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Amphorae Fabrics of Solus: Evidences for Local Production and Export*

Introduction

As with the amphorae production of Motya, so have Solus' ceramic fabrics already been the subject of previous, in-depth studies.¹ The archaeometric aspects of the amphorae² and plain ware³ production have been analysed in detail by R. Alaimo, G. Montana and team (Palermo). The morphological repertoires of the local amphorae issue have been outlined by C. Greco (Punic series)⁴ and C. Polizzi (Greek series),⁵ while A. Termini (Phoenician-Punic series)⁶ and V. Tardo (Greek series)⁷ have discussed various plain wares types.

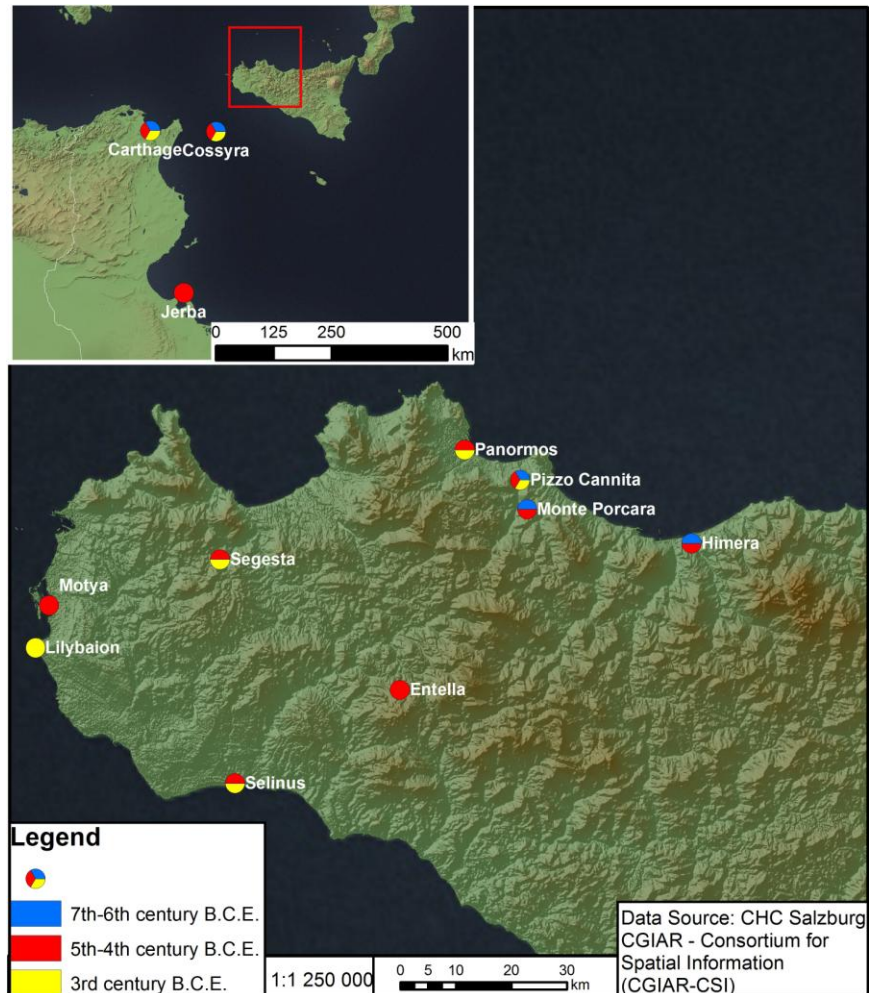


Fig. 1. The sampling sites yielding amphorae from Solus.

* Special thanks are due to S. Gallagher, University of Warwick, for his critical input during the correction phase of the English manuscript. Furthermore, I thank R. Lampl, University of Vienna, for the photographic documentation of the samples, the realisation of Figs. 1-2, the digitalisation of all amphorae drawings and the composition of Figs. 3-8.

¹ For the most recent overview of this topic, see Bechtold 2012, 6-8 with full references.

² Alaimo et al. 2005; previously, see Alaimo et al. 2003; Alaimo et al. 1998a; Alaimo et al. 1998b.

³ Montana et al. 2009a; Montana et al. 2009b.

⁴ Greco 2005; previously, see Greco 2000; Greco 1997.

⁵ Polizzi 1997; Tardo 2005, 687.

⁶ Termini 2005.

⁷ Tardo 2005, 685.

Based on these well-defined evidences for local ceramic workshops, the present research focuses on the identification of amphorae from Solus which have been documented outside the production site.⁸ About 140 samples from Carthage,⁹ Jerba (Ghizène),¹⁰ Cossyra (Pantelleria),¹¹ Selinus,¹² Segesta,¹³ Entella,¹⁴ Motya,¹⁵ Lilybaion,¹⁶ Panormos,¹⁷ Monte Porcara,¹⁸ Pizzo Cannita¹⁹

⁸ Presently, archaeometric analyses have proved the documentation of amphorae from Solus at Motya (Iliopoulos et al. 2002), Entella (Montana et al. 2015; Quartararo 2012) and Himera (Montana et al. 2006).

⁹ I am indebted to B. Maraoui Telmini (University of Tunis) for allowing me to include in the present research one sample yielded by the Belgium-Tunisian excavations at the Bir Messaouda site at Carthage, already published in Maraoui Telmini 2012, 125, cat. 131, fig. 124 (M 92/94).

¹⁰ I am indebted to S. Ben Tahar (Institut National du Patrimoine, Jerba) for allowing me to include within the present research two samples of Greek amphora (M 149/60.66, see Bechtold (forthcoming b), cat. 38-39). The samples from Jerba have been assigned the FACEM site identification number 'M 149/'.

¹¹ I thank M. Almonte (Direzione Generale delle Antichità a Roma), responsible for the Cossyra survey, Th. Schäfer (Universität Tübingen) and M. Osanna (then Scuola di Specializzazione di Matera), co-directors of the excavations on the acropolis of S. Teresa (2000-2011 campaigns), for the liberty to study selected materials yielded by their research. Furthermore, I owe my thanks to the authorities of the Soprintendenza BB.CC.AA. di Trapani for granting sampling permission. All the amphorae samples from Pantelleria have been assigned the FACEM site identification number 'M 119/'.

¹² Excavations (2006-2012 campaigns) of the New York University, Institute of Fine Arts, under the direction of C. Marconi, to whom I am very indebted for permission to study the Hellenistic finds, see Bechtold (forthcoming a). Furthermore, I thank S. Helas (Universität Bonn), D. Mertens and H. v. Hesberg (then DAI Rome) for the permission to consider for the presented study a Punic amphora from the German excavations on the acropolis (M 154/96, published in Helas 2011, 342, pl. 46,12). I am also indebted to C. Greco, then director of the Parco Archeologico di Selinus e Cave di Cusa 'Vincenzo Tusa', for generous sampling permission. The amphorae samples from Selinus have been assigned the FACEM site identification number 'M 154/'.

¹³ I am indebted to M. de Cesare (Università degli Studi di Palermo) and M. Quartararo (Pisa) for their generous permission to consider for the present research two samples referring to Punic amphorae from the Grotta Vanella dump. The whole assemblage of Grotta Vanella is currently being prepared for publication by M. de Cesare. For an overview of the Punic amphorae from Grotta Vanella, see Quartararo 2015b. More samples refer to published and unpublished Punic amphorae yielded by the excavations of the Soprintendenza BB.CC.AA. di Trapani at the Northern Gate and collected in the Segesta survey undertaken by the University of Siena (for both see previously Bechtold 2008). The samples from Segesta have been assigned the FACEM identification number 'M 165/'.

¹⁴ I thank M. Quartararo (Pisa) and A. Corretti (Scuola Normale Superiore di Pisa) for allowing me the possibility to consider, within the framework of the present research, samples of six amphorae from the excavations of the Scuola Normale Superiore di Pisa at Entella and already characterised by archaeometric analysis (Montana et al. 2015; Quartararo 2012). For an overview of the assemblage of the Punic amphorae from Entella, see Quartararo 2015a. The samples from Entella have been assigned the FACEM identification number 'M 187/'.

¹⁵ I am indebted to G. Montana (Università degli Studi di Palermo) for the possibility to include three already published samples from Motya (Iliopoulos et al. 2002, 358) within the framework of the present research, which served as initial reference points, already characterised by archaeometric analyses. These samples from Motya have been assigned the FACEM identification number 'M 185/'.

¹⁶ I am indebted to M.L. Famà, director of the 'Museo archeologico regionale Lilibeo Marsala – Baglio Anselmi' for the authorisation to sample one amphora found in the Punic necropolis and already published in Bechtold 1999. It has been assigned the FACEM site identification number 'M 169/'.

¹⁷ I am extremely grateful to S. Vassallo, C. Aleo Nero and M. Chiovaro (all Soprintendenza BB.CC.AA. di Palermo) for allowing me to include within the present research about 20 samples taken from amphorae yielded by recent excavations (2011-2012) in the following areas: Pz. Bologni, Crs. Calatafimi (civ. 133-137, Pal. Orlando and Pz. Indipendenza, Pal. d'Orléans). For preliminary reports on the excavations, see Aleo Nero (forthcoming) and Aleo Nero and Chiovaro (forthcoming). I thank T. Arena (Castellammare del Golfo) for her essential help in selecting, sampling and drawing the materials. The samples from Panormos have been assigned the FACEM site identification number 'M 106/'.

and Himera²⁰ have been studied using binocular microscopy and digital photos of freshly broken surfaces (at x8, x16, and x25 magnification). Furthermore, about 35 items selected out of this assemblage have undergone archaeometric analysis.²¹ As a result, in ch. 4, we have traced a preliminary distribution pattern for this class through the central-southern Mediterranean from the late 7th to the 3rd century B.C.E. For the sake of clarity, in the following discussion we will briefly report the basic results of previous archaeometric (ch. 1) and archaeological (ch. 2-3) research on amphora production at Solus.

1. Archaeometric research and provenance of raw materials

The archaeometric feature of the amphorae fabrics of Solus has already been described in detail in 2003:²² '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

¹⁸ I thank S. Muratore (Palermo) for the possibility to sample and study eleven Punic amphorae found within the framework of his survey undertaken at Monte Porcara, object of his 'tesi di laurea' (Università degli Studi di Palermo, 2008-2009). The whole assemblage is discussed in Muratore 2015. The samples from Monte Porcara have been assigned the FACEM identification number 'M 193'.

¹⁹ I am indebted to T. Arena (Castellammare del Golfo) for the permission to consider for the present research seven samples of Punic amphorae found in the Pizzo Cannita survey and already published in Arena's 'tesi di laurea' (Università degli Studi di Palermo, 2008-2009). For an overview of this assemblage from Pizzo Cannita, see Arena 2015. The samples from Pizzo Cannita have been assigned the FACEM identification number 'M 189/'. I am also indebted to F. Spatafora, director of the Museo Archeologico "Antonino Salinas", for generous sampling permission.

²⁰ I am very indebted to S. Vassallo (Soprintendenza BB.CC.AA. di Palermo) for the permission to study and sample the whole assemblage of Punic amphorae yielded by the necropolis of Himera which will be published in Bechtold and Vassallo (in preparation). The samples from Himera have been assigned the FACEM identification number 'M 179/'.

²¹ G. Montana and L. Randazzo (both Università degli Studi di Palermo), in preparation. Laboratory methodologies applied in this study include thin-section petrography and chemical analyses (combination of Lithium Metaborate/Tetraborate fusion – ICP and ICP/MS).

²² 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 5th century B.C.E. onwards. The archaeometric research on the production of Solus is based on the interpretation of thin sections of 52 amphorae samples and 30 samples of misfired items and production debris (thin sections, chemical and mineralogical analysis), in addition to soil samples (chemical and mineralogical analysis). See Alaimo et al. 1998, 10–22, fig. 5.

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.'

Specifically, similarly to the production of Motya, two different fabrics²³ have been defined for Solus which differ fundamentally in packing and dimension of the sandy temper: a coarser Archaic fabric (20%–30%)²⁴ and a much finer Classical/Hellenistic fabric (10%–20%).²⁵

Given the substantial similarity in the geological context of the two settlements of Motya and Solus and the consequent absence of distinctive mineralogical markers within the sandy temper used in both series, packing represents an effective criterion for the differentiation of the two pottery productions. In fact, at Motya packing results are generally less than 20%, while in Archaic artefacts from Solus it ranges between 20%–30%. Furthermore, carbonate components are more frequent at Motya.²⁶

The *Argille di Ficarazzi*, the raw material used by Soluntinian potters,²⁷ was probably extracted in several coastal zones close to the peninsula of Sòlanto itself, in proximity to the industrial area,²⁸ while the tempering material may have been collected along the mouth of the Cefalà stream.²⁹

2. Industrial areas

C. Greco's excavations undertaken in the mid 90's have provided good evidences for the existence of a pottery quarter situated on the peninsula of Sòlanto, in immediate proximity of the Archaic

²³ This evidence has been interpreted as an improvement in manufacturing technology over time (Alaimo et al. 2005, 711. Lastly, see Iliopoulos et al. 2009, 159–160, figs. 2A–b).

²⁴ See also Alaimo et al. 2005, 708; Iliopoulos et al. 2009, 159.

²⁵ See also Alaimo et al. 2005, 708–9; Iliopoulos et al. 2009, 159.

²⁶ Alaimo et al. 2005, 711.

²⁷ Alaimo et al. 1998b, 13–4. For the mineralogical and petrographic aspects of the raw materials see Alaimo et al. 2005, 707–8; Montana et al. 2009b, 123–4; Montana et al. 2009a, 102–4, fig. 1.

²⁸ Alaimo et al. 2005, 708.

²⁹ Montana et al. 2009a, 104, fig. 1.

settlement and the earliest necropolis.³⁰ To date, four kilns F 1–4 dating from the Archaic to the Late Punic period³¹ have been partly discovered. Moreover, fragments of misfired amphorae of the late 7th and 6th centuries B.C.E. clearly suggest that ceramic production had already started in the Archaic period. As a consequence, the industrial belt of Solus shows a remarkable continuity from the earliest occupation period of the site until the Hellenistic phase when the settlement itself was 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'.³²

3. Amphorae fabrics and morphological repertoire: evidences from Solus itself

According to C. Greco, Solus' amphorae production began towards the later 7th century B.C.E. with Ramon's small sized, bag-shaped type T-1.1.2.1/2 (fig. 3,1-2) and the ovoid T-2.1.1.2 (fig. 3,3).³³ The 6th century B.C.E. production is already characterised by cylindrical shaped amphorae of Ramon's T-1.4.2.1 (fig. 3,4),³⁴ while the 5th century B.C.E. series are almost exclusively represented by Ramon's T-1.4.5.1 (fig. 3,5) with an in-sloping rim, flatted on top.³⁵ To a minor degree, towards the late 5th and the first half of the 4th centuries B.C.E., we also find Ramon's T-4.2.1.4 (fig. 3,6)³⁶ and

³⁰ Greco 2005, 670–2; Spatafora 2009, 220–1, fig. 2, 224–5. Most recently, see Montana et al. 2009a, 90.

³¹ Greco 2000, 682–3, pl. CXII,1, the omega-shaped kiln F 2 was active during the late 5th century B.C.E. and has been destroyed towards at the beginning of the 4th 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 late 3rd century B.C.E., see Greco 2000, 688; Alaimo et al. 1998, 8–10, fig. 9.

³² Greco 2000, 688.

³³ Spanò Giammellaro 2000, 308; Greco 2005, 673; Alaimo et al. 2003, 3; Iliopoulos et al. 2009, 158, fig. 1, 159, table 1.

³⁴ Spanò Giammellaro 2000, 308; Alaimo et al. 2003, 3-4; 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 one 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.

³⁵ For the most recent and detailed discussion of this type, see Bechtold and Vassallo (in preparation), previously, see Greco 1997, 60–3; Alaimo et al. 2003, 4. For the presence of items of this shape at Himera to be attributed to the production of Solus or Palermo, see Montana et al. 2006, 150–1, table 1; Vassallo 2005b, 832.

³⁶ Alaimo et al. 2003, 4.

T-2.2.1.2 (for the type see fig. 6,6).³⁷ The highly emblematic type Ramon T-1.4.5.1, which characterises the north-western Sicilian amphorae repertoire of the earlier Middle Punic period,³⁸ evolves, towards the early 4th centuries B.C.E.,³⁹ into Ramon T-4.2.2.6 with elongated, clearly-slanting rims (fig. 4,1).⁴⁰ This latter one develops during the last third of the 4th century B.C.E.⁴¹ in Ramon-Greco's T-4.2.2.7 (fig. 4,2), distinguished by externally concave-shaped rims, pointed at the top.⁴² A still later stage of this north-western Sicilian series is represented by amphorae with triangular-shaped rims: first Ramon's T-7.1.2.1 (fig. 4,3), dating from the very late 4th to the first half of the 3rd centuries B.C.E.,⁴³ and later on Ramon's T-7.1.1.2 (fig. 4,4) and T-7.2.1.1 (fig. 4,5), which both⁴⁴ appear around the mid to second half of the 3rd century B.C.E. A possible hint for a later, second century B.C.E. onwards, production of Punic amphorae at Solus is given by the identification of one item of Ramon's T-7.5.2.1 (fig. 4,6) of supposed local fabric.⁴⁵

Finally, interesting evidences exist for the local production of Punic Solus in several *non*-Punic shapes, such as Polizzi's 'greco-occidentali 1' (fig. 8,1). That is to say, there are examples of late 6th to first half of the 5th centuries B.C.E. western Greek amphorae close to Gassner's rim type 3,⁴⁶ as well as of Vandermersch. MGS III⁴⁷ and V (fig. 8,9) during the late 4th to the first half of the 3rd century B.C.E.⁴⁸

³⁷ According to the archaeometric data referring to an amphorae found at Motya, see Toti 2002, 297, pl. 22,5 (of Toti's type 20), fabric I from Solus.

³⁸ Docter and Bechtold 2011, 107.

³⁹ Important in this regard is the absence of the shape in the necropolis of Himera, destroyed in 409, and in the destruction layers of 397/96 excavated at Motya.

⁴⁰ Alaimo et al. 2003, 4; Greco 1997, 60–3.

⁴¹ Lastly, see Docter and Bechtold 2011, 107.

⁴² Greco 1997, 60–3. For the first definition of shape Ramon T-4.2.2.7, see Corretti and Capelli 2003, 307.

⁴³ Greco 1997, 64. For a recent discussion of this particular north-Sicilian amphorae family, see Bechtold 2008b, 548, 556–8. For the presence of this type of probable Soluntinian fabric at Motya, see Toti 2002, 296 (type 20).

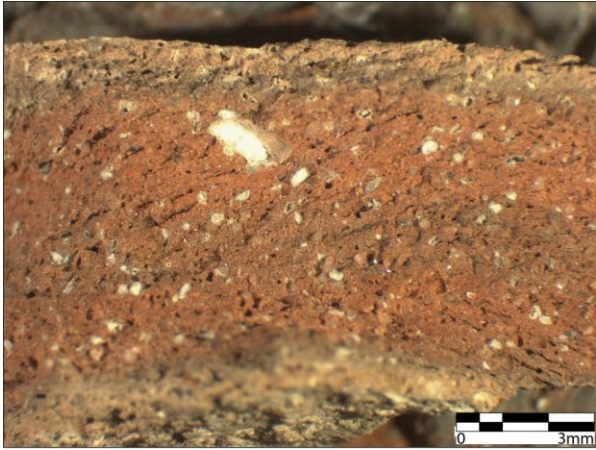
⁴⁴ Alaimo et al. 2003, 3–4; Greco 1997, 65.

⁴⁵ Greco 1997, 66; Alaimo et al. 2003, 4.

⁴⁶ Tardo 2005, 687. For the type, see Gassner 2003, here esp. 181–3, fig. 91. The phenomenon of the imitation of Greek shapes at Solus has recently been discussed by Montana et al. 2009a, 91 '(...) archaeological research (...) suggests that between the 6th and the 5th centuries B.C., a specific ceramic production had occurred at Solunto that was inspired, in terms of style and form, by the coeval manufactures of the Greek colonies in Sicily, yet revised through a Phoenician-Punic perspective.'

⁴⁷ Corretti and Capelli 2003, 297, note 53 with earlier references.

⁴⁸ Polizzi 1997, 97–8. 103, figs. 4–5. For the type, see Vandermersch 1994, 76–80, first half of the 3rd century B.C.E.



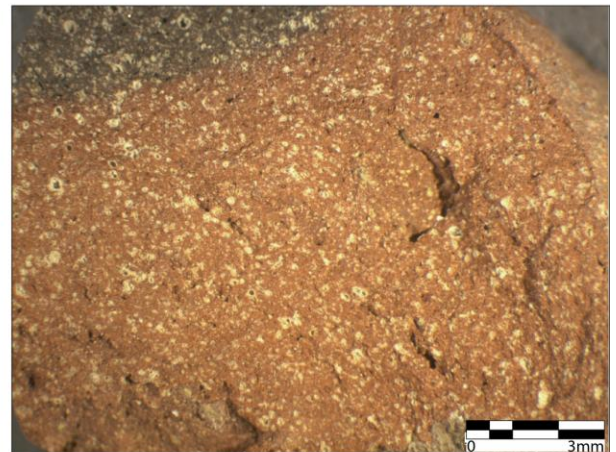
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2



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Fig. 2. Fabrics from Solus (at x8 magnification). 1. SOL-A-1 (M 179/50). 2 SOL-A-2 (M 179/22). 3. SOL-A-3 (M 179/84). 4. SOL-A-4 (M 165/19). 5. SOL-A-5 (M 165/3).

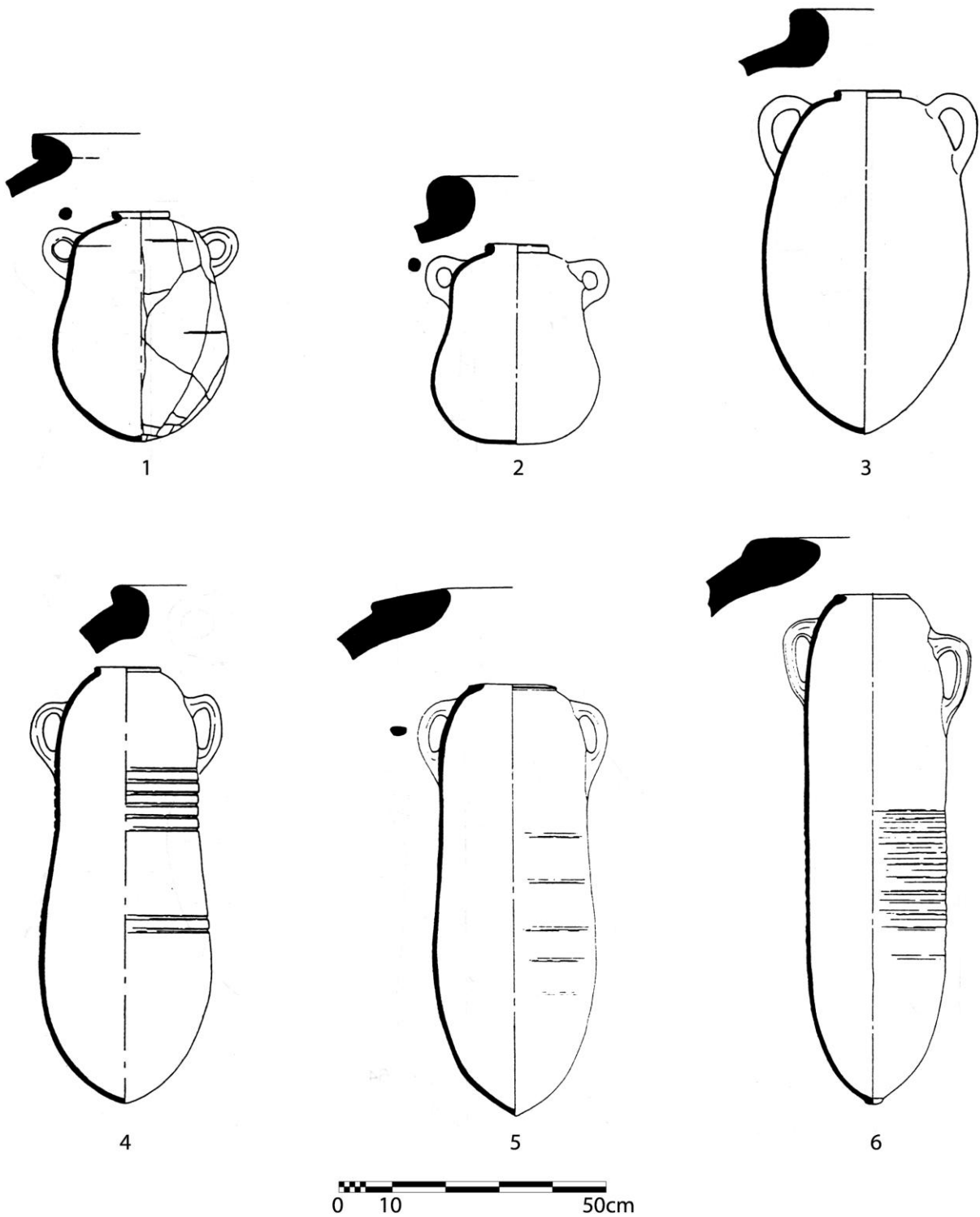


Fig. 3. The amphorae repertoire of Solus (7th-5th century B.C.E.): 1.-2. Ramon T-1.1.2.1 3. Ramon T-2.1.1.2 4. Ramon T-1.4.2.1 5. Ramon T-1.4.5.1 6. Ramon T-4.2.1.4.

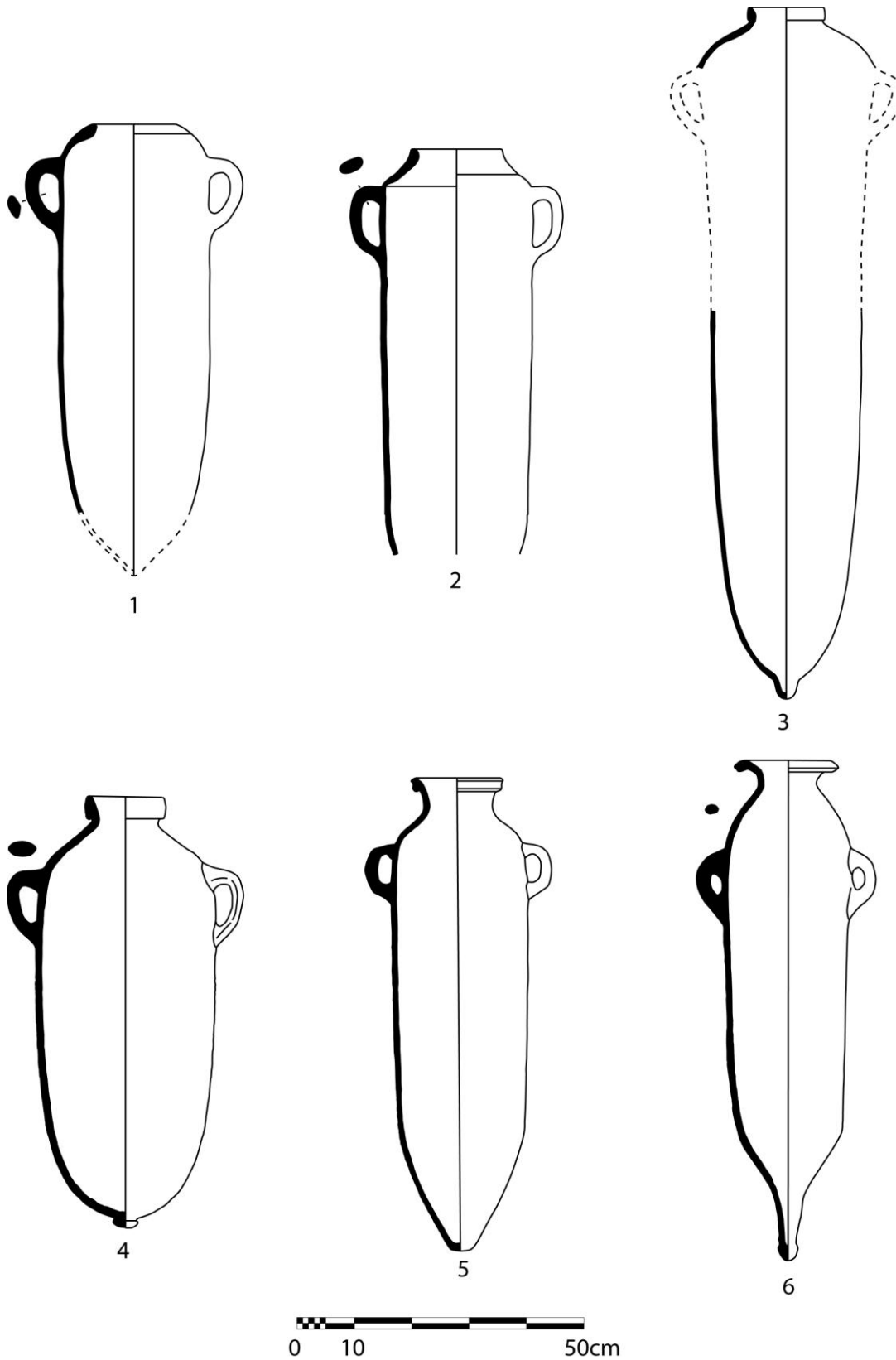


Fig. 4. The amphorae repertoire of Solus (4th-2nd century B.C.E.): 1. Ramon T-4.2.2.6 2. Ramon-Greco T-4.2.2.7 3. Ramon T-7.1.2.1 4. Ramon T-7.1.1.2 5. Ramon T-7.2.1.1 6. Ramon T-7.5.2.1.

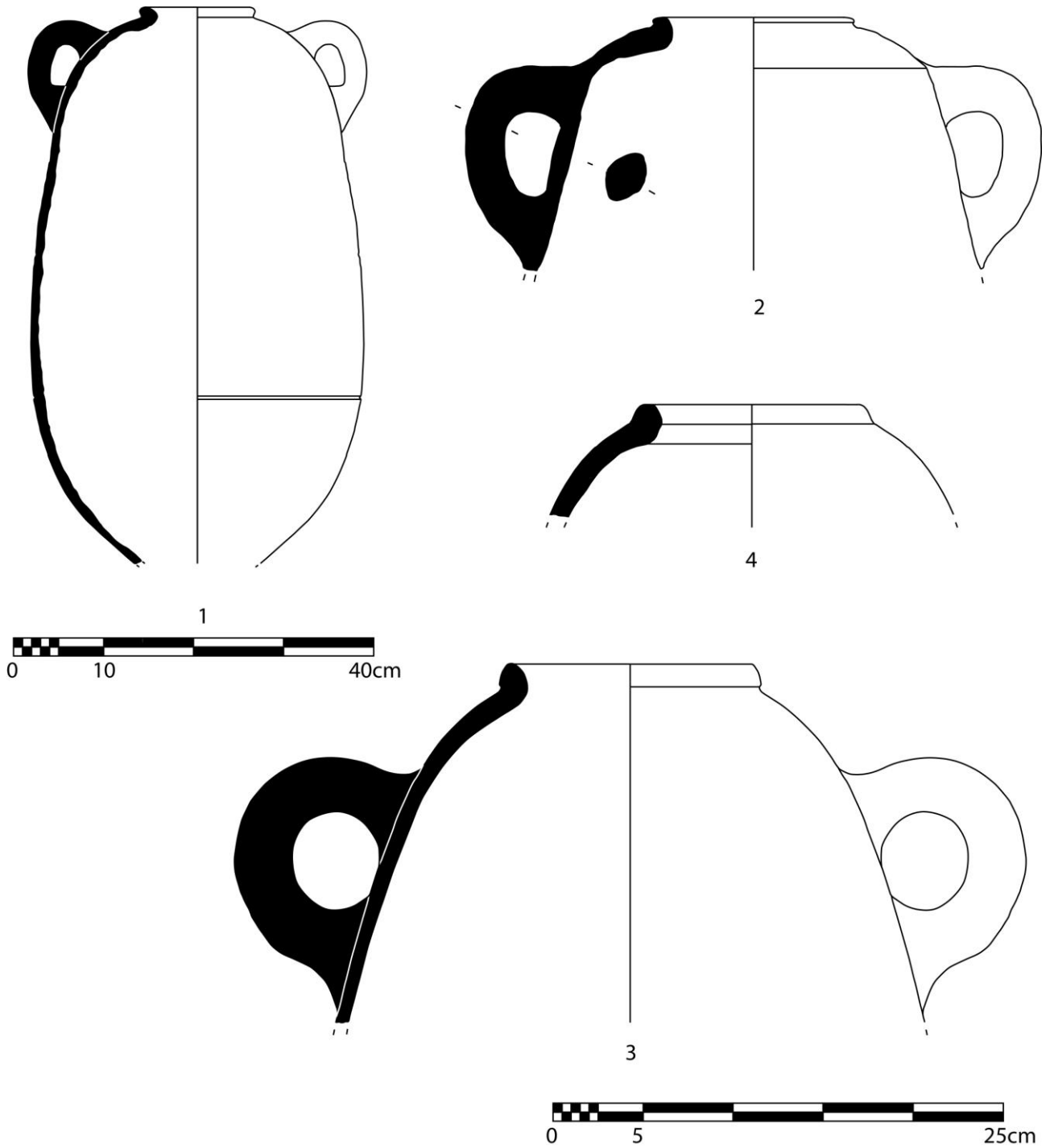


Fig. 5 Amphorae from Solus found outside the production site (late 7th-6th century B.C.E.): 1. Ramon T-2.1.1.2 2. Ramon T-13.2.2.1 3. Ramon T-1.3.2.1 4. Ramon T-1.4.2.1.

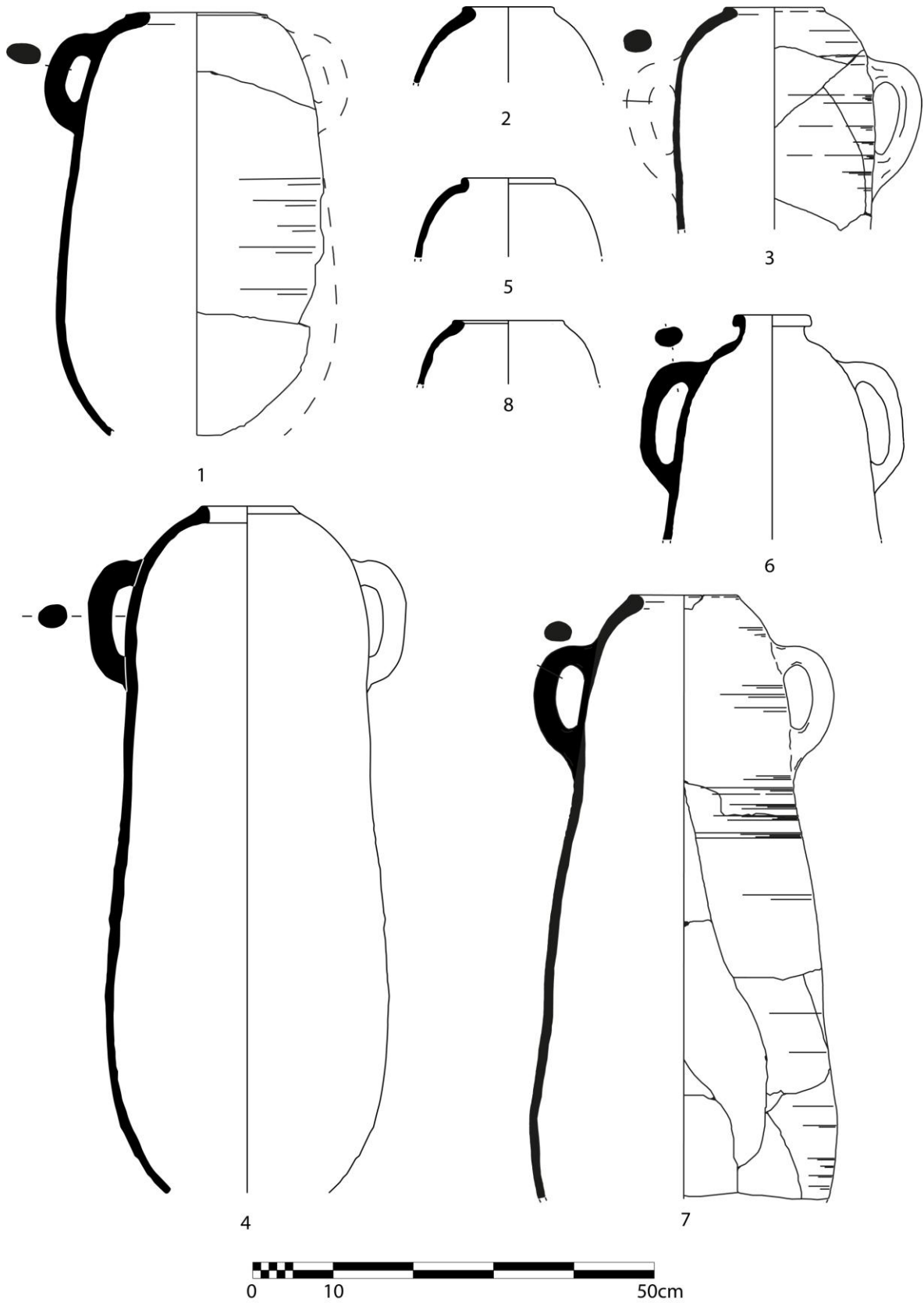


Fig. 6. Amphorae from Solus found outside the production site (late 6th-5th century B.C.E.): 1. Ramon T-1.4.5.1 2.-3. Ramon T-1.4.2.1/2 4. Ramon T-1.4.1.1/2.1 5. Ramon T-1.4.3.1 6. Ramon T-2.2.1.2 7. Ramon T-1.4.4.1/4.2.1.10 8. Ramon T-4.2.1.4.

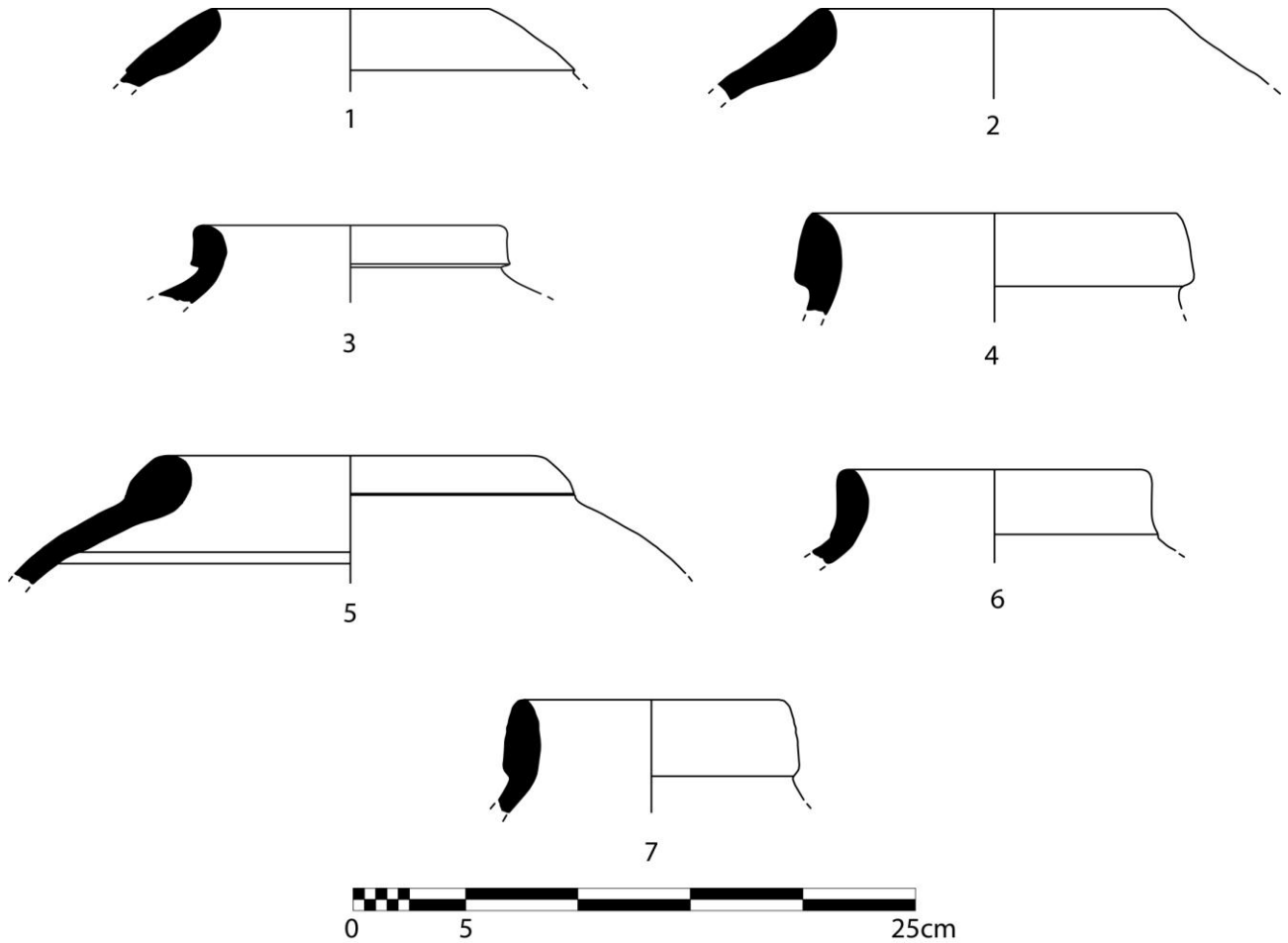


Fig. 7. Amphorae from Solus found outside the production site (4th-3rd century B.C.E.): 1. Ramon T-4.2.2.6 2. Ramon-Greco-4.2.2.7 3. Ramon T-7.1.2.1 4. Ramon T-6.1.2.1 5. as Ramon T-1.4.4.1, no. 65 6. Ramon T-6.1.1.3 7. Ramon T-7.1.1.1.

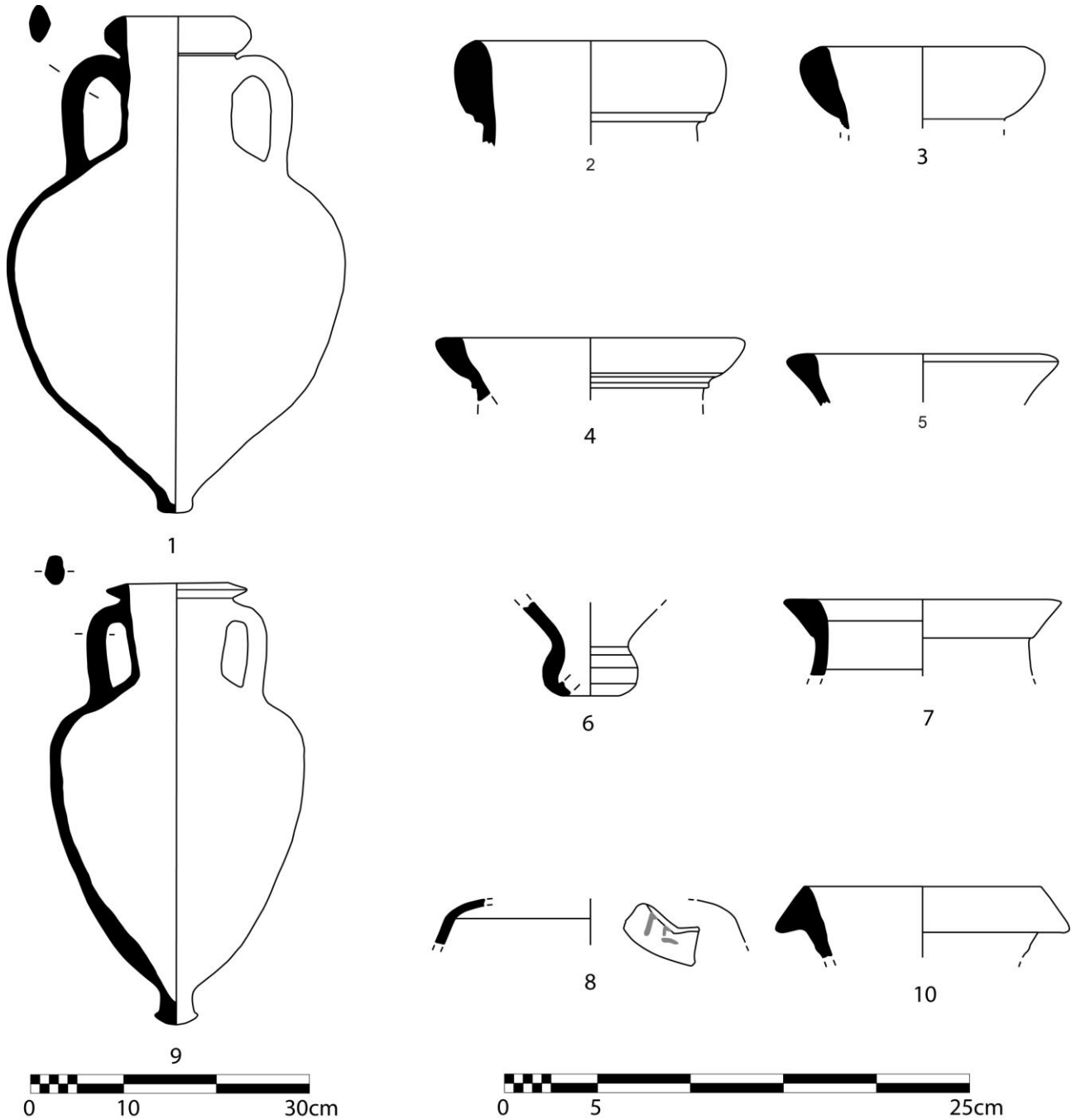


Fig. 8 Greek amphorae produced at Solus (5th-3rd century B.C.E.): 1. as Gassner's rim type 3 2. as Gassner's rim type 3a 3. as Gassner rim type 4 4.-5. as Corretti's 'ad echino sottolineato' type 6. as Gassner's base type 3 7.-8 Vandermersch's MGS III 9. Vandermersch's MGS V 10. Vandermersch's MGS VI.

4. Amphorae fabrics and morphological repertoire: evidences from other sites

At present, the coarsest and earliest of the Soluntinian fabrics (see below, Schmidt), **SOL-A-1** (fig. 2,1), is documented most commonly at the close Calchidian colony of Himera and sporadically at the hill sites Monte Porcara⁴⁹ and Pizzo Cannita, located on the mouth of the Eleuterio river. However, two 6th/early 5th century B.C.E. amphorae from Pantelleria and one fragment from Carthage itself also give an initial idea about a modest circulation of the Archaic Soluntinian series within Carthage's sphere of influence.

The earliest items in SOL-A-1 refer to Ramon's late 7th/early 6th centuries B.C.E. type T-2.1.1.2 (fig. 5,1)⁵⁰ and to the first half of the 6th century B.C.E. types T-13.2.2.1 (fig. 5,2),⁵¹ T-1.2.1.1⁵² and T-1.3.2.1./2 (fig. 5,3).⁵³ Furthermore, we find a 6th century B.C.E. item of Ramon's T-1.4.2.1 from Pantelleria (fig. 5,4).⁵⁴ The late 6th/early 5th centuries B.C.E. series is documented by Ramon's T-1.4.2.2 (fig. 6,2),⁵⁵ one of the key-types of successive fabrics SOL-A-2 and SOL-A-3, Ramon's T-1.4.1.1/2.1 (fig. 6,3)⁵⁶ and an early item of Ramon's T-1.4.5.1 (for the type see fig. 6,1).⁵⁷ Finally, a late appendix of fabric SOL-A-1 is represented by later 5th century B.C.E. vessels of Ramon's T-2.2.1.2 (fig. 6,6).⁵⁸

Apart from the shapes T-2.1.1.2 and T-1.4.2.1, the Archaic types in SOL-A-1 documented in the necropolis of Himera still have not been observed in the Soluntinian series documented at the production site itself (see fig. 3 and ch. 3).

Moreover, to date, the slightly finer fabric **SOL-A-2** (fig. 2,2) has been identified almost exclusively among late 6th to 5th century B.C.E. amphorae found the necropolis of Himera. The main shape of

⁴⁹ For the identification of more ceramic finds dating to the 7th and 6th century B.C.E. at Monte Porcara, see Spatafora 2000, 900.

⁵⁰ FACEM – <http://facem.at/m-179-41> (Bechtold and Vassallo (in preparation), cat. 74). M 179/43 (Bechtold and Vassallo (in preparation), cat. 75). M 179/29 (Bechtold and Vassallo (in preparation), cat. 76). From Pantelleria one still unpublished item probably to be attributed to SOL-A-1: M 119/253 (PN 14 ACR V/XVI, 6911-4), from a second half of the 6th century B.C.E. deposit.

⁵¹ FACEM – <http://facem.at/m-179-93> (Bechtold and Vassallo (in preparation), cat. 81).

⁵² Bechtold and Vassallo (in preparation), cat. 78. One more fragment from Carthage: M 92/94, published in Maraoui Telmini 2012, 125, cat. 131, fig. 124, here attributed to a Sardinian production, from a context of the second half of the 5th century B.C.E.

⁵³ FACEM – <http://facem.at/m-179-48> (Bechtold and Vassallo (in preparation), cat. 79). M 179/45 (Bechtold and Vassallo (in preparation), cat. 80).

⁵⁴ FACEM – <http://facem.at/m-119-251>.

⁵⁵ From Himera: M 179/55 (Bechtold and Vassallo (in preparation), cat. 88). From Monte Porcara: M 193/5, see Muratore 2015. From Pizzo Cannita: M 189/31, see Arena 2015.

⁵⁶ FACEM – <http://facem.at/m-179-19> (Bechtold and Vassallo (in preparation), cat. 82).

⁵⁷ M 179/95 (Bechtold and Vassallo (in preparation), cat. 98).

⁵⁸ FACEM – <http://facem.at/m-179-50> (Bechtold and Vassallo (in preparation), cat. 138).

this series is represented by Ramon's T-1.4.5.1 (fig. 6,1),⁵⁹ exceptionally already attested in SOL-A-1. Furthermore, we find four amphorae of Ramon's T-1.4.2.1/2 (fig. 6,2-3)⁶⁰ and one item of Ramon's T-1.4.3.1 (fig. 6,5),⁶¹ not yet attested among the Soluntinian series (see fig. 2, ch. 3). The latest item from this assemblage is represented by one Ramon's T-2.2.1.2 (fig. 6,6)⁶² dating to the last third of the 5th century B.C.E.

The key type of the yet finer **SOL-A-3** (fig. 2,3), the most common in the necropolis of Himera, corresponds to Ramon's 5th century B.C.E. shape T-1.4.5.1 (fig. 6,1)⁶³ which represents about 58% (N 45) of the typologically identified amphorae attributed to this fabric. Furthermore, we find five late 6th or first half of the 5th century B.C.E. vessels of Ramon's T-1.4.2.1 (for the type see fig. 5,4)⁶⁴ and 1.4.2.2 (for the type see fig. 6,2).⁶⁵ The latest items of this group from Himera, dating around 409 B.C.E., refer to an intermediate type, to be placed between Ramon's T-1.4.4.1 and T-4.2.1.10 (fig. 6,7).⁶⁶

Of high interest is the documentation within Carthage's sphere of influence of a few Greek-shaped amphorae in SOL-A-3, which display various western Greek types. These include Gassner's rim types 3-4 from Ghizène/Jerba (fig. 8,2)⁶⁷ and Pantelleria (fig. 8,3),⁶⁸ Corretti's late 5th-4th century B.C.E. type 'ad echino sottolineato'⁶⁹ (fig. 8,4) from Pantelleria,⁷⁰ a base fragment close to

⁵⁹ FACEM – <http://facem.at/m-179-5> (Bechtold and Vassallo (in preparation), cat. 105). FACEM – <http://facem.at/m-179-54> (Bechtold and Vassallo (in preparation), cat. 96). FACEM – <http://facem.at/m-179-56> (Bechtold and Vassallo (in preparation), cat. 95). Furthermore Bechtold and Vassallo (in preparation), cat. 97, cat. 111, cat. 116, cat. 125, cat. 130.

⁶⁰ FACEM – <http://facem.at/m-179-63> (Bechtold and Vassallo (in preparation), cat. 84). FACEM – <http://facem.at/m-179-70> (Bechtold and Vassallo (in preparation), cat. 87). Bechtold and Vassallo (in preparation), cat. 86, cat. 89.

⁶¹ M 179/104 (Bechtold and Vassallo (in preparation), cat. 90).

⁶² FACEM – <http://facem.at/m-179-22>. (Bechtold and Vassallo (in preparation), cat. 137).

⁶³ FACEM – <http://facem.at/m-179-74> (Bechtold and Vassallo (in preparation), cat. 102). Furthermore Bechtold and Vassallo (in preparation), cat. 99, cat. 101, cat. 103 (M 179/65), cat. 106, cat. 107, cat. 108 (M 179/53), cat. 109, cat. 115, cat. 118 (M 179/52), cat. 119, cat. 120 (M 179/57), cat. 121, cat. 124, cat. 127, cat. 128, cat. 129, cat. 131. From Entella: FACEM – <http://facem.at/m-179-70> and M 187/20, for both see Quartararo 2015a. From Panormos, still unpublished: M 106/27 (necropoli Crs. Calatafimi, Pal. Orlando, PORL 8, saggio 5, tomba 12). From Segesta, Grotta Vanella dump: M 165/53, see Quartararo 2015b.

⁶⁴ FACEM – <http://facem.at/m-179-51> (Bechtold and Vassallo (in preparation), cat. 91). FACEM – <http://facem.at/m-179-84>. (Bechtold and Vassallo (in preparation), cat. 85). M 179/98 (Bechtold and Vassallo (in preparation), cat. 92).

⁶⁵ M 179/61 (Bechtold and Vassallo (in preparation), cat. 93). From Pizzo Cannita stems an intermediate shape, to be classified between Ramon's T-1.4.2.2. and T-1.4.4.1: FACEM – <http://facem.at/m-189-3>, see Arena 2015.

⁶⁶ FACEM – <http://facem.at/m-179-3> (Bechtold and Vassallo (in preparation), cat. 134). Furthermore Bechtold and Vassallo (in preparation), cat. 135 (M 179/103), cat. 136 (M 179/69).

⁶⁷ M 149/60, published in Bechtold (forthcoming b), cat. 38.

⁶⁸ FACEM – <http://facem.at/m-119-177>

⁶⁹ For the type see Corretti and Capelli 2003, 294-6, pl. LIV.

⁷⁰ FACEM – <http://facem.at/m-119-178>. FACEM – <http://facem.at/m-119-179>. M 119/184 (from the acropolis excavation, unpublished: ACR 00, I, 180-12).

Gassner's late Classic base type 3 from Selinunt (fig. 8,6),⁷¹ Vandermersch's late 4th/early 3rd MGS III (fig. 8,7),⁷² and a shoulder fragment with a red *dipinto* probably of this latter type (fig. 8,8),⁷³ all from Carthage.

Fabric **SOL-A-4** (fig. 2,4), riddled with numerous highly characteristic calcium carbonate particles and pseudomorphoses, is documented in the necropolis of Himera by the key type of the earlier fabrics SOL-A-2 and SOL-A-3, i.e. Ramon's T-1.4.5.1 (for the type see fig. 6,1),⁷⁴ and by one late 5th century B.C.E. item of Ramon's T-4.2.1.4 (fig. 6,8).⁷⁵ From the necropolis of Panormos come three fragments of Ramon's T-1.4.2.1 (for the type see fig. 5,4)⁷⁶, T-1.4.2.2 (for the type see fig. 6,2)⁷⁷ and another item of Ramon's T-1.4.5.1 (for the type see fig. 6,1),⁷⁸ while the suburban territory of Pantelleria⁷⁹ and Entella⁸⁰ have yielded items of Ramon's T-2.2.1.2 (for the type see fig. 6,6). Towards the early 4th century B.C.E., Ramon's T-4.2.2.6 (see above, ch. 2, note 40), a direct evolution of the type T-1.4.5.1, appears among our assemblage documented at Motya⁸¹ and Segesta (fig. 7,1).⁸² This latter shape develops during the last third of the 4th century B.C.E. to Ramon-Greco's T-4.2.2.7 (see above, ch. 3, note 41), attested at Segesta (fig. 7,2),⁸³ Monte Porcara⁸⁴ and Panormos⁸⁵. Towards the very late 4th and during the first third of the 3rd century B.C.E. we find single items of Ramon's T-7.1.2.1, documented at Panormos,⁸⁶ Pizzo Cannita⁸⁷ and Segesta (fig. 7,3),⁸⁸ and Ramon's T-6.1.2.1 (fig. 7,4).⁸⁹ Furthermore, we find eight thickened, ovoid-

⁷¹ FACEM – <http://facem.at/m-154-31>.

⁷² M 92/67 (published in Bechtold 2008a, 102, cat. 42, fig. 21). M 92/69 (published in Bechtold 2008, 103-4, cat. 43, pl. 3,3 with earlier references). For an in-depth discussion of this type, see Corretti and Capelli 2003, 296-8, pl. LV.

⁷³ FACEM – <http://facem.at/m-92-70>.

⁷⁴ Bechtold and Vassallo (in preparation), cat. 114, cat. 117, cat. 122.

⁷⁵ Bechtold and Vassallo (in preparation), cat. 133 (M 179/64).

⁷⁶ M 106/18 (unpublished, necropolis Crs. Calatafimi, civ. 133-137, CAL 13.2, SAS A, ampl. S, cass. 16, US 16).

⁷⁷ M 106/14 (unpublished, necropolis Crs. Calatafimi, civ. 133-137, CAL 4, cass. 7, SAS A, ampl. S, dromos 15, US 29). M 106/19 (unpublished, necropolis Crs. Calatafimi, civ. 133-137 CAL 13.3, SAS A, US 16, ampl. Sud).

⁷⁸ M 106/49 (unpublished, settlement excavations in Pz. Bologni, PB US 701/20).

⁷⁹ M 119/55 (unpublished, from the survey: ACR RIC 07, UT 175.1-87).

⁸⁰ M 187/17, see Quartararo 2015a.

⁸¹ M 185/10 (Mz/A.13), see above, note 15.

⁸² FACEM – <http://facem.at/m-165-18>.

⁸³ FACEM – <http://facem.at/m-165-10>. M 165/9 (SG 96 RIC, UT 1.74). M 165/13 (SG 96 RIC, UT 45.3). M 165/17 (SG 93 RIC, UT 32.6), all unpublished and from the survey.

⁸⁴ M 193/3, see Muratore 2015.

⁸⁵ M 106/26 (necropolis Crs. Calatafimi, Pal. Orlando, PORL 7, tomba 10, US 19). M 106/68 (necropolis Pz. Indipendenza, Pal. d'Orléans, PIO 9, US 12, cass. 13). M 106/69 (necropolis Pz. Indipendenza, Pal. d'Orléans, PIO 10, US 12, cass. 13), all unpublished.

⁸⁶ M 106/71, unpublished (necropolis Pz. Indipendenza, Pal. d'Orléans, PIO 12, US 12, cass. 15).

⁸⁷ M 189/27, see Arena 2015.

⁸⁸ FACEM – <http://facem.at/m-165-43>.

⁸⁹ FACEM – <http://facem.at/m-165-19>.

shaped rims from Panormos (fig. 7,5),⁹⁰ Pizzo Cannita⁹¹ and Monte Porcara⁹² which seem to refer to an early Hellenistic shape characteristic of the production area of Panormos (see Bechtold 2015a, ch. 2) and Solus, with more regional comparisons from Kephaloïdion,⁹³ Entella,⁹⁴ Pizzo di Ciminna⁹⁵ and Cozzo Sannita.⁹⁶

In addition to the previous local fabric SOL-A-3, Greek styled amphorae have also been found in SOL-A-4 and are attested with one late-4th century B.C.E. 'ad echino sottolineato' rim from Jerba (fig. 8,5)⁹⁷ and one Vanderersch's MGS VI (fig. 8,10) from Pantelleria.⁹⁸

The less homogeneously tempered, coarse fabric **SOL-A-5** (fig. 2,5) represents the latest issue of the Soluntinian series. It reproduces mainly one shape, Ramon's T-7.1.2.1 (for the type see fig. 7,3),⁹⁹ already sporadically documented in SOL-A-4 and dated between the very late 4th and the first third of the 3rd century B.C.E. Furthermore, we find one fragment of Ramon's T-6.1.2.1 (for the type see fig. 7,4),¹⁰⁰ two items close to Ramon's T-6.1.1.3 (fig. 7,6),¹⁰¹ one amphora of Ramon's T-4.2.1.5¹⁰² and three extremely high and thinned rims of Ramon's T-7.1.1.1 (fig. 7,7)¹⁰³ which represent the latest issue of this fabric from somewhere in the mid-3rd century B.C.E. Interestingly, no Greek shapes are attested among SOL-A-5.

⁹⁰ FACEM – <http://facem.at/m-106-41> M 106/42 (settlement excavations in Pz. Bologni, PB US 701/13). M 106/70 (necropolis Pz. Indipendenza, Pal. d'Orléans, PIO 11, US 12), both still unpublished.

⁹¹ M 189/14. M 189/17. M 189/19. M 189/30, see Arena 2015.

⁹² M 193/1, see Muratore 2015.

⁹³ Aloisio 2008, 95, cat. 10, pl. XVII,5, fig. 53, 350-250 B.C.E., almost completely preserved, cylindrical amphora with nearly horizontal shoulder, h about 95 cm, used as funerary container in the enchytrismos 'deposizione 119', here erroneously identified with Ramon's T-14.1.1.1.

⁹⁴ Corretti and Capelli 2003, 306, cat. 70 (from the fill of the cave), pl. LIX,70.

Rondinella 2012, 61-2, pl. 5,26-29, survey finds here identified as Ramon's T-3.1.1.2 dating to the 7th century B.C.E., but in our opinion very clearly referring to the early Hellenistic shape discussed above.

⁹⁶ Lauro 1997, 353, fig. 7,32, from the survey in the ancient settlement.

⁹⁷ M 149/66, see Bechtold (forthcoming b), cat. 39.

⁹⁸ FACEM – <http://facem.at/m-119-51>, published in Bechtold 2013a, 475-6, cat. 60, pl. 30.

⁹⁹ From the acropolis of Selinunt: FACEM – <http://facem.at/m-154-79>, FACEM – <http://facem.at/m-154-96> (published in Helas 2011, 342, pl. 46,12). M 154/76 (Bechtold (forthcoming a), cat. 128). M 154/78 (Bechtold (forthcoming a), cat. 146). M 154/80 (unpublished, from saggio L, US 6, P10.172). M 154/81 (Bechtold (forthcoming a), cat. 139). From Segesta: FACEM – <http://facem.at/m-165-3>. FACEM – <http://facem.at/m-165-42>. M 165/5 (Bechtold 2008a, 559, cat. 18). M 165/7 (Bechtold 2008a, 559, cat. 16). M 165/11 (Bechtold 2008a, 559, cat. 14). M 165/16 (unpublished: SG 93 SAS 7, US 5853-1). M 165/12 (unpublished: SG 93 SAS 7, US 5253-4).

¹⁰⁰ M 106/30, unpublished (settlement excavations in Pz. Bologni, PB US 701/1).

¹⁰¹ From the acropolis of Selinunt: FACEM – <http://facem.at/m-154-29>. From the territory of Segesta: FACEM – <http://facem.at/m-165-8>.

¹⁰² M 169/10 (published in Bechtold 1999, 341, from a grave dated between the last third of the 4th and the early 3rd century B.C.E.). For the exceptional documentation of this Carthaginian type among the fabrics of Panormos, see Bechtold 2015a, ch. 4.

¹⁰³ FACEM – <http://facem.at/m-119-50>. FACEM – <http://facem.at/m-119-214>. M 119/215 (published in Bechtold 2014, cat. 32).

5. Conclusions

5.1 Concluding remarks on Solus' amphorae fabrics

The microscopic study of about 100 amphorae samples from the necropolis of Himera attributed to workshops of Solus, combined with archaeometric analyses, has led to the distinction of four fabrics SOL-A-1 to SOL-A-4. These fabrics differ from one another in density of packing and tempering dimension and gradually increase in fineness from the Archaic to the Hellenistic period. Only the Archaic fabric SOL-A-1 is characterised by added sand (see below, Schmidt). A fifth fabric SOL-A-5, a coarser version of the Classic-Hellenistic SOL-A-4, has been identified among the late 4th-first half of the 3rd century B.C.E. groups from Segesta, Pantelleria and Selinus. Thus, we can state that the fabric studies, undertaken according to the methodology of FACEM, have confirmed and even refined earlier archaeometric research, which first distinguished an Archaic from a Classical-Hellenistic fabric (see above, ch. 1).

5.2 Concluding remarks on Solus' amphorae export

The archaeological data considered in the present study outline the regional and extra-regional chrono-typological distribution of the Soluntinian amphorae series from the late 7th to the first half of the 3rd century B.C.E. This corresponds to the entire production period of Punic Solus (see above, ch. 3). The morphological types of Soluntinian fabric documented outside the production site fit, in almost all cases, into the cities repertoire outlined in ch. 3. The identification of some new shapes, especially among the western Greek amphorae, significantly increases the typological panorama attested for the production of Solus.

In general, the late 7th to late 5th century B.C.E. Punic series issued in SOL-A-1 to SOL-A-4 primarily circulated in the regional context of the production site. The overwhelming majority of the items analysed have been found at near Himera. Among the 276 Punic amphorae recorded from the necropolis of Himera, vessels from Solus represent, at about 37%, by far the most common Punic group. Given the distance of just 25km via sea between Himera and Solus,¹⁰⁴ close commercial relations between the two cities can not only be assumed, but have already been demonstrated at several occasions. Thus, V. Tardo has outlined the presence at Solus, from the third quarter of the

¹⁰⁴ Vassallo 2005a, 55, fig. 63.

7th century B.C.E. onwards, of important amounts of ceramic artefacts produced in the Chalcidian colony.¹⁰⁵ Within the necropolis of Himera, S. Vassallo has already observed the copious presence of transport vessels from Solus.¹⁰⁶ Consequently, our new amphorae data from Himera confirm the privileged relationship between the two towns. In the necropolis, comparison between the still-limited documentation of the late 7th to early 6th century B.C.E. amphorae from Solus to later items of the 6th to 5th century B.C.E. underlines a steep rise of imports from Solus versus Himera during the first half of the 6th century B.C.E.

In contrast to the continuous and numerous presence of Soluntinian Punic amphorae at Himera, the distribution of this series in the rest of western Sicily begins later, in the 5th century B.C.E., that is to say contemporaneously to the drastic decrease of Motya's regional amphorae export (see Bechtold 2015b, ch. 5). In order to better understand the following analysis, however, it should be stated that, due to the strong similarity between the features of the ceramic fabrics of Solus and Panormos and their parallel morphological repertoires, a clear distinction between these two productions must rely on the use of a microscope or a well trained eye. On the other hand, using the archaeological and archaeometric data presently available, we can now claim that the amphora family formed by the successive types Ramon T-1.4.5.1 (fig. 6,1), T-4.2.2.6 (fig. 7,1), 4.2.2.7 (fig. 7,2) and T-7.1.2.1/6.1.2.1 (fig. 7,3-4) almost exclusively characterises the issue of the workshops of Solus and Panormos.¹⁰⁷ In fact, there is almost no evidence for the imitation of any of these shapes outside its production area.¹⁰⁸ Consequently, the distribution patterns discussed below are certainly valid for the amphorae issue of the region of Solus and Panormos when based on morphological criteria only. Samples analysed within the framework of the present project generally allow the distinction between the two production sites.

¹⁰⁵ Tardo 2005, 682 '(...) massiccia presenza di prodotti imeresi indica nella colonia calcidese un interlocutore privilegiato (...) contatti precoci, su base materiale databili al terzo quarto del VII al V sec. a.C.' Furthermore see F. Spatafora (2010, 40) who indicates the incidence of imports in 6th-4th century B.C.E. Solus with about 40%, assuming the arrival especially of Attic ceramics more generally via the Sicilian colonies.

¹⁰⁶ Vassallo 1999, 372; Vassallo 2009a, 256; Vassallo 2009b, 149, 151.

¹⁰⁷ See previously Bechtold 2008b, 548; Docter and Bechtold 2011, 107; Bechtold 2012, 6, 10.

¹⁰⁸ On the basis of our data, the earliest of these shapes, Ramon's T-1.4.5.1, has been occasionally imitated on Motya (Toti 2002, 285-87, pl. 9,3) and in western Sardinia (two items from the necropolis of Himera, see Bechtold and Vassallo (in preparation), cat. 223-224), while the successive type Ramon T-4.2.2.6 has been found at Solus, again in a fabric attributed to south-western Sardinia (Alaimo et al. 2003, 6, 'impasto B').

Outside its production area, the earliest of the regional key types, Ramon's T-1.4.5.1, is attested on Motya,¹⁰⁹ at Selinunt,¹¹⁰ Iaitas,¹¹¹ Entella¹¹² and in its chora,¹¹³ at Segesta¹¹⁴ (but apparently not in its territory),¹¹⁵ on the Montagnola di Marineo,¹¹⁶ and on Colle Madore.¹¹⁷ Outside Sicily, the type occurs on Ischia¹¹⁸ and Lipari,¹¹⁹ at Velia¹²⁰ in Lucania and at Corinth.¹²¹ With the beginning of the production of Ramon's T-4.2.2.6 towards the early 4th century B.C.E., the regional distribution of the Soluntinian series seems to have increased.¹²² At Segesta, the shape is documented during this period not only in the settlement, but also in the territory.¹²³ Furthermore, it seems quite frequent on Motya,¹²⁴ is attested in both Entella's settlement and territory¹²⁵ and on the Pizzo Nicolosi.¹²⁶ A further increase can be linked to the late 4th century B.C.E. creation of Ramon-Greco's T-4.2.2.7 which appears to be common not only in western Sicilian towns and their territories (e.g. Segesta

¹⁰⁹ Toti 2002, 285-6, type 13, pl. 9,4, of Soluntinian fabric with clearly sloping rim, separated from the shoulder by a deep groove which hints at a dating towards the later 5th century B.C.E. Not even the fragments from Ciasca's excavations mentioned in note 27 seem to be much earlier.

¹¹⁰ Helas 2011, 323, SL 15686, illustrated in Helas 1999 (vol. III), with clearly sloping rim, separated from the shoulder by a deep groove, from a 4th century B.C.E. level.

¹¹¹ Fröhlich 1990, 331, no. 539, with clearly sloping, thinned rim, distinguished from the shoulder by a deep groove. Apparently residual in a phase I context (late 4th or early 3rd century B.C.E.). According to the macroscopic description of the fragment, it might well be of Soluntinian fabric.

¹¹² M 187/20 (hybrid shape to be placed between Ramon's T-1.4.5.1 and T-4.2.2.6), see Quartararo 2012. For two more items, see Corretti and Capelli 2003, 307, nos. 72-73, pl. LX.

¹¹³ Nenci 1993, 266-7, fig. 31,6, with a groove separating the rim from the shoulder. According to the macroscopic description of the fragment, it might well be of Soluntinian fabric.

¹¹⁴ For Grotta Vanella: M 165/53 (in fabric SOL-A-2), see Quartararo 2015b. From the settlement: Vaggioli 1995, 941, 1), pl. CLXVII,5, with a groove separating the rim from the shoulder, from a medieval deposit. 955, 6), pl. CLXX,4, with a step separating the rim from the shoulder, from a context possibly to be dated to the 5th century B.C.E. 975, 4), pl. CLXXIII,5, with a groove separating the rim from the shoulder, from a medieval deposit. All these amphorae from Segesta might well be of Soluntinian fabric.

¹¹⁵ Bechtold 2008b, 543-4.

¹¹⁶ Termini 1997, 162-3, fig. 3,42.

¹¹⁷ Polizzi 1999, 223, 228, fig. 222,421, with a groove separating the rim from the shoulder, from the final occupation phase of the site of the later 5th century B.C.E. According to the macroscopic description of the fragment, it might well be of Soluntinian fabric.

¹¹⁸ Di Sandro 1986, 123, pl. 28, SG 333.334.

¹¹⁹ Bernabò Brea and Cavalier 1998, 70, fig. 22d,69, from the 'Bothros of Eolo'; Cavalier 1985, 57, fig. 14,43 from grave 1106.

¹²⁰ Gassner (forthcoming), ch. V.A.5.4.2, from a period 2.2 context (370-330 B.C.E.), inv. 409/97-7 in fabric IG-PUN-A-2.

¹²¹ Ramon 1995, 145-6, from the second phase of the 'Punic amphora building'. Ultimately, see Docter and Bechtold 2011, 106, note 40.

¹²² Docter and Bechtold 2011, 107 for the documentation of the type outside Sicily, at Corinth, Ampurias and on Ischia.

¹²³ Bechtold 2008b, 543, 550-1.

¹²⁴ Toti 2002, 285-7. For archaeometric analyses which prove a Soluntinian origin of most of these items, see Iliopoulos 2002, 358; for earlier references, see Bechtold 2008b, 550, note 67; ultimately, see Orsingher 2011, 124, note 168.

¹²⁵ Quartararo 2012, on item of Soluntinian fabric (on the basis of archaeometric analyses); previously, see Bechtold 2008b, 550, notes 72-73 with earlier references.

¹²⁶ Vassallo 1985, 133, fig. 29,33.

and Entella), but also on the Cozzo Scavo in Central Sicily¹²⁷ and along the Tyrrhenian coasts of southern Italy (mostly in Lucania).¹²⁸ The peak of the regional and extra-regional distribution of amphorae from Solus (and Panormos) certainly falls within the very late 4th and the first third of the 3rd century B.C.E. and is exemplified by the vast occurrence of Ramon's T-7.1.2.1 and the less common, probably contemporaneous, Ramon's T-6.1.2.1. This is identified not only at almost all the sites of Carthage's Sicilian eparchy,¹²⁹ but also '(...) on several sites along the Tyrrhenian sea, in presentday Calabria and Campania, on Ischia, at Euesperides in Cyrenaica, and at Carthage.¹³⁰ Relevant quantitative data are currently available for Segesta and Selinus: in the stratigraphic excavations at 'Porta di Valle' at Segesta, the presence of the north-western Sicilian amphorae series Ramon T-4.2.2.6 (4 items), Ramon-Greco T-4.2.2.7 (14 items) and Ramon T-7.1.2.1 (48 items) continually increases.¹³¹ At Selinus, among the sealed deposits related to the construction of temple B around 300 B.C.E. or little later, amphorae from the production area of Solus/Panormos represent about 27% of all recorded diagnostic amphorae (N 66) and about 86% of all Punic-Sicilian vessels (N 21).¹³²

According to our data, during the final decades of the First Punic War and with the production of amphorae with thinned, high vertical rims of Ramon's T-7.1.1.1 (fig. 7,7), the occurrence of the amphorae series of Solus outside the production site comes to an end.

¹²⁷ See Bechtold 2008b, 551-3 with full references. For Entella, see Quartararo 2012, three items of Soluntinian fabric (on the basis of archaeometric analyses).

¹²⁸ See Docter and Bechtold 2011, 107 with full references. For Velia see Gassner (forthcoming), ch. V.A.5.3.3, inv. 332/99-5, 338/99-14, both in fabric PAN-A-1 and from contexts dated to the first third of the 3rd century B.C.E. (period 2.4).

¹²⁹ See Bechtold 2008b, 556-8 with full references.

¹³⁰ Docter and Bechtold 2011, 107. For Velia see Gassner (forthcoming), ch. V.A.5.3.3, inv. 211/99-62, inv. 517/97-41 in PAN-REG-A-2, from contexts dating to period 2.4 (300-270 B.C.E.).

¹³¹ Bechtold 2008b, 542, fig. 3.

¹³² Bechtold (forthcoming a), ch. 2.1.

Thus far, we have discussed Solus' Punic amphorae production which was largely exported to western Sicily, and, to a minor extent, also to extra-regional markets located along the coasts of the Tyrrhenian sea, especially in Lucania. A very different distribution pattern appears across the city's Greek series, currently documented only in Carthage's North African sphere of influence. Whilst single items seem to begin to arrive during the 5th century (Gassner's rim shapes 3-4 from Jerba and Pantelleria, see fig. 8,2-3), better evidences are available for the occurrence of the 4th century B.C.E. types 'ad echino sottolineato' (fig. 8,4-5) and Vandermersch MGS III (fig. 8,7-8), attested at Carthage, on Jerba and on Pantelleria.

Even if admittedly still based on a very limited number of items, it is important to keep in mind the hypothesis that Carthage (and its North African area of influence) was not particularly interested in the purchase of commodities sold in the Punic amphorae from Solus, documented with a few Archaic items only, but rather in the goods packed in Greek-styled vessels, which might have transported different merchandises.

In fact, in parallel to its Punic series, from the late Archaic period onwards, Solus set in motion the fabrication of Greek-styled amphorae, perhaps as a reaction of the competition in trade with close Himera,¹³³ even if no local amphora production is presently known for this latter colony. As far as we can currently see, the morphological repertoire of Solus' Greek series imitates Gassner's 'Tyrrhenian circle', with rim shapes 3, 4,¹³⁴ 7 and 9.¹³⁵ This supposed 'Tyrrhenian connection' of Solus (but also of Panormos, see Bechtold 2015a) no doubt represents one of the most interesting aspects of the present research, since it gives excellent evidence for the often claimed commercial relations between the Campanian area and the flourishing north-western Sicilian cities.¹³⁶ At present, we do not dispose of fabric data concerning the origin of the extremely numerous western Greek 5th century B.C.E. amphorae yielded by the necropolis of Himera,¹³⁷ but a certain presence of Lucanian vessels among this assemblage might well be expected.

¹³³ Montana et al. 2009a, 90.

¹³⁴ Gassner 2003, 207-8, fig. 104, 213, fig. 22.

¹³⁵ For Gassner's new typology of the Early Hellenistic shapes see Gassner (forthcomig), ch. V.A.2.2.1.3, V.A.2.2.1.5.

¹³⁶ For Himera, see previously Vassallo 2009b, 151. ¹³⁷ 'Tutti rinvenimenti che confermano gli intensi rapporti tra l'area campana ed Himera (...).'

¹³⁷ Vassallo 1999, 356.

5.3 Hypothesis on the content of the amphorae series produced at Solus

Notwithstanding the lack of clear archaeological evidences for the content of the Punic amphorae from Solus, recent research suggests that the appearance of numerous fish processing factories along the shores between Capo Gallo and Termini Imerese, in the Panormos/Solus area, during the course of the 4th century B.C.E. has to be set in relation with increases in the above discussed amphora series. These obvious chronological and topographical links, coupled with consideration of historical sources, have led to the hypothesis '(...) that the coastal strip between Solus and Palermo evolved from the late 5th century B.C.E. onwards into one of the most important fish processing regions in the central Mediterranean.'¹³⁸ A perfect confirmation of this supposition seems to be presented by the highly important discovery, in a pottery dump dating 290/80 to 270/260 B.C.E. excavated in the agora of Morgantina, of about 180 Punic amphorae, mainly of Ramon's T-7.1.2.1, as well as, to a minor extent, of Ramon's T-7.2.1.1 and T-6.1.1.3 and about 130 items of Vanderersch. MGS III-IV. The Punic amphorae of a reddish-orange fabric have regularly been found '(...) in associazione con pelle, squame e spine di pesce. Molte delle anfore puniche evidentemente contenevano *tarichos* o pesce salato, e possibilmente altri prodotti marini (...)'.¹³⁹ On the basis of the equation of 'Ramon T-7.1.2.1 = production of the area of Panormos/Solus' discussed earlier (see above, ch. 5.2), the new deposits of Morgantina might constitute admissible evidence that at least part of this amphora family contained fishery products.

Thus, assuming fishery products were the content of the Middle Punic amphorae series of Solus, it is now very tempting to consider the contemporaneous Greek-styled vessels as wine-carrying containers, even if present archaeological evidences have not been discovered in favour of this hypothesis. There is no doubt, however, that through the history of Carthage, Greek wine represented one of the most important, amphora-packed commodities acquired from foreign markets.¹⁴⁰ Set in this perspective, the purchase of Greek and not Punic amphorae from Solus starts to make sense!

¹³⁸ Docter and Bechtold 2011, 108 with earlier references. For a sea-orientated economy of the coastal towns of western Sicily see more generally Spanò Giammellaro and Spatafora 2012, 341, 345.

¹³⁹ Bell (forthcoming).

¹⁴⁰ Bechtold 2013b, 96-7 with earlier references.

Table of correspondence for the amphorae illustrated in figs. 3-8.

Fig.	FACEM inv.-no.	Site inventory number	Published
3,1	--		From: Ramon 1995, 505, fig. 142,2
3,2	--		From: Ramon 1995, 516, fig. 153,78
3,3	--		From: Ramon 1995, 505, fig. 142,3
3,4	--		From: Ramon 1995, 512, fig. 149,56
3,5	--		From: Ramon 1995, 514, fig. 151,67
3,6	--		From: Ramon 1995, 523, fig. 160,143
4,1	--		From: Greco 1997, 58, fig. 1,9
4,2	--		From: Corretti and Cappelli 2003, pl. LX,77
4,3	--		From: Greco 1997, 58, fig. 1,22
4,4	--		From: Ramon 1995, 534, fig. 171,204
4,5	--		From: Ramon 1995, 535, fig. 172,213
4,6	--		From: Ramon 1995, 544, fig. 181,285
5,1	M 179/41	Himera, necropolis East "RADEO", RA 124	FACEM – http://facem.at/m-179-41 Bechtold and Vassallo (in preparation), cat. 74
5,2	M 179/93	Himera, necropolis West, W 5980	FACEM – http://facem.at/m-179-93 Bechtold and Vassallo (in preparation), cat. 81
5,3	M 179/48	Himera, necropolis West, W 6904	FACEM – http://facem.at/m-179-48 . Bechtold and Vassallo (in preparation), cat. 79
5,4	M 119/251	Pantelleria, acropolis, PN 14 V/XVI, 6911-1	FACEM – http://facem.at/m-119-251 .
6,1	M 179/56	Himera, necropolis West, W 1352	FACEM – http://facem.at/m-179-56 Bechtold and Vassallo (in preparation), cat. 95
6,2	M 179/55	Himera, necropolis West, W 7630	Bechtold and Vassallo (in preparation), cat. 88
6,3	M 179/70	Himera, necropolis West, W 5608	FACEM – http://facem.at/m-179-70 . Bechtold and Vassallo (in preparation), cat. 87
6,4	M 179/19	Himera, necropolis East "Royal Himera", RO 428	FACEM – http://facem.at/m-179-19 Bechtold and Vassallo (in preparation), cat. 82
6,5	M 179/104	Himera, necropolis West, W 1678	Bechtold and Vassallo (in preparation), cat. 90

Fig.	FACEM inv.-no.	Site inventory number	Published
6,6	M 179/22	Himera, necropolis West, W 296	FACEM – http://facem.at/m-179-22 . Bechtold 2015 c, fig.1,4. Bechtold and Vassallo (in preparation), cat. 137
6,7	M 179/103	Himera, necropolis West, W 1513	Bechtold and Vassallo (in preparation), cat. 135
6,8	M 179/64	Himera, necropolis West, W 4884	Bechtold and Vassallo (in preparation), cat. 133
7,1	M 165/18	Segesta, survey, SG 96 RIC UT 1.74	FACEM – http://facem.at/m-165-18 .
7,2	M 165/10	Segesta, Northern Gate, SG 93 SAS 7, US 5271-5	FACEM – http://facem.at/m-165-10 Bechtold 2008a, 553-554, cat. 6
7,3	M 165/43	Segesta, acropolis, sporadic find	FACEM – http://facem.at/m-165-43 Bechtold 2015 c, fig.1,7
7,4	M 165/19	Segesta, survey, SG 96 RIC UT 1.6	FACEM – http://facem.at/m-165-19 .
7,5	M 106/41	Palermo, settlement, Pz. Bologni, US 701/12	FACEM – http://facem.at/m-106-41
7,6	M 165/8	Segesta, survey, SG 96 RIC UT 1.75	FACEM – http://facem.at/m-165-8 Bechtold 2015 c, fig.1,10
7,7	M 119/214	Pantelleria, survey, PN 04 ACR RIC, UT 100.1-2	FACEM – http://facem.at/m-119-214 . Bechtold 2013a, 464, cat. 27. Bechtold 2015 c, fig. 1,11
8,1	--		Polizzi 1997, 99, fig. 5,7
8,2	M 149/60	GH 180010.1	Bechtold (forthcoming b), cat. 38
8,3	M 119/177	Pantelleria, acropolis, PN 06 ACR I, 2098-28	FACEM – http://facem.at/m-119-177 . Bechtold 2014, cat. 11
8,4	M 119/179	Pantelleria, acropolis, PN 06 ACR I, 2098-6	FACEM – http://facem.at/m-119-179 . Bechtold 2014, cat. 14
8,5	M 149/66	GH 110241.157	Bechtold (forthcoming b), cat. 39
8,6	M 154/31	Selinunt, temple B, saggio H, US 3B, P09.100	FACEM – http://facem.at/m-154-31 .
8,7	M 92/69	Carthage, Decumanus Maximus, KA 91/4-2	Bechtold 2008a, 103-4, cat. 43, fig. 21, pl. 3,3 with earlier references
8,8	M 92/70	Carthage, Decumanus Maximus, KA 87/104-12	FACEM – http://facem.at/m-92-70 Bechtold 2008a, 104, cat. 44 with earlier references
8,9	--		From: Polizzi 1997, 99, fig. 5,19
8,10	M 119/51	Pantelleria, survey, PN 04 ACR RIC, UT 104.1-5	FACEM – http://facem.at/m-119-51 Bechtold 2013a, 475-6, cat. 60, pl. 30

KARIN SCHMIDT

Amphorae Fabrics of Solus*

Introduction

The ceramic fabrics of Solus are quite similar to those of Panormos, due to the use of the same raw materials (*Agille di Ficarazzi*, see above, Bechtold, ch. 1 with note 27).¹ The main point of difference consists of a higher frequency of inclusions in Soluntinian fabrics. On the basis of archaeometric analysis of amphorae samples, Alaimo and team have established '(...) differences in dimension and packing of the sandy temper between the Archaic (late VII–VI century B.C.) and the Classical - Hellenistic (V–III century B.C.) productions. The Archaic potsherds contain inclusions with a prevailing size of medium-fine sand (0.2–0.5 mm) and packing generally ranging between 20 and 30% (...). By contrast, all the Classical – Hellenistic artefacts are characterised by temper consisting of very fine sand (0.06–0.125 mm) with packing ranging between 10 and 20% (...).'² According to ulterior archaeometric research, packing can also be even lower.³

Our microscopic observations and typological studies both confirmed the distinction between Archaic (SOL-A-1) and Classical-Hellenistic fabric groups (SOL-A-2 to SOL-A-5). The main characteristic of amphorae fabrics from Solus is a more-or-less high density of sand temper, which mainly consists of quartz grains and calcium carbonate, as well as carbonate pseudomorphoses. The Archaic group has a higher frequency of artificially-added quartz sand, while the Classical-Hellenistic group is characterised by a higher density of smaller-sized inclusions with a predomination of calcium carbonate and carbonate pseudomorphoses.⁴ The Archaic fabric SOL-A-1 shows particles sized up to 1.8 mm and the packing range starts at c. 15%. By contrast, the packing

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¹ For archaeometric analysis of Soluntinian amphorae, see esp. Alaimo et al. 2005; Montana et al. 2015 (fabric 1). For analysis of Soluntinian table wares, see Montana et al. 2009a; Montana et al. 2009b.

² Alaimo et al. 2005, 707–11, figs. 7–8, esp. 708: 'The sand fraction has a very fine grain size (<0.125 mm) and is constituted predominantly from monocrySTALLINE quartz and calcareous bioclasts and lithoclasts (Fig. 4). In relatively fewer quantities are present chert fragments, polycrySTALLINE quartz, feldspars and fragments of radiolarite, argillite and quartzarenite.'

³ A short description of Soluntinian amphorae fabrics of the 5th and 4th century B.C.E. can be found in Montana et al. 2015, 817: 'Fabric 1 (Fig. 3a) is composed mostly of monocrySTALLINE quartz, followed by minor amounts of calcareous microfossils and or 'micritic cloths' (...), mica flakes and minor quantities of K-feldspar, plagioclase and polycrySTALLINE quartz. Inclusions are predominantly represented by very fine to fine sand grains with 15% packing (area).' For the differences between fabrics of Motya and Solus see p. 711 with figs. 9–10.

⁴ Alaimo et al. 2005, 708: 'Archaic pottery is characterised by more quartz sand.'

range of Classical-Hellenistic fabrics can be lower than 10%. SOL-A-4 and SOL-A-5 show large-sized inclusions (up to 2.6 mm) among the fine-grained sand. Particularly within the Classical-Hellenistic group, samples characterised by a lower density of inclusions might be quite similar to the fabrics of Panormos (see PAN-A-1 and PAN-A-2). In contrast to these latter ones, the sandy temper of Soluntinian pottery has a high carbonate component, although this is not as predominant as found in the fabrics of Motya (see MOT-A-1 and MOT-A-2).

Transport Amphorae (SOL-A-1 to SOL-A-5)

FABRIC DESCRIPTION

SOL-A-1 (M 179/19. 41. 44. 48. 50. 93; M 119/251) Ref. M 179/50

SOL-A-1 (see above, fig. 2,1) is characterised by a middle-fine to coarse matrix with a high density of poorly-sorted sandy temper, mainly composed of quartz, calcium carbonate particles and pseudomorphoses of fine to medium dimensions (<0.04–1.8 mm). The packing ranges between 15% and 20%, whilst porosity varies between 5% and 7.5%. Quartz grains are grey, clear or, rarely, brownish and are of very spherical to subelongated and well rounded to subangular shape (0.06–1.0 mm). The white or yellowish-white calcium carbonate particles and pseudomorphoses are mainly spherical- to subspherical- or subelongated-shaped (0.04–1.8 mm). Apart from in M 179/48, red, reddish-brown and black particles are rare or infrequent and are generally small-sized (<0.04–0.4 mm, rarely up to 1.0 mm). Mica is also rare. Clay colours vary from red to light-red, orange (often with dark grey, brown or pale brown cores, see M 179/41. 48. 50) and brownish-grey.

SOL-A-2 (M 179/5. 6. 22. 54. 56. 63. 70) Ref. M 179/22

In contrast to SOL-A-1, the sandy temper of SOL-A-2 (see above, fig. 2,2) has a higher frequency of small-sized inclusions (esp. <0.04–0.2 mm, infrequent or only sporadic up to 2.5 mm; M 179/56). Generally, white and/or yellowish-white calcium carbonate and pseudomorphoses are predominant. Red, reddish-brown and black particles are rare to infrequent. Foraminifera (M 179/6. 56. 63) and reddish or yellowish-white to pale-brownish chamotte fragments (M 179/22) appear sporadically. The packing is between 12.5% and 15%, and occasionally up to 25% (M 179/5), and porosity varies between 5% and 10%. The colours of the matrix are red, light-red, orange, grey and pale-brown.

SOL-A-3 (M 92/70; M 119/177. 178. 179; M 154/31; M 179/3. 51. 74. 84; M 187/13; M 189/3) Ref. M 179/84

SOL-A-3 (see above, fig. 2,3), the finest fabric of the SOL-A group, is characterised by a more or less dense, very-fine temper (grain sizes are mainly <0.04–0.125 mm, infrequently up to 1.0 mm and exceptionally up to 3.4 mm). White and/or yellowish-white calcium carbonate particles and pseudomorphoses are usually predominant. Very small-sized quartz grains are also present in great quantities (<0.04–0.06 mm, grey, clear, rarely brownish), which cannot be easily distinguished even by x25-microscopy (e.g. M 179/51. 60). Red, reddish-brown and black particles are mainly very small-sized and vary from very frequent to rare. Foraminifera appear sporadically and, in some cases, few chamotte fragments are present (M 119/177). The compact matrix is mainly of red, light-red or orange colour, often with a grey core, or brownish to grey. The porosity is low (c. 3%–7.5%) and the packing range is between 5% and 10%. Some samples of this group are very similar to the PAN-A-group (e.g. M 179/3. 84).

SOL-A-4 (M 106/41; M 119/51; M 149/66; M 165/10. 18. 19. 32. 43; 179/100; M 187/17) Ref. M 165/19

SOL-A-4 (see above, fig. 2,4) shows all characteristics of the previous SOL-A-3, but differs from this due to a higher density of generally very small and sporadically large calcium carbonate particles and pseudomorphoses (up to 2.6 mm, M 165/18). Red, reddish-brown and black particles are rare to frequent (especially when small-sized). In some cases, few chamotte fragments are present (e.g. M 165/8. 10). The packing ranges between 7.5% and 15%; porosity is between 2.5% and 10%. The colours of the matrix are red to light-red and orange, brownish-red, grey or brownish-grey. Some samples of this group are very similar to the PAN-A group.

SOL-A-5 (M 119/50. 214; M 154/29. 79. 96; M 165/3. 8. 42) Ref. M 165/3

Fabric SOL-A-5 (see above, fig. 2,5) is a coarser and less-homogeneously tempered variant of fabric SOL-A-4. The dimensions of particles vary from very small to large (up to 2.4 mm). The packing ranges between 10% and 15% and porosity is between 2% and 7.5%. Fabric SOL-A-5 represents the latest issue of the Soluntinian amphorae series. Some samples of this group are very similar to the PAN-A group.

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