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Regional Amphora Standardization in Roman Africa (146 B.C.–A.D. 699+).

Michel Bonifay, Claudio Capelli, Alessia Contino, Elyssa Jerray, Jihen Nacef†

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Horacio González Cesteros – Justin Leidwanger (eds.)

REGIONAL ECONOMIES IN ACTION

Standardization of Transport Amphorae in the
Roman and Byzantine Mediterranean

HORACIO GONZÁLEZ CESTEROS – JUSTIN LEIDWANGER (EDS.)

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Roman and Byzantine Mediterranean

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MICHEL BONIFAY – CLAUDIO CAPELLI – ALESSIA CONTINO –
 ELYSSA JERRY – JIHEN NACEF (†)

REGIONAL AMPHORA STANDARDIZATION IN ROMAN AFRICA (146 B.C.–A.D. 699+)¹

Abstract

The present contribution aims to describe African amphora production between the late Republican age and Late Antiquity to show both how the African amphora underwent a long succession of standardization and diversification during the centuries and to reflect upon the different periods and regions where the standardized forms appear and develop. The paper is focused on three main research issues: the introduction of the Greco-Roman model in Africa and the first efforts at standardization, the development of different patterns of amphora production in different regions and its impact on the amphora shape, and the last transformations of typology, capacity, and production centers of the late Roman, Vandal, and Byzantine periods. Lastly, the paper compares the chrono-typological data of amphora production with the general chronology of Africa from the mid-2nd century B.C. to the end of the 7th century A.D.

INTRODUCTION

African amphora genealogy shows a long succession of standardization and diversification phases. The present contribution aims to give a panoramic view over African amphora production between the second half of the 2nd century B.C. and Late Antiquity, reflecting upon the following question: when, how, and why did standardized amphora forms develop in different regions of Africa?

In particular we will place special emphasis on:

- 1) the introduction in Africa of the Greco-Roman model of amphora during the 2nd century B.C. and the survival of the Punic amphora types until Late Antiquity;
- 2) the two different patterns of amphora production in Africa during the mid-Roman period and their impact on amphora typology;
- 3) the transformations during the late Roman, Vandal, and Byzantine periods, in terms of container typology, capacity, and production centers.

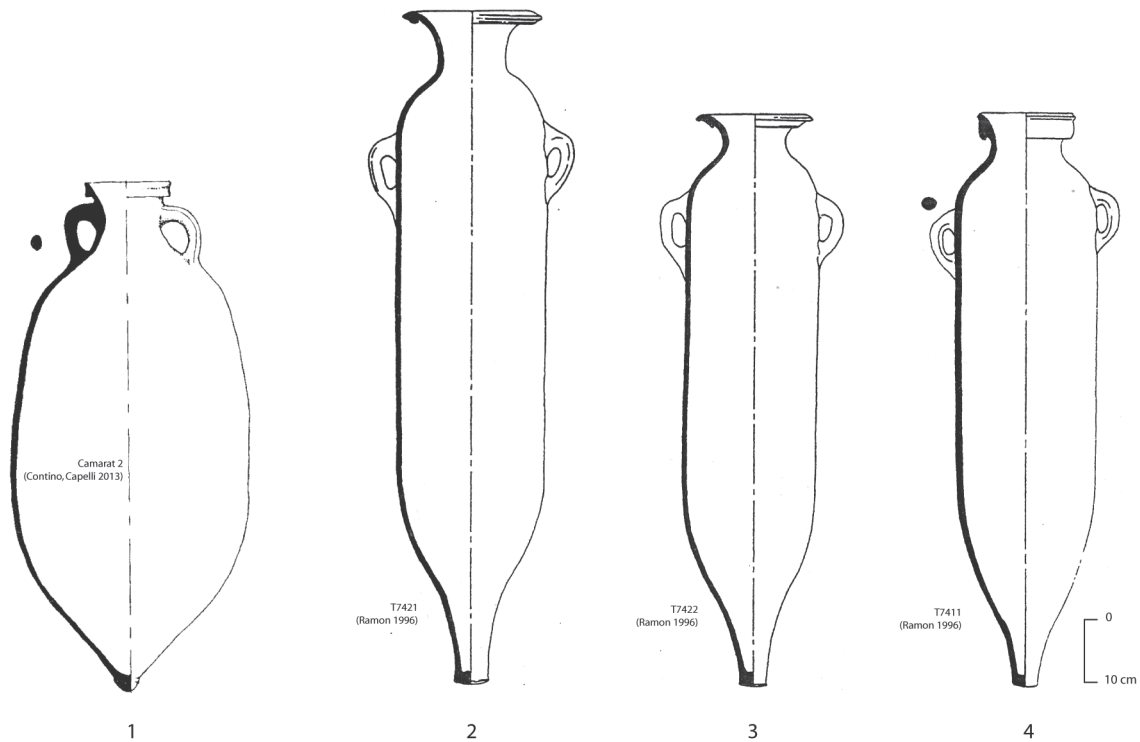
This short survey will focus on the territory of the Roman provinces of Africa Proconsularis, Numidia, and Mauretania Caesariensis, today included in the territory of Algeria, Libya and Tunisia.

THE INTRODUCTION OF THE GRECO-ROMAN MODEL OF AMPHORA AND THE SURVIVAL OF THE PUNIC AMPHORA TYPES

Introduction of the Greco-Roman Model of Amphora

The first Greco-Roman amphora known in Africa is the ovoid ancient African amphora (fig. 1, 1). Ovoid republican amphora production is attested throughout the Mediterranean. This Greco-Roman model seems to have arrived in Africa at the beginning of the second half of the 2nd cen-

¹ This paper is dedicated to our dear colleague Jihen Nacef, lecturer at the University of Monastir (ISEAHM), prematurely deceased on 1 August 2018, who devoted her too-short life to studying the Roman amphora production in the Sahel region of Tunisia.



1 African amphorae. Standardization phase (Republican-Augustan period). First Greco-Roman type: Ancient African (1). 2: Classic Punic/Neo-Punic types: Van der Werff 1–3 (2–4) (© see the individual numbers)

ture B.C., and the appearance of this new shape in northern Africa could be attributed to two main causes: a) the movement of Greek populations across the Mediterranean, particularly after the fall of Corinth in 146, which diffused this model of amphora all along the Mediterranean coasts, as is suggested too for the production of ovoid amphorae on the Adriatic coast of Italy²; b) the birth of the Roman province of Africa in northwest Tunisia in 146 B.C., with Utica as the first capital and then Carthage. The colonization of the African coast and inland, beginning with the northwest region, caused the arrival of the *coloniae italici*, who perhaps brought typical Italic traditions and forms of amphorae with them³.

The recent systematic typo-petrographic study of those containers carried out on samples from the Nuovo Mercato Testaccio in Rome and from Pompeii, La Longarina, Ostia, Cap Camarat 2, and Valencia allows us to localize the start of the production in northwest Tunisia (so-called Zeugitana), more specifically in the Carthage-Tunis-Utica triangle⁴, and not in Tripolitania as previously proposed⁵. This hypothesis has been confirmed by Imed Ben Jerbania, who recently discovered production traces in the hinterland of Carthage and Tunis, and then in Utica⁶. In fact, this new hypothesis appears quite obvious because this is the area of the first official Roman settlement.

Moreover, the analyses allow us to propose that two different types of amphorae descend from the ancient African amphora. First is the Dressel 26 type (fig. 2, 5), initially identified at Castro Pretorio by Heinrich Dressel and recently studied and republished⁷. This amphora is bigger than the ancient African one and more cylindrical with a collar rim. Its capacity can reach around 80 liters for the biggest examples. The typo-petrological study allows us to propose a production area located in the hinterland of Carthage. This amphora seems to be distributed only during the

² Manacorda – Pallecchi 2012; Panella 2013, 192 f.

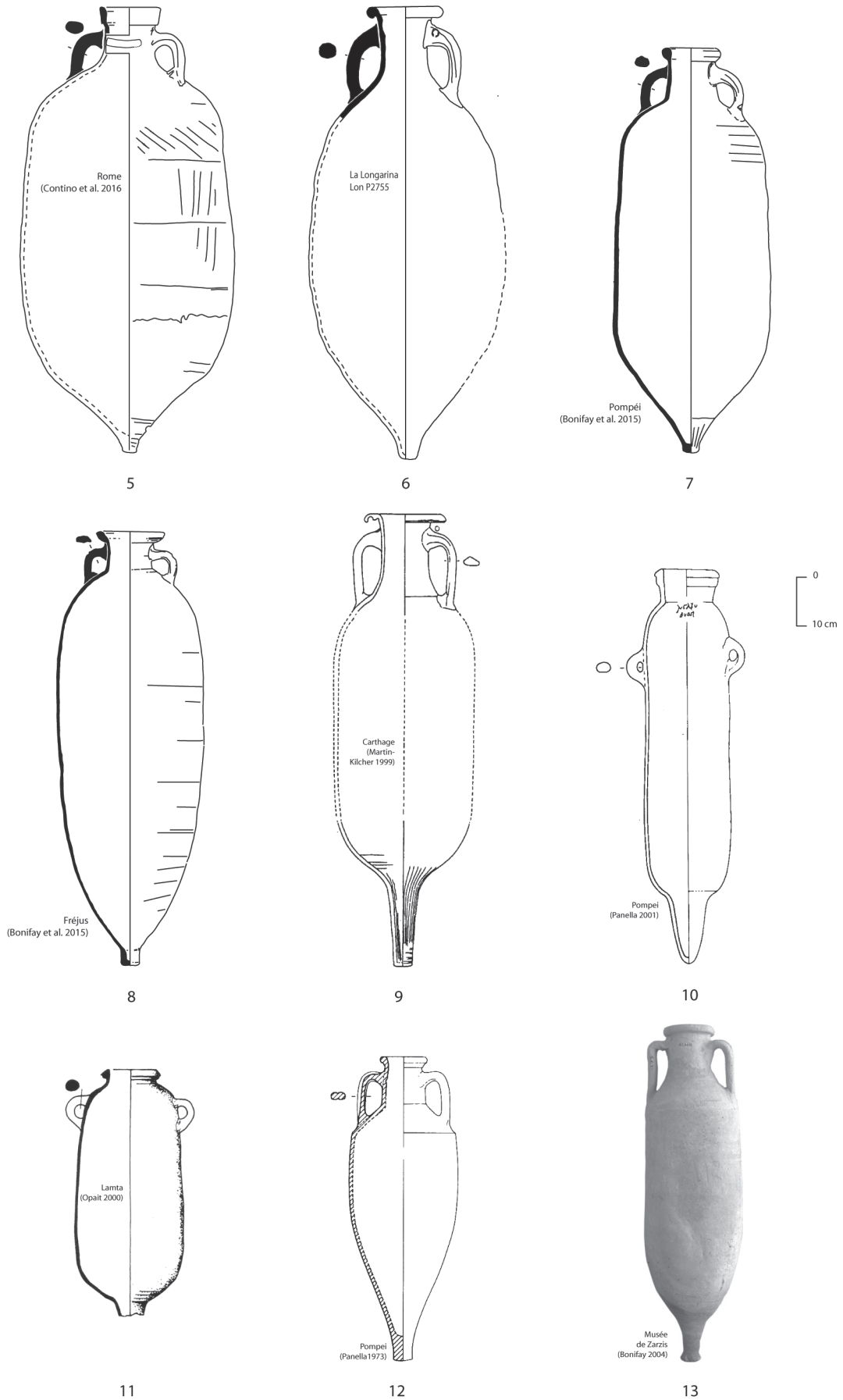
³ Contino – Capelli 2016, 541; Contino – Capelli 2019.

⁴ Capelli – Contino 2013; Contino 2015.

⁵ Empereur – Hesnard 1987, 69 fig. 42.

⁶ Ben Jerbania 2013; Ben Jerbania 2017.

⁷ Contino et al. 2016.



- 2 African amphorae. Diversification phase (1st cent.–mid-2nd cent. A.D.). Greco-Roman types: Dressel 26 (5), early Ostia LIX (pseudo-ovoid amphora) (6), Ostia LIX (7), Ostia XXIII (8). Romanized Punic type: Carthage Early Amphora IV (9). Punic tradition types: Schöne-Mau XL (10), Leptiminius II (11). Introduction of exogenous Mediterranean types: Schöne-Mau XXXV (12), ›pseudo-Dressel 2/4‹ (12) (© see the individual numbers)

1st century A.D. The second type is a pseudo-ovoid amphora with an annular ring (fig. 2, 6), attested in the 1st century A.D. and similar in rim and fabric to the Ostia LIX amphora, the first cylindrical Greco-Roman amphora produced in Africa, with a rounded rim, a wide cylindrical neck, short bent handles⁸, and a capacity of 40 liters. The pseudo-ovoid type was probably produced in the region near the current border with Algeria, perhaps close to Tabarka, due to the similarity of the clay with one group of the ancient African and some groups of the two following types. The Ostia LIX and the Ostia XXIII (fig. 2, 7–8) types represent the latest stage of early African amphorae that started with the ancient African type. They appear between the 1st century A.D. and the early 2nd century in northern Tunisia and are the best attested outside Africa during this period.

These new Greco-Roman models of amphorae appeared in northwest Tunisia, then spread towards other, more southern production areas of Africa. For example, it is not impossible that the ancient African type might have provided a model for the production of the first examples of Tripolitana I. In the Longarina context, two pseudo-ovoid amphorae, with handles on the rim, have been identified with Tripolitanian fabrics⁹. On the other hand, the amphora Ostia LIX was imitated in Byzacena, as suggested by the identification of this type in the Salakta workshop by J. Nacef¹⁰. This discovery attests to the beginning of Roman amphora production in this region that led to the serial and massive production of Africana I and II starting from the mid- to late 2nd century.

It is difficult for these first centuries to propose a pattern that involves agricultural activities, amphora production, and goods distribution. Perhaps we can imagine a low level of surplus production with a low level of exportation and consequently low levels of amphora production and a low level of standardization of the types, which is particularly clear when observing the variety of rims and fabrics attested in the earliest examples. Probably the workshops could be related to the sites of agricultural activities, and there was not yet a system of pottery production, checking, and distribution of goods related to the main cities of the coast, as would happen from the 2nd century A.D. onward. Probably the Ostia LIX and perhaps also the Dressel 26 type carried oil or olives, as recently proposed in a collective article that reinterprets the epigraphy of those containers and specifically the tituli *vir as olivae virides*, *str as olivae strictae*, *mol as olivae mollis* and *tavr* as a place name for *Thabraca*, where olive production is attested¹¹. However, recent archeometric studies attested olive oil and other products. At this moment is hard to define the possible reuse of the sampled amphorae, coming from consumption sites.

Survival of Punic Amphora Types

The production of amphorae with a Punic shape – i.e., with handles attached on the shoulder – however, did not stop with the fall of Carthage and the introduction of the Greco-Roman types that just preceded or followed this event. In fact, the standardization process implied by the introduction of the first Greco-Roman type of amphora in Africa in the mid-2nd century B.C. meets the standardization, already in place, of the local Phoenician-Punic types. At that time, three main types shared the Punic territory and markets: Van der Werff 1 (= Maña C2 = Martin-Kilcher A = Ramon T7421/7431) in the north (fig. 1, 2), Van der Werff 2 (= Martin-Kilcher B1 and B3 for the latest variants = Ramon T7311/7422 and T7511/7523) in Byzacena (fig. 1, 3), and Van der Werff 3 (= Martin-Kilcher B2 = Ramon T7211/7411) in Tripolitania (fig. 1, 4). Then, during the second half of the 2nd century and the 1st century B.C., in the region of Utica and the former Carthage, the same workshops produced both the Greco-Roman and the neo-Punic types (Ancient African and Maña C2)¹².

⁸ Contino – Capelli 2016, fig. 8, 1.

⁹ Contino et al. 2019.

¹⁰ Nacef 2007b; Nacef 2015a (type *Sullethum* 3).

¹¹ Bonifay et al. 2015. Chemical traces of *Moringa* oil in some exemplars could be explained by a reuse of the amphorae: Djaoui et al. 2015. See more recently Pecci et al. 2021.

¹² Utica: Ben Jerbania 2017; Mnhla: Ben Jerbania 2013.

In Zeugitana and Byzacena, the Punic amphora traditions coexisted with the new Greco-Roman types until at least the first half of the 2nd century A.D. In the region of Carthage, the latest variants of the Maña C2 type (e.g., Dressel 18) gave birth, with the shift of the handles from the shoulders to the neck, to the Carthage Early Amphora IV (fig. 2, 9) in the mid-1st century A.D.¹³, perhaps as an attempt (without real follow-through) at a new morphological standardization. On the contrary, in the Sahel region, we can see a broad diversification of Punic-tradition types, quite heterogeneous in the details of their shapes, during the 1st century A.D.: small amphorae with a band rim, types Schöne-Mau XL (fig. 2, 10), Vindonissa 592 and similar, as well as Leptiminus II (fig. 2, 11) were produced in Byzacena (central Tunisia) between the cities of Sullethum, Thapsus, and Leptiminus, according to recent petrographic studies and fieldwork¹⁴. A workshop was recently studied by Jihen Nacef in Thapsus¹⁵, which showed that the capacity of these containers is generally low (25/30 l).

The production of Punic-tradition amphorae continued throughout the Roman, Vandal, and Byzantine periods. In some regions, these amphorae become rather standardized, as shown by the Tripolitana II type of the 2nd and 3rd centuries A.D.¹⁶ and its successors until the first half of the 6th century (Benghazi LRA 7)¹⁷ or in the production of the northern Hammamet Gulf¹⁸. In contrast to this general trend, some other regions completely break with the production of Punic-tradition amphorae at the beginning of the 1st century A.D., for example in Jerba and Zitha¹⁹. For some other regions (Algeria), information is lacking. We do not exactly know the contents of these Punic-tradition amphorae; however, it is clear enough that the Tripolitana II amphora was not devoted to olive oil but rather to fish products and/or wine²⁰.

Introduction of Other ›Universal‹ Greco-Roman Types

As in other regions of the Empire, amphora standardization here includes the introduction of some ›universal‹ Greco-Roman types. It is not clear whether this should be understood as a phenomenon of imitation or of appropriation/interpretation of a model by local producers. Finally, the same question could have been asked about the introduction of the ovoid type and the appearance of the ancient African amphora.

Nevertheless, two examples of imitation or interpretation of non-African types by African potters are beyond doubt. The first is the African adaptation of the Eastern and then Italian Dressel 2/4 type, with its distinctive bifid handles, during the 1st and 2nd centuries A.D. in Tripolitania, mainly at Oea, Zitha, and Jerba. Even if the production in Africa of Dressel 2/4 amphorae of normal size is not completely excluded, the interpretation of this model in Tripolitania is mainly through a series of small versions that are not homogeneous in their details. Two main variants are known to date²¹: the Schöne-Mau XXXV type (fig. 2, 12), characteristic of central Tripolitania (Oea and perhaps Leptis Magna), and the so-called pseudo-Dressel 2/4 type (fig. 2, 13) in western Tripolitania (Zitha and Jerba). The first one reproduces the sharp edge of the Italian Dressel 2/4 shoulder, while the second one does not; the size and the general shape of the body and of the bottom are also different, all attesting to an incomplete standardization of this type in the same geographic area. The second example is the imitation of Gaulish 4 amphorae in Africa, where they

¹³ Martin-Kilcher 1999.

¹⁴ Contino et al. 2017.

¹⁵ Nacef 2015b.

¹⁶ Panella 1973.

¹⁷ Bonifay et al. 2010a.

¹⁸ Bonifay 2004, 92.

¹⁹ Jerray 2015; Jerray 2016.

²⁰ Bonifay 2007; Bonifay 2021.

²¹ Jerray 2016, 162.

are given the name Dressel 30, not only in Mauretania Caesariensis but also in Africa Proconsularis during the 3rd century A.D.²².

In both cases there is no doubt that wine was the main content, and the workshops were located not far from the ports. In these conditions, one may wonder whether the introduction of local interpretations of the Dressel 2/4 type in Tripolitania could help explain the end of production of the latest variants of the Van der Werff 3 type if this local neo-Punic form was also dedicated to the transport of the wine²³.

THE TWO DIFFERENT PATTERNS OF AMPHORA PRODUCTION IN AFRICA (MID-2ND TO BEGINNING OF THE 5TH CENTURY A.D.)

After a first attempt at amphora standardization following the introduction in Africa of the Greco-Roman ovoid type and after a period of broad typological diversification during the 1st century and the first half of the 2nd century A.D., African amphora production entered a new period of strict standardization. This phenomenon includes two patterns²⁴.

Pattern 1: Centralized Production Links to Port Cities (Zeugitana and Byzacena, Mid-2nd to Mid-/Late 3rd Century A.D.)

The first pattern shows a centralization of amphora production in the suburbs of the port cities. This pattern is characteristic of the Byzacena region and part of the Zeugitana region, from the mid-2nd century up to the mid- to late 3rd century A.D. Such a centralization of production led to a strict standardization of amphora typology. During this period, the production was dominated by two types²⁵:

- Africana I or ›Africana piccola‹ (fig. 3, 14), with a capacity of about 40 liters.
- Africana II (variant A) or ›Africana grande‹ (fig. 3, 15), with a capacity of about 60 liters.

Both types were produced in a series of port cities along the eastern coastline of Tunisia: Thae-nae, Acholla (?), Sullectum, Leptiminus, Hadrumetum in the Byzacena region, and Neapolis/Nabeul in Zeugitana²⁶. It is not clear whether Carthage and the northwest part of Tunisia were included in this pattern at this date: late variants of the Ostia LIX and XXIII types, perhaps originating from this region, are attested at Monte Testaccio²⁷, and information on amphora production in Hippo Regius is lacking. The typological standardization is even reinforced by the standardization of the fabrics. Twenty years of petrographic research on the workshops have made it possible to easily identify the fabrics of each port city's production, even sometimes with a simple lens²⁸.

Two types mean two different contents. The content of Africana I was olive oil, as evidenced by chemical analyses²⁹. Africana I is the African counterpart of the Spanish Dressel 20. The centralization of the production of these amphorae implies the preliminary mobilization in the port cities of olive oil coming in leather skins from the inland regions of Africa. This pattern, demonstrated by J. T. Peña through the Carthage ostraca³⁰, is probably applicable to all the port cities with a centralized amphora production³¹. The content of Africana II was different: locally produced salted fish or wine from the near or distant hinterland³². In this case, standardization clearly

²² Laporte 2010.

²³ Fentress 2001.

²⁴ For a general discussion on this point, see more recently: Hobson 2015, 140–142.

²⁵ Panella 1973.

²⁶ Bonifay 2004, with bibliography.

²⁷ Revilla 2007, fig. 70, 14–18.

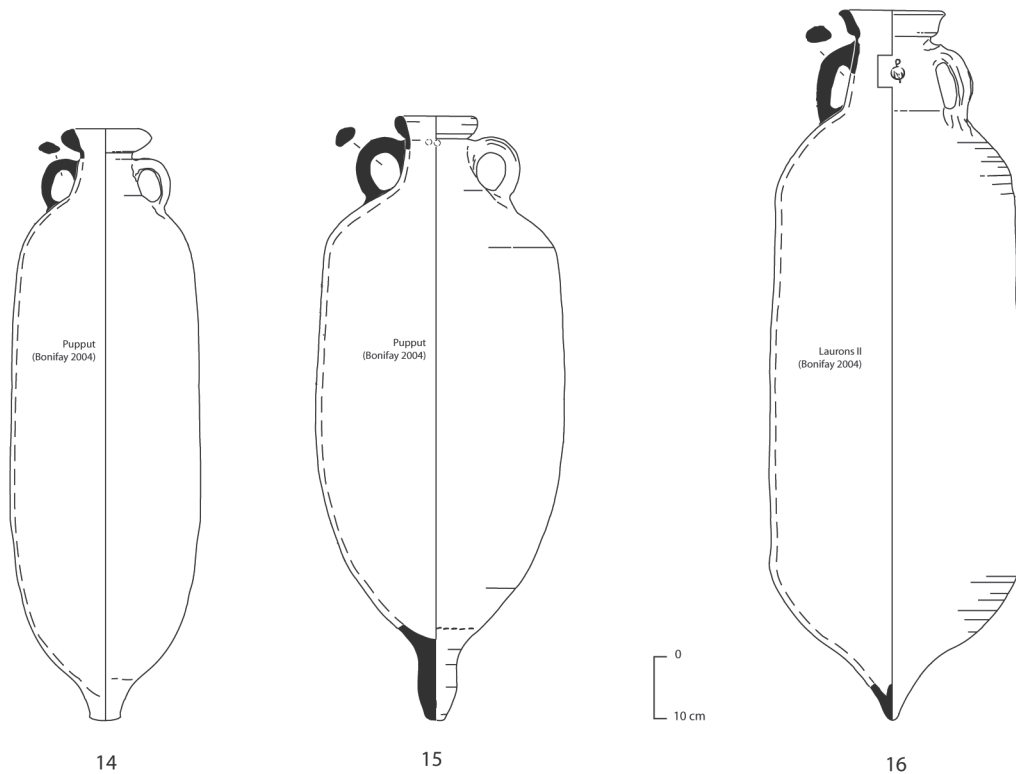
²⁸ See most recently Capelli et al. 2016.

²⁹ See most recently Garnier et al. 2011.

³⁰ Peña 1998.

³¹ Marlière – Torres Costa 2007.

³² Bonifay 2007; Bonifay 2021.



3 African amphorae. Standardization phase (late 2nd cent.–mid-3rd cent.). Eastern Zeugitana and Byzacena types: Africana I and II (14–15). Tripolitania: type I–III transitional (16) (© see the individual numbers)

means a controlled general capacity and content (about 42 l for type Africana I, and 62 l for type Africana II A). The traceability implied by the standardized shape is even reinforced by a series of stamps, the first ones indicating the name of the *figlinator* (?) through initials of two or three letters and the second ones specifying in addition or alone the name of the city: *C(oloni I(ulia) N(eapolis), COL(onia) HADR(umetum), LEP(timinus), A SVLL(ecthum)*³³.

This typological uniformity, generated by the mass production of two single types of amphorae across a huge geographical area that covered most of the very large province of Africa Proconsularis, tends to disappear in the mid-3rd century. At that time, we observe the beginnings of diversification internally within the Africana II type with the appearance of types Africana II B (fig. 4, 17) in Hadrumetum, II C (fig. 4, 18) in Nabeul, and II D (fig. 4, 19) in the Sahel region. This typological diversification goes together with the development of stamps indicating the name of the port cities. These last stamps could be intended to balance this diversification by reinforcing confidence among purchasers in the traceability of the products³⁴.

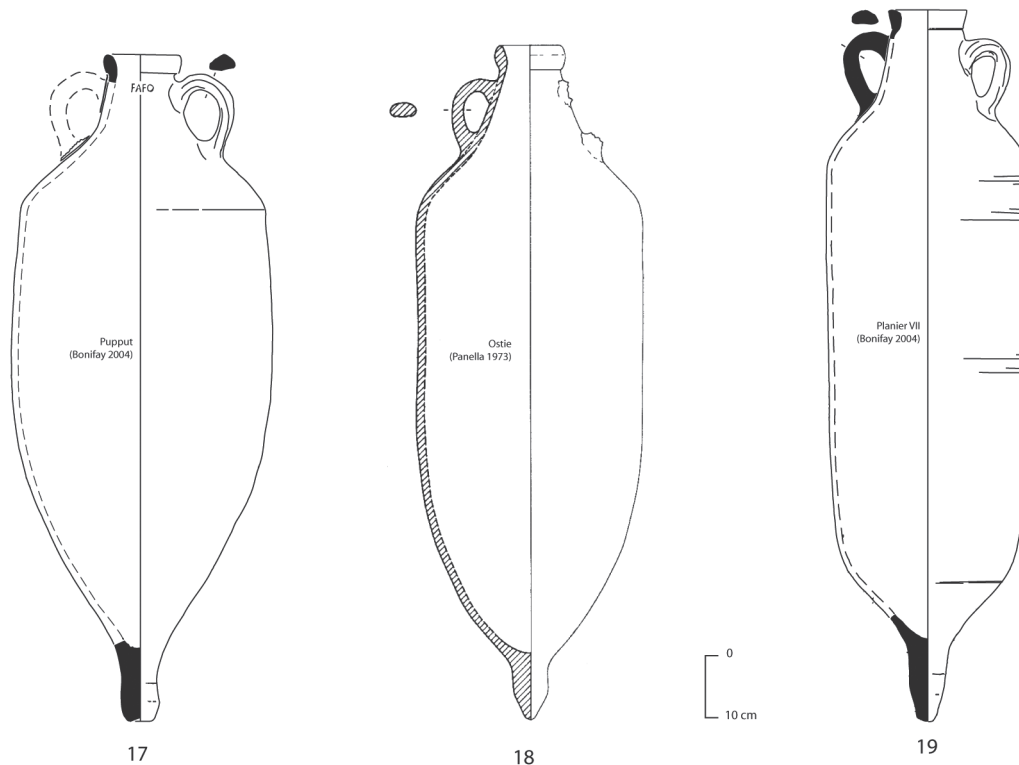
Pattern 2: Production Linked to the Estates (Tripolitania, 1st–4th Century A.D.)

The second pattern shows a rural production linked to estates, which is characteristic of the Tripolitania region from the 1st century into the mid- to late 3rd century A.D. This amphora production includes two types: Tripolitana I and III (fig. 3, 16), both of them devoted to the transport of olive oil³⁵. These amphorae are less standardized than the Byzacena amphorae, with great variability in rim profiles as well as fabrics. The size and capacity of the Tripolitana I type seem to vary through

³³ Bonifay 2004, 9–15, with bibliography.

³⁴ Bonifay 2018, 344.

³⁵ Jerray 2016.



4 African amphorae. Diversification phase (2nd half of the 3rd cent.). Eastern Zeugitana and Byzacena types: Africana II B (17), C (18), and D (19) (© see the individual numbers)

time³⁶, but the lack of large numbers of complete examples prevents us from having good information on capacity variations in the same period of production.

The lower degree of standardization in comparison with the African amphorae produced at the same time in Byzacena is probably due to the distribution of workshops in the countryside of Tripolitania. The documentation from the Tarhuna plateau, south of Oea and Leptis Magna, is the most significant for Tripolitania. The survey carried out by Muftah Ahmed Alhddad in the hinterland of these cities allowed him to discover more than 15 workshops linked to Roman farms with remains of olive presses³⁷. This survey shows us a high degree of specialization in olive oil production, in which the elites of Leptis Magna as well as sometimes the emperor were involved, as demonstrated by the stamps. A series of amphora workshops have also been discovered along the coast³⁸, most of them probably linked to possible *villae maritimae*, which is perhaps also the case for those found in the surroundings of the present-day city of Tripoli. The situation is more diverse in the western part of Tripolitania, where some workshops are clearly located in the suburbs of port cities (like Meninx) or cities not far from the sea (like Zitha). This is perhaps the particularity of a region at the border with Byzacena, which assumes some of its production patterns³⁹.

Even if the lifespan of the Tripolitana I and III types was very long – from the first variants of the end of the 1st century A.D. (perhaps the evolution of the local ovoid type, as mentioned above) to the last ones at the end of the 4th or beginning of the 5th century – it seems that the second half of the 3rd century brought a major change, with a reduction in production in the Leptis Magna hinterland, or even a complete collapse in western Byzacena⁴⁰. Some of the latest variants shared morphological similarities (rim profile) with the Africana III type.

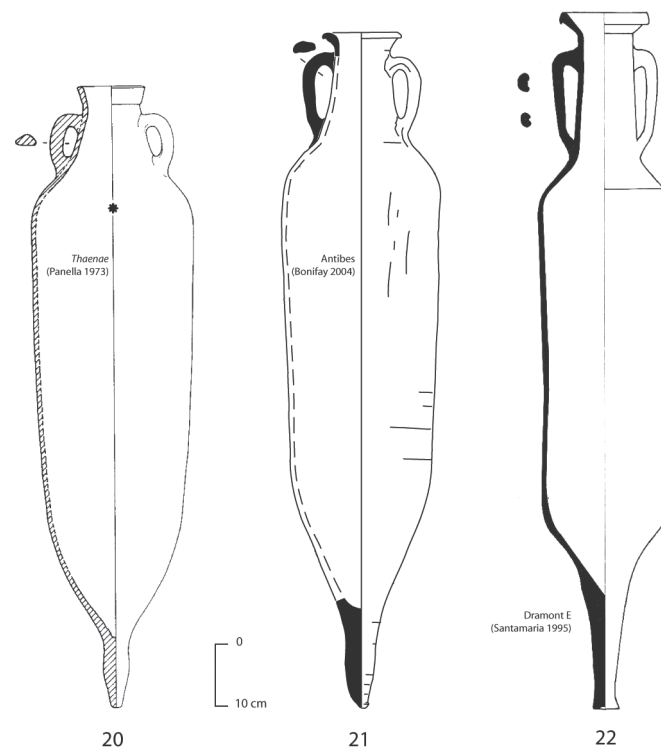
³⁶ Bonifay 2004, fig. 55 a.

³⁷ Ahmed 2010.

³⁸ Jerray 2016, fig. 12, 7 (map).

³⁹ Jerray 2016, 163.

⁴⁰ Jerray 2016, 164 f.



5 African amphorae. Standardization phase (4th cent.). Ubiquitous type: Keay 25/Africana III A–C (20–22) (© see the individual numbers)

The Reorganization of the 4th Century A.D.

African amphora production underwent a major reorganization at the end of the 3rd century or the beginning of the 4th century A.D. A new standard of container appeared: the Keay 25 or Africana III type, which is a medium-sized cylindrical amphora with a capacity of 26–27 liters (= the *amphora* unit of measure)⁴¹. The morphology was not completely uniform, and many variants have been determined, the majority of which can be grouped into three subtypes (fig. 5, 20–22).

This variability might be able to be explained by the distribution of the workshops, located not only in the suburbs of the port cities – for example in Thaenae⁴², Sullectum⁴³, Leptiminus⁴⁴, Nabeul⁴⁵, and Carthage⁴⁶ – but also close to the foodstuff production plants (estates and salted-fish factories)⁴⁷ from western Tripolitania to perhaps Mauretania Caesariensis. This new African type is rare in that it was imitated outside of Africa, notably in the Iberian Peninsula⁴⁸.

Another explanation for the typological variation might be found in the diverse nature of its contents. Wine seems to have been the major content of the most distributed subtype, Keay 25.1, as shown by chemical analyses⁴⁹. It has been proposed that the birth of this type could have been linked with the introduction of the *canon vinarius* at the end of the 3rd or beginning of the 4th century⁵⁰. Subtype Keay 25.3 is typical of the workshop of the Nabeul region and was perhaps

⁴¹ Bonifay 2004, 119–122, with bibliography.

⁴² Bonifay 2004, 31; PhD thesis in progress, by Rémi Rêve.

⁴³ Nacef 2015a.

⁴⁴ Mattingly et al. 2011, tab. 6, 3.

⁴⁵ Bonifay et al. 2010b.

⁴⁶ Ariana workshop: Panella 1982, 179.

⁴⁷ See, most recently Ben Tahar – Capelli 2018; Ben Tahar et al. 2018.

⁴⁸ See, for example, Berrocal 2012.

⁴⁹ Woodworth et al. 2015.

⁵⁰ Bonifay 2018, 342.

devoted to the transport of fish products. It is still difficult at present to assign a specific subtype of Keay 25 to the transport of olive oil. Lastly, variant Keay 25.2 is a late evolution of the type in general, which foreshadows the changes of the first half of the 5th century.

TRANSFORMATIONS OF THE LATE ROMAN, VANDAL AND BYZANTINE PERIODS

From the beginning of the 5th century onwards, African amphora production experienced significant changes, with a phase of broad diversification during most of the late Roman and Vandal periods, followed by a new attempt at standardization during the 6th and part of the 7th century A.D.

Small-sized Amphorae (so-called Spatheion Type)

We must first deal with the question of the small-sized containers improperly called *spatheia*⁵¹, which are a phenomenon of the 5th century (fig. 6, 23). In fact, as has already been demonstrated by J.-P. Joncheray 45 years ago⁵², *spatheia* are nothing more than small models of the type Keay 25.2, the latest variant of the 4th-century type. Their size may vary from 77 to 92 cm in height, and from 13 to 18 cm in diameter, not far from the medium size of type Keay 25.2 (77–92 cm in height and 20–25 cm in diameter).

Their contents seem to be completely interchangeable, without links to specific typological variations, as shown by different traces of contents found in amphorae of the same type. For example, fish remains were preserved in a *spatheion* bottom at Tarragona⁵³, while a complete example discovered in the port of Pisa could have carried oil (as it did not present any visible traces of pitch)⁵⁴, and pickled olives were transported in the amphorae from the Dramont E wreck (as shown by the remains of olive pits found inside)⁵⁵.

Moreover, the distribution of the *spatheia* within the cargo of Dramont E wreck shows that they were quite regularly inserted between the large amphorae of types Keay 35A and B⁵⁶. For this reason, the current presumption is that these containers were pure space fillers, designed for the optimization of the shipments from the beginning of the 5th century onwards. The appearance of this new standard of small-sized amphora, which coincides with the development of new types of large-sized amphorae, is probably the sign of major change in the organization of late Roman trade. In this case, standardization just meets the technical requirements of maritime trade.

Diversification Phase: 5th Century A.D.

The 5th century is the moment of broad typological diversification through a huge series of large-sized cylindrical containers. A good example of this situation is given by the African containers reused in the 5th-century necropolis of the Christian Basilica at Malaval Street, Marseille, with not less than 28 different types in an assemblage of only 49 African amphorae⁵⁷.

Among these numerous types, it is worth noting that some of them are intrinsically homogeneous:

- The types Keay 27 and 36 (fig. 6, 24–25), with two different capacities (ca. 55 and 65 l), and perhaps two different contents (oil could be one content), were produced in a quite homogeneous fabric, pale pink-orange in color, with the presence of darker or paler streaks

⁵¹ Bonifay 2004, 125.

⁵² Joncheray 1975, pl. 2.

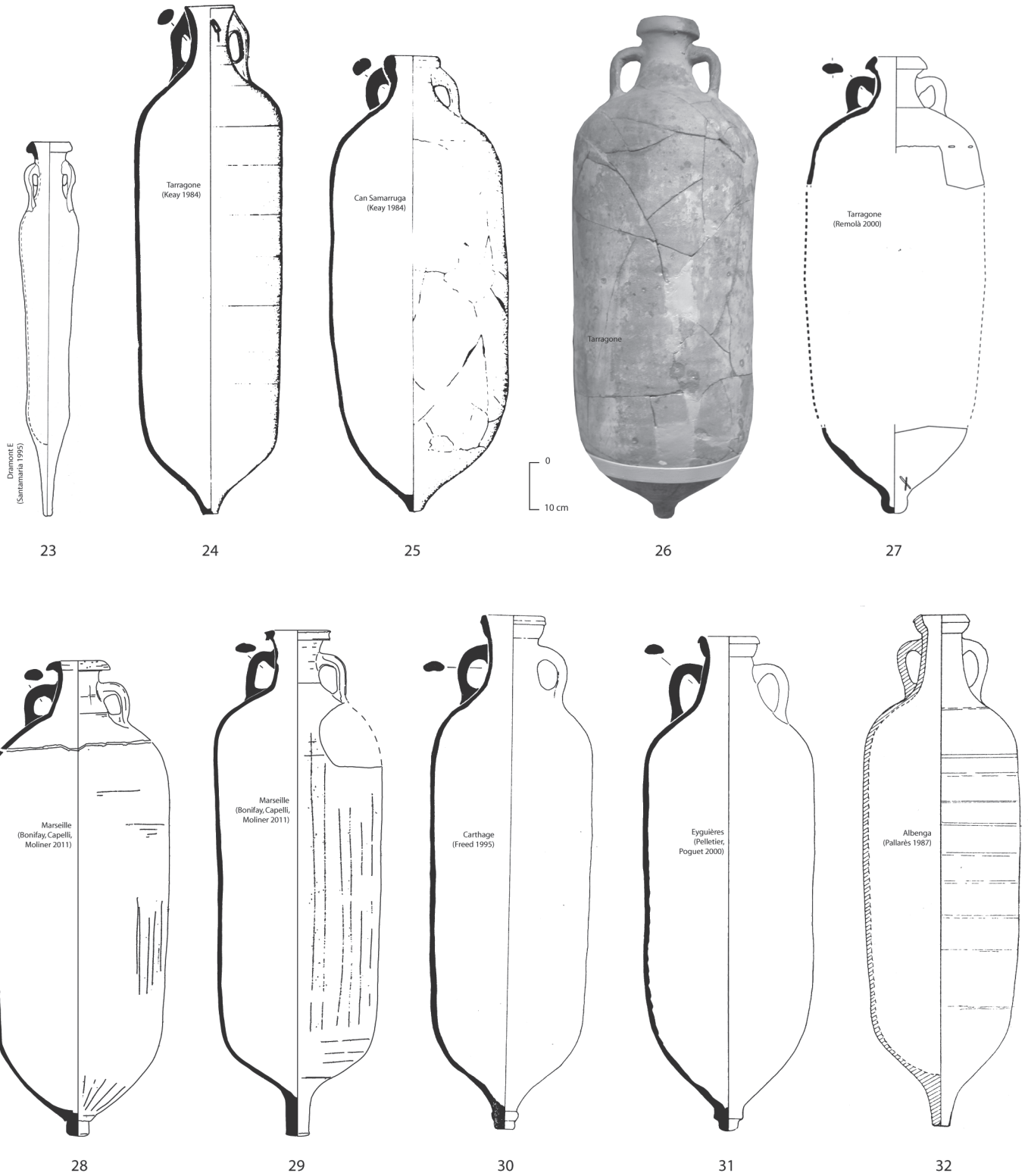
⁵³ Morales 1989.

⁵⁴ Personal observation M. Bonifay.

⁵⁵ Santamaria 1995, 123.

⁵⁶ Santamaria 1995, fig. 9.

⁵⁷ Bonifay et al. 2011.



6 African amphorae. Diversification phase (5th cent.). *Spatheion* 1 (23), types Key 27 and 36 (24–25), types Key 40 and 41 (26–27), type Key 35A/B transitional (28), type Key 59 (29), types Key 62R, 62Q, and Albenga 11–12 (30–32) (© see the individual numbers)

due to the imperfect mixing of clay components during the creation of the fabric. According to their distribution in Africa, these types seem to have been produced in a single workshop in the Carthage region, perhaps in the lower Mejerda Valley⁵⁸.

- The types Keay 40 and 41 (fig. 6, 26–27), with the same general shape and the same details of rim and bottom morphology, can only be differentiated through fabric, even if both seem to originate from the northwest region of Tunisia⁵⁹.
- Within the prolific 5th-century amphora production along the eastern coast of Cape Bon (mainly Nabeul but also Korba, and perhaps Kelibia), it is interesting for our purposes to focus on the types Keay 35A and B. These two types were produced at the same time, in the same workshop, and commercialized together but were probably devoted to different contents: oil (?) for variant A and fish products (?) for variant B. Details of the rim and the bottom are distinctive, allowing for distinguishing each type on the basis of simple sherds. Nevertheless, some transitional variants are known, with intermediate characteristics (fig. 6, 28)⁶⁰, and also three different sizes for type B.
- The types Keay 59 (fig. 6, 29) and 8B are also interesting, as they were first completely separate in their typologies, but they represent, in fact, two different developmental stages of the same amphora type. This reflects a long-lasting standardization of production from the end of the 4th century, the possible date of birth of the type Keay 59, to the mid-6th century, the probable date of the latest Keay 8B variants. The general homogeneity of the fabric, even if some petrographic particularities are noted, reveals a restricted area of production in southern Byzacena, where two rural workshops have been discovered⁶¹. These types were probably devoted to the transport of olive oil.

In contrast, some other types are more heterogeneous. This is notably the case of the large ›family‹ represented by types Keay 62R, Keay 62Q, and Albenga 11/12 (fig. 6, 30–32), with a similar general shape but many differences regarding detail in the shape of the rim, neck, handles, bottom, and of course fabrics. These amphorae, the contents of which are completely unknown, seem to have been produced from the end of the 5th century to the first third of the 6th century in more than one region⁶². The low homogeneity of each type but the undeniable similarities between examples produced in remote regions could prefigure the standardization on a large scale, which will occur during the Byzantine period.

The cessation of activity in the large suburban workshops of the eastern coastline of Tunisia put an end to the large-scale standardization of amphora production in Zeugitana and Byzacena. The location of the new 5th-century workshops, which seem to have moved closer to the center of foodstuff production, shows a huge development in production in Cape Bon, specifically in Nabeul. This was also the time at which the south Byzacena workshops were very active. On the other hand, the production seems to have almost completely ceased in the Sahel region, for example in Leptiminus and Salakta⁶³. Of course, the irregular distribution of the production centers over the territory inhibited a high level of standardization.

Standardization Phase: 6th–7th Century

A new phase of standardization began with the first decades of the 6th century, the date generally accepted for the onset of the Keay 62 type, even before the Byzantine conquest. As a matter of

⁵⁸ Capelli et al. 2016, 286.

⁵⁹ Capelli et al. 2016, 289.

⁶⁰ Bonifay et al. 2011, 240.

⁶¹ Majoura: Bonifay 2004, 31; Nasr – Capelli 2018. Meknassi: Ben Moussa 2017. On the other hand, the hypothesis of a workshop in the suburbs of the Roman city of Iunca could not be confirmed by the recent survey in 2017–2018.

⁶² Capelli et al. 2016, 289.

⁶³ Mattingly et al. 2011, 266 (Leptiminus); Nacef 2015a, 107 (Salakta).

fact, the production of the 6th and 7th centuries A.D., perhaps until the first third of the 8th century, was dominated by the types Keay 62, 61 and 8A (fig. 7, 33–35), which share similar details of shape for almost two hundred years, including its very specific foot, with its characteristic bulb (or ring) around the spike. The complete examples are too few to attempt a comparison of sizes and capacities, but the similarities of form are quite striking. In particular, the type Keay 62A of the first half of the 6th century was produced in both the Nabeul and Sahel regions, and it is sometimes difficult to distinguish the two different origins without an archaeometric approach, demonstrating a high level of interregional standardization. Types Keay 61 and 8A are more specifically linked with the amphora production of Moknine in the Sahel region⁶⁴ but still with a high level of standardization. Contents are still unknown, but olive oil and *salsamenta* have been suggested.

The 7th century is also marked by the development of very small amphorae of about half a liter, sometimes without handles. Even without any link to the examples of the 5th century, they are also called *spatheia*. They are produced in several parts of the African territory, for example in Nabeul (type *spatheion* 3C) and Moknine (*spatheion* 3D) (fig. 7, 36–37). The contents of these bottles are unknown, but *garum* has been suggested on the basis of some *tituli picti* from Egypt⁶⁵.

Finally, the last evidence attesting to the standardization of African ›Roman‹ amphorae is shown by the dissemination in Africa of the Byzantine model of globular amphora from the beginning of the 7th century onwards. At least four types have been identified, which differ quite considerably in their details, but their general shape seems to derive from the eastern Mediterranean types LRA 1 (which was also imitated in Africa during the Byzantine period)⁶⁶ and LRA 2. Only the so-called Castrum Perti type (Bonifay's ›Globulaire 3‹) (fig. 7, 38) achieves a genuine consistency in terms of production centers, the Sahel region, maintained throughout the mid- and late 7th century⁶⁷. The lack of complete examples (except the one from Rome)⁶⁸ as well as of chemical analyses of residues prevents us from reflecting on other elements of the standardization of this specific type aside from its morphology. However, it is worth noting that this general globular shape survived during the Islamic period, as shown by the amphorae of the Aghlabid period⁶⁹, while the cylindrical shape, characteristic of most of the amphora production during the Punic and Roman periods, disappeared. With this last example, standardization became synonymous with typological impoverishment.

CONCLUSION

If we compare these data with the general chronology of Africa from the mid-2nd century B.C. to the end of the 7th century A.D., we observe that the four main phases of standardization do not correspond to the main historical divisions (fig. 8):

- Phase 1: The first phase took place during the Republican period with the introduction of the Greco-Roman type of amphora, which represented a standardization at a Mediterranean level. Nevertheless, the pattern of production showed a standardization of the shape but a very low metrological standardization and a dispersed system of workshops perhaps linked to the *fundi*.
- Phase 2: The second major phase of standardization developed between the mid-2nd century and the mid-3rd century, with the classic types Africana I and II in Africa Proconsularis and Tripolitana III in Tripolitania. The most interesting point here is the coexistence during this phase of two different patterns of production: the first one (in Zeugitana and Byzacena) centralized in the port cities and the second (in Tripolitania) linked to the estates. These

⁶⁴ Nacef 2014; Nacef 2017; Nacef – Capelli 2018.

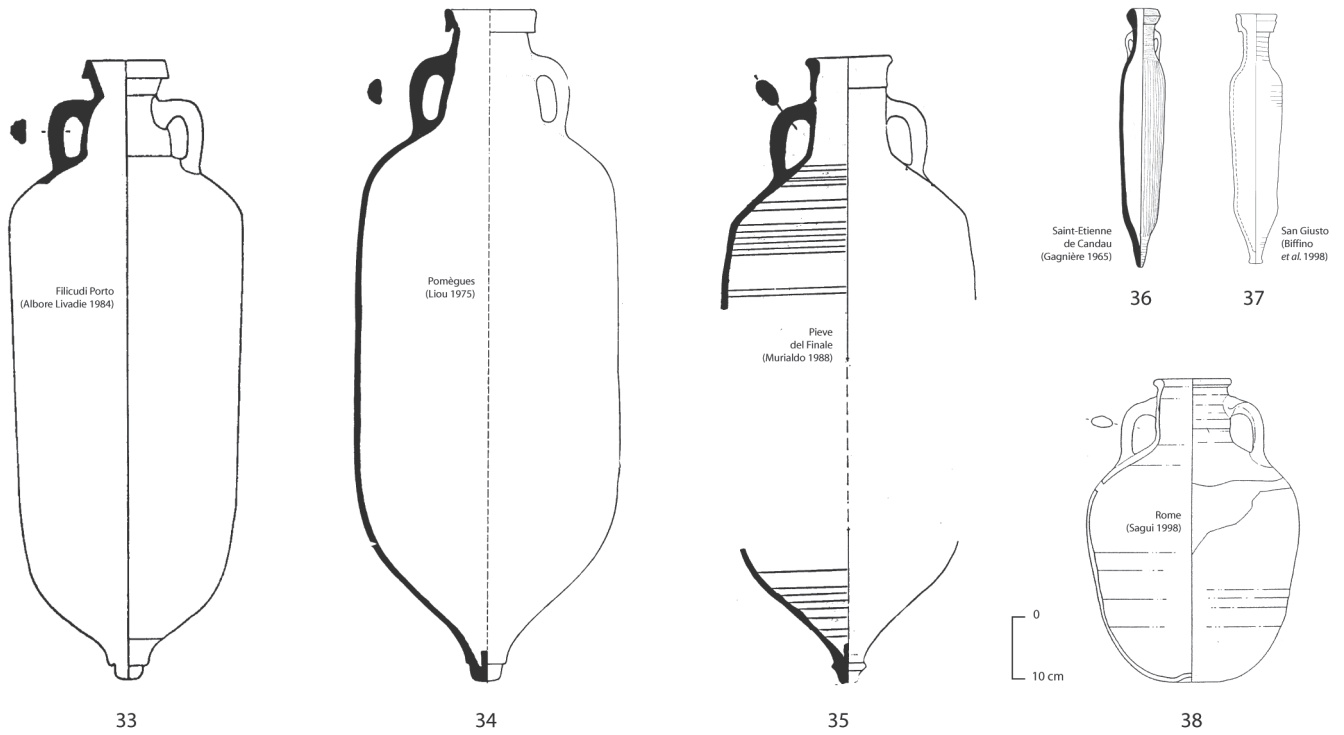
⁶⁵ Fournet – Pieri 2008.

⁶⁶ Nacef 2007a.

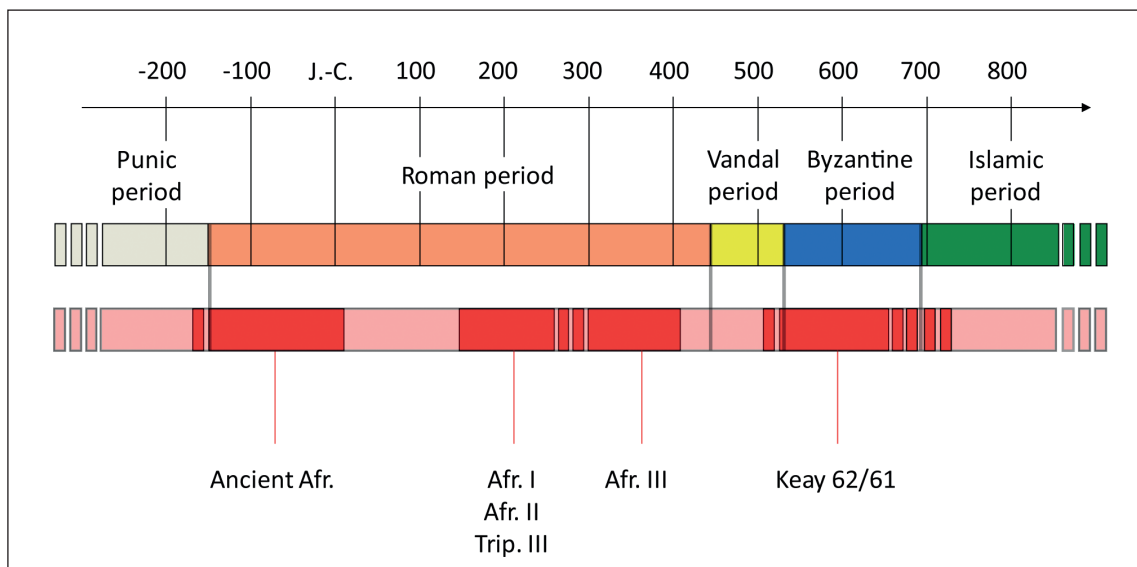
⁶⁷ Type produced in Moknine, in a separate workshop: Nacef 2017; Bonifay – Capelli 2018.

⁶⁸ Sagui 1998, fig. 8, 4.

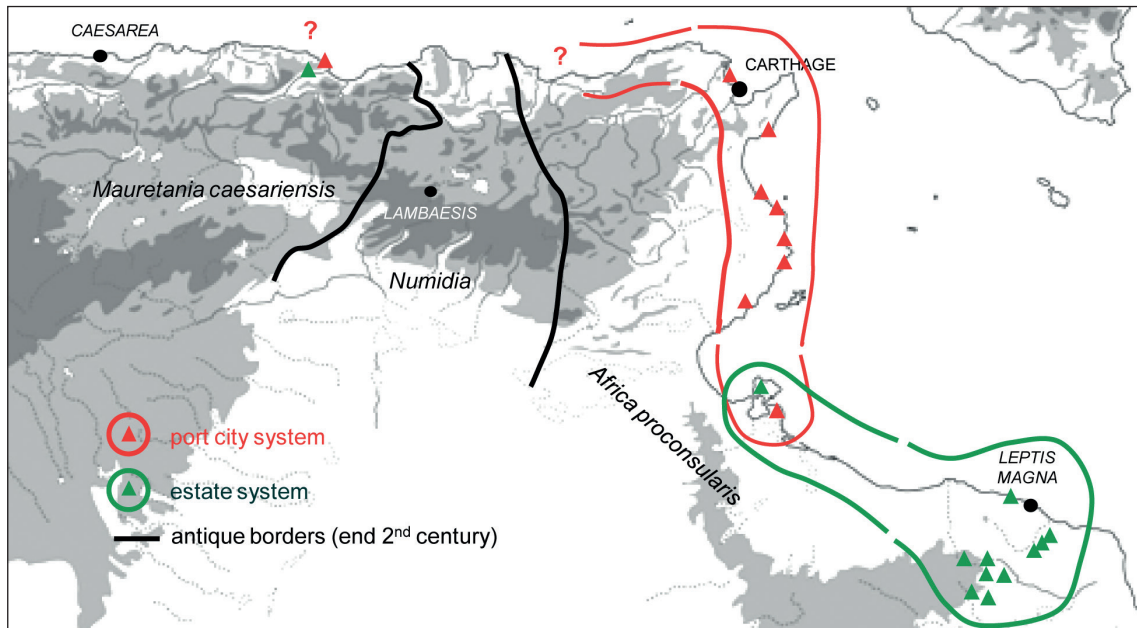
⁶⁹ Reynolds 2016, 154.



7 African amphorae. Standardization phase (6th–7th cent.). Types Keay 62, 61, and 8A (33–35). *Spatheia* 3 C and D (36 f.). Globular amphora type ›Castrum Pertici‹ (38) (© see the individual numbers)



8 African amphorae. Standardization and diversification phases through time (© M. Bonifay)



9 African amphorae. Geographical extension of the two main patterns of standardization (late 2nd–mid-3rd cent.) (© E. Jerray, M. Bonifay)

two patterns imply a standardization of amphora types, very strict (very similar shapes and fabrics) in the first case and looser (quite different details regarding shapes and fabrics) in the second one. Western Tripolitania (Jerba and the city of Zitha) is at the intersection of the two systems.

- Phase 3: A third phase during the 4th century with the Africana III type testifies to a complete reorganization of production. The pattern of production combined the two previous ones, with a production linked to the suburbs of the port cities and the estates. The shape was highly standardized but the contents were probably diversified in relation to the system of production and agricultural products.
- Phase 4: The fourth and last phase, at the end of the Vandal period and during at least a part of the Byzantine period, shows a new effort at standardization with the large-sized cylindrical amphorae (Keay 62, Keay 61 and Keay 8A) and the Byzantine globular amphorae. It is difficult to understand the production system during the Byzantine period: were the workshops linked either to private or church estates or grouped in craftsmen villages?

In this panorama, the 1st century A.D. and the 5th century, with the development of a great variety of different types, appear to be phases with major shifts in production systems. On the other hand, in the second half of the 3rd century, the strict standardization of African amphorae seems to waver for a while, but it is rapidly stabilized at the beginning of the 4th century with the creation of a new ubiquitous type. In fact, the first phase of standardization in Zeugitana during the Republican period is very similar to the system used in Tripolitania during the mid-Roman period, while uniform standardization is only attested during a short period, from the end of the 2nd century to the mid-3rd century in a limited area, namely the eastern coast of Africa Proconsularis from Carthage (?) – or at least Nabeul – in the north to Thaeanae in the south (fig. 9). This very specific and coastal organization of production probably had something to do with the geographic configuration of North Africa, which unlike the Baetica region lacked perennial rivers (except the Mejerda), and, with its east-west topography orientation, did not facilitate terrestrial transport of heavy amphorae. But it also probably had to do with the economic system of the mid-Roman Empire. Indeed, this uniform system, partly renewed during the 4th century, totally ended at the

beginning of the 5th century when Rome-centered trade collapsed⁷⁰. Nevertheless, the new organization of production in the 5th and 6th centuries still preserved some aspects of concentration, as shown by the large potter groupings identified in the vicinity of Sullectum and Nabeul.

The documentation in Numidia and Mauretania Caesariensis is very poor for the moment and does not allow for the decipherment of any economic pattern except for the phenomenon of the Gaulish amphora (Dressel 30 type) imitation in the second quarter of the 3rd century, associated with city name stamps. Lastly, the production of African amphorae of Punic tradition continued throughout the entire Roman period, with local attempts at standardization but limited distribution in the Mediterranean market.

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⁷⁰ As shown by the study of African amphorae from Portus: Franco 2012.

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