office address

Institut za arheologiju

/ Institute of Archaeology

Jurjevska ulica 15

HR-10000 Zagreb

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Dizajn / Design

Umjetnička organizacija OAZA

Korektura / Proofreaders

Katarina Botić

Računalni slog / Layout

Hrvoje Jambrek

Annales Instituti Archaeologici uključeni su u indekse: Clarivate Analytics services – Emerging Sources Citation Index, SciVerse Scopus – Elsevier, Amsterdam. / Annales Instituti Archaeologici are included in the indexes: Clarivate Analytics services – Emerging Sources Citation Index, SciVerse Scopus – Elsevier, Amsterdam.

Izrađeno uz financijsku potporu Ministarstvo znanosti, obrazovanja i mladih Republike Hrvatske. / Made with the financial support of the Ministry of Science, Education and Youth of the Republic of Croatia.

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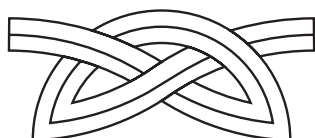
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DOI 10.33254/aia

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An Olynthus mill from Kaštelir above Korte near Izola (southwestern Slovenia)

Olintski žrvanj s Kaštelira iznad Korta kod Izole (jugozapadna Slovenija)

Pregledni rad >
Klasična arheologija
Review paper >
Classical archaeology

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Primljeno Received 27. 11. 2025.
Prihvaćeno Accepted 19. 12. 2025.
doi.org/10.33254/aia.21.1.13

Key words: hopper-rubber mill, Olynthus mill, volcanic rock, Greek import, Hellenistic period, indigenous communities, Kaštelir above Korte, Istria and Dalmatia

Ključne riječi: žrvanj s lijevkom, žrvanj olintskog tipa, vulkanska stijena, uvoz iz Grčke, helenističko razdoblje, autohtone zajednice, Kaštelir iznad Korta, Istra i Dalmacija

Kaštelir above Korte is situated in the immediate coastal hinterland of northwestern Istria. It is one of the largest and most important Istrian hillforts, a status confirmed by its longevity: finds spanning from the Late Neolithic to the early Roman period have been discovered there. During research in 2009, two fragments of grain grinding tools were recovered. Their pronounced vesicular structure indicates they were made of volcanic rock, a material not found in the immediate vicinity; macroscopic examination suggests a probable origin in Sicily. Based on the morphology of both pieces, we conclude that they are the remains of the lower and upper stones of a hand mill with a hopper – specifically, a rectangular Olynthus mill, a typical Hellenistic quern type. Such mills have been identified on the eastern Adriatic coast, notably in Greek settlements on Vis and in central Dalmatia. Conversely, fragments of mills made of similar material, which may also belong to this type, have been documented at hillforts in the hinterland of both Dalmatia and Istria. The use of Olynthus mills is a clear indicator of contact between indigenous communities and the Greeks, as this imported form was distributed via long-distance overseas trade. Their significance is heightened by the fact that they are distinctly practical everyday objects rather than luxury items.

Kaštelir iznad Korta smješten je u neposrednom obalnom zaleđu sjeverozapadne Istre. Riječ je o jednoj od najvećih i najvažnijih istarskih gradina, a taj status potvrđuje njezina dugotrajnost: ondje su otkriveni nalazi u rasponu od kasnog neolitika do ranog rimskog razdoblja. Tijekom istraživanja 2009. godine pronađena su dva ulomka alata za mljevenje žita. Njihova izražena vezikularna struktura ukazuje na to da su izrađeni od vulkanske stijene, materijala koji se ne nalazi u neposrednoj blizini. Makroskopski pregled upućuje na vjerojatno podrijetlo sa Sicilije. Na temelju morfologije obaju komada zaključujemo da je riječ o ostacima donjeg i gornjeg kamena ručnog žrvnja s lijevkom – točnije, pravokutnog žrvnja olintskog tipa, tipičnog helenističkog oblika žrvnja. Takvi su žrvnjevi identificirani na istočnoj obali Jadrana, odnosno u grčkim naseljima na Visu i u srednjoj Dalmaciji. S druge strane, ulomci žrvnjeva izrađeni od sličnog materijala, koji bi također mogli pripadati ovom tipu, zabilježeni su na gradinama u zaleđu Dalmacije i Istre. Uporaba žrvnjeva olintskog tipa jasan je pokazatelj dodira između autohtonih zajednica i Grka, jer se ovaj uvozni oblik distribuirao putem prekomorske trgovine na velike udaljenosti. Njihov je značaj tim veći zato što je riječ o izrazito praktičnim predmetima za svakodnevnu uporabu, a ne o luksuznim dobrima.



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Introduction

Kaštelir ('Kašler'), situated above Korte near Izola,¹ is one of the largest and most important hillforts in Istria. It is located in the northwestern part of Istria² (Map 1), atop a flat hill that is naturally well-protected on three sides. Over time, the site was further

fortified with a robust entrance and a transverse embankment or wall. The hilltop, which has a perimeter of about 1,300 m, was likely at least partially leveled, creating approximately 5.5 ha of flat terrain.

Although its altitude is only 260–270 m above sea level, the site stands higher than most neighboring hills. This elevation affords a commanding view northward toward the Friuli plain, southward into the Istrian interior, and westward to the open sea (Fig. 1). To the east, the view extends to Čičarija, Podgorski Kras, Slavnik, Vremščica, and Nanos. The coast lies approximately five kilometers from the hillfort, reaching the sea both to the southwest at the estuary of the Dragonja River and to the north near Izola.

1 In The Register of Immovable Cultural Heritage of Slovenia, it is registered as the archaeological site "Kaštelir pri Čedljah" (EID 1-07238). The toponym "Kaštelir", along with its derivatives and Croatian and Italian translations, is a common designation for hills featuring archaeological remains in Istria and the Karst region. Throughout this article, the name Kaštelir refers exclusively to the site near the village of Korte (formerly "Dvori").

2 Lat: 44°57'51", Lon: 8°39'43".



Map 1 Location of Kaštelir above Korte (physical map: Maps-For-Free, CC0 <https://creativecommons.org/public-domain/cc0/>; prepared by: A. Preložnik)

Karta 1 Položaj Kaštelira iznad Korta (reljefna karta: Maps-For-Free, CC0 <https://creativecommons.org/public-domain/cc0/>; izradio: A. Preložnik)



Fig. 1 Kaštelir, view from the east. In the foreground is the village of Korte; in the background are the salt pans at the estuary of the Dragonja River, the Bay of Piran, and Cape Savudrija (photo by: A. Ogorelec)

SL 1 Kaštelir, pogled s istoka. U prvom planu je selo Korte, u pozadini su solane na ušću rijeke Dragonje u Piranski zaljev, te rt Savudrija (snimio: A. Ogorelec)

History of research

The name *Kaštelir* (derived from the Italian *castelliere*, meaning “hillfort”) and local legends regarding Attila’s treasure suggest that the local population has been aware of the remains at the site for a very long time. However, the earliest written record dates back to 1529, when Pietro Coppo identified it as the Greco-Roman predecessor of Izola (Coppo 1999: 50). Carlo Marchesetti was the first to formally document it as a hillfort in 1903 (Marchesetti 1903: 74, T. 9: f.1). Although archaeological finds from Kaštelir were known earlier, systematic research was not conducted until after World War II. Elica Boltin, a curator at the City Museum Piran,³ excavated several test trenches at Kaštelir in 1956 and 1957 (Boltin 1959: 237–238; 1967: Annex 1). These revealed a shallow, mixed cultural layer that had been disturbed by cultivation. The construction of water supply infrastructure in 1959 partially destroyed the transverse embankment, necessitating rescue excavations in 1960 and, more extensively, in 1962, when the original probe was expanded and deepened (Boltin-Tome 1967). These excavations, documented in a cross-section of the central transverse embankment, uncovered the remains of several phases of dry-stone structures, primarily comprising a transverse defense system.

After that campaign, research halted for several decades. Due to a combination of

circumstances, activities resumed between 2008 and 2010, when intensive farming began on several plots on the southern side of the western part of the hillfort. Archaeological work conducted by the Institute for Mediterranean Heritage (IMH),⁴ in collaboration with students from the Faculty of Humanities at the University of Primorska, involved clearing overgrown areas (2008), documenting stone structures and clearing a clandestine pit (2009), and conducting an intensive surface survey along with two test trenches (2010) (Sakara Sučević et al. 2010).

In 2014, the IMH conducted further minor research on the highest part of the hillfort, where two dry-stone structures were documented and a test trench was excavated (Tomaž, Sakara Sučević 2017) (Map 2).

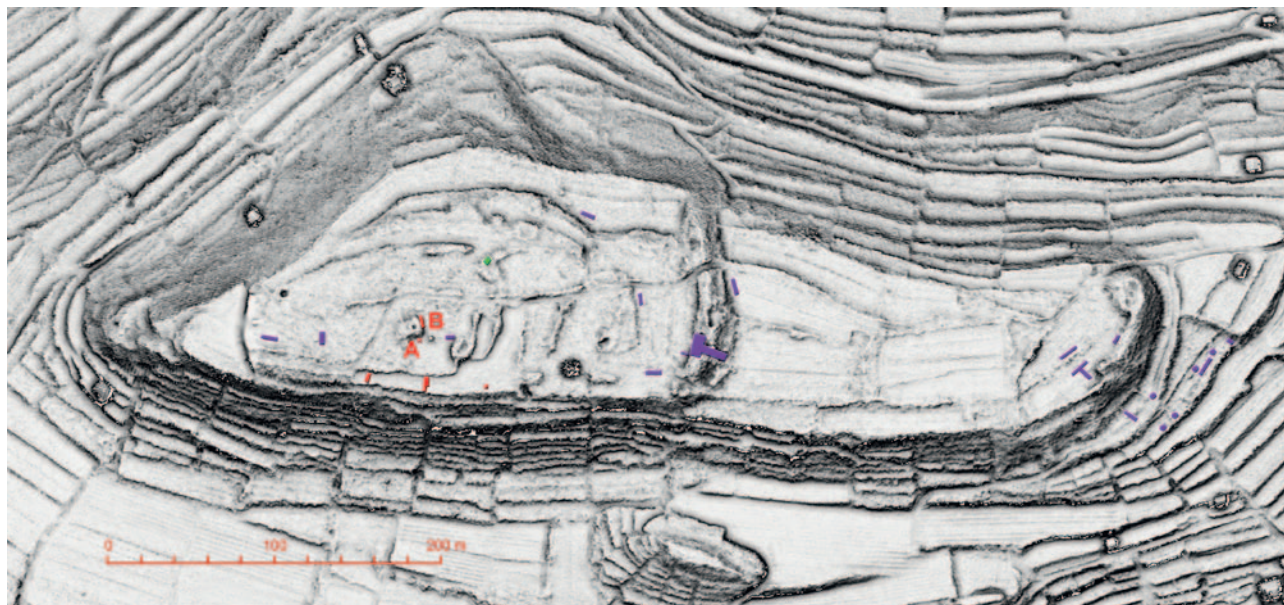
Recently, within the framework of the KAŠTELIR Interreg project, LiDAR image analysis was performed (Hobič 2021), and various geophysical measurements were conducted as part of a postdoctoral research project (Medarić 2022).

Research conducted to date indicates that the archaeological layers, at least in the western part of the hillfort, have been significantly damaged by cultivation and terracing. Despite this disturbance, a relatively large number of small finds were recovered during excavations.⁵ As expected, a more complex stratigraphy was revealed in the cross-section of the embankment.

⁴ Institute for Mediterranean Heritage, Science and Research Centre Koper, University of Primorska.

⁵ The archaeological finds are housed in the Koper Regional Museum and the “Sergej Mašera” Maritime Museum, Piran.

³ Today the “Sergej Mašera” Maritime Museum, Piran.



Map 2 LiDAR image of Kaštelir showing marked archaeological interventions and the location of the Olythus mill fragments (labeled A and B). Legend: rectangle □ = archaeological trench; circle ○ = grave; purple = archaeological interventions from the 1950s and 1960s; red = interventions in 2009 and 2010; green = intervention in 2014 (base map: GiskD, data: Boltin-Tome 1967, and documentation of the Institute for Archaeology and Heritage, Faculty of Humanities, University of Primorska; prepared by: A. Preložnik)

Karta 2 Lidarska snimka Kaštelira s označenim arheološkim zahvatima i mjestom nalaza ulomaka žrvnja olintskog tipa (označeni s A i B). Legenda: pravokutnik □ = arheološka sonda, krug ○ = grob, ljubičasto = arheološki zahvati iz 1950-ih i 1960-ih, crveno = zahvati 2009. i 2010., zeleno = zahvat 2014. (osnova: GiskD, podaci: Boltin-Tome 1967. i dokumentacija Instituta za arheologiju i baštinu, Fakultet humanističkih znanosti, Sveučilište na Primorskem; izradio: A. Preložnik)

Analysis of the finds, consisting primarily of pottery, indicates a long-term settlement sequence. The earliest material dates to the Late Neolithic and Eneolithic periods; however, the majority of the assemblage is attributed to the Bronze and Iron Ages (Sakara Sučević 2008: 443–444; 2012: 59). Roman material is also frequently represented among the finds (Boltin 1959; Boltin-Tome 1967: 172; Tomaž, Sakara Sučević 2017: 93–94). While the investigation of the transverse embankment yielded material predominantly from earlier periods, a small test trench excavated in 2010 produced several significant artifacts from later prehistoric phases. These include a bronze figurine of a dog, a fragment of a bronze fibula, an amber bead, and a disc-shaped ceramic weight (Sakara Sučević et al. 2010). Two stone fragments were discovered nearby in 2009; these artifacts form the focus of this contribution.

Two fragments of an Olynthus-type hand mill

One of the objectives of the 2009 student fieldwork campaign was to clean and document a large, stone-mound structure designated “Gomila 2” (“Mound 2”) and to identify the original perimeter of this circular feature (Fig. 2: right). While clearing this edge, a fragment of a worked stone object made from a distinctive, highly vesicular foreign rock (Fragment A) was recovered as a surface find (Fig. 2: left). Another, smaller and less diagnostic fragment of the same material (Fragment B) was uncovered nearby during the removal of scattered debris from a mixed cultural layer. This layer contained small fragments of prehistoric pottery, larger sherds of Early Roman pottery, and occasional shells and bones. Based on its material and morphology, the larger fragment was immediately recognized as part of a hand mill, whereas the smaller fragment was identified only recently.

Both fragments are dark gray and seem to

be manufactured from the same or very similar material, specifically vesicular volcanic rock.

The larger fragment, Fragment A (Koper Regional Museum, Inv. No.: KK1/09; length 19.7 cm, width 12.4 cm, height 12.2 cm), is part of the upper rectangular grinding stone (Fig. 3: A; 4: A). The fragment preserves a portion of the upper rim, the hopper, the lateral face, and part of the basal working surface. All original surfaces exhibit weathering. The lateral face is nearly vertical, sloping slightly inward at an angle of 6.5°. The rim is 4.0 cm wide, and the hopper tapers downward at an angle of approximately 41° toward the inferred location of the narrow slit. On the lower edge of the lateral face, there is a slightly elliptical depression – partially chipped – which appears to be an intentional feature.

The smaller fragment, Fragment B (Koper Regional Museum, Inv. No.: KK2/09; length 9.2 cm; width 8.9 cm; height 7.8–8.0 cm), likely belongs to the lower stone (Fig. 3: B; 4: B). This fragment preserves two original surfaces: the upper working surface is nearly flat, exhibiting a slight concavity, while the lateral face slopes inward at an angle of 11.5°.

The working surfaces display no visible intentional striations or use-wear traces, a distinctness that may be observed by the small size of the fragments or weathering. It is also possible that the lower stone originally lacked such features. Apart from the indentation on the lateral face mentioned previously, there are no visible indications of handles, levers, or other attachment components.

Due to the specific rock type, which is foreign to the site and to Istria in general, and its distinctive morphology, Fragment A is identified as part of a quern or hand mill with a hopper, known as a “hopper-rubber mill”.

Hopper-rubber mills

For thousands of years, populations across Europe and the Mediterranean relied on various types of saddle querns to grind grain. However, the mid-first



Fig. 2 Kaštelir above Korte: fragment A *in situ* (left) and the stone structure “Gomila 2,” adjacent to which both fragments were recovered (right) (photo by: A. Ogorelec)

Sl. 2 Kaštelir iznad Korta – ulomak A *in situ* (lijevo) i kamena struktura „Gomila 2” pokraj koje su pronađena oba ulomka (desno) (snimio: A. Ogorelec)

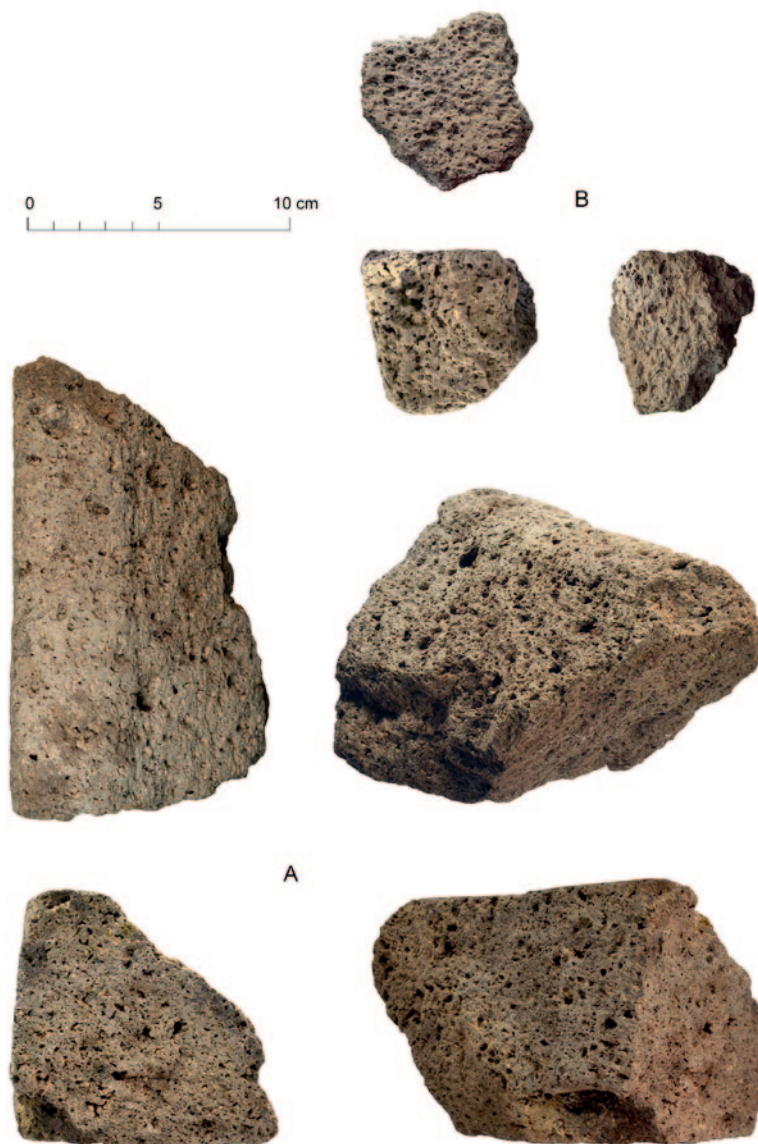


Fig. 3 Photos of the upper (A) and lower (B) fragments of the Olynthus mill from Kaštelir above Korte. (photo by: A. Ogorelec)
 Sl. 3 Fotografije gornjeg (A) i donjeg (B) ulomka žrvnja olintskog tipa s Kaštelira iznad Korta. (snimio: A. Ogorelec)

millennium BC witnessed the emergence of several new grinding technologies, marking a turning point (Alonso, Frankel 2017: 461–462). One such innovation is the hopper-rubber mill (also known as the “Olynthus mill”,⁶ named after the prominent findspot), which originated in the eastern Mediterranean during the 5th century BC (Frankel 2003).

The primary feature of this system, utilized in various types of hand mills, is the hopper – a funnel-shaped slot in the upper stone that

ensures a smooth, continuous flow of grain without the need to pause work or lift the stone. This design offers the additional advantages of being significantly lighter to operate while retaining the majority of the grinding surface area.

A hypothetical evolutionary sequence can be traced from saddle-shaped hand mills, wherein the upper stone first acquired a flat lower surface, followed by lateral handles, and finally a central hopper. This type is most frequently documented in elliptical and rectangular variations along the southern Aegean coast (Alonso, Frankel 2017: 464). However, recent discoveries indicate that this form

⁶ In this text, the term “Olynthus mill” is used exclusively for the “classical” rectangular type, in contrast to the broader group of hopper-rubber mills, which encompasses various shapes.

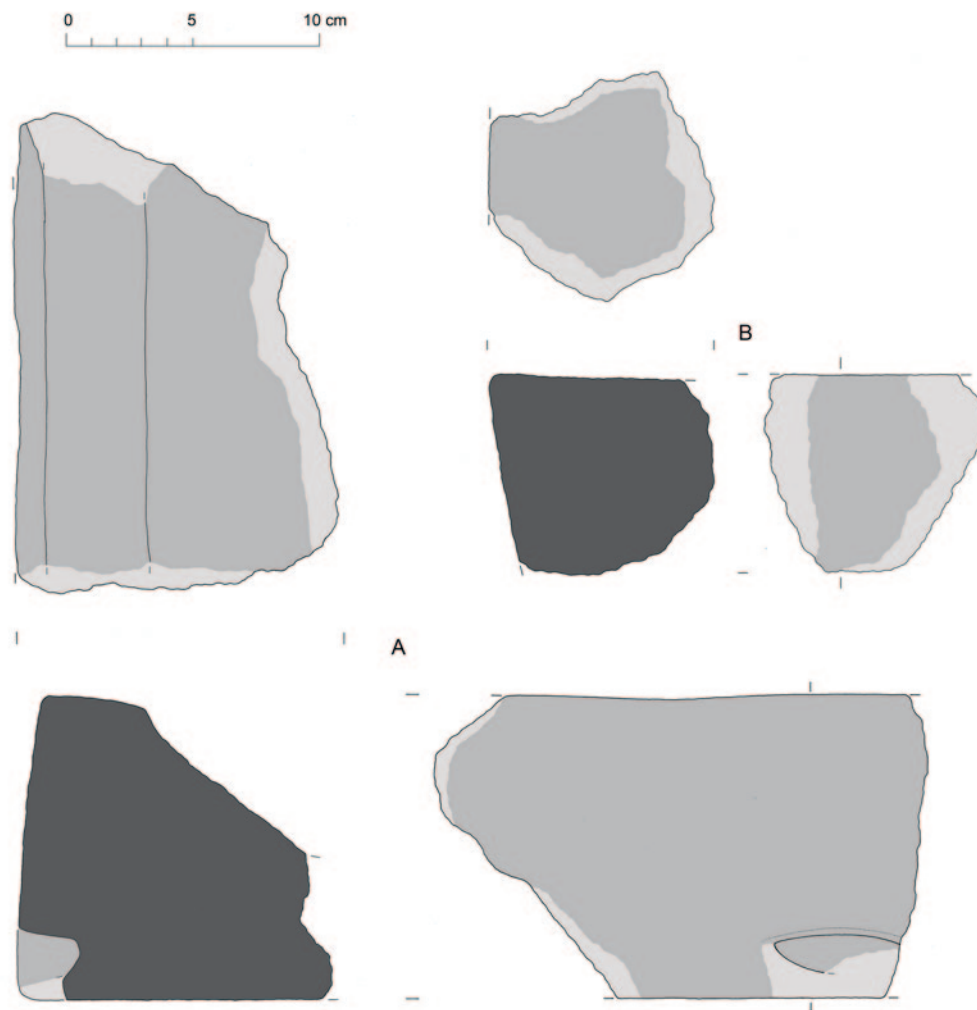


Fig. 4 Drawings of the upper (A) and lower (B) fragments of the Olynthus mill from Kaštelir above Korte. (drawings by: J. Tratnik Šumi)
 Sl. 4 Crteži gornjeg (A) i donjeg (B) ulomka žrvnja olintskog tipa s Kaštelira iznad Korte. (crtež: J. Tratnik Šumi)

was also present in the Adriatic and Anatolia (Radić Rossi 2008: 464–465; Baştürk 2024: 225–226).

A further advancement was the addition of a wooden handle, which functioned as a lever to facilitate the movement of the upper stone, alongside the development of larger formats that enabled the grinding of greater quantities of flour. Conversely, these innovations required more space and a more complex, potentially fixed installation (Fig. 5).

This evolution led to the development of variants differentiated by the method of handle or lever attachment, which, alongside the morphology of the hopper, serves as the primary criterion for typological classification. Some of these variants exhibit a relatively distinct geographical distribution (Frankel 2003: 8–12, Fig. 10). An additional diagnostic element may be the presence of striations on the grinding surfaces of the upper and lower stones.

The classic – i.e., rectangular – hopper mill is primarily distributed across Greece, Palestine, Anatolia, and Sicily. As noted, these mills are

typically high-quality manufactures, produced from carefully selected hard raw materials, predominantly volcanic rocks (e.g., basalt in the Near East and Anatolia, andesite in the Aegean islands). It appears that the design spread with Greek and Phoenician colonists and traders, establishing it as the predominant milling system in the eastern Mediterranean and, beyond this region, chiefly in areas of Greek colonization and influence. The type is also documented in North Africa (Egypt, Tunisia), the northern Black Sea coast, the southern Balkans, and southeastern France. When mills are fashioned from local stone, it is reasonable to assume they were produced locally. Representing a more distant morphological variant are examples from the periphery of the ancient world: the Alpine group in Trentino and Tyrol, where the mill is a characteristic element of Rhaetian material culture, featuring distinctly amorphous, rounded forms (Frankel 2003: 2–7, 17–18, Fig. 1, Tab. 1; Alonso, Frankel 2017: 467; Francisci 2020: 2).

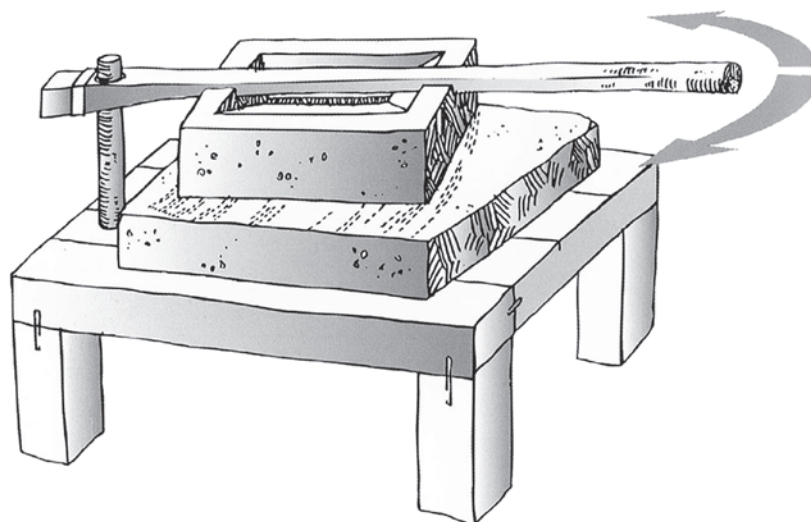


Fig. 5 Olynthus-type hand mill (after Santi 2020: Fig. 2)
Sl. 5 Ručni žrvanj olintskega tipa (prema Santi 2020: sl. 2)

Examples of mills with hoppers are also documented throughout Central Europe (Germany, Czechia, Slovakia, and Poland), where the slots are typically quite inconspicuous. These examples are invariably fashioned from local or regional materials (Wefers 2024: 23–27).

Given the considerable distance from the core regions where such mills were utilized, the origins of this technology remain unclear. Several hypotheses have been proposed, including a Balkan route originating in Thrace and spreading along the Danube, and a Rhaetian origin in the Alps (for an overview, see Frankel 2003: 7; Francisci 2020: 4–5).

The earliest hopper mills in Classical Greece date to the 5th century BC, although they are most commonly recovered from contexts dating between the 4th and 2nd centuries BC (Frankel 2003: 7). Early contemporaneous appearances are to be expected along the coast of Asia Minor; in Phrygia and Anatolia, local variants developed during the 4th century BC (Baştürk 2024, 229–231).

This does not preclude their continued use in later periods; some examples persisted into the 1st century BC, and in the Near East, they remained in use until the end of antiquity. In the former instance, their longevity may be attributed to the quality and utility of the implements, while in the latter, it likely stems from their deep roots in traditional material culture (Alonso, Frankel 2017: 467).

In southern France, the earliest Olynthus mills appeared as early as the 5th century BC. They remained the predominant type from the 4th to the 2nd century BC, at which point they were supplanted by rotary hand mills (Py 1992; Jaccotey et al. 2023).

A similar trajectory is observed in the Rhaetian group and among individual mills from Veneto and Friuli: local forms apparently emerged as early as the

5th century BC, though their origins remain obscure (Francisci 2020: 2). Central European finds possess few well-dated contexts; nevertheless, all appear to date to the La Tène period (Wefers 2024: 27).

Discussion

Fragment A from Kaštelir is clearly identifiable as part of an upper millstone with a hopper, as indicated by its morphology and inclination. However, the absence of diagnostic features hinders a precise determination of its dimensions or specific typology. Fragment B, being smaller and simpler in form, appears to belong to the lower millstone. A basic, roughly flat slab is a feature common to various hand mill types, ranging from saddle querns to lever-operated mills and various hopper mill variants. Nevertheless, given the spatial proximity of the two fragments and the similarity of their material, it is highly probable that Fragment B also originates from an Olynthus mill.

The find from Kaštelir represents the first known example of an Olynthus mill – and, indeed, the only mill with a hopper – discovered in Slovenia and Istria. This scarcity suggests it is a design foreign to the area. This conclusion is further supported by the exotic material and high-quality craftsmanship, indicating that the object was produced in a specialized workshop and subsequently imported.

The millstone is fashioned from vesicular volcanic rock. Although petrographic analysis has not yet been conducted, macroscopic examination suggests a probable origin in Sicily or the surrounding region (personal communication, F. Bernardini and M. Knez). This information is essential for determining the origin of the mill, especially when compared with data from other hopper mills in the Adriatic region.

We can immediately rule out examples from northern Italy, as our specimen (Fragment A) is not comparable in terms of either morphology or material (Francisci 2020: 5–8, Fig. 4–5, 8). On the west coast, several fragments are known from the Celtic-Etruscan settlement of Monte Bibele (Morrone 1999). In at least one instance, judging by the published photograph, the find represents a “classic” Olynthus mill, featuring a high rectangular runner (upper stone) and a socket for a handle (Renzulli et al. 2002: 176, Fig. 2a). However, analyzed samples revealed that the rock used for these mills originated from sites around Orvieto – that is, on the opposite side of the Apennines – where the Etruscans did not utilize this mill type (Santi et al. 2000: 214–215; Francisci 2020: 3). Consequently, the prototype for the Monte Bibele mills remains unknown. A plausible hypothesis involves the mediation of two powerful

Greek emporia in the Po Delta: Spina and Adria. These important settlements, characterized by strong Greek influence – both from mainland Greece and Magna Graecia – have long been considered potential intermediaries for the introduction of hopper mills in northern Italy (Francisci 2020: 3).

Surprisingly, only a single example is known from Spina: fashioned from Aegean andesite, it was used secondarily (or even tertiarily, if it arrived in Spina as ship’s ballast) as a gravestone. In Adria, no examples have been recorded to date (Desantis 1998; Francisci 2020: 3, 5). This scarcity may, however, be due to the limited extent of settlement research.

On the eastern Adriatic coast, mills manufactured from volcanic rock are well-documented, with a concentration in Dalmatia, particularly within the Greek colonies and their hinterlands (Map 3). Mills of various morphologies,



Map 3 Distribution of millstones or fragments of millstones made from Sicilian volcanic rock along the eastern Adriatic coast.

Legend: ● = Olynthus mill; ○ = indeterminate type; ? = potential but unverified fragment; larger symbol = numerous specimens. Sites: 1 San Leonardo; 2 Povir; 3 Kaštelir above Korte; 4 Sv. Dionizije; 5 Sv. Martin above Lim; 6 Senj – Kuk hillfort; 7 Velika Mrdakovica; 8 Bribirska glavica; 9 Danilo – Gradina; 10 Resnik; 11 Vis island (multiple sites); 12 Brdo – Stine (base map: Maps-For-Free, CC0 <https://creativecommons.org/public-domain/cc0/>; prepared by: A. Preložnik)

Karta 3 Rasprostranjenost žrvnjeva ili ulomaka žrvnjeva izrađenih od sicilijanske vulkanske stijene na istočnoj obali Jadrana. Legenda: ● = žrvanj olinthskog tipa, ○ = neodređeni tip, ? = mogući ali nepotvrđeni ulomak, veći znak = brojni primjerci. Nalazišta: 1 San Leonardo; 2 Povir; 3 Kaštelir iznad Korte; 4 Sv. Dionizije; 5 Sv. Martin iznad Lima; 6 Senj – gradina Kuk; 7 Velika Mrdakovica; 8 Bribirska glavica; 9 Danilo – Gradina; 10 Resnik; 11 otok Vis (više nalazišta); 12 Brdo – Stine (osnova: Maps-For-Free, CC0 <https://creativecommons.org/public-domain/cc0/>; izradio: A. Preložnik)

including a fully preserved elliptical hopper-rubber mill with handles, are recorded among the finds from the shipwreck at Krava near Vis, which is dated to the 4th–3rd centuries BC based on amphorae types (Radić Rossi 2008: 465; 2017: 16; Web Register 2025). Numerous other mills and fragments – predominantly rectangular but also encompassing other types – have been discovered on Vis itself, both during excavations of the Issa settlement and as surface finds, as well as in the vicinity of Roman villas on the eastern part of the island. These examples may have remained in use as late as the 1st and 2nd centuries AD (Šuta et al. 2017; personal communication B. Čargo).

Numerous examples of Olynthus mills have been discovered at Resnik (ancient Siculi), a settlement established by Greeks from Vis that thrived between the 2nd and 1st centuries BC as a commercial hub linking island Greeks with their mainland trading partners. Some examples were recovered from the remains of the settlement's earlier phase, while others were found in secondary contexts, likely having been reused as building material (Šuta et al. 2017). To date, only an extensively worn runner (upper stone) from an Olynthus mill and a lower plate, likely from the same mill type, have been published (Šuta 2011: 106–107).

Analysis of selected mill samples from Vis and Resnik indicates that the stone originates from Sicily (Šuta et al. 2017; Borzić, Radić 2021: 354, note 27). This finding is consistent with the historical context, as Issa was established on the initiative of Syracuse, and Siculi functioned as an outpost of Issa.

Fragmentary remains of what are likely millstones made from vesicular volcanic rock have also been recovered from several indigenous hillforts in Dalmatia. Primarily on the basis of their material composition, these finds are classified as Olynthus mills.

Two smaller fragments recovered from the Brdo – Stine hillfort on Korčula (Borzić, Radić 2021: 352–354, Fig. 6: 4–5) are interpreted by the authors as components of an Olynthus mill, possibly representing the lower and upper stones of a single set. From the long-lived settlement of Velika Mrdakovica (ancient Arauzona), a rectangular lower plate has similarly been identified as part of an Olynthus mill (Brajković 2023: 30, Fig. 27).

Fragments of volcanic millstones were recorded among the surface finds at the Kuk hillfort above Senj, and similar items are known (though as yet unpublished) from other Velebit sites (Domines Peter 2024: 162, note 13; personal communication P. Domines Peter).

Petrological analysis has confirmed that Sicilian lava is the source material for certain querns from Bribirska Glavica; however, the specific typology and dating of the samples were not provided (Simat, Lugović 2011).

We might also tentatively include Gradina above Danilo among these sites, based on an archival photograph of quern fragments discovered there, which includes a distinctly

vesicular specimen (Zaninović 1978: Fig. 4).

The inhabitants of these hillforts recognized the advantages of Greek mills – both in terms of their technological superiority and the quality of the material – and actively acquired them. The Dalmatian finds illustrate the supply chain: originating from quarries and stonemasonry workshops in Sicily, these mills were shipped to Greek colonies in the Adriatic, where they served as everyday household items. It is reasonable to assume that, through these intermediaries, the mills became known to nearby indigenous populations. The more prominent and maritime the community, the stronger its connections with Greek settlers or traders, thereby increasing the likelihood of acquiring such imported mills. As fragments are often difficult to identify, an accurate picture of their distribution remains elusive. However, the current pattern, wherein finds are concentrated primarily near Greek settlements and coastal zones, is likely not coincidental.

Conclusion

What are the implications for the Olynthus mill from Kaštelir? Kaštelir was undoubtedly an important, long-lived regional center. Its geographic location, situated near the sea, facilitated easy communication with the coast and maritime traffic. It would be anomalous if Greek sailors, who are known to have navigated the Istrian coast along the route around Caput Adriae and were familiar with the Timavo springs (Strabo V, 1, 8), did not make stops in this area.

Certain coastal toponyms of Greek origin situated between the Mirna and Rižana rivers likely represent a legacy of the late Hellenistic period (Šašel 1974: 452). While Piranon is not attested in ancient sources, Aegida, first mentioned by Pliny (*Nat. Hist.* 3, 127), was clearly a significant pre-Roman settlement in northwestern Istria. Its precise location remains unidentified, with various hypotheses siting it at Koper, Sermin, or Elleri/Jelarji (overview by Šašel 1974: 448–449, 452; Župančič 1985: 315; Plestenjak 2013: 13; Degrassi, Brani 2024: 152–153). The identification with Koper rests on etymological grounds, while the cases for Sermin and Elleri are supported by topographic suitability and archaeological material contemporary with Kaštelir. Sermin, situated by the sea at the estuary of the Rižana River, appears to be a particularly compelling candidate.

Finds dating to at least the second century BC have been documented there, including Greco-Italic amphorae, which are also known from Kaštelir (Horvat 1997: 57; Tomaž, Sakara Sučević 2017: 94). Even more significant evidence of close contact with the Greek world is the presence of disc-shaped loom weights found at both Sermin and Kaštelir (Horvat 1997: Pl. 26: 8; Sakara Sučević et al. 2010); these artifacts find their best parallels in Greek settlements in Dalmatia (Korić 2024: 72–73). Irrespective of the identification of Sermin as Aegida, the assemblage suggests a connectivity pattern in Istria similar to

that observed in Dalmatia – albeit on a smaller scale: a network linking Greek maritime trade to coastal emporia and, subsequently, to indigenous hillforts.

The available data and subsequent analysis demonstrate that these findings both corroborate and expand upon the current understanding of Greek-indigenous relations along the eastern Adriatic coast, as derived from other Hellenic cultural markers such as numismatics (e.g., Gorini 2012; Visonà 2017; Domines Peter 2024), amphorae (e.g., Kirigin 1994; Miše, Quinn 2022; Borzić 2017; Radić Rossi 2017), and prestige goods (e.g., Blečić Kavur, Kavur 2020; Blečić Kavur 2024), all of which are well-documented in Istria (Mihovilić 2002: 504–511). It is crucial, however, to recognize that these represent distinct classes of material. Olynthus mills are distinguished by their strictly utilitarian function as everyday implements; yet, by virtue of their advanced technology and exotic material composition, they are undeniably products of long-distance trade networks.

Precise chronological attribution of the Kaštelir mill remains elusive at this time. Nevertheless, the focus should likely be directed toward the interval between the 4th century BC – when Olynthus-type mills reached their zenith and Greek presence in the Adriatic intensified – and the 2nd century BC. The latter date corresponds with the appearance of late Hellenistic assemblages from Kaštelir and Sermin, as well as the dating of late Olynthus mill examples from Vis and Resnik. As the Resnik example demonstrates, mills manufactured from high-quality raw materials were valued commodities, utilized until they were worn to exhaustion.

The discovery of the Olynthus mill from Kaštelir necessitates a reevaluation of similar fragments currently held in Istrian and other museum

collections. Even in the absence of additional petrographic studies, this find offers new insights into earlier analyses of querns, which indicated that certain specimens from Istria and the Karst were manufactured from Sicilian hawaiiites and mugarites (Antonelli et al. 2004: 540–541; Bernardini 2005) (Map 3: 1–2, 4–5). Since these artifacts were uniformly classified as “Saddle-quern?” or indeterminate, it is plausible that some represent the remains of imported Olynthus mills or other mill types that reached these regions via Greek maritime networks.

Finally, this discovery indicates that “Greek” hopper-mill models reached the northern Adriatic coast, a fact that may explain their early appearance in Friuli and eastern Veneto (Montereale, Oderzo). Furthermore, it supports the hypothesis that the Piave River served as a conduit for the diffusion of this technology into the Rhaetian sphere (Francisci 2020: 11–13).

Acknowledgments

The authors acknowledge the financial support from the Slovenian Research and Innovation Agency for the “Osor beyond the Myth (N6-0292)” project.

We want to thank Maša Saccara, Alenka Tomaž, and Snježana Karinja for information regarding Kaštelir and its finds; Martin Knez, Angelo De Min, and Federico Bernardini for providing macroscopic analysis and determining the most probable origin of the material; and our colleagues from Croatia (Biljana Burazer, Boris Čargo, Pio Domines Peter, Andrej Janeš, Robert Matijašić, and Morana Vuković) for sharing their knowledge and information regarding Olynthus mills.

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Sažetak

Kaštelir iznad Korta kod Izole jedna je od najvećih i najvažnijih istarskih gradina. Nalazi se u sjeverozapadnoj Istri (karta 1), na zaravni na vrhu brda (sl. 1).

Arheološka istraživanja (vidi kartu 2) – od poslijeratnih iskopavanja (Boltin 1959; 1967) do novih istraživanja Instituta za baštinu Mediterana od 2008. do 2014. (Sakara Sučević et al. 2010; Tomaž, Sakara Sučević 2017) – otkrila su dugotrajnu naseljenost od kasnog neolitika do rimskog razdoblja (Boltin 1959; Boltin-Tome 1967: 172; Sakara Sučević 2008: 443–444; 2012: 59; Tomaž, Sakara Sučević 2017: 93–94). Iako su dosadašnja istraživanja pokazala da je stratigrafija nalazišta znatno oštećena poljoprivrednim radovima, prikupljeni su brojni nalazi.

Godine 2009. u blizini velike strukture nalik kamenoj gomili (sl. 2) otkrivena su dva ulomka obrađenog kamenog predmeta izrađenog od vezikularne vulkanske stijene. Veći ulomak (sl. 3: A; 4: A) dio je gornjeg pravokutnog kamena žrvnja, s djelomično očuvanim gornjim rubom, lijevkom, bočnom stranom (s namjerno (?) izrađenim eliptičnim udubljenjem) i dijelom donje radne površine. Manji ulomak (sl. 3: B; 4: B) vjerojatno pripada donjem kamenu. Zbog specifične vrste stijene, koja ne pripada samom nalazištu ni Istri općenito, te zbog karakterističnog oblika, ulomak A može se identificirati kao dio žrvnja/ručnog mlina s lijevkom, takozvanog „hopper-rubber mill”, poznatog i kao „žrvanj olinskog tipa”.

Njihova je ključna značajka ljevkastrasti otvor u gornjem kamenu koji omogućava dodavanje zrnja bez prekidanja rada. Varijante se uglavnom razlikuju po obliku lijevka i načinima pričvršćivanja ručke (Frankel 2003: 8–12; Alonso, Frankel 2017: 461–462). Klasični pravokutni oblik žrvnjeva s lijevkom (za kojeg koristimo izraz „žrvanj olinskog tipa”; sl. 5) može se naći diljem Grčke, Palestine, Anatolije i Sicilije. Ovi su žrvnjevi obično kvalitetno izrađeni od tvrdih vulkanskih stijena. Njihovo širenje povezuje se s grčkom i feničkom kolonizacijom i trgovinom (Frankel 2003: 2–7, 17–18; Alonso, Frankel 2017: 467). Najraniji pouzdano potvrđeni žrvnjevi s lijevkom potječu iz 5. st. pr. Kr. u klasičnoj Grčkoj, dok većina nalaza potječe iz razdoblja od 4. do 2. st. pr. Kr. (Frankel 2003: 7).

Nalaz s Kaštelira prvi je poznati primjer žrvnja olinskog tipa, a zapravo i jedini žrvanj s lijevkom u Sloveniji i Istri. Izrađen je od vezikularne vulkanske stijene, vjerojatno podrijetlom sa Sicilije ili iz obližnjeg područja (osobna komunikacija, F. Bernardini i M. Knez).

Na istočnoj obali Jadrana žrvnjevi od vulkanske stijene poznati su i koncentrirani u Dalmaciji, osobito na području grčkih kolonija i njihova zaleđa (karta 3). Na Visu (antička Isa) (Radić Rossi 2008: 465; Šuta et al. 2017; osobna komunikacija B. Čargo) i u Resniku (antički Sikuli) (Šuta 2011: 106–107; Šuta et al. 2017) otkriveni su uglavnom pravokutni žrvnjevi, ali i druge vrste. Analiza izabranih uzoraka žrvnjeva s tih dvaju lokaliteta pokazuje da je kamen sicilijanskog podrijetla (Šuta et al. 2017; Borzić, Radić 2021: 354, bilj. 27). To ne iznenađuje, s obzirom na to da je Isa osnovana na

inicijativu Sirakuze, a Sikuli su bili ispostavljeni. Nejasni ulomci vjerojatnih žrvnjeva izrađenih od vezikularne vulkanske stijene nalaze se i na nekim autohtonim gradinama u Dalmaciji (Brdo – Stine: Borzić, Radić 2021: 352–354, sl. 6: 4–5; Velika Mrdakovica: Brajković 2023: 30, sl. 27; gradina Kuk iznad Senja i neka druga velebitska nalazišta: Domines Peter 2024: 162, bilj. 13, i osobna komunikacija P. Domines Peter; vjerojatno i Bribirska glavica: Simat, Lugović 2011 te Gradina iznad Danila: Zaninović 1978: sl. 4). Dalmatinski nalazi ilustriraju lanac opskrbe ovim predmetima: od kamenoloma i klesarskih radionica na Siciliji do grčkih kolonija na Jadranu, gdje su služili kao svakodnevni kućanski predmeti. Može se pretpostaviti da se putem njih obližnje autohtono stanovništvo upoznao s takvim žrvnjevima.

Kaštelir je nedvojbeno bio važno, dugovječno regionalno središte. Njegov zemljopisni položaj nedaleko od mora omogućavao je laku vezu s obalom i pomorskim prometom. Pojedini obalni toponimi grčkog podrijetla između rijeka Mirne i Rižane mogli bi biti nasljeđe kasnog helenističkog razdoblja (Šašel 1974: 452). Sermin (jedna od mogućih lokacija antičke Egide), smješten uz more na ušću rijeke Rižane, čini se posebno značajnim. Tamo su dokumentirani nalazi koji datiraju najmanje u 2. st. pr. Kr., poput grčko-italskih amfora, koje su poznate i s Kaštelira (Horvat 1997: 57; Tomaž, Sakara Sučević 2017: 94). Još značajniji dokaz bliskih kontakata s grčkim svijetom bili bi diskoidni utezi za tkalački stan pronađeni i na Serminu i na Kašteliru (Horvat 1997: T. 26: 8; Sakara Sučević et al. 2010), koji svoje najbolje paralele nalaze u grčkim naseljima u Dalmaciji (Korić 2024: 72–73). Bez obzira na to je li Sermin Egida ili nije, na temelju tamošnjih nalaza možemo pretpostaviti da je u Istri postojala slična veza kao i u Dalmaciji, samo u manjem opsegu: grčka pomorska trgovina – obalni emporiji – autohtone gradine. Žrvnjevi olinskog tipa jedinstveni su po tome što su očito uporabni i svakodnevni alati, a istodobno su, zbog nove tehnologije i osebujnog materijala, nedvojbeno predmet trgovine na velike udaljenosti.

Datiranje žrvnja s Kaštelira zasad nije moguće, no vjerojatno se trebamo usmjeriti na razdoblje između 4. i 2. st. pr. Kr.

Zahvale

Autori zahvaljuju na financijskoj potpori Slovenskoj agenciji za istraživanja i inovacije za projekt „Osor s onu stranu mita (N6-0292)”.

Zadužili su nas Maša Saccara, Alenka Tomaž i Snježana Karinja informacijama o Kašteliru i njegovim nalazima, Martin Knez, Angelo De Min i Federico Bernardini provedbom makroskopske analize i određivanjem najvjerojatnijeg podrijetla materijala, kao i kolege iz Hrvatske (Biljana Burazer, Boris Čargo, Pio Domines Peter, Andrej Janeš, Robert Matijašić i Morana Vuković) razmjenom znanja i podataka o žrvnjevima olinskog tipa.