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GUADALQUIVIR VALLEY (FIRST CENTURY
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IVÁN GONZÁLEZ TOBAR 

AMPHORAE FROM BAETICA. NEW DATA RELEVANT TO RURAL PRODUCTION IN THE GUADALQUIVIR VALLEY (FIRST CENTURY BC–FIFTH/SIXTH CENTURIES AD)

Summary. *One of the most prolific areas of agrarian production of the Roman Empire was the Guadalquivir valley of Hispania Baetica. The current study was carried out in the region downstream from Corduba (Córdoba), the capital of Baetica. Knowledge of amphorae from this zone, often underrepresented at consumption sites, has in recent times undergone a complete renewal. This study thus offers an overview of the main archaeological results concerning amphora production based on fieldwork carried out between 2016 and 2020. It sheds light on a heretofore unknown early activity dating to the Augustan period followed by variable dynamics during the first three centuries of the first millennium. The findings also allow a delving deeper into the mechanisms of the sector during Late Antiquity, widening the repertoire of amphorae originating from the area.*

The province of *Hispania Baetica* underwent a spectacular economic development between the late first century BC and the fifth century AD. Strabo's (3, 2, 6) allusion to *Turdetania* as the source of abundant oil and wine suggests that these products came from the middle and lower valley of the Guadalquivir.¹ Yet it is above all the archaeological research on amphora workshops that has made it possible to delimit the precise production areas. Research since the end of the nineteenth century has focused on the Guadalquivir valley as a privileged area of olive production. Surveys by G. Bonsor and E.W. Clark-Maxwell established that globular amphorae, widespread throughout the Western Mediterranean,² were produced in the heart of Roman Andalusia (Clark-Maxwell 1899; Bonsor 1901). These amphorae served to transport olive oil from the province of Baetica, more precisely from the valleys of the Guadalquivir river and its main tributary, the Genil.³

¹ See Cruz Andreotti (ed.) 2019 for a recent overview of 'Roman *Turdetania*'.

² At that time it was only identified at Monte Testaccio (Rome) in the then recent publication by H. Dressel (no. XV of the CIL, 1899).

³ Dr. 20 today are known to have been produced in small numbers along the coast through *tituli picti* citing the cities of *Sexi* (Almuñécar, GR=Granada) and *Sal* (Salobreña, GR) (Martínez *et al.* 2017) and the discovery of wasters in the workshops of Malaga, Granada and Almería (Mateo and Berni 2017).

Major surveys of the 1970s and 1980s yielded increasingly precise maps of the amphora workshops along these two rivers (Ponsich 1974; 1979; 1991; Remesal 1983; Chic 1985), downstream from the capitals of the *conventus*, Córdoba and Ecija, and upstream from Seville. This rapid advance in research was followed by 40 years where the new data was gleaned mainly from consumption contexts. Notable here was the data collected during resumption of work at the Mount Testaccio in Rome (Rodríguez Almeida 1984; Blázquez *et al.* 1994), as well as the excavation of numerous shipwrecks and different sites in urban contexts along the *limes* (e.g. Martin-Kilcher 1987; Liou *et al.* 1990). Moreover, other non-olive oil bearing amphorae (Haltern 70, Dressel 28) also began to be identified as coming from the Guadalquivir valley (Colls *et al.* 1977).

Despite two recent surveys (Étienne and Mayet 2004; Berni 2008) and a new study offering a methodological approach (Barea *et al.* 2008), different specialists have stressed the necessity of systematic fieldwork in Baetica (Rico 1994, 108; Ehmgig 2004, 155; Étienne and Mayet 2004, 41–2, 118; Berni 2008, 214). Their most common criticism is that research has primarily focused on amphora epigraphy (Rico 1994, 108; Bernal 2000, 243), leaving unsolved many research questions such as workshop size, chronology, product repertoire and their link to different types of settlements. R. Etienne and F. Mayet (2004, 124, 142–3), in particular, also highlight the need to define and clarify the nature of the different workshops.

Two Franco-Spanish systematic field surveys were carried out throughout the amphora production sector between 2013 and 2019 in the framework of the PAEBR and OLEASTRO⁴ research programs. The intention of these successive projects, coordinated by the Universities of Paul-Valéry Montpellier 3, Seville, and Córdoba, was to characterize not only each workshop but also the whole of the territorial production. In addition, the excavation of a series of ‘sample’ workshops (Mauné *et al.* 2014; Bourgeon *et al.* 2016; González Tobar *et al.* 2018) has rendered it possible to shed light on fuel supply strategies, in particular those related to wood and olive stones (Bourgeon *et al.* 2017), as well as to verify the hypotheses advanced during field work (González Tobar *et al.* 2018). To undertake the study of such a vast geographical zone, the fieldwork was broken down into three areas, each the subject of a doctoral thesis.⁵ The first focused on the workshops along the banks the Genil river, while the second and third corresponded respectively to those along banks of the Guadalquivir either downstream (in the area of Seville) or upstream (in the area of Córdoba) from its confluence with the Genil.

The present study thus summarizes the main archaeological results of the third survey, that concentrating on the banks of a segment of the Guadalquivir between its confluence with the Genil and Córdoba, the capital of Baetica (Fig. 1). This separation in fact represents more than a simple methodological division, as it coincides with a historical reality, that of one of the administrative sub-divisions of the province, the *conventus Cordubensis* (Cortijo Cerezo 1993, 144–6; Stylow 1995; Remesal 2004, 349; 2011). The study question posed here is: what is the role of the production area of Córdoba, the capital of the Baetican Province? Did the amphora production of this region develop in a later stage, a notion pointed out previously (Berni 2008) based on stamps found in known workshops? The greater distance to Seville and the Atlantic by way of the Guadalquivir might explain such a later development. The objective of this study is thus to offer an approach to these questions by investigating the amphora-producing workshops of the area, their

⁴ OLEASTRO: OLÉiculture et AmphoreS en Turdétanie Romaine (2016–19). PAEBR: Production Artisanale, Economie et environnement en Bétique Romaine (2013–15).

⁵ Phd theses: O. Bourgeon (2018), Q. Desbonnets (2018) and I. González Tobar (2020).



FIGURE 1

Distribution of the oil amphora workshops in *Hispania Baetica* along the Guadalquivir and Genil rivers. The frame designates the sector examined in this study (I. González Tobar).

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locations, dimensions and archaeological and topographical characteristics. As finds of imported non-oil containers from the Guadalquivir are numerous throughout consumption contexts, this study has attempted to determine if these workshops also produced other types of amphorae, a finding that could significantly alter the view of the domination of regional production by oil. Moreover, a rigorous characterization of the different production sites also has allowed the pinpointing of their precise chronological frameworks, elements which ultimately offer clues to respond to the general question regarding the general dynamics of amphora production of the *conventus Cordubensis*.

METHODS: THE FIELD SURVEY

The field work between 2016 and 2019 consisted of four surface campaigns (2016–18) and two excavations (2018–19). Due to the vastness of the area along the Guadalquivir between Córdoba and the city of Palma del Río (several thousand hectares), it was impossible to apply an exhaustive systematic survey. Thus three objectives were prioritized: the rigorous characterization of the known workshops, identification of the workshops in the vicinity or along the riverbank, and the systematic survey of targeted zones beyond the riverbank of specific interest to amphora production.

The methods applied to characterize the amphora workshops fall into two categories: systematic methods (applicable to all the workshops) and those of restricted methods (i.e. applicable to a selection of workshops). The first basically corresponds to surface surveys, that is, oral information gleaned from the local population, the actual field walking, creating topographic records, determining sherd density (in part explained in Corbeel *et al.* 2018), artefact processing, isolating the epigraphic *corpus* of potter stamps and analysing the evolution of workshop management. The second is more specialized and includes UAV thermal imaging and geophysical surveys, and archaeological excavations. This last option was applied to two sites⁶ chosen for the clues they could yield to solve specific questions.

The fact that Dressel (hereafter Dr.) 20 amphora fragments are omnipresent on Roman archaeological sites in the Guadalquivir valley does not necessarily indicate the presence of workshops. Consequently, apart from large clearly defined workshops primarily characterized by great concentrations of surface sherds,⁷ the identification of workshops in the field can be arduous. This complication led to attempts to define workshops solely on the basis of objective parameters that are valid not only for excavated sites but above all for surface ones. The presence of amphora sherds, debris linked to kiln architecture, overfired fragments (wasters) and basins serving as supports⁸ are key but not definitive criteria.⁹ The intention is to favour more distinct criteria such as the clear presence of kilns, an assemblage of original potter stamps, and a density of surface amphora sherds indicative of waste dumps (Fig. 2). This last criterion is garnered through 1 m² equidistant surface samplings which, besides identifying waste dumps, is very useful in validating

⁶ Fuente de Los Peces (Fuente Palmera, CO) (CO=Cordoba) (Fig. 3.14) and at El Mohino (Palma del Río, CO) (Fig. 3.19). The latter of these sites has been partially published (González Tobar *et al.* 2018).

⁷ A good example is the photo of the workshop of El Temple (Almodóvar del Río) published by M. Ponsich (1979, 182, pl. LXIX).

⁸ The objects labelled *lebrillos* were first determined to be integral elements of workshops by J. Remesal (1977–78).

⁹ These criteria, stemming from surface surveys in Narbonese Gaul (Laubenheimer 1985; Bermond and Pellecuer 1997; Mauné and De Chazelles 1998), were adapted to the Baetican contexts (Bourgeon 2018).

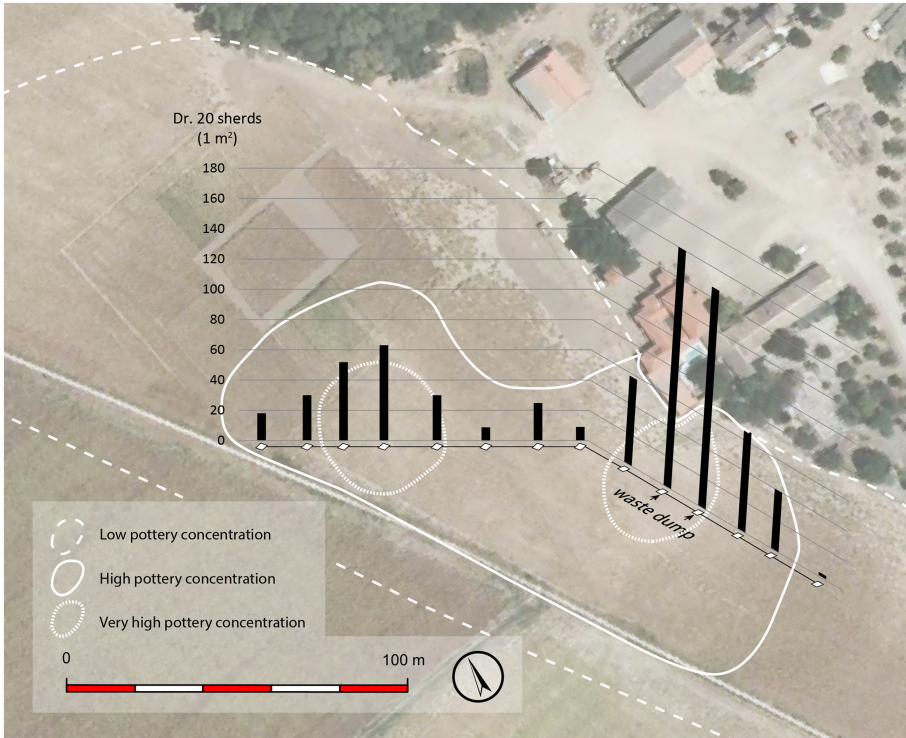


FIGURE 2

Aerial view of the amphora workshop of El Temple (Almodóvar del Río, Córdoba) with a graph superimposed, indicating the position of the tests and the number of sherds per square metre. Noteworthy are the two tests with over 120 sherds per square metre presumably corresponding to a waste dump (I. González Tobar).

the initial observations. This method has made it possible to accurately identify different types of concentrations within a given site allowing, for example, to distinguish residential areas from artisanal sectors.

RESULTS

General data

A total of 79 Roman sites were explored during the four survey campaigns of which 35 were classified as potential amphora workshops. Of these, only 23 could be corroborated by the methods described above (Fig. 3). Previous research, according to the map published by Carreras and Funari (1998) based on surveys by M. Ponsich, G. Chic and J. Remesal, recorded 29 amphora workshops. Paradoxically, although it was assumed prior to the project that fieldwork would yield more workshops, the final result, on the contrary, saw a reduction of their number. However, the systematic review of each site enabled a finer level of analysis.

Dr. 20 amphora production generated such an extraordinary amount of sherds that they are found scattered beyond their points of production into surrounding areas. As this type of spread entails the risk of over-interpretation, that is of multiplying the number of workshops, the

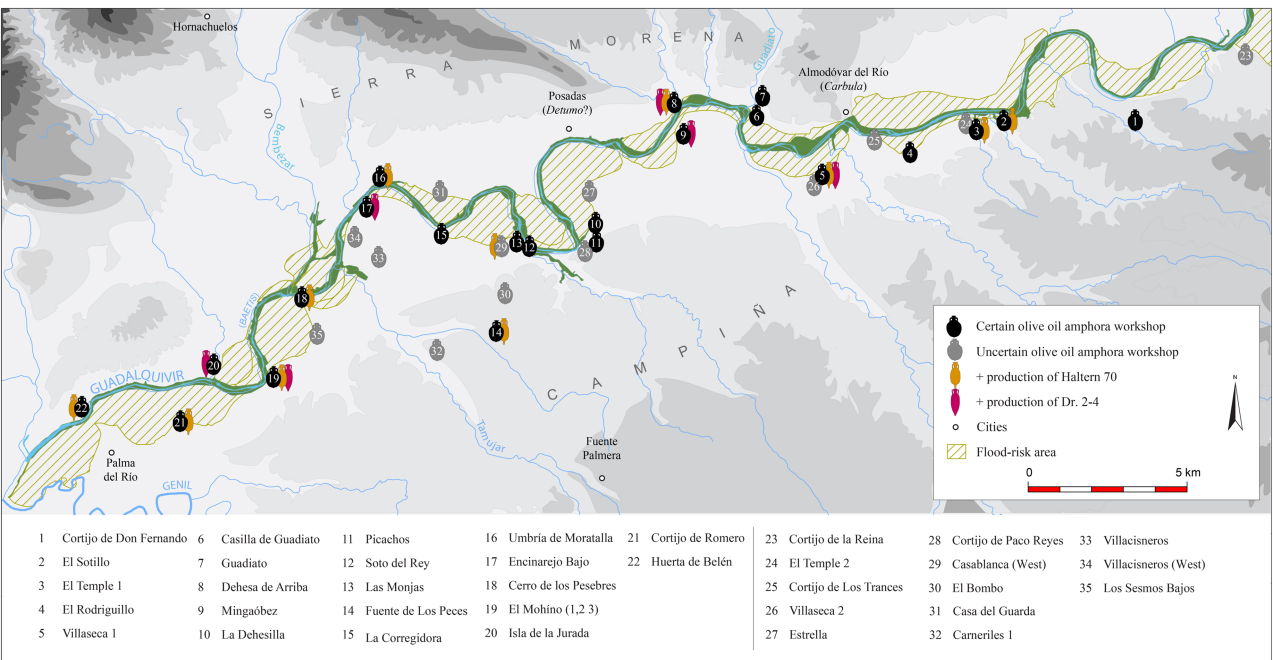


FIGURE 3

Amphora production area associated with the *conventus Cordubensis*, an area along the Guadalquivir stretching from Córdoba to its confluence with the Genil river (I. González Tobar).

phenomenon requires special attention. Furthermore, as amphorae were intended for fluvial or maritime export, there is no reason to believe that nearby sites acquired these oil amphorae for their own supply.¹⁰ An explanation for the presence of these anomalous features at other sites is the reuse of amphorae production waste sherds as building material.

The discovery of potter stamps in one workshop that are linked to another workshop has also led us to reflect on their nature. These types of finds not produced at a site could be indicative of either workforce displacement or the arrival of amphorae at a site before or after its period of activity.

The current study also attempted to distinguish between high concentrations of sherds from more scattered groupings, as well as artisanal material from residential areas. Artisanal sector surfaces can vary between 0.1 to 2 hectares in size. Some are clearly either physically linked to an adjacent settlement (6 cases) or with an area where luxury goods suggest the presence of a *villa* (5 cases). Many workshops (10 cases), however, do not appear to form part of archaeological sites with a clear residential quarter. It is possible that workers travelled back and forth between the workshop and nearby dwellings. However, the findings of surface surveys are insufficient to resolve this point. Residential areas are at times found closely associated with artisanal sectors but clear links between workshops and surrounding sites are scarce, except in cases of very close proximity and where their association is obvious (e.g. Villaseca 1 and Villaseca 2, Fig. 3.5 and 26).

Before moving on to the question of production phases, it is necessary to clarify that it is beyond the scope of this study to offer an in-depth analysis of the advances in amphora epigraphy. It is nonetheless of note that field work has nearly doubled the names of potters from 174 to 320 and provided key onomastic aspects and details as to the organization of amphora production. These new aspects call into question not only our knowledge of the society of this territory, but also the results of numerous studies which have attempted to analyse amphora producing districts through the origin of the Dr. 20 amphora stamps unearthed at consumption sites. This new work offers further new opportunities for understanding the Córdoba production district.

Phases of amphora production

Progress in the methods of dating potter stamps¹¹ has made it possible to place 91% of this corpus, greatly refining the chronological precision of the workshops (Fig. 4). Stamp and amphora morphology of the fragments have both been integrated in the analysis defining the limits of production periods. Research on potter stamps and Dr. 20 typology have contributed greatly to the understanding of the production timeframes of the different workshops. An overview of the dynamics of oil amphora production in the *conventus Cordubensis* yields two major trends. The first is characterized by a rise in the number of production centres, whereas the second, conversely, corresponds to a gradual decrease. The graph depicting the evolution in the number of establishments and abandonments of workshops is quite straightforward (Fig. 5). Moreover, no production gap is visible between the two main trends. On the contrary, there is a peak of production in the region ranging between the Flavian period and the first decades of the second century AD. It is

¹⁰ Determining at what distance that amphora finds originating from the Guadalquivir can be defined as imports is an issue that requires a deeper grasp of Roman olive oil production.

¹¹ Datings from consumption sites, notably Monte Testaccio (Rome), handle morphology (Berni 2017) and more recently the study of stamp structure (Moros 2021) are key to obtaining a relative chronology.

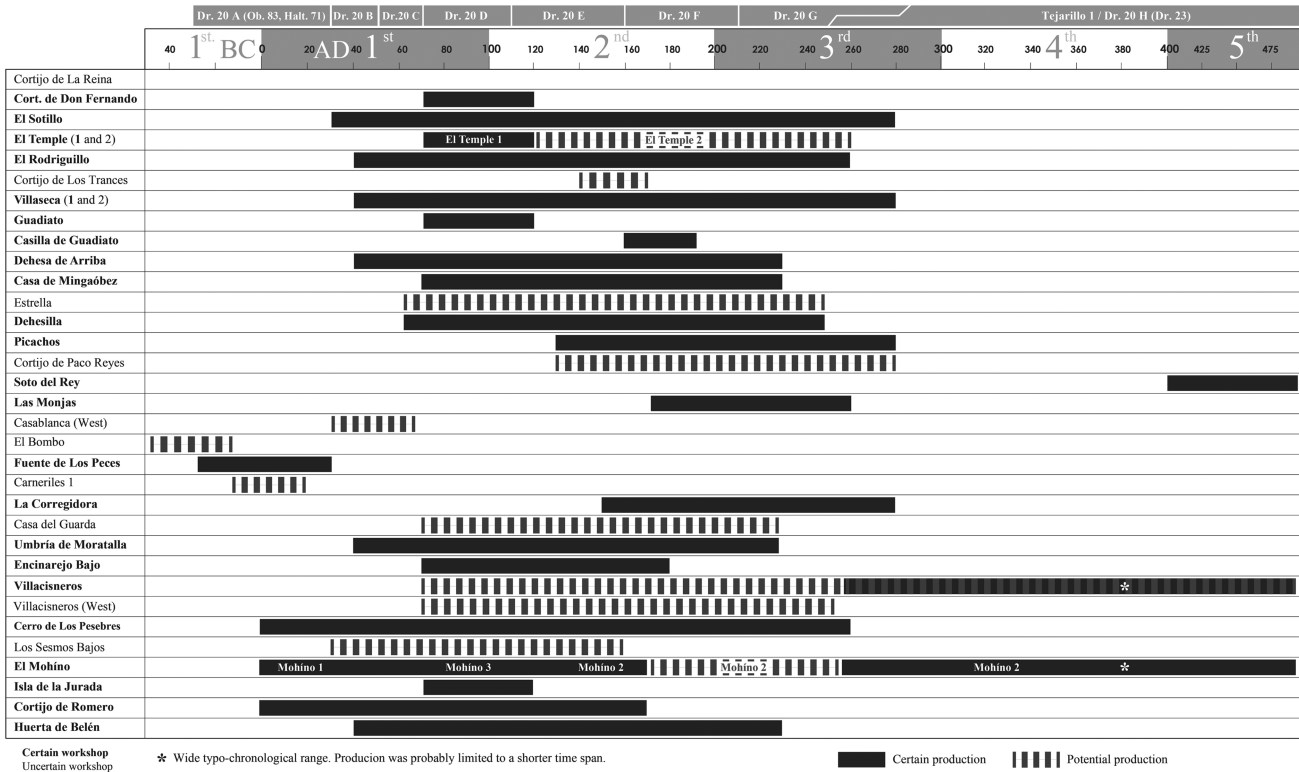


FIGURE 4
 Graph indicating the dynamics of production of oil amphorae over time in the *conventus Cordubensis* based on the number of active workshops and the establishment and abandonment of workshops (I. González Tobar).

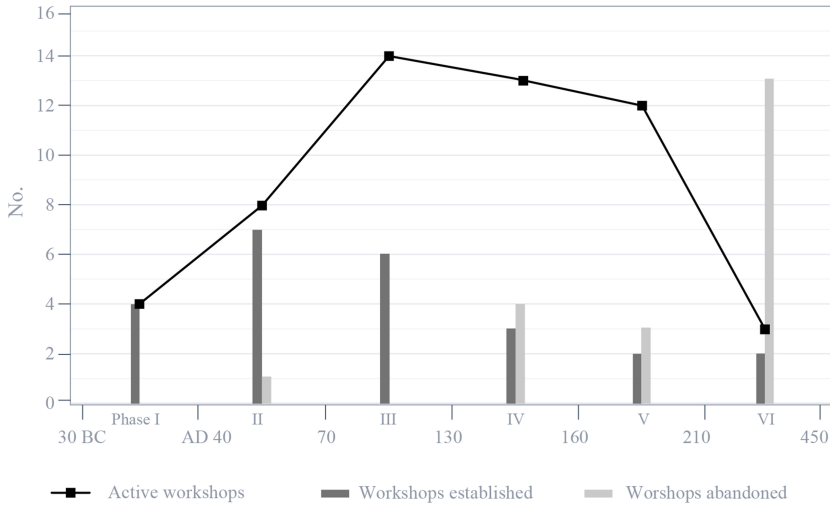


FIGURE 5

Graph indicating the dynamics of production of oil amphorae over time in the *conventus Cordubensis* based on the number of active workshops and the establishment and abandonment of workshops (I. González Tobar).

possible to assume from the number of workshops and their distribution along each of the Guadalquivir banks that olive cultivation attained its greatest extent at this time.

It would be of interest to attain a better grasp of the rhythm of growth of workshops within this broad chronological span (AD 70–140). Unfortunately, the high degree of uniformity of amphora profiles and the lack of consular datings at Rome's Mount Testaccio for this period hinders any advance beyond the dating provided by the typology of the rims and handles.

Baetican oil amphora production

Most of the data on oil amphora workshops prior to 2016 stemmed from research on potter stamps. As Baetican oil amphorae were almost without exception stamped only between the Claudian period and the mid-third century AD (Dr. 20 B to Dr. 20 G) (Fig. 6), production prior to and following this chronological range has remained largely obscure.

The panorama from the Augustan period onwards is very revealing. While Strabo praised Baetican oil at the time of Augustus, knowledge of this product during this phase is quite limited. Early oil amphora production has been identified hitherto only in the area of Seville, on the outskirts of *Hispalis* (García Vargas and Bernal 2008, 674) and Carmona (García Vargas 2010) and possibly in Alcalá del Río (García Vargas *et al.* 2019, 98). The discovery of a sector of early activity in the *conventus Cordubensis* marks a fundamental step in research on oil amphorae production (Fig. 7). The site of Fuente de Los Peces (Fig. 3.14) stands out among the workshops active around the turn of the first century. This site, which did not endure more than two generations, is located on the Tamujar, a non-navigable tributary of the Guadalquivir in a drainage basin about 3 km from the Guadalquivir. It represents the dawn of an industrialized, highly specialized production of oil amphorae already in part destined for the Germanic *limes*. Subject of a survey in 2016 (González Tobar and Mauné 2018) and of an excavation in 2019 (unpublished), it is to date the oldest

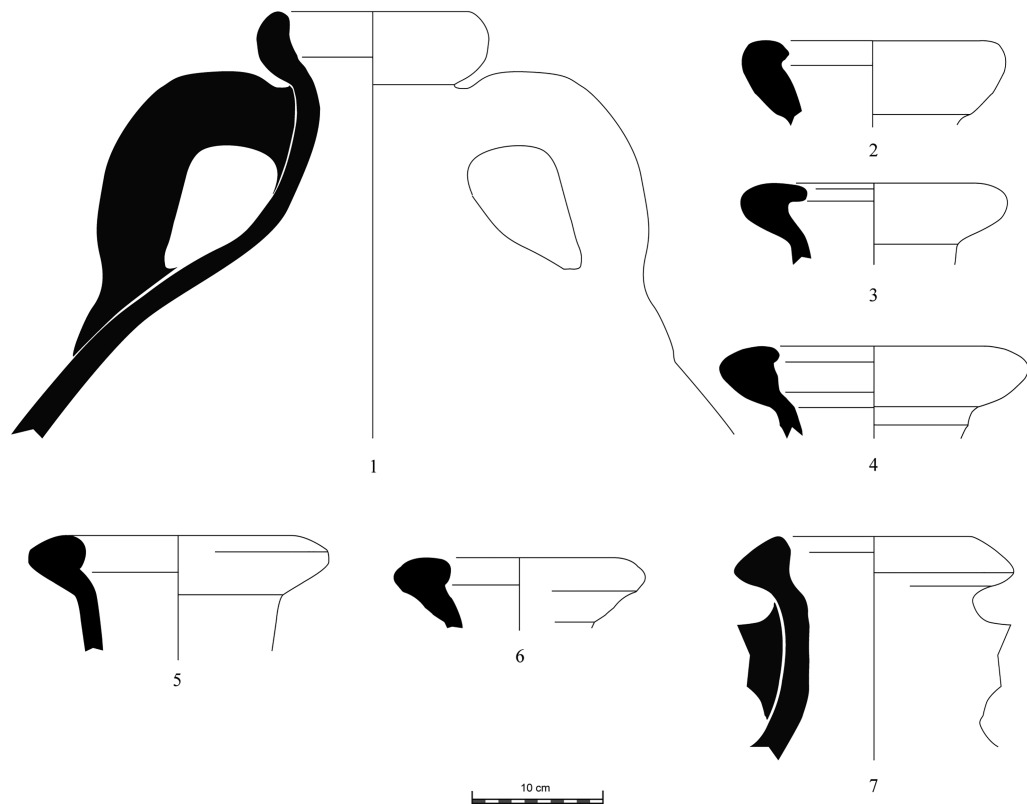


FIGURE 6

Examples of amphorae produced in workshops in the area of Córdoba. Dr. 20 B from El Mohino (1), Dr. 20 C from Dehesa de Arriba (2), Dr. 20 D from El Temple (3) and Guadiato (4), Dr. 20 E from Mingáóbez (5), Dr. 20 F from Mingáóbez (6) and Dr. 20 G from Cerro de Los Pesebres (7).

workshop producing stamps (MR, Fig. 7.3) on Baetican oil amphora.¹² Stamp frequency calculated from finds in waste dumps points to a maximum of 52%, a very high rate in general and especially for a period when no other workshops took part in the practice. The workshop is at present the earliest to offer evidence of the stamping that spread throughout the Guadalquivir valley during the outset of the first century AD.¹³ If amphora stamping is synonymous with an advanced organization of production, then this Corduban workshop from around the turn of the century may have responded to the needs of a highly structured commercial flow, continuously delivering merchandise to the German *limes*, and represents the dawn of an industrialized, highly specialized production of oil amphorae.

¹² It cannot be excluded that the LHORATI stamp (Almeida 2008, 177; Fabião and Guerra 2016, nos. 54-57) could be older than that of Fuente de los Peces. The question remains unsolved as the sherds are too fragmented to clearly link them to either an Ovoid 6 or Oberaden 83 type.

¹³ The MR stamp from this workshop appears on numerous amphorae in the military camp of Haltern (Germany) (Bemi 2008, 82).

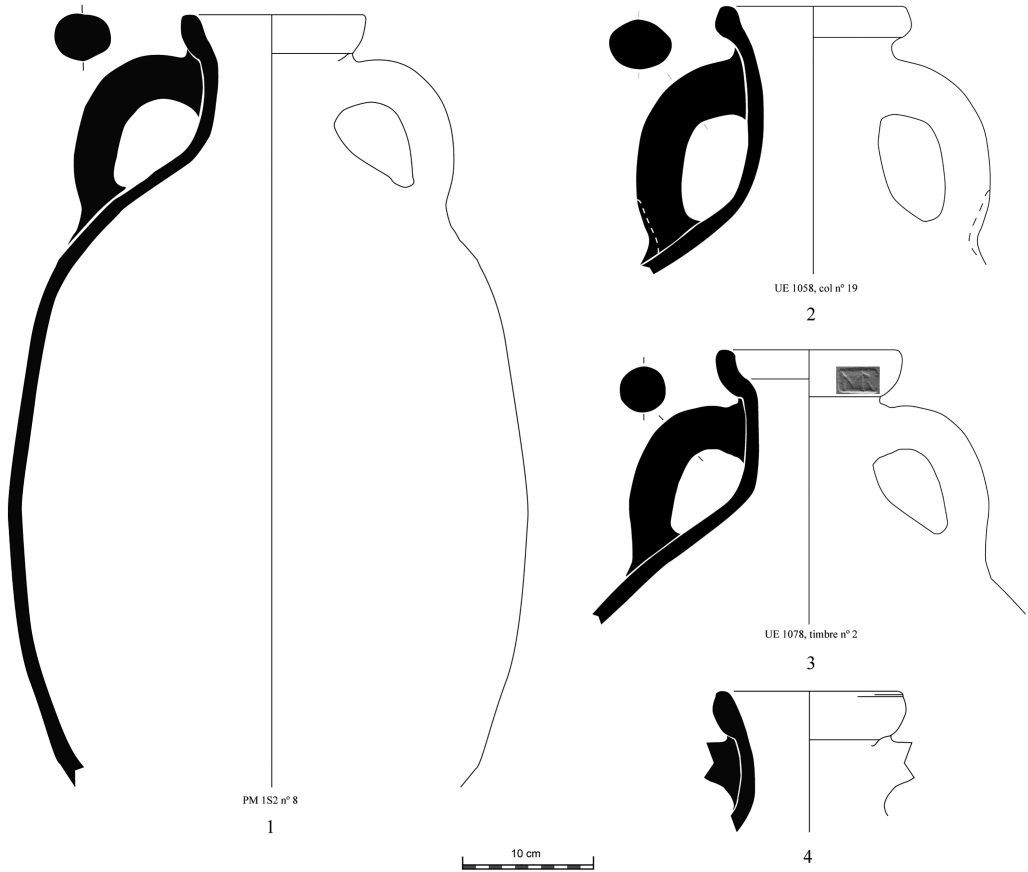


FIGURE 7

Examples of amphorae produced in workshops in the area of Córdoba. Augustan oil amphorae from Fuente de Los Peces (1–3) (no. 3 is stamped MR) and Mohino (4).

The new analyses and data on those oil amphorae of Late Antiquity which replaced the spherical oil amphorae in the middle of the third century AD (Dr. 20 G) are also worth noting. The evidence pointing to a continuity of production in Baetica has increased progressively since the 1980s. New findings stemming from the research of J. Remesal have led to the identification of other Dr. 23 workshops along both the Genil and Guadalquivir rivers (Chic 1985; Berni and Moros 2012). O. Bourgeon has more recently pinpointed other sites along the Genil as Dr. 23 workshops (Bourgeon 2017). J. Remesal's map (1983) of the *conventus Cordubensis* also indicates late amphorae in the Cortijo de Romero (Palma del Río, CO) and Villacisneros (Hornachuelos, CO) (Fig. 3.21 and 33). Yet the only certain Dr. 23 workshop so far is Soto del Rey (Fig. 3.12), confirmed by 54 stamps (Berni and Moros 2012).

The findings of the new field surveys offer typo-chronological novelties (Fig. 8). Well-preserved amphora fragments suggest that at least two workshops, El Sotillo (Almodóvar del Río, CO; Fig. 3.2) and Villaseca (Almodóvar del Río, CO; Fig. 3.5) produced small amphorae with pear-shaped Tejarillo 1 profiles, a type previously only identified at the homonymous

workshop El Tejarillo (Alcolea del Río, SE) (SE=Seville) near in the *conventus Hispalensis* (Remesal 1983). This discovery implies that this type is no longer local but regional. This notion is confirmed by the fact that a FCERARIA stamp on a Tejarillo 1 type from the Corduban workshop of Villaseca (Almodóvar del Río, CO) is also seen on a Dr. 20 from the same workshop (Fig. 8.1). The stamp also places this production around the middle of the third century AD. Finally, the number of fragments of late amphorae (Dr. 23) suggests the existence of a production in Soto del Rey, as P. Berni and J. Moros (2012) suggested, and in two other workshops: El Mohíno (Palma del Río, CO) and Villacisneros (Homachuelos, CO) (Fig. 8.2–5).

Other amphorae

Apart from oil amphora research, recent amphora analyses at consumption centres (Étienne and Mayet 2000; Almeida 2008; García Vargas *et al.* 2019) propose that the Guadalquivir valley yielded a variety of products: wine (Dr. 2-4, Urceus, Dr. 28, Dr. 1); olives preserved in wine-products such as *defrutum* and, less frequently, *defrutum* or *mulsum* alone (Haltern 70) (Martin-

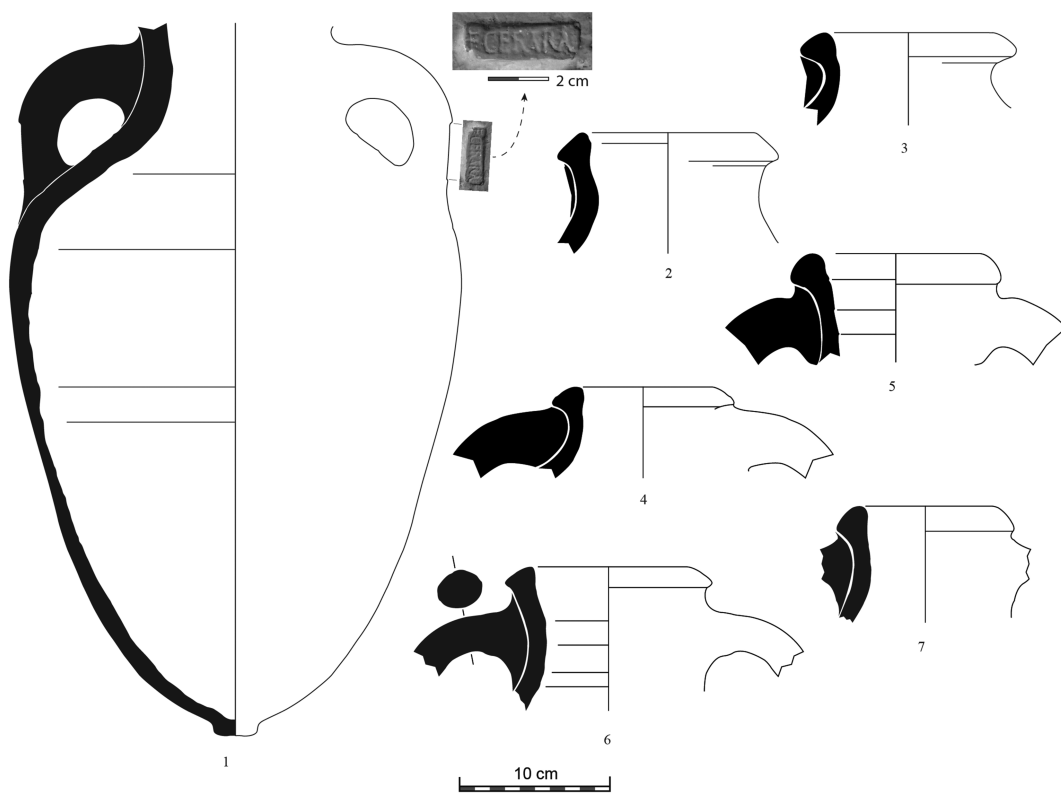


FIGURE 8

Examples of amphorae produced in workshops in the area of Córdoba. Tejarillo 1 from Villaseca stamped FCERARIA (1), Dr. 23 from El Mohíno (2–3), Villacisneros (4–5) and Soto del Rey (6–7) (drawings by I. González Tobar).

Kilcher and Tchernia 2021); fish sauce (Dr. 7-11 group) and other uncertain products¹⁴ (Late Republican ovoid amphorae group). The fieldwork carried out in Córdoba therefore also included a search for these amphora types. The few that have been discovered (Fig. 9) bear the typical Guadalquivir type of ceramic fabric¹⁵ and are in general, in the company of a great number of oil amphorae. In fact, no workshop exclusively focusing on these non-oil amphorae types has been identified.

Recent research by R. Almeida (2008) and García Vargas *et al.* (2011; 2019) indicates that there are practically no finds of Late Republican ovoid amphorae in the Guadalquivir valley. Only two are known for the whole area¹⁶ and none for the *conventus Cordubensis*. Finds during recent fieldwork suggest the production of the Ovoid 5 (Fig. 9.2) type at El Bombo (Hornachuelos, Córdoba), a site in a remote area detached from the Guadalquivir (Fig. 3.30) (González and Berni 2018). Moreover, the presence of an Ovoid 4 rim (Fig. 9.1) in the vicinity of the riverside *oppidum* of *Carbula* (Almodóvar del Río, Córdoba) could point to the existence of suburban production.

There are nonetheless novelties concerning Haltern 70 and Dr. 2-4 amphorae as their proportions are always small and secondary compared to oil amphorae. Excavations have confirmed the production of Haltern 70 (Fig. 9.7–9) at the workshops of El Mohíno (González Tobar *et al.* 2018, fig. 24) and Fuente de Los Peces (González Tobar 2020). Haltern 70 production at El Mohíno only accounts for about 7% of the total, compared to 93% of Dr. 20s (González Tobar *et al.* 2018, fig. 24). Likewise only seven rims were recorded at during the entire 2019 excavation of Fuente de Los Peces compared to 595 (MNI) Dr. 20 examples. This places the Haltern 70 production in a very secondary position. Surface finds of Haltern 70 suggest its production in at least seven other workshops (Fig. 3). Dr. 2-4, in turn, are known at Dehesa de Arriba (Posadas, CO) due to the LVALERIAMETHYSTI=L. *Valeri Amethysti* stamps (García Vargas 2004). The new examples suggest production of Dr. 2-4 (Fig. 9.3–6), even if at a lesser scale, in at least eight other workshops. The cases from El Mohíno and El Sotillo, contrary to those of the other sites, are straightforward as the first site reveals overfired examples, while at the second the Dr. 2-4 s are among the strata consisting solely of discarded wasters.

There are no traces of Dr. 28 or Dr. 1 wine amphora workshops – at least for the moment – in the area of Córdoba. The hypothesis of identifying Dr. 1 production at the Corduban workshop of Dehesa de Arriba based on a Dr. 1 fragment bearing a ceramic fabric typical of the Guadalquivir (García Vargas and Bernal 2008; 674; García Vargas *et al.* 2011, 196) poses a fundamental problem. Surveys only confirm that production was initiated between AD 30–50. The site reveals no find of the ovoid type and no other ware points to an occupation prior to this timeframe. As the production of Dr. 1 from the Guadalquivir took place half a century earlier, between the first and third quarters of the first century BC (García Vargas *et al.* 2011), only the excavation of the older levels of the

¹⁴ Morphological similarities with Augustan oil amphorae suggest that Ovoid 6 is also an oil container. Content analysis seems to confirm the presence of wine in two vessels of the types Ovoid 5 and Ovoid 1 (Bernal *et al.* 2019).

¹⁵ The great homogeneity of the Guadalquivir fabrics has often discouraged petrographic analyses and, due to their magnitude, they did not form part of the current project. An undertaking on this scale would in fact require a separate project focusing specifically on this question.

¹⁶ Two isolated ovoid amphora rims (type Ovoid 1) were found at the workshop of Huertas del Río (Lora del Río, SE) and La Catria (Lora del Río, SE). It is difficult to confirm that they produced these types as the first oil amphorae productions starts in these workshops in the first century AD (García Vargas *et al.* 2019, 98).

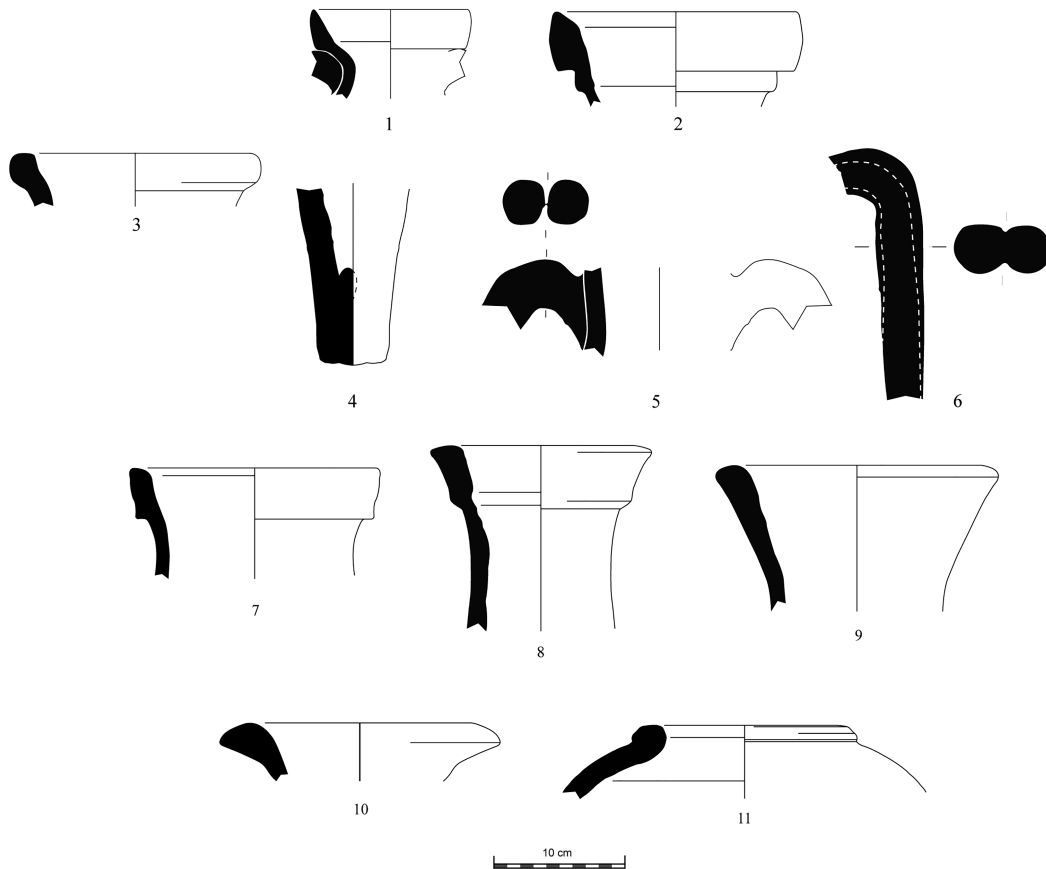


FIGURE 9

Examples of amphorae produced in workshops in the area of Córdoba. Ovoid 4 from Almodóvar del Río (1), Ovoid 5 from El Bombo (2), Dr. 2-4 from Dehesa de Arriba (3), El Sotillo (4) and Villaseca (5–6); Haltern 70 from Cortijo de Romero (7) and El Mohino (8–9), Dressel 7-11 from Mohino 1 (10) and amphora of Iberian tradition from Fuente de Los Peces (11) (drawings by I. González Tobar).

workshop will be able to confirm a Dr. 1 production. Thus, given the state of research, this notion must remain hypothetical.

Noteworthy is the presence of a ware resembling traditional Iberian amphorae (Fig. 9.11) in certain Augustan workshops (Fuente de Los Peces and Cortijo de Romero, Fig. 3.1 and 21). Although their rims relate morphologically to the Pellicer C type, they fall into the Pellicer D group dated to the last third of the first century BC (García Vargas 2010, 194) and represent a production that is completely unknown in the Middle Guadalquivir valley. The only inland site to date with evidence of an analogous production is Carmona (SE) (Moreno Megías 2016, 687).

Finally worth mentioning are two rims at El Mohino (Fig. 3.19) attributed to the Dr. 7-11 group of fish amphorae (Fig. 9.10). Dr. 7-11 characterized by a Guadalquivir ceramic fabric have been identified in earlier research at consumption contexts (e.g. González Cesteros and Tremmel 2011–12, 530). El Mohino is in an area further upstream from the few known workshops

of the Lower Guadalquivir nearer the Atlantic coast, a few kilometres downstream from Seville (Carreras 2000). However, the finds from the region of Córdoba reveal a clear Guadalquivir fabric which leads to speculation that either they contained a sauce made from river fish, or that another unknown element was transported in these containers (García Vargas *et al.* 2011, 253). In any case, if these amphorae were indeed produced here, El Mohino would be the first workshop of this type identified in the middle Guadalquivir.

DISCUSSION

Although the protocols of identification of the spherical Dr. 20 (B to G) amphora workshops can be fully validated by means of surface surveys, a definite identification of other products (Dr. 23, Haltern 70, Dr. 2-4, etc.) remains inconclusive without confirmation through excavation. It is still difficult to distinguish Dr. 23 workshops contemporary to Dr. 20 G (and therefore not going beyond the third century AD) from those still yielding Dr. 23s during the fourth and fifth centuries AD. Moreover, as the necks of the Dr. 23A and the Tejarillo 1 amphorae are similar, and since the new survey suggests a manufacture of the latter throughout the Guadalquivir valley, how can they be distinguished when found in fragmentary form? Excavation of late amphora workshop waste dumps could provide many answers and clarifications. Concerning the question of the volume of late oil amphora production, one must recall that their range of production is almost as wide as that of spherical Dr. 20 throughout almost three centuries. The large imbalance among the surface finds of wasters of Dr. 23 and Dr. 20¹⁷ appears to undermine the case for continuity after the third century AD. Despite the emergence of new workshops (Bourgeon 2017), one must assume a certain decline of the Guadalquivir valley's traditional hegemony over olive oil exports during the centuries of Late Antiquity. The coastal area of Málaga, for example, appears to assume an important role in this sense according to the recent fabric analyses (Fantuzzi and Cau 2017) and to the morphology of the Dr. 23s observed in the few published photos of the Mandirac shipwreck (Port-La Nautique, Narbonne, France) (Sánchez and Jézégou 2014, 63).

In general, the dominant proportion of Dr. 20 sherds on workshops prevents one from easily characterizing their other products. The presence of these other amphorae on consumption sites can nonetheless attain considerable proportions. This is the case for the Haltern 70 amphorae. For the Augustan period, they generally represent a quarter or a third of all Dr. 20 amphorae at Oberaden (Germany) (e.g. González Cesteros and Tremmel 2011–12, 530). This ratio at times can rise to half or even three-quarters. For example, Haltern 70s at the German sites of Neuss and Xanten at times surpass the number of Dr. 20s (Carreras and Berni 2012). For the Claudian period, the Port-Vendres II shipwreck yielded 16 Haltern 70 amphorae and around 60 Dr. 20s (Colls *et al.* 1977), about one Haltern 70 for every four Dr. 20s. Haltern 70s play a lesser role among the cargo of the Flavian Cala Culip IV shipwreck, being only two as opposed to 76 of Dr. 20 (Nieto *et al.* 1989, 59).

However, the general Haltern 70 proportions at the workshops identified in the area of Córdoba do not correspond to those seen at consumption contexts. Haltern 70 wasters at El Mohino, the only Baetican workshop yielding the data to calculate their proportions, does not surpass 7% (González Tobar *et al.* 2018).

¹⁷ The number of Dr. 20 rim (26) surface finds at Mohino 2, for example, is double that of Dr. 23 (13).

There are two potential explanations that account for the general overabundance of spherical Dr. 20s (Dr. 20 B to G). The first is that the bulk of the secondary production is indeed manufactured elsewhere. As the workshops upstream from Seville (Berni 2011) are no more numerous than those of Córdoba, one cannot but wonder whether there remain unidentified Haltern 70 workshops on the hillsides inland from the rivers, in geographical contexts similar to that of the Augustan workshops of Fuente de Los Peces and Carmona (García Vargas 2010; González Tobar and Mauné 2018). Finally, the potential of production of the *marismas* (marshlands) around the *Lacus Ligustinus* (downstream from Seville) remains largely unknown (Carreras 2000). A second possibility, which does not necessarily exclude the first, is that there are significant discrepancies between the debris generated by the different amphora types. Dr. 20s potentially yielded higher rates of firing wasters due to their volume and weight. Stricter quality controls could have likewise forced their rejection in higher numbers, impairing the visibility of other products.

Although it is necessary to wait for the publication of the results the production areas of Seville (*Hispalis*) and Écija (*Astigi*) to establish broad and more definitive conclusions, one phenomenon appears to be specific to the area of Córdoba: the existence of a group of very short-lived workshops (Cortijo de Don Fernando, Isla de la Jurada, Guadiato, El Temple 1) founded during the Flavian period. Certain of these appear to have been very prolific¹⁸ but did not endure more than one or two generations. The ephemeral character of these Corduban enterprises could stem from the convergence of several phenomena under Flavian rule. Written sources indicate that oil became one of the products of the *Annona* of the city of Rome (Pavis d'Escurac 1976; Christol 2016), while the award across Baetica of the *ius Latii* elevated the towns along the Guadalquivir in the area of Seville to the rank of *municipium* (Remesal 1986, 75). Berni highlights that the word *portus* appears on stamps at works subsequent to the Vespasian period (Berni 2008, 166) interpreting it, in line with Remesal, as a sign of strong investments by the Flavians aimed at facilitating export. With the emergence of new workshops, it appears that the Córdoba area also formed part of these Flavian investments. The restriction of the word *portus* to workshops of the *conventus Hispalensis* and its systematic association with those cities leads to speculate whether the demise of these Corduban enterprises was linked to the overpowering infrastructure built downstream around Seville.

On the other hand, it is vital to point out that these reflections are solely based on the number of active workshops. Workshop number is, however, not the sole indicator of fluctuations in the volume of production of amphora types. A more in-depth analysis currently underway on productivity trends based on the quantification of precise numbers of surface wasters will probably nuance the picture.

Finally, the great novelty in the area of Córdoba is undoubtedly the new evidence indicating a very substantial productive activity in a fully rural context beginning at the latest in the Augustan period. The situation of the workshop of Fuente de Los Peces is also of great interest from the standpoint of logistics, as it is well beyond the Guadalquivir riverbank and thus points to an early olive-growing area in the sector. It is likewise key that this is the first area on the opposite bank upstream of the Guadalquivir intersecting with the foothills of the Sierra Morena and certain of its mines such as Minas de la Plata (Posadas, CO). It is also the location of the first metal foundries set up not in the mountains but along the river (Domergue 1990, 566, Carte 4). This proximity to the

¹⁸ The stamp analysis of El Temple (Almodóvar del Río), for example, suggests that its owner *C. Marius Silvanus* had at least six contemporary supervisors.

metal-producing zone of the Sierra Morena (north of the Guadalquivir) invites the question as to whether this development might be linked to the installation of early settlements focusing on olive-growing. In fact, there is a metal-working sector devoid of foundries in the *Campiña*, the vast plain to the south of the Guadalquivir. C. Domergue, in view of this anomalous situation, wondered whether the collapse of mining at the end of the first century BC could have shifted a part of the capital used by this sector to develop the cultivation of olives in the *Campiña* (Domergue 1990, 199). Fuente de Los Peces is indeed situated in the heart of the area of the foundries in the *Campiña*, supporting a connection between the mining operators and investors in the olive oil trade during the Augustan period.

CONCLUSIONS

This study offers a new picture of the amphora production of the *conventus Cordubensis*. The chronological classification of this activity now not only integrates dates gleaned from potter stamps but from ceramic typo-chronological data. In addition to the 23 well-documented amphora workshops, there is now enough evidence to paint a portrait of a hinterland whose productive fabric was not only marked by pottery workshops but by *villae*, olive groves, and *almazaras* (oil mills), interconnected by a wide network of terrestrial and fluvial transport.

In addition, the area around Córdoba now reveals evidence of early activities. Certain sectors of the countryside had been in full production since the Augustan period, and perhaps earlier. Although limited by the chronology of amphora typology, it is now possible to begin to specify certain particularly intense phases, notably the Flavian period in which a series of short-lived workshops were founded before being abandoned after only a few years. Overall, a decline in production is evident and this despite the resilience (and even the founding) of certain workshops in Late Antiquity. Lastly, the current study sheds new light on non-oil amphorae with evidence suggesting that Dr. 2-4 and Haltern 70 were potentially secondary productions at more than a dozen workshops in the area of Córdoba, which suggests that this territory too was a prolific producer of these amphora types. This obviously does not exclude, as with the case of ovoid amphorae, that unknown productions remain to be identified either in the peri-urban areas of *conventus Hispalensis*, where modern urbanization complicates access, or in the interior of the Guadalquivir valley's *Campiña*, far from the river.

This investigation clearly demonstrates that field surveys are effective means of advancing knowledge on the economy of Roman *Hispania*. It is increasingly possible to identify how the evolution of a massive olive oil production altered the economy of the south of the Iberian peninsula, a phenomenon that is still recognisable today. The area of Córdoba crystallizes key aspects of this phenomenon. It benefitted from an early investment on a grand scale, so opening a way to explore the links between the different economic sectors of the Augustan period.

Research carried out in this region within the framework of different programs represents essential steps towards the development of new projects targeting specific questions. Excavations, for example, have concentrated mainly on kiln sectors, which are key as they yield data on combustion waste which in turn enables an appreciation of supply strategies and the use of the different olive varieties¹⁹. There is nevertheless a need to target other artisanal structures, as well

¹⁹ The study of the site of Las Delicias (Écija, SE) Bourgeon *et al.* (2017) has delved into these questions.

as to extend investigations across the inland areas of olive oil production so as to make progress on comprehending the whole Baetican agrarian system.

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