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Amphorae Production in Punic Sicily (7th–3rd/2nd Centuries B.C.E.)

An Overview

Introduction

This contribution intends to summarize the status of research on both the typological evolution of the Punic Sicilian amphorae series¹ and the archaeometric studies available for the known Punic production centers with the intention of presenting the whole range of published data within the framework of *Fabrics of the Central Mediterranean (FACEM)* where four local ceramic fabrics of Palermo are now presented.² Hopefully, in the near future it will be possible to also add the identified fabrics of the other Punic production sites mentioned below to the present open database.

In the following, the Punic production centers of Mothia (§ 1), Lilybaeum (§ 2), Solunto (§ 3) and Palermo (§ 4) will be discussed one by one,³ with particular regard to:

- the typological repertoire attested for the local series,
- the archaeometric data available for the local fabrics and
- the location of the industrial areas and the provenance of the raw materials

1. Mothia

Among the local amphorae series issued by Punic production sites of western Sicily, the one of the small island of Mothia⁴ is, together with Solunto (see § 3), certainly the best known and most studied.

1.A TYPOLOGICAL REPERTOIRE OF THE LOCAL AMPHORAE SERIES⁵

No doubts exists about the earliest local type of Ramón's T-3.1.1.2/Toti's T1 (pl. 1,1) dating from between the second half/late eighth to the seventh centuries B.C.E. It is well documented both in the cemeteries and in the tophet, as well as in the settlement.⁶ The seventh century B.C.E. issue is characterized by the presence of Ramón's T-2.1.1.1/Toti's T2 (pl. 1,2)⁷ and T-2.1.1.2/Toti's T3 (pl. 1,3)⁸, while during the sixth century B.C.E. Ramón's T-1.3.2.1/Toti's T4 (pl.

¹ All typological references to Punic amphorae types are based on J. Ramón's classification, see Ramón 1995.

² Cf. the paper "The Fabrics of Panormos" by V. Gassner & M. Trapichler in *FACEM* (version, 06.06.2011).

³ In this paper I intentionally skip the recently ascertained production center of Punic Selinunte, since the typological repertoire of the local fabric is still far from being clear. For the identification of a local Punic amphora fabric, labeled 'impasto II', on the bases of petrographic and chemical analysis of 23 amphorae samples see Az-zaro et al. 2006. Further research is needed to understand the chrono-typological spectrum of this production site.

⁴ For an overview of the amphorae assemblage found at Mothia, updated to the mid 90's, see Ramón 1995, 124–28, even if no distinction between local and imported fabrics has been made.

⁵ In addition to Ramón's Mediterranean typology, for the definition of the local amphorae repertoire Toti's specific classification for Mothia has been used, see Toti 2002a.

⁶ For the type see Ramón 1995, 182, for its documentation at Mothia see 124–25. More recently Spanò Giammelaro 2000, 303–4, fig. 1. For the settlement, zone A, see Toti 2002a, 278, pl. 1,1–3, with more references at notes 15–16 and Iliopoulos et al. 2002, 355. For the necropolis see Toti 2003, 1204, 1210, cat. 2, pl. CCIV,2.

⁷ Toti 2002a, 278–79, pl. 1,4–5. Iliopoulos et al. 2002, 355. Toti 2003, 1205, 1210, cat. 4, pl. CCV,1.

⁸ Toti 2002a, 278, 280, pl. 2,1–3. Iliopoulos et al. 2002, 355. For the presence of one item of supposed Mothian fabric at Himera see Vassallo 2005, 831.

1,4)⁹, T-1.4.2.1/Toti's T7 (pl. 1,5),¹⁰ T-13.2.1.2 (pl. 1,6)¹¹ and certainly T-1.4.3.1/Toti's T8 (pl. 1,7)¹² were produced. The local fifth to the early fourth centuries B.C.E. series are mainly reproductions of Ramón's T-1.4.4.1/Toti's T9 (pl. 1,8),¹³ T-1.3.2.3/Toti's T12 (pl. 2,1),¹⁴ T-4.1.1.3/Toti's T14 (pl. 2,2)¹⁵ and T-4.2.1.1/Toti's T15 (pl. 2,3),¹⁶ but apparently also Ramón's T-1.4.5.1,¹⁷ whereas the latest fourth century B.C.E. amphorae series of the island is characterized by Ramón's T-4.2.1.7/Toti's T16 (pl. 2,4),¹⁸ T-4.2.1.6/Toti's T17 (pl. 2,5),¹⁹ T-4.2.1.2/Toti's T19 (pl. 2,6),²⁰ but most of all by Ramón's T-4.2.2.1/4.1.1.2/4.2.1.4/Toti's T18 (pl. 2,7).²¹

1.B ARCHAOMETRIC DATA CONCERNING THE LOCAL PRODUCTION

On the basis of mineralogical, petrographic and chemical analysis of 47 amphorae samples from Mothia and Birgi, the archaeometric aspects of the local fabrics have been studied and published in two important papers by R. Alaimo and his team:²² "The ceramic artifacts at Mozia resulted characterized by a porous and quite coarse paste. The sandy temper has a packing mainly ranging between 10 and 20%, with minor exceptions (...). These sand inclusions are heterogeneously distributed, poorly sorted and, for the most of the artifacts, a distinct bimodality can be pointed out, with a clear prevalence of medium (0.25–0.5 mm) and very fine (0.125–0.06 mm) size fractions. They are predominantly constituted of subrounded and/or subangular carbonatic lithoclasts (...) bioclasts (...) rounded and subrounded monocrystalline quartz. Chert, quartzarenite fragments, polycrystalline quartz and feldspars are also present, even if in smaller quantities. This composition can be appreciated in the artifacts not exceeding 850° C in firing temperature, which are still preserving, at least partially, the carbonate component of the temper. The samples fired at higher temperatures as well as the over-fired fragments show, as expected, only the silicate component accompanied by secondary firing minerals, such as gehlenite and calcium pyroxene, which, were determined only through X-rays diffraction analysis. The sherds that underwent a higher firing temperature exhibit an optically isotropic paste with numerous firing macro-pores, often of vesicular form and irregular pores that represent casts of decomposed carbonate fragments." In comparison to the ceramic production of Solunto (see below, § 3.B), the Mothian fabrics reveal a more heterogene-

⁹ Toti 2002a, 278, 280, pl. 2,4–5; Spanò Giammellaro 2000, 305.

¹⁰ Toti 2002a, 282, pl. 5,1–4. Iliopoulos et al. 2002, 355. For the identification of items of Ramón's T-1.4.1.1 of presumably Mothian origin at Himera see Montana et al. 2006, 150–51, table 1 (impasto IV).

¹¹ Toti 2003, 1205, 1210, cat. 6, pl. CCV,4.

¹² Toti 2002a, 282–83, pl. 6,1. Iliopoulos et al. 2002, 355. Toti 2003, 1205, 1210, cat. 7, pl. CCVI,1; Iliopoulos et al. 2009, 158, fig. 1, 159. table 1.

¹³ Toti 2002a, 282–83, pl. 6,2–4.

¹⁴ Toti 2002a, 284, pl. 8,2–3.

¹⁵ Toti 2002a, 287–88, pl. 13,1–3.

¹⁶ Toti 2002a, 288–89, pl. 14,1.

¹⁷ According to Montana et al. 2006, 150–1, table 1 (impasto IV) on the basis of samples taken from amphorae found in the necropolis of Himera. However, type Ramón T-1.4.5.1 (for the type see pl. 4,5) should be considered particularly characteristic of the local amphorae series of the production centre of Solunto, see below, § 3.A.

¹⁸ Toti 2002a, 288–9, pl. 14,2–3. Iliopoulos et al. 2002, 355. Iliopoulos et al. 2009, 158, fig. 1, 159. table 1.

¹⁹ Toti 2002a, 290, pl. 15,1–2.

²⁰ Toti 2002a, 294–95, pl. 20,1–4.

²¹ Toti 2002a, 288–94, pls. 18–9. Iliopoulos et al. 2002, 355. Toti 2002b, 565, the types Ramón T-4.2.1.4 and T-4.2.1.7 area represented among a dump excavated in 1989 in the area of the northern city gate and referred to the second half of the fourth to the early third centuries B.C.E. production of kiln M58. Toti 2003, 1210, cat. 8, pl. .CCVI,2. For the abundance of the local type T-4.2.2.1 see also Ramón 1995, 127. For the presence of one item of Ramón's T-4.2.2.1 probably to be attributed to the workshops of Mothia at Himera see Vassallo 2005, 833. For the documentation of Ramón's T-4.1.1.2 of presumably Mothian origin at Himera see Montana et al. 2006, 150–51, table 1, impasto IV.

²² Alaimo et al. 2005, 707–11, esp. 708; previously Iliopoulos et al. 2002, 355–57, 'impasti A–C'; at latest Iliopoulos et al. 2009, 159, table 1. For previous, macroscopic observations on the presumably local fabrics of Mothia see Docter 1997a, 218. Ramón 1995, 261.

ously distributed sand temper, in addition to a definitively major frequency of the carbonatic component, which is considered to represent the most important distinctive feature of the pottery issue of the island.²³ Furthermore, recently for Mothia, as well as for Solunto (see below, § 3.B), it has been possible to distinguish a coarser Archaic fabric (sand temper 0,25–0,8 mm) from a quite finer one (sand temper 0,125–0.25 mm), produced after the fifth century B.C.E.²⁴

1.C INDUSTRIAL AREAS AND PROVENANCE OF RAW MATERIALS

Within the city of Mothia, ceramic kilns have been found in a peripheral position at the North of the island within the areas 'K' and 'K EST' (kilns 1–5),²⁵ and at the so called 'Luogo di arsione' located at South of the Archaic necropolis where two kilns in use from the Archaic period until the fourth century B.C.E. have been found.²⁶ A second industrial area is situated on the north-eastern coast outside the city wall, just between the eastern tower and the northern gate, kiln 6,²⁷ and inside 'Porta Nord', kiln M58, in use at least during the second half of the fourth to the early third centuries B.C.E. and also producing amphorae of Ramón's T-4.2.1.4/1.7.²⁸

The raw materials used for the local pottery were almost certainly extracted in alluvial deposits nearby the old fan of the Birgi river, situated on the opposite side of the island, which must have been the clay-source exploited by the potters of Mothia.²⁹

2. Lilybaeum

Compared with the high level of knowledge of the typological repertoire and the fabric characteristics of the amphorae production of Mothia, only very little data has been available for the nearby Lilybaeum up to now.³⁰

2.A TYPOLOGICAL REPERTOIRE OF THE LOCAL AMPHORAE SERIES

The detailed analysis of c. 500 graves yielded by rescue excavations in the necropolis during the late 80's and early 90's³¹ suggests that towards the final years of the fourth century B.C.E. at least Ramón's T-4.2.1.5 (in the Lilybaeum typology 'AC 4B', see pl. 3,1) was produced by the local workshops.³² A re-examination of the samples referring to 24 Punic amphorae found in

²³ Alaimo et al. 2005, 711.

²⁴ Iliopoulos et al. 2009, 159–60, figs. 2C–d.

²⁵ Excavations undertaken by a team of the *Cattedra di Archeologia fenicio-punica dell'Università di Palermo*. For full references see Spanò Giammellaro 2002, 546–47, notes 6, 14, pl. II for the plan of the whole area, in addition to Falsone's monographic paper on the kilns of Mothia (Falsone 1981). On the basis of the materials edited by A. Spanò Giammellaro (2000), the industrial area K has been apparently in use from the Archaic period to the early fourth centuries B.C.E.

²⁶ Spanò Giammellaro 2002, 549–50 with earlier references at the notes 22–5.

²⁷ See Falsone 1981, fig. 1 and Toti 2002b, 555 and note 2 with full references.

²⁸ Toti 2002b, 555, 565.

²⁹ Alaimo et al. 2005, 707.

³⁰ The published items found at Lilybaeum are mentioned in Ramón 1955, 128–9, but no distinction between local and imported fabric has been made.

³¹ Bechtold 1999.

³² Bechtold 1999, 161, 163, 189, fig. 50, group I. The only diagnostic item is the amphora from T. 38 of Via Cicerone (pl. 3,1), see Bechtold 1999, pl. XXXIII,287, for the context see p. 339. The frequency of this type within the local burials is underlined also by Bisi 1971, 690, 692, fig. 21. For the possible local production of Ramón's T-4.2.1.2, a fourth century B.C.E. production attributed to both North Africa and West Sicily, see below, note 38.

the burial area of Via Cicerone³³ has shown that out of this assemblage, 16 items are of Carthaginian fabric (more than a 66%), in addition to another possible North African amphora and one vessel from western Sardinia, while only five samples have to be attributed to West Sicilian workshops (20.8%), three of them (12.5%) being of possibly local fabric. These data underline Lilybaeum's extremely close relation to Carthage and might indicate also its dependence from food imports produced in the surroundings of the North African metropolis, especially during the earliest phase of the Sicilian colony, that is to say during the period Ia (350–325 B.C.E.), when apparently only Carthaginian amphorae are documented among the grave inventories.³⁴ On the basis of the necropolis data, there is no evidence for the onset of a local amphora production earlier than 320/300 B.C.E.³⁵ When local potters started to produce transport vessels, they imitated very clearly Carthaginian prototypes of Ramón's T-4.2.1.5, probably imported in a high number,³⁶ but not attested to within the contemporaneous amphorae series of the north-west Sicilian Punic centers of Palermo and Solunto (see §§ 3.A, 4.A), and not even documented among the production of Mothia (see § 1.A). This scenario seems to confirm a hypothesis expressed in a previous paper which attributes the production of Ramón's T-4.2.1.5 to the south-western area of Sicily with Lilybaeum as its gravity center,³⁷ while the massive presence of this shape of North African fabric has been linked to the physical presence of Carthaginians, or at least to close relations with Carthage itself.³⁸

Furthermore, the presence of a large fragment of an amphora of Ramón's T-4.2.1.2 (pl. 3,2) among the late fourth to the first half of the third centuries B.C.E. archaeological deposit found directly on top of the bottom of kiln US 52 at Capo Boeo³⁹ (see § 2.C) suggests the local production of this shape, earlier or contemporaneously issued also by the Mothian workshops (see pl. 2,6).

No further certain information is available about the local amphorae panorama of the third and early second centuries B.C.E., even if it might be worth noting a possible concentration of vessels of Ramón's T-3.2.1.2 at Lilybaeum,⁴⁰ which has been attributed by J. Ramón to the third century B.C.E. series of Western Sicily, the area of Carthage and perhaps Malta.⁴¹ A curious, late appendix of the local production of Punic amphorae shapes is represented by

³³ For the publication of this cemetery area, characterized by an unusual high presence of fragmentary Punic transport amphorae, documented to within a 46% of the tombs, see Bechtold 1999, 336–46. These vessels served in 6 cases as containers for inhumations of rite B (enchytrismos) and in 3 cases as containers for secondary cremations according to rite D. For the remaining 15 items a function as covering for the skeleton has been proposed. The problem with this assemblage is, however, that the bulk of the identified amphorae consists only in parts of vessels preserved by undiagnostic body sherds. For this reason, the samples inform us about the fabrics documented within this portion of cemetery, but give scarce information about the morphological repertoire represented within the tombs of period I.

³⁴ On the other hand, the exclusive use of amphorae originating from Carthage might have also ritual reasons and the question can only be resolved when contemporaneous amphorae data from the settlement will be available.

³⁵ In addition to the 24 samples from Via Cicerone, some more seven samples from other cemetery portions are available.

³⁶ The only diagnostic item of certainly Carthaginian fabric, to be referred to Ramón's T-4.2.1.1/4.2.1.5, is published in Bechtold 1999, pl. XXXII,283, for the context see p. 337.

³⁷ Bechtold 2007a, 57; Bechtold 2008a, 548.

³⁸ Bechtold 2007a, 57–8.

³⁹ Bechtold and Valente 1990, 43, pl. 2, US 46-4, 48.

⁴⁰ Ramón 1995, 129; Bisi 1971, 688, fig. 18, from 'tomba VIII Giattino', context datable possibly to the first third of the third century B.C.E.; 720, fig. 57 from 'tomba I Tumbarello', context datable possibly to within the late fourth or the first half of the third centuries B.C.E.; for a third item, but of clearly elongated shape, see Bechtold 1999, 162 type 'AC 7', pl. XXXIV,292, for the context see p. 328, used as an urn for burial 10 and dated to the late fourth to the early third centuries B.C.E.; for an in-depth discussion of possible prototypes of Levantin origin see Bisi 1993, 21–22. Five more items of this shape might have been found in the necropolis of Lilybaeum (Toti 2003, 1206–7, 1210–11, cat. 11–15, pls. CCVII,1–2,4, CCVIII,1–2), but painted lines on their shoulders seem rather to hint at a Maltese production.

⁴¹ Ramón 1995, 183.

Ramón's T-7.6.2.1 (pl. 3,3), which seems to have been fabricated at or around Lilybaeum to within the second half of the second and the first half of the first centuries B.C.E.⁴²

2.B ARCHAEOLOGICAL DATA CONCERNING THE LOCAL PRODUCTION

In relation to the archaeometric aspects of the local fabrics, to my knowledge the only attempt to characterize the pottery series of Lilybaeum by the means of scientific methods was under the neutron activation analysis made by Cesana and his team in the early 90's.⁴³ Given the very short distance of only seven km from Mothia to Marsala, in addition to the fact that the raw materials used for the pottery production of Mothia were extracted in the back-land of the island, in the fan of the river Birgi,⁴⁴ it is extremely likely that the local fabric of Punic Lilybaeum closely resembles that of the island's production (see § 1.C). In fact, on the basis of the necropolis material⁴⁵ and the analysis of the pottery dump found in the Punic kiln excavated in the late 80's in the area of the Baglio Anselmi on the Capo Boeo,⁴⁶ its macroscopic description harmonizes very well with Alaimo's observations (see § 1.B).

2.C INDUSTRIAL AREAS AND PROVENANCE OF RAW MATERIALS

Until now, the only published information about the location of the industrial area of Punic Lilybaeum derives from the data yielded by a rescue excavation undertaken in 1988 in the court of the Baglio Anselmi, the actual Archaeological Museum.⁴⁷ In trench D, the remains of a pottery quarter have been found which consists of numerous irregularly-shaped cuts into the bedrock, one containing a dolium (US 33),⁴⁸ and another a pottery dump (US 38)⁴⁹, in addition to a circular kiln with a central pillar (US 52) with parallels to Punic North African kilns of the Hellenistic period⁵⁰ and in kiln 1 of Mothia (area K).⁵¹ The analysis of the ceramic material of both the pottery dump US 38 and the deposit US 46 found in direct contact with the bottom of kiln US 52 indicates a dating towards the late fourth or rather within the first half of the third century BC for these ceramic finds, in obvious relation with this production area.

Apparently, only some meters North-East from kiln US 52, a second kiln was uncovered in 1985 on the occasion of the restructuring of Baglio Anselmi.⁵² For this reason it is absolutely plausible to suggest the location of at least one *kerameikos* of Punic Lilybaeum on Capo Boeo, in a peripheral position and in immediate proximity to the sea. The question as to whether this industrial area was located inside or outside the city wall is still open since the exact alignment of the urban defenses in this area is far from being clear.⁵³

⁴² Toti 2003, 1208, 1211–2, cat. 21–25, pls. CCV,1–3 CCXI,1–2; previously Bechtold 1999, 162–3, pl. XXXIV,293 with earlier references.

⁴³ Cesana et al. 1993 who analyzed 32 plain ware sample of supposed local fabric, in addition to 3 clay samples collected in the surroundings of Marsala.

⁴⁴ Iliopoulos et al. 2002, 356 with further references.

⁴⁵ Bechtold 1999, 136 'imp. 1–2' for the plain wares and 163, 'a.c. imp. 1–2', even if the presence of mica has to be denied.

⁴⁶ Bechtold and Valente 1990, 47: coarse reddish clay with abundant white inclusions, yellowish scum on surface.

⁴⁷ Bechtold and Valente 1990.

⁴⁸ Bechtold and Valente 1990, 41–2, figs. 3, 5.

⁴⁹ Bechtold and Valente 1990, 41, pl. 1, 47.

⁵⁰ For a description of the Hellenistic kilns of Carthage, Utica and Kerkouane, all two-storied, of circular or subcircular shape with central pillar and built up in unfired bricks ('mattoni crudi'), see Falsone 1981, 50–4.

⁵¹ Bechtold and Valente 1990, 41–3, figs. 3, 6. and note 3.

⁵² Bechtold and Valente 1990, 43, note 4. This kiln, situated beneath the ficus tree still visible within the courtyard, is still unpublished.

⁵³ Bechtold and Valente 1990, 39; for a recent reconstruction of the whole fortification system of Punic Lilybaeum see Caruso 2003, pls. XXII–XXIII, and esp. pl. XXV where Capo Boeo seems to have been left outside of the

3. Solunto

Just like Mothia, the physical and typological aspects of the amphorae production of late seventh to the third centuries B.C.E. Solunto are best known. R. Alaimo, G. Montana and their team⁵⁴ have studied the archaeometric aspects of the local fabrics, and C. Greco⁵⁵ has identified the typological repertoire of the Soluntinian craftsmen on the basis of materials yielded by the necropolis and discovered in the industrial area situated on the promontory of Solunto.

3.A TYPOLOGICAL REPERTOIRE OF THE LOCAL AMPHORAE SERIES

For the Archaic period the production of Ramón's T-1.1.2.1 (pl. 4,1), T-2.1.1.2 (pl. 4,2)⁵⁶ and, to a minor extent T-1.1.2.2 (pl. 4,3)⁵⁷ has been ascertained, while the fifth century B.C.E. series are characterized by the presence of Ramón's T-1.4.2.1 (pl. 4,4)⁵⁸ (also sixth century B.C.E.), T-1.4.5.1 (pl. 4,5)⁵⁹ and, towards the late fifth to the first half of the fourth centuries B.C.E., Ramón's T-4.2.1.4 (pl. 4,6) and T-4.2.2.6 (pl. 5,1).⁶⁰ Probably in the course of the second half of the fourth century B.C.E. amphorae of Ramón-Greco's T-4.2.2.7 (pl. 5,2) evolve from the former shape.⁶¹ The latest evolution of these north-west Sicilian series is represented by vessels of Ramón's T-7.1.2.1 (pl. 5,3), dating to the late fourth to the first half of the third centuries B.C.E.,⁶² and, during the advanced third century B.C.E., Ramón's T-7.1.1.2 (pl. 5,4) and T-7.2.1.1 (pl. 5,5).⁶³ A possible hint for a late, second century B.C.E. or later, production of Punic amphorae at Solunto is given by the identification of one item of Ramón's T-7.5.2.1 (pl. 5,6) of supposed local fabric.⁶⁴

Finally, for Punic Solunto exist interesting evidences for the local production of several *not* Punic shapes, such as Polizzi's 'greco-occidentali 1' (pl. 5,7), that is to say Western Greek amphorae of Gassner's 'Randform' 3,⁶⁵ in addition to items of Vandermersch's MGS V⁶⁶ and VI⁶⁷ (pl. 5,8).

3.B ARCHAEOLOGICAL DATA CONCERNING THE LOCAL PRODUCTION

On the basis of archaeometric analysis (thin sections) of 52 amphorae samples and some more 30 samples referring to misfired items and production debris (thin sections, chemical and

alignment of the city wall. For a discussion of the so called 'Muro del Salinas', containing a small city gate and located north-east to the Baglio Anselmi area, see *ibidem*, 183–85.

⁵⁴ Alaimo et al. 2005; previously Alaimo et al. 2003; Alaimo et al. 1998.

⁵⁵ Greco 1997; Greco 2000; Greco 2005.

⁵⁶ Greco 2005, 673; Alaimo et al. 2003, 3; Iliopoulos et al. 2009, 158, fig. 1, 159, table 1.

⁵⁷ Alaimo et al. 2003, 3.

⁵⁸ Alaimo et al. 2003, 4. See also Greco 1997, 59; for the presence of this shape of presumably Soluntian fabric at Himera see Montana et al. 2006, 150–1, table 1. For an item of Soluntian fabric from a possibly mid third century B.C.E. context excavated at Palermo, in Via d'Alessi, see Lauro 2005, 740, 750, fig. 3a.

⁵⁹ Alaimo et al. 2003, 4; Greco 1997, 60–3. For the presence of items of this shape to be attributed to the production of Solunto or Palermo at Himera see Vassallo 2005, 832; Montana et al. 2006, 150–1, table 1.

⁶⁰ Alaimo et al. 2003, 4. Greco 1997, 60–3.

⁶¹ Greco 1997, 60–3. For the first definition of shape Ramón T-4.2.2.7 see Corretti and Capelli 2003, 307.

⁶² Greco 1997, 64. For a recent discussion of this particular North Sicilian amphorae family see also Bechtold 2008a, 548. For the presence of this type of probable Soluntinian fabric at Mothia see Toti 2002a, 296 (type 20).

⁶³ Alaimo et al. 2003, 3–4; Greco 1997, 65.

⁶⁴ Greco 1997, 66; Alaimo et al. 2003, 4.

⁶⁵ Tardo 2005, 687. For this recent classification of West Greek amphorae see Gassner 2003, here esp. 181–3, fig. 91.

⁶⁶ Polizzi 1997, 97–8. 103, figs. 4–5. For the type see Vandermersch 1994, 76–80, first half of the third century B.C.E.

⁶⁷ Bechtold (forthcoming), 'impasto 50', cat. 60.

mineralogical analysis),⁶⁸ in addition to soil samples (chemical and mineralogical analysis),⁶⁹ the local amphorae fabrics of Punic Solunto have been particularized described in a paper edited in 2003:⁷⁰ “Dal punto di vista compositivo (...) non esistono marcate differenze tra le manufatti arcaiche e quelle classiche ed ellenistiche (...) visto che l'argilla utilizzata come materia prima è la stessa (argille grigio-azzurre del Pleistocene inferiore). Nelle tipologie di età arcaica la componente silico-clastica appare (...) più abbondante rispetto ai tipi anforici prodotti in età classica ed ellenistica, in conseguenza dell'aggiunta di sabbia media (verosimilmente prelevata dal vicino Vallone Cefalà) come degrassante artificiale. Lo scheletro sabbioso dei frammenti cotti a temperature inferiori a 800°C, che ancora conservano abbastanza integrale la componente calcarea, risulta costituito da prevalenti granuli di quarzo monocristallino (...) da bioclasti quarzarenitici, feldspato e, raramente, piccole lamelle di mica. Anche in questo caso, come già visto per i manufatti arcaici, vi sono delle apparenti differenze di aspetto dei vari campioni visti al microscopio polarizzatore, che sono legate soltanto alla temperatura di cottura, ovvero alla progressiva decomposizione dei clasti di natura calcarea ed alla loro reazione con la componente allumo-silicatica a formare minerali secondari (gehlenite, diopside e plagioclasio calcico). Questo (...) comporta nell'impasto mostrato dai reperti cotti a temperature maggiori di 900–950°C, una pasta di fondo otticamente inattiva (bruno scuro a nico incrociati) e la comparsa, al posto dei granuli calcarei, di pori da impronta con bordi schiariti (con forma irregolare o pseudo-tondeggianti)”.⁷¹

The identification of two fabrics,⁷² basically distinguished by differences in packing and dimension of the sandy temper, which refer to a coarser Archaic (20–30%)⁷³ and a much finer Classical/Hellenistic (10–20%)⁷⁴ local pottery production, enables us to characterize quite precisely the pattern of the ceramic series of Punic Solunto. Given the substantial similarity of the geological context of the two settlements of Mothia and Solunto and the consequent absence of distinctive mineralogical markers within the sand temper used in both workshops, packing represents also an effective criterion for the differentiation of the two pottery productions: in fact, in the case of Mothia, packing results in generally less than 20%, while in Archaic artifacts fabricated at Solunto it ranges between 20–30%, in addition to a major frequency of carbonate components at Mothia (see § 1.B).⁷⁵

3.C INDUSTRIAL AREAS AND PROVENANCE OF RAW MATERIALS

Mainly due to the excavations undertaken by C. Greco in the mid 90's, the ancient pottery quarter has been identified in several areas located on the peninsula of Sòlunto, in immediate proximity to the Archaic settlement and the earliest necropolis.⁷⁶ To date, four kilns F 1–4 dating apparently from the Archaic to the Late Punic period⁷⁷ have been partly discovered, in addition to fragments of misfired amphorae of the late seventh to the sixth centuries B.C.E.

⁶⁸ At this regard see particularly Alaimo et al. 1998, 13, 17–22.

⁶⁹ At this regard see particularly Alaimo et al. 1998, 10–2, fig. 5, 13–7.

⁷⁰ Alaimo et al. 2003, 1–5 with earlier references. For a macroscopic description of the local fabrics and photos of these fabrics in fresh break see also Greco 1997, 59–61, pl. III, 1–2 (impasti A1–2 of the Archaic period) and 8 (impasto F2) and 10 (impasto G2) in use from the late fifth century B.C.E. onwards.

⁷¹ Previously see Alaimo et al. 1998, 21–2 (also for the results of the chemical analysis).

⁷² This evidence has been interpreted as an improvement in the manufacturing technology over time (Alaimo et al. 2005, 711. At latest Iliopoulos et al. 2009, 159–160, figs. 2A–b.

⁷³ See also Alaimo et al. 2005, 708; Iliopoulos et al. 2009, 159.

⁷⁴ See also Alaimo et al. 2005, 708–9; Iliopoulos et al. 2009, 159.

⁷⁵ Alaimo et al. 2005, 711.

⁷⁶ Greco 2005, 670–2; Spatafora 2009, 220–1, fig. 2, 224–5. At latest Montana et al. 2009b, 90.

⁷⁷ Greco 2000, 682–3, pl. CXII, 1, kiln F 2, omega-shaped, active during the late fifth century B.C.E. and destroyed towards the beginning of the fourth century B.C.E., in the period of the military expedition of Dionysos I, see Alaimo et al. 1998, 7–9, fig. 2; for the kilns F 3 (circular) and F 4 (omega-shaped) see Greco 2000, 688, 691, pl. CXX, 2, filled up with Archaic material and Alaimo et al. 1998, 8–10, fig. 4. The big circular kiln F 1 dates to the second half or the end of the third century B.C.E., see Greco 2000, 688 and Alaimo et al. 1998, 8–10, fig. 9.

which clearly suggest that the ceramic production started already in the Archaic period. The industrial belt of Solunto therefore shows a remarkable continuity from the earliest occupation period of the site until the Hellenistic phase when the settlement itself moved to the higher situated Monte Catalfano. "(...) a Solunto l'area destinata alle installazioni industriali sembrerebbe essersi ampliata, verosimilmente in (...) epoca ellenistica, a scapito delle attigue e più antiche zone funerarie, per far posto ad impianti artigianali che per l'abbondanza dell'acqua, la vicinanza alle cave di argilla e l'immediato collegamento con l'area portuale avrebbero verosimilmente suggerito di mantenere sul promontorio, in una zona meglio servita dalla viabilità costiera e ben distinta dall'area residenziale (...) del Monte Catalfano (...) lecito presumere che il pianoro costiero del promontorio di Solunto abbia continuato ad assolvere, per tutta l'epoca ellenistico-romana, quelle funzioni produttive e di servizio necessarie alla vita di una città pienamente inserita nel circuito dei traffici mediterranei".⁷⁸

Finally, the provenance of the *Argille di Ficarazzi*, the raw material used by the Soluntinian potters,⁷⁹ was probably extracted in several coastal zones close to the peninsula of Solunto itself, in proximity to the industrial area,⁸⁰ while the tempering material may have been collected along the mouth of the Cefalà stream.⁸¹

3.B ARCHAOMETRIC DATA CONCERNING THE LOCAL PRODUCTION

On the basis of archaeometric analysis (thin sections) of 52 amphorae samples and some more 30 samples referring to misfired items and production debris (thin sections, chemical and mineralogical analysis),⁸² in addition to soil samples (chemical and mineralogical analysis),⁸³ the local amphorae fabrics of Punic Solunto have been particularized described in a paper edited in 2003:⁸⁴ "Dal punto di vista compositivo (...) non esistono marcate differenze tra le manifatture arcaiche e quelle classiche ed ellenistiche (...) visto che l'argilla utilizzata come materia prima è la stessa (argille grigio-azzurre del Pleistocene inferiore). Nelle tipologie di età arcaica la componente silico-clastica appare (...) più abbondante rispetto ai tipi anforici prodotti in età classica ed ellenistica, in conseguenza dell'aggiunta di sabbia media (verosimilmente prelevata dal vicino Vallone Cefalà) come degrassante artificiale. Lo scheletro sabbioso dei frammenti cotti a temperature inferiori a 800°C, che ancora conservano abbastanza integrale la componente calcarea, risulta costituito da prevalenti granuli di quarzo monocristallino (...) da bioclasti quarzarenitici, feldspato e, raramente, piccole lamelle di mica. Anche in questo caso, come già visto per i manufatti arcaici, vi sono delle apparenti differenze di aspetto dei vari campioni visti al microscopio polarizzatore, che sono legate soltanto alla temperatura di cottura, ovvero alla progressiva decomposizione dei clasti di natura calcarea ed alla loro reazione con la componente allumo-silicatica a formare minerali secondari (gehlenite, diopside e plagioclasio calcico). Questo (...) comporta nell'impasto mostrato dai reperti cotti a temperature maggiori di 900–950°C, una pasta di fondo otticamente inattiva (bruno scuro a nico incrociati) e la comparsa, al posto dei granuli calcarei, di pori da impronta con bordi schiariti (con forma irregolare o pseudo-tondeggianti)".⁸⁵

⁷⁸ Greco 2000, 688.

⁷⁹ Alaimo et al. 1998, 13–4. For the mineralogy and petrography of the raw materials see Alaimo et al. 2005, 707–8 and, very recently, Montana et al. 2009a, 123–4 and Montana et al. 2009b, 102–4 and fig. 1.

⁸⁰ Alaimo et al. 2005, 708.

⁸¹ Montana et al. 2009b, 104, fig. 1.

⁸² At this regard see particularly Alaimo et al. 1998, 13, 17–22.

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⁸⁶ This evidence has been interpreted as an improvement in the manufacturing technology over time (Alaimo et al. 2005, 711. At latest Iliopoulos et al. 2009, 159–60, figs. 2A–b.

⁸⁷ See also Alaimo et al. 2005, 708; Iliopoulos et al. 2009, 159.

⁸⁸ See also Alaimo et al. 2005, 708–9; Iliopoulos et al. 2009, 159.

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⁹⁰ Greco 2005, 670–2; Spatafora 2009, 220–1, fig. 2; 224–5. At latest Montana et al. 2009b, 90.

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⁹⁴ Alaimo et al. 2005, 708.

⁹⁵ Montana et al. 2009b, 104, fig. 1.

4. Palermo

Like Lilybaeum/Marsala, also the ancient settlement of Panormos suffers from the continuity of occupation of the site up to the modern period, which has caused the continued demolition and destruction of archaeological stratigraphies and generally renders difficult any kind of archaeological intervention.⁹⁶ In fact, until now, we have no information about the location of the pottery quarter of Punic and Roman Palermo,⁹⁷ even though a local ceramic production must have existed since the Punic occupation period of the town.⁹⁸

Exactly for this reason the publication of four samples of presumably local fabric within the present database of FACEM is extremely helpful and gives a first impression of the physical aspect of the Palermitanian ceramic production.⁹⁹

4.A TYPOLOGICAL REPERTOIRE OF THE LOCAL AMPHORAE SERIES

Up to date, there are no papers that deal specifically with the local amphorae repertoire of Punic Palermo, with the exception of G. Falsone's article published on the *Palermo Punica* book, which, however, appears to be of little help for our purpose since apparently the *fabric* of the ca. 15 items considered here has *not* been taken in account.¹⁰⁰

In my opinion, convincing published archaeological evidence for a local production is available only for the Early Hellenistic period. Within an amphorae deposit dating at the earliest around the middle of the third century B.C.E.¹⁰¹ and found in a hypogeic room excavated in Via d'Alessi, in association with five Graeco-Italic amphorae of Vanderersch's MGS V/VI, four Punic vessels have been found: two items of Ramón's T-1.4.2.1/2¹⁰² (a shape generally dated to within the sixth to the fifth centuries B.C.E.),¹⁰³ one of them of supposed local fabric (pl. 6,1),

⁹⁶ Ramón 1995, 122. Tamburello 1998, 79 and recently Belvedere et al. 2006, 549, 567.

⁹⁷ Lauro 2005, 741.

⁹⁸ The only archaeometric analysis of ceramic materials yielded by excavations in Palermo refer, however, to twelve samples of Black Glaze Ware, nine of them of regional fabric (group II), see Belvedere et al. 2006, esp. 554, table 1. For the lack of scientific analysis on local pottery see also Lauro 2005, 741. It appears sufficiently evident, however, that the fabric of the pottery issued by the workshops of Palermo should be quite similar to the one of Solunto, since the raw materials, made of the *Argille di Ficarazzi*, are easily available along a narrow coastal area which extends from the eastern outskirts of modern Palermo to Contrada Olivella just North to the promontory of Sòlanto with the industrial quarter of Solunto, see Belvedere et al. 2006, 567. For the similarity of the fabric of Solunto and early modern tiles for interiors see Alaimo et al. 1998, 24–5, fig. 13: ' (...) è assai interessante notare l'estrema somiglianza nel fabric (composizione mineralogica, struttura e tessitura) esistente tra la produzione soluntina più fine ed evoluta di età classico-ellenistica e le mattonelle per interni (quadrittoni rossi) prodotte industrialmente presso le fornaci site nella periferia orientale di Palermo (Acqua dei Corsari) dal XVII secolo con la medesima argilla pleistocenica'.

⁹⁹ Cf. the paper "The Fabrics of Panormos" by V. Gassner in **FACEM** (version, 06.06.2011).

¹⁰⁰ Falsone 1998. Falsone identifies four main types 1–3, 6 of transport amphorae of supposed local origin: type 1 dating to the late seventh/sixth centuries B.C.E. (type 1a, *Palermo Punica*, 178, 314, cat. 15, possibly to be attributed to Ramón's T-1.1.2.1 and type 1b, *Palermo Punica*, 314, 317, 319, R 10); type 2 dating to the sixth century B.C.E. (*Palermo Punica*, 314, 317, 319, R 11, possibly to be attributed to Ramón's T-2.1.1.1/2); type 3 (type 3a, *Palermo Punica*, 314–15, 317, 320, R 16, to be attributed to Ramón's T-4.2.2.6, dating to the fourth century B.C.E.; type 3b, *Palermo Punica*, 315, 317, 320, R 15, to be attributed to Ramón's T-1.4.5.1 and type 3c, *Palermo Punica*, 315, 317, 319, R 14, to be attributed to Ramón's T-1.4.5.1, both possibly dating to the second half of the fifth century B.C.E.) and type 6 (*Palermo Punica*, 232–33, VG 180–181, 315, to be attributed to Ramón's T-7.1.2.1, dating to the late fourth to the first half of the third centuries B.C.E.).

¹⁰¹ Dating on the basis of five presumably Campanian Graeco-Italic amphorae of Vanderersch's MGS V/VI, one of them bearing the stamp L.VALER, see Lauro 2005, 743, 749, fig. 2. For an in-depth discussion of the probable dating of the Via d'Alessi deposit see Bechtold (forthcoming), cat. 152, note 85.

¹⁰² This type is also attested among the excavation material yielded by a sondage made in the interior of Palazzo Arcivescovile, see Spatafora 2003, 1179, pl. CLXXXVII,2.

¹⁰³ Ramón 1995, 173–5.

¹⁰⁴ in addition to respectively one item of Ramón's T-7.1.2.1 (pl. 6,2)¹⁰⁵ and T-6.1.2.1 (pl. 6,3)¹⁰⁶ of possibly local origin. In fact, at Palermo Ramón's T-7.1.2.1 (Falsone's type 6) and perhaps also the related type Ramón T-6.1.2.1 seem rather frequent to within late fourth and first half of the third centuries B.C.E. settlement deposits¹⁰⁷ and also in the necropolis.¹⁰⁸

5. The Identification of Punic Sicilian Amphorae on Selected West Sicilian Sites and Outside Sicily

So far, the intra- and extra-regional occurrence and distribution of Punic Sicilian transport amphorae has been studied only very occasionally, most probably due to the effectual difficulty of identification of the specific local series of the major production centers.

The presence of Punic amphorae of West Sicilian fabric has been noted **at Carthage** where vessels of Ramón's T-2.1.1.1/3.1.1.2 (pl. 1,1-2), that is to say of Docter's Karthago 1 A2/3,¹⁰⁹ originating presumably from Mothia, occur already in the first quarter of the seventh century B.C.E. deposits (stratum III).¹¹⁰ At Carthage, the quantitative occurrence of amphorae from Mothia rises slightly from 0.9% in period 1 (c. 760–675 B.C.E.) to 1.6% in period 2 (c. 675–550 B.C.E.).¹¹¹ West Sicilian Punic vessels are apparently rather sporadically documented also during the Middle Punic period (480–300 B.C.E.),¹¹² when items probably from Mothia (fabric 48), but more frequently from the north-western production sites of Palermo and/or Solunto (fabrics 16–17) are attested to within the stratigraphies of the Bir Messaouda excavations.¹¹³ Finally, the evidence for the arrival of Punic Sicilian amphorae of the Late Punic period (300–146 B.C.E.)¹¹⁴ is almost completely negative.¹¹⁵

Fully in line with the Carthaginian data is the occurrence of Punic Sicilian amphorae **at Pantelleria**. Here, the evaluation of the amphora material from both the survey undertaken by M. Almonte¹¹⁶ and the excavations on the acropolis of S. Teresa by the Universities of Tübingen and Matera¹¹⁷ has shown that the earliest evidence for the circulation of Punic Sicilian transport vessels presumably from Mothia (impasto 51) dates to within the late eighth to the seventh centuries B.C.E.¹¹⁸ On average, the proportional occurrence of the hypothetical Mothian series at Pantelleria can be indicated, for the moment, with 4.8% for phase II (675–525 B.C.E.), 3.2% for phase III (525–425 B.C.E.) and 2.4% for phase IV (425–300 B.C.E.).¹¹⁹ Towards the late phase IV and during phase Va (300–250/240 B.C.E.) amphorae from north-west

¹⁰⁴ Lauro 2005, 740, 743, 750, fig. 3b. The clay is described as 'arancio al nucleo, camoscio in superficie, dura, ricca di minutissima calcite, priva di rivestimento'. The same fabric has been identified also among numerous presumably local plain wares vessels found in the same context.

¹⁰⁵ Lauro 2005, 741, 743, 751, fig. 4d.

¹⁰⁶ Lauro 2005, 741, 743, 751, fig. 4c.

¹⁰⁷ Spatafora 2003, 1179, pl. CLXXXVII,2, from the rescue excavation inside Palazzo Arcivescovile; Di Stefano 1993, 266–7, figg. 19–20, from rescue excavations beneath Palazzo Mirto.

¹⁰⁸ Di Stefano 2000, 444, two items of Ramón's T-7.1.2.1 from tomb 50 and in the function of urn. *Palermo Punica*, 232–33, VG 180–1, 211, 224, from the 'Tomba della regina'.

¹⁰⁹ Docter 1997a, 177–9.

¹¹⁰ Docter 1997a, 218, fig. 442; Docter 2007a, 651–52, fig. 356, cat. 5454–5. In total, 16 fragments have been attributed to the fabric of Mothia.

¹¹¹ Docter 2007a, 618, figs. 335–6.

¹¹² See Bechtold 2010, 4–6.

¹¹³ Bechtold 2008b, 28, table 1.C. The probable identification of the fabrics 16–17 with the local series of Palermo or Solunto was possible only after the editing of Carthage Studies 2.

¹¹⁴ Bechtold 2010, 4–6.

¹¹⁵ Bechtold 2010, 45, note 75. To my opinion, just one item of Ramón's T-7.1.2.1 (compare to pl. 6,2) has a good chance to be of north-west Sicilian origin.

¹¹⁶ To be published on Vol. 2 of the Cossyra series. For a preliminary report see Almonte (forthcoming).

¹¹⁷ For full references for these excavations started in 2000 see Schäfer (forthcoming).

¹¹⁸ Bechtold (forthcoming), cat. 62 of Ramón's T-3.1.1.2/Toti's T1 from, the survey, compare to pl. 1,1.

¹¹⁹ Bechtold (forthcoming), § 13.A.5, types Ramón T-2.1.1.2, Toti T6 and Toti T18, cat. 63–67, compare to pls. 1,2 and 2,7.

Sicily, that is to say from Solunto, or, more likely from Palermo (impasto 50),¹²⁰ are documented with 4.5%.¹²¹

Even if focused on only two discovery sites, the data from Carthage and Cossyra suggest quite clearly that amphorae from Mothia should have circulated with a certain frequency in the southern part of the Central Mediterranean area in the course of the seventh to the sixth centuries B.C.E., but also during the fifth century B.C.E. Its quantitative occurrence decreases steadily in the later Middle Punic period, when one or more new fabrics from north-west Sicily (Solunto and/or Palermo) appear which reach its peak of distribution apparently in the decades preceding the First Punic War.

This last observation is confirmed by the amphora data yielded by several recent settlement excavations in western Sicily: at **Segesta** (Porta di Valle) c. 90% (N. 82) of the Punic amphorae types dating to the second half of the fourth to the first half of the third centuries B.C.E. refer to the north-west Sicilian series Ramón T-4.2.2.6 (pl. 5,1), Ramón-Greco 4.2.2.7 (pl. 5,2) and Ramón 7.1.2.1/6.1.2.1 (pl. 5,3).¹²²

According to the preliminary data emerging by the analysis of the Early Hellenistic levels yielded by the recent excavations on the acropolis of **Selinunte** in the area of temple B,¹²³ north-west Sicilian amphorae of Ramón's T-7.1.2.1 (pl. 5,3) represent the most common Punic amphora shape among the studied deposits.

At Mothia (zone A),¹²⁴ amphorae of Toti's T13/Ramón's T-4.2.2.6 (pl. 5,1) and Toti's T20/Ramón's T-2.2.1.2/7.1.2.1 (pl. 5,3), both of probable Soluntian fabric, represent during the fourth century B.C.E. the most common transport vessel of non-local fabric.

Finally, for the sixth to the fifth centuries B.C.E. **Himera**, recent archaeometric analysis undertaken by G. Montana and his team have shown the circulation of both amphorae from nearby Solunto, which represent 70% of the intra-regional Punic transport vessels, and from Mothia (30%).¹²⁵ The presence of north-west Sicilian Punic amphorae, in part certainly of Palermitanian fabric,¹²⁶ of Ramón-Greco's T-4.2.2.7 (pl. 5,2) and Ramón's T-7.1.2.1 (pl. 5,3) **at Velia** in deposits of phase C 3 (330–300 B.C.E.)¹²⁷ extends the distribution area of this class towards the North Lucanian area.¹²⁸

6. Concluding Remarks

In conclusion, the published data referring to the diachronic distribution of Punic amphorae produced in Sicily within the Central Mediterranean area and in West Sicily itself suggest the existence of at least three main production centers: Mothia, Palermo and Solunto. On an international scale, the amphorae series issued by these sites seem to have circulated rather subsequently than contemporaneously, since the hypothetical exports from Mothia characterize basically the seventh to the fifth centuries B.C.E. settlement deposits of Carthage and

¹²⁰ On the basis of a direct comparison of samples of 'impasto 50' of Pantelleria with the samples attributed to the local fabric of Palermo and published within the present data base by F. Spatafora.

¹²¹ Bechtold (forthcoming), § 13.A.5, types Ramón-Greco T-4.2.2.7, Ramón T-6.1.2.1/7.1.2.1 and T-6.1.1.3, cat. 58–59, 61, 68, compare to pls. 5,2–3 and 6,3.

¹²² Bechtold 2008a, esp. 50, fig. 1.

¹²³ Excavations of the IFA of the New York University, started in 2006 and directed by C. Marconi to whom I am very grateful for the permission to study the Early Hellenistic excavation materials.

¹²⁴ Toti 2002a, 276, figs. 193–4. Both types of presumably Soluntian fabric are also documented in zone E, see Famà and Toti 2000, 460–1, 469, pl. XCII,3–4.

¹²⁵ Montana et al. 2006, 150, table 1, 'impasti III–IV'.

¹²⁶ **FACEM** sample M 10/53, former fabric AH 19 comparable to **FACEM** fabric PAN-REG-A-3; **FACEM** sample M-10/61, former fabric AP 6, comparable to **FACEM** fabric PAN-A-1 of Ramón's T-6.1.1.3

¹²⁷ Gassner and Trapichler 2010, 164, fig. 109.

¹²⁸ The extra-regional distribution of exactly this shape has already underlined in an earlier paper (Bechtold 2008a, 560, notes 175–82 for Sicily, and notes 183–5 for Italy and North Africa). For Euesperides see now Göransson 2007, 182, 185, n. 389.

Pantelleria, while the presumably North Sicilian vessels are attributed to the second half of the fourth and the first half of the third centuries B.C.E.

Finally, it is remarkable that the typological repertoire of the different Punic Sicilian amphorae series identified at Carthage, Pantelleria, Mozia, Himera, Selinunte, Segesta and Velia fits perfectly within the obviously wider morphological spectrum proposed for each of these productions centers (see §§ 1, 3–4).

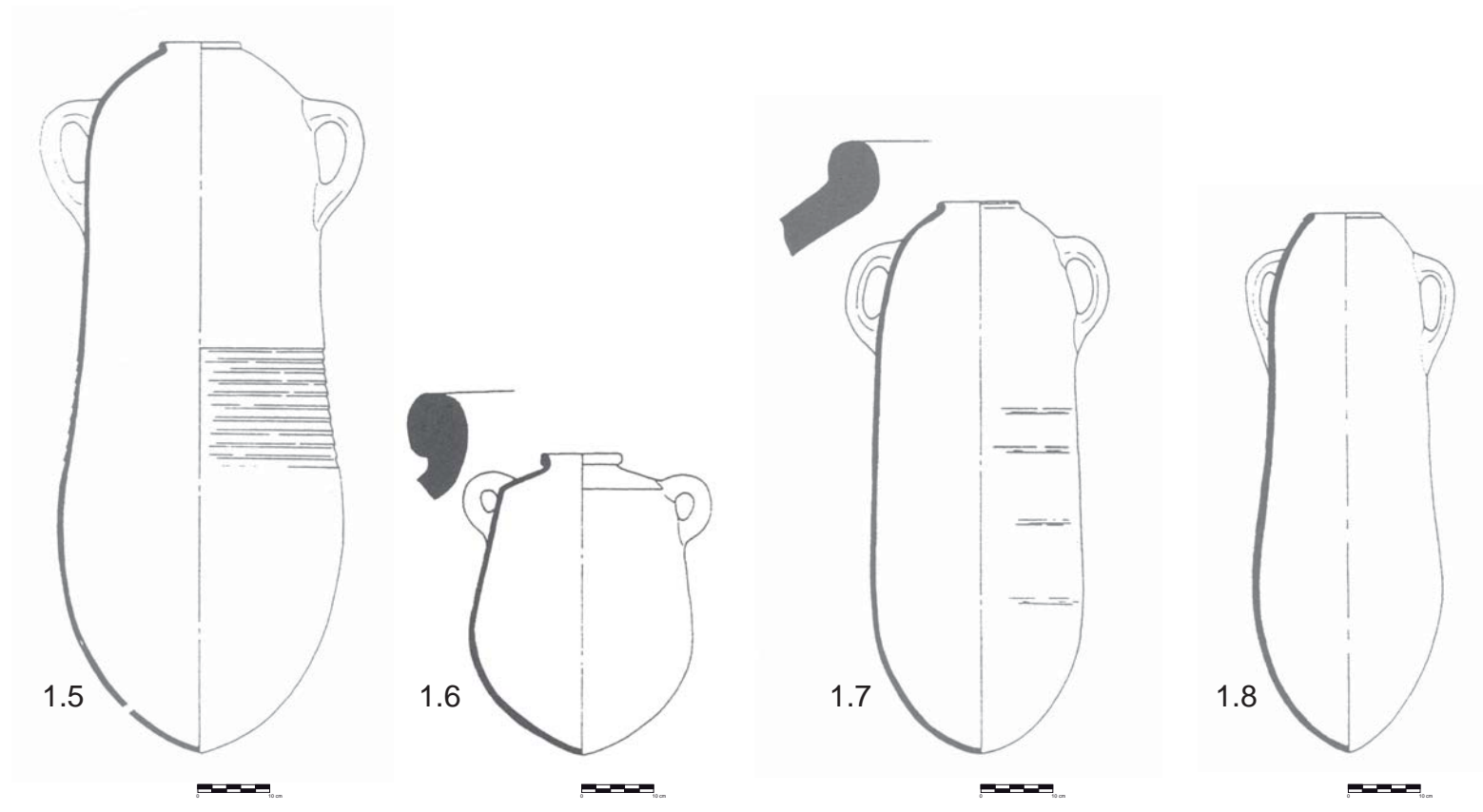
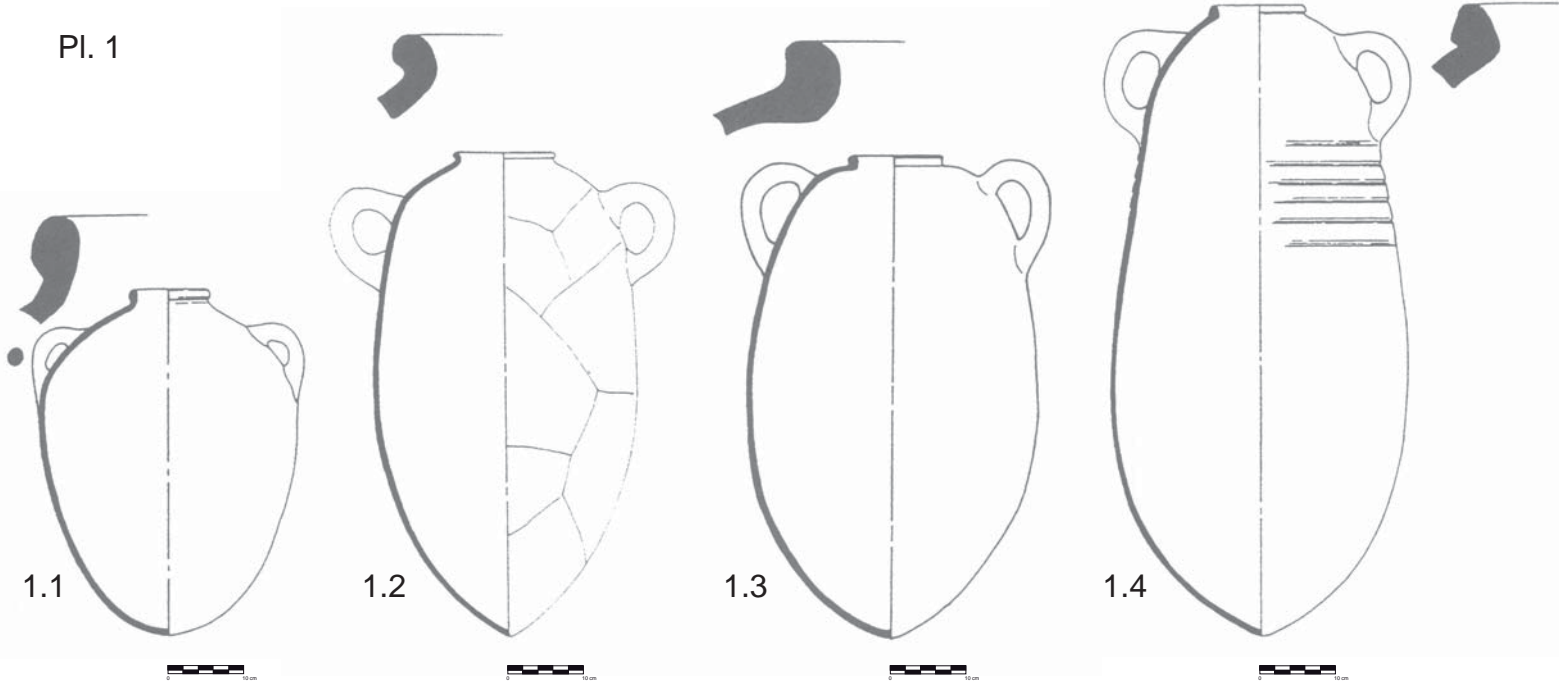
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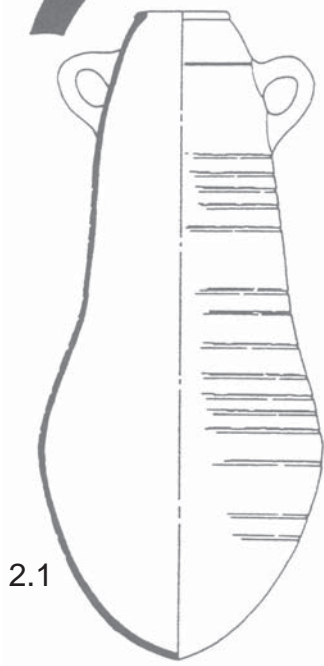
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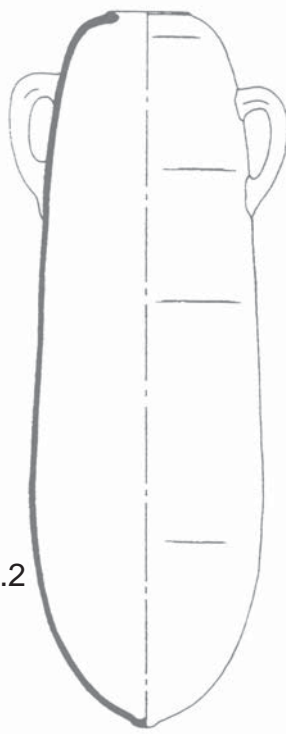
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- 1.3 Ramón T-2.1.1.2/Toti T3 (from Ramón 1995, 516, fig. 153,78 = Toti 2002a, 280, pl. 2)
- 1.4 Ramón T-1.3.2.1/Toti T4 (from Ramón 1995, 508, fig. 145,24 = Toti 2002a, 280, pl. 2)
- 1.5 Ramón T-1.4.2.1/Toti T7 (from Ramón 1995, 512, fig. 149,55 = Toti 2002a, 282, pl. 5)
- 1.6 Ramón T-13.2.1.2 (from Ramón 1995, 577, fig. 214,526)
- 1.7 Ramón T-1.4.3.1/Toti T8 (from Ramón 1995, 513, fig. 150,59 = Toti 2002a, 283, pl. 6)
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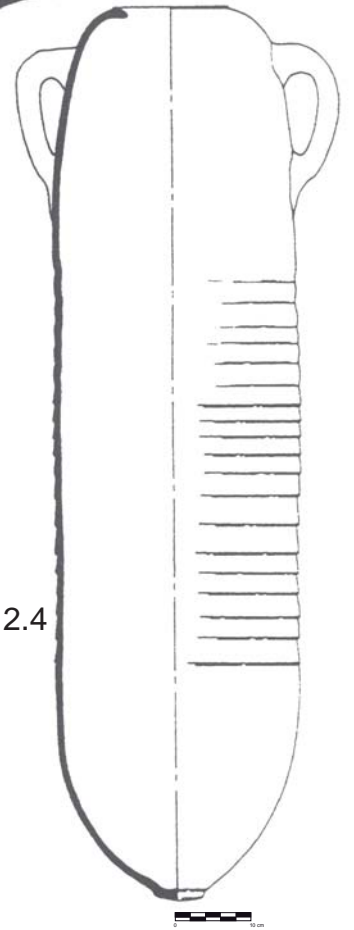
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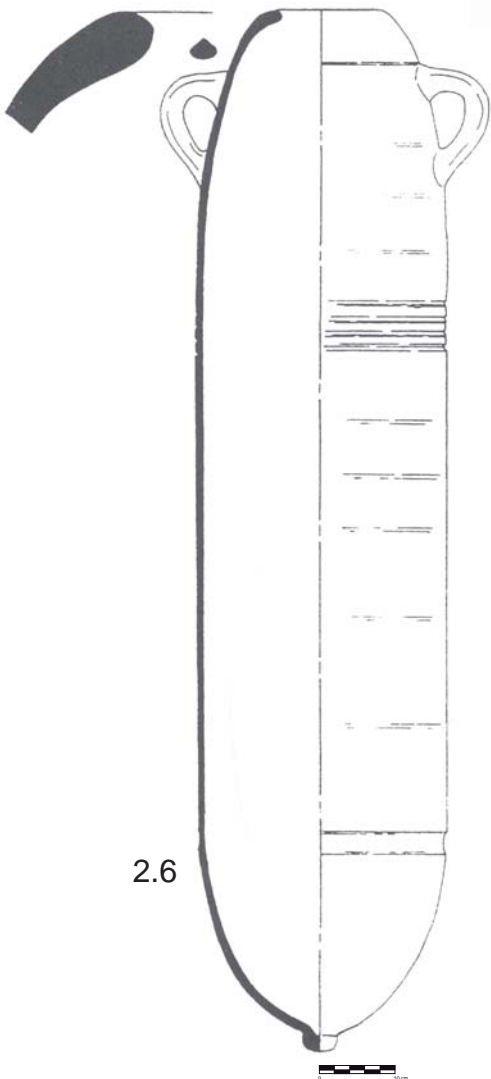
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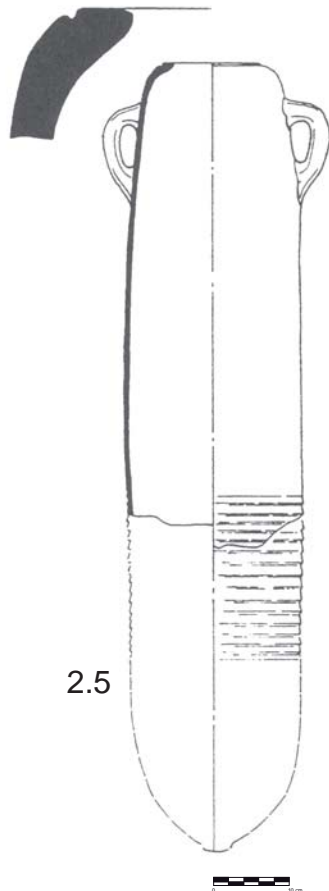
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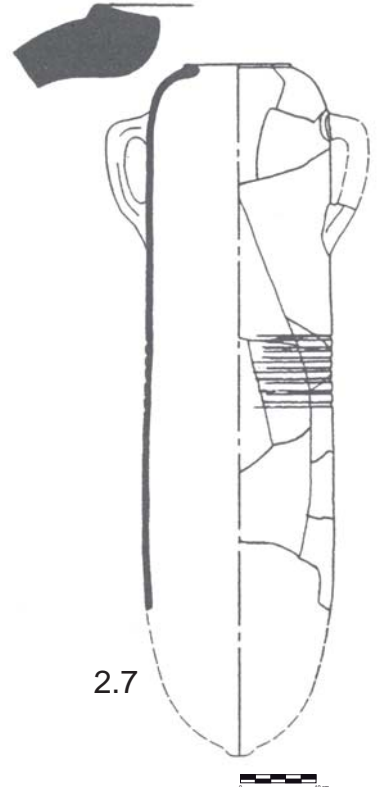
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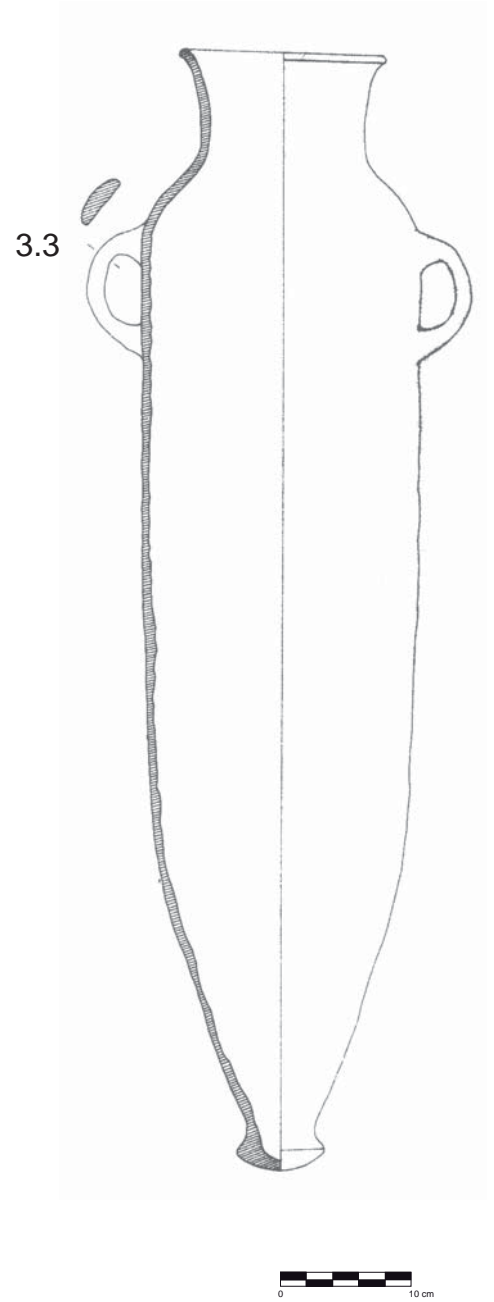
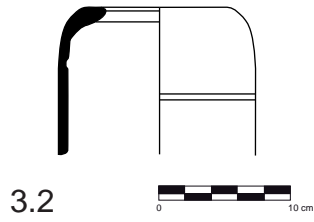
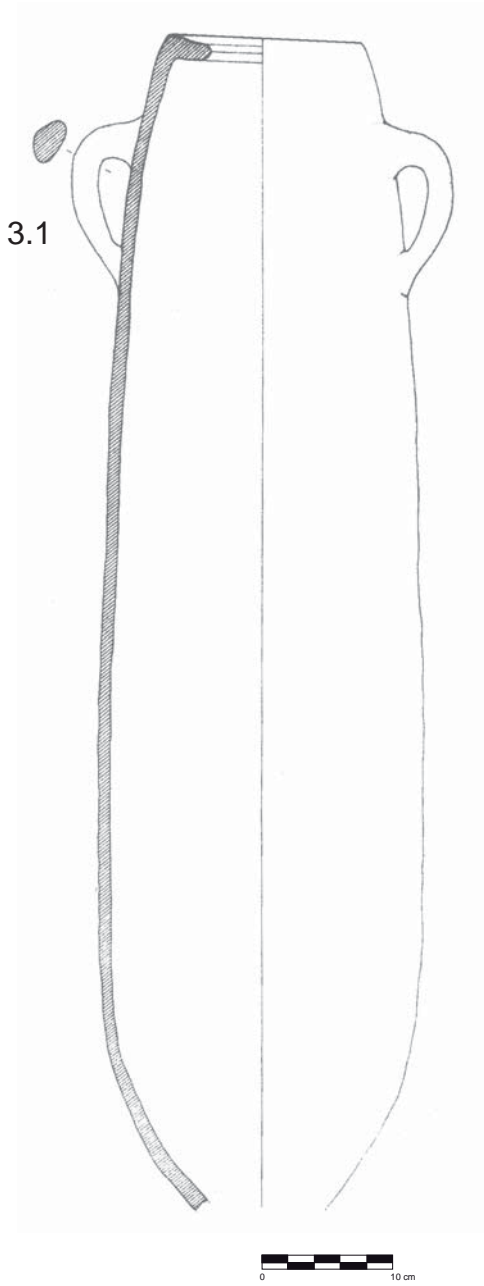


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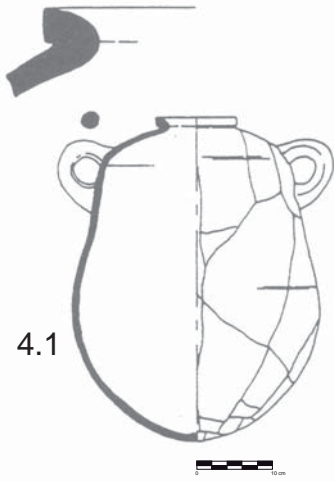
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- 2.3 Ramón T-4.2.1.1/Toti T15 (from Ramón 1995, 522, fig. 159,135 = Toti 2002a, 289, pl. 14)
- 2.4 Ramón T-4.2.1.7/Toti T16 (from Ramón 1995, 524, fig. 161,150 = Toti 2002a, 289, pl. 14)
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- 2.6 Ramón T-4.2.1.2/Toti T19 (from Ramón 1995, 523, fig. 160,141 = Toti 2002a, 295, pl. 20)
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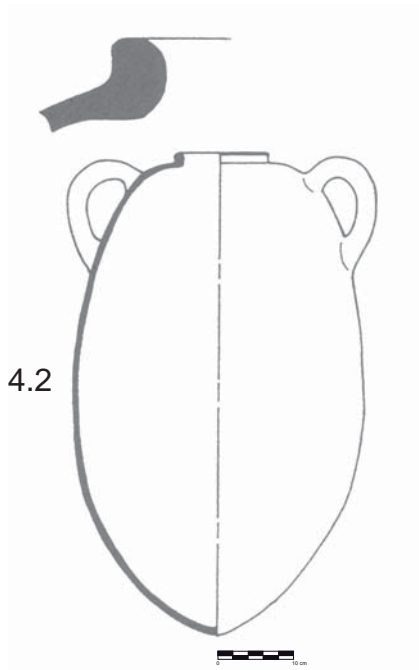
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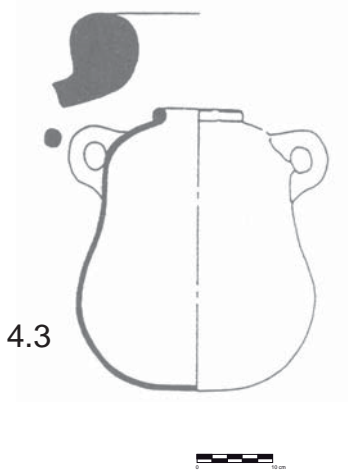
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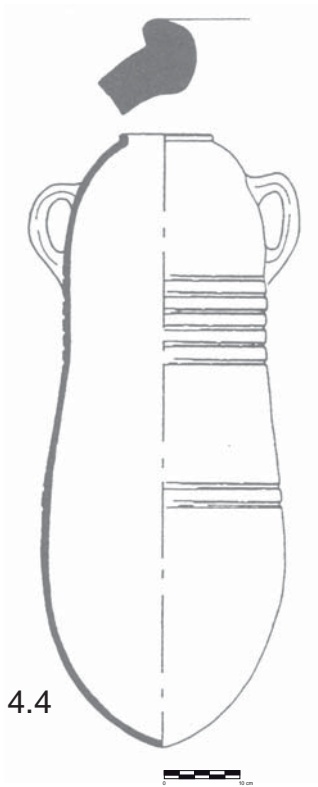
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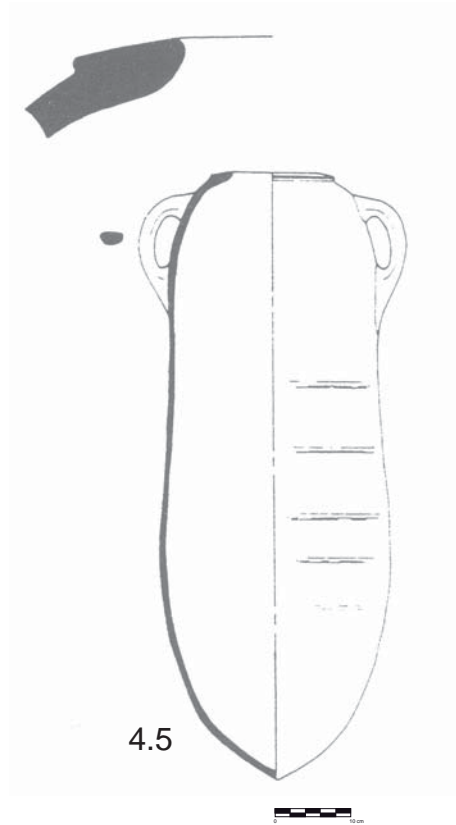
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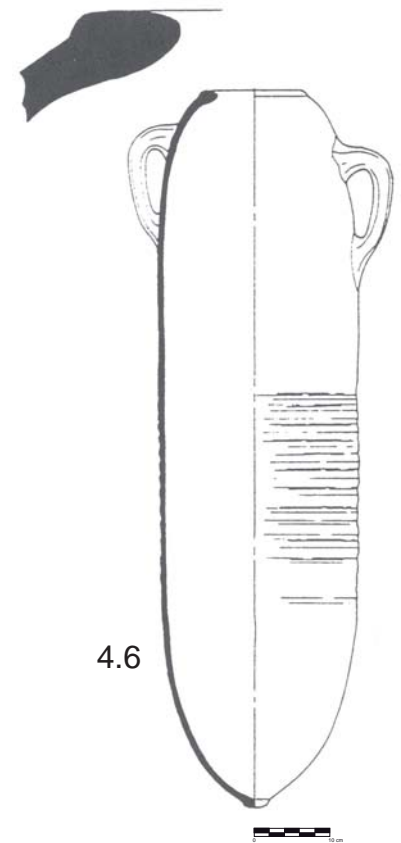
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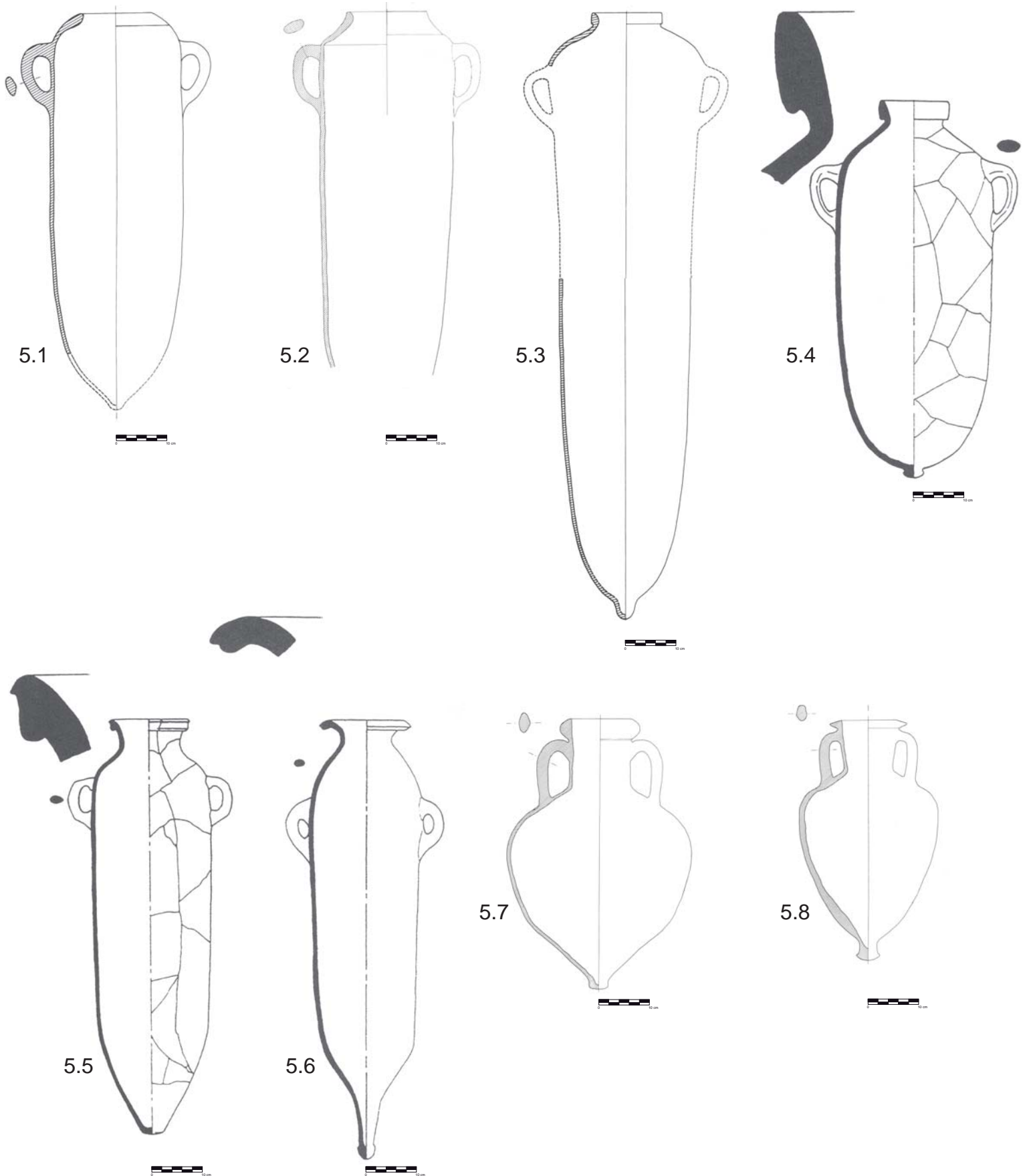


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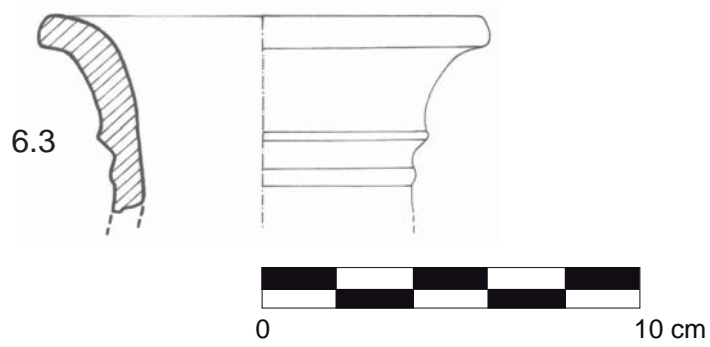
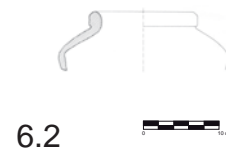
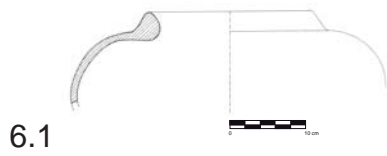


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- 4.1 Ramón T-1.1.2.1 (from Ramón 1995, 505, fig. 142,2)
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- 4.3 Ramón T-1.1.2.2 (from Ramón 1995, 505, fig. 142,3)
- 4.4 Ramón T-1.4.2.1 (from Ramón 1995, 512, fig. 149,56)
- 4.5 Ramón T-1.4.5.1 (from Ramón 1995, 514, fig. 151,67)
- 4.6 Ramón T-4.2.1.4 (from Ramón 1995, 523, fig. 160,143)



- 5.1 Ramón T-4.2.2.6 (from Greco 1997, 58, fig. 1,9)
- 5.2 Ramón-Greco T-4.2.2.7 (from Corretti, Capelli 2003, pl. LX,77)
- 5.3 Ramón T-7.1.2.1 (from Greco 1997, 58, fig. 1,22)
- 5.4 Ramón T-7.1.1.2 (from Ramón 1995, 534, fig. 171,204)
- 5.5 Ramón T-7.2.1.1 (from Ramón 1995, 535, fig. 172,213)
- 5.6 Ramón T- T-7.5.2.1 (from Ramón 1995, 544, fig. 181,285)
- 5.7 'greco-occidentale 1' (from Polizzi 1997, 99, fig. 5,7)
- 5.8 Vanderersch MGS V (from Polizzi 1997, 99, fig. 5,19)



6.1 Ramón T-1.4.2.1/2 (from Lauro 2005, 750, fig. 3b)

6.2 Ramón T-7.1.2.1 (from Di Stefano 1993, 267, fig. 20)

6.3 Ramón T-6.1.2.1 (from Lauro 2005, 751, fig. 4c)