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Clay paste characterization and provenance determination of Middle and Late Helladic vessels from Midea

Abstract*

Results of the Neutron Activation Analysis (NAA) of 61 pottery samples of Middle and Late Helladic date from recent excavations in Midea are presented. Chronologically, the sampled pieces fall into two groups, the first of Middle Helladic and Late Helladic I/II, the second of LH III date, with most samples dating to LH IIIB or IIIC. The analyses suggest an Argive/North-eastern Peloponnesian provenance for the majority of the sampled pottery, since 26 of the samples are assigned to the NAA group Mycenae-Berbati (MYBE) and 15 to the NAA group Tiryns (TIR), including their subgroups. In addition to the two main groups the analyses include three other categories: "non-Argive", unlocated, and singles. The differentiation into a small number of distinct chemical patterns is much more evident in the second chronological group of sampled pottery than in the earlier one which comprises a variety of chemical patterns in a small number of samples. Evidently, during the Mycenaean Palatial period several specialized workshops operated in the wider region of the North-eastern Peloponnese for the production of fine and coarse ware pottery in large quantities.

Keywords: Midea, Neutron activation analysis, Northeastern Peloponnese, pottery production, Middle Helladic, Late Helladic, Mycenaean culture, Mycenae, Tiryns, Berbati, workshops

Introduction

The here-presented results of the Neutron Activation Analysis (NAA) of Middle and Late Helladic pottery from Midea are based on sampling campaigns that were conducted in 1995 and 1996. The research was carried out within the 'Archaeological Investigations of Bronze Age Pottery of the Aegean' (*Archäologische Untersuchungen an bronzezeitlicher Keramik der Ägäis*) project that was funded from 1995 to 1997 by the German Federal Ministry for Education, Research, Science and Technology. The aim of the project was to broaden the basis for provenancing Mycenaean decorated pottery, but also other pottery classes of the 2nd millennium BC by defining reference groups for the various regions from Thessaly in the north to Laconia in the south. The sampled pottery from Midea stems from the excavations in the area of the West Gate (nos. *Mid 1–31*)[1] and in the Lower Terraces (nos. *MidW 1–30*)[2] of the site respectively. The samples were selected with a special focus on Late Bronze Age decorated vessels, both open and closed and of different phases of occupation. This category, among others, includes samples from pictorial vessels as well as from transport stirrup jars which indicate commercial and cultural exchange in the Aegean and the Eastern Mediterranean during the Mycenaean period. In addition, other Mycenaean pottery classes, such as fine plain and coarse wares and also Middle Helladic pottery, were sampled to create a basis for comparing the diachronic and synchronic variability of observable chemical patterns at the site. At the time of sampling the pottery was still in a fragmentary state, but since then, after the subsequent study and conservation, many of the fragments were restored partly or completely to whole vessels (see the illustrations of the catalogue). Moreover, the study of the material led to a better understanding and interpretation of its date and function. Most of the pottery from which the NAA samples were taken has been securely dated according to stratified deposits. The pottery recovered from disturbed contexts has been dated on stylistic grounds. Of the corpus of sampled sherds from Midea six examples bearing pictorial decoration

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[1] Demakopoulou 2007; 2012 and 2015.

[2] Walberg 1998 and 2007.

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have been already published.[3] To allow an assessment of the wider context of NAA groups at that site, these sherds are here discussed together with the rest of sampled fragments.

The Bonn procedures of neutron activation analysis and statistical grouping

It is well accepted today that the elemental composition of pottery points to its production place, since it depends on the local clay composition. The likelihood of a transport of clays over larger distances in antiquity can be assumed to be negligible. The elemental composition of pottery and with it of the clay paste prepared by the ancient potters describes a specific production series of a workshop. This composition can be established if many different (the more the better) minor and trace elements are measured with high experimental precision. In many cases where there are numerous and well-measured parameters, the composition pattern of pottery can be assumed to be unique. Therefore, this provenancing method has been compared to the human fingerprint testing and is often called 'chemical fingerprinting'.

For this task of provenance determination of pottery, NAA has proven to be successful as noted many times previously.[4] In Bonn we have routinely applied this method for more than 25 years. The specific aspects of the procedure used are therefore only summarized here. A small sample of about 80 mg is taken from the pottery object to be analysed. This is done preferably using a pointed 10 mm-diameter drill bit of corundum (sapphire, Al oxide) on an electric drill, which produces a shallow depression of 10 mm diameter and a depth of only about 1 mm, leaving negligible evidence of analysis. After pressing the sample powder to pills of 10 mm diameter, a whole set of such pills together with six pills of the Bonn pottery standard[5] is then irradiated with a flux of $5 \cdot 10^{12}$ neutrons/(cm^2 s) at the research reactor of the Reactor Institute in Delft. During the following four weeks the emitted radiation is measured three times with different detectors and at different times.[6] This procedure allows us to determine the concentration of up to 30 elements if present above detection limit, with several redundant values for some elements ascertaining the correctness of the measurements. Since the Bonn pottery standard is calibrated with the Berkeley pottery standard[7] our concentration values can be directly compared to values from the Berkeley laboratory. The NAA data measured in Manchester are also comparable, since they have also been adjusted to the Berkeley pottery standard.[8]

The next step after the measurements is to compare the elemental values of the different new samples with patterns already known. For this task a statistical filter procedure developed in Bonn almost 30 years ago is normally used.[9] In a statistical description of elemental concentration patterns each sample is usually visualised as a point in the m-dimensional space of concentrations with m = number of elements considered. In this space all members of a group of samples with similar composition form a 'cloud of points'. A possible dilution or enhancement of all the concentrations with respect to the centre of the group can be corrected by a best relative fit of the individual members of the group to its centre point. This moves diluted samples along a line through origin removing elongations of the group along this line. If only two elements are plotted, such elongations have been often interpreted as correlations instead of dilution neglecting that in the case of a dilution all other elements also behave in a similar way. After the dilution correction the filter procedure calculates the distance of a point representing an individual sample from the centre point of every cloud stored in the data bank in units of the extension of the cloud in direction to the point. In order to be able to calculate these normalized or modified distances the variances of the average elemental values have to be given or, in the case of a single sample, the experimental uncertainties. The inclusion of these uncertainties has the advantage that the average modified distance can be converted into the probability that the sample belongs to the group,[10] since the assumption of normal distributions is usually good.

Some compositional patterns with a particularly high number of members in the Bonn data bank, e.g. the MYBE group (see below) currently with some 1,000 members, has along certain axes of the concentration space a large extension as e.g. often for the elements Co, Cr or Cs. The volume of the total cloud of samples can be reduced by placing members with higher or lower values of these special elements in subgroups leaving a better defined "core" group with smaller concentration variations and several adhering subgroups differing only in one or two elements.[11] Since all the other more than 20 elements of the subgroups still agree statistically with the core group, the probability of a similar origin of the whole group including the subgroups is very high. The vessels of the

[3] Mommsen & Maran 2000–2001.
[4] Perlman & Asaro 1969; Harbottle 1976; Mommsen 1986 and 2007.
[5] Composition given in Mommsen & Sjöberg 2007 is then irradiated with a flux of 5 • 1012 neutrons/(cm2 s).
[6] Mommsen *et al*. 1991.
[7] Perlman & Asaro 1969, 29, Tab. 3.
[8] Hoffmann *et al*. 1988.
[9] Mommsen *et al.* 1988a; Beier & Mommsen 1994a and b.
[10] An example of individual distance values is given in Akurgal *et al.* 2002.
[11] For definition of core groups, see Mommsen 2001 and Zuckerman *et al*. 2010, 411.

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subgroups might have been produced with clay from a different clay layer of the clay-bed with slightly changed composition for a few elements, or the potters might have changed the preparation recipe of the clay paste causing the deviations. On the other hand, it is possible that two patterns with very similar composition, e.g. a core group and a suspected subgroup have to be assigned to two different distant production places, if reference material supports this.[12] In such cases a geological or other explanation of the similarity of the clay pastes used in the two distant workshops is needed, e.g. the occurrence of a clay deposit with large geographical extent formed by wind-blown sedimentation, since an accidental agreement is not very probable considering the size of the multidimensional space of NAA.

NAA results

The samples taken from 61 ceramic pieces from the excavations of Midea – three displayed in the Archaeological Museum at Nauplion and the rest kept in the storerooms of the Museum – have been analysed by NAA. The statistical evaluation of the concentration data with the Bonn statistical filter procedure using only the values, without any knowledge of the archaeological sample description to avoid introducing any bias, resulted in several different compositional elemental patterns that are described in the following.

As expected from former studies of Mycenaean sherds from the Argolid, two elemental compositions known for many years prevail: the most abundant one is the pattern known as MYBE, and the second is that known as TIR. Both these patterns measured in Bonn were first published in 1988[13] and given the names Mycenae/Berbati and Tiryns/Asine because of distribution arguments of the 81 sherds of this first project from these four sites (26 samples with the MYBE pattern from the Mycenae and Berbati sites and only five from Tiryns, 36 samples with the TIR pattern from the Tiryns and Asine sites and only four from Mycenae). Since then many more pieces with these patterns have been analysed in Bonn.

As described above, besides the main core patterns of MYBE and TIR, different subgroups with pattern variations in a few elements but otherwise matching the core group have been formed. These variation patterns, often with many members, can be assumed to have the same origin as the main group.

If single samples deviate without any explanation only in a few elemental compositions from a group, they are described as associated to the group assuming a contamination or a measurement error and marked with a – ("minus"). But in many cases this association proved to be wrong, since our new measurements showed that they are members of a previously unknown different group. The origin of associated samples remains questionable.

About 20% of the samples are chemical singles that do not match each other or any of our elemental patterns. About these singles nothing can be archaeometrically concluded. They might be the first member of a still-unknown paste used on-site or somewhere else, or they may have been contaminated in ancient times or recently in our laboratory.

The two main groups are:

a) MYBE: To this well-known group belong 25 + 1 associated (+ 1 repetition measurement) sherds (43%) of the 61 pieces from Midea.

a0) The core group MYBE has 20 members including one associated piece. The same compositional pattern was also previously measured at the Berkeley laboratory[14] and also at the Manchester laboratory.[15] The Brookhaven NAA laboratory published three small groups formed from 20 sherds from Berbati[16] using hierarchical cluster analysis without considering experimental uncertainties and dilution effects. None of these Brookhaven groups agree with our groups, so these data are not comparable with our values.[17] The MYBE pattern was assigned originally to a workshop in the Argolid and in particular to the Mycenaean pottery workshop excavated at Berbati, because wasters from there measured in the NAA laboratory

[12] For an example, see Mommsen *et al*. 2016.

[13] Mommsen *et al*. 1988b.

[14] Pattern similar to the MYBE group in Karageorghis *et al*. 1972, 196. For 16 samples of LH IIIB excavated in Mycenae, see Asaro & Perlman 1973, 215 and Fig. 1. The first group of 20 samples from Tiryns measured in Berkeley with "typical Argolid composition" is similar to MYBE, as we know now (no data are given there); in Mommsen *et al.* 2002b the Berkeley group MBP is similar to MYBE (see also fn. 31).

[15] For similar patterns to the MYBE group, see Hoffmann *et al.* 1988, 16. Five different patterns are given there: Berbati (fit factor 1.00), Zygouries (1.02), Tiryns A (0.99), WHFW(SJ) (1.01), Heavy Ware (1.15). According to the Bonn filter procedure they are all statistically similar and can be added to one pattern if multiplied with the best relative fit factor with respect to the first cluster Berbati, respectively (given above in brackets). This summed pattern as well as the single patterns are statistically similar to pattern MYBE. This similarity was discussed with Robinson and Hoffmann during their visit in Bonn already in the 1990s. Tomlinson 2013, App. 3.1, presents 29 different patterns for Asine, Berbati, Korakou, Mycenae, Tiryns, Zygouries and other "fabrics" using the same and additional data. He mentions that they can be assembled into five clusters, but does not calculate their average values, so a comparison of his clusters with the clusters of Hoffmann *et al.* 1988 is not possible.

[16] Bieber *et al.* 1976.

[17] The data of Bonn, of Berkeley and its branch in Jerusalem as well as of Manchester are adjusted and can be compared directly, Brookhaven data not.

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in Berkeley[18] and in Bonn[19] matched this composition. However, the Berbati workshop seems to have ceased production during the LH IIIB period.[20] Following this, many more samples from other sites, e.g. also from Corinthia during classical antiquity, have been measured and show the same pattern.[21] Accordingly, the origin of all samples with this composition cannot be assigned to Berbati or to workshops in the Argolid only, but must be assumed to point to different production sites somewhere in the whole North-eastern Peloponnese.[22]

The reason or reasons for the similarity of the composition of pottery from the Argolid and from Corinthia are unknown. It seems unlikely that solely one large centre produced all the wares found in the Argolid in Mycenaean times and in Corinthia in classical times. The use of a clay paste of similar composition in workshops at locations far apart suggests, if it is not a random occasional event, that an extended stratum of clay of similar diagenesis existed or still exists. A series of sediments in Corinthia and the eastern Argolid belong to the same geological units and also in some parts share a similar basement geology.[23]

In general, Neogene deposits are considered to be an important clay source for potters in Greece for the production of calcareous (fine) wares during the Late Bronze Age and other periods, although a good agreement between the chemical patterns of clay deposits and pottery was rarely found.[24] This disagreement might be due to several factors such as the manipulation of clays by the potters, environmental change, or an unsystematic or wide-meshed sampling strategy. Hitherto, no clay deposits suitable for producing Mycenaean pottery in the Argive Plain have been identified. In addition, no clay samples analysed by NAA with the composition of the vessels in the MYBE group or its subgroups have been published or found by us until now.

Chemical analysis with ICP-AES combined with petrographic analysis was conducted for the Berbati Valley.[25] A weak correlation of the calcareous clay samples from Pliocene-Pleistocene sediments in the Kephalari Rema ravine with the ancient pottery was demonstrated. Similar observations were made for the area of Corinth although very suitable sources were pointed out.[26]

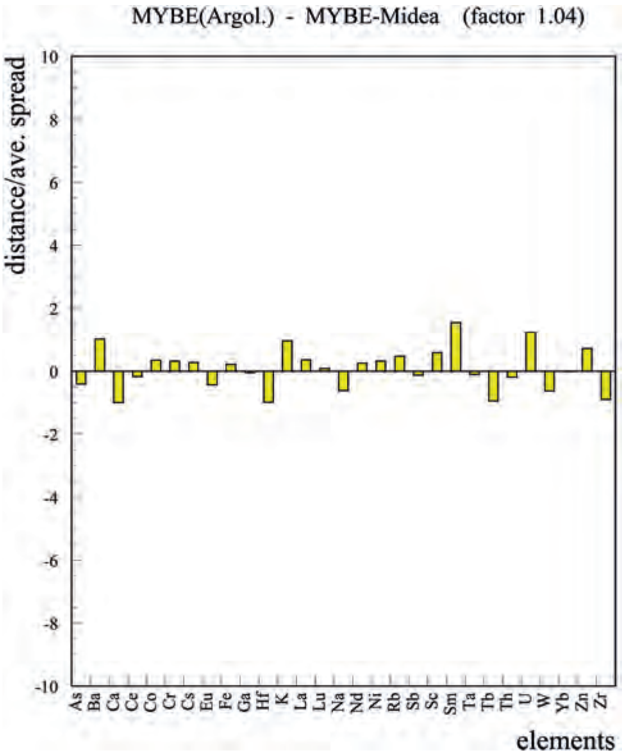

Fig. 1. Comparison of chemical compositions of group MYBE formed with samples from the Argolid and group MYBE-Midea. Plotted are the differences of the concentration values normalized by the average standard deviations (spreads, see Table 1). The values of the group MYBE-Midea have been multiplied first by the best relative fit factor 1.04 with respect to group MYBE. The concentrations are statistically similar, as the small distances for all elements show.

In Corinthia as well as in the Argolid Neogene or Pliocene-Pleistocene clay deposits were most likely exploited for pottery production. Although until now no systematic geological survey has been carried out to explain the chemical similarity of Mycenaean pottery from the Argolid to Corinthian pottery from the Geometric to the Classical periods, they proved to have been produced at Berbati and Corinth respectively, and the geochemical similarity of clay deposits may be a plausible explanation.[27]

While it is almost certain that Mycenae and its immediate vicinity had important pottery workshops throughout the Mycenaean period, unfortunately their products cannot yet be separated through NAA from vessels of other parts of the Argolid and Corinthia.

[18] Mommsen *et al*. 2002b, 621.
[19] Mommsen *et al*. 2016, 375.
[20] See Åkerström 1987, 24, 69–70. Also, most recently, Schallin 2015, 199.
[21] See samples of Protocorinthian and Early Corinthian pottery from Sicily, in Lang & Mommsen 2010 and of samples dating to the 6th century BC, in Mommsen *et al.* 2016.
[22] Zuckerman *et al*. 2010, 411.
[23] Higgins & Higgins 1996, 40–41. For Corinthia see also Bornovas *et al.* 1972; Whitbread 2003, for the Argolid, see Tartaris *et al.* 1970.
[24] Whitbread 2003; Hein *et al*. 2004; Gauss & Kiriatzi 2011, 72–139, 144.
[25] Whitbread *et al*. 2007.
[26] Whitbread 2003.
[27] Compare also similar conclusions in Gauss & Kiriatzi 2011, 144.

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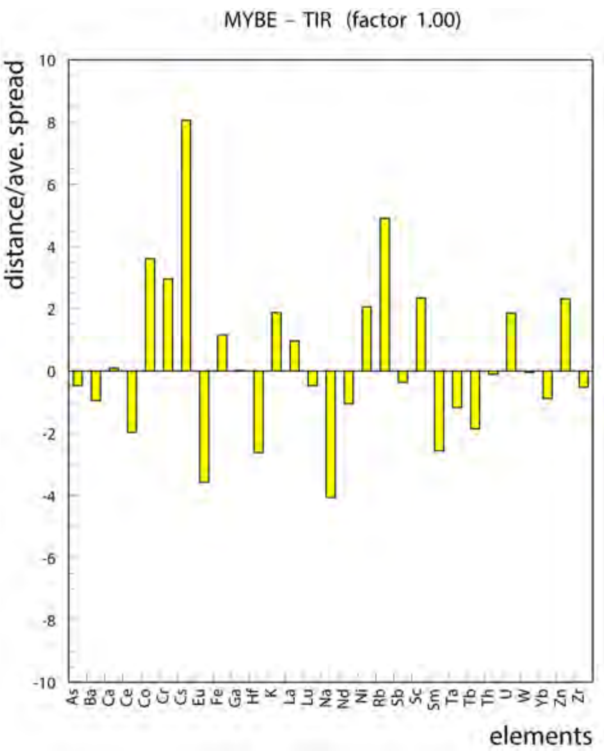

Fig. 2. Graphical comparison of chemical compositions of group MYBE and group TIR, both formed with samples from the Argolid (s. Tab. 1, column 1 and Tab. 2, column 1). Plotted are the differences of the concentration values normalized by the average standard deviations (spreads). The composition of both groups is clearly different.

In *Table 1* the average core pattern MYBE is given and compared with the pattern MYBE formed with the 19 samples from Midea. The agreement is good; both patterns are statistically similar. The best relative fit factors (*Table 3*) to be applied to the raw data of the samples of the group given in *Table 6* are listed in *Table 4*. In *Fig. 1* the normalized differences between the core MYBE and the Midea MYBE groups is plotted. Normalized differences up to about 1.6 are allowed for statistically similar patterns.[28]

There are several further samples in the set from Midea that belong to one of the subgroups showing a variation of the MYBE pattern in a few elements. These subgroups are:

a1) MBCn: this group is similar to MYBE except for the elements Co and Cs that are higher, if a best relative fit factor (dilution factor) of 0.99 with respect to MYBE is applied.

a2) MBCr: is similar to MYBE with Cr higher and Eu lower, if a best relative fit factor of 1.06 with respect to MYBE is applied.

a3) MBKK: is similar to MYBE with K and Rb very low, both lower than in the published group MBKR,[29] if a best relative fit factor of 0.97 with respect to MYBE is applied.

Table 1 shows besides the concentration pattern of the core group MYBE also the patterns of the subgroups and gives the total number of samples in these groups including the Midea samples.

b) TIR: the second pattern has 14 + 1 associated members (25%) in the set of 61 pieces from Midea.

b0) The core pattern TIR of 10 pieces is also known from old measurements here,[30] in Berkeley,[31] and Manchester,[32] only cluster Tiryns B. New unpublished results from material from kiln sites excavated in Tiryns now ascribe this clay composition to workshop(s) at Tiryns itself.[33] The core pattern and again the patterns of the subgroups are presented in *Table 2*.

b1) TIRA: is similar to TIR with higher K, Cr, and Cs after raising all values by the best relative fit factor with respect to TIR of 1.12. The diluting material is unknown, but it is not a Ca compound as the low Ca concentrations show. Two sherds from Tiryns formerly sampled as wasters (label Tirf 2, 7)[34] cannot serve as reliable reference pieces for the assignment of this TIR subgroup to Tiryns because their find context is not related to a workshop or kiln.[35] A tile excavated in Asine in this group may be an import from Tiryns or the workshop or clay source has to be sought in the wider region of Tiryns, Asine, and Midea. Therefore, the assignment of TIRA to Tiryns is possible but not conclusive.

b2) TIRB: is similar to TIR with higher Hf and lower Ca and Sc values. All the elemental concentrations of this subgroup of TIR have to be increased by 15%, i.e. multiplied with a best relative fit factor of 1.15 to match group TIR. As for TIRA, the diluting material is again unknown. Several samples from coarse vessels of Handmade Burnished Ware (HBW) from Tiryns are members of this group. This sup-

[28] Beier & Mommsen 1994a and 1994b.

[29] Mommsen *et al.* 1994, 516, Tab. 2 and 1996, 171, Tab. 1 and 175, Fig. 1.

[30] Mommsen *et al.* 1988b.

[31] Asaro & Perlman 1973, 215 and Fig. 1: another group from Tiryns of 13 samples is similar to TIR, as we know now, no data given; see also: Mommsen *et al.* 2002b, group TAP there is similar to TIR.

[32] Hoffmann *et al.* 1988, 16.

[33] Prillwitz *et al.* forthcoming.

[34] They have been now reassigned from TIR in Mommsen *et al.* 1988 b to TIRA.

[35] Furthermore, Tirf 7 was found in a house context with signs of a conflagration which could also overfire the fabric. Nearby finds of amorphous lumps of vitrified clay or mud, burnt mudbricks and a black- to greyish-coloured floor surface support this assumption.

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ports the assumption that HBW was produced with a diluted paste of the local clay(s).

The difference in composition of the two main patterns MYBE and TIR is shown graphically in *Fig. 2*. Nearly all elements show large normalized differences, especially Cs and Rb are larger and the Rare Earth Elements (REE) Ce, Eu, Hf, and Sm are lower in MYBE compared to TIR.

Several other samples have elemental patterns that are also known already and occur in our databank of patterns. The average values are listed in *Tables 2* and *3*.

ChiA is assigned to one or several workshops at the island Chios.

This assignment is based on mainly archaeological arguments, since a large group of samples from sherds excavated in Taganrog at the Azov Sea, part of the Black Sea, are members of the ChiA group. They all belong to different types of Chiotic amphorae discussed by S. Huy.[36]

TheB/KnoL are very similar patterns assigned to Boeotia and central Crete.

For most of the samples with these patterns a provenance cannot be established with certainty, since the statistical treatment shows that the probability to be a member of the one or the other group is often around 50%. We report therefore always TheB/KnoL or KnoL/TheB stating the group first that has the higher probability of being the origin of this sample. The close similarity of the patterns of pottery from Boeotia and central Crete has been noticed previously by measurements made by Jones (1986, 485) and is discussed in Gilboa *et al.*, forthcoming.

LacA is a group from Laconia.

It is assigned tentatively to Laconia,[37] since a clay sample from the slope of the ascent to the Menelaion is close in composition to this pattern and many unpublished samples from the Laconian sites Epidauros Limera (21 from 58), Melathria (11 of 14) are group members.

Still unlocated patterns, lacking any geographical assignment are:

Ul20 is a well-separated group from all other groups in our data bank.

Besides the two pieces here the group has twelve more members. All these samples stem from sites in the Argolid, half of them from Lerna (unpublished data in the Bonn NAA data bank).

Ul27 is like Ul20 a well-separated group from all other groups in our data bank.

This small group of six samples including the two from Midea has four additional members, one from Asine, one from Tiryns, and two from Katsingri (Prophitis Ilias).[38]

Archaeological discussion

In general, it has to be stressed that regarding the MYBE group and its associated subgroups we are confronted by now with a relatively wide geographical assignment covering parts of Corinthia and the Argolid. Furthermore, the current chemical differentiation between MYBE and the subgroups does not seem to correspond to archaeological groups based on fabrics, chronological or stylistic criteria, or distribution patterns.[39] This mismatch has to be in the focus of future research and cannot be solved within the present study. The problem is partly due to the lack of more reliable reference groups in the Argolid and Corinthia and possibly affected by the aforementioned similar geology. Apart from the wasters and debris of the one workshop in Mastos/Berbati and the two workshops in Tiryns there are no secure production contexts published or analysed with NAA. Therefore, we can assign samples of the MYBE group and subgroups only to the wider region of the North-eastern Peloponnese. The association of TIR and TIR B to Tiryns or its clay resources respectively on the other hand seems to be well-grounded, while TIR A should be associated only tentatively with Tiryns.

The sampled and analysed pottery from Midea falls into two main chronological groups. The first group is made up of vessels of Middle Helladic and Late Helladic I/II date, and the second group of vessels of LH III date. An overview of the distribution of NAA group members in broad archaeological groups is given in *Table 5*.

With the exception of two fragments (Mid 19–20), the Middle Helladic and Late Helladic I/II sampled vessels of the first group all come from the excavation in the Lower Terraces (MidW 11–17, 19, 21, 25). In general, the NAA results of the members of this group do not yet seem to reflect the clear-cut differentiation between two main chemical groups, MYBE and TIR (including their subgroups), which dominate the sampled fine decorated and undecorated LH III pottery. Instead, we are confronted with a wide variety of groups of different provenance and/or recipes.

The sampled vessels of the Middle Helladic Grey Minyan (MidW 11) and Argive Minyan (MidW 12) pottery classes are assigned to Laconia (NAA group LacA) and Tiryns (NAA group TIR B) respectively through NAA. The majority of the

[36] Huy 2008, Kat. nos. 41, 42, 166, 167 are all members of ChiA.

[37] Pattern already published in Jung *et al.* 2015, 461, Tab. 2.

[38] Mommsen *et al.* 1994, sample Kats 5 is published there still as a single, while the second sample from Katsingri is unpublished.

[39] Zuckerman *et al.* 2010, 411.

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Table 1

Average concentrations of elements M in μg/g (ppm), if not indicated otherwise, and spreads (root mean square deviations) σ in percent of M. Each individual sample of the groups has been corrected by its best relative fit factor (dilution or enhancement factor) with respect to M. These factors for the Midea samples are given in *Table 4*. The group MYBE-Midea is compared to the group MYBE that is formed with samples from sites in the Argolid only (see also *Fig. 1*). The groups MBCn, MBCr, and MBKK are taken to be subgroups of the core group MYBE. All group patterns have been corrected with the best relative fit factor (factor) with respect to pattern MYBE.

	MYBE(Argol.)		MYBE-Midea		MBCn(Argol.)		MBCr		MBKK	
	151 samples		19 samples		26 samples		38 samples		38 samples	
	factor 1.00		factor 1.04		factor 0.99		factor 1.06		factor 0.97	
	M	σ(%)	M	σ(%)	M	σ(%)	M	σ(%)	M	σ(%)
As	5.50	(47.)	6.61	(43.)	10.7	(50.)	10.4	(83.)	6.00	(52.)
Ba	408.	(21.)	334.	(18.)	398.	(25.)	442.	(25.)	365.	(24.)
Ca\%	9.34	(21.)	11.2	(17.)	8.19	(23.)	9.01	(15.)	10.6	(15.)
Ce	63.1	(2.4)	63.4	(2.5)	62.1	(3.3)	64.8	(2.8)	62.5	(4.2)
Co	28.6	(5.7)	28.1	(4.7)	34.6	(7.2)	29.5	(5.2)	29.4	(6.3)
Cr	222.	(10.)	216.	(4.8)	246.	(7.9)	258.	(13.)	228.	(6.7)
Cs	8.85	(7.6)	8.68	(6.6)	13.1	(14.)	9.46	(5.4)	9.40	(10.)
Eu	1.15	(4.0)	1.16	(3.0)	1.09	(4.4)	1.11	(3.4)	1.15	(4.3)
Fe\%	5.23	(3.3)	5.19	(3.0)	4.91	(4.7)	5.62	(3.1)	5.44	(4.1)
Ga	21.1	(20.)	21.3	(20.)	20.6	(14.)	23.8	(9.3)	20.9	(25.)
Hf	3.55	(9.2)	3.84	(6.3)	3.27	(6.7)	3.91	(9.5)	3.63	(7.1)
K \%	2.72	(7.4)	2.56	(4.6)	2.79	(9.6)	3.02	(12.)	1.07	(18.)
La	31.7	(2.5)	31.4	(1.9)	29.3	(2.6)	31.4	(2.8)	31.1	(3.4)
Lu	0.43	(4.6)	0.42	(14.)	0.42	(6.0)	0.45	(3.6)	0.43	(7.3)
Na\%	0.49	(27.)	0.56	(16.)	0.41	(40.)	0.58	(22.)	1.40	(10.)
Nd	26.6	(5.5)	26.0	(12.)	24.2	(7.3)	24.4	(6.7)	27.0	(6.6)
Ni	220.	(13.)	212.	(10.)	306.	(16.)	245.	(13.)	231.	(12.)
Rb	154.	(5.9)	151.	(4.9)	153.	(4.9)	164.	(6.2)	70.6	(24.)
Sb	0.58	(15.)	0.59	(13.)	0.85	(20.)	0.70	(24.)	0.60	(20.)
Sc	21.6	(3.8)	21.2	(2.4)	20.8	(4.5)	22.8	(4.1)	22.1	(3.9)
Sm	4.88	(3.7)	4.57	(4.7)	4.49	(7.1)	4.56	(4.7)	4.94	(5.7)
Ta	0.80	(6.4)	0.81	(5.4)	0.79	(5.6)	0.86	(4.9)	0.81	(5.0)
Tb	0.67	(6.7)	0.72	(7.9)	0.65	(8.3)	0.66	(7.8)	0.66	(7.1)
Th	11.0	(2.4)	11.1	(2.8)	10.1	(2.7)	11.6	(2.3)	11.2	(2.7)
U	2.31	(5.7)	2.12	(8.0)	2.33	(9.0)	2.40	(5.9)	2.25	(9.9)
W	2.16	(13.)	2.37	(16.)	2.10	(14.)	2.36	(16.)	2.04	(23.)
Yb	2.77	(2.9)	2.77	(3.2)	2.61	(2.2)	2.80	(2.5)	2.69	(3.0)
Zn	113.	(8.2)	106.	(10.)	110.	(13.)	104.	(11.)	111.	(14.)
Zr	150.	(23.)	182.	(20.)	120.	(43.)	145.	(34.)	144.	(25.)

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Table 2

Average concentrations of elements M in μg/g (ppm), if not indicated otherwise, and spreads (root mean square deviations) σ in percent of M. Each individual sample of the groups has been corrected by its best relative fit factor (dilution or enhancement factor) with respect to M. These factors for the Midea samples are given in *Table 4*. The group TIR-Midea is compared to the group TIR that is formed with samples from sites in the Argolid only. The groups TIRA and TIRB are taken to be subgroups of the core group TIR. The patterns of the TIR subgroups have been corrected with the best relative fit factor (factor) with respect to pattern TIR. Pattern ChiA is assigned to a production workshop in Chios.

	TIR(Argol.)		TIR Midea		TIRA		TIRB		ChiA	
	137 samples		10 samples		8+1 rep. samples		17 samples		24 samples	
	factor 1.00		factor 1.00		factor 1.12		factor 1.16		factor 1.00	
	M	?(%)	M	?(%)	M	?(%)	M	?(%)	M	?(%)
As	6.82	(44.)	7.19	(33.)	10.1	(76.)	8.65	(23.)	16.9	(85.)
Ba	498.	(21.)	528.	(17.)	578.	(30.)	515.	(19.)	391.	(27.)
Ca\%	9.17	(17.)	7.72	(16.)	6.97	(31.)	2.49	(86.)	5.74	(38.)
Ce	67.0	(1.8)	67.1	(1.6)	63.3	(4.1)	69.1	(2.5)	46.2	(4.6)
Co	23.3	(5.6)	23.2	(4.5)	23.3	(6.8)	21.6	(8.5)	32.7	(7.8)
Cr	175.	(4.7)	185.	(3.6)	208.	(14.)	236.	(14.)	454.	(11.)
Cs	4.80	(7.0)	4.89	(5.9)	5.10	(4.5)	4.67	(9.1)	8.37	(14.)
Eu	1.30	(3.3)	1.28	(3.1)	1.19	(8.0)	1.23	(3.9)	0.96	(4.7)
Fe\%	5.03	(3.5)	5.16	(3.3)	4.87	(6.3)	4.76	(3.7)	4.79	(7.9)
Ga	21.0	(25.)	14.8	(34.)	19.5	(24.)	19.4	(18.)	14.9	(32.)
Hf	4.33	(6.1)	4.66	(7.1)	4.85	(6.0)	6.31	(7.0)	3.47	(6.9)
K \%	2.26	(13.)	2.05	(18.)	2.84	(5.7)	2.54	(12.)	1.64	(10.)
La	30.8	(1.8)	30.9	(2.4)	30.3	(4.7)	31.6	(4.5)	21.8	(3.7)
Lu	0.44	(4.3)	0.47	(20.)	0.42	(3.4)	0.44	(3.7)	0.37	(5.7)
Na\%	1.27	(20.)	1.41	(19.)	1.21	(28.)	1.08	(19.)	1.35	(35.)
Nd	28.4	(7.3)	25.1	(14.)	26.3	(6.0)	27.9	(6.7)	19.2	(7.3)
Ni	172.	(11.)	167.	(5.6)	181.	(14.)	171.	(26.)	369.	(15.)
Rb	111.	(7.8)	103.	(12.)	117.	(4.2)	109.	(5.6)	78.4	(9.5)
Sb	0.62	(20.)	0.65	(9.4)	0.57	(26.)	0.71	(15.)	0.77	(29.)
Sc	20.0	(2.6)	20.1	(2.3)	19.6	(6.2)	17.6	(4.3)	19.6	(5.7)
Sm	5.46	(5.0)	5.22	(4.7)	4.93	(6.4)	5.08	(6.4)	3.79	(6.9)
Ta	0.86	(6.0)	0.90	(5.6)	0.88	(11.)	0.99	(4.3)	0.71	(6.6)
Tb	0.76	(6.3)	0.78	(5.9)	0.68	(7.9)	0.74	(6.5)	0.57	(8.9)
Th	11.1	(2.1)	11.3	(3.6)	11.0	(3.6)	11.7	(3.9)	7.72	(5.4)
U	2.05	(7.3)	2.11	(8.2)	2.05	(4.3)	2.03	(5.9)	1.62	(23.)
W	2.18	(20.)	2.22	(17.)	2.18	(8.9)	2.15	(22.)	1.83	(40.)
Yb	2.86	(4.0)	2.88	(2.8)	2.83	(5.6)	2.92	(4.4)	2.30	(4.8)
Zn	92.7	(8.9)	82.4	(7.0)	89.2	(15.)	87.4	(8.6)	87.4	(11.)
Zr	169.	(22.)	203.	(14.)	207.	(14.)	235.	(16.)	116.	(32.)

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Table 3

Average concentrations of elements M in µg/g (ppm), if not indicated otherwise, and spreads (root mean square deviations) σ in percent of M. Each individual sample of the groups has been corrected by its best relative fit factor (dilution or enhancement factor) with respect to M. These factors for the Midea samples are given in *Table 4*. The group TheB formed with samples from sites in Boeotia only can be compared to the quite similar group KnoL formed with samples from sites in Central Crete only. The best relative fit factor between these two groups is 1.00. The largest deviation in the spreds is found for Rb and K. The group LacA is assigned to a workshop(s) in Laconia, the groups Ul20 and Ul27 are of unknown origin.

	TheB		KnoL		LacA		Ul20		Ul27	
	Boeotia & Argolid		Cetral Crete		Laconia		unknown		unknown	
	72 samples		29 samples		61 samples		14 samples		6 samples	
	M	σ(%)	M	σ(%)	M	σ(%)	M	σ(%)	M	σ(%)
As	7.73	(43.)	8.32	(29.)	11.2	(60.)	--		5.26	(25.)
Ba	395.	(25.)	406.	(34.)	564.	(24.)	420.	(19.)	457.	(15.)
Ca\%	6.01	(39.)	9.73	(33.)	5.81	(43.)	13.6	(24.)	2.05	(66.)
Ce	59.9	(4.5)	56.9	(3.0)	84.4	(4.3)	55.3	(2.4)	58.3	(1.3)
Co	34.7	(9.5)	33.5	(8.8)	23.6	(13.)	35.3	(7.0)	21.3	(13.)
Cr	371.	(18.)	396.	(17.)	193.	(14.)	525.	(18.)	339.	(9.1)
Cs	6.33	(13.)	6.68	(12.)	6.45	(8.2)	4.56	(9.1)	6.42	(2.8)
Eu	1.05	(5.1)	1.10	(8.0)	1.46	(3.9)	1.10	(3.8)	0.99	(2.4)
Fe\%	5.43	(5.6)	5.46	(4.4)	4.73	(7.2)	4.15	(4.0)	4.07	(5.5)
Ga	21.6	(21.)	17.5	(15.)	23.5	(23.)	10.9	(37.)	18.5	(14.)
Hf	3.55	(10.)	3.82	(7.3)	5.73	(11.)	3.55	(6.4)	4.82	(4.0)
K \%	2.60	(10.)	2.09	(7.0)	2.44	(7.9)	1.17	(19.)	2.81	(3.4)
La	28.3	(4.5)	27.0	(3.5)	40.8	(4.4)	28.0	(2.2)	26.9	(3.0)
Lu	0.40	(6.1)	0.41	(5.7)	0.49	(5.3)	0.36	(11.)	0.37	(7.4)
Na\%	0.63	(26.)	0.75	(20.)	0.80	(43.)	0.58	(18.)	0.94	(7.9)
Nd	23.8	(12.)	23.0	(4.5)	34.3	(8.2)	25.0	(4.4)	23.0	(6.1)
Ni	420.	(28.)	398.	(16.)	156.	(21.)	385.	(8.3)	301.	(18.)
Rb	133.	(6.8)	110.	(7.0)	132.	(6.0)	76.9	(6.3)	135.	(3.3)
Sb	0.59	(17.)	0.80	(37.)	1.06	(32.)	0.58	(18.)	0.66	(10.)
Sc	21.2	(5.2)	20.9	(4.6)	20.3	(5.2)	15.2	(3.0)	16.9	(2.3)
Sm	4.42	(7.3)	4.45	(5.6)	6.35	(6.7)	4.56	(5.9)	4.52	(9.0)
Ta	0.80	(7.1)	0.87	(4.2)	1.17	(9.4)	0.68	(5.4)	0.86	(8.8)
Tb	0.63	(8.7)	0.62	(9.0)	0.88	(6.5)	0.70	(6.3)	0.61	(8.4)
Th	10.2	(4.2)	9.60	(4.5)	14.0	(5.1)	8.41	(2.7)	11.3	(1.9)
U	2.10	(12.)	2.27	(16.)	3.47	(29.)	1.71	(7.7)	2.05	(9.2)
W	2.00	(17.)	1.81	(13.)	2.39	(19.)	1.62	(23.)	2.19	(9.2)
Yb	2.54	(4.2)	2.56	(3.8)	3.30	(4.4)	2.47	(2.9)	2.60	(3.7)
Zn	106.	(9.8)	106.	(12.)	110.	(13.)	88.2	(13.)	92.9	(22.)
Zr	151.	(24.)	172.	(21.)	231.	(17.)	174.	(24.)	215.	(14.)

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Table 4

Best relative fit factors for the Midea samples with respect to their average grouping values. These factors have to be applied to the raw data given in *Table 6* to calculate the values of the group patterns.

MYBE-Midea	Mid 5(1.01), 6(1.07), 8(0.98), 11(0.96), 12(1.00), 17-(1.03), 19(0.96), 22(1.01), 24(1.10), 26(0.97), 27(1.00), MidW 1(0.96), 4(1.12), 8(1.03), 20(1.00), 23(0.99), 24(0.98), 27(0.93), 28(1.00), 29(0.94)
MBCn	Mid 1(1.05), 2(1.06)
MBCr	Mid 25(1.13), MidW 14(1.02), 14rep(1.01), 21(1.03)
MBKK	Mid 16(1.06)
TIR-Midea	Mid 3(0.95), 15(1.02), 28(1.04), MidW 3(0.96), 5(1.04), 6(1.00), 7(0.99), 9(1.04), 10(0.96), 22-(0.94), 30(0.99)
TIRA	MidW 2(0.92)
TIRB	Mid 23(0.93), 29(0.95), MidW 12(1.11)
ChiA	Mid 30(1.08)
TheB	MidW 15(1.04)
KnoL	MidW 17(1.05)
LacA	MidW 11(0.81)
Ul20	MidW 13(1.15), 19(1.17)
Ul27	Mid 4(1.02), MidW 25(0.97)

Table 5

Distribution of the members of the NAA groups into archaeological groups (1: LH III Mycenaean fine wares, painted and unpainted, incl. fine Transport Stirrup Jars. 2: LH III coarse wares. 3: Transport Stirrup Jars, coarse. 4: MH to LH IIB). Numbers designate Mid samples, w-nos. MidW samples.

NAA groups		arch group 1	arch. group 2	arch. group 3	arch. group 4	totals
MYBE	MYBE core	5,6,8,11,12,17-, 22,24,26,27,w1,w4, w8,w20, w23,w24, w27,w28,w29			19	19 + 1 assoc.
	MBCn			1	20	2
	MBCr	25			w14,w14rep w21	3 + 1 rep
	MBKK	16				1
totals						25+1 assoc. +1 rep
TIR	TIR core	3,15,28,w3,w5,w6, w7,w9,w10,w22-, w30				10 + 1 assoc.
	TIRA	w2				1
	TIRB		23,29		w12	3
totals						14 + 1 assoc.
ChiA				30		1
TheB/KnoL					w15,w17	2
LacA					w11	1
Ul20					w13,w19	2
Ul27			4		w25	2
singles		14,w26	7, 9, 10, 18, 21	2, 13, 31	w16, w18	12
totals		35	8	5	13 + 1 rep.	61 + 1 rep

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Table 6

Raw NAA elemental concentration data of samples from Midea in µg/g (ppm), if not indicated otherwise. The average experimental uncertainties (counting errors) are given below, also in %. Missing values are below the detection limit. rep = repeated measurement.

Sample	factor	As	Ba	Ca%	Ce	Co	Cr	Cs	Eu	Fe%
Mid 1	1.000	17.4	415.	9.10	59.8	29.9	193.	16.5	1.04	4.88
Mid 2	1.000	20.3	149.	2.13	86.7	30.3	154.	4.16	1.75	4.71
Mid 3	1.000	10.3	624.	7.86	71.8	22.7	208.	4.84	1.37	5.69
Mid 4	1.000	6.98	426.	4.27	57.0	23.1	343.	6.35	0.99	3.93
Mid 5	1.000	9.87	263.	10.3	60.0	27.8	208.	8.24	1.15	4.76
Mid 6	1.000	5.34	309.	11.9	54.1	23.7	194.	7.69	1.08	4.53
Mid 7	1.000	7.71	500.	8.83	46.1	24.3	253.	3.15	1.08	5.13
Mid 8	1.000	5.71	262.	8.73	59.1	27.3	231.	8.24	1.17	5.17
Mid 9	1.000	12.5	557.	0.91	117.	35.7	86.6	5.84	2.96	4.14
Mid 10	1.000	8.49	374.	1.95	60.4	18.0	212.	3.59	1.13	3.76
Mid 11	1.000	12.2	314.	9.72	63.3	27.8	207.	8.37	1.17	5.06
Mid 12	1.000	7.10	279.	9.36	60.6	26.7	201.	7.47	1.15	5.00
Mid 13	1.000	37.1	446.	1.00	73.3	22.0	212.	6.94	0.99	4.57
Mid 14	1.000	7.03	560.	5.53	56.7	24.4	494.	8.35	1.03	4.81
Mid 15	1.000	11.6	518.	6.81	64.4	22.5	190.	4.77	1.26	5.17
Mid 16	1.000	6.73	350.	13.2	61.3	29.7	220.	10.2	1.10	5.37
Mid 17	1.000	14.3	300.	10.3	56.2	27.7	242.	7.95	1.06	4.87
Mid 18	1.000	5.24	589.	4.11	52.5	14.4	53.9	5.67	1.01	4.79
Mid 19	1.000	7.32	348.	8.51	64.0	25.1	206.	8.69	1.12	5.32
Mid 20	1.000	10.9	290.	9.92	59.0	34.3	247.	13.2	1.10	4.61
Mid 21	1.000	7.68	549.	6.85	57.8	12.0	52.8	4.01	1.14	4.11
Mid 22	1.000	12.4	326.	12.7	62.6	25.8	196.	7.99	1.14	4.77
Mid 23	1.000	9.17	536.	0.94	63.0	19.6	257.	5.14	1.10	4.38
Mid 24	1.000	6.18	374.	12.4	53.9	25.2	205.	7.34	1.01	4.40
Mid 25	1.000	7.77	463.	10.2	53.6	22.9	213.	8.09	0.92	4.67
Mid 26	1.000	6.08	386.	10.7	62.9	30.4	222.	9.01	1.15	5.40
Mid 27	1.000	9.04	227.	11.0	62.1	28.4	216.	8.45	1.11	5.15
Mid 28	1.000	6.58	528.	9.68	64.5	23.8	174.	4.32	1.23	4.73
Mid 29	1.000	8.47	420.	0.65	63.5	17.5	183.	4.31	1.08	4.22
Mid 30	1.000	6.85	145.	10.2	43.0	28.6	432.	8.13	0.85	4.43
Mid 31	1.000	16.8	345.	0.67	171.	10.5	101.	6.56	2.89	5.01
MidW 1	1.000	4.86	302.	10.3	62.2	29.6	224.	10.7	1.11	5.50
MidW 2	1.000	4.51	674.	5.95	65.5	23.4	188.	5.22	1.15	5.11
MidW 3	1.000	6.67	490.	8.36	70.0	24.5	191.	5.72	1.32	5.24
MidW 4	1.000	4.80	352.	10.7	54.9	23.7	198.	7.34	1.00	4.25
MidW 5	1.000	5.94	598.	7.00	63.4	21.1	171.	4.72	1.21	4.84
MidW 6	1.000	7.19	642.	5.40	68.4	22.8	182.	4.92	1.20	5.41

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Sample	factor	As	Ba	Ca%	Ce	Co	Cr	Cs	Eu	Fe%
MidW 7	1.000	5.72	367.	7.76	69.6	23.2	178.	4.82	1.35	5.13
MidW 8	1.000	5.39	314.	10.1	59.0	28.2	204.	7.90	1.09	4.79
MidW 9	1.000	6.52	482.	8.19	63.5	22.2	181.	4.56	1.28	4.83
MidW 10	1.000	8.48	609.	8.49	69.6	24.7	189.	5.27	1.32	5.47
MidW 11	1.000	19.8	657.	0.86	99.8	35.5	231.	8.82	1.79	5.73
MidW 12	1.000	9.27	233.	2.83	52.0	16.8	185.	3.63	0.97	3.83
MidW 13	1.000	5.89	208.	14.7	49.9	30.9	630.	4.05	1.04	3.65
MidW 14	1.000	4.00	393.	7.90	60.2	29.2	248.	7.89	1.07	5.16
MidW 14rep	1.000	4.10	236.	9.46	59.7	29.7	252.	7.99	1.08	5.20
MidW 15	1.000	4.00	395.	8.93	58.1	29.3	270.	7.53	1.09	4.93
MidW 16	1.000	7.16	401.	6.68	60.1	23.3	226.	5.54	1.13	4.61
MidW 17	1.000	3.78	294.	10.1	55.6	36.4	353.	7.48	1.04	5.09
MidW 18	1.000	1.33	234.	12.8	53.5	28.8	234.	7.78	0.97	5.05
MidW 19	1.000	6.26	322.	18.7	47.1	30.2	614.	3.94	1.01	3.39
MidW 20	1.000	4.58	388.	10.5	61.7	27.2	215.	7.99	1.13	5.05
MidW 21	1.000	4.47	497.	7.24	60.0	27.6	269.	8.82	0.98	5.19
MidW 22	1.000	4.35	531.	5.99	71.5	24.0	195.	5.07	1.29	5.75
MidW 23	1.000	3.21	315.	12.4	62.1	28.2	202.	8.74	1.14	5.01
MidW 24	1.000	4.17	297.	14.5	64.1	27.2	203.	8.50	1.18	5.11
MidW 25	1.000	3.45	326.	2.64	59.8	21.0	313.	6.90	1.00	4.24
MidW 26	1.000	3.70	413.	13.0	60.0	26.8	237.	6.60	1.14	5.43
MidW 27	1.000	3.18	467.	8.51	65.7	28.2	213.	9.53	1.13	5.48
MidW 28	1.000	5.68	245.	13.5	62.4	26.0	200.	8.25	1.15	5.09
MidW 29	1.000	3.75	395.	11.3	68.2	28.5	213.	8.78	1.15	5.38
MidW 30	1.000	3.01	420.	7.94	66.9	25.2	186.	5.08	1.35	5.21
ave. error		0.10	53.	0.73	0.54	0.16	1.4	0.100	0.028	0.021
in%		1.3	13.	8.9	0.8	0.6	0.6	1.4	2.3	0.4

Sample	factor	Hf	K %	La	Lu	Na%	Nd	Ni	Rb	Sb
Mid 1	1.000	2.99	2.44	29.4	0.44	0.45	23.0	210.	150.	0.59
Mid 2	1.000	6.71	2.04	39.0	0.54	0.67	36.4	175.	84.9	1.60
Mid 3	1.000	5.13	1.35	32.5	0.74	1.77	27.3	169.	80.9	0.65
Mid 4	1.000	4.43	2.69	26.3	0.41	0.96	22.3	335.	133.	0.68
Mid 5	1.000	3.20	2.49	30.5	--	0.47	19.6	177.	153.	0.54
Mid 6	1.000	3.87	2.12	27.4	0.39	0.59	23.6	187.	128.	0.56
Mid 7	1.000	3.64	2.02	21.3	0.49	0.89	17.8	136.	85.8	0.43
Mid 8	1.000	4.00	2.43	29.8	--	0.58	28.3	187.	146.	0.61
Mid 9	1.000	7.76	1.97	78.3	0.56	0.58	74.5	109.	119.	0.92
Mid 10	1.000	5.33	1.49	30.3	0.41	0.56	24.2	172.	85.5	0.61
Mid 11	1.000	3.81	2.49	31.8	0.54	0.50	24.3	181.	152.	0.44

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Sample	factor	Hf	K %	La	Lu	Na%	Nd	Ni	Rb	Sb
Mid 12	1.000	3.75	2.46	30.4	0.47	0.51	28.4	174.	141.	0.58
Mid 13	1.000	6.20	2.67	32.9	0.53	0.99	21.4	155.	143.	0.66
Mid 14	1.000	4.09	2.64	28.0	0.44	0.58	19.0	209.	165.	0.50
Mid 15	1.000	5.04	2.14	29.3	--	1.50	24.3	183.	102.	0.71
Mid 16	1.000	3.11	0.64	30.7	--	1.39	30.2	231.	80.3	0.70
Mid 17	1.000	3.66	2.37	28.2	0.48	0.45	18.4	236.	145.	0.64
Mid 18	1.000	4.46	1.66	24.4	0.70	1.84	16.5	31.8	91.7	0.33
Mid 19	1.000	3.85	2.57	31.0	0.50	0.57	24.9	207.	160.	0.59
Mid 20	1.000	3.06	2.35	27.6	0.40	0.41	21.7	322.	144.	1.09
Mid 21	1.000	4.64	1.71	26.9	0.47	1.99	22.4	62.9	65.9	0.53
Mid 22	1.000	3.63	2.52	30.1	0.48	0.56	27.2	187.	147.	0.44
Mid 23	1.000	5.69	2.13	29.1	0.40	1.19	25.6	156.	110.	0.76
Mid 24	1.000	3.62	2.29	26.7	0.39	0.55	22.2	191.	128.	0.48
Mid 25	1.000	4.10	2.23	25.6	0.37	0.58	17.0	200.	132.	0.56
Mid 26	1.000	3.99	2.39	30.1	--	0.59	21.4	239.	154.	0.50
Mid 27	1.000	3.65	2.58	30.0	--	0.61	21.3	242.	142.	0.56
Mid 28	1.000	4.74	1.98	28.7	0.52	1.52	24.8	152.	99.6	0.56
Mid 29	1.000	6.32	2.28	28.4	0.43	1.07	26.4	118.	100.	0.62
Mid 30	1.000	3.46	1.59	20.9	0.33	0.74	18.1	352.	75.5	0.50
Mid 31	1.000	7.23	2.24	71.8	1.60	0.76	66.7	49.7	133.	1.38
MidW 1	1.000	3.46	2.49	31.3	0.42	0.28	26.9	241.	155.	0.61
MidW 2	1.000	4.53	2.64	30.2	0.43	0.99	26.5	187.	119.	0.70
MidW 3	1.000	4.41	1.62	32.5	0.46	1.61	31.5	182.	102.	0.74
MidW 4	1.000	3.19	2.18	27.5	0.39	0.55	20.0	195.	123.	0.53
MidW 5	1.000	4.57	2.23	30.2	0.41	0.95	20.4	156.	112.	0.55
MidW 6	1.000	4.82	2.43	30.5	0.44	1.35	21.7	168.	114.	0.72
MidW 7	1.000	4.41	2.34	32.4	0.45	0.95	23.3	160.	112.	0.62
MidW 8	1.000	3.41	2.39	29.9	0.39	0.46	21.7	224.	140.	0.63
MidW 9	1.000	4.42	2.15	29.9	0.42	1.43	20.3	155.	104.	0.62
MidW 10	1.000	4.26	2.28	32.9	0.44	1.33	33.0	182.	114.	0.64
MidW 11	1.000	6.83	3.10	48.3	0.61	1.07	44.0	195.	171.	0.76
MidW 12	1.000	4.96	1.56	24.2	0.36	0.79	17.3	146.	87.0	0.45
MidW 13	1.000	3.17	0.91	25.4	0.32	0.60	17.4	366.	61.8	0.53
MidW 14	1.000	3.56	2.52	29.4	0.41	0.55	23.4	242.	146.	0.53
MidW 14rep	1.000	3.74	2.57	29.8	0.41	0.56	19.0	216.	143.	0.69
MidW 15	1.000	3.57	2.39	28.6	0.41	0.60	21.5	251.	134.	0.59
MidW 16	1.000	4.40	1.90	29.2	0.42	0.94	26.2	198.	108.	0.58
MidW 17	1.000	3.46	1.72	26.5	0.32	0.86	25.8	294.	110.	0.46
MidW 18	1.000	3.88	1.37	25.9	0.37	1.17	25.0	232.	74.7	0.48
MidW 19	1.000	3.27	0.75	23.9	0.26	0.61	23.4	345.	61.4	0.52

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Sample	factor	Hf	K %	La	Lu	Na%	Nd	Ni	Rb	Sb
MidW 20	1.000	3.90	2.35	30.1	0.33	0.61	29.4	206.	131.	0.64
MidW 21	1.000	3.82	3.10	29.5	0.37	0.53	22.9	232.	147.	0.63
MidW 22	1.000	5.07	1.53	31.4	0.40	1.84	33.2	195.	85.2	0.65
MidW 23	1.000	3.63	2.58	31.2	0.36	0.51	25.4	228.	146.	0.59
MidW 24	1.000	3.94	2.54	31.6	0.38	0.58	26.7	196.	143.	0.44
MidW 25	1.000	5.10	2.93	27.3	0.34	0.83	24.2	294.	144.	0.63
MidW 26	1.000	3.73	2.44	29.5	0.37	0.79	24.5	235.	117.	0.65
MidW 27	1.000	3.79	2.88	32.5	0.39	0.47	29.4	222.	176.	0.69
MidW 28	1.000	3.82	2.40	30.7	0.35	0.59	25.1	199.	139.	0.63
MidW 29	1.000	3.70	2.90	32.9	0.38	0.63	29.2	204.	158.	0.55
MidW 30	1.000	4.87	1.96	31.0	0.38	1.79	26.2	172.	88.5	0.67
ave. error		0.077	0.039	0.094	0.023	0.007	3.0	11.	2.7	0.073
in%		1.8	1.8	0.3	5.0	0.8	12.	5.4	2.3	12.

Sample	factor	Sm	Ta	Tb	Th	U	W	Yb	Zn	Zr
Mid 1	1.000	4.50	0.77	0.55	9.97	2.25	2.09	2.55	95.7	150.
Mid 2	1.000	7.56	1.75	1.18	11.8	4.55	1.57	3.92	87.4	346.
Mid 3	1.000	6.02	1.03	0.77	12.8	2.37	1.52	2.92	72.9	224.
Mid 4	1.000	4.40	0.81	0.68	10.9	2.05	1.86	2.42	87.2	179.
Mid 5	1.000	4.08	0.72	0.69	10.4	1.93	1.95	2.75	114.	189.
Mid 6	1.000	4.22	0.71	0.65	9.55	1.89	1.79	2.63	102.	203.
Mid 7	1.000	4.04	0.67	0.67	7.31	1.46	1.45	2.61	86.4	180.
Mid 8	1.000	4.48	0.80	0.65	10.6	2.13	1.79	2.59	109.	186.
Mid 9	1.000	13.6	1.46	1.63	13.7	2.61	1.95	4.02	92.3	428.
Mid 10	1.000	4.48	0.95	0.67	10.1	1.55	1.67	2.64	65.5	203.
Mid 11	1.000	4.57	0.89	0.72	11.1	2.05	2.28	2.72	111.	204.
Mid 12	1.000	4.48	0.76	0.69	10.2	1.99	2.28	2.64	107.	198.
Mid 13	1.000	4.28	1.23	0.65	12.7	2.66	2.61	2.98	96.9	325.
Mid 14	1.000	4.09	0.87	0.54	11.1	2.15	2.50	2.52	73.0	155.
Mid 15	1.000	4.94	0.95	0.70	11.2	2.07	1.83	2.78	79.2	241.
Mid 16	1.000	4.92	0.74	0.60	10.8	2.15	1.40	2.68	113.	145.
Mid 17	1.000	3.75	0.65	0.62	9.94	1.79	1.90	2.70	103.	182.
Mid 18	1.000	3.92	0.70	0.56	10.9	1.98	1.89	2.52	79.4	238.
Mid 19	1.000	4.83	0.87	0.64	11.6	2.36	2.22	2.76	111.	158.
Mid 20	1.000	4.39	0.72	0.70	9.59	2.37	1.78	2.48	103.	157.
Mid 21	1.000	4.80	0.65	0.73	9.79	1.60	1.03	2.84	73.5	172.
Mid 22	1.000	4.38	0.77	0.70	10.7	2.29	2.15	2.57	104.	138.
Mid 23	1.000	4.81	0.97	0.75	11.2	1.98	1.80	2.57	81.3	220.
Mid 24	1.000	3.83	0.71	0.70	9.65	1.73	1.83	2.38	94.8	181.
Mid 25	1.000	3.75	0.74	0.62	9.63	1.82	1.94	2.40	79.3	199.

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Sample	factor	Sm	Ta	Tb	Th	U	W	Yb	Zn	Zr
Mid 26	1.000	4.60	0.78	0.64	11.2	2.09	1.87	2.59	115.	205.
Mid 27	1.000	3.93	0.73	0.72	10.6	1.79	2.14	2.66	116.	153.
Mid 28	1.000	5.11	0.83	0.76	10.3	2.31	2.03	2.82	85.1	213.
Mid 29	1.000	4.54	0.96	0.61	11.3	1.93	--	2.59	77.4	230.
Mid 30	1.000	3.19	0.71	0.57	7.31	1.81	1.53	2.01	73.3	113.
Mid 31	1.000	13.1	1.47	1.60	15.7	3.65	2.31	3.84	89.0	352.
MidW 1	1.000	4.77	0.76	0.73	10.9	2.14	2.16	2.74	117.	125.
MidW 2	1.000	4.89	0.93	0.68	11.4	1.95	1.88	2.82	69.5	210.
MidW 3	1.000	5.51	0.92	0.89	11.3	2.12	2.19	2.99	87.2	166.
MidW 4	1.000	3.95	0.68	0.65	9.32	1.90	2.41	2.50	87.0	162.
MidW 5	1.000	4.77	0.90	0.78	10.9	1.90	2.15	2.81	80.3	202.
MidW 6	1.000	4.84	0.94	0.77	11.7	2.04	2.66	2.75	81.3	205.
MidW 7	1.000	5.30	0.86	0.82	11.3	1.85	2.53	2.94	91.3	161.
MidW 8	1.000	4.30	0.76	0.63	10.2	2.01	2.41	2.70	99.0	135.
MidW 9	1.000	4.96	0.82	0.79	10.6	1.99	2.39	2.88	79.1	210.
MidW 10	1.000	5.37	0.89	0.79	11.6	2.01	2.42	3.04	88.3	227.
MidW 11	1.000	7.76	1.36	1.12	16.1	3.16	3.23	4.20	131.	297.
MidW 12	1.000	3.66	0.72	0.63	8.93	1.49	2.23	2.33	66.6	217.
MidW 13	1.000	3.53	0.55	0.63	7.43	1.43	1.60	2.20	68.3	192.
MidW 14	1.000	4.21	0.79	0.74	10.4	1.98	2.64	2.60	95.4	134.
MidW 14rep	1.000	4.50	0.76	0.55	10.5	2.15	3.14	2.74	101.	157.
MidW 15	1.000	4.22	0.72	0.65	9.98	2.01	2.15	2.50	104.	173.
MidW 16	1.000	4.48	0.83	0.77	10.00	1.54	2.33	2.65	86.1	233.
MidW 17	1.000	4.29	0.74	0.57	9.71	2.07	1.92	2.31	90.5	149.
MidW 18	1.000	4.14	0.74	0.59	10.7	2.08	2.43	2.41	79.5	150.
MidW 19	1.000	3.84	0.57	0.64	7.05	1.26	1.70	2.11	65.8	176.
MidW 20	1.000	4.61	0.76	0.70	10.5	1.74	2.58	2.69	83.4	212.
MidW 21	1.000	4.14	0.68	0.66	10.9	1.92	2.70	2.61	81.6	180.
MidW 22	1.000	5.61	0.91	0.95	12.7	2.53	2.25	2.96	65.3	201.
MidW 23	1.000	4.63	0.76	0.68	10.9	2.43	2.88	2.65	102.	124.
MidW 24	1.000	4.65	0.83	0.87	11.0	2.05	2.23	2.71	90.1	145.
MidW 25	1.000	3.95	0.85	0.69	11.9	2.16	2.65	2.58	70.0	267.
MidW 26	1.000	4.49	0.81	0.67	10.8	2.38	2.66	2.55	84.4	265.
MidW 27	1.000	4.64	0.90	0.77	12.1	2.24	3.13	2.83	97.4	224.
MidW 28	1.000	3.98	0.86	0.67	11.1	1.81	2.85	2.78	91.3	187.
MidW 29	1.000	4.85	0.78	0.86	11.8	2.10	3.07	2.80	88.0	244.
MidW 30	1.000	5.53	0.91	0.76	11.5	2.26	2.68	2.83	79.9	201.
ave. error		0.034	0.031	0.054	0.073	0.11	0.17	0.058	2.3	29.
in%		0.7	3.7	7.4	0.7	5.4	8.0	2.1	2.5	15.

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sampled vessels of the first group belong to the Matt-painted pottery class (MidW 13–17, 19, 25). Two fragments (MidW 13 and 19) were sampled in order to test whether they might belong to Aeginetan matt-painted pottery. Although the fabric of the sherds macroscopically lacked the typical Aeginetan inclusions, their way of decoration resembled this kind of matt-painted pottery. The NAA analyses (MidW 13 and 19) do not confirm an Aeginetan origin, although the region of origin of NAA group Ul 20, to which the vessels are assigned, remains unclear. Another fragment of a matt-painted vessel (MidW 15) dating to LH I was sampled because its fabric and wheel-made way of manufacture archaeologically pointed to an origin outside the NE Peloponnese. The Boeotian provenance suggested by NAA (group TheB/KnoL) corroborates this conclusion and is persuasive because during LH I/II eastern central Greece had a strong tradition of producing and exporting wheel-made monochrome and polychrome matt-painted pottery.[40]

The rest of the sampled matt-painted vessels (MidW 14, 16-17, 25) was expected to derive from the NE Peloponnese. This assumption is directly confirmed in one case (MidW 14) by the attribution to the NAA group MBCr, while the results of the analyses of the other vessels do not allow an exact assignment to a place of production. Nevertheless, an Argive origin of the NAA group Ul 27 (MidW 25) is likely, in view of the fact that the other example of this group from Midea and the four previously known group members come from neighbouring sites (Asine, Prophitis Elias of Katsingri, Tiryns). An additional argument supporting the regional origin of this group is the production of a variety of pottery classes over a span of several centuries that is evidenced by the appearance of the matt-painted vessel and the LH IIIB2 coarse ware vat (Mid 4).

Archaeologically, a Cretan origin of the handmade matt-painted vessel MidW 17 assigned to NAA group TheB/KnoL is highly unlikely, which leaves a Boeotian (mentioned first) origin as the probable option, although there are no additional morphological, technological or stylistic arguments that would confirm such an attribution.

The one sampled fragment of a wheel-made bridge-spouted jar of the light-on-dark Minoanizing pottery class (MidW 21) dating to MH III/LH I is assigned by NAA to an Argive/NE Peloponnesian workshop (NAA group MBCr). The analytical results of the two fragments of Early Mycenaean decorated pottery (Mid 19-20) support a North-eastern Peloponnesian origin and correspond to the macroscopic differences. The finer Goblet (Mid 19) belongs to the MYBE group while the medium coarse palace style jar (Mid 20) belongs to MBCn. The latter provides evidence for production in the North-eastern Peloponnese of this particular type of vessel which is inspired by prototypes of the Neopalatial period on Crete.[41]

The Late Helladic III sampled vessels of the second group from Midea predominantly date to LH IIIB and IIIC and belong to two main categories: fine ware and coarse ware. The fine ware from Midea covers the typical repertoire of Mycenaean pottery, decorated (Mid 3, 8, 11–12, 14–16, 19–20, 22, 25–28, MidW 1–10, 20, 22–24, 26–30) and undecorated (plain) vases (Mid 5–6, 24). To the coarse ware can be assigned five of the transport stirrup jars (Mid 1–2, 13, 30–31) and other storage and cooking vessels (Mid 4, 7, 9–10, 18, 21, 23, 29). The majority of the sampled pottery from the area of the West Gate is of LH III B2 date, especially LH III B2 Late, which has been recovered mostly from well-stratified deposits, notably destruction layers and floor deposits. It is largely comparable with the pottery from the relevant destruction layers at Mycenae and Tiryns, with close similarity in shape and decoration.[42]

A special group within the fine decorated LH III pottery is represented by vessels with pictorial decoration mainly known from the great Mycenaean Argive centres Mycenae and Tiryns, and also from Berbati. Of the pottery with pictorial decoration from Midea, six examples were sampled all dating to either LH IIIB or IIIC. Four of the pictorial vessels are assigned by NAA to Tiryns (TIR: Mid 3, 15, MidW 3 and associated only MidW 22), the two other examples to the NAA group MYBE (Mid 8, MidW 20). The results have already been separately presented,[43] but it makes sense to discuss them again in the context of the entire set of samples, especially since the ongoing archaeological research has added more evidence for their provenance and production.

The study and the chemical analysis of the pictorial pottery from Midea and its comparison with the relevant pottery from the other Argive centres demonstrate that during the palatial period specialized workshops operated in the region of the Argive Plain and adjacent Corinthia, as shown by the abundant production of fine ware pottery, including remarkable pictorial vases. Furthermore, a number of these vases were designed to be exported, as is clear by the Mycenaean pictorial vessels found in Cyprus. It seems that a considerable number of pictorial vessels and other Mycenaean decorated pottery, produced in these workshops, were intended for export to the Eastern Mediterranean.[44]

[40] Mommsen *et al*. 2002a.

[41] Kalogeropoulos 1998, 85–179.

[42] French & Stockhammer 2009.

[43] Mommsen & Maran 2000–2001.

[44] Catling 1986, 597–601; Crouwel 1991b, 52–53; Demakopoulou 1992, 147–148.

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The jug Mid 8 depicting wavy-line birds has a close parallel from Enkomi.[45] Moreover, the birds on both jugs are closely linked with similarly rendered birds on vases, mostly jugs, from Mycenae, Berbati, and Tiryns. This similarity supports the origin of these vases from the same workshop, most probably the MYBE as shown by the analysis. The fragment of the chariot scene krater (Mid 3) has parallels from Cyprus and Tiryns, notably the Shield Bearer's krater as for the rendering of the horse's mane. A provenance from Tiryns (TIR) is very probable. The fragmentary krater with the stag procession (Mid 15) must have also a Tirynthian provenance (TIR). It has a close parallel in the well-known Stag Krater from Enkomi.[46] Some other vases with stags from Tiryns are very much like with the Midea and Enkomi kraters.

Very interesting is the fragment of a marsh bird krater (MidW 22) from the Lower Terraces of Midea. We mention this here because numerous fragments, mostly from kraters, with this bird type decoration were recovered from excavated areas all over the site. In addition, another marsh bird krater was recently found in Midea.[47] It is significant that the marsh bird motif, so popular in the pictorial pottery of Midea,[48] is otherwise largely known only from Tiryns.[49] This pictorial category from both sites, obviously produced in the same workshop, can be associated with the TIR grouping, as the analysis has shown.

Two transport stirrup jars (Mid 12, 14) can be assigned to the fine ware category. Both have linear decoration and are likely to be of Argive origin. Mid 12 is associated with the NAA group MYBE. As to the stirrup jar Mid 14, classified by NAA as a single, its shape, fabric, and decoration show that it may also come from an Argive workshop.

In general, the quality and abundance of the fine decorated and plain pottery from Midea matches the respective pottery from the other two palatial centres, Mycenae and Tiryns. Therefore, it does not come as a surprise that the attribution by NAA of almost all of the sampled members of these wares to either the NAA groups MYBE and TIR or their subgroups reflects the predominance of certain clay pastes during the late palatial and post-palatial periods. In fact, only the fragments of a LH IIIB krater (MidW 26) and a fine large transport stirrup jar (Mid 14) among the sampled members of these pottery classes from Midea are classified as singles by NAA. Whether these indicate unknown imports or a contamination remains uncertain. What the predominance of the two NAA groups means in terms of the number of pottery workshops producing Mycenaean pottery is impossible to say. While Mycenae and Tiryns are likely to have played a major role in Mycenaean pottery production, the ubiquity of clay pastes of at least NAA group MYBE in the North-eastern Peloponnese points to the likelihood of a coexistence of other workshops in Corinthia and the Argolid. In this respect, it cannot even be excluded that Midea and its vicinity produced Mycenaean pottery. Although currently there is no archaeological evidence (such as kilns, wasters, or specific stylistic traits) that would support such a conclusion, the issue should be examined by future excavations, alongside further archaeometric and geological research.

Unfortunately, the results of the NAA analyses of the plentiful coarse ware pottery from Midea are not particularly informative as regards the question of provenance since most sampled vessels proved to be NAA singles.

Four of the coarse transport stirrup jars are decorated (Mid 1–2, 30–31). Another medium coarse transport stirrup jar (Mid 13) is burnished monochrome. Most prominent among them is the transport stirrup jar (Mid 2) with the Linear B inscription *wi-na-jo*.[50] This is a common personal name in Cretan Linear B inscriptions known from several tablets in Knossos and from two transport stirrup jars found at Knossos and Armenoi. The fabric and the graphic rendering of the signs suggest that all three jars may come from the same workshop. Consequently, the Midea jar could well have been imported from west or central Crete, although the NAA analysis classifies it as a single. Another remarkable transport stirrup jar is Mid 1, which has a close parallel from Mycenae. Both jars have the same decoration of repeated Linear B signs on the shoulder as decorative symbols. This similarity supports the association of Mid 1 jar with an origin in the workshops of the NE Peloponnese suggested by the NAA analysis (NAA group MBCn). The coarse ware stirrup jar Mid 30 shows all morphological and stylistic features of imported vessels from central Crete. Similar inscribed and uninscribed transport stirrup jars bearing the octopus motif or stylized octopus tentacles were exported to the Mainland, especially to Thebes and the Argolid, from central Crete.[51] Therefore, the assignment to Chios (NAA group ChiA) comes as a surprise and needs to be assessed in the light of future analyses. The Mid 31 coarse transport stirrup jar with light-on-dark decoration could have been imported from west Crete as has been suggested for this type of jar.[52] The analysis, however, classifies it as a single probably due to the lack of camparative

[45] Vermeule & Karageorghis 1982, 51, 204, no. V68.
[46] Vermeule & Karageorghis 1982, 49, 203, no. V54.
[47] Demakopoulou 2017, forthcoming.
[48] Fisher 1998, 105, pls. 66:115, 119:67, 123–124, 127.
[49] Güntner 2000, 96–101, pls. 42–46.

[50] Demakopoulou 2004, 408–409, fig. 35.10.
[51] Jones 1986, 86; Haskell 1999; Haskell *et al.* 2011, 112–115.
[52] Haskell 2005, 208–211, pl. 1; Haskell *et al.* 2011, 83–85.

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data.[53] Samples Mid 4, 7, 9–10, 18, 21, 23, 29 have been taken from storage vessels (pithos, vat, basin) and cooking pots (three tripod cooking pots, cooking grill or portable hearth). These vessels are attested in many Mycenaean Mainland sites and also in Crete, notably at Kommos,[54] and, of course, in Mycenae[55] and Tiryns[56] in great quantities, as in Midea. Two of the sampled cooking pots (Mid 18, 21) with gold mica were archaeologically attributed to Aeginetan gold-mica fabric,[57] while the NAA analyses identify them as singles. There are many other similar cooking pots without gold mica – some of them with silver mica – which are thought to be of Argive origin, as the majority of the coarse ware vessels are from Midea. This is corroborated in one example, a LH IIIB tripod cooking pot (Mid 23), by its attribution to Tiryns as is suggested by the NAA analysis (NAA group TIRB). The assignment of the basin Mid 29, made in a cooking pot fabric, to group TIR B is additional evidence that this group covers certain coarse ware fabrics local to Tiryns or its environs.

Conclusions

The NAA analysis of 61 samples taken from Middle Helladic and Late Helladic fine and coarse ware pottery from Midea is important for the provenance determination of Argive pottery. It has led to interesting conclusions about the variety of fabrics and consequently of the different workshops. In most of the sampled pieces, 41 of the total, an Argive/North-eastern Peloponnesian provenance has been identified; specifically, 26 of the samples are assigned to the MYBE group and its subgroups and 15 to the Tiryns groups (TIR and its subgroups). It is noteworthy that for some of them this provenance has been corroborated by the archaeological evidence.

In addition to the two main groups (MYBE and TIR), the analysis includes three other categories: "non-Argive", unlocated and singles. Four groups are assigned to the "non-Argive" category with different non-Argive provenance. One of them, the transport stirrup jar Mid 30, is assigned to the island of Chios, although archaeologically it could well have been originated in a central Crete workshop.

The four unlocated members come from three Middle Helladic matt-painted vessels (MidW 13, 19, 25) and one Late Helladic IIIB2 coarse vat (Mid 4), a common Argive storage vessel. According to the analysis, they have no geographical assignment. However, an Argive origin for these vessels could not be excluded as shown by similar members of analysed samples from other sites in the Argolid[58] and by the Mycenaean storage vessel.

For the category single, which consists of twelve pieces, most of them of coarse ware, the analysis could not reach a secure provenance archaeometrically. Nevertheless, the provenance of some of these pieces could be determined archaeologically. The transport stirrup jar Mid 2 with Linear B inscription could well have been imported from west or central Crete, as shown by the personal name *wi-na-jo*, a common name in Cretan Linear B inscriptions on tablets and vessels, as well as by the graphic rendering of the signs. Another transport stirrup jar (Mid 31) with light-on-dark decoration may come from west Crete as many other transport stirrup jars with the same decoration. As for the transport stirrup jar Mid 14, its shape, fabric and decoration indicate that it may well come from an Argive workshop.

Regarding the sampled Late Helladic III coarse storage and cooking vessels, five of eight samples have been classified as singles by the analysis. However, the abundance and the macroscopic and typological similarities of these vessels in the Argolid (notably Mycenae, Tiryns, Midea) strongly suggest their regional origin. Some of them, however, with gold mica are archaeologically attributed to Aeginetan workshops, although the analysis classifies them as singles.[59]

Finally, another important result of the chemical analysis alongside the archaeological evidence is that during the Mycenaean Palatial period several specialized workshops operated in the wider region of the North-eastern Peloponnese for the production of fine and coarse ware pottery in large quantities. This pottery, mainly of fine ware including pictorial vessels, was intended not only for the supply of the great Argive centres, but also for export to the Eastern Mediterranean.

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[53] Mommsen *et al.* 2002 b, 611, Tab. 2. West Cretan patterns are missing in the Bonn databank except for one from Chania describing the compositions of Linear B inscribed jars exported from there to Thebes.

[54] Betancourt 1980 and 1985, *passim*.

[55] Mylonas 1973 (1975), 105–106, pl. 125b; Mylonas-Shear 1987, 109–112, pl. 33:145, 148–149.

[56] Kilian 1979, 400, figs. 24–25.

[57] Lindblom 2001, 22–38. See also Lis *et al.* 2015, 65–69.

[58] See above, fn. 39.

[59] 18 samples from Lerna (still unpublished) classified as Aeginetan cooking pots by C. Zerner showing gold mica all have one pattern, AegP. This pattern is also found in 13 samples of cooking ware from Aegina (Mommsen *et al.* 2001, Tab. 2) and in five cooking pots from Katsingri, Profitis Ilias (unpublished).

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Catalogues

SAMPLES MID 1–MID 31

Catalogue structure:

Cat. no., *Fig. no*.
Find-spot.
Shape. Ware.
Description/parallels.
Context. Date. NAA result.
Publication.

Fig. 3 Mid 1

Find-spot: Midea 1994, West Gate area, Building Complex, Baulk T/S, layer 3, #974, AA 3
Shape: Transport stirrup jar. Ware: Coarse decorated.
Description/parallels: Large globular transport stirrup jar, partly restored, with linear decoration. Cross on false mouth. On shoulder four broad Linear B signs (*ti* or *pi*) used here as repeated decorative motifs. Reddish-brownish clay with stone inclusions, well smoothed yellowish-buff surface, red paint. A transport stirrup jar from Mycenae[60] has the same decoration on the shoulder. It seems that both stirrup jars from Mycenae and Midea bear Linear B signs painted as decorative symbols rather than inscriptions.
Context: Destruction layer with LH IIIB2 pottery.
Date: LH IIIB2. NAA result: MBCn.
Publication: Demakopoulou 2009, 250, fig. 7a.

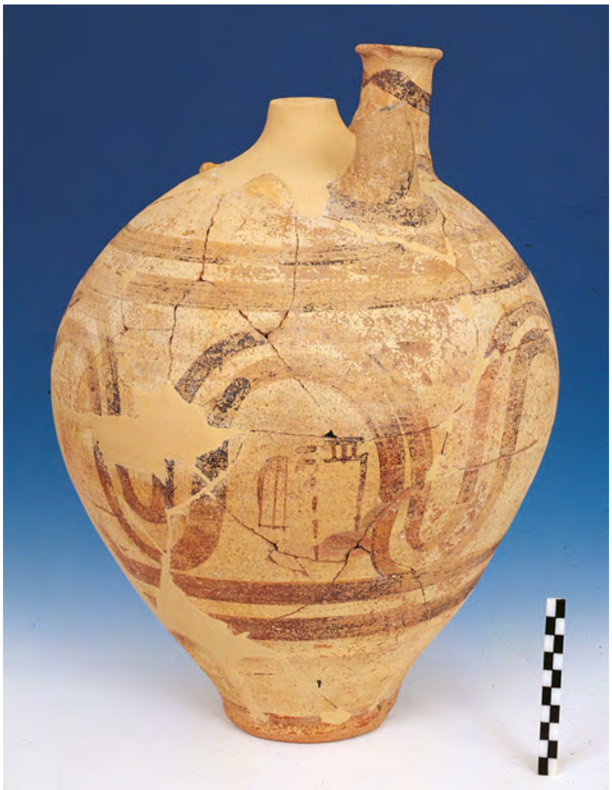

Fig. 4 Mid 2

Find-spot: Midea 1995, West Gate area, Building Complex, Room VI, Trench Sb, layer 3, #1334, 1344, AA 1.
Shape: Transport stirrup jar. Ware: Coarse decorated.
Description: Large transport stirrup jar, restored from fragments almost completely. Broad zone on belly with highly stylized octopus tentacles forming a double deep wavy line continuous around the body. In one of the open spaces of the tentacles the Linear B inscription *wi-na-jo* is painted. Red-

[60] Onassoglou 1995, 96, fig. 48:6, pl. 36c.

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dish-buff clay with stone inclusions, whitish slipped surface, red-brownish paint.
Context: Destruction layer with LH IIIB2 pottery.
Date: LH IIIB2. NAA result: Single.
Publication: Demakopoulou 2009, 248–249, fig. 5d.

Fig. 5 Mid 3

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 2, #834, AA 10b.
Shape: Krater. Ware: Fine decorated.
Description/parallels: Part of the upper body with rim from a ring-based krater, decorated with a chariot scene. Most of the horse, the reins, a piece of the chariot box with part of the traction system and the hand of the driver are preserved. Fine light brown clay, well-polished pale brown surface, dark brown paint. The body of the horse is ornamented like the body of animals painted on pictorial vases from Tiryns[61] and Cyprus.[62] The tufted mane of the horse is similar to that of the horses on pictorial vases from Tiryns, notably on the Shield Bearer's krater.[63]
Context: Accumulated deposits with LH III pottery, mostly LH III B. Date: LH IIIB2. NAA result: TIR.
Publication: Demakopoulou 2006, 36, fig. 11; Mommsen & Maran 2000–2001, 98, table 1, 102–103.

Fig. 6 Mid 4

Find-spot: Midea 1995, West Gate area, Building Complex, Room VI, Trench Sb, layer 3, #1336, AA 3.
Shape: Vat. Ware: Coarse.
Description: Large part of an oval vat, with flat base, rim and lug. Reddish-brown clay with stone inclusions, smoothed surface of the same colour.
Context: Destruction layer with LH IIIB2 pottery.
Date: LH IIIB2. NAA result: Ul27.
Unpublished.

Fig. 7 Mid 5

Find-spot: Midea 1994, West Gate area, Building Complex, Room V, Trench Sa, layer 3, #1047, AA 7.
Shape: Askos. Ware: Fine undecorated.
Description: Large plain askos, almost complete. Three small vertical handles on belly, loop horizontal handle on top of the vase. Pinkish clay, whitish slipped surface.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: MYBE.
Publication: Demakopoulou *et al.* 1996, 22, fig. 33.

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61 Güntner 2000, 20, pl. 3:5; 56–57, pls. 22:7–12, 23:3b.
62 Vermeule & Karageorghis 1982, 47–48, 53, 203, 205, nos. V43–52, V100–101.
63 Vermeule & Karageorghis 1982, 108, 215, no. X1; Güntner 2000, 19, pl. 3: 3–4.

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Fig. 8 Mid 6

Find-spot: Midea 1994, West Gate area, Building Complex, Room V, Trench Sa, layer 3, #1047, 1049, AA 8.
Shape: Piriform jar. Ware: Fine undecorated.
Description: Plain piriform jar, almost complete, of medium size. Tall flaring neck, two preserved vertical handles, torus base. Pale brown clay, slipped surface of the same colour.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: MYBE.
Publication: Demakopoulou *et al.* 1996, 22, fig. 32.

Fig. 9 Mid 7

Find-spot: Midea 1994, West Gate area, Building Complex, Room V, Trench Sa, layer 3, #1047, AA 7.
Shape: Pithos. Ware: Coarse.
Description: Lower part of a pithos with large flat base. Very coarse porous light brown clay with stone inclusions visible on the pale orange surface.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: Single.
Unpublished.

Fig. 10 Mid 8

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #831, AA 7a.
Shape: Narrow-necked jug. Ware: Fine decorated.
Description/parallels: Narrow-necked jug, partly restored from fragments; large parts of the body completed with plaster. Full ovoid shape with tall narrow neck, squared patterned rim, vertical handle, slightly raised base. On the shoulder zone three birds are depicted with body in outline, filled with vertical wavy lines, and necks in silhouette sharply bent under body. Fine buff clay, well-polished buff surface with prominent traces of fire, dark red-brown paint.
The birds are closely linked with birds with the same wavy-line fill on some fragmentary vases from Mycenae,[64] Berbati,[65] and

[64] Crouwel 1991a, 22, pl. 3:E2.
[65] Åkerström 1987, 39, nos. 210, 216, pls. 37:7, 38:1; 40, no. 234, pl. 42:2; 41, nos. 246–247, pl. 43:9–10.

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Tiryns.[66] Furthermore, the Midea jug matches a jug from Enkomi with similarly rendered birds on the shoulder.[67]
Context: Accumulated deposits with LH III pottery, mostly LH IIIB.
Date: LH IIIB1. NAA result: MYBE.
Publication: Demakopoulou 2006, 32–34, figs. 4–5; Mommsen & Maran 2000–2001, 98, table 1, 102–103.

Fig. 11 Mid 9

Find-spot: Midea 1994, West Gate area, Building Complex, Room V, Trench Sa, layer 3, #1037, 1040, AA 2.
Shape: Piriform jar. Ware: Coarse decorated.
Description: Large part of the body of a coarse piriform jar with tall torus base. Brown clay with stone inclusions, slightly smoothed whitish surface with traces of red paint.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: Single.
Unpublished.

Fig. 12 Mid 10

Find-spot: Midea 1995, West Gate area, Building Complex, Room VIb, Trench Sb, layer 3, #1361, AA 17, layer 4, #1395, 1396, AA 45.
Shape: Cooking grill. Ware: Coarse.
Description: Large discoid cooking grill, completely restored, with raised rim on both sides. One surface plain and the other full of small punctured cavities. Prominent traces of fire on both surfaces. Brown-reddish hard clay with tiny grits, roughly smoothed surface of the same colour.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: Single.
Publication: Demakopoulou *et al.* 1997–1998, 66, fig. 44.

Fig. 13 Mid 11

[66] Güntner 2000, 91–94, pls. 40:5–13, 41:1–3.
[67] Vermeule & Karageorghis 1982, 51, 404, no. V68.

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Find-spot: Midea 1994, West Gate area, Building Complex, Baulk T/S, layer 3, #972, AA 1.
Shape: Stirrup jar. Ware: Fine decorated.
Description: Small globular stirrup jar, completely restored, very well preserved. Linear decoration on body, dot rosettes on shoulder. Very fine buff clay with pinkish-buff polished surface. Reddish-brown paint.
Context: Destruction layer with LH IIIB2 pottery.
Date: LH IIIB2. NAA result: MYBE.
Publication: Demakopoulou *et al.* 1996, 19, fig. 22.

Fig. 14 Mid 12

Find-spot: Midea 1994, West Gate area, Building Complex, Room V, Trench Sa, layer 3, #1047.
Shape: Transport stirrup jar. Ware: Fine decorated.
Description: Large globular transport stirrup jar, partly composed from fragments with many pieces of the body completed with plaster. Linear decoration. Incised potter's marks on both handles. Fine reddish-yellow clay with some tiny grits, pinkish-buff surface, red paint.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: MYBE.
Publication: Demakopoulou 2009, 247–248, fig. 4a–b.

Fig. 15 Mid 13

Find-spot: Midea 1994, West Gate area, Building Complex, Room VI, Trench Sa, layer 4, #1063, AA 6, Midea 1995, Room VIb, Trench Sb, layer 4, #1394, 1395, AA 47.
Shape: Transport stirrup jar. Ware: Medium coarse.
Description: Large biconical transport stirrup jar, incompletely restored. Relatively thin walls with monochrome reddish burnished surface. Brownish-grey clay with many grits.
Context: Floor deposit with LH IIIB2 Late pottery.
Date: LH IIIB2 Late. NAA result: Single.
Publication: Demakopoulou 2009, 248, fig. 4d.

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Fig. 16 Mid 14

Find-spot: Midea 1991, West Gate area, Building Complex, Room IV, Trench S, layer 3, #945, AA 8.
Shape: Transport stirrup jar. Ware: Fine decorated.
Description: Large ovoid transport stirrup jar, incompletely restored. Linear decoration with reddish-brown paint. Fine brown-buff clay, polished surface of the same colour.
Context: Destruction layer with LH IIIB2 pottery.
Date: LH IIIB2 Late. NAA result: Single.
Publication: Demakopoulou 2009, 247, fig. 3d.

Fig. 17 Mid 15

Find-spot: Midea 1989, West Gate area, layer 2, #723, Midea 1994 Building Complex, Trench Sa, layer 3, #1046, 1057 and many non-joining sherds from Midea 1994 layers 1 and 2, Midea 1995, Baulk S/Sa layer 2, Trench Sb layer 3, Midea 1996 layer 2, Room VI.
Shape: Krater. Ware: Fine decorated.
Description/parallels: Fragments composed of joining sherds of a ring-based krater. Many other non-joining sherds occur. It was originally decorated on each side with a frieze of stags facing right, with their heads turned back over their body. Fine pinkish-buff clay, well-polished yellowish-buff surface, reddish-brown paint.
The pictorial pottery from Tiryns includes many fragments with stags, some of which are shown in a row looking back and have a wavy-line body fill like the Midea krater.[68] There is also a close parallel from Enkomi with a procession of stags.[69]
Context: Accumulated deposits with LH III pottery, mostly LH IIIB.Date: LH IIIB1. NAA result: TIR.
Publication: Demakopoulou 2006, 34–36, figs. 8–9.

Fig. 18 Mid 16

Find-spot: Midea 1995, West Gate area, Building Complex, Room VIa, Trench Sb, layer 4, #1382, 1384, AA 27 and many joining sherds from Midea 1995, Trench Sb layers 3 and 4, Trench Sa layer 3, Baulk S/Sa layer 2, Midea 1996, Room VIa, Trench Sb, layer 3.
Shape: Krater. Ware: Fine decorated.
Description: Ring-based krater, partly restored, with deep semiglobular shape. In the broad handle zone triglyphs with isolated semicircles and horizontal wavy lines. Fine greenish-yellow clay with tiny grits, buff-yellowish surface, dark brown paint.

[68] Güntner 2000, 64–69, pls. 28–30.
[69] Vermeule & Karageorghis 1982, 49, 203, no. V54.

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Context: Destruction layers with LH IIIB2 pottery.
Date: LH IIIB2. NAA result: MBKK.
Unpublished.

Fig. 19 Mid 17

Find-spot: Midea 1990, West Gate area, Trench R, layer 3, #762, 766, AA 9, AA 13, Midea 1991, Trenches S and T, Midea 1994, Trench S, Baulk T/S.
Shape: Funnel-shaped rhyton. Ware: Fine monochrome.
Description: Unusual open vessel, partly restored, in the form of a stemmed bowl with perforated stem. Completely coated with red paint. Fine brownish-red clay.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIA2–B. NAA result: MYBE or single.
Publication: Demakopoulou *et al.* 1994, 27, fig. 23.

Fig. 20 Mid 18

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #849, AA 22a.
Shape: Tripod cooking pot. Ware: Coarse.
Description: Parts of the body with rim, handles, and legs of an Aeginetan tripod cooking pot. Potter's mark on the lower part of one handle. Brown hard clay with grits and gold mica. Smoothed surface with traces of fire.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB. NAA result: Single.
Unpublished.

Fig. 21 Mid 19

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #847, AA21a.
Shape: Goblet. Ware: Fine decorated.
Description: Stem and part of lower body of a goblet. Monochrome stem, stipple pattern on body. Fine buff-brownish clay, dark brown paint.
Context: Accumulated deposits with LH II–III pottery, mostly LH IIIB. Date: LH IIB. NAA result: MYBE.
Unpublished.

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Fig. 22 Mid 20

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #847, AA 21.
Shape: Jar. Ware: Medium coarse decorated.
Description: Body sherd of a palace style jar with a palm decorative motif. Hard brownish clay with black grits. Inner surface rough, outer surface well polished, whitish. Thick black paint.
Context: Accumulated deposits with LH II–III pottery, mostly LH IIIB. Date: LH IIA. NAA result: MBCn.
Unpublished.

Fig. 23 Mid 21

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #842.
Shape: Tripod cooking pot. Ware: Coarse.
Description: Parts of the body with rim and one leg of an Aeginetan tripod cooking pot. Brown hard clay with grits and gold mica. Smoothed surface.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB. NAA result: Single.
Unpublished.

Fig. 24 Mid 22

Find-spot: Midea 1991, West Gate area, Building Complex, Trench S, layer 3, #936, AA 4b.
Shape: Mug. Ware: Fine decorated.
Description: Fragmentary mug decorated with whorl shells running from rim to base. Dot rosette under handle, rough ridges at waist. Fine red-yellowish clay, buff polished surface, reddish paint.
Context: Destruction layer with LH IIIB2 pottery. Date: LH IIIB2. NAA result: MYBE.
Publication: Demakopoulou *et al.* 1994, 27, fig. 22.

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Fig. 25 Mid 23

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #852, AA 25a.
Shape: Tripod cooking pot. Ware: Coarse.
Description: Fragmentary tripod cooking pot, collar-necked, with handle and two legs preserved. Brownish-buff hard clay with grits. Roughly smoothed surface of the same colour, with traces of fire.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB. NAA result: TIRB.
Unpublished.

Fig. 26 Mid 24

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #823, AA 6.
Shape: Kylix. Ware: Fine undecorated.
Description: Fragmentary plain kylix. Preserved are the lower part of the broad conical body and the stem with base. Fine buff clay with polished whitish surface.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB. NAA result: MYBE.
Unpublished.

Fig. 27 Mid 25

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #845, AA 20d. Joining and non-joining sherds from Midea 1990 and 1994 in the same area.
Shape: Jug. Ware: Fine decorated.
Description: Large narrow-necked jug with globular body, tall narrow neck and raised concave base. Partly restored from fragments with large part of belly completed with plaster. Shoulder zone panelled with central triglyph and side stemmed spirals. Fine pinkish-buff clay, well-polished surface of the same colour, dark brown paint.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB2. NAA result: MBCr
Publication: Demakopoulou *et al.* 1994, 27, fig. 25.

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Fig. 28 Mid 26

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #852, AA 25.
Shape: Deep bowl. Ware: Fine decorated.
Description: Part of body with handle of a group A deep bowl. Panelled decoration with a preserved narrow side triglyph. Fine pale orange clay, polished surface of the same colour. Dark brown paint.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB2 Late. NAA result: MYBE.
Unpublished.

Fig. 29 Mid 27

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 3, #851, AA 23.
Shape: Jug. Ware: Fine decorated.
Description: Neck with upper part of shoulder of a large wide-necked jug. Linear decoration with broad encircling band on base of neck. Fine pale orange clay, whitish polished surface, dark brown-reddish paint.
Context: Accumulated deposits with LH III pottery, mostly LH IIIB. Date: LH IIIB2 Late. NAA result: MYBE.
Unpublished.

Fig. 30 Mid 28

Find-spot: Midea 1991, West Gate area, East of the Building Complex, Trench T, layer 2, #813, AA 4a. Joining sherds from Midea 1994 in the same area.
Shape: Stemmed bowl. Ware: Fine decorated.
Description: Part of upper body of a stemmed bowl, restored from fragments. In shoulder zone rudely drawn stemmed spirals. Fine buff clay, polished surface with prominent traces of fire.
Context: Accumulated deposits with LH IIIB–C pottery. Date: LH IIIC Early. NAA result: TIR.
Unpublished.

Fig. 31 Mid 29

Find-spot: Midea 1985, West Gate, Gateway, layer 2, #354, 361, 352 AA 1, layer 3, #363, Midea 1987, West Gate, Inner/Guard room, layer 4, #527, AA 10.
Shape: Basin. Ware: Coarse.
Description: Large conical basin, partly restored. Two horizontal strap handles on the exterior of the flat rim. Part of

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the large flat base preserved. Hard dark brown clay with grits. Smoothed surface of the same colour.
Context: Destruction layer with LH IIIB2 pottery. Date: LH IIIB2. NAA result: TIRB.
Unpublished.

Fig. 32 Mid 30

Find-spot: Midea 1995, West Gate area, Building Complex, Room VIa, Trench Sb, layer 4, #1396 AA 51, layer 3, #1452.
Shape: Transport stirrup jar. Ware: Coarse decorated.
Description: Large ovoid transport stirrup jar, almost completely restored from many fragments. Dark-on-light decoration with highly stylized octopus tentacles on the belly. Coarse pale brown clay with many stone inclusions, whitish slipped surface, dark brown paint.
Context: Floor deposit with LH IIIB2 Late pottery. Date: LH IIIB2. NAA result: ChiA.
Publication: Demakopoulou 2009, 249, fig. 6a.

Fig. 33 Mid 31

Find-spot: Midea 1995, West Gate area, Building Complex, Room VIa, Trench Sb, layer 4, #1396, 1384, 1387, AA 30.
Shape: Transport stirrup jar. Ware: Coarse decorated.
Description: Large ovoid transport stirrup jar, almost completely restored from fragments. Light-on-dark linear decoration. Wavy lines on shoulder. Encircling lines on body: three under shoulder, two on lower belly and one on exterior base. Coarse reddish clay with stone inclusions, slipped greyish-black surface. Matt white paint.
Context: Floor deposit with LH IIIB2 Late pottery. Date: LH IIIB2. NAA result: Single.
Publication: Demakopoulou 2009, 248, fig. 5a–b.

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SAMPLES MIDW 01–MIDW 30

Catalogue structure:

Inv., *Fig. no.*
Shape. (Diameter)
Fragment.
Fabric, Slip, Paint.
Decoration.
Parallels.
Date. NAA group.
Publication.

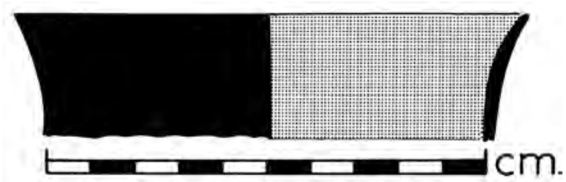

Fig. 34 MidW 1

M91Mb8-002A.
FS 284/285 Deep bowl, Monochrome.
Rim sherd. D. 17.0.
Fab. 7.5YR 7/4 Pink, fine, Pnt. 5YR 3/3 DRB
Monochrome exterior and interior.
Mountjoy 1986, fig. 192.
Early LH IIIC Middle.
NAA group: MYBE.
Publication: Walberg 1998, 226 no. 813, pl. 96.

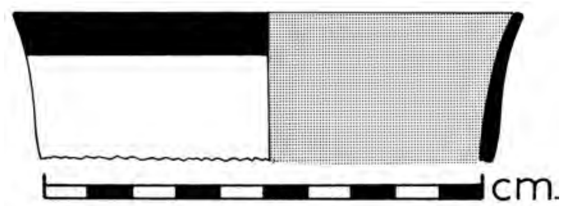

Fig. 35 MidW 2

M90Nb3-222B.
FS 284 Deep bowl, Linear?
Rim sherd. D. 19.0.
Fab. 5YR 8/4 Pink, fine, Sl. 7.5YR 8/4, Pnt. 7.5YR 5/6 Red.
Band on rim exterior. Monochrome interior.
Mountjoy 1986, fig. 192.
LH IIIC Early. NAA group: TIRA.
Publication: Walberg 1998, 227 no. 838, pl. 97.

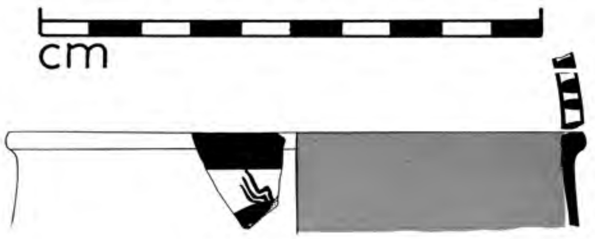

Fig. 36 MidW 3

M90Ma7-181A.
FS 282 Ring-based krater.
Rim sherd.
Fab. 5YR 7/3 Pink, fine, Sl. 2.5Y 7/2, Pnt. 2.5Y 4/2 DGB.
FM 2 Horse mane and neck. Transverse strokes on top rim.
Mountjoy 1986, figs. 188:1, 223:1; cf. Vermeule & Karageorghis 1982, XI.16, 16.1.
LH IIIC Early. NAA group: TIR.
Publication: Fisher 1998, 188 no. 135, pls. 67, 135.

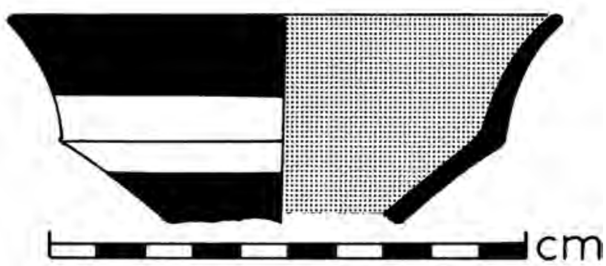

Fig. 37 MidW 4

M91Ya3-053B.
FS 295 Shallow angular bowl.
Rim sherd. D. 13.0.
Fab. 5YR 7/6 RY, fine, Sl. 5YR 7/4 Pink, Pnt. 2.5YR 4/8 Red.
Medium bands on exterior with reserved band in centre. Monochrome interior.
Cf. Mountjoy 1986, fig. 197:1.
LH IIIC Early. NAA group: MYBE.
Publication: Walberg 1998, 229 no. 863, pl. 98.

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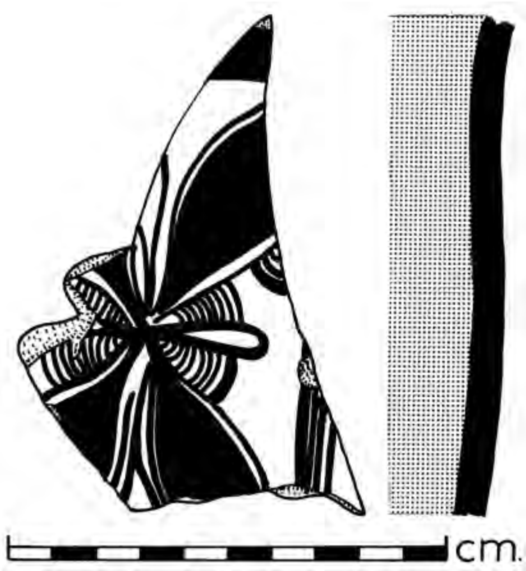

Fig. 38 MidW 5

M87H5-067Y.
FS 282 Ring-based krater.
Body sherd.
Fab. 5YR 6/4 LRB, fine, Sl. 7.5YR 7/4 Pink, Pnt. 2.5YR 5/8 Red.
Elaborate floral motif.
Late LH IIIC Middle. NAA group: TIR.
Publication: Walberg 1998, 224 no. 782 pls. 95, 139.

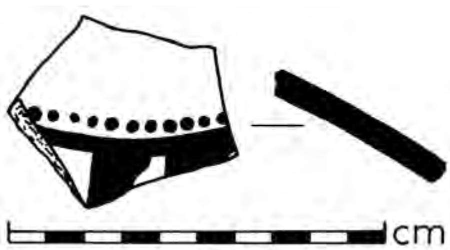

Fig. 39 MidW 6

M90Mb6-196C.
Open vessel.
Body sherd.
Fab. 5YR 7/8 RY, fine, Sl. 5YR 7/4 Pink, Pnt. 2.5YR 4/8 Red.
FM 7:16 Bird, folded wing variety marsh bird. Bird body interior outlined with dots, silhouette legs.
Walberg 1967, 166, no. 52; Slenczka 1974, 10, no. 5.
LH IIIB. NAA group: TIR.
Publication: Fisher 1998, 187 no. 119, pl. 66.

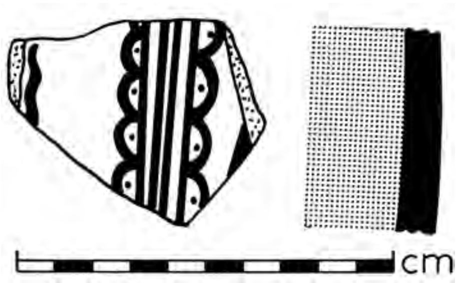

Fig. 40 MidW 7

M91Va7-096D.
Krater.
Body sherd.
Fab. 7.5YR 7/4 Pink, Sl. 10YR 7/4 VPB, Pnt. 5YR 3/1 VDG.
FM: 75:29 Panelled pattern with fewer vertical lines inside and dots inside the attached semicircles. Monochrome interior.
Mountjoy 1986, figs. 188, 223.
Late LH IIIC Middle. NAA group: TIR.
Publication: Walberg 1998, 224 no. 778, pl. 95.

Fig. 41 MidW 8

M87H6-067V.
Ring-based krater?
Body sherd. D. 30.0.
Fab. 5YR 7/4 Pink, fine, Sl. 10YR 8/4 VPB, Pnt. 5YR 5/6 YR.
Close style pattern.
Mountjoy 1986, figs. 223:6, 225.
Late LH IIIC Middle. NAA group: MYBE.
Publication: Walberg 1998, 224 no. 781, pls. 95, 139.

https://doi.org/10.30549/opathrom-10-02

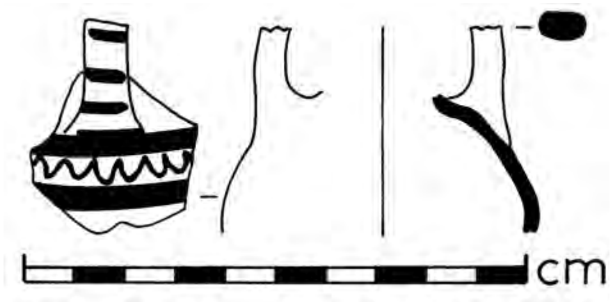

Fig. 42 MidW 9

M87H5W-067O.
Stirrup jar.
Body and handle sherd.
Fab. 7.5YR 7/6 RY, fine, Sl. 10YR 8/4 VPB, Pnt. 5YR 3/1 VDG.
Two thick horizontal bands on lower body with horizontal FM 61 Zigzag in between. Splashes on handle.
Podzuweit 2007, pl. 88:2.
LH IIIC Late. NAA group: TIR.
Publication: Walberg 1998, 221 no. 722, pl. 91 (drawing upside down).

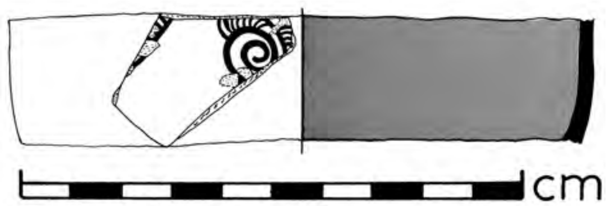

Fig. 43 MidW 10

M90Ma1EB-233B.
Krater?
Body sherd.
Fab. 10YR 7/2 LG, fine, Sl. 10YR 8/4 VPB, Pnt. Ext. 7.5YR 6/6 RY and 7.5YR 3/1 VDG, Pnt. Int. 7.5YR 3/1 VDG.
Elaborate spiral motif (bird?). Monochrome interior.
LH IIIC. NAA group: TIR.
Publication: Walberg 1998, 188 no. 129, pls. 67, 140.

Fig. 44 Mid W11

M89Qa3b-116A.
Grey Minyan vessel.
Body sherd.
Fab. 7.5YR 4/0 Grey, very fine inclusions 1% mottled, Sl. 7.5YR 4/0 Grey.
Burnished. Incised spiral and three curved lines.
Heurtley 1939, fig. 75d (Agios Mamas).
MH. NAA group: LacA.
Publication: Walberg 1998, 180 no. 7, pl. 58.

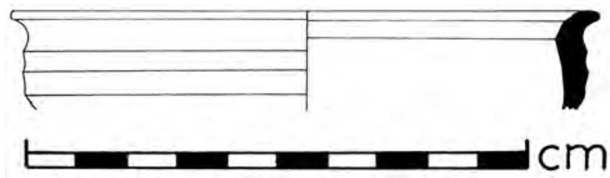

Fig. 45 MidW 12

M87H6-067KK.
DS CB1 Argive Minyan basin.
Rim sherd. D. 26.2.
Fab. Ext. 2.5Y 2/0 Black, Fab. Int. 5YR 4/3 RB, very fine inclusions 1% mottled, Sl. 2.5Y 2/0 Black.
Burnished.
Dietz 1991, DB; Dickinson 1977, fig. 2:3 Decorated; Nordquist 1987, fig. 44 Group C.
MH II Final. NAA group: TIRB.
Publication: Walberg 1998, 180 no. 12, pls. 58, 134.

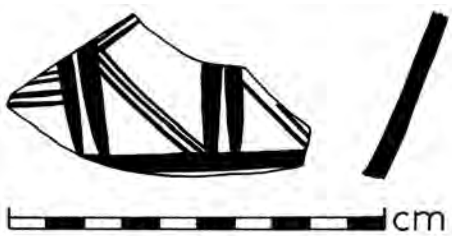

Fig. 46 MidW 13

M89Qa3-117J.
Matt-painted vessel
Body sherd.
Fab. 7.5YR 7/4 Pink, very fine black inclusions 7% mottled, Sl. 10YR 8/3 VBP, Pnt. 10YR 3/1 VDG.
Two double vertical bands connected by three oblique fine lines above a medium band. Horizontal fine lines to left. Oblique fine lines to right.
Dietz 1991, FT2; Siedentopf 1991, pl. 23:99a Reif.
MH. NAA group: Ul20.
Publication: Walberg 1998, 183 no. 51, pl. 60.
Dietz 1991, FT2; Nordquist 1987, fig. 55:1 Group D.
LH I–II. NAA group: MBCr.
Publication: Walberg 1998, 182 no. 36, pl. 60.

Fig. 47 MidW 14

M90Na5N-274D.
Matt-painted open jar.
Body sherd.
Fab. 5YR 6/3 LRB, very fine light brown inclusions 7% mottled, Sl. 5YR 7/3 Pink, Pnt. 5YR 3/1 VDG.
BM 78. Overlapping festoons between horizontal bands.

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Dietz 1991, FT2; Nordquist 1987, fig. 55:1 Group D.
LH I–II. NAA group: MBCr.
Publication: Walberg 1998, 182 no. 36, pl. 60.

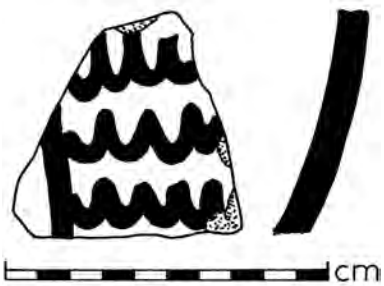

Fig. 48 MidW 15

M87H5M-067H.
Matt-painted closed vessel.
Body sherd.
Fab. 7.5YR 6/4 LB, fine light inclusions 15% mottled, Sl. 2.5Y 8/4 PY, Pnt. 10YR 5/2 GB. Wheel-made.
Horizontal medium wavy lines between medium vertical lines.
Dietz 1991, MT2; Nordquist 1987, fig. 58 Group F.
LH I. NAA group: Theb/KnoL.
Publication: Walberg 1998, 181 no. 29, pls. 59, 135.

Fig. 49 MidW 16

M87H6-040A.
BS C2 Matt-painted wide-mouthed storage jar.
Horizontal handle sherd. D. 2.0.
Fab. 2.5YR 6/4 LRB, very fine inclusions 3–5% mottled, Sl. 10YR 8/2 White, Pnt. 5YR 5/2 RG.
Horizontal band continuing from body along handle. Five vertical bands from horizontal handle band. Two joining semicircle bands at handle base.
Dietz 1991, FT2.
LH I. NAA group: Single.
Publication: Walberg 1998, 183 no. 59, pls. 61, 134.

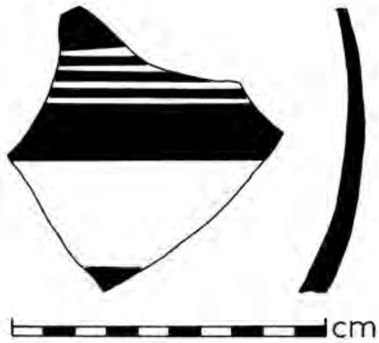

Fig. 50 MidW 17

M89Qa3b-134C.
Matt-painted vessel.
Body sherd.
Fab. 10YR 6/3 PB, fine dark inclusions 20% mottled, Sl. 2.5Y 8/2 White, Pnt. 7.5YR 6/2 PG.
Two wide parallel horizontal bands framing three medium parallel horizontal bands.
Dietz 1991, MT2.
MH. NAA group: KnoL/TheB.
Publication: Walberg 1998, 181 no. 25, pl. 59.

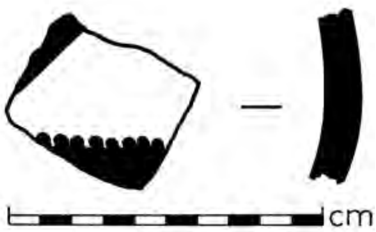

Fig. 51 MidW 18

M89Qba2-049A.
Matt-painted vessel.
Body sherd.
Fab. 7.5YR 7/4 Pink, fine dark inclusions 7% mottled, Sl. 2.5Y 8/2 White, Pnt. 7.5YR 5/2 Brown.
Oblique band. Horizontal foliate band.
Dietz 1991, MT2.
MH Late. NAA group: Single.
Publication: Walberg 1998, 181 no. 33, pl. 60.

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Fig. 52 MidW 19

M89Qa3-117K.
Matt-painted vessel.
Body sherd.
Fab. 10YR 7/4 VPB, very fine black and white inclusions 5% mottled, Sl. 5Y 8/3 PY, Pnt. 10YR 3/2 VDGB.
Two medium vertical bands. Triple fine zigzag lines to the right and double fine zigzag line to the left.
Dietz 1991, FT2; Nordquist 1987, fig. 41:3 Group C.
MH II. NAA group: Ul20.
Publication: Walberg 1998, 183 no. 53, pl. 61.

Fig. 53
MidW 21

M90Na6N-305A.
BS 6 LOD Bridge-spouted jar (Minoanizing).
Collar sherd. D. 19.0.
Fab. 5YR 6/4 LRB, very fine light inclusions 7% mottled, Sl. 7.5YR 7/4 DGB, Pnt. 5YR 3/2. Wheel-made.
Reserved band crossed by oblique transverse lines. Row of small white dots.
Dietz 1991, LDW.
MH IIIB–LH I. NAA group: MBCr.
Publication: Walberg 1998, 185 no. 88, pl. 62.

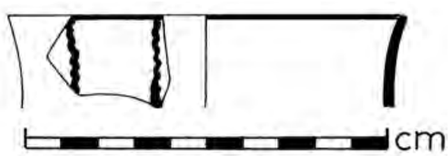

Fig. 54 MidW 23

M90Nb5-324T.
FS 284 Deep bowl Group A.
Rim sherd. D. 16.5.
Fab. 5YR 7/3 Pink, fine, Sl. 10YR 8/4 VPB, Pnt. 2.5YR 4/6 Red.
Band on rim. FM 53:32 Vertical wavy line.
Mountjoy 1986, figs. 143, 160.
LH IIIB. NAA group.
Publication: Giering 1998, 203 no. 399, pl. 77.

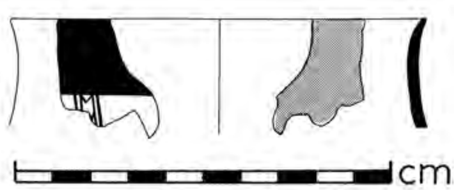

Fig. 55 MidW 24

M90Nb5-324S
FS 284 Deep bowl Group B.
Rim sherd. D. 20.0.
Fab. 10YR 7/2 LG, fine, Sl. 10YR 7/2 LG, Pnt. 7.5YR N3/ VDG.
3.40 cm band on rim. FM 75:9 Panelled pattern filled with FM 58 chevrons. Monochrome interior.
Mountjoy 1986, fig. 161; French 1969, fig. 7:12; Wardle 1973, fig. 11:79.
LH IIIB. NAA group: MYBE.
Publication: Giering 1998, 210 no. 520, pl. 82.

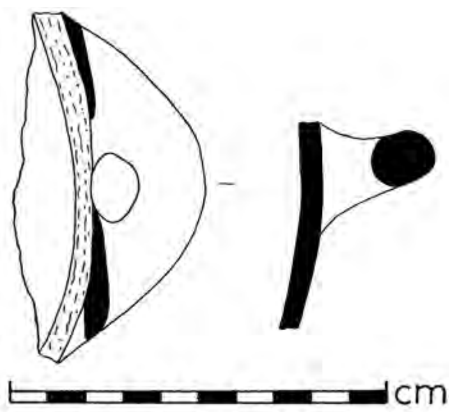

Fig. 56
MidW 25

https://doi.org/10.30549/opathrom-10-02

M89Qa3-111D.
White-slipped ware vessel.
Horizontal handle sherd. D. 2.6.
Fab. 2.5YR 6/6 LR, fine black and white inclusions 10% mottled, Sl. 10YR 8/3 VPB, Pnt. 10YR 4/1 DG.
Single wide band circling base of handle.
Dietz 1991, MT2b.
MH. NAA group: Ul27.
Publication: Walberg 1998, 185 no. 83, pl. 62.

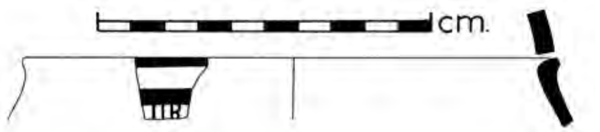

Fig. 57 MidW 26

M90Mb8-251H.
FS 281 Ring-based krater.
Rim sherd. D. 29.0.
Fab. 10YR 6/1 Grey, fine, Sl. 10YR 7/4 VPB, Pnt. 10YR 3/1 VDG.
Band on and below rim. FM 75:2 Panelled pattern.
Mountjoy 1986, figs. 142, 159; Grossmann & Schäfer 1971, pl. 38:35.
LH IIIB. NAA group: Single.
Publication: Giering 1998, 200 no. 344, pl. 75.

Fig. 58 MidW 27

M90Nb5-324M.
Body sherd.
Fab. 5YR 7/3 Pink, fine, Sl. 10YR 8/4 VPB, Pnt. 5YR 4/6 YR.
FM 45:6 U-pattern.
LH IIIA2–LH IIIB. NAA group: MYBE.
Publication: Giering 1998, 216 no. 615, pl. 85.

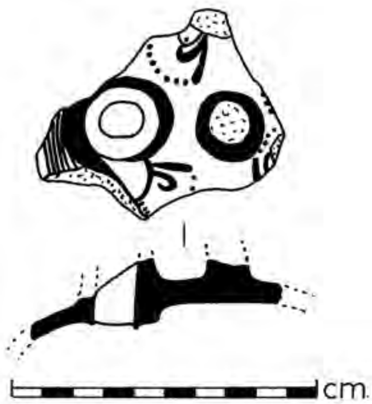

Fig. 59 MidW 28

M91Va10-159C.
FS 171/173 Globular stirrup jar.
Shoulder sherd.
Fab. 10YR 7/3 VPB, fine, Sl. 10YR 7/4 VPB, Pnt. 5YR 3/1 VDG.
FM 18C:122 Mycenaean flower with dots instead of lines. Bands.
Mountjoy 1986, figs. 128, 129, 131:1, 154; Schönfeld 1988, fig. 9:4; Rudolph 1973, pl. 56:Gr. XVI 18.
LH IIIB. NAA group: MYBE.
Publication: Giering 1998, 197 no. 293, pls. 74. 136.

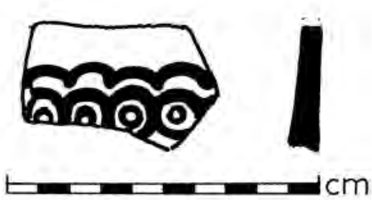

Fig.60 MidW 29

M91Va9-141A.
FS 284 Deep bowl Group B.
Body sherd.
Fab. 7.5YR 7/4 Pink, fine, Sl. 10YR 6/2 LBG, Pnt. 2.5YR 4/4 RB.
Cf. FM 48:23. Quirk. Monochrome interior.
Mountjoy 1986, fig. 161; cf. fig. 133:2
LH IIIB. NAA group: MYBE.
Publication: Giering 1998, 210 no. 515, pl. 81.

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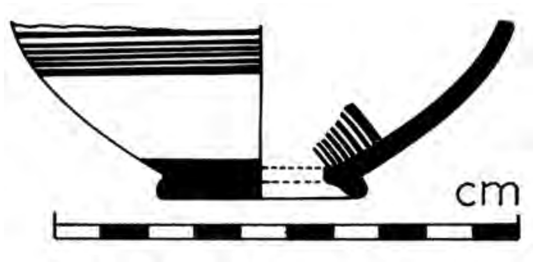

Fig. 61 MidW 30

M91Va10-159D.
FS 284 Deep bowl Group A.
Ring-based sherd. D. 6.0.
Fab. 7.5YR 7/4 Pink, fine, Sl. 10YR 7/4 VPB, Pnt. 2.5YR 4/8 Red and 2.5YR 3/0 VDG.
Band and fine lines on exterior. Fine line group on interior.
Mountjoy 1986, figs. 143, 160:1, 2.
LH IIIB. NAA group: TIR.
Publication: Giering 1998, 208 no. 474, pl. 80.

MidW 20 *Figs. 62–63* (pp. 43–44)

Sample without no., entire vessel M91Va11S-208A.
Very fragmentary. Over 60 pieces. Reconstructed.
Fab. 10YR 7/6 Yellow to 5Y 7/3 PY, very brittle, Sl. 10YR 7/4 VPB, Pnt. 5YR 3/1 VDG to 2.5YR 4/6 Red.
On shoulder: antithetic large birds with dot filling and papyrus growing from backs flanking antithetic small stick birds surrounding Myc. flower type. Belly panels: horns of consecrations with alternating birds, Myc. flower double axe, unknown motif.
LH IIIB. NAA group: MYBE.
Publication: Fisher & Giering 1998, 109–113, 187 no. 125, pls. 63–65, 135–136; Mommsen & Maran 2000–2001, 98 table 1, 102–103.

MidW 22 *Fig. 64* (p. 45)

M94Mh01-2NE-134G (and more joining/belonging fragments from other contexts).
FS 281 Krater.
Substantial vessel. D. of rim 30.0.
Fab. 10YR 6/2 LGB, very fine inclusions, 10% density. Sl. 10YR 7/4 VPB, Pnt. 10YR 2/2 VDB.
Band on rim, band below rim, two right-facing marsh birds on each side, first bird head bent down, second bird head held aloft, bodies and necks outlined in dots, beaks long and thick at top, legs in outline, rounded tail type, three bands on belly.
Walberg 1998, pls. 66:115, 67:123; Slenczka 1974, pls. 28:5B, 31:95.
LH IIIB. NAA group: TIR.
Publication: Fisher 2007, 109, 225 no. 1373, fig. 123, pl. 19; Mommsen & Maran 2000–2001, 98 table 1, 102–103.

https://doi.org/10.30549/opathrom-10-02

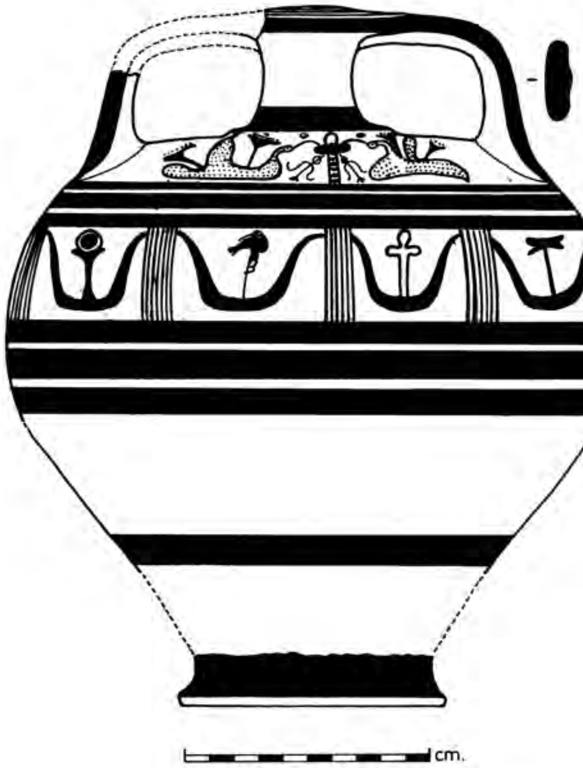

Fig. 62 MidW 20

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Fig. 63 MidW 20

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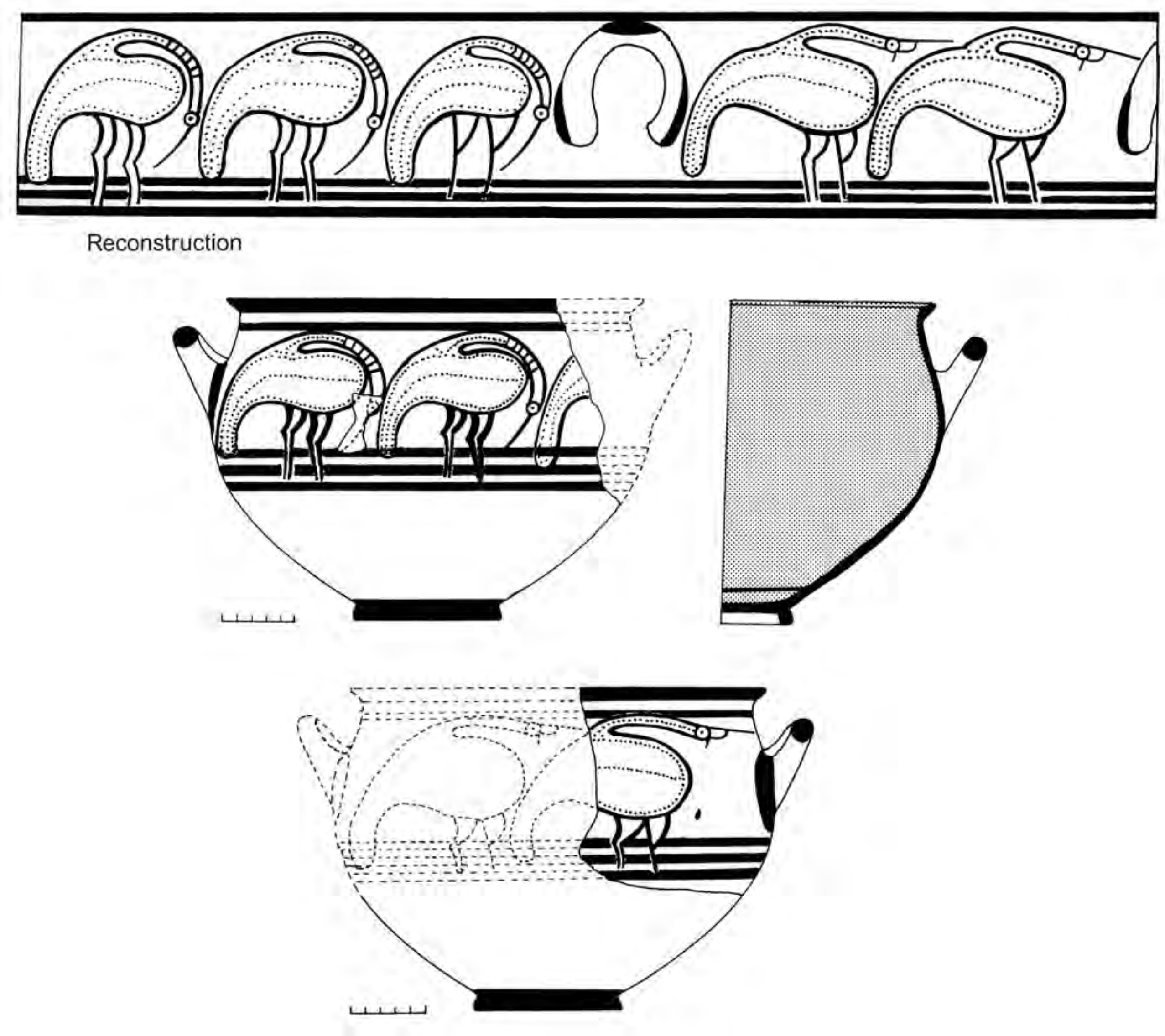

Fig. 64 MidW 22

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