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Kilns, Commodities and Consumers: Greco-Roman Pottery Production in Eastern Marmarica (Northwestern Egypt)

In archaeological terms, the regions west of the Nile are associated with the remains in the Oases (especially Dakhla, Kharga and Siwa) or with sites like Marina al Alamein and the archaeologically less known Marsa Matruh: coastal urban centres in Greco-Roman tradition. A large part of the Western Desert and its northern fringe were included in the Ptolemaic-Egyptian nome *Marmarika* and from the 3rd cent. A.D. in the *provincia Libya (inferior and superior)*. The administrative entity of the *provincia* stretched from Lake Mareotis to Cyrenaica¹ but due to its semi-arid and arid environmental situation was never, according to the sources, the focus of political or economic interest (Fig. 1)².

A closer look reveals a rich archaeological record of which large-scale pottery production forms a considerable part. The evidence from these production sites raises a broad range of questions concerning the economic life of the Eastern Marmarica, particularly relating to production and organization of processing and exchange. These will be considered partly by the following overview of the features and finds in the broader context of the archaeology of the region and their interpretation³.

A relatively high number of Greco-Roman pottery production sites have been found in the coastal area of Egypt, mainly around Lake Mareotis⁴, but only a few were known in the northwestern coastal zone: a semi-arid and arid region poor in resources and ancient remains. Tell al Haraby is the westernmost pottery production site of the Greco-Roman period discovered in modern day Egypt. It is situated ca. 77 km west of Al Alamein and was found by chance during the construction of the Alexandria – Sollum road⁵.

New research has revealed an area of intense production activity further to the west of Tell al Haraby, in the hinterland of Marsa Matruh (ancient Paraitonion). The area of detailed research stretches some 90 km from Ras al Hekma in the East to Ras Abu Laho in the West (Fig. 1. 2). The inland boundary of pottery production lies some 10 km south from the coast in what is, in ecological terms, a steppe region.

The economic relations manifested in the pottery production show the links of this region to the east (to Egypt proper) and west (to the Western Marmarica and Cyrenaica). This suggests that the hitherto unproven prosperity of

1 Brands et al. 2006.

2 In the context of the SFB (Collaborative Research Center) 586 (Universities of Halle-Wittenberg and Leipzig) the research area was archaeologically approached for the first time (2004–2008). The

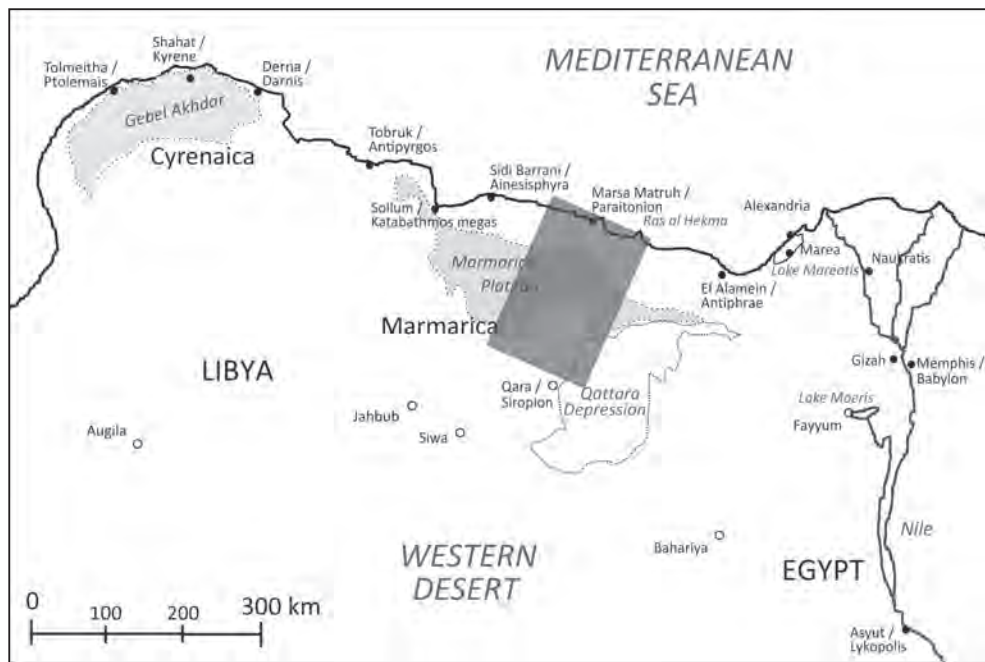
unexpected density of ancient, mainly Greco-Roman remains (cf. Rieger 2009, 78–84; Vetter et al. 2009, 12–19; Vetter et al. [in print]; Rieger et al. [in print]) necessitated to deepen the study that is financed by the DFG (German Research

Foundation) and the Gerda Henkel Stiftung.

3 Möller in prep.

4 Empereur 1993; Empereur 1998.

5 Machjerek – El Shennawi 1991; Machjerek – El Shennawi 1992.



a city like Marina al Alamein (Antiphræ) and the no longer discernible urban character of Paraitonion can now be placed within the complex pattern of hinterland agricultural production, pottery production and trading relations.

Fig. 1 The investigation area in the Eastern Marmarica (northwestern Egypt), scale 1 : 10 000 000

1. Environment and Ecology

The research area belongs to the semi-desert strip that stretches from Lake Mareotis to Cyrenaica. Beside a very small zone along the coast, where a mediterranean climate and vegetation predominates, a steppe-like environment is characteristic of the majority of the Northern fringe of the Libyan Desert. This zone stretches some 15 km to the south. Winterly rainfalls do not exceed 140 to 160 mm/annum on the coast and decrease further the south. With a precipitation of only 100 mm/annum, technically desert-like conditions begin only 25 km south of the coast.

The region around Marsa Matruh is ecologically more favourable than the areas to the east due to the relief of the landscape even if it lies below an isohyet of 200 mm/annum: the limit for agricultural activities. From Ras al Hekma to Ras Abu Laho an escarpment, where the Marmarica-Plateau steps down from 100 to 20 m above sea level, changes the environmental conditions of this semiarid region. Wadi of up to 15 km length cut the tableland and the escarpment. The wadi valleys, in combination with the slightly descending plains on the Northern Tableland, are the base for a dry farming agriculture that uses the runoff coming from the plains in the south for watering the fields and wadi terraces in the north. A system of water and soil harvesting structures dating back to the second millenium B.C. optimises the availability of the scarce natural resources and is still in use today (Fig. 2. 3)⁶. The latest research by Kuper and Kröpelin (2006) and Bruins (2006) determined no climatic changes in the Eastern Sahara for the last 3000 years, allowing us to assume that modern day ecological conditions (water availability and temperature) are broadly similar to those of Greco-Roman times⁷.

⁶ Rieger et al. (in print); Rieger 2009; Vetter et al. 2009.

⁷ Cf. Kuper – Kröpelin 2006; Bruins 2006. It is important to state that slightly more humid conditions would have disturbed the whole system of water runoff. Since more rain would have let more vegetation grow in the south, the runoff to the north would have decreased to the point that was insufficient for the growing of crops.

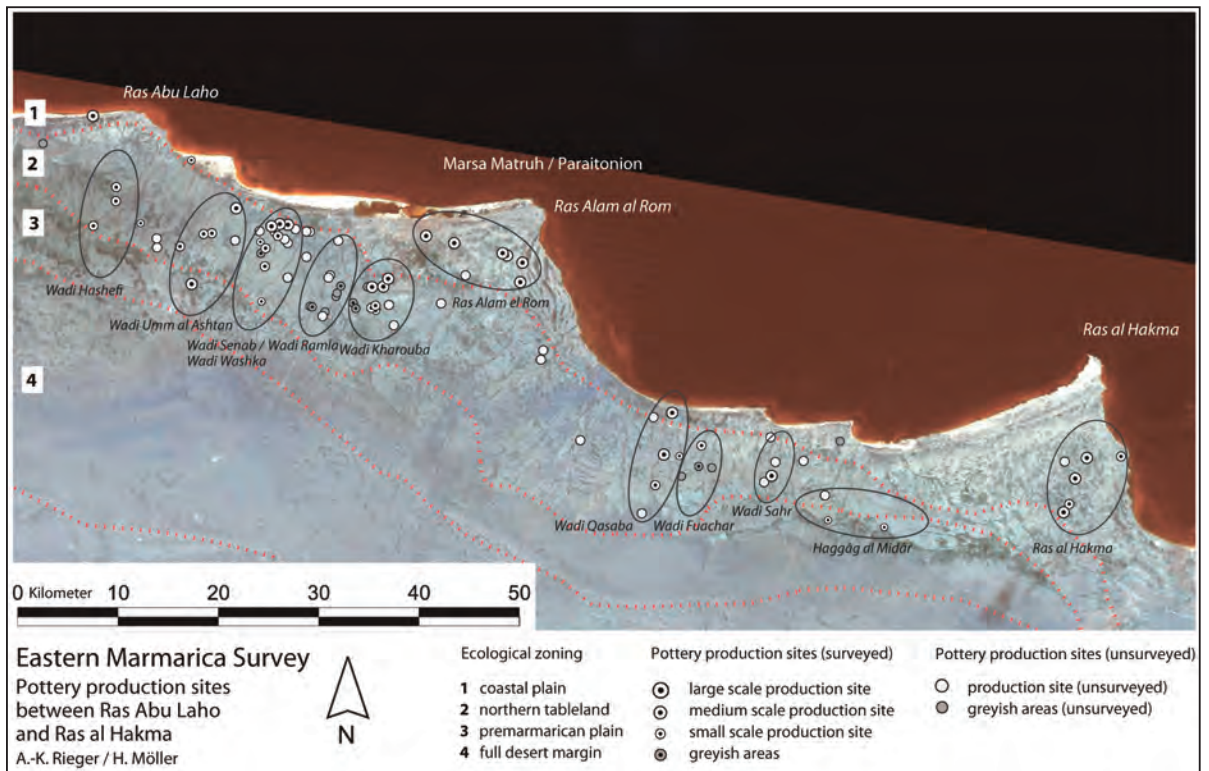


Fig. 2 Eastern Marmarica. Pottery production sites in the investigation area (scale 1:750 000)

Fig. 3 Environment in the Marmarica: semi-desert tableland with cultivation area in a wadi



As in any semiarid region, the spatial and temporal distribution of precipitation in Eastern Marmarica is highly variable and any agricultural utilization has to cope with problems of water management and storage during floods and droughts⁸, even in the favoured area around Marsa Matruh. Due to calcareous and karstic bedrock there are no perennial aquiferous layers or sources, so that only soil and cisterns can store and provide water for animals, plants and men.

2. A Surplus Economy

Due to the locally favourable conditions, a large part of the livelihood of the inhabitants in the northern strip of the region is based on dry farming combined with livestock, responding to annual resource variation (especially in

8 Vetter et al. 2009.

rainfall) and in all probability the same was true in antiquity owing to similar environmental conditions. Cultivable areas were created by terracing the wadi bed, the slopes and also on the tableland. The main crops were presumably wine and barley, followed by other cereals and fruits. In addition, some sorts of vegetables may have been cultivated in smaller gardens.

This range of products, in combination with livestock breeding, is evidenced in the written, as well as the archaeological, sources. The only papyrus from the Marmarica, today kept in the Biblioteca Apostolica Vaticana (P. Marm.) contains the tax lists of a region slightly west of the investigation area⁹. It reports that the following products were grown and taxed on the estates: wine (49.5 % of all mentioned estates), barley (26.5 %), figs (12 %), wheat (4.3 %), grazing land (4.3 %), olive trees (1.7 %), beans (0.85 %) and dates (0.85 %). Archaeologically, the evidence for processing of high quantities of agricultural products is shown by the existence of pressing installations, large basins, and storage rooms in every area occupied by the ancient structures.

It is striking that the conditions for cultivation seem to have even been sufficient enough to produce a surplus in a region that was below the minimum of precipitation for agricultural activities. It can be assumed that some 10 % of the land was used for crop growing. The calculations of their annual yields are based on hypothetical assumptions, but even with the lowest area/crop ratio the resulting amounts of produced goods are high¹⁰.

The existence of a surplus economy in the Eastern Marmarica is corroborated by the high production of amphoras and other transportation vessels that were found in the research area. During the surveys and detailed studies more than 40 production sites were discovered (Fig. 2; Table 1). The number of kilns and manufactured vessels far exceeds the local need and it is best explained as part of a developed system of exchange, trade and export of the goods that were cultivated and processed in the region.

3. The Pottery Production Sites – Appearance, Dimensions and Features

Large-scale pottery production must have taken place with a fairly developed ceramic industry starting in Ptolemaic and increasing in Roman times. In an area of ca. 10 km × 100 km along the coast, 45 production sites were surveyed or visited. 10 more surveyed sites could not be securely identified as pottery production areas, because the remains on surface were too few, but by analogy, this function seems highly likely (see »greyish areas« in the Table 1). 33 kiln sites were traceable on satellite imagery of the strip where production should still be possible, based on local environmental conditions, but these have yet to be surveyed (Fig. 2). Moreover, since there is a gap in the survey in the Wadi Garawla area and along the coastal strip, the density may have been even higher.

Amongst the large number of pottery production sites, differences in the dimensions and the components of facilities, as well as in topographical position, are evident. Archaeological features on the surface, such as mounds of wasters, pot sherds and slags, traces of buildings and remains of cisterns and basins, can all be contextualised in order to learn about the chronological range of production, the types of produced vessels and the economical implications of the production.

⁹ The P. Marm. was published by Norsa – Vitelli 1931.

¹⁰ Vetter et al. 2009.

| | Name of location | Extension of production area (sherd/waster heaps) | Scale of production | Indicator of pottery production | Adjacent buildings | Pressing installation | Cistern | Kind of production | Chronological range of production | Amphora type (after Empereur) | State of preservation and documentation |
|----|---|---|---------------------|---|--------------------|-----------------------|---------|---|--|-------------------------------|---|
| 1 | Ras al Hakma 1, RH 1 | 2100 m ² , height 5.3 m | large | waster, slag, pottery/ amphora stand | √ | | | amphora | ptolemaic/ roman | AE 2, AE 3 | surveyed, measured by track log |
| 2 | Ras al Hakma 2, RH 2 | 2000 m ² , height 6.5 m | large | waster, slag, pottery/ amphora stand | √ | | | amphora | ptolemaic/ roman | AE 2, AE 3 | surveyed |
| 3 | Ras al Hakma 3, RH 3 | 1800 m ² | large | waster, slag, pottery/ amphora stand | | | | amphora/coarse ware (little) | roman | AE 3 | surveyed |
| 4 | Ras al Hakma 4, RH 4 | | middle | waster | | | √ | | no sherds taken | | visited (SCA excavation) |
| 5 | Ras al Hakma 5, RH 5 | 4900 m ² | middle | waster, slag | | | | coarse ware/ amphora | no sherds taken | | surveyed |
| 6 | Haggäg al Midär 1 (settlement and karm) | | small | slag/waster | | √ | | amphora/coarse ware | roman | AE 3 | |
| 7 | Haggäg al Midär 2 (farmsteads and karm) | | small | slag/waster | | | √ | | ptolemaic/ roman | AE 2, AE 3 | |
| 8 | Wadi Sahr | 3100 m ² | large | waster, slag, pottery/ amphora stand | √ | ? | √ | amphora | roman | AE 3 | mapped |
| 9 | Wadi Fuachar/ Fawkher 1 (north) | | middle | slag | ? | ? | √ | coarse ware/ amphora | ptolemaic/ roman | AE 2, AE 3 | surveyed |
| 10 | Wadi Fuachar/ Fawkher 2 (south) | | small | | | | | | roman? | AE 3? | |
| 11 | Wadi Qasaba 1 (north) | 3800 m ² , height 3 m | large | waster, slag, pottery/ amphora stand, <i>kiln visible</i> | √ | √ | √ | amphora/coarse ware (little) | roman | AE 3 | mapped, partly excavated |
| 12 | Wadi Qasaba 2 (north) | | large | waster | | √ | ? | amphora | roman | no sherds taken | visited (SCA excavation) |
| 13 | Wadi Qasaba 3 (south) | | middle | waster, slag | | √ | √ | amphora/coarse ware | roman | AE 3 | surveyed |
| 14 | Matruh, Bir Abu Sakran | | large | waster, slag, pottery/ amphora stand, <i>kiln visible</i> | √ | | | amphora/coarse ware | ptolemaic | AE 2 | surveyed, mapped (excavated by SCA, partly destroyed) |
| 15 | Matruh, Alam el Rom, RR 1, Bir Helua | first heap 5900 m ² , second heap 2000 m ² , height 5.8 m | large | waster, slag, pottery/ amphora stands | ? | | | amphora/coarse ware (little) | roman | AE 3 | surveyed, measured by track log, partly destroyed |
| 16 | Matruh, Alam el Rom, RR 2, Samala south | hill 1: 4500 m ² , hill 2: 2400 m ² | large | waster, slag, pottery/ amphora stands | √ | | | amphora | hill 1 (WP 90ff): ptolemaic/ roman hill 2 (WP 60ff): ptolemaic/ roman | AE 2, AE 3 | surveyed, measured by track log, partly destroyed |
| 17 | Matruh, Alam el Rom, RR 3, Samala north | 3700 m ² | large | waster, slag | √ | | ? | hill 1: amphora coarse ware, hill 2: amphora, hill 3: amphora | roman | AE 3 | surveyed |

| | Name of location | Extension of production area (sherd/waster heaps) | Scale of production | Indicator of pottery production | Adjacent buildings | Pressing installation | Cistern | Kind of production | Chronological range of production | Amphora type (after Empereur) | State of preservation and documentation |
|----|--|---|---------------------|--|--------------------|-----------------------|---------|---|---|--|---|
| 18 | Matruh, Alam el Rom, RRR 4 Hashima east | 4100 m ² , 450 m ² , 950 m ² | large | waster, slag | ? | ? | | amphora/coarse Ware | ptolemaic/roman | AE 2, AE 3 | surveyed, measured by track log |
| 19 | Matruh, Alam el Rom, RRR 5, Hashima west | 4500 m ² | large | waster, slag, pottery/amphora stand | | √ | | amphora/coarse ware | roman | AE 3 | surveyed, measured by track log |
| 20 | Wadi Magid | | small | slag/waster | | √ | √ | amphora/coarse ware (?) | roman | | surveyed |
| 21 | Wadi Kharuba 1 (north) | hill 1: 5000 m ² , hill 2: 3700 m ² , hill 3: 2500 m ² | large | waster, slag, pottery/amphora stand | √ | | √ | hill 1: amphora coarse ware, hill 2: amphora, hill 3: amphora | hill 1: ptolemaic/roman, hill 2: roman, hill 3: roman | hill 1: AE 2, AE 3, hill 2: AE 3, hill 3: AE 3 | surveyed, mapped |
| 22 | Wadi Kharuba 2 (north) | | large | waster, slag, pottery/amphora stand | | | | amphora | ptolemaic/roman | AE 2, AE 3 | surveyed, mapped |
| 23 | Wadi Kharuba 3 (north) | 2700 m ² | large | waster, slag | √ | | ? | amphora | roman | AE 3 | surveyed, mapped |
| 24 | Wadi Kharuba 4 (south) | | middle | waster, slag | √ | √ | √ | amphora (little)/coarse ware | ptolemaic/roman | AE 3 | surveyed |
| 25 | Wadi Kharuba 5 (south) | | small | waster, <i>kiln visible</i> | | | √ | amphora (little)/coarse ware | roman | | surveyed |
| 26 | Wadi Kharuba 6 (south) | | middle | slag/waster | | | | ? | roman | | |
| 27 | Wadi Washka 1 (north) | | middle | slag/waster | | √ | | amphora/coarse ware | ptolemaic/roman | AE 2, AE 3 | surveyed |
| 28 | Wadi Washka 2 (north) | | middle | slag/waster | | √ | √ | coarse ware, amphora | ptolemaic/roman | AE 2, AE 3 | surveyed |
| 29 | Wadi Washka 3 (north) | | small | waster, slag, pottery/amphora stand | | ? | | amphora, coarse ware | ptolemaic/roman | AE 3 | surveyed |
| 30 | Wadi Washka 4 (south) | | middle | waster, slag | √ | | √ | amphora | roman | AE 3 | surveyed |
| 31 | Wadi Senab 1 | 4500 m ² | large | waster, slag, pottery/amphora stand | √ | √ | √ | amphora/coarse ware (little) | roman | AE 3 | surveyed, mapped |
| 32 | Wadi Senab 2 | 4000 m ² | large | waster, slag, pottery/amphora stand, <i>kiln visible</i> | √ | ? | ? | amphora/coarse ware (?) | roman | | surveyed |
| 33 | Wadi Senab 3 | 1100 m ² | large | waster, slag, pottery/amphora stand | √ | | ? | amphora? | roman | AE 3 | surveyed, partly destroyed |
| 34 | Wadi Senab 4 | | small | waster | | √ | | | roman | | surveyed |
| 35 | Wadi Umm al Ashtan 1 (north) | | large | | √ | √ | √ | amphora | roman | AE 3 | surveyed |
| 36 | Wadi Umm al Ashtan 2 (settlement) | | small | waster, slag, <i>kilns visible</i> | ? | √ | √ | amphora/coarse ware | roman | AE 3 | mapped, excavated |

| | | | | | | | | | | | | |
|-------------------------|--|---------------------|--------|---|---|---|---|-----------------------------------|-----------------------------|-------|------------------------------------|--|
| 37 | Wadi Umm al Ashtan 3 (2 nd settlement) | | small | waster, slag?? | | ✓ | ✓ | no sherds taken | | | mapped | |
| 38 | Wadi Umm al Ashtan 4 (south) | 1800 m ² | large | waster, slag, pottery/ amphora stand | | ✓ | ✓ | amphora | roman | AE 3 | surveyed, measured by track log | |
| 39 | Wadi Umm al Ashtan 5 (western tributaries) | | middle | waster, slag, <i>kiln visible</i> | | ✓ | ✓ | amphora/coarse ware | roman | AE 3 | surveyed | |
| 40 | Rakabat Sitra Nakhlal | | small | waster, pottery/ amphora stand | | | | amphora? | ? | ? | surveyed | |
| 41 | Umm al Rakkham | | small | waster, slag | | | | amphora | roman | AE 3 | surveyed, partly destroyed | |
| 42 | Wadi Hashefi 1 (north) | | middle | waster, slag | | | | amphora/coarse ware/sigillata? | roman/late roman/arabic? | | surveyed | |
| 43 | Wadi Hashefi 2 (middle) | | middle | waster, slag | ✓ | ✓ | ✓ | amphora/coarse ware | roman | AE 3 | surveyed | |
| 44 | Wadi Hashefi 3 (south) | | middle | waster, slag | | ✓ | ✓ | amphora | roman | AE 3 | surveyed | |
| 45 | Ras Abu Laho | | large | waster, slag | | | | amphora | roman | AE 3 | surveyed | |
| greyish areas or mounds | | | | | | | | | | | | |
| 46 | Wadi Fuachar (south) | | small | | | | ✓ | amphora | roman | AE 3 | surveyed | |
| 47 | Wadi Kharouba 1 (south) | | small | | | | ✓ | coarse ware?/ amphora? | | | surveyed | |
| 48 | Wadi Kharouba 2 (north) | | | | | | | amphora?/coarse ware? | ptolemaic/ roman | ? | surveyed | |
| 49 | Wadi R.amlia 1 | | small | | | ✓ | | amphora? | roman | AE 3? | surveyed | |
| 50 | Wadi R.amlia 2 | | small | | | ✓ | | amphora? | roman | AE 3? | surveyed | |
| 51 | Wadi R.amlia 3 | | small | | | | | Sigillata? | late roman? | | surveyed | |
| 52 | Wadi R.amlia 4 | | | | | | | coarse ware/ amphora? | ptolemaic/ roman | ? | surveyed | |
| 53 | Wadi R.amlia 5 | | small | | | | | ? | ? | ? | surveyed | |
| 54 | Wadi Washka 1 (south) | | small | | | ? | | no sherds taken | | | surveyed | |
| 55 | Wadi Washka 2 (north) | | small | | | | | amphora? | roman | AE 3? | surveyed | |

Table 1 List of surveyed kiln sites (no. 1–45) and greyish mounds (no. 46–55)

3.1 Mound of Wasters as a Criterion for Large-, Medium- and Small-Scale Production

The main distinguishing feature of the sites was their spatial dimensions – that is the dimension of the waste heaps that are still visible today.

As a result of the unexpectedly large number of kiln sites, the criteria for distinguishing between large-, medium- and small-scale production sites were adapted to take account of surface appearance and features (Table 1). These criteria were tested through case studies of the large and medium-scale production sites using exemplary excavations.

The huge wasters and sherd heaps are the most easily recognisable markers of a pottery production site in the landscape (Fig. 4). They reach a height of up to 6 m above the surface level (Bir Helua). In the case of large-scale sites and given the undisturbed nature of the place, the waster heaps appear as round or oval mounds, or half to two-thirds of a circle (bean-shaped), with at least two differently composed heaps forming a border around a small bean-like depression (Fig. 5). One dump appears reddish due to the high amount of sherds, the second one is more greenish coloured because it contains slags, wasters and overfired bricks. Sometimes a third heap is accumulated from mixed material (slags and broken pots). The kiln itself presumably lies in the depression encircled by the mounds (see below ch. 4.1, esp. p. 154 and Fig. 11).

Where single mounds mark a production site, this consists of only one circular heap of sherds with some flat scatters of wasters and slags around. In both



Fig. 4 Large-scale production site, Wadi Senab 1 (Eastern Marmarica)



Fig. 5 Typical bean-like waster heap of a large-scale production, Wadi Senab 1 (Eastern Marmarica), cf. Fig. 4

cases the density of sherds is very high and single fragments are of relatively large dimensions (Fig. 6).

Medium-scale production sites appear as more or less circular mounds which never reach the height and circumference of the examples described above (see Table). The sherd density is also much lower (Fig. 7) and the sherds are highly fragmented, apart from those on the high red dumps of the large

Fig. 6 Sherd density on surface at a large-scale production site, Wadi Kharouba 1 (Eastern Marmarica)



Fig. 7 Sherd density on surface at a medium-scale production site, Wadi Qasaba 3 (Eastern Marmarica)

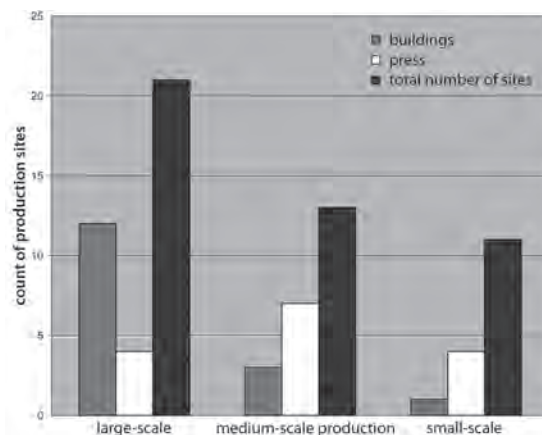


Fig. 8 Sherd density on surface at a small-scale production site, Wadi Hashefi 1 (Eastern Marmarica)





9



10

sites. In contrast to the large-scale production sites with their clearly distinguished red and green heaps, medium-scale sites show only one single heap that appears greyish/greenish coloured because of the mixture of slags as well as broken and overheated vessel (wasters).

In both large- and medium-scale production sites, pottery/amphora stands occur in relatively large quantities (Fig. 2; Table 1)¹¹.

Beside these easily recognisable pottery production features, little greyish to flat blackish mounds or surface areas also appear (Fig. 2 with 10 of them found in the investigated area, not all visible on the map). Their appearance is down to the colour of the sherds and the little burnt limestone pieces they consist of, that may be the result of the production process. The sherd density is low and the degree of fragmentation high (Fig. 8). Even though their appearance is similar, both types of sites are visible as dark spots in the landscape and in some cases on the satellite imagery, two different interpretations and consequently two different types of greyish areas, have to be distinguished. One holds pottery stands and/or slag on the surface, suggesting the role of a small workshop. This interpretation was confirmed by excavations in the settlement of Wadi Umm al Ashtan which yielded a small kiln under one of the greyish sherd areas (Fig. 9; see below ch. 4.2 for small-scale production sites)¹². At several sites imported wares could also be found on the surface. This may be due to the fact that the kiln itself was used as dump after the production site was shut down, as in the case of the kiln in the settlement of Wadi Umm al Ashtan. The second type of greyish area does not provide any remains that suggest an obvious interpretation as a production site. Their genesis and function remains unclear.

3.2 Adjacent Buildings

Additional distinctions between the pottery production sites can be made through observing the closer surrounding of the waster heaps themselves.

As a part of the production process, adjacent supplementary buildings for producing and storing of vessels can be observed, but almost exclusively at the large production sites (see Fig. 10). The stone bases of the walls are visible on the surface and always lie in close proximity to the large waster heaps. In most of the surveyed cases, the walls form corridor like structures (Fig. 11. 12) with up to five units of this type. In contrast to this standardised form, some workshops have a more scattered conglomeration of buildings for the

Fig. 9 Remains of a kiln visible in the surface, Wadi Umm al Ashtan 2, Eastern Marmarica (scale bar 50 cm)

Fig. 10 Adjacent buildings and wine-presses at pottery production sites in the Eastern Marmarica

¹¹ Majcherek – El Shennawi 1992, 133.

¹² An easy but, owing to chance and logistical organisation, impossible way to trace the kilns, would be a survey after a rainy day. The bricks of the remains of the kilns' walls appear as dark circles on the surface (Fig. 9).

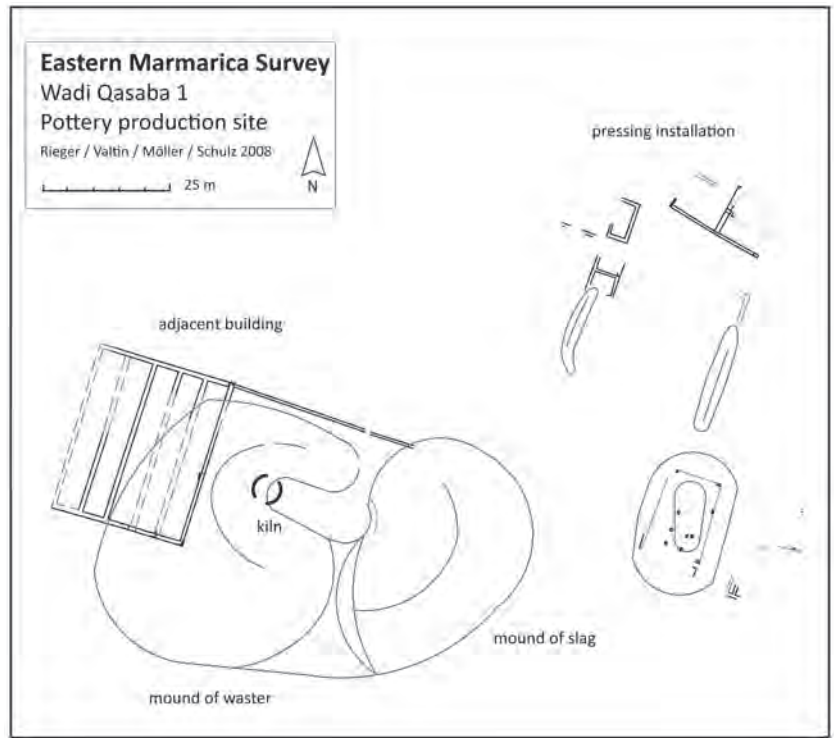


Fig. 11 The production site of Wadi Qasaba 1 (Eastern Marmarica) and its features (scale 1 : 1500)

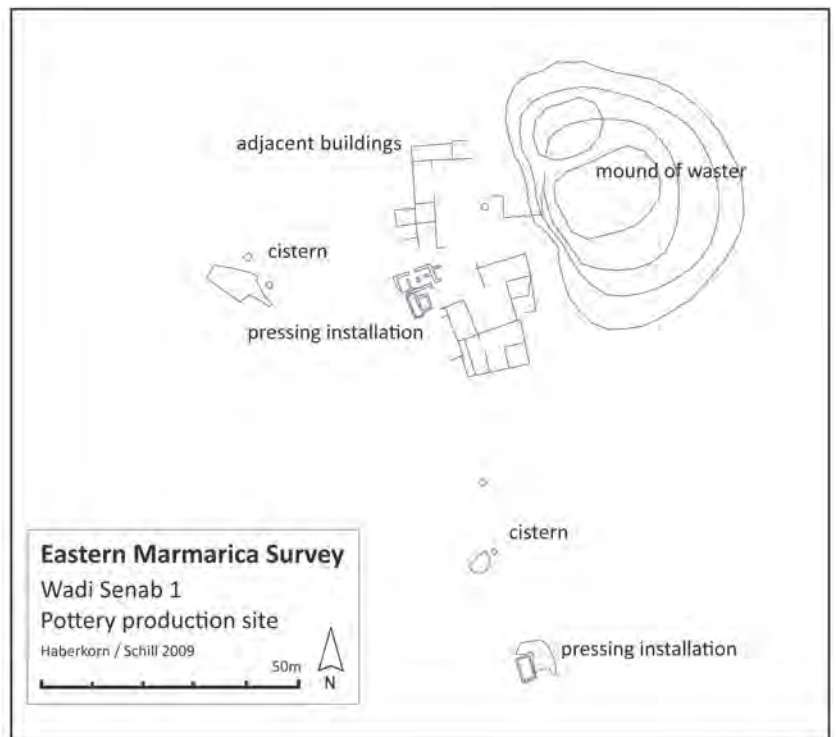


Fig. 12 The production site of Wadi Senab 1 (Eastern Marmarica) and its features (scale 1 : 1500)

production and storage of vessels and associated activities. At the sites of Wadi Kharouba and Wadi Umm al Ashtan, circular buildings are connected to the rectangular units.

Clay preparation pits were not discovered at any of the surveyed sites. In only one case there are remains of walls that hint at production and storage rooms close to the kiln on a medium-scale production site in a settlement (Fig. 13). Although the absence of work buildings at medium-scale sites may be the result of their preservation and visibility, these workshops might also have organised the work in a different manner, dispensing with stable structures, owing to the amount of produced vessels and the availability of space. This is also the case for the small production sites.

3.3 Pressing Installations in the Surrounding Areas

A second type of structure also appears frequently in close connection to pottery production: processing installations for agricultural commodities, mainly in the form of wine presses. They are found with certainty at 15 sites (see Fig. 10). At Wadi Qasaba, a large structure with several basins on different levels is situated slightly north of the potter's workshop (Fig. 11). At least three basins with thick layers of waterproof plaster were used for processing and keeping liquids like grape juice for making wine and its derivatives like vinegar or syrup (Fig. 11, 19). A spouted stone connecting a higher and a lower basin was integrated into the walls with heavy large limestone blocks, feasibly used as bedding for pressing installations. In the settlement of Wadi Umm al Ashtan, kilns and wine presses were working in close spatial and logistical proximity as the example of a small installation with a treading floor and a fermentation basin indicates (Fig. 13, 14). At four production sites, the surrounding structures are not clearly discernable, but their layout and the edges of plaster, suggest the basins necessary for the pressing installations (see Table 1).

The proximity of the processing of goods and the producing of vessels seems to be a more common feature in the east (e. g. Borg al Arab¹³, Lake Mareotis and Marea¹⁴). This phenomenon provides a useful insight into the organisation of economic relations between the different production fields in the Eastern Marmarica.

The wine-producing facilities are more commonly found associated with medium-scale pottery production sites (7) than large-scale ones (4). This is due to the different organisation of the outputs of amphora and pottery. In the large kilns, they were produced for a centralised market, being brought to the goods. The medium-scale production sites functioned in a different way, where the coordination of processing and producing happened in one place and the filled amphora were sold and transported from there.

4. Scale of Production

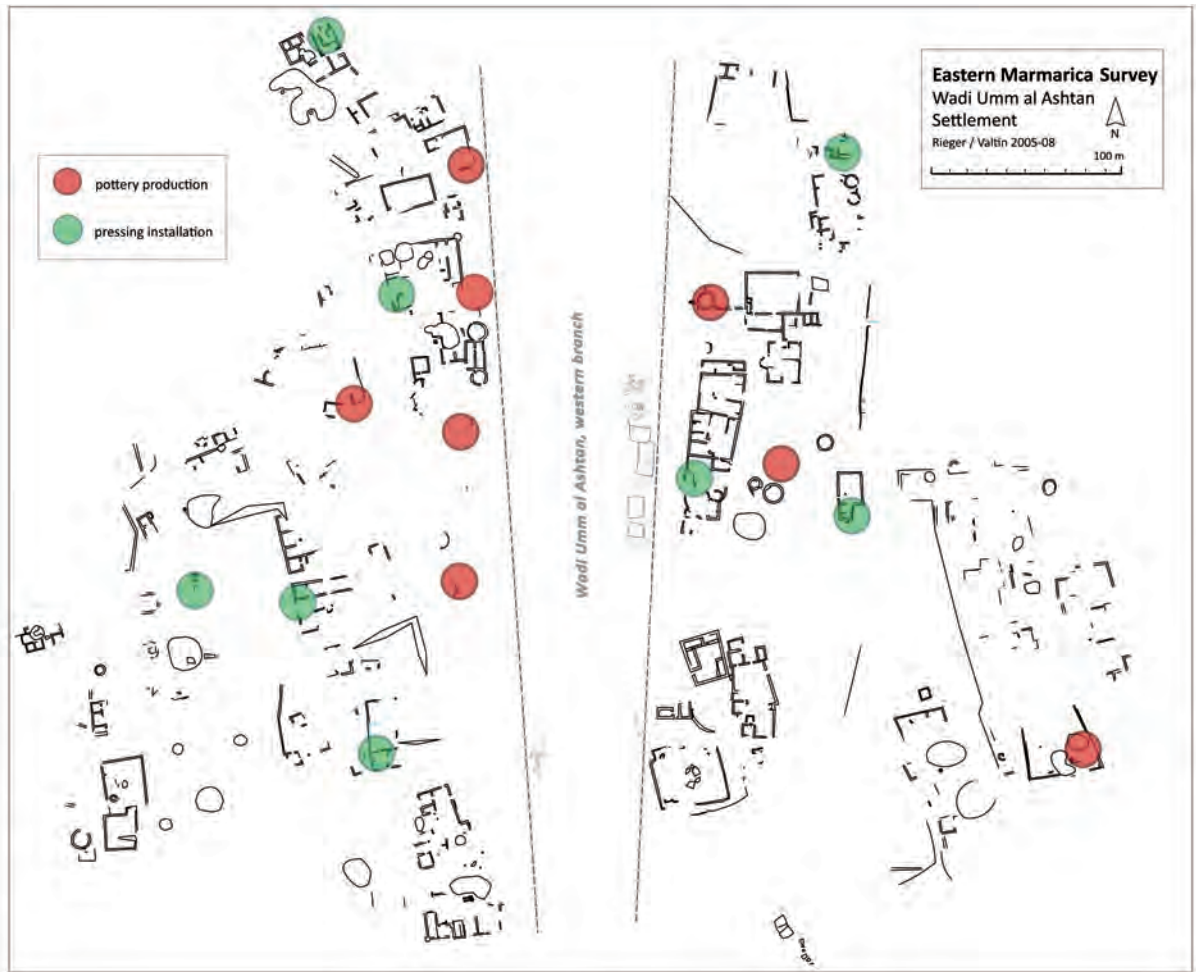
4.1 Sites with Large-Scale Production (without Close Association to Settlement)

The clearest characteristic evident in the description of the production sites' features is the scale of production, being closely related to the quantity of remains (sherd and slag) visible today. As well as the dimensions, the site's connection to, or independence from, settlements, is clearly related to the scale of production.

Twenty-one pottery facilities in the Marmarica were producing at a high level of output and seem, even if in close spatial relation to settlements, to be primarily production sites (Fig. 2; Table 1).

¹³ El Ashmawi 1998.

¹⁴ Empereur 1993; Szymanska – Babraj 2004; El Fakharani 1983.



13



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Eastern Marmarica

Fig. 13 The settlement of Wadi Umm al Ashtan (Wadi Umm el Ashtan 2) with the producing areas for pottery and liquid goods (scale 1:4000)

Fig. 14 Pressing installation in the settlement of Wadi Umm al Ashtan (scale bar 50 cm)



Fig. 15 Section of the wasters' heap at Wadi Qasaba 1 (Eastern Marmarica), showing bands of pottery and a band of charcoal and ashes (scale bar 50 cm)

These large sites may be called ›industrial‹, in the sense that they produce pottery on a large-scale, for special economical purposes, as containers of goods from well organised facilities for processing and filling¹⁵.

According to their output and the time range of the kiln's operation, the wasters and sherd heaps accumulated over several decades. Their gradual development, clearly evident through the different layers of sherds and other refuses, is well demonstrated at the site of Wadi Qasaba.

This production site is situated ca. 28 km east of Marsa Matruh (Fig. 2. 11). The largest of the three heaps rises some 3 m. On the two waste heaps, sherds and slags were discarded separately, while the third bean-shaped heap consists of a mixture of both materials. The wasters are situated opposite the presumed opening of the firing channel and constantly grow after every cleaning of the furnace chamber, with the sherd waste surrounding the side and back part of the kiln, stabilising the high superstructure of the kiln¹⁶. Layers of sherds alternate with layers of burnt organic material and white pebble fills (Fig. 15).

The kiln was constructed as a circular updraft kiln with an inner diameter of ca. 5.5 m and was set against a cavity in the natural rock between the two large waste heaps (Fig. 11. 18). The stacking platform of the kiln, found 3.5 m under the surface, was approximately 0.3 m thick, supported by a pillar of ca. 1.5 m (Fig. 16. 17). The platform was pierced by holes set in a radial pattern. The furnace chamber below measures ca. 4 m in diameter. The walls were built of large clay bricks (Fig. 16). The firing chamber itself had collapsed but its appearance could be reconstructed with a slight curve inward at the highest point and probably an open top¹⁷ (Fig. 18).

To the northwest of the waste heaps and the kiln site itself, is situated a building for production and storage (30 m × 26 m). Its five long rectangular halls were partly built on the gently inclined terrain (Fig. 11). There are no finds suggesting the main use or different uses of the halls.

About 100 m to the northeast of the potter's workshop, lies a building with all the features required for producing liquid goods (Fig. 11. 19, see above ch. 3.3). The discovery of a large piece of raisin, used for lining the ceramic vessels confirms the assumption of wine production, ›filling lines‹ and distribution in Wadi Qasaba.

¹⁵ Peacock 2003, 433.

¹⁶ Using the measured volume of the heap, the layers visible in the trenches and the weight of pot sherds, the amount of waste can be calculated approximately.

¹⁷ Cf. Majcherek – El Shennawi 1992, 131.



16



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Eastern Marmarica, kiln at Wadi Qasaba 1

Fig. 16 Firing chamber with central supporting pillar (left border of the photograph) of the kiln (scale bar 50 cm), cf. Fig. 11

Fig. 17 Staking platform of the kiln (scale bar 50 cm), cf. Fig. 11

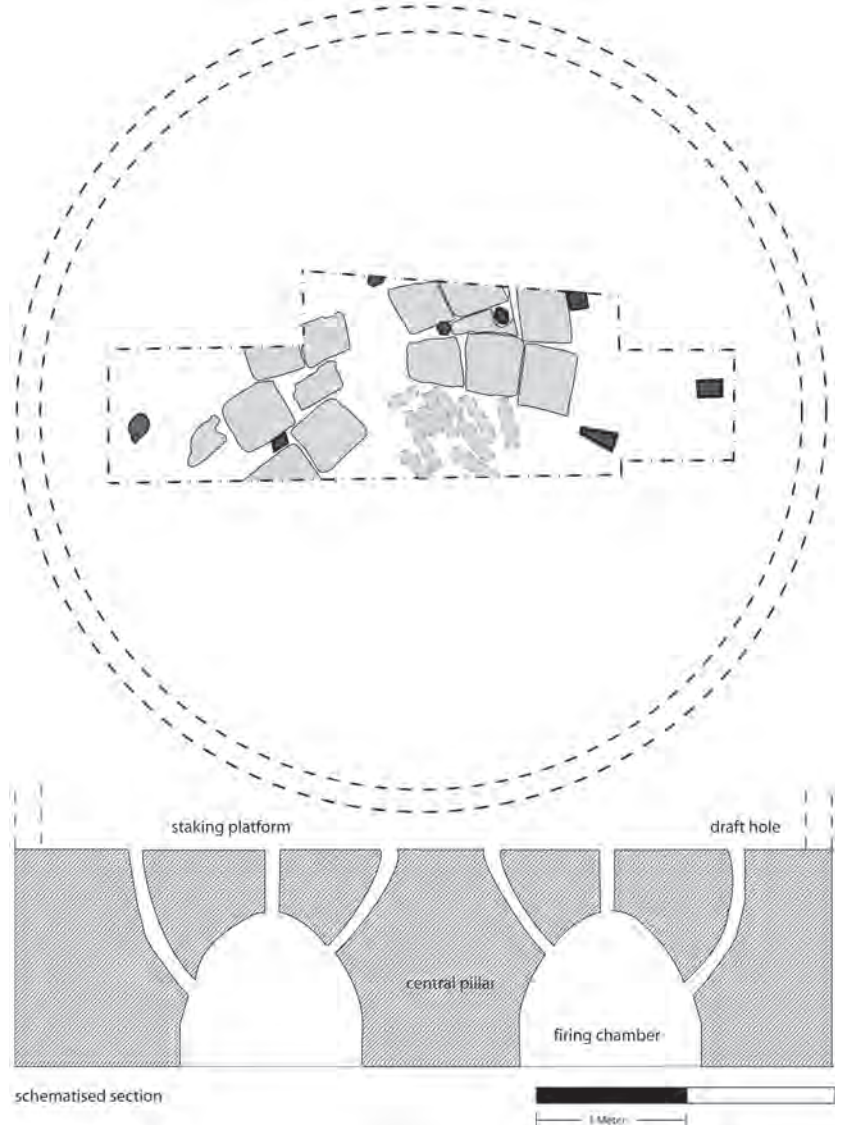


Fig. 18 Reconstruction of the staking platform and firing chamber of the kiln at Wadi Qasaba 1, Eastern Marmarica (cf. Fig. 11), scale 1:50



Fig. 19 Remains of a wine press (bassins and spout) at Wadi Qasaba 1, Eastern Marmarica (scale bar 50 cm), cf. Fig. 11

The archaeological features at Wadi Qasaba suggest a close collaboration between the production of both pottery and wine at that site over a period of time. The excavation demonstrated the output of vessels and dimension of production facilities – and thereby the great economical potential of Eastern Marmarica.

Three smaller kilns can also be posited at the Wadi Qasaba site, appearing as greyish concentrations of sherds of common ware. Building structures that do not belong to the production units at the site are very poor and not very extensive. It is clearly a production site, rather than a settlement with production.

4.2 Sites with Medium- and Small-Scale Production (with Close Association to Settlement)

Smaller sites that did not leave large sherd dumps are in most cases situated within a settlement, providing ceramic products on a scale needed for the daily purposes of the inhabitants as well as for their surplus (agricultural) production that needs to be stored or traded. Fifteen kiln sites of this category have been identified so far. There is an example of medium-scale production situated in the Ras al Hakma area which is not connected to a settlement as far as the survey shows, but the economical organisation may have been different in this special area, being a micro-region with favoured ecological conditions.

Pottery production in a settlement is not restricted to one area or one kiln. The size of the production sites justifies the assumption that they were built only for the internal use of the settlement.

At the settlement of Wadi Umm al Ashtan, eight small-scale kilns are used, probably contemporaneously, in order to guarantee a supply of vessels (coarse, cooking and storing ware) in the settlement and to cover the inhabitants' needs (Fig. 13). One of them was studied in more detail, being the test trench for testing the assumption that the greyish hills were in fact pottery production sites (see above ch. 3.1, esp. p. 150).



Fig. 20 Small kiln (Wadi Umm el Ashtan 2) at the settlement of Wadi Umm al Ashtan, Eastern Marmarica (scale bar 50 cm)

The confirmation of this hypothesis came in the form of a small kiln of the updraft type. Its stacking platform is circular like the one in Wadi Qasaba, but it only has a diameter of 3.3 m and therefore does not need a supporting pillar. The surface of the platform is convex. The furnace chamber with its firing channel opens to the southwest of the kiln (Fig. 20).

The wall of the firing chamber is 30 cm thick, although the upper parts of the chamber itself were not preserved. There is no dump around the kiln to stabilise it, which may be due to the smaller dimensions of the whole facility and the lower output in comparison to those like Wadi Qasaba. The produced vessels definitely include amphora, but common and cooking ware were also highly likely to have been manufactured here.

5. Resources and Routes

To approach the question of regional supply and demand of pottery on the different levels of productivity, an analysis of the topographical distribution of kilns is key. Calculating the coverage of kilns in use contemporaneously in the investigation area of about 100 km × 10 km there is one pottery production site per 20 km² (Fig. 2. 32). When one adds the unsurveyed sites (those that are likely to be sites based on the clear correlation of satellite image appearance and ground-work) that figure may even double to one pottery production site per 10 km².

5.1 The Topographical Distribution of Different Sized Production Sites

One general characteristic of the production sites is that they do not appear further south than 10–12 km from the coast, owing to ecological conditions. The highest concentration of sites is close to the coast and particularly to harbours (Ras al Hekma, Abu Hashaifa, Marsa Matruh). The sites with large-scale production lie closer to the centres of exchange and are therefore near to the coast (Fig. 2. 32). Since they are often situated close to, but not in,

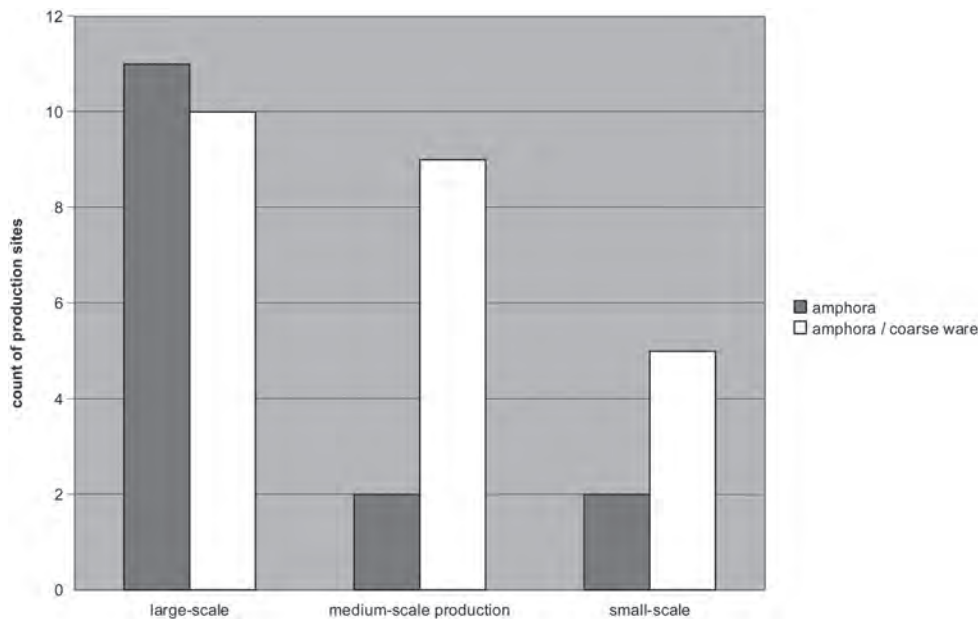


Fig. 21 Kind of production (amphora/coarse ware) at the different scale pottery production sites in the Eastern Marmarica

the settlements themselves, they seem to be independent production units. Medium-scale production sites are mostly located inside settlements, which goes along with their position further away from the coast.

Wadi Kharouba, south-west of Marsa Matruh represents a good example of the topographical alignment of six different sized production sites between the coast and tableland of which five were in use contemporaneously (Fig. 2).

One of the largest production sites found in the whole investigation area is situated in the alluvial plain of Wadi Kharouba, about 7 km southwest of the centre of Marsa Matruh (Wadi Kharouba 1). Large-scale production, over several centuries, is indicated by three separated kiln facilities consisting each of three huge sherd and waster heaps. They mainly produced amphoras and a little coarse ware for the region marked (see Fig. 21), starting in Ptolemaic times and active until Roman times. Two more facilities further to the east in the alluvial plain of the wadi started the production of amphora in the 1st cent. B.C. ended contemporaneously with the first one (Wadi Kharouba 2 and 3).

About two kilometres upstream along the wadi, one can find remains of a settlement on the wadi slopes with two medium-scale production sites. Even if one of them is better equipped and possesses a building for the production process and storing, their output of vessels (amphora, coarse ware) was lower than that of the large kilns in the plain. Thus, they presumably covered the local demand of the villagers, whereas the large facility to the north was producing for a larger market situated in the city of Paraitonion/Paraetionium.

One more kiln, producing coarse ware, is situated opposite the settlement on the western slope of the wadi, associated with a large building.

A similar system of the topographical juxtaposition of larger and smaller production sites and their association to settlements can also be observed between Wadi Washka and Wadi Senab as well as in the area of Wadi Umm al Ashtan west of Marsa Matruh. Here, the large production sites are situated in the coastal plain, while the smaller ones are found on the tableland in connection to settlements. This distribution pattern with large production sites at the coast and smaller ones on the tableland is again repeated east of Marsa Matruh in Wadi Qasaba. In the Wadi Sahr area the kiln sites are mostly unsurveyed, but a similar juxtaposition seems probable.

5.2 Production, Filling Process and Distribution of the Pottery

The clear distribution pattern of large sites in the plains and smaller ones in the hinterland (only one large site, Wadi Sahar, is more than 6 km distant from the coast) is due to the infrastructure needed by the production sites and those users connected to them. The large sites with 'industrial' character are close connected to zones with developed infrastructure, including production areas, roads, harbours and urban centres, whereas the smaller ones were primarily linked to the immediately surrounding area's settlements and needs, and only had secondary relation with the coastal centres.

For the large-scale production sites, either their position close to a centre included an easy line of transportation or they were also well connected to a road in order to carry the output of vessels from the respective facility. Because of their location in settlements, every medium-scale production site had access to a nearby road or track. So, the agricultural surplus produced in the villages could easily be traded to central markets. The same is true for small kilns that produced amphora and common ware in equal quantities, with these having a primarily local distribution, rather than broader exchange (Fig. 32).

The concentration of pottery production sites at Ras Alam al Rom and Ras al Hekma (Fig. 2) is explained by the favourable agricultural conditions of the peninsula-like environment and the proximity to harbour cities. The agricultural potential of the promontories fostered a larger production of commodities and a substantial need for vessels with short-distance lines of transportation. In these special topographical areas, potters, goods and vessels travelled only a short distance between production, filling and the final recipient or trader. At Ras al Hekma, three of the five kiln sites seem to have a large-scale production, possibly due to the export of goods via the harbour of Leuke Akte. At Ras Alam al Rom, where the features of the surveyed sites suggest a very high rate of production, those taking the amphoras, their contents and coarse ware were the traders of Paraitonion/Paraetonium, which was the most important market and staple place for the Eastern Marmarica.

A production site like Wadi Qasaba with a high output of amphoras was directly connected to the manufacturer of the goods that the vessels were filled with. The pressing installation with at least three large basins (Fig. 11) to the northeast of the potter's workshop produced liquid goods, presumably wine and its derivatives like vinegar and syrup¹⁸. Once placed in the amphoras from the kiln, the commodities were ready for transportation. Since amphoras from the described production sites were found at cisterns on the Marmarican Plateau, it is clear that one of the directions of the vessels and their contents was southwards, to Siwa¹⁹.

The large-scale coastal production site at Wadi Qasaba, with the same set of installations, may have been oriented towards the harbours of Paraitonion and Leuke Akte (maybe also Abu Hashaifa) via the coastal road.

5.3 Supply with Raw Materials – Water, Clay, Fuel

The decision as to where to build a potter's workshop was mainly determined by the ease of access to the basic materials for ceramic production. In addition, for an unobstructed transportation of the filled vessels or coarse ware products to their recipients, the infrastructural connection of the production sites played an important role. Tracks and routes to the centres facilitated the transportation and exchange of vessels and the commodities they contained.

18 A large piece of raisin was found in the surrounding wall of the kiln area (Fig. 11). Raisin was used to line the inner walls of the amphora certainly if wine was transported.

19 Vetter et al. (in print).

The large number of production sites in Eastern Marmarica, most of them having an industrial character, raises certain questions about the availability of raw materials (water, clay, fuel) and how these sites fit into the infrastructure of the region.

Water

Water for the purification and levigation of the clay as well as for the workers' needs is essential, especially at the large-scale production sites with no settlements nearby. However, already in the coastal zone, a constant water supply, e. g. via a conduit for the working process, was not easily obtained and even the manufacturers in Paraetionium or close by (Bir Abu Sakran, Kilo Saba/Bir Helua) may not have had access to any urban water supply system (with conduits only in the west of Matruh traceable close to the town²⁰). As in the region as a whole, potters' sites had a water supply provided by cisterns with seasonal and annual variation.

Cisterns close to workshops were observed at almost half of the large-scale production sites (9 out of 21) (Table 1; Fig. 11. 12). The pattern of all large-scale sites being situated near to a wadi or a depression (Alam al Rom, Ras al Hekma, Wadi Fuachar, Sahr, Kharouba, Senab, Qasaba) may reflect the fact that the waters coming down the wadi were stored in the soil as well, providing a favourable situation for constructing a potter's workshop.

Clay

The clay of the Marmarican pottery is distinct from the alluvial clay used in the Nile Valley production centres. There are two natural sources of clay. The first is a marl clay, deposited through a process of weathering and decomposition of the calcareous layers of the Marmarica-Plateau. Today, these deposits are still occurring, especially in Wadi Kharouba and Wadi Ramla but also in Wadi Senab. A second source of clay, the sediment accumulated in the wadi beds by runoff events, can also be used as raw material for pottery, since it has a high argillaceous content.

The topographical location of the large-scale production sites such as those on the alluvial plains of Wadi Kharouba and Senab is down to the fact that the clay and water resources were available from the nearby marl deposits and wadi beds.

Fuel

Another important question relating to the pottery production process arises immediately from looking at the steppe landscape: Where did they find the fuel necessary for firing such a large number of kilns.

Wood, or charcoal, would certainly have been the preferred firing material, but these were relatively scarce. Among the poorly conserved botanical material at Wadi Qasaba, a piece of tamarisk from an ash layer of the waster heap was recognisable (Fig. 15). Further analysis may provide more information in this respect, but tamarisk was certainly a favoured fuel²¹. However, in an environment in which trees grow only in exceptional cases, other combustible materials must have been utilized for the maintenance and the functioning of potters' workshops.

According to the archaeological and textual record, vineyards should have outnumbered fig and olive tree gardens. By pruning the grapevines and utilizing the old growth from old vineyards, the kiln operators may have had some fuel with good combustion (combustion properties) value at their disposal. Whether the amounts would have been large enough for firing the kilns of the

²⁰ See White 2003, 155–158.

²¹ Thanks for the archaeobotanical analysis are due to Ursula Thanheiser, Vienna.

area remains an open question. The naturally growing shrubs of the steppe are fast-burning and do not have a high heating value, but they might also have been used in ancient times as a common fuel. Straw (especially of barley) may also have been a feasible fuel as suggested by excavations at other sites (the Petrie's excavations at Memphis²²), but it has only 40 % of the heating value of charcoal. Its use in combination with other materials may have been more likely²³. Beside straw, other agricultural residues such as grape marc, olive kernels and animal dung were also used for firing and are readily available in the region.

Due to the ecological conditions in the region the most probable solution to the question of combustible fuels was a mixture of all of the available materials.

6. Forms Produced in the Eastern Marmarica

Generally speaking, the repertoire of local potters consists mainly of amphora, followed by coarse and cooking ware in both Ptolemaic and Roman times²⁴. The question of whether there was local Terra Sigillata manufacture (e. g. Wadi Hashefi 1) is still unclear owing to the lack of clay analyses.

6.1 Amphora

The amphora types produced in the Eastern Marmarica resemble the common forms of AE (Amphores Égyptiennes). The same forms were produced further east, not only around lake Mareotis, but also in the Delta and the Nile Valley²⁵. Therefore we use here the classification proposed by Empereur based on the amphora production around Lake Mareotis²⁶.

The same forms reached the Western Marmarica, probably also being locally produced²⁷. In the majority of cases, the amphoras' content was wine, as explained above. This is further confirmed by the configuration of the kiln site in Wadi Qasaba (see above ch. 3.2, Fig. 11).

In Ptolemaic times the amphora types that were produced in the Eastern Marmarica were considerably less than those manufactured in Roman times (Fig. 22). Currently, the earliest Ptolemaic amphora known to have been produced in the area was the AE 2 (Amphore Égyptienne 2) with its subtypes: a form inspired by Rhodian and Cnidian amphoras. The rim is plain and sometimes slightly concave on top and markedly undercut. The diameter averages 15 cm. This form has long handles, almost rectangular on top, bent with an irregular oval section extending from slightly below the rim to the shoulder. The shoulder itself is sharply rounded and passes into a cylindrical relatively long neck and a rounded, narrow body that tapers into a solid conical spike²⁸.

Generally speaking the AE 2 amphora made of local clay occurs during the 2nd cent. B.C. to the 1st cent. B.C. Since more precisely datable finds are so far

22 Quoted in Nicholson and Shaw 2000, 192.

23 For the different kinds of fuels and their combinatin see Moorey 1994, 144. 150 f. referring to mesopotamian contexts (straw, dung cakes and bones) and Hope 1993, 126 (acacia, palm tree and straw).

24 The relation between coarse ware and amphora is extracted from the numbers of the Wadi Qasaba wasters.

25 Dixneuf 2011, fig. 181.

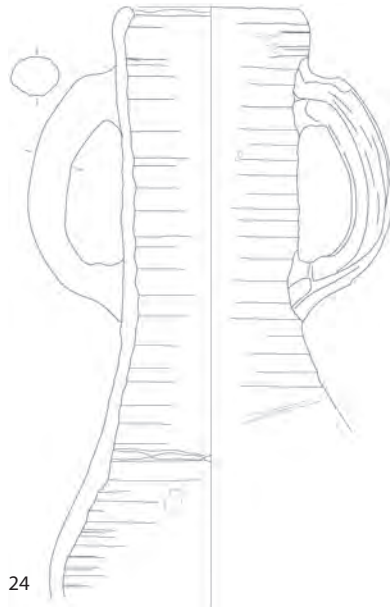
26 Empereur 1998.

27 Hulin et al. 2009, 181. 184, cf. Western Marmarica Coastal Survey 53,

Mellaha.

28 For the production of AE 2 amphoras see: Dixneuf 2011, 87–96; Coulson et al. 1986, 548; Empereur 1998, 77; Majcherek – El Shennawi 1992, 133.

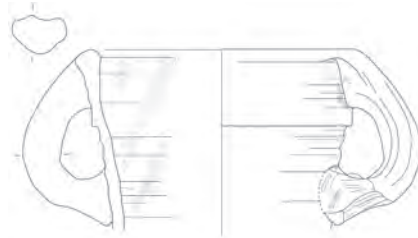
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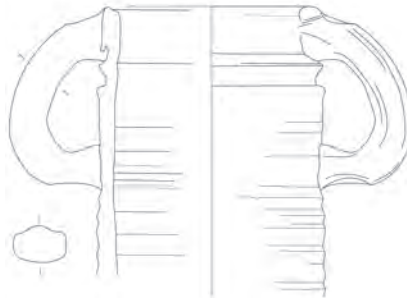
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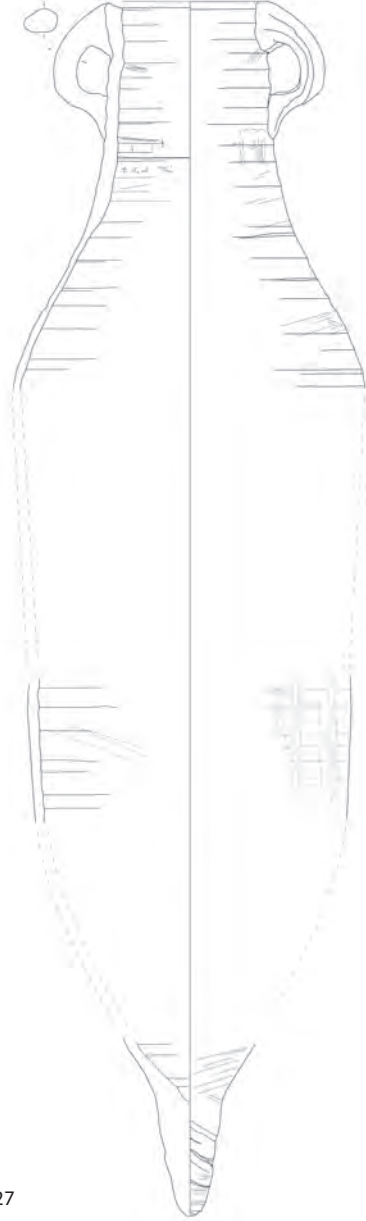
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0 5 cm

Main amphora types in the Eastern Marmarica

Fig. 22 Amphora AE 2 (scale 1:5)

Fig. 25 Amphora AE 3, subtype (scale 1:5)

Fig. 23 Amphora AE 3 (scale 1:5)

Fig. 26 Amphora AE 3, subtype (scale 1:5)

Fig. 24 Amphora AE 3, subtype (scale 1:5)

Fig. 27 Amphora AE 3, subtype (scale 1:5)

missing, the dating of this type in the Eastern Marmarica area cannot be more clearly specified, being based on comparison with dated versions of the same type and clay elsewhere on the coast, in the Delta and in the Nile Valley²⁹. This type occurred in the Marmarica mainly in Wadi Kharouba and Ras Alam al Rom (the kilns of Samala and Hashima), in the area of Marsa Matruh (ancient Paraitonion) and in the town itself at Bir Abu Sakran³⁰. To the east, these forms were produced at Wadi Fuachar and Ras al Hakma (Fig. 22 and Table 1).

In Roman times, the so called bitronconical amphora AE 3 (Amphore Égyptienne 3)³¹ is very frequent in the Eastern Marmarica and has been produced on many sites (Fig. 23). For this amphora type, in contrast to its predecessors, intensive morphological changes can be seen which are unrelated to the Aegean-influenced type AE 2. The form of the AE 3 is, in general, distinguished by a long, cylindrical neck, striated or even, differing in height and a rounded rim. The handles are round and vary from bigger, almost rectangular ones to little looped handles, which are always attached to the upper underneath or directly in contact to the rim. The shoulder is rounded and leads into a cylindrical, long body that tapers into a solid spike.

The AE 3 occurs with its variations from the beginning of Roman times to the middle of the 8th cent. A.D.³². In the Eastern Marmarica, the latest production site for this type of amphora can be dated to the 4th cent. A.D. Its variations are quite numerous and in this context only a subsumption of some subtypes will be given³³.

One subtype with a slightly or markedly inverted rim, a normally cylindrical striated neck and rectangular to looped handles (Fig. 24), was found all over the investigated area. The stratigraphy of the wasters' heap in Wadi Qasaba might give a hint of the relative sequence of this type of amphora as it was found almost exclusively in deeper, earlier layers. Elsewhere it occurs in contexts of the 1st to the 3rd cent. A.D. Two further subtypes, one with a round rim markedly undercut and striated (Fig. 25), and one with the same rounded rim, striated and with two deep incisions bands on the upper part of the neck, occurred in very small quantities mainly in the upper layers (Fig. 26). The layers were separated by a charcoal band, so that it should be possible to determine the production period of this subtype in the Eastern Marmarica through Carbon 14 dating³⁴. Comparable datable finds for the last two described subtypes occur in contexts of the end of the 1st cent./beginning of the 2nd cent. A.D. to the 4th cent. A.D. in Bates' Island in the Western Lagoon of Marsa Matruh³⁵. All three of the subtypes are very common in the Eastern Marmarica.

A subtype with a cut rim and very short looped handles was exclusively produced at a small kiln site without any 'industrial' character in Wadi Umm el Ashtan. The neck of this amphora is quite short, while the body is long and tapers into a massive conical spike (Fig. 27). Fragments of the same type were found in contexts up to the 4th cent. A.D. in the settlement of Wadi Umm el Ashtan itself. It is not clear yet when exactly the kiln was left open but outstanding Carbon 14 dating may give further clues. Comparable finds

29 Cf. Dixneuf 2011, 91 f. for further reading.

30 Sallam et al. (in prep).

31 Cf. Amphora Hermopolite A, Bailey 1998, 125.

32 Dixneuf 2011, 97.

33 Further Möller (in prep.).

34 Carbon 14 analyses of charcoal samples are expected the year 2012, undertaken by the Institut Français d'Archéologie Orientale, Cairo. Thanks are due to M. Wuttman and the staff of the Laboratoire.

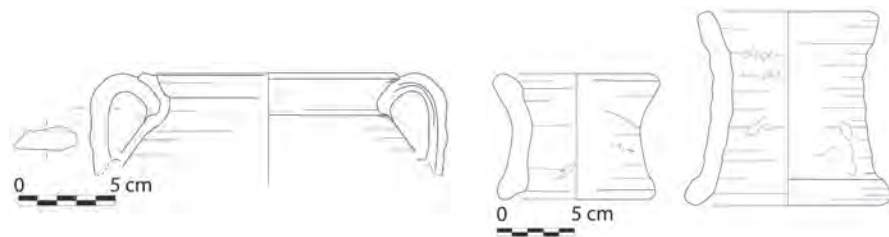
35 Bailey 2002, 134 f. »Egyptian type A Amphora«, fig. T. 12.128. and fig. T. 12.80, 12.134.

from other sites in Egypt are from unstratified contexts and therefore cannot help to clarify this dating³⁶.

It is remarkable to note that production of type AE 4 (Amphore Égyptienne 4 or Dressel 2-4) from the 1st to the middle of the 3rd cent. A.D. is totally absent in the Eastern Marmarica. This form, of Greek origin, was imitated all around the Mediterranean. As far as we know, in Egypt this amphora type was only produced in the Mareotis area³⁷. This lack, not only for the region of the Eastern Marmarica, but also for the Nile Valley, gives a hint about the economic relationships and transportation practices in Roman Egypt³⁸.

6.2 Coarse Ware/Cooking Ware

It is difficult to determine the extent to which coarse ware may have been produced at the surveyed kiln sites and which types were being produced. At most of these production sites, only surface pottery was studied and the variety of forms is large, but the frequency of any single form is low and hardly any wasters were found. Imported wares (African Red Slip Ware/ARS,



28

29

Cypriote Red Slip Ware/CRSW) were also found at some of these spots, showing clearly that not all pottery lying on the surface of production sites, has necessarily been produced there. Hence, it is even harder to determine which types of pottery made of local clay were being produced and which were just deposited by chance at these sites. In addition, some sites and their findings have yet to be evaluated. As a result, only one coarse ware/cooking ware shape will be discussed, as an example.

It is certain that a double handled, casserole shape was produced in the workshop of Wadi Qasaba (Fig. 28). It is a globular cooking pot with a slightly concave, everted rim and vertical, irregular shaped handles. The base is rounded. The size varies from 15 cm to 28 cm (waster) in diameter. Unfortunately, independent dating of this globular cooking pot for this region is hindered by the absence of precisely dateable finds. However, it can be shown that this very common type of cooking vessel occurs elsewhere in contexts of the 1st to 3rd cent. A.D.³⁹.

Pottery or amphora stands (see above ch. 3.1, esp. p. 150 and Fig. 29), although produced and found across the sites and in both Ptolemaic and Roman contexts, are not precisely dateable as their appearance changes but without any clear typological seriation, which is unsurprising, given that they were only made just for technical use.

Eastern Marmarica

Fig. 28 Globular cooking pot (scale 1:4)

Fig. 29 Pottery/amphora stand for the firing process (scale 1:5)

³⁶ Dixneuf 2011, 108 AE 3-1.2.

³⁷ Empereur 1986. Since a few sherds of alluvial clay could be found presumably other production sites beside the Mariotis Lake do exist. They could be situated in the close-by Western Delta region, cf. Dixneuf 2011, 130.

³⁸ Möller (in prep.).

³⁹ Sackett 1992, 170–172 and fig. 5, 3; 5, 6a; Tomber 2006, 80 f., Type 38. For coarse ware production in Ptolemaic times in the Eastern Marmarica, see also Sallam et al. (in prep.) with finds from Bir Abou Sakran.

6.3 The Characteristics of the Clay

The clay of the pottery produced in the Eastern Marmarica resembles, in many respects, the clay of the Mareotis region. It is a silty, quartzous more or less carbonate rich, slightly ferreous clay⁴⁰. Determining the difference between the Mareotide and the Marmarican clay and its local components requires petrographical analyses⁴¹.

The characteristics of the clay do not differ from one site to another in the Eastern Marmarica so there is no typical fabric for any restricted area of pottery production. The fabric in general is coarse to medium coarse, dense and hard. The mineral inclusions are mainly sand, quartz and small, white and yellowish lime particles. In addition, organic inclusions are rather frequent. The section colours vary from red/brown to brownish, reddish and reddish-orange.

Two different types of surface treatment can be distinguished. In many cases the surface is transparent and unslipped. Other amphoras show a rough yellowish surface, which should not be called slip since it is probably caused by saline water treatment in the manufacturing process⁴².

The clay used in the pottery produced in the Eastern Marmarica does not appear to differ between sites, but there are distinct fabric preferences in the different chronological phases. The majority of amphoras produced in Ptolemaic times are made (as far as we can say without further scientific analyses) of one type of fabric (Fig. 30). This fabric exists further on in late Ptolemaic and Roman contexts among other fabrics. Unfortunately we cannot say whether the majority of Roman amphoras was made of one typical clay.

The same distinction can be made for coarse ware fabrics as explained above. The section colour differs from reddish-orange to brownish. The majority of fabrics are medium-coarse to coarse, hard and dense. The fabric of cooking ware mainly appears as a very coarse and hard, reddish-greyish, fabric with inclusions of sand and quartz and sometimes mica. The surface is clear, without any slip and can be very rough.

Concerning the *chaîne opératoire* for defining the entire process from the mining of clay to the distribution of the vessels, especially amphoras, thin section analyses of soil samples should be able to help to distinguish more exactly the areas in which the composition of soil meets the requirements of being used for pottery production⁴³.

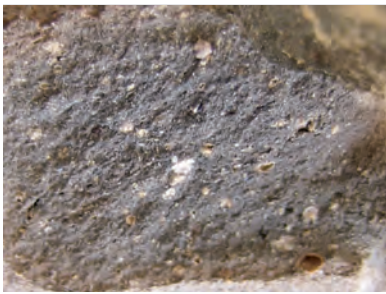


Fig. 30 Macrophoto of the common fabric of Eastern Marmarica amphora production

7. Conclusion

The high number of pottery production sites, their dimensions and their remarkable output (even if only assumed at this point) were, like the agricultural potential of the area, a completely unexpected feature of the Eastern Marmarica in ancient times. A well developed ceramic industry and the associated demand for its products are proof of the region's flourishing economic status, despite its ecological disadvantages.

The chronological range of the 45 surveyed pottery production sites (41 of the 45 are dated) coincides with the increase and ascendancy of the settlements in the region between Ptolemaic and Late Roman times. The number of kilns doubles in Roman times: 13 workshops started their production in Ptolemaic times, while 28 were in use in Roman times.

Current evidence suggests that in Ptolemaic times large- and medium-scale pottery production sites are far more frequent than small-scale production sites (seven large-, four middle- and two small-scale sites, out of thirteen, represent

40 Rodziewicz 1998, 245–260.

41 The analyses will be carried out at the IFAO/Cairo. Thanks are due to Sylvie Marchand, N. Mounir and the laboratory of the IFAO.

42 Majcherek – El Shennawi 1992, 134; Peacock 1984, 263 f.

43 Analyses will be done by O. Klammer and A. Nicolay for Möller (in prep.).

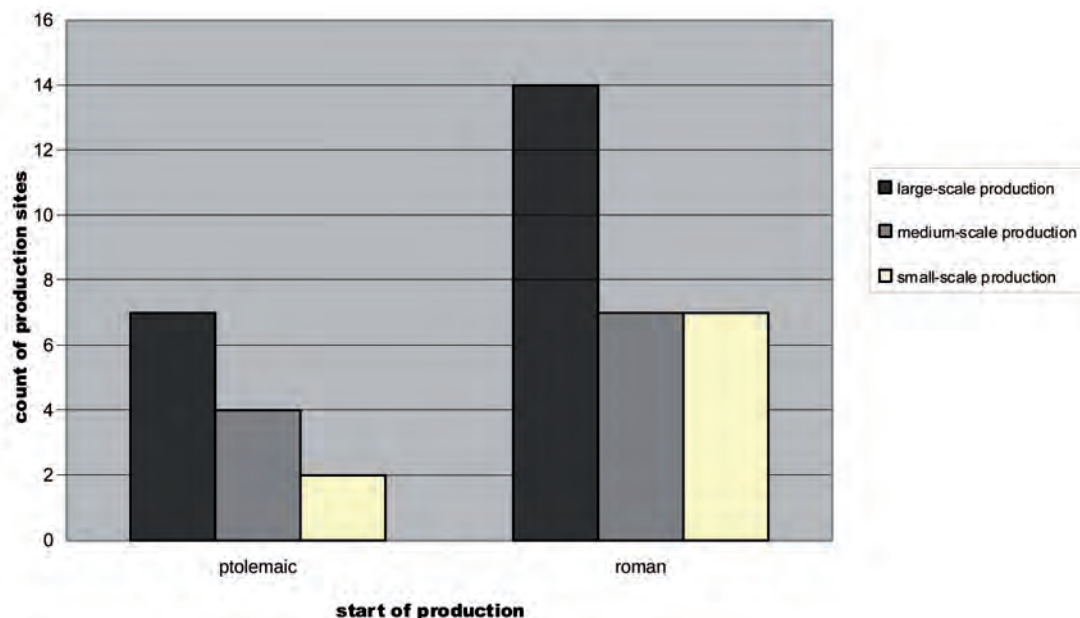


Fig. 31 Chronological range of pottery production in the Eastern Marmarica

54 %, 31 % and 15 % of all Ptolemaic sites). No Ptolemaic kiln has, as yet, been found in a settlement. A centralised organisation of production, filling and packing at ›industrial sites‹ can therefore be assumed for Ptolemaic times, while small kilns with ceramic output for the surrounding, small area are in the minority. This pattern continues into Early Roman times.

In Roman times, the situation changes as the total number of production sites increases (see Table 1). This development in pottery production corresponds with an increase in cultivated land in Roman times, resulting in higher agricultural yields leading to a surplus, and a higher demand for vessels in smaller settlements and urban centres.

Nevertheless, in Roman times, large-scale production dominates the region as it did in the previous period. Fully half of all roman manufacturing sites are large-scale. Medium- and small-scale production are found in equal numbers at a lower frequency (fourteen large-, seven medium- and seven small-scale sites from a total of twenty-eight, corresponding to 50 %, 25 % and 25 % of Roman sites) (see Fig. 31).

The amphora types produced in these kilns are of ›mark‹ clay, based on the AE 2 and AE 3 forms with numerous variations. Their morphological evolution can be seen on the partly excavated kiln site in Wadi Qasaba, and elsewhere. It is noteworthy that the AE 4 Amphora, an imitation of the Dressel 2-4, was not produced at any of the surveyed sites. This is probably due to economic relationships that require much further investigation. The production of coarse ware and amphora at the same kiln site occurs in several places, but it is rare to find a site where only coarse ware was produced.

It can be shown that large-scale pottery production must have been taken place in the Marmarica since Ptolemaic times. In a strip of land, ca. 100 km × 10 km along the coast with more than 40 kiln sites in use contemporaneously in Roman Imperial times (Fig. 32). For a region with semi-arid conditions and economic marginality, this number and the overall output seems remarkable. Even beyond 10 km south of the coast in a steppe-like environment, it is possible to find a large-scale production site (Wadi Umm al

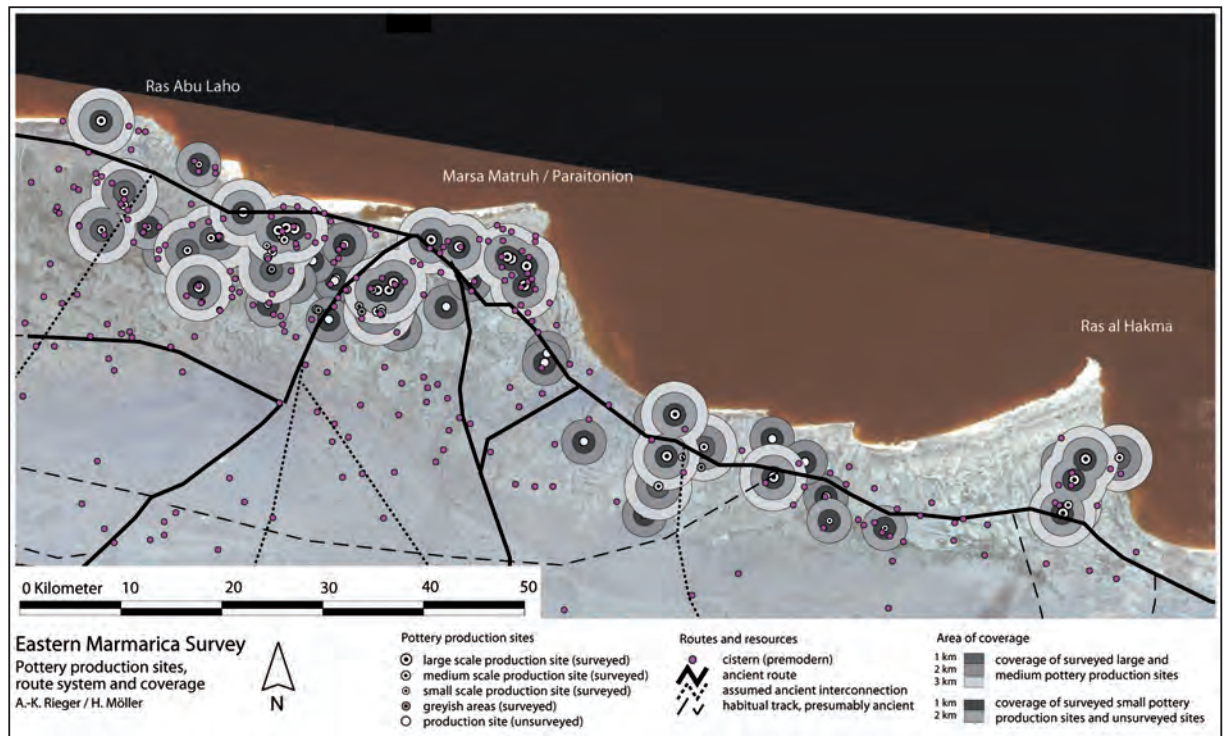


Fig. 32 Eastern Marmarica. Pottery production sites, routes, resources and coverage (scale 1 : 750 000)

44 The Western Marmarica Coastal Survey revealed also a number of pottery production sites (Hulin 2008, 301–303, 305–309; Hulin et al. 2009, 181, 184, 186), whose preliminary date is in most cases later than the Eastern Marmarica production. There is little doubt that in the ecologically comparable areas of Sidi Barrani and in the Western Marmarica (Hulin 2008; Hulin et al. 2009) the situation relating to supply and demand for pottery will be similar. A comparison of the regions and their economical potentials on base of more detailed informations would be promising.

45 The question of the pottery and pottery production in the Oasis of Siwa was approached by L. Bavay and will be further studied by B. Böhm.

Ashtan), supporting the view of a well functioning economic infrastructure in the Eastern Marmarica⁴⁴.

The vessels were used for several commodities such as wine, *sapa* or vinegar, locally produced in the Eastern Marmarica and widely traded. Of other possible liquid goods (oil, *garum*), we have no clear trace of cultivation or processing. It is possible that some quantity of the high output of amphoras were being traded empty to the south to Siwa, where determining if there was local production of high quality vessels is problematic due to the composition of the clay⁴⁵. The Nile Valley, Siwa and Cyrenaica are neighbouring areas which showed a demand on goods from the Marmarica. Longer range connections can also be found on routes to the Mediterranean or the Oases. It is not yet clear if the commodities, such as Marmarican wine, were exchanged overseas.

Since the ceramic material of the region has never been discussed before in economic and historical terms, the detection of Marmarican pottery at other sites in the ancient world will provide useful information for the study of trade relations of what appeared initially to be a poor region, but one that in reality, shows considerable ecological and economical potential.

Abstract

Anna-Katharina Rieger – Heike Möller, Kilns, Commodities and Consumers: Greco-Roman Pottery Production in Eastern Marmarica (Northwestern Egypt)

The northwestern coastal zone of Egypt is not an area well known for its rich archaeological record, especially when compared to the adjoining regions like the Cyrenaica in the west and the Nile Valley to the east. As a part of ancient Marmarica it was an ecologically and economically marginal region of semi-arid environmental conditions. However, a remarkably dense pattern of Greco-Roman settlements and agricultural use has been uncovered by recent archaeological and geographical research in the Eastern Marmarica. A surplus economy based on dry farming and livestock can be reconstructed for the hinterland of ancient Paraitonion (modern Marsa Matruh). The need to trade agricultural goods such as grapes and/or wine, barley, figs, olives and/or olive oil explains the large number of pottery production sites in the area. This paper will deal firstly with the layout and features of more than forty surveyed pottery production sites, which mainly manufactured amphoras, and secondly, the topographical distribution of these sites within the area. Based on these analyses, aspects of the economic organization relating to the transport vessels, the filled goods and the exchange centres of the region can be reconstructed. A preliminary typological and chronological evaluation of the vessels produced closes the discussion.

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Keywords

pottery production • amphora • economic history • arid regions • Marmarica

Sources of illustrations

Fig. 1: A.-K. Rieger on base of S. Snape, *The Emergence of Libya on the Horizon of Egypt*, in: D. O'Connor – S. Quirke (eds.), *Mysterious Lands. Encounters with Ancient Egypt* (London 2003) 93–106 fig. 6, 3 • Fig. 2: A.-K. Rieger on base of Landsat scene • Fig. 3: 4: A.-K. Rieger • Fig. 5: quickbird satellite image, curimage • Fig. 6: A. Nicolay • Fig. 7: 8: H. Möller • Fig. 9: A.-K. Rieger • Fig. 10: A.-K. Rieger, H. Möller • Fig. 11: A.-K. Rieger, S. Valtin, H. Möller, D. Schulz • Fig. 12: F. Schill, Ch. Haberkorn • Fig. 13: A.-K. Rieger, S. Valtin • Fig. 14: A. Matthaei • Fig. 15–17: A. Groß • Fig. 18: H. Möller • Fig. 19: A.-K. Rieger • Fig. 20: A. Vacek • Fig. 21: A.-K. Rieger, H. Möller • Fig. 22–29: H. Möller, B. Böhm • Fig. 30: H. Möller • Fig. 31: A.-K. Rieger, H. Möller • Fig. 32: A.-K. Rieger on base of Landsat scene

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