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A Byzantine rotary hand mill in Thorikos

ABSTRACT: *The excavation of Cistern No°1 has shown that the latest occupation phase in Thorikos might extend further in time than has been thought initially. Among the finds, two uncommon rotary hand mill's fragments, belonging to the cistern's upper layer, allow expanding upon the knowledge of this latest phase. This contribution presents several aspects of these finds, like their typology and raw material, and discusses their chronology. It also sums up archaeological data relative to Late Antique and Byzantine remains in Thorikos and Lavrio to put the finds into a broader perspective. The paper concludes that the rotary hand mill might date from the 7th–8th century AD or later and emphasizes the need to publish such kind of data systematically.*

KEYWORDS: LAURION, CISTERN NO°1, MILLSTONES, GRINDING, MILLING EQUIPMENT, VOLCANIC ROCK

Introduction

From 2010 to 2012, a team of archaeologists from Ghent and Utrecht Universities, directed by R.F. Docter and F. van den Eijnde, conducted archaeological investigations in the zone of Cistern No°1 in Thorikos. The excavation of the cistern, co-directed by K. Van Liefferinge, resulted in the publication of three preliminary reports in 2011: one presenting the primary raw data and giving some initial interpretations (Van Liefferinge, et al., 2011), one giving an overview of the Late Archaic to Late Antique finds from the fill and the surroundings of the cistern (Docker, Monsieur and van de Put, 2011), and one focusing on the Late Classical and Early Hellenistic finds (Mortier, 2011). Elsewhere in this volume, another contribution deepens the study of the finds related to the last use and abandonment of Cistern No°1. Within this context, the present publication aims at providing information on an exceptional type of find in Thorikos: a rotary hand mill, of which two non-joining fragments were found during the 2011 excavations. Although somewhat isolated in Thorikos' archaeological record, these two finds are of great importance and provide the opportunity to reflect and expand upon the knowledge of the latest, less well-known phase of the site's occupation.

Description of the finds and contexts

The fragments were registered as TP11.149 and TP11.545. Although they are non-joining, they belong probably to the

same grinding implement. Both were found in the same area of the cistern and have the same material characteristics.

TP11.149 is a fragment of the upper stone of a rotary hand mill (Fig. 1). Part of the collar, eye and cutting for the rynd is preserved (see Fig. 2 for the terminology).

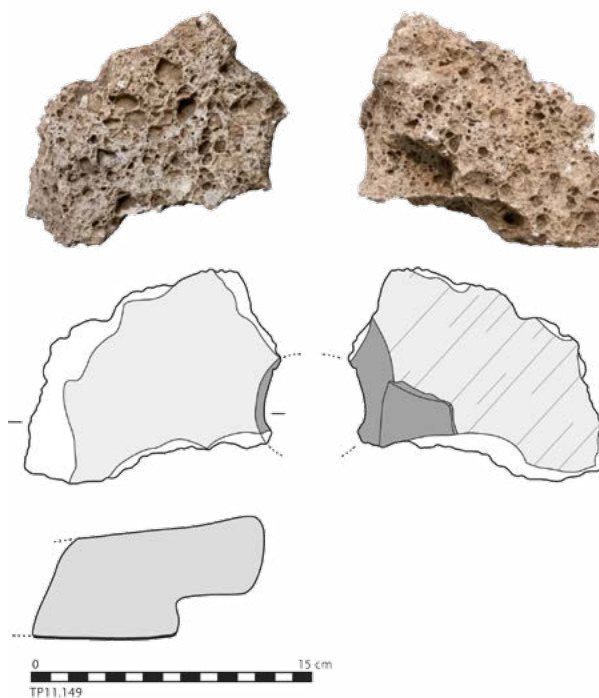


Fig. 1: Thorikos, Cistern No°1, fragment of the upper stone of a rotary handmill, Cat. 1: TP11.149 (source: S. Duchène).

The maximum preserved radius is 13 cm. The preserved height ranges from 6.7 cm at the top of the collar to 6 cm elsewhere. The weight of this fragment is 0.7 kg. It is made of a white vesicular igneous rock.

Likewise, TP11.545 is a fragment of the upper stone (Fig. 3). However, no typological features were conserved. The maximum preserved dimensions of the fragment are 9.5 cm by 7.8 cm, and its maximum preserved height is 5.1 cm. The fragment weighs 0.3 kg. It is made of the same white vesicular igneous rock as TP11.149.

TP11.149 and TP11.545 were found respectively in contexts T11-15-1 and T11-10-3. The latter was excavated in the upper layers of the cistern's zone A (Fig. 4; see

also Van Liefferinge, et al., 2011, fig.10). It is the continuation of T11-10-1 and -2 and is followed by T11-10-4, -5, and -6. These contexts are characterized by a layer of fine brownish silty sand and a considerable quantity of stones (layer 2), concealed under a top layer of humus and large stone blocks (layer 1) (Van Liefferinge, et al., 2011, p.66; Docter, et al., this vol., figs.6–7). Besides TP11.545, T11-10-3 yielded a series of sherds ranging from Archaic time to Late Antiquity. Like T11-10-3, context T11-15-1 (where TP11.149 was excavated) is located in zone A of the cistern. However, T11-15-1 is completely contaminated as it consists of cleaning operations of a trench dug in 2010.

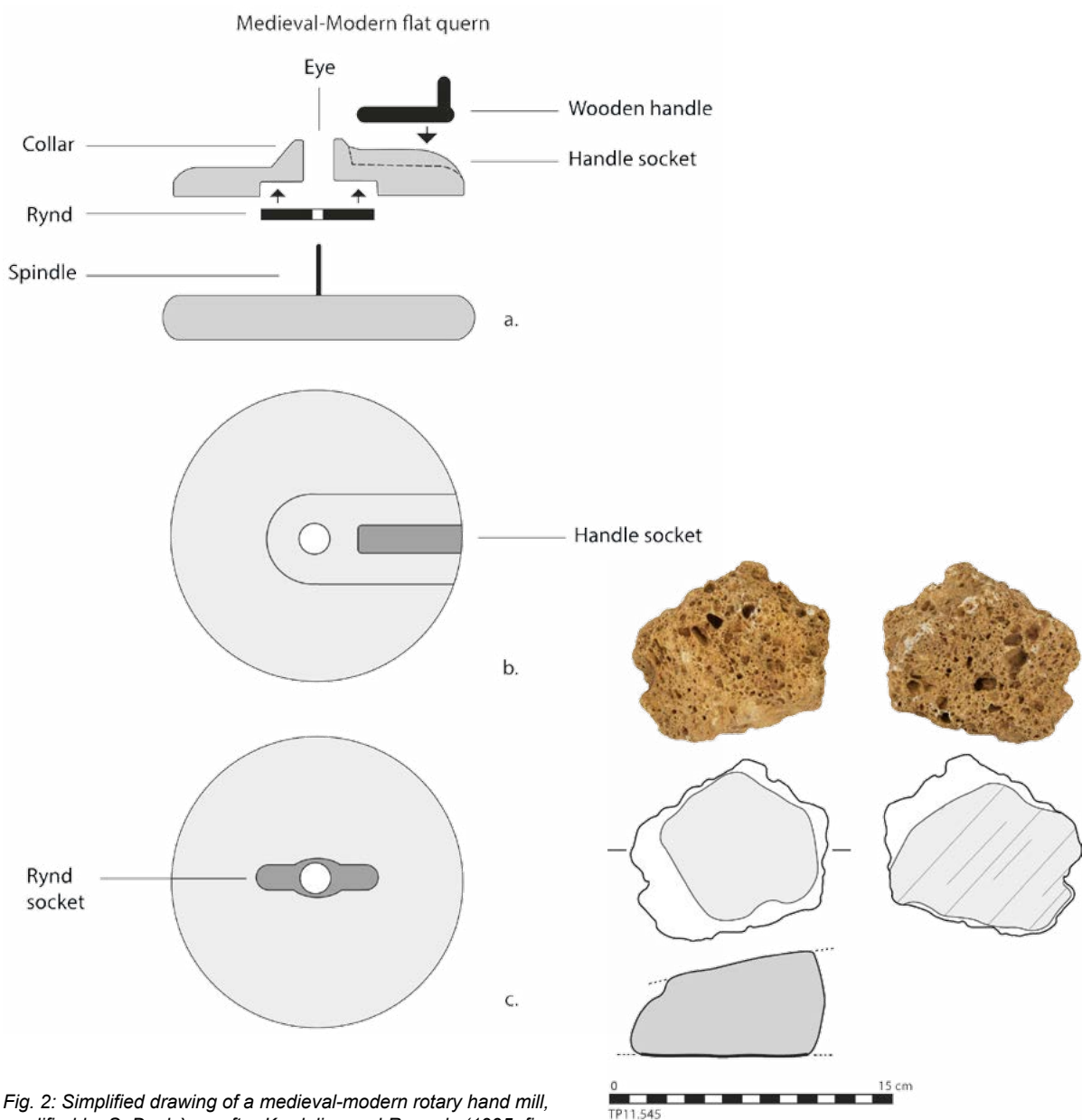


Fig. 2: Simplified drawing of a medieval-modern rotary hand mill, modified by S. Duchène, after Kardulias and Runnels (1995, fig. 96). – a. Section view of the mill; – b. Top view of the upper stone; – c. Bottom view of the upper stone, modified by S. Duchène, after Kardulias and Runnels (1995, fig. 96).

Fig. 3: Thorikos, Cistern No°1, fragment of the upper stone of a rotary handmill, Cat. 2: TP11.545 (source: S. Duchène).



Fig. 4: Thorikos, map of Cistern No°1 with the indication of zone A, modified by S. Duchène, after a map by C. Stal, K. Van Liefferinge and R. Docter, TARP 2020.

The upper layers of the fill belong to the very last episodes of occupation of the cistern’s area. These episodes can be situated in the 6th, 7th, and even 8th centuries AD (Docter, Monsieur and van de Put, 2011, pp.95, 108, 119–120, cat.51, 80). The above implies that only limited chronological insight can be obtained from the archaeological contexts to help to date TP11.149 and TP11.545 more precisely. Therefore, the typological aspects of the fragments should be examined in an attempt to identify a more specific period. The next two sections propose,

firstly, an overview on rotary hand mills and, secondly, a more specific look at the type of mills in the Aegean.

Rotary hand mills: an overview

Rotary hand mills – or querns – consist of a fixed lower stone (*meta* or μύλη), and of a mobile upper stone (*catillus* or ὄνοϋς) which is operated by hand in a continuous, or in

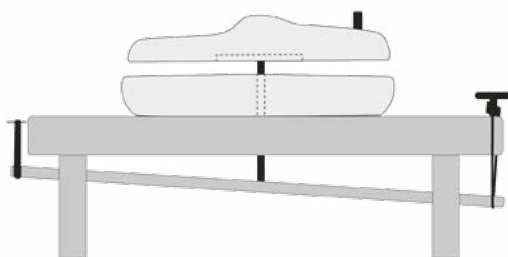


Fig. 5: Simplified drawing of a rotary hand mill with the spindle resting on a bridge tree, modified by S. Duchène, after Runnels (1988, fig. 1) and Longepierre (2010, fig. 7). Not to scale.

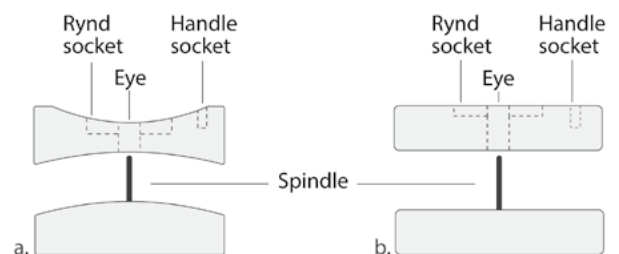


Fig. 6: Simplified drawings of Roman and Late Roman rotary hand mills in Argolid, Isthmia, Corinth and Athens according to C. Runnels, modified by S. Duchène, after Runnels (1990, fig. 1). Not to scale.

some cases semi-continuous, circular motion. Rotary hand mills originate in the Western Mediterranean and seem to be the result of an Iberian innovation taking place at the end of the 6th or the beginning of the 5th century BC (Alonso, 2002; Alonso and Frankel, 2017, p.470). Over the centuries, this new type of implement spread across the Mediterranean to reach Greece in the 1st century BC and Israel in the 1st century AD, under the influence of the Roman expansion (Runnels, 1990, p.147; Alonso and Frankel, 2017, p.470).

Their morphology varies over time and depending on the region, but some general features, not typical to Greek specimens only, can be summed up as follows (Fig. 2).¹ Both stones are generally circular in outline, but their shape can fluctuate in section. The upper stone, for example, can be cylindrical, hemispherical or flat (Peacock and Green, 2013, pp.65–71). Besides the shape of the millstones, other elements characterize the rotary hand mill. A hole, or eye, is usually drilled in the centre of the upper stone to allow the material to be ground to flow down between both implements. Another feature is the vertical spindle in metal or wood, which is fastened in the middle of the lower stone and topped the rynd. The latter is a horizontal component usually inserted somewhere above or under the eye. Together, spindle and rynd keep both stones in the same axis and avoid deviations of the circular motion (Alonso and Frankel, 2017, p.470). In more advanced configurations, the spindle goes through the whole thickness of the lower stone and is connected to a mechanism under the latter, which allows adjusting the distance between both millstones (Fig. 5; see also Longepierre, 2010, p.92 fig. 7). Finally, one or more cavities were cut on the top or on the lateral side of the upper stone to fasten the handle.

Rotary hand mills in the Aegean

Turning now specifically to rotary hand mills in the Aegean, a scarcity of finds, publications and recent systematic studies is to be deplored.² Medieval hand mills are particularly poorly documented (Arthur, 2011, p.205). However, the seminal article of C. Runnels (1990), based on the examination of 36 specimens from Corinth, Athens, Isthmia and the Southern Argolid, provided a general framework for chronologically distinguishing rotary hand mills. According to Runnels, rotary handmills were introduced in Greece by the Romans after the first century BC onwards (Runnels, 1990, p.147). From then on, rotary handmills underwent a typological transformation which has allowed archaeologists to distinguish between Roman and medieval mills. In his data set, rotary hand mills of Roman and Late Roman sites up until 6th century AD were of two types: hopper querns, which had a large, hopper-shaped upper stone, and flat querns (Fig. 6). The rynd was always inserted above the eye. On the contrary, medieval-modern rotary querns from 12th to 18th-century

sites he studied never had a hopper and were always flat. They typically had a raised collar around the eye, and the rynd socket was located underneath the upper stone (Runnels, 1990, p.151) (Fig. 3).

Moreover, according to Runnels (1990, pp.151–152), the raw material seems to be another way to distinguish between Roman and medieval querns. Indeed, in his study, the Roman and Late Roman samples were usually made of the same kinds of volcanic rocks³ that he called andesite and were commonly used for other grinding stones (Runnels, 1990, p.151). By contrast, most medieval and modern querns examined by the scholar appear to be made of a previously not attested, pale orange or nearly white vesicular hydrothermally altered volcanic rock (Runnels, 1990, p.153).

In this framework, the discovery of two pairs of rotary hand mills in the 11th-century shipwreck of Serçe Limani is of great importance since they are well-dated (ca. 1025 AD) and illustrate the typological features of medieval mills: flat querns, rynd cutting at the bottom of the upper stone and a raised collar around the eye (Runnels, 1988; 2004). Moreover, their raw material seemed very similar to medieval querns discovered in the Southern Argolid (Kardulias and Runnels 1995, p.127). O. Williams-Thorpe and R.S. Thorpe (Runnels, 2004, pp.259–260) conducted a limited provenance analysis on two samples of the Serçe Limani mills and suggested that they might come from Rema in Milos. In post-Medieval times, this rock was used to produce renowned millstones that made up the majority of the island's exports in the 19th century AD (Runnels, 1981, pp.235–236; Renfrew, 1982, p.278). However, Milos may be only one of many possibilities. Indeed, P. Arthur underlines that similar rock crops out elsewhere in the Aegean (Arthur, 2011, pp.205–206). Furthermore, according to R. Poupaki, who studied Koan rotary hand mills, a Koan origin for the Serçe Limani mills might also be considered (Poupaki, 2011, p.53; 2017, pp.86, 117).

This section has described characteristics that may help distinguishing medieval and modern rotary hand mills from Roman and Late Roman ones. However, before moving on to the next section, it is necessary to keep in mind that regional variations in typology and raw material undoubtedly existed.

A Byzantine rotary hand mill in Thorikos?

Let us now examine the fragments discussed in this paper in light of the characteristics described above. Even though TP11.149 (Fig. 1) is small and rather poorly conserved, it still preserves two essential features. First, at one end, a circular polished zone can be interpreted as a part of the eye. Secondly, a somewhat regular, although incomplete, cutting underneath the eye can be considered as the socket for the rynd. Noticeably, the section of TP11.149 also reveals a slight elevation around the eye, although the

overall shape of the fragment indicates a rather flat quern. The second fragment (TP11.545) is flat in section but, unfortunately, did not keep any other typological feature.

The preserved characteristics of TP11.149 make it possible to attribute the fragment to a late period in the history of Thorikos. The position of the rynd socket underneath the eye suggests that the fragment did not belong to a Roman or Late Roman mill, but to a later one. Published parallels are scarce, but in the ancient Halasarna's data set, which ranges from Roman time to mid 7th century AD, no upper stone seem to have such an underneath rynd socket (Poupaki, 2011; 2017). Therefore, although a later date cannot be ruled out, it seems possible to attribute the fragments to a period ranging from the 7th century to the 8th century AD, following the chronology of the latest sherds identified in the cistern's fill.

Concerning the raw material, both fragments are made of the same white vesicular volcanic rock that seems to match the descriptions given of the Rema stone. As previously stated, caution must be applied since similar rocks possibly crop out elsewhere in the Aegean. The foreseen petrographic and geochemical analyses⁴ of one of these fragments will tell whether or not Milos might have been the source of these finds.

Nevertheless, Rema stone remains a possibility, and would not be incompatible with a date in the 8th century AD. Indeed, P. Kardulias and C. Runnels observed a change in the raw material of Southern Argolid's grinding implements from the 7th century AD onwards (Kardulias and Runnels, 1995, p.127). Before that, most of grinding implements around the Saronic Gulf, in Argolid and Attica, were made of volcanic rocks imported from Aegina, Methana or Poros, since the beginning of the Bronze Age up into Classical time (Runnels 1981, p.114). From Classical time onwards new types of grinding implements made of black vesicular lavas were introduced from more distant places like Nisyros, which became the primary sources in Roman times (Runnels, 1981, pp.124–126, 130; Kardulias and Runnels, 1995, p.138). These millstones' exchange and trade circuits, which also applied to Thorikos and the Laurion,⁵ seem to end somewhere around the 7th or 8th century AD. One explanation given by these scholars is the disruption of these circuits due to Saracen and Slavic raids that took place at that time (Kardulias and Runnels, 1995, p.138).

To conclude this section, although caution must be applied because of the lack of parallels, the fragments presented in this contribution might have belonged to a 7th–8th-century AD rotary hand mill. This timeframe has been assigned based on the date of the latest sherds identified in the cistern's fill but also on the typological differences between Late Roman and medieval querns. However, this might be a very early date for such a mill, and a later one should not be dismissed. Therefore, it cannot be excluded that future publication of new material disproves this interpretation.

In the next section, some contemporary archaeological evidence in Thorikos and the Laurion will be briefly

summed up to put the mill's fragments into a broader context.

Contemporary evidence

Scanty, yet solid evidence for occupation in Thorikos at the end of the Early Byzantine period can be found in Insula 3, more particularly in the Tower Compound AX. This complex, composed of a tower, buildings, and a courtyard, was erected in early 5th century BC. Since then, it has experienced several structural transformations and phases of occupation, the latest going from the 4th/5th to the 7th century AD (Spitaels, 1978, pp.67, 109; Kalaitzoglou, 2004, pp.67–94), or even possibly to the 8th century AD (Docter, Monsieur and van de Put, 2011, p.100).⁶

The nature of this latest occupation's phase is not precisely known but was perhaps related to a resumption of the mines' exploitation in the 5th century (Spitaels, 1978, p.109; Docter, Monsieur and van de Put, 2011, pp.119–120; Monsieur, 2008; Konstantinidou, forthcoming). According to H.F. Mussche (1998, p.65), the scale of this Late Roman occupation was limited, and it did not last after Slav incursions in 582–3 AD. However, as indicated previously, the results of the cistern's excavation and the study of the pottery indicate that this occupation did persist beyond that point and continued into the 8th century AD (Docter, Monsieur and van de Put, 2011, p.119 fig.46).⁷

In her PhD thesis on urban and rural landscape in Early and Middle Byzantine Attica between the 4th and 12th century AD, E. Tzavella reflects on these latest findings. She suggests that, during this last attested occupation phase, Thorikos might have functioned as a guardpost to control the bay (Tzavella, 2012, pp.203–204). However, the evidence is too scanty, and Tzavella does not exclude a purely domestic character either.

In Southeast Attica, other places have preserved Late Antique/Early Byzantine, 8th–9th-century AD, or Middle Byzantine remains. T. Mattern (2010, pl. 53) and E. Tzavella (2012, pp.175–190) have listed many of these. Noticeably, at nearby Lavrio and thus not far from Thorikos, excavations have revealed finds or structures of Late Antique to Middle Byzantine date. There is the 5th-century AD basilica, where the well-known mosaic floor was discovered (Gini-Tsophopoulou, 1985, p.82). On the slopes of a little hill near to the scoria mount⁸ Cordella (1869, p.32) reports the presence of a necropolis where several hundreds of coins from Constantine (311–337 AD) to Honorius (395–423 AD) were discovered. M. Salloria-Oikonomakou (2007, p.46) reports recent excavations in that area, which confirmed Cordella's findings, and states that an extensive settlement must have thrived at Lavrio from the 4th to the 7th AD. Besides the coins mentioned above, several later ones were found in Lavrio, some of which from the Middle Byzantine period (Cordella, 1869, p.32). Another unique find is a 9th–10th century AD decora-

ted bronze buckle that was discovered next to the basilica. Such a buckle could indicate the presence of a local elite in Lavrio at that time (Tzavella, 2012, pp.185, 205).

Although many events might have disturbed Attica's occupation pattern in Late Antiquity and Early Byzantine time (Mattern, 2010, p.202; (Docter, Monsieur and van de Put, 2011, p.120), the above indicates that Thorikos outlived these Late Antique events in a limited but evident way.

Finally, it is not known whether the millstone's fragments discussed in this contribution were used to grind grain or some other type of material. However, they indicate that somewhat regular domestic or artisanal activities may have taken place in the cistern's area. Likewise, millstone fragments discovered in a dark-age settlement in Isthmia's ancient Roman baths were considered as an indication of domestic activities (Gregory, 1994, p.159). If a 7th or 8th-century date is admitted for TP11.149 and TP11.545, they could be concomitant with the latest phase of the Tower Compound AX. If, at a later date, this interpretation turned out to be incorrect, these finds still can bring valuable information about later periods in Thorikos or be brought in relation to Middle Byzantine findings in the surrounding sites.

Conclusion

This contribution has shown that the lack of published parallels can impede a precise dating of finds. This is particularly true for grinding implements, which are often only reported, without any drawings or pictures. Hopefully, the publication of these finds will spark some interest and will encourage more systematic documentation of such artefacts.

Nevertheless, although caution is required, the finds were given a date in the 7th–8th century AD at the earliest, based on their typological features and the latest sherds identified in the cistern's fill. They might be concomitant with the very last years of occupation in the Tower Compound or be related to a later event. Unlike H.F. Mussche stated (1998, p.65), it has become evident that Thorikos was not abandoned at the end of the 6th century AD.

Acknowledgements

I am grateful to the Ephorate of Antiquities of East Attica for allowing me to study and publish the stone tools of Thorikos, and to the Archaeological Museum of Lavrio and its staff for welcoming me and making the material available. Likewise, I am thankful to the Belgian School of Archaeology at Athens and especially its deputy director, P. Iossif, for the administrative support, and to the excavators of Cistern No°1, especially R. Docter, K. Van Lieffering and F. van den Eijnde. Finally, I warmly thank Rena Poupaki for the always stimulating discussions,

and Guy Dierkens for his invaluable logistic help. This research is conducted within the framework of my PhD thesis, which is funded by the Scientific Research Fonds (BOF) of Ghent University (2017–2021).

Notes

- 1 For a non-exhaustive overview of different types of rotary hand mills, the reader can consult, among others, the general publications of D. Peacock (2013, pp.54–76), and N. Alonso and R. Frankel (2017, pp.469–472). Although concerning more specifically specimens in France and Spain, many publications of the Groupe Meule also offer a thorough background on rotary mills (Buchsenschutz, et al., 2011; 2014).
- 2 Only a few studies were recently devoted wholly or partly to the analysis of this type of mill in the Aegean (e.g. see Poupaki, 2011; 2017).
- 3 Either grey, brown or reddish volcanic rocks containing crystals of plagioclase and iron-magnesium minerals, coming from the Saronic Gulf, or dark grey or black vesicular volcanic rock occurring in Nisyros or other islands.
- 4 These analyses will be conducted in collaboration with C. Mavrogonatos (National and Kapodistrian University of Athens, Faculty of Geology and Geoenvironment).
- 5 This question is part of the author's PhD research on the grinding and crushing implements found in Thorikos. See also Duchène (in prep.).
- 6 In the Tower Compound AX (Insula 3), one globular amphora initially attributed to the 5th or 6th century AD (Spitaels, 1978, p.103 n.45) might be of a later date given its similarity with 7th and 8th-century amphorae in Gortyn (Docter, Monsieur and van de Put, 2011, p.100; Poulou-Papadimitriou and Nodarou, 2007, p.758 fig. 6, no. 14).
- 7 The latest ceramic finds in the cistern's fill are 4 joining fragments of a cooking pot with parallels in the 7th and 8th centuries AD, and 2 joining fragments of a globular amphora of the same period (Docter, Monsieur and van de Put, 2011, cat. 51, 80).
- 8 This is the hill where the Greek Lavrion Mining Company's chimney stands (Salloria-Oikonomakou, 2007, p.45).

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