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ABSTRACT

Finds from Miletus XXXII. Clay Rings from the Sanctuary of Dionysos in Miletus

Lisa Steinmann

During its excavation in the 1970s, a large number of unidentifiable objects were found in the sanctuary of Dionysos in Miletus: »Peculiar and as of now not explicable for the editor [Willi Real] are numerous fragments of flat rings […]. They are reminiscent of the rings used for modern coal stoves. […] Hitherto no interpretation has been found.« (Real 1977, 105). In the course of a re-examination of the excavation's findings since 2017, it has been possible to find similar rings from different places in the Mediterranean. It is plausible that these until now unidentified objects are stacking rings used in potters workshops, an isolated and unique find for 5th century Miletus. In this article, the rings will be compared and classified, followed by an assessment of their functionality as well as a discussion of their context.

KEYWORDS

stacking rings, pottery production, Asia Minor, Miletus, 5th century, classification

LISA STEINMANN

Finds from Miletus XXXII

Clay Rings from the Sanctuary of Dionysos in Miletus

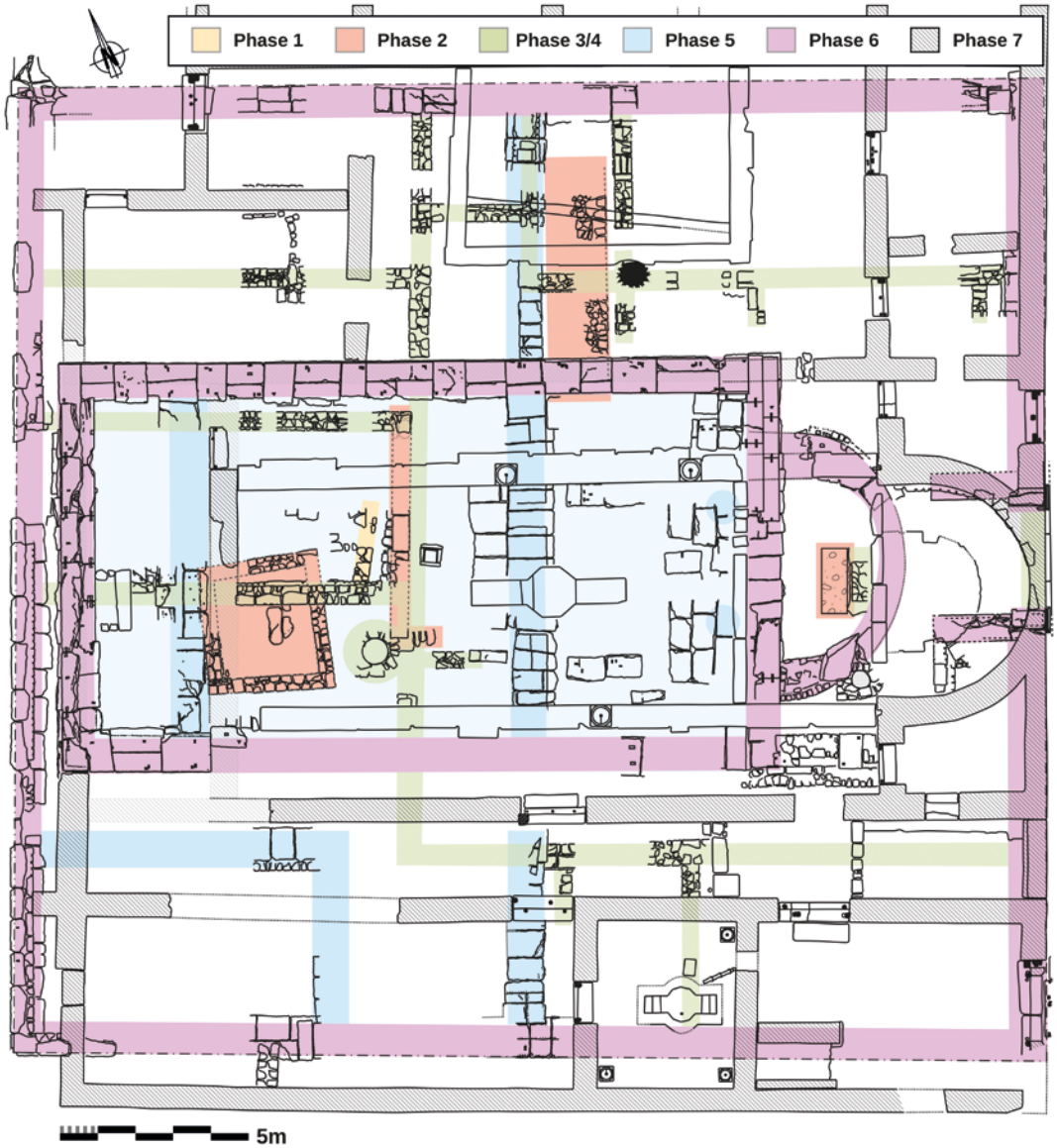
1 Since the area's excavation by the architect and archaeologist Wolfgang Müller-Wiener from 1973–1977, the temenos of Dionysos in the ancient city centre of Miletus (Fig. 1) has received only sparse attention[1]. The sanctuary is situated in the vicinity of the north market and occupies half of an insula next to the road between the Bouleuterion and the Theatre. The first recorded building in the area (Fig. 1, phase 1) – only the remains of its foundation are preserved, measuring 1.71 m in length and consisting of small rocks – was abandoned in the first half of the 5th century B.C. at the latest. The second phase – made of similar albeit better-preserved foundations that carried mud-brick walls – lasted until the second half of the 5th century, followed by a third and a fourth phase dated to the 4th century[2].

2 The finds that are presented here originate from a layer directly below the foundations of the third phase[3] (Fig. 1, phase 3/4; Fig. 2, N16). The pottery from this layer

1 Müller-Wiener published two preliminary reports, including a small selection of exceptional finds presented by Willi Real immediately after the excavation (Müller-Wiener 1977; Real 1977; Müller-Wiener 1979). Since then there has been an examination of the frieze of the Hellenistic temple (Pfrommer 1989) and a comparative study of dionysiac sacred places prominently featuring the Milesian sanctuary, which relies on the published material (Hirsch 2001). Recently Burkhard Emme expressed new and insightful ideas about the sanctuary's chronology based on typological comparisons within Miletus. He highlighted the importance of clarifying the sanctuary's stratigraphy, stating that especially the finds and dating of the area remain a desideratum of Milesian research (Emme 2016). In 2016 my supervisor Christof Berns kindly entrusted me with the reappraisal of the sanctuary and its excavation as the subject of my doctoral thesis. Since January 2018 the project has been funded as a PhD scholarship by the Gerda Henkel Stiftung under the preliminary title »Ein Heiligtum des Dionysos in der Sakrallandschaft von Milet« (»A Sanctuary of Dionysos in the Sacral Landscape of Miletus«). The first research stay in Miletus in 2017 was funded by the Research School at the Ruhr-University Bochum, with subsequent stays funded by the Gerda Henkel Stiftung. I wish to thank several scholars and colleagues for discussions, suggestions and kind words of advice that have greatly contributed to this article's development, among them Christof Berns, Bernhard Schmaltz, Alexander Herda, Barbora Weissova, Clarissa Haubenthal, Sascha Ratto and Melanie Spiegelhalter as well as the community of ›Milesians‹ that has been gathering in Bochum.

2 Müller-Wiener 1979, 164. The re-examination of the stratigraphy will slightly change the dating and the division of phases, as well as the interpretation of the pre-Hellenistic remains. These results were presented at the conference »Sanctuaries and Cults in the Aegean from Early Historic Times to Late Antiquity« in September 2019 on Limnos and will be published in the conference proceedings.

3 A single fragment (Fig. 16 no. 59, MK73.C5.3) came from another stratigraphically distinct unit, C5, which lies next to the foundations of the second phase building.



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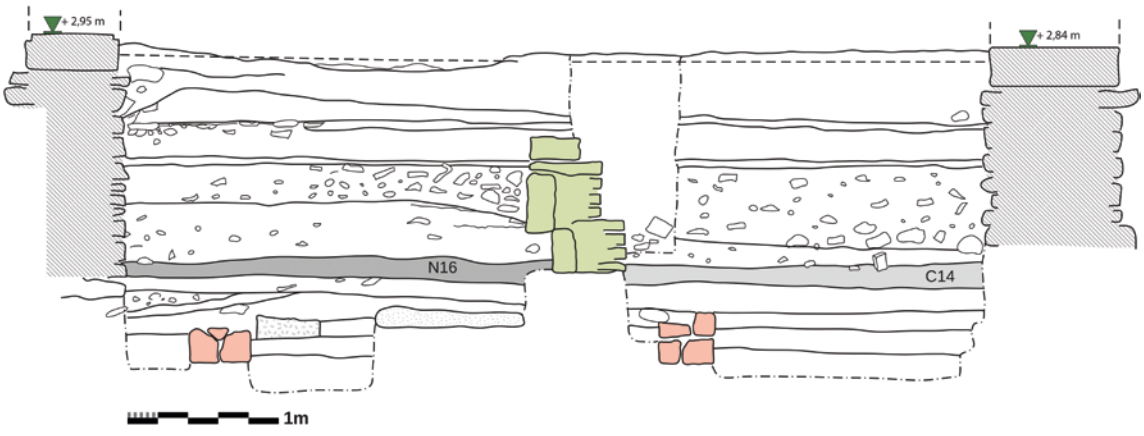

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Fig. 1: Miletus, Sanctuary of Dionysos. Detailed plan of all phases in the excavation area of the Church of St. Michael resp. the sanctuary of Dionysos (scale 1 : 200)

Fig. 2: Miletus, Sanctuary of Dionysos. Profile of trench N containing the clay rings' layer of origin (N16) and part of the foundations of phase 3/4 (colour legend see Fig. 1; scale 1 : 50)

consists mostly of regional and imported tableware[4]. Fig. 15 provides an overview of all the finds from the stratigraphical unit without the clay rings. Some of the objects are presented and discussed in detail in the catalogue. Overall the pottery points to a *terminus post quem* in the second half of the 5th century B.C.[5]. Most interesting, however, is the multitude of plain clay rings that were found here. These objects are circular bands of fired clay with three distinct varieties of profile (Fig. 3) and are about 11 to 15 cm in diameter. So far it appears that similar rings have never been found elsewhere in Miletus, and especially when considering the biased selection process the excavation has yielded surprisingly many of those fragments.

3 This article is divided into two parts, each with their respective conclusions. Firstly, it will be shown below that the clay rings can be interpreted as *stacking rings*, used during the process of pottery production, which is – at least for the period in question[6] – not attested to in this area of the city. The following methodological section is intended as a suggestion on how to approach objects for which conventional typological approaches do not apply. It makes use of the possibilities provided by computational classification and quantitative methods. One goal of this first part of the article is to show how to extract information about or provided by such objects based solely on their measurable characteristics. Apart from their functionality and their possible significance for the assessment of local pottery production, another question arises, which will be discussed in the second part of the article: How did they end up here? The published interpretation of their findspot as a sanctuary reflexively suggested at first that they might have found their way here as offerings[7]. As other rings have occasionally been found in sanctuaries, this possibility will be briefly explored. It will be argued whether they can be addressed as votives, or if they may have had another function entirely, which leads to the consideration of the utility of such rings in a very broad and theoretical manner.

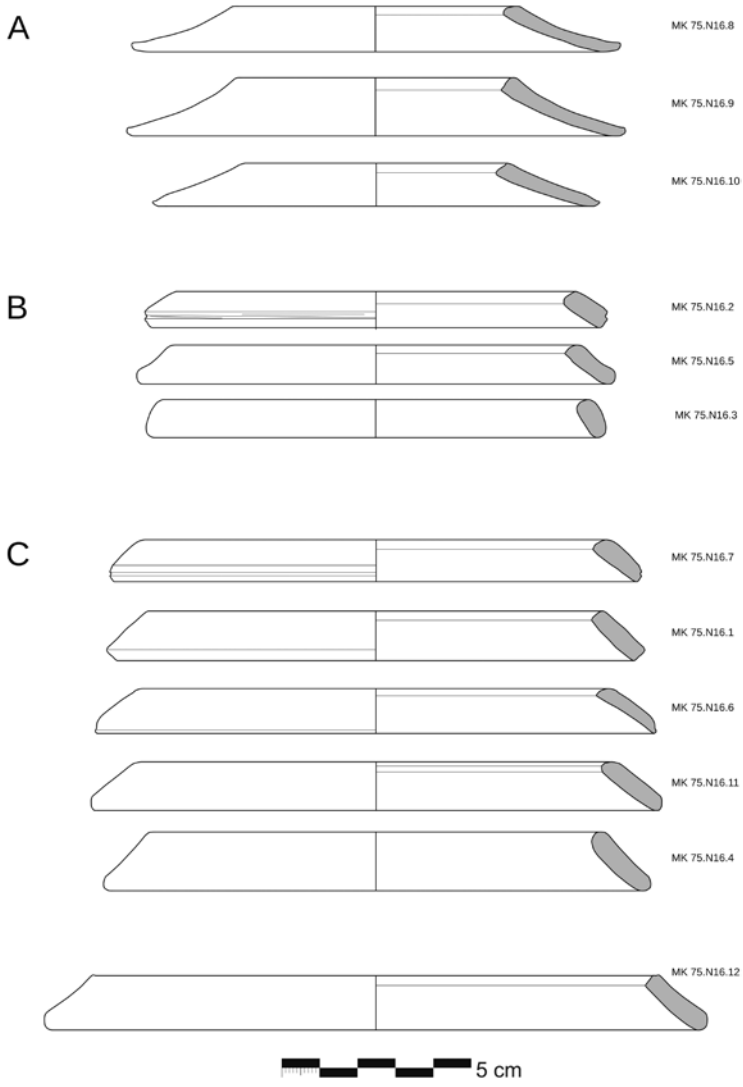

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Fig. 3: Miletus, Sanctuary of Dionysos. Profile drawings of selected rings (scale 1 : 2)

4 The objects recovered by the excavation were heavily selected for. There where only 30 fragments of approximately 20 objects belonging to this stratigraphical unit to be found in the excavations depot. Although there is no mention of the selection in the diaries, the fact that mostly diagnostic or decorated fragments remain is a strong indication for the selection as well as the criteria employed. In total there appears to be a strong selection bias towards ›fine pottery‹.

5 The dating relies on a rim fragment of a Castulo Cup (black glaze pottery, Cat. 4) and two well-preserved identical saltcellars (black glaze pottery, Cat. 5–6), pointing to the second half of the 5th century.

6 Some workshop remains have been excavated in Miletus. Kilns of the 7th and 6th centuries B.C. had been found south-east of the later city centre on Kalabaktepe (e. g. Seifert 1991; Senff 1995, 211; von Graeve 1997, 77 fig. 6). The findings are presented in further detail in Senff 2002. Next to the basilica of St. Michael resp. the sanctuary of Dionysos, a medieval pottery workshop had been discovered, where tripod-shaped stacking equipment was used (Müller-Wiener 1979, 170; Böhlendorf-Arslan 2008, 373–376).

7 As recent work on the finds and stratigraphy has shown, there is no indication for the identification of the pre-Hellenistic phases as a sanctuary besides the – in this case unwarranted – assumption of cult continuity. These results were presented at the conference »Sanctuaries and Cults in the Aegean from Early Historic Times to Late Antiquity« in September 2019 on Limnos and will be published in the conference proceedings.

4

Fig. 4: Miletus, Sanctuary of Dionysos. Assemblage of clay rings from the area

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Fig. 5: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.2. Close-up of the clays structure

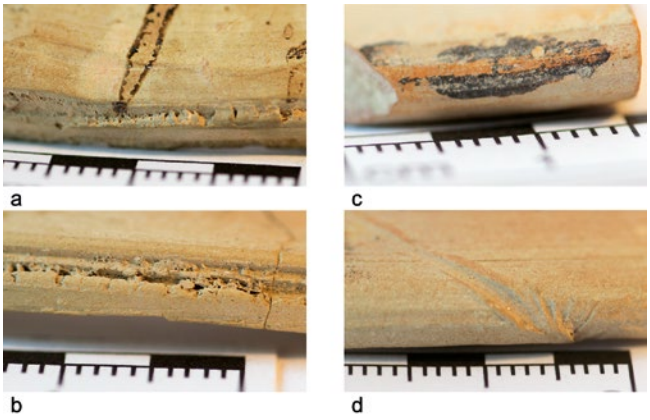

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Fig. 6: Miletus, Sanctuary of Dionysos. Details of markings on some of the stacking rings

4 The approximately 69 clay rings are preserved in 134 fragments (Fig. 4)[8] – a surprisingly high amount in comparison to the low number of other finds from the same unit. This might be due to their supposed status as an »inexplicable«[9] curiosity, which led to them being retained to a larger degree than the above-mentioned ›usual‹ finds[10]. They are consistently made of fine, smooth clay between yellowish-red and pink

8 Insofar as their coherence was clear without ambiguity even non-fitting fragments were assigned to one object. Since fits might have been overlooked in the process and in some cases the connection was not quite clear it might be more accurate to estimate around 55 to 69 clay rings.

9 Real 1977, 105.

10 45 years after the excavation took place it seems impossible to estimate the amount of material that was lost in the selection process.

in colour, and very occasionally contain macroscopically observable traces of mica, lime or other small black inclusions (Fig. 5). The form and profile (either convex, concave or straight, Fig. 3) of each ring is very even and the surface is smooth, though some of them bear markings such as tears, stretches and incisions, which have not been smoothed or levelled (Fig. 6). On two of the rings what appears to be a Θ has been incised before the firing process (Fig. 7). The maximum diameter varies between 11.4 and 18 cm and in every case the profiles run approximately diagonal resulting in either the inner or the outer rim being raised between 0.7–1.9 cm from the resting surface, depending on whichever way one chooses to orient them. Fig. 3 illustrates the different varieties, while Fig. 16 lists all recorded rings and variables.

7

Fig. 7: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.11. Incised Θ

Comparable Examples in Their Contexts

5 While the clay rings so far seem to be a unique find in Miletus, very similar objects can be found in several other places around the Mediterranean[11]. In this article the relevant finds from Metapontum and Athens will be discussed as comparisons for the Milesian rings, as there is enough data available from the respective publications. Most of those rings were found in contexts of pottery production, i. e., potters workshops and kiln sites, mostly dating to classical and Hellenistic times[12].

6 The north-west of Athens encompasses several such sites, most notably the famous Kerameikos itself. A number of excavations have uncovered other workshops, some of which might even be ascribed to painters such as the Brygos painter, which indicates that they were involved in the production of fine wares[13]. In most of those workshops objects described as ›rings‹ (gr. δακτύλιος) have been found[14], which are mostly unpublished. One notable exception is a rescue excavation from the 1980s conducted in Lenorman Street[15], situated on the road to Hippeios Colonus[16]. In the remains of a pottery workshop of the 5th and 4th century B.C., a large deposit of stacking rings was found[17]. The rings documented for other workshops and described in a similar fashion may resemble them. In her comprehensive summary of workshops in Athens and Attica, Maria Chiara Monaco presents 40 of the stacking rings (*distanziatori circolare da fornace*) found in Lenorman Street in a deposit alongside a wall next to one of the two kilns[18] (see Baziotopoulou 1994, fig. 2. 6; Zachariadou et al. 1992, fig. 4; Monaco 2000, pl. 41). Owing to Monaco's detailed descriptions, photographs and drawings, they may easily be compared in size and shape to the rings from Miletus (see below, »Comparison«).

7 There is not much information about the rings found at the nearby Kerameikos. One 5th century grave from the adjacent cemetery along the *Gräberstraße*[19] contained at least 3 similar clay rings with a diameter of 13.4–15.5 cm[20] alongside red-figure

11 For a list of contexts between the 7th to 2nd centuries B.C. see: Segbers 2019, 90 fig. 17.

12 Hasaki 2002, 94 (regarding Athens). For Hellenistic examples from the Pnyx in Athens see: Edwards 1956, 88 f. 108 fig. 5 no. 121. 122 pl. 50.

13 Baziotopoulou 1994, 47; Monaco 2000, 141; Hasaki 2002, 94.

14 Baziotopoulou 1994, 45–47.

15 Λένορμαν 28–30, Αθήνα 104 36; see also: Baziotopoulou 1994, 47–50.

16 Monaco 2000, 81–95.

17 Zachariadou et al. 1992, Hasaki 2002, 94. In 1936 another rescue excavation in this area supervised by Virgina Grace had yielded a cemetery in use from the classical period to the 1st century A.D. (see Boulter 1963).

18 Monaco 2000, 216 f. D IV pls. 44–56. Another clay ring has also been found on the Athenian Agora (see Monaco 2000, 37. 242 APP. III,1. Other isolated finds of similar rings also occur (e. g. Davidson et al. 1943, 35 no. 29; Rotroff – Oakley 1992, 128 pl. 61 no. 370, <http://agora.ascsa.net/id/agora/object/mc%201337> [06.08.2020]).

19 Kunze-Götte 1999, fig. 1.

20 Kunze-Götte 1999, 103 no. 400,18 pl. 68, 3. 5; Kübler 1976, 120 no. 400. The actual amount is unclear. Two descriptions say 5, one states 3, and there are 3 rings depicted in the photographs.

pottery[21]. Other clay rings from the area of the so-called *Bau Z* next to the Sacred Gate bear fewer similarities[22]. One of them has a dipinto (ANEΘE[...]) and thus may have been a votive, as it was also found in an offering pit[23]. Nonetheless its dimensions do resemble the other clay rings (diameter 16.0 cm, width 2.9 cm).

8 During the excavation of the *kerameikos* in Metapontum a large quantity of diverse stacking supports came to light, of which some closely resemble the Milesian rings as well as the rings from Lenorman Street in Athens[24]. In 2003 Vincenzo Cracolici published a comprehensive study of the Metapontian kiln firing supports (*sostegni di fornace*) including a typology and the dactyloscopic analysis of recorded fingerprints[25]. The catalogue also features some objects from Himera and Taranto. According to Cracolici those rings were used to stack open vessels with low walls or closed vessels with a round opening[26]. They appear in Metapontum in contexts dating between the end of the 5th and end of the 4th century[27].

9 Another findspot of such stacking rings is a pottery workshop in Pella that was occupied between the 4th and 3rd centuries B.C.[28]. While there are not enough data on size and shape of the objects to include them in this study, it should be noted that the δακτύλιοι στήριξης αγγείων[29] (vessel support rings) from Pella were found inside kilns filled with pottery of the 3rd century B.C. As the kilns seem to have been destroyed during their operation, the context clearly demonstrates that they had been used for stacking vessels during firing[30].

10 While many other variants of kiln firing supports are known from several find spots[31], most of them do not match the Milesian rings as closely as the ones presented above. Other rings may be shaped from slivers of clay into a torus (*loops*)[32], but as Cracolici's catalogue illustrates there are many variants of supports that can be conceptually divided into rings, tripods and or solid forms[33]. In any case, most of the other types of firing supports seem to be far more common than the specific rings described in this article.

Classification and Primary Function of the Milesian Clay Rings

11 Due to the similarities with the rings mentioned above the Milesian clay rings presented here will be addressed as a variety of *stacking rings*. What information may they provide about the local pottery production, and what – with respect to their intended purpose – is the most meaningful way to classify and compare them? These issues will be addressed here through their measurable characteristics using quantitative

21 The sex of the buried individual is unknown, as there have not been anthropological examinations, though Kübler includes it in a list of supposedly female graves. Kübler 1976, 193 f.

22 Knigge 2005, 125 no. 118 pl. 59; 149 no. 290 pl. 83 (with around 6.8–7.7 cm the outer diameter of the last mentioned rings from one of the *oikos units* is considerably smaller).

23 Knigge 2005, 125 no. 118.

24 In the first publication though, only one of those rings had been included: D'Andria 1975, 417. 432 figs. 60. 68 no. 334. In Cracolici 2003, 688 of 1878 objects were classified as rings (*gruppo III*).

25 Cracolici 2003, 33–49.

26 Cracolici 2003, 45. 51–56.

27 Cracolici 2003, 45. 61 (Scarico N. 1); 81 (Scarico N. 16); 87 (Scarico N. 3).

28 Lilimbaki-Akamati – Akamatis 2008, 153 f.

29 Lilimbaki-Akamati – Akamatis 2008, 148 f. 151 Eik. 4.

30 Lilimbaki-Akamati 2014, 441.

31 For a summary of different types of firing supports or stacking equipment from the western Mediterranean see: Segbers 2019, 87–101.

32 Stillwell 1948, 12–14 pl. 53 nos. 68. 69; Davidson 1952, 339 pl. 139 nos. 2920. 2922.

33 Cracolici 2003; see also D'Andria 1975, 360. 415–417 figs. 5. 58–60; Papadopoulos 1992; Papadopoulos – Schilling 2003.

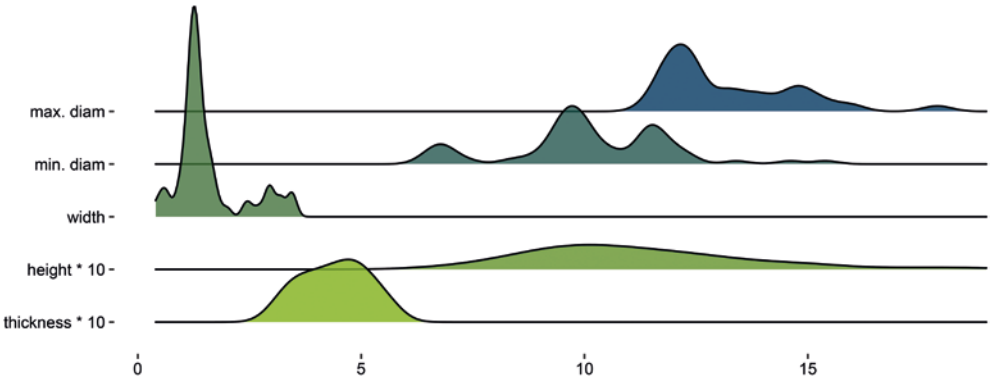

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Fig. 8: Kernel density graph of five recorded numerical variables

methods and computational classification. The process is by no means exhaustive, as with a larger dataset there would be many more options, but it still points to a different way for assessing group characteristics and determining sub-group membership.

12 The distribution of measured values for the five numeric variables recorded (outer and inner diameter, width, height and thickness, see Fig. 16) shows a notable dispersion in some and unification in other variables, see Fig. 8. For easier comparability in one figure, height and thickness values are displayed in millimetres while the other variables are displayed in centimetres on the x-axis. The peaks represent the agglomeration of single values around the highest points. The inner diameter in particular shows three very distinct peaks in the distribution, which indicate three different pools of roughly equally sized inner rims. The widths[34] seem to be noticeably divided along a value of ca. 2 cm, with most rings showing a width of ca. 1.25 cm. The distribution of the outer rim diameters has a large peak at around 12 cm, followed by a more continuous distribution until the second peak of ca. 15 cm, indicating two size classes that blend into each other. Height and thickness on the other hand show a more even distribution around one value, suggesting that all rings are relatively equal in those variables.

13 It seems that these rings are recognizable as one group of objects regarding their generic form, material as well as thickness and height. They can, on the other hand, be separated into smaller sub-groups by their width, diameters, and shapes, which might be the relevant to their function. Based on these observations a classification for the Milesian clay rings can be developed: The aforementioned numeric variables in particular lend themselves to a computational approach to classification. As has been demonstrated above (Fig. 8), width, inner diameter and outer diameter are the most promising candidates for clustering[35], i. e., the division of all rings into subgroups. It is possible to incorporate the categorical variables such as shape or colour into a cluster analysis. However, attempts to do so have not yielded substantially advanced insights. Therefore, only the results of the cluster analysis employing inner and outer diameter will be shown. The width was left out in this case, since to some degree it depends on both variables[36].

14 An implementation of *hierarchical density based clustering* for R (*hdbscan*)[37] was chosen as the most suitable method. It compiles clusters in space (such as shown by Fig. 10) by grouping objects that are near to each other, and simultaneously disregards singular values that occur outside of a certain density of points in the said space. Thus, faulty mea-

34 It should be noted that the width naturally depends on inner and outer diameter, as it can be approximated with the subtraction of one from the other divided by two.

35 In archaeology clustering methods are most often employed for the classification of archaeometrically obtained data e. g. from chemical analysis of clays (Cuomo di Caprio 2007, 655–657 and Rice 2015, 231). However, there are countless other possible applications of the method (Carlson 2017, 320).

36 The width mostly corresponds to the difference of maximum and minimum diameter, only slightly varied due to the different heights of the rings, resulting in a broader or narrower surface width.

37 Hahsler et al. 2017; McInnes et al. 2017.

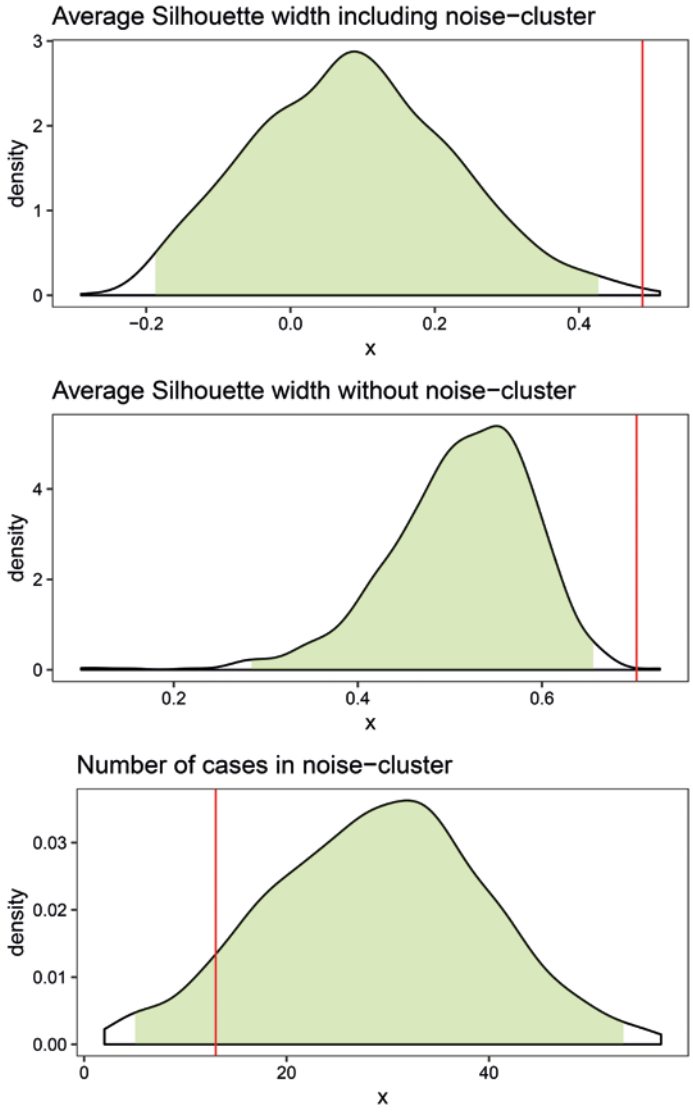

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Fig. 9: Comparison between cluster cohesion in test samples and actual data

surements and singular divergent values are treated as noise[38]. This is especially useful since misclassification of diameter might often occur when examining small fragments, reflected in the well-known rule of thumb to only regard diameters of sherds where more than 5–15 % of the rim is preserved[39].

15 To ensure that the clustering algorithm does not accidentally produce a structure were none exists, 1000 test samples of 67 measurements were generated. First, a set of 67 outer diameters was generated from a normal distribution around the mean of the actual data along with the standard deviation. The same was repeated for the width, which was subsequently multiplied by two and subtracted from the values for the outer diameter to produce a suitable value for the inner diameter. The sample was then passed to *hdbscan* and the emerging clusters evaluated with the Silhouette method[40], which returns a value representing the cohesion of the formed clusters. A value of > 0.51 implies a reasonable structure, and one of > 0.71 a very reliable structure. The Silhouette coefficient of the cluster configuration returned by *hdbscan* for the actual data is at 0.70 after removing the noise[41]. Fig. 9 shows a density graph of the Silhouette coefficients from all 1000 generated test samples. The green area contains 99 % of the values. The red line represents the value of the actual data. It appears that the clusters detected by *hdbscan* in the actual data show significantly more cohesion than the generated samples. The number of noise points is also noticeably lower than in most of the samples. It is likely that the configuration found in the measurements of the clay rings represents an actual structure and therefore that the rings can be divided into three groups of different sizes based on inner and outer diameter (Fig. 10). Accepting this, other observations can be made about similarities and differences between those groups.

16 Apart from the defining diameters, the objects in each cluster show certain similarities while between the clusters many differences can be observed. All objects have in common the occasional streaks and smudges of differently coloured clay, though the colours seem to differ among the groups. All colours mentioned in the descriptions and tables are in reference to the colour names from the Munsell Soil Colour Charts and have been assessed using the charts[42]. Cluster A stands out with its larger width and the

38 For a very understandable in-depth explanation of how *hdbscan* operates see McInnes et al. 2019.

39 This otherwise prudent rule of thumb was intentionally disregarded in this case in the hope that a quantitative approach as explained here would even out the occasional slightly off measurements. In any case, most of the fragments do fulfil the requirements, and if not they only just fail the 15 % criterion. Some very small fragments of about 1 cm in length (see Fig. 4), where it seemed impossible even to approximate the diameter, were indeed left out and are also not incorporated into Fig. 16.

40 Rousseeuw 1987 (implementation for R from the package ›cluster‹); Carlson 2017, 330 f. also explains the functionality of the Silhouette method with examples.

41 Including the noise yields a Silhouette coefficient of 0.49, which is to be expected as the noise cluster by definition has no internal cohesion and therefore considerably lowers the average value.

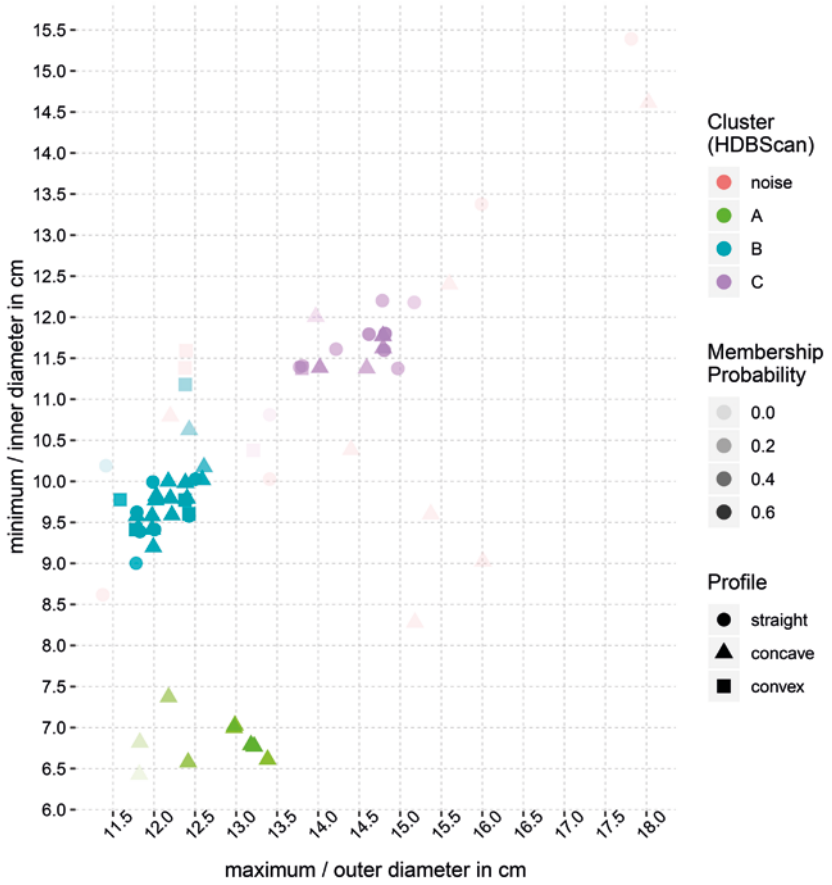
42 Favouring the referenced colour names over the Munsell colour notation is due to the fact that the notation is too detailed for quantitative approaches, as slight variations in hue are generally not meaningful.

more pronounced uniformly concave profile (Fig. 3. 10). Though some peculiarities of the clusters regarding clay colour and other variables are mentioned in the descriptions, they are mostly not statistically significant. A notable exception is the colour of clay smudges, which is weakly linked to cluster membership[43], and could indicate peculiarities in usage of differently sized rings.

17 **Cluster A (9 rings)**: The objects are without exception concave in their shape. There are fragments without stains and others that have patches of light red or red colour. Three fragments from this group were treated with a thin yellowish wash. The height is more heterogeneous than in other clusters (see Fig. 11), ranging from 0.9 to 1.9 cm. The majority of the objects in this cluster are between 1.1 and 1.5 cm in height. The thickness, on the other hand, is more homogeneous and somewhat thinner than in the other clusters, ranging from 0.32 to 0.36 cm (see Fig. 11). Most distinct from the other groups is the width of cluster A's rings. With a mean of 2.92 cm, they are generally more than 1.5 cm wider than the other rings, which can also be easily observed in the drawings in Fig. 3.

18 **Cluster B (28 rings)**: Fragments with a light coloured wash accumulate in this cluster. The shape of the profile can be convex, concave or straight. There are patches of black, dark red and dusky red coloured clay on the objects. Some fragments show no stains. The height varies from 0.7 to 1.3 cm with the majority between 0.9 and 1.1 cm. The thickness of most rings in this cluster ranges from 0.43 to 0.51 cm (see Fig. 11). There are more markings in this group. The fragments nos. 63, 64 and 65 pose an exception and possibly even belong to a single object. Their round shape is irregular and unique among the Milesian rings. Only one of those objects was sorted into cluster B. They might be considered to form a sub-group or – in the case that they do belong to one object – simply be an exception.

19 **Cluster C (17 rings)**: Patches and stains of black, red, reddish brown, dark red and light red colour are present in this cluster. There are some fragments without



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		height	inner rim	outer rim	width	thickness
A	mean	1.32	6.82	12.67	2.92	0.33
	sd	0.33	0.29	0.62	0.34	0.02
B	mean	1.03	9.78	12.10	1.16	0.47
	sd	0.21	0.44	0.31	0.21	0.06
C	mean	1.19	11.54	14.33	1.39	0.46
	sd	0.22	0.45	0.60	0.20	0.07

11

Fig. 10: Results of the cluster analysis with hdbscan

Fig. 11: Summary statistics for each cluster

43 A measure of association has been calculated for the contingency tables of various nominal variables across cluster membership. The greatest association has been found between smudge colour and cluster membership, while the other variables (clay colour, smudge type, slip, tool marks, shape) displayed only very weak correlations. The measure used is Cramer's V, best suited for tables with more than two rows and/or columns and yielded a value of 0.63. As Cramer's V can take values between 0 and 1, which expresses the strength of association between two variables, 1 being absolute association, the obtained value of 0.63 indicates a moderate correlation (see Shennan 2004, 115–118).

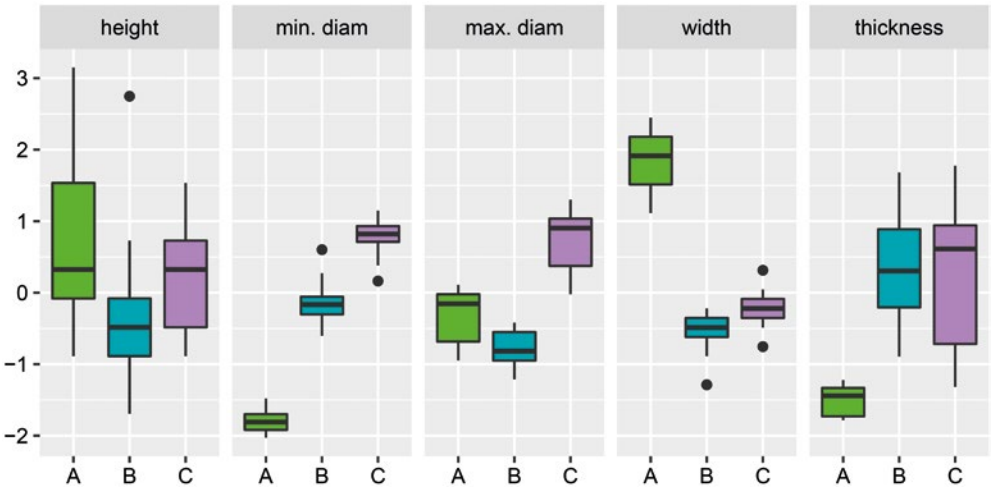


Fig. 12: Scaled boxplot of the summary statistics (see Fig. 11)

12

stains. Only one fragment has a light wash. The others are either not treated or show a yellowish wash or a chalky slip. Some fragments in this cluster differ considerably in clay colour (nos. 5, 6, 7 and 9 are light reddish brown, considerably darker than the other rings). The height of the objects in cluster C ranges from 0.8 to 1.5 cm, with most objects between 1.03 and 1.3 cm. The thickness of most rings lies between 0.39 and 0.5 cm (see Fig. 11).

20 In the clustering process, 13 rings have been regarded as noise. Only three rings from the noise cluster are preserved in more than one fragment (rings nos. 5, 30 and 37 in Fig. 16). No. 5 (preserved in 5 fragments) could – with a certain tolerance – be seen as part of or at least closely related to cluster C, as it lies only just outside of its boundaries.

21 Fig. 12 features a boxplot of the numeric variables over all clusters. All values have been scaled to make the differences comparable. While the original values (as seen in Fig. 11) cannot be gathered from this plot, it serves to illustrate the relationship among the variables.

22 Clusters B and C are somewhat similar. They mostly differ in their outer diameters, with some differences but a potential overlap in the inner diameter. They have large similarities in all other variables. Cluster A on the other hand is very distinct. Thickness, inner diameter and especially width differ greatly from the other clusters.

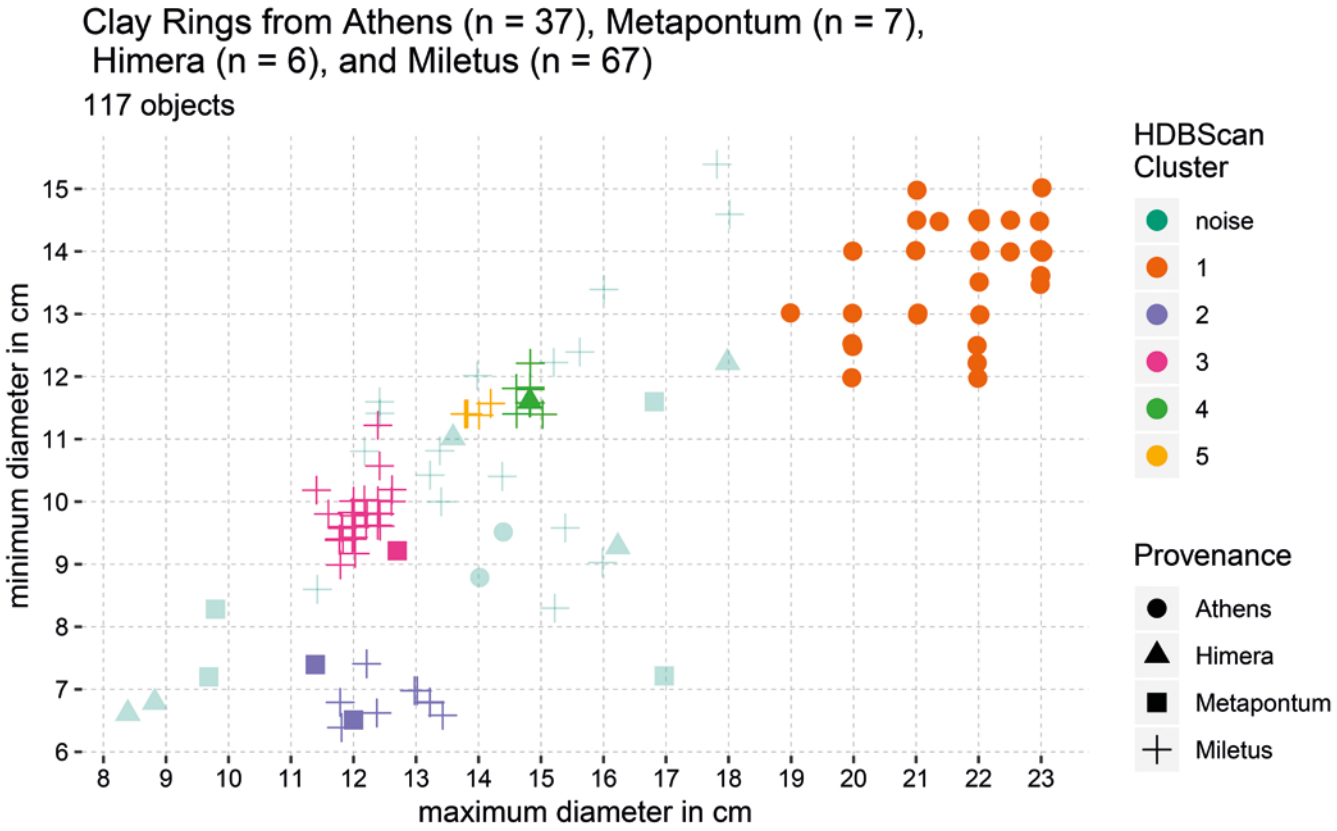
Comparison

23 The same method that was employed to sort the Milesian rings into groups is employed to look for differences and similarities in all stacking rings mentioned in this article, including the comparisons from Athens and Metapontum. The data was either provided by the catalogues of the mentioned publications[44] or manually measured from the drawings provided.

24 The resulting plot (Fig. 13)[45], showing the minimum diameter on the y- and the maximum diameter of each object on the x-axis, illustrates a common tendency among all rings for the ratio of minimum to maximum diameter. This might have practical reasons, such as the stability of the rings, as a ring 23 cm in diameter could easily break during

44 The dataset comprises the rings from Monaco 2000 and Cracolici 2003, the latter of which contains some duplicates with the catalogue in D'Andria 1975, as well as the Milesian rings (see Fig. 16).

45 A point jitter of 0.03 cm has been added on both axes of the plot to improve readability. The values do not exactly match those from Fig. 16, but a difference of 0.03 cm will not diminish the validity of the visualization.



13

Fig. 13: Results of the cluster analysis including other findspots

usage if it were only 1 cm wide[46]. The colours in this plot correspond to the clusters found by *hdbscan* (see above); the noise cluster was made transparent to improve legibility. The shape of the points provides information about the provenance of each object.

25 In Cracolici's Typology L1, L2 and L3 from group III – »*anelli a fascia sottile inclinata*« – are most similar to the Milesian rings. The obvious difficulty when attempting to integrate them into the clustering process is the lack of data for the Metapontian rings. There are only 7 rings from Metapontum and 6 from Himera, which provided sufficient numeric data. In contrast, the histograms in Cracolici's catalogue attest to 55 type III-L rings from Metapontum in total, of which 44 are type III-L1, 11 type III-L2 and none from type III-L3, since this variant is only attested to in Himera[47]. The types are further divided into moduli, which are based on the diameters. The moduli present in the relevant types are M1 (25–20 cm), M3 (14–11 cm), M4 (10–8 cm) und M6 (5.9–4 cm)[48]. Most of the Metapontian rings are classified as Modulo 4 (49 of 56, 87.5 %), which comprises diameters between 8 and 10 cm. The Milesian rings of cluster A have a mean diameter of 12.66 cm (see Fig. 11). While similar in shape to the Milesian rings of Cluster A, the Metapontian rings are generally smaller.

26 Most obvious is the complete separation of the Athenian rings (Fig. 13 cluster 1). While they have a similar ratio of minimum to maximum diameter, they are consistently larger. Some rings from Metapontum and Himera on the other hand have very similar measurements to the Milesian ones. For each Milesian cluster, a corresponding ring from Himera or Metapontum can be attested to. Some rings from Metapontum and Himera have been grouped with the Milesian rings of cluster A (Fig. 13 cluster 2) and one was added to the Milesian cluster B (Fig. 13 cluster 3). The separation of clusters

46 In her work on ancient Greek kilns Eleni Hasaki mentions the »high breakage rate« of the clay rings found in the Athenian workshops, assuming that because of this they could not have been used for especially heavy vessels (Hasaki 2002, 94).

47 Cracolici 2003, 59–98.

48 Cracolici 2003, 38. 45.

4 and 5 – containing the Milesian cluster C and one ring from Himera – seems unreasonable from an archaeological viewpoint, since there are no large differences in the diameters[49]. However, this only concerns the diameters of the rings. The shapes of the rings from Cracolici's work (as well as the Athenian ones) are similar to the rings from the Milesian cluster A. For the clusters B and C no comparisons in shape from other sites have been found so far.

27 The Metapontian rings divide themselves mainly along the minimum (or inner) diameter, while the maximum (or outer) diameters appear to be more continuous. In their inner diameter, there are more similarities with the Milesian cluster A. Most of the rings from Metapontum have been classified as noise, since they are too far apart from each other. It can be assumed that this is due to the selective and representative nature of the catalogue and would drastically change if the measurements for the complete assemblage of objects were available. They possibly form size clusters of their own, as Cracolici's separation of the types into *moduli* does suggest[50], but how they correspond to the Milesian clusters can only be estimated. As mentioned above, the Metapontian rings of similar shape are generally 3–5 cm smaller.

Usage of Stacking Rings

28 It is plausible that the Milesian rings are stacking rings made for a potter's workshop. They carry stains of differently coloured clay, drops and smudges (Fig. 6) that can easily be explained if the rings were present during the painting and coating of vessels in a workshop. The Milesian rings of cluster A are very similar in shape to the Type III-L1 rings from Metapontum and the rings from Lenorman Street in Athens. For the rings of clusters B and C, however, so far no comparison in shape has been found, though their other characteristics (clay properties, smudges) closely link them to their counterparts in cluster A. The two identical markings on rings nos. 66 and 67 (see Fig. 16) parallel the Metapontian and Athenian rings, where recurring dipinti or graffiti can be found on many rings. Those labels are often assumed to represent either the name of the workshop or its owner[51]. The incised Θ (Fig. 7) on the Milesian rings thus points to some entity claiming ownership (or production) of these objects.

29 The well-documented contexts from Metapontum offer insights into the usage of stacking rings[52]. Cracolici's catalogue is separated into 11 deposits or dumps (*scarico*) from different areas of the Metapontian *kerameikos*, some of which are associated with kilns. The percentage of groups in each deposit does not vary by much. The distribution does change slightly over the course of time, as Fig. 14 aims to illustrate by showing the percentages of each group over the contexts sorted by their dating from oldest (left) to most recent (right). One could assume that this might either point to changes in the manufacturing process or changes in the products that have been manufactured, as different shapes of vessels would require different methods of stacking[53]. Of course, it

49 The reason for the separation lies in *hdbscan's* density based approach and the parameters used, as one condition for a cluster is a minimum number of 5 members. In this case, the distance between the two dense areas is large enough for *hdbscan* to identify two clusters of at least five members, which is computationally but not necessarily archaeologically meaningful. An excellent explanation of how *hdbscan* operates and why this happened can be found in the github-repository of the (python) package: <https://github.com/scikit-learn-contrib/hdbscan/blob/master/docs/how_hdbscan_works.rst> (05.06.2018).

50 Cracolici 2003, 45.

51 e. g. Monaco 2000, pls. 47. 53; Cracolici 2003, 87. 121–123 tab. 12.3 pl. 22; Segbers 2019, 94 f.

52 For Cracolici's reconstruction of how different stacking supports may be employed see: Cracolici 2003, 51–56. An earlier reconstruction from the Pnyx in Athens shows the same method, though employing a different type of stacking ring: Edwards 1956, 89 fig. 3.

53 See also: Segbers 2019, 96.

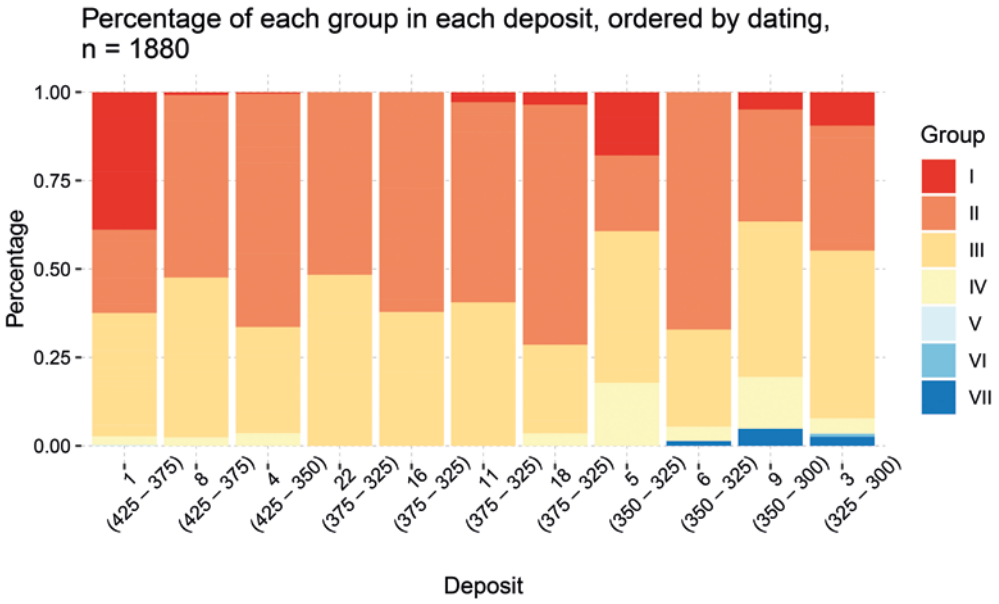


Fig. 14: Metapontum, percentages of stacking tool types in Metapontian contexts (chronological order)

14

is also possible that the changes can be attributed to differences between the contexts themselves as distinct places of production within the workshop.

30 Remarkably, the III-L-type rings only appear in 4 of the deposits (namely 1, 3, 6 and 16)[54] with the largest quantity from *scarico* 3 (last quarter of the 4th century) where they comprise 37.07 % (43 L-type rings of 116) of the kiln supports, while in total they only make up 2.98 % (56 of 1880)[55].

31 The deposit 3 is a pit dug into the alluvial soil located ca. 10 m east of the kilns A and B[56]. Other finds include red-figured pottery attributed to the circle of the Darius Painter and Gnathia wares. All finds are heavily fragmented. Cracolici states that the kiln supports indicate a more simplified system of production compared to the other, earlier deposits, in which a greater number of variants of supports is attested to. While the variants of shapes in the kiln supports are reduced, there is now a broader range of different *moduli* (diameters) that allow the stacking of vessels of many different sizes. Many of the kiln supports carry inscriptions and dipinti, especially the name ›Εχίνος‹ or abbreviations thereof[57]. The fact that so many rings were found in one place – which is also the case in Lenorman Street in Athens – could indicate a confined area of usage for those objects in particular. Actions pertaining to the use of such stacking rings could be spatially confined (or usually carried out) in the place they have been found in, explaining the accumulation of identical types of stacking equipment in the deposits.

32 It follows that in comparison to Metapontum the assumed original function of the rings as supports from a potter's workshop possibly allows the drawing of conclusions about the contemporary production of pottery in Miletus. A chemical analysis of the clay, which could link the rings to locally produced clay vessels[58] or even mark them as imports, is a particular desideratum. In order to do draw broader conclusions, however, there needs to be a larger basis for determining the utility of such supports. So far only the existence of pottery production – probably during the 5th century B.C. or earlier, and probably of smaller open vessels such as cups or bowls that can easily be stacked using those rings – can be ascertained. The clusters may lead the way to a specification

54 Cracolici 2003, Scarico 1: 60–74; Scarico 3: 87–90; Scarico 6: 92–94; Scarico 16: 81–84.

55 Cracolici 2003, 87. The calculation is based on Cracolici 2003, 118 tab. 7.

56 D'Andria 1975, 360 fig. 6.

57 D'Andria 1975, 422–434; Cracolici 2003, 87.

58 Stacking equipment is usually made from the same clay as the pottery produced in the associated workshop (Segbers 2019, 93. 96).

of the produced vessel types and shapes. As each cluster could only be utilized for stacking a certain range of vessel sizes, this may point to a specialization of production that differs especially from the substantially larger rings found in the workshops in Athens mentioned above. The blotches, smudges and streaks of differently coloured clay on the rings indicate that the vessels have been decorated or coated in some way, and that – as a correlation between smudge colour and cluster membership has been observed – the mode of decoration or coating depends on vessel size and therefore probably also on the types of vessels.

33 Cracolici's work in particular is an important step towards a comprehensive perspective on potter's tools, as it identifies differences in support types, sizes and distribution between the deposits[59]. Determining which supports could be used for which shapes or types of vessels, and at which step during the production they were used, might yield some insights about the operational sequences in ancient pottery production in general. Furthermore, the objects in their contexts carry information about who used them where and what for, and if and how workshops shared or did not share kilns (via the markings). Given enough data, such as common occurrences of finished or discarded vessels and other tools in one context, or in which spots of the workshop's premises they can be found, their shape and size may indicate differences in the production or the production techniques[60]. In her work on the pottery production and related find spots in the western Mediterranean, Anne Segbers reaches the same conclusion: types of firing or stacking supports may indicate the range of production of a single workshop, and may be associated with different groups of pottery[61]. Segbers notes that at least in the western Mediterranean, finds of stacking rings[62] are never isolated, and their use always seems to be supplemented by other types of supports as well. Simultaneously, they are the most common types of firing supports found in Athens[63]. Kiln supports may even point to knowledge exchange between workshop members of different places. Are the striking similarities in the Milesian, Metapontian and Athenian rings due to practicalities, to pure chance, or did the individuals making them know of each other's – or that of other generations and places – approaches to the production of such supports?

The Context in Miletus

34 As mentioned above, potter's workshops are not the only place where similar rings – even those that can safely be identified as stacking rings – have been found, with the area of the sanctuary of Dionysos in Miletus being one of those exceptions. It should be noted that recent work has shown there is no indication for the pre-Hellenistic remains in the temenos to be interpreted as a sanctuary as well[64]. Thus, only a brief overview of clay rings in varying contexts will be provided here, and possible other uses for the rings will be explored.

59 A current PhD project at the University of Florence by Martina Fusi deals with kiln firing supports from Populonia. Furthermore, the recent excavations in the potter's quarter of Selinus will hopefully provide many detailed insights about the spatial organization of workshops and tool usage (Bentz 2015 or <https://www.ai.uni-bonn.de/lehre-und-forschung/selinunt> [11.06.2018]).

60 A look towards other sources may be helpful as well. One red-figure bell crater (475–425 B.C.) actually depicts a ring (or rather a ring shaped object) suspended from the wall of a potter's workshop (Beazley Archive Pottery Database no. 213813 <http://www.beazley.ox.ac.uk/record/A55E3098-76EA-432B-B926-4A8207159F49> (27.01.2020); CVA Oxford, Ashmolean Museum (1), pl. 24, 2).

61 Segbers 2019, 87.

62 i. e., kiln supports of type III in the typology developed by Cracolici 2003.

63 Segbers 2019, 89 f. 94.

64 However, results of the re-examination have not yet been published and the work is still ongoing, thus all options will be considered (see Proceedings of »Sanctuaries and Cults in the Aegean, September 2019«).

35 Very different types of decorated clay rings are among the offerings at the Argive Heraeum in Perachora and are usually interpreted as representations of votive cakes, referred to as *koulouria*[65]. They do differ from the rings used in potter's workshops as well as the Milesian rings, but bear some similarities to, for example, the rings from *Bau Z* mentioned above[66]. However, the similarities with stacking rings are limited to them being overall ring-shaped and made out of clay. It does not seem reasonable to interpret the Milesian rings – or any deposit of stacking rings for that matter, regardless of context – as a representation of votive cakes. The use of stacking rings as grave goods in Athens[67], and the fact that other isolated kiln supports have also been found in sanctuaries[68], does point to stacking aids being used as offerings in some instances. There is ample textual evidence for the act of donating used tools or objects employed for a specific task to a deity deemed relevant to the completion of the said task or to commemorate a change in lifestyle[69].

36 Helmut Kyrieleis writes in *Offerings of the Common Man* in 1988: »But it also has something to say [...] about the donor himself. As a personal gift, the votive is always an integral part of the dedicator, who, on the one hand, establishes contact between himself and the god and, on the other hand, makes a public statement. [...] Thus, if some part of the donor's person manifests itself in the gift, this is not so much his profession or character in the narrow sense of the word, but rather, primarily, his social position«[70]. If the context of deposition is a sanctuary, it is quite possible that such rings where donated in lieu of more pompous or expensive offerings, as some potters and painters certainly had been able to afford[71], and possibly in reference to the dedicator's life in whichever way. Even everyday objects may carry a sentimental, symbolic and somewhat profound meaning for the person using and dedicating it. That being said, the fact that a large quantity of uniform rings was found in one spot seems to contradict this idea of a sentimental »personal gift« of symbolic nature, of votives that are »charged with meaning [...] sometimes divorced from that given at their inception«[72]. While this speaks against an interpretation of the Milesian rings as offerings, the argument may be made for other isolated depositions of such rings in sanctuaries.

37 Recollecting the quantity of type III-L1 rings from the Metapontian *kerameikos* (44), one may wonder how an even larger deposit of stacking rings has found its way into a context that is apparently not related to pottery production. The state of preservation suggests that they have not been carefully deposited. They might have broken on site during usage, or the fragments could have been gathered and discarded here. While the comparisons make it plausible that the original function of the clay rings was indeed the stacking of vessels in a potter's workshop, they may have been brought into their context for a wholly different purpose. However, it seems very unlikely that

65 There exist other types of clay rings that differ from the ›stacking rings‹ in many ways. Dugas 1921, 407 no. 232; Waldstein 1905, 44 no. 294; Payne 1940, 67–69; Dunbabin – Payne 1940, 328.

66 See Payne 1940, 67 pls. 16. 33 and Dunbabin – Payne 1940, 328 with other examples as well as Salmon 1972 and Kalligas 1968, 312, who proposes an interpretation of some of them as tripod handles.

67 Kunze-Götte 1999, 103 no. 400, 18 pl. 68, 3. 5.

68 Davidson 1952, 335; Cracolici 2003, 101.

69 Rouse 1976, 70 ff., where Book VI (dedicatory epigrams) of the Anthologia Palatina without any mention of the chronology is the most cited source.

70 Kyrieleis 1988, 216.

71 Some potters or workshop owners do choose to display their social status and success through dedications mentioning or relating to their craft. Thus, they might be more inclined to give elaborately decorated vessels or objects – if not votives of entirely different categories, such as sculptures – to the sanctuary or deity of their choice (see Stissi 2002, 156–158). If, however, such rings were to be interpreted as offerings or votives dedicated by potters, they might not have belonged to the financially more successful potters or workshop owners. Even considering the possible sentimental nature of a dedication, it seems more likely to attribute them to the »common men« (or women) working in ceramic workshops.

72 Weinryb 2017, 102.

they were deposited as *dedications* in the sense of a votive[73] intending display and representation. As a readily available material, maybe oddments sold off or given away by the workshop or the potters originally using them, they could have found a secondary use in the context of festivities or daily activities within any type of context, be it sanctuary, living quarters or public space.

The Affordance of Clay Rings

38 What may their secondary functionality have been in the indisputably different context? A concept well suited for approaching such questions is that of an object's affordance[74]. Exploring the possibilities of human-object interaction may bring about fruitful interpretations regarding their deposit in the sanctuary.

39 Fired clay as a choice of material ensures durability and resilience. It is especially resistant against changes in temperature and humidity or even the influence of water and other liquids, since under most circumstances clay does not deform easily once fired. Nonetheless it is possible, often even easy, to destroy objects made of fired clay by hand. The weight and size of the rings make them easy to carry. Their form might facilitate easy transport of large amounts when bound together by rope, string or other flexible materials. The inner diameter is large enough for a hand, and in some cases even a foot, to fit through, but not small enough to stay on the extremities on its own. The rigid and brittle consistency of the material would impede jamming them on arms or legs, since the movement of muscles might break them. It should be easy to throw the rings. They might, however, break on impact depending on the surface they are thrown upon. The outer and inner rim both serve as a stable resting surface. Other vessels or objects of complementing form might be placed on top of them. In this scenario the rings might function as a base for objects without a foot on their own. It is unknown how much weight could be supported in this way. Furthermore, rings can be hung on walls or beams etc., or wrapped in other materials such as textiles or plants, and they could be attached to one another or to other objects.

40 Most rings have a smoothed surface and only few show distinct traces of tools or fingers that have not been levelled. It seems that a smooth surface was not a requirement of their function, but was nonetheless aimed at. On many rings there are blotches of differently coloured clay under 1 cm in length, as well as thin streaks that go around the whole object. There is no apparent system behind the positioning of those streaks and blotches.

41 Thus it is not impossible to assume that the rings may have served purposes other than stacking vessels in a potters workshop, for example as supports for vessels without a foot of their own[75] or as a base for wreaths to be hung on the wall or carried around, which is well within their affordance, and also within the realm of plausible

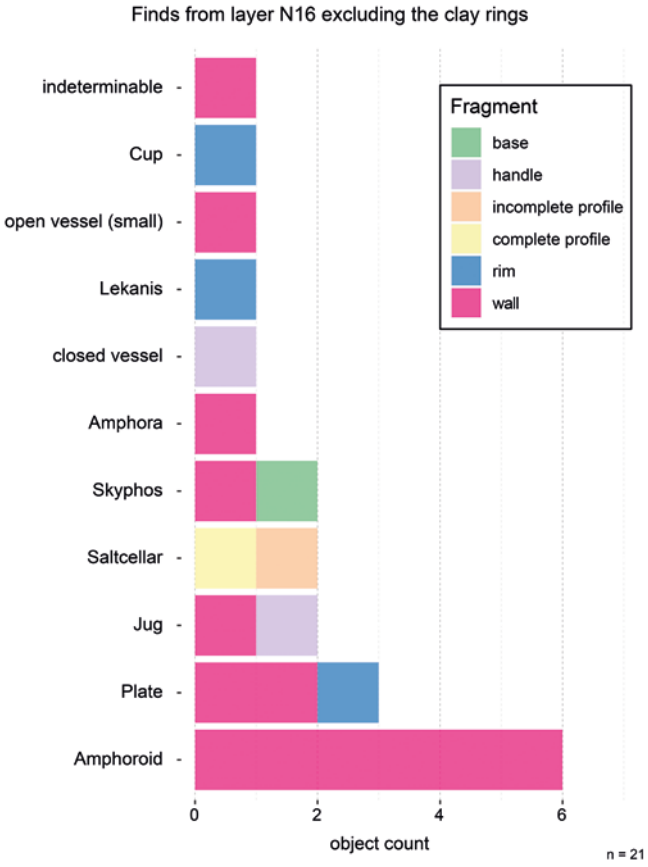
73 Weinryb 2017, 98.

74 The style of description here employed relies on the concepts presented in Keßeler 2016. While originally coined by the psychologist James Gibson in the 1970s, the concept of affordance(s) has made its way into product design (see Norman 2013) and several other fields, and has also become popular in archaeology (Fox et al. 2015). As a broad generalization, it can be described as the possibilities of action any one object can offer those who use it (e. g. Norman 2013, 10–13). As a cautionary note it may be added that even in the product design of our time the »interpretation of a perceived affordance« of an object, as is the interpretation provided in this article, is always subject to cultural conventions (Norman 2013, 145 f.). This is even more the case for the application of the *affordance*-concept to archaeological artefacts, from which we are not only separated by differing cultural conventions but also by a considerable amount of time.

75 It should be mentioned that only one such vessel of fitting size has been uncovered from an adjacent layer, though one may imagine baskets or other containers made from biodegradable material to have existed. This possibility, however, remains an idea without any actual evidence. Segbers also suggests the use of stacking supports for purposes other than pottery production (Segbers 2019, 95).

actions within contexts such as sanctuaries or living quarters. At least among the associated finds from the same stratigraphical unit, no vessels that would profit from such a base can be identified. All deliberations aside, judging from the context and the other finds associated with them, there is no indication of their purpose whatsoever, as the manner of deposition is not stated by the documentation[76].

42 The quantification of the contexts ceramic finds is shown in Fig. 15. A statistical evaluation of such a small[77] and curated assemblage would not be viable. Two well-preserved black glaze saltcellars (Cat. 5. 6) and several fragments of banded ware plates or bowls (Cat. 1 and others, see Fig. 15) indicate food consumption. Additionally, several wall fragments of amphoroid[78] vessels (mostly banded ware and thus possibly contemporary) can be considered service vessel used during food and drink consumption, e. g. feasts or symposia. Only the Castulo Cup (Cat. 4) can safely be attributed to drinking activities, while the actual functionality of the open vessel here classified as a Skyphos or Bowl (Cat. 2) remains unclear. The wall fragment of another Skyphos recorded in Fig. 15 is not contemporary, as its decoration with concentric circles indicates a dating in the geometric period. The Krater or Lekanis (Cat. 3) may be typologically and chronologically ambiguous, but none of the possible types lack a base. One unidentified wall fragment (Fig. 15) can be classified as cooking ware.



15

Fig. 15: Miletus, Sanctuary of Dionysos, unit N16. Quantification of ceramic vessels associated with the clay rings

43 Keeping in mind that the selection may be biased towards fine wares, as it is not a random sample[79], the spectrum present in the assemblage is not indicative of the type of context[80]. Typically, assemblages associated with symposia (or feasts) would contain a significant amount of (fine ware) drinking vessels[81], and since such vessels have been favoured due to the selection process their relative sparseness should at least be noted. In comparison the amount of clay rings seems remarkably high, as has already been mentioned in the beginning of this paper. This is at least in part due to their peculiarity, and it is unclear whether they outnumbered the other finds to the same degree (or at all) in the original assemblage.

76 In the excavation diary Müller-Wiener states that the layer contains ash. He contemplates the possibility that this might be a backfilling for the construction of the building above the layer, but discards this idea without providing an explanation, thereafter referring to it as a burnt layer. No photographs are available.

77 There are other contemporary stratigraphical units belonging to the same phase or layer. Including them, however, would go beyond the scope of this paper. Moreover, they do not contain stacking rings.

78 Vessels classified as ›amphoroid‹ might be (Table) Amphorae, Jugs or Hydriai, but cannot be further identified, as the three classes often share many characteristics even in otherwise diagnostic parts such as bases and handles.

79 Considering the apparent criteria of selection as they can be understood from the complete material of the excavation, the focus was put predominantly on diagnostic and decorated fragments. An indication for this would be that in many contexts, rim sherds and handles of transport amphorae and cooking vessels have been kept, while corresponding wall fragments are conspicuously rare throughout the material. At the same time, there are many wall fragments of banded ware amphoroid vessels that can only in very few cases be joined. Any quantification of the assemblage is biased towards table ware, as this class of pottery is most frequently ›decorated‹ in some way as opposed to plain wares such as cooking equipment.

80 Stissi 2002, 220 f. 241–243. 245 f.

81 Lynch 2011, 75–79.

44 On the one hand, the layer they originate from might well be haphazardly gathered debris from the vicinity discarded or levelled here during a building process. The state of preservation of the heavily fragmented rings as well as the other finds could corroborate this. On the other hand, it would seem unlikely that such an abundance of matching fragments and similar objects would have made it into this rather small area if it were indeed an accumulation of disorganised debris. This holds true for the two almost identical saltcellars Cat. 5–6 as well as the stacking rings.

45 In the end, the possibilities of usage explored in this section are not dependent on the type of context they were found in, but seem to work for most areas of activity within the scope of a city, as do the associated finds. In the end every interpretation of their context and the purposes they may have served must remain speculative, though it should be mentioned that there seems to be no known contemporary potter's workshop in the direct vicinity.

Conclusion

46 The deposit of 5th century stacking rings is a singular occurrence within Miletus. Several other occurrences of such supports as used in potter's workshops or other contexts around the Mediterranean have been introduced in this article, though the specific type of stacking support represented by the Milesian clay rings appears to be rare compared to other forms.

47 While there can be no definite answer to the question of the rings' most likely secondary purpose in this deposit, several possible explanations for their presence have been investigated. Due to the large quantity in a confined space and the lack of other finds associated with pottery production it seems rather unlikely that they would simply be the discarded remnants of a nearby potter's workshop that came to the area in a layer of debris. If they had served a purpose other than as stacking vessels during celebrations or feasts, a secondary usage may be found as a foot for other vessels, or as the base for wreaths. As has been shown, an interpretation as votive offerings seems unlikely.

48 The methodological part of this article was intended as a suggestion on how to advance toward the examination and classification of artefacts that cannot be dealt with in terms of regular typological approaches. Objects for which aesthetic features may not be relevant or deterministic, but that were produced mainly with their functionality in mind, as can often be the case with tools, can be examined and classified by certain measurements, as they relate closely to tool usage. One could keep in mind the thickness of a chisel or the size and shape of a screwdriver, to use a modern equivalent. In the same way, the size and shape of stacking supports – especially in large numbers – offers insights about vessel types and shapes stacked with them, and by the residues on the rings also about the different varieties of decoration or coating. The data provided in the appendix will hopefully aid others in their research on stacking supports in general and records the presence of these often-neglected objects in yet another place.

no.	inv.	clay	applications	colour of appl.	slip	mark-ings	height	min. Diam.	max. Diam.	width	thickness	shape	fragments
1	MK75.N16.1	pink	stains	red	beige	none	1.30	11.60	14.20	1.30	0.51	straight	9
2	MK75.N16.7	light reddish brown	stains	dark red	none	none	1.30	11.40	13.80	1.20	0.50	straight	3
3		pink	none		none	tools	1.00	9.40	11.80	1.20	0.42	straight	3
5		light reddish brown	streaks	light red	yellowish	none	0.80	12.40	15.60	1.60	0.47	concave	5
6	MK75.N16.6	light reddish brown	streaks	light red	yellowish	none	1.20	11.60	14.80	1.60	0.34	straight	4
7		reddish yellow	streaks	light red	yellowish	none	0.90	11.80	14.80	1.50	0.36	concave	2
8		pink	mittig	light red	none	none	0.70	9.80	12.00	1.10	0.42	concave	9
9	MK75.N16.4	light reddish brown	none		yellowish	none	1.50	11.40	14.60	1.60	0.57	concave	3
10		pink	none		none	none	1.30	11.40	13.80	1.20	0.55	convex	5
11		pink	none		none	none	1.30	9.80	12.40	1.30	0.56	convex	3
12		reddish yellow	none		none	none	1.20	9.60	12.40	1.40	0.56	convex	3
13	MK75.N16.5	pink	stains	dark red	none	none	1.00	10.00	12.40	1.20	0.44	concave	3
14	MK75.N16.2	pink	stains	black	beige	tools	1.00	10.00	12.20	1.10	0.50	concave	1
15		pink	smudges	dark red	none	none	0.90	9.40	11.80	1.20	0.51	convex	2
16		pink	streaks	dark red	none	tools	1.10	9.60	11.80	1.10	0.39	concave	1
17		pink	none		none	tools	0.70	9.20	12.00	1.40	0.43	concave	2
18	MK75.N16.9	reddish yellow	streaks	light red	none	none	1.70	6.80	13.20	3.20	0.35	concave	3
19		pink	streaks	light red	yellowish	none	1.20	7.00	13.00	3.00	0.31	concave	2
20	MK75.N16.10	pink	none		none	none	1.10	6.80	11.80	2.50	0.34	concave	2
21		pink	none		none	none	1.10	6.40	11.80	2.70	0.34	concave	1
22		pink	stains	red	none	none	1.20	9.60	15.40	2.90	0.32	concave	1
23		pink	streaks	light red	none	none	0.90	7.40	12.20	2.40	0.31	concave	2
24		pink	stains	dusky red	none	none	1.30	8.30	15.20	3.45	0.35	concave	1
25		pink	stains	light red	none	none	1.90	6.60	13.40	3.40	0.31	concave	3
26		pink	stains	red	none	none	1.50	6.60	12.40	2.90	0.34	concave	1
27		pink	streaks	light red	yellowish	none	1.40	6.80	13.20	3.20	0.33	concave	2

28		pink	stains	black	beige	tools	1.00	9.40	11.80	1.20	0.46	concave	1	
29		pink	stains	black	beige	tools	1.00	9.60	12.00	1.20	0.50	concave	1	
30		pink	none		beige	none	1.10	10.40	14.40	2.00	0.42	concave	2	
31		light reddish brown	none		beige	none	1.20	10.20	11.40	0.60	0.55	straight	1	
32		light reddish brown	stains	black	beige	none	1.40	15.40	17.80	1.20	0.51	straight	1	
34		light reddish brown	none		beige	none	1.00	10.00	12.00	1.00	0.56	straight	1	
35		light reddish brown	none		beige	none	1.10	9.40	12.00	1.30	0.55	straight	2	
36		light reddish brown	none		none	none	1.30	12.20	14.80	1.30	0.54	straight	1	
37		pink	none		none	none	1.10	10.80	12.20	0.70	0.43	concave	3	
38		pink	none		none	tools	0.80	9.40	12.00	1.30	0.42	concave	1	
39		pink	none		none	tools	0.90	10.00	12.60	1.30	0.44	concave	2	
40		pink	stains	red	none	none	0.90	12.00	14.00	1.00	0.38	concave	1	
41	MK75.N16.8	pink	none		none	none	1.10	7.00	13.00	3.00	0.35	concave	1	
42		pink	none		none	none	1.00	9.00	16.00	3.50	0.38	concave	1	
43		pink	none		none	none	1.10	9.80	11.60	0.90	0.47	convex	1	
44		pink	none		none	none	0.90	10.40	13.20	1.40	0.52	convex	2	
45		pink	none		none	none	1.00	9.80	12.20	1.20	0.47	concave	1	
46		pink	smudges	dusky red	none	none	0.90	9.60	12.40	1.40	0.48	straight	1	
47		light reddish brown	streaks	black	none	none	1.50	11.40	15.00	1.80	0.49	straight	1	
48		pink	none		none	none	1.20	10.60	12.40	0.90	0.38	concave	1	
49		pink	stains	black	none	tools	1.00	13.40	16.00	1.30	0.51	straight	1	
50		pink	none		none	tools	0.90	11.40	14.00	1.30	0.48	concave	1	
51		yellowish red	smudges	reddish brown	none	tools	0.80	9.80	12.00	1.10	0.44	concave	1	
52		pink	smudges	black	none	tools	1.00	10.20	12.60	1.20	0.44	concave	1	
53		pink	stains	dark red	none	tools	0.90	9.80	12.40	1.30	0.42	concave	1	
54		pink	smudges	reddish brown	none	none	1.20	10.80	13.40	1.30	0.44	straight	1	

55		pink	none		none	none	1.10	11.40	13.80	1.20	0.39	straight	1
56		pink	smudges	reddish brown	yellowish	tools	1.10	11.80	14.60	1.40	0.39	straight	2
57		pink	smudges	reddish brown	none	none	1.00	11.80	14.80	1.50	0.37	straight	1
58		pink	none		none	none	0.90	9.60	12.20	1.30	0.46	concave	1
59	MK73.C5.3	reddish yellow	none		none	tools	1.80	10.00	12.50	1.25	0.39	straight	1
60		reddish yellow	none		none	tools	0.90	8.60	11.40	1.40	0.40	straight	1
61		reddish yellow	none		none	tools	0.80	10.00	13.40	1.70	0.38	straight	1
62		pink	none		none	tools	1.00	9.00	11.80	1.40	0.46	straight	1
63		pink	none		none	none	1.00	11.20	12.40	0.60	0.50	convex	1
64		pink	none		none	none	1.00	11.40	12.40	0.50	0.46	convex	1
65	MK75.N16.3	pink	none		none	none	1.17	11.60	12.40	0.40	0.48	convex	1
66	MK75.N16.11	pink	none		none	Θ	1.30	12.20	15.20	1.50	0.49	straight	1
67	MK75.N16.12	pink	stains		none	Θ (half), tools	1.48	14.60	18.00	1.70	0.49	concave	1
68		pink	smudges	reddish black	none	tools	1.20	9.60	11.80	1.10	0.51	straight	5
69		light reddish brown	none		yellowish	none	1.50	11.60	14.80	1.60	0.49	concave	2

16

Fig. 16: Miletus, Sanctuary of Dionysos. Measurements of the clay rings from the area

17

18

Fig. 17. 18: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.13 (Cat. 1)

Catalogue of Finds Associated with the Clay Rings

49 This list contains the diagnostic inventoried objects from unit N16 of the excavation in the Sanctuary of Dionysos resp. the Basilica of St. Michael in Miletus. Fig. 15 gives a complete account of all objects from this unit as archived by the excavation. In two cases two fragments evidently belonged to one object and have been grouped accordingly, as fragment count using the very selected material would create a heavy bias in the distribution. Approaches used for the estimation of complete vessels from fragments as they are usually employed by modern excavations[82] cannot be applied here due to the incomplete but assumed to be representative nature of the archived material. Thus, the minimum number of vessels[83] has already been reached (or undercut) with selective sampling.

Abbreviations: fr. = fragment, H = height of fragment, W = width of fragment, Diam = Diameter (preserved amount of the circumference is given behind it in percent), Th = wall thickness. Hardness was determined on the clay body (not on the surfaces) using the Mohs scale[84], colours are given according to the Munsell notation[85] and aim at reflecting the overall impression of the clay body if not specified otherwise.

19

20

Fig. 19. 20: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.15 (Cat. 2)

1 MK75.N16.13: **Plate** (1 rimfr.); Fig. 17. 18

H: 1.8 cm; W: 6.4 cm; Diam.: 18.2 cm (10 %); Th.: 0.58 cm

Very hard, porous, micaceous clay (10YR7/3) containing black inclusions up to 0.6 mm, rough surface. Horizontal stripes (2.5YR4/2, thin) at the rim, complete slip (5Y8/2).

Comparable to Voigtländer 1982, nos. 93–106, especially 96 (6th–5th centuries B.C.) or Pfrommer 1985, 42. 54. 62 fig. 15 no. 15 (450–400 B.C.). These plates (or bowls) are numerous in Miletus and other archaic and classical findspots in the region and are often classified as local or regional ›Streifenware‹ (banded ware) (see Pfrommer 1985, 43). Similar examples employing the same scheme of decoration (usually a horizontal stripe directly below the outside of the rim, frequently slipping over into the inside as well) can also be found in late archaic strata in the Samian Heraion (e. g. the »Fußteller« in Furtwängler 1980, 220–221 fig. 22 no. IV/16). As ›banded bowls‹ they have also been classified as East Greek imports in the Levant, where their frequency seems to spike in the second half of the 5th century B.C. (see Martin 2014, 752–753. 763–764 fig. 14.2 [especially 14.2e = no. 65]).

2 MK75.N16.15: **Skyphos/Bowl?** (1 basefr.); Fig. 19. 20

H: 2.6 cm; W: 9.7 cm; Diam.: 11.2 cm (40 %); Th.: 0.54 cm

Very hard, porous, micaceous clay (7.5YR7/4) containing white and black inclusions up to 0.6 mm, rough surface. Outside and inside covered (10R3/3, thick and dull), resting surface and underside reserved.

In shape this base fragment seems to relate to black glaze Bolsal and Bowl types of the 5th century (e. g. Sparkes – Talcott 1970, 274. 294 fig. 6. 8 nos. 554. 809 and Voigtländer 1982, no. 320), echoing the shape of Corinthian type Skyphoi of the late archaic and classical periods (e. g. Sparkes – Talcott 1970, 257–258 fig. 4 nos. 305–322), though without the groove at the junction of wall and base. However,

82 Baxter – Cool 1995 and in detail Orton 1989. Recently Mateo Corredor – Molina Vidal 2016. For the application of a similar concept see: Lynch 2011, 49 f.

83 Voss – Allen 2010.

84 Cuomo di Caprio 2007, 73 f.; Rice 2015, 312 f. »Very hard« here corresponds to 5 on the Mohs scale, the material being hardly scratched by a sharp knife. »Hard« implies the material can easily be scratched with a sharp knife, but not a fingernail, i. e. 3–4 on the Mohs scale.

85 Rice 2015, 282–286.

the fragment is most likely not attic. In clay and decoration, it seems more comparable to the above-mentioned ›Streifenware‹ (banded ware), though non of the available examples provide a good typological parallel for this base.

3 MK75.N16.16: **Lekanis/Krater** (1 rimfr.); Fig. 21. 22

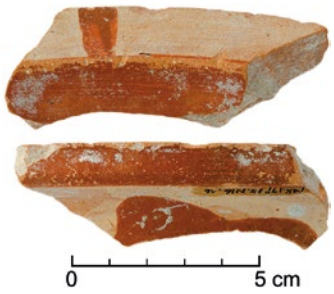
H: 3.0 cm; W: 8.3 cm; Diam.: 30 cm (7 %); Th.: 0.55 cm
Hard, porous, micaceous clay (2.5YR6/8) containing white, black and red inclusions up to 0.6 mm, rough surface. Horizontal stripes at the rim on the outside and inside, radial stripes on the thick rim, amorphous area outside below the rim (all 10R4/8, thick and dull).
Decoration and colour equivalent to Voigtländer 1982, no. 89 (5th century B.C.). Such rim fragments can only be vaguely classified as either a krater or a lekanis in many cases. Boardman 1967, 165 no. 812 (»bowl or crater«, listed as 6th century B.C. [Athena Temple Cella Phase II: late archaic – classical, see Boardman 1967, 101]) is similar in shape, though the decoration slightly differs (no radial stripes on the rim). For a summary of (decorated) archaic Milesian krater types see Panteleon 2011, 64 f., though Cat. 3 should most likely be classified as banded ware.

4 MK75.N16.18: **Castulo Cup** (1 rimfr.); Fig. 23. 24

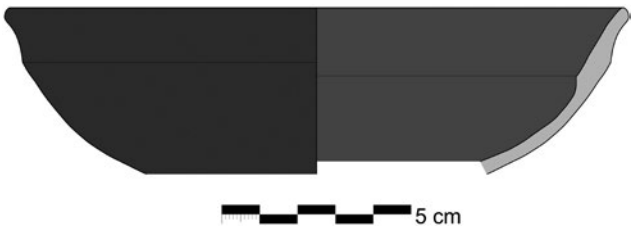
H: 4.6 cm; W: 11.4 cm; Diam.: 16.2 cm (25 %); Th.: 0.36 cm
Very hard clay (7.5YR6/6) with no visible inclusions. Completely glazed (deep, partially greyish black, seamless glossy surface).
Most probably attic. Comparable to Sparkes – Talcott 1970, 268 fig. 5 no. 471 (470–450 B.C., large stemless cup with inset lip). For a summary of the development of and research on Castulo Cups see Walsh – Antonaccio 2014, 48–50. Other examples in Miletus: Voigtländer 1982, 92. 154 fig. 47 no. 303 (dated 6th century, from the area west of the Bouleuterion). Another example from the Heroon III in Miletus is far smaller and has thicker walls: Pfrommer 1985, 53. 61 fig. 8 no. 8 pl. 14, 4. 5 (dated 475–450 B.C.). On the distribution of Castulo Cups in the Aegean and some comments on their dating and typology see Shefton 1996, 165. 169–173.

21

Fig. 21. 22: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.16 (Cat. 3)



22

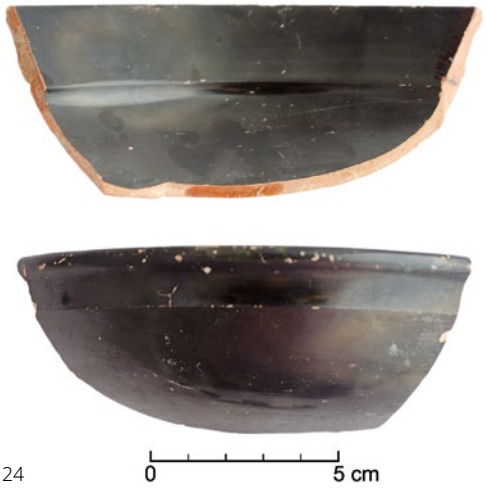


23

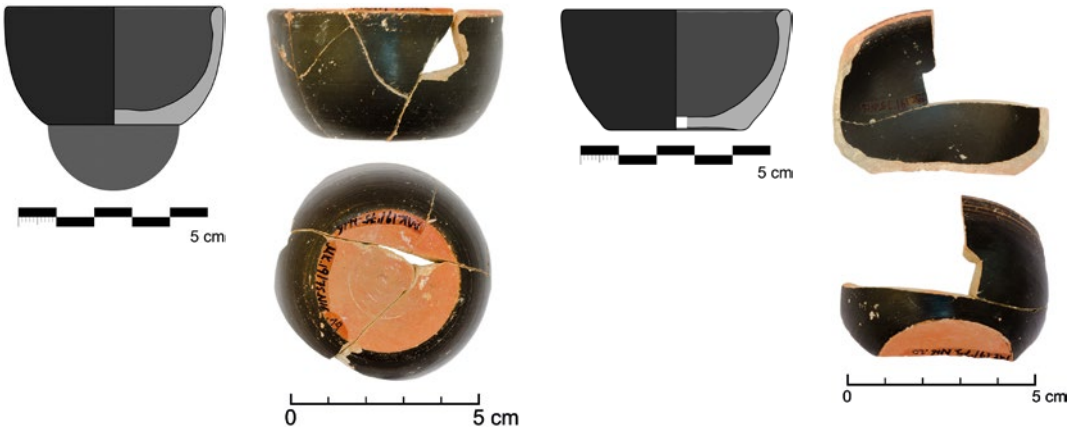
Fig. 23. 24: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.18 (Cat. 4)

5 MK75.N16.19: **Saltcellar with Echinus wall and flat bottom** (complete profile, 7 frs.); Fig. 25. 26

H: 3.0 cm; W: 5.7 cm; Diam.: 5.7 cm (rim); 3,5 cm (base; ca. 80 % of vessel); Th.: 0.25 cm; volume: 52.53 ml
Hard, porous clay (7.5YR6/6) with no visible inclusions, smooth surface on underside. Glazed inside and out (black, thick but uneven, visible lines) reserved stripe at the rim, underside reserved, traces of red slip (miltos?) (2.5YR5/6).
Comparable to Sparkes – Talcott 1970, no. 912 (450–425 B.C.). Attic or atticising. On the difficulties of determining the origin of black glaze pottery in many cases see: Berlin – Lynch 2002. For further information on atticising black glaze pottery in Asia Minor see Scherrer – Trinkl 2006, 177 as well as Kowalleck in: Kerschner et al. 2008, 75 f. and Kowalleck in: Schlotzhauer et al. 2016, 162 f. (concerning Miletus).



24



25 26 27 28

Fig. 25. 26: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.19 (Cat. 5)

Fig. 27. 28: Miletus, Sanctuary of Dionysos, Inv. MK75.N16.20 (Cat. 6)

6 MK75.N16.20: **Saltcellar with Echinus wall** (incomplete profile, 4 frs.); Fig. 27. 28
H: 3.2 cm; W: 5.5 cm; Diam.: 6.0 cm (rim); 3.5 cm (base; ca. 25 % of vessel); Th.: 0.26 cm; volume: 55.79 ml
Very hard clay (2.5YR6/8) with no visible inclusions, smooth surface on underside. Glazed inside and out (black, thick but uneven, visible lines) reserved stripe at the rim, underside reserved, very faint traces of red slip (miltos?).
Comparable to Sparkes – Talcott 1970, no. 912 (450–425 B.C.) and here Cat. 5 (MK75.N16.19). Cat. 6 (MK75.N16.6) has a very slightly concave underside. The thin wall and flat to slightly concave underside of both no. 5 and no. 6 indicate a dating in the second half of the 5th century B.C. (Sparkes – Talcott 1970, 136).

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