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Fish processing and salted-fish trade in the Punic West : New archaeological data and historical evolution

Antonio M. Sáez Romero

1. Studying ancient fishing in the far West

Dealing with fishing in the Strait Region in Antiquity (**fig. 1**) inevitably means to discussing fish-processing and at the same time about producing salt and the use of salt-works, and identifying a convincing relationship between these activities. However, in the opinion of the author it is necessary to add at least two activities to the elements of the regional economy developed from the arrival of the Canaanite settlers. The first activity is shipbuilding, on which virtually no direct information is currently available, except for a few vague allusions in ancient literary sources. Secondly, the pottery production is in a diametrically opposed situation, as it currently stands as one of the best archaeologically characterized economic activities in a representative part of the Punic Strait Region. More recently the regional mints of western coastal

cities should be added to this list, actively participating in the economic exchange mechanisms (acceleration towards a market economy) and integrating in the iconography of many of their coinage series representations of fishes (like tuna) (**fig. 2**), which constituted one of the economic foundations of the region.

Thus, it is clear that an approach to the analysis of fishing and fish-processing in this western area in the pre-Roman period forces us to focus our attention on other factors that were traditionally linked to the basic extraction processes, and that helped to complete the commercialization of these fish by-products. In this paper we will attempt to discuss succinctly all these hypotheses and new data, trying to provide a concise and updated review of the current state of research of these topics, closely linked to the cultural roots and craft traditions found in the geo-historical region of the Straits of Gibraltar.

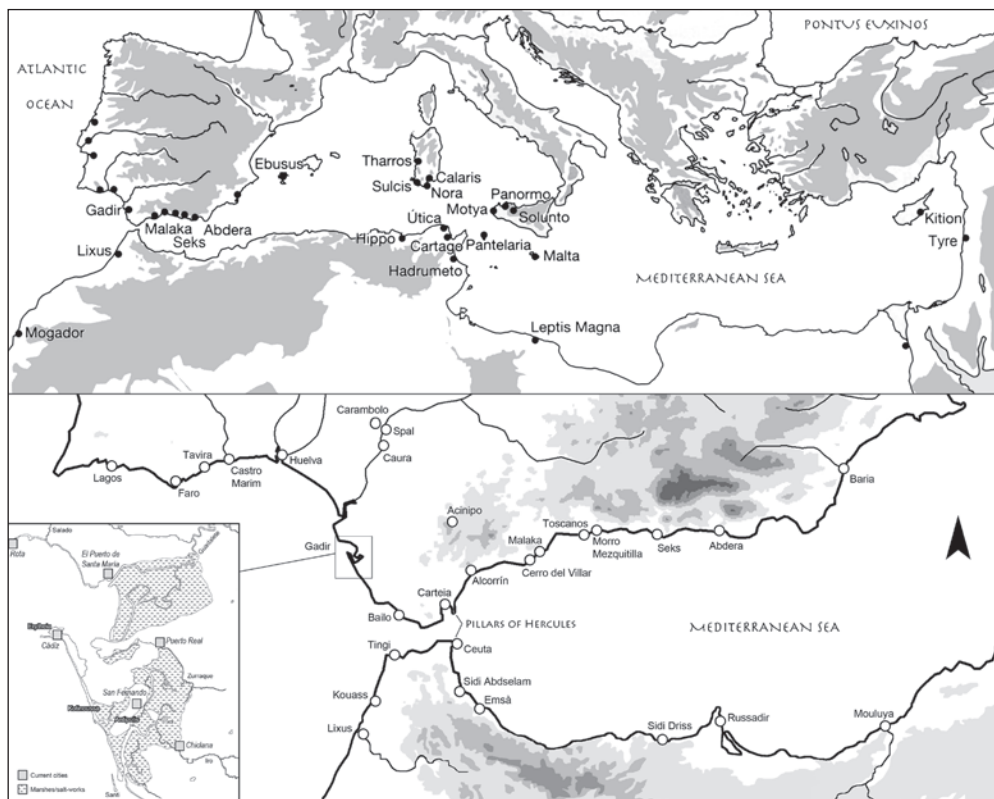


Fig. 1. Maps indicating the main sites mentioned in the text. At bottom left, current settlement patterns in the Bay of Cadiz. (© A. Saez).



Fig. 2. Bronze of the mint of Gadir, with Melkart/Hercules and tuna (coins from Torre Alta pottery workshop) (© A. Saez).

1.1. Ancient fishing, salt-fish and literary sources

The long voyages, fishing away from home and extended stays abroad should have been well known experiences to many western Phoenicians, ever familiar with and closely linked to the sea. Unfortunately, only a little direct evidence about this aspect of the lives of people of the Strait in pre-Roman times has been recovered; a lifestyle that could be a general feature of broad sectors of the population of colonial (and latter urban) settlements. Despite this, the small set of indirect evidence left by ancient writers has been (and still is) a basis for the analysis of fishing and especially fish-processing in the Punic Far West¹.

These texts refer to the commercialisation of Gadiritan salted-fish mainly belonging to different literary genres and medical treatises (Hippocrates). Much of the latter were transmitted by a more indirect route, for example the quotation of passages from the much later work of authors like Atheneus of Naucratis (2nd/3rd c. AD). Thus, although most of the sources of Classical and Hellenistic periods explicitly refer to *Gadir*, there are traces of a more diversified involvement among urban sites along the Strait area. In all cases the entries are too generic to define which products or qualities were referenced, but it seems that it would have been *tárichos* (salted-fish in portions or complete, depending on size), preferably tuna and after later texts sturgeon or meagre (traditionally associated to less salty by-products).

The consequence of the process of evolution of western Phoenician cities and its integration into the Roman Republic did not affect at all the role of fish-processing industry in the socio-economic regional framework, which contemporary scholars have highlighted precisely because of this characteristic. Beyond

the chronological and cultural limits self-imposed on this paper, we find evidence of this extremely stimulating process in Strabo's descriptions of the seashores of ancient *Turdetania*, which is the northern atlantic sector of the Strait region.

2. An incredible fishing wealth: an overview

One key aspect in offsetting out the context of the Punic regional fishing and fish-processing is the natural biological wealth of the coasts and seawaters of the area, especially on the atlantic side, explicitly quoted and praised by ancient authors. Recent historiography has also highlighted these advantages, suggesting the possible role of the fishing wealth of the region (and especially seasonal catches, continuous and predictable) as one of the reasons that could have led to the Phoenicians taking a remarkable interest in establishing colonies in the Far West and the Central Mediterranean². Also, historiography has underlined the location of many of these Phoenician colonies being in areas located close to essential resources (like marshes used for salt-works facilities) and good for fishing (and particularly for the installation of tuna-traps, *almadrabas*).

For the final settlement of Levantine settlers in this western bound of the ancient world, the exceptional richness of this western coast and its fishing grounds all along the Straits of Gibraltar region would have thus become an attraction that complemented the traditional ones (metals, exotic products and raw materials, etc.). Thereby, the conjunction of this privileged environment and the Canaanite advanced technology (much more advanced than the indigenous) would have ensured not only subsistence but also the beginning of the development of patterns of a surplus-type exploitation of these marine resources.

2.1. Archaeo-ichthyology: current state of research

On the basis of this ichthyologic wealth of the 'Strait region' and the first archaeo-zoological data, recent investigations have offered fresh views of this natural situation to explain how it could influence the generation of different micro-economies (exploitation strategies) in the region, and at the same time how it constrained the progress in each area of the fish-processing industry. This proposal focuses on the possible existence of two

1. Lopez Castro 1997.

2. Morales, Roselló 1988.



Fig. 3. Actual salt-works in Cádiz Bay, with the island of Sancti Petri and the Atlantic coast in the background (© Gerencia Municipal de Urbanismo de San Fernando).

differentiated biological, fishing and productive frames (Atlantic circle *vs.* Mediterranean Circle) that could have largely determined the composition of the salted-fish by-products on both sides of the Pillars.

In fact, it has been pointed out³ that this feature is one of the most significant characteristics of current research, emphasizing existing marked differences between the two coasts from one side of the Strait to the other with respect to dominant ichthyofauna (not only recognized in consumption centres but also in the production ones). In the case of the Mediterranean coast this differences would result in a preponderance of possible use of little size fishes such as *engraulis encrasicolus* (white anchovy), sardines, bogues or blotched picarels for the production of salted-fish and sauces from at least Roman imperial period⁴. This interesting discussion is currently at the mercy of a progressive increase in the quantity and contextualization of faunal information⁵, especially that recorded in the industrial deposits and inside of non-reused containers.

2.2. Geoarchaeology and "archaeology of salt"

Thus, clay, pottery kilns, fish and basins were ready to converge towards a common purpose from early

moments of Canaanite presence in the West in many corners of the Strait Region. But as noted before, it is necessary to draw attention on another of the essential elements in this successful combination: salt production and the presence of salt-works in these colonial centres or western Phoenician cities. The later references of Strabo's geography describe a region rich in rock salt and brackish outcrops in the inland and riddled with large tidal estuaries, marshes, shallow waters and salty creeks that certainly offered excellent possibilities for systematic exploitation⁶. In the particular case of *Gadir*, the same author also explicitly states that its merchants used salt for direct exchange with the Atlantic populations in exchange for metals⁷.

The Gadiritan settlement so far has led the debate on the location of ancient salt-works in the large local marshy areas (**fig. 3**). Recent research projects concerning the diachronic analysis of the geomorphological evolution of the coastline of Cadiz Bay during the Holocene have recorded pottery sherds and ancient structures (both Punic and Roman), but this evidence still does not allow an unequivocal interpretation of the salt-works facilities⁸. Strabo's references show that the intense exploitation of these intertidal marshlands would have been mainly linked to the local fish-salting activity, even generating enough surpluses to trade with this marine salt. Many other western cities of Phoenician

3. García, Ferrer 2006.

4. *Ibid.*, p. 24.

5. Morales, Roselló 2006.

6. Strabo, 3.2.6.

7. Strabo, 3.5.11.

8. Alonso *et al.* 2003; Arteaga, Schulz 2008.

origin, often located next to river mouths (and thus endowed with marshy estuaries) may have followed this Gadiritan model, using in many cases their own salt production for local fish-processing factories.

3. Fishing and salted-fish during the Orientalizing and Archaic periods

Prior to the establishment of the colony of *Gadir* in the beginning of 1st millennium BC, the growing evidence dating from the Late Bronze Age indicates that fishing and shell-fishing were already part of the daily life of the indigenous population of Cadiz Bay and of large areas of the Straits coast⁹. However, it is clear that even from an advanced pre-colonial stage the Phoenician technological contribution may have revolutionized fishing strategies and patterns of many coastal areas of the region. Barely modified environment and fishing grounds would have suffered (especially from stable settlement of the Levantine peoples) a much more intense and effective exploitation, as a result of the importation of advanced fishing techniques and probably fish-preservation processes.

The debate of the origins of these products in the context of the Punic western economy has moved in recent decades to a main question: whether their emergence was caused by rising of urban phenomenon (from 6th c. BC) or whether it was instead the crystallization of a trend already established. In the last two decades it seems that in the historiography a "non-industrialized" role has been assigned (basically linked to subsistence) to archaic fishing. This is quite different from the role attributed to these marine activities from 6th c. BC as an emerging regional economic flagship replacing the metal trade¹⁰. Several archaeological reports generated over the past decade and a review of other evidence that has remained in the background, as well as adding to the discussion the archaic pottery production, begin to outline a different scenario in which the salted-fish was regularly traded from the first contacts between Tartesians and Canaanites¹¹.

The exceptional set of evidence rescued from the excavations in the area of Méndez Núñez/Plaza de las Monjas (Huelva), probably the oldest Phoenician trading deposits so far recovered in the Atlantic side of this western bound, has revealed some significant traces of

fishing and fish consumption¹². The evidence was read as a sign of pre-colonial commercial contacts or the settlement of a first small stable Levantine contingent, and generally the finds were dated towards the central section of 9th c. BC century or in the early-8th c. BC. The development of active fishing and fish consumption seems to be well attested, subject to monographic publication of archaeofaunal analysis. So far, many fish remains include species such as sea bass, snapper, bream, rays, sardines, cuttlefish, crustaceans and even a skull fragment have been identified and attributed to an unspecified cetacean.

Furthermore, the site has provided the current earliest evidence in the western Phoenician colonial area of a container filled with preserved fish presumably for commercial purposes (an unclassified sherd indicated fish scales affixed to the inner surface of the container). In any case, the movement of fish by-products as early as the last decades of 9th c. BC (and thus the import of technology, well known to the Tyrians in the Eastern Mediterranean before the colonial diaspora), is an example that should warn us about the validity of the traditional hypothesis that identified archaic fishing exclusively as a subsistence activity.

3.1. Fish consumption and salt-fish trade in the Western Archaic colonies

The strongest contextualized evidence of the archaic colonial stage has been found at the site of Cerro del Villar (Malaga), regarding fishing, fish-processing, purple dye production and amphora manufacture¹³. The interaction of these major Phoenician coastal settlements with the indigenous inland shows forcefully almost all the elements included in the extraction-processing-commercialization-consumption cycle together.

On the management of fish products and fish packaging the results of the campaign of 1995 must be highlighted, because they revealed a large residential sector and a wall located close to the river, both dated to the first half of the 7th c. BC (Sector 8). The most interesting find in this area was a section of a colonnaded street, full of small rooms interpreted as retail shops following an oriental pattern (*sūqu* or *souk*), which seems to have constituted a market place or shopping street. Inside one of these small shops two archaic amphoras T-10121 were found, one of which contained fish

9. López, Ruiz 2010.

10. García 2001.

11. Sáez 2010, 2011a.

12. González *et al.* 2004.

13. Aubet *et al.* 1999; Delgado 2011.

remains still inside¹⁴. These would have been displayed there for sale.

However, the most outstanding finds related to archaic western fish-processing would have been those linked to a building investigated in Sector 2/6 of the site. This structure was immediately related to the fishing and processing of catches (as well to purple dye production), interpreted as a rectangular building used all along the 7th c. BC¹⁵. The ichthyofauna recovered in these archaic layers was clearly dominated quantitatively by clupeids (*sardina pilchardus*) and a lower volume of a broad range of seabream (*sparidae*), with a minor presence of other species like mackerel, mullet, bass, etc.¹⁶

These data from the Phoenician settlements like Toscanos and Cerro del Villar (and probably in the future, Malaka, Morro de Mezquitilla and many more), become even more informative if we connect them with archaeological record recovered from the Depresión de Ronda (the Malaga hinterland), an area with important overland routes through river valleys that enabled crossing the coastal foothills. Such evidence, with specimens apparently of considerable size (of sturgeon, *galeorhinus galeus* and *pagrus pagrus*), suggests the possibility that inland transportation could have supplied "preservation systems, salting" to enable fish products to be used long after processing in coastal settlements¹⁷.

However, one finding dominates this reduced sample of consumption of marine fish species, that is the arrival of these fish by-products to the Tartesian inland as early as the 7th century BC, probably carried by the western Phoenicians. As pointed out by the excavators, the find consisted of a Phoenician archaic amphora (T-10121) that appeared quite well preserved at the corner of one of the excavated rectangular huts. Its content was made up of a sawdust-like mass, consisting of a large amount of scales and fish vertebrae.

3.2. Fishing and amphora production in Cadiz bay during the Archaic period

The growing evidence of the colonial Phoenician fishing and its possible relationship with an early fish-processing industry also finds some archaeological support in Cadiz Bay. Based on both recent excavations

and proposed approaches or interpretative hypotheses, the first scientific attempt to this subject came from archeo-ichthyology, with a thorough interdisciplinary analysis of the archaic levels recorded in a stratigraphical survey practiced in the fortified continental village of Castillo de Doña Blanca (CDB). The consumption of imported tuna (maybe processed) in this archaic stage at CDB was probably one of the most important results provided by this analysis¹⁸.

In addition, many other indications of a close relationship with archaic fishing in the insular environs of Gadir had emerged in recent years, especially on the margins of the navigable channel between the islands of *Kotinoussa* and *Erytheia* (especially on its northern shore, the historical city centre of current Cádiz). Recently, new evidence has been added to this discussion from rescue excavations undertaken on the site of Canovas de Castillo (Cádiz). The interpretation given by the excavators of the clay-floors and archaic levels of occupation recorded over the sandy dunes, considering as well the organic components observed, is that it could have been intermittently occupied. The absence of buildings or stable structures led its excavators to discard any relationship with a colonial (urban) foundation, but to propose a close relationship of this settlement with fishing, perhaps acting as a watchtower (*thynnoskopeia*) for seasonal tuna fishing¹⁹. Other sites next to Canovas, like Teatro Andalucía or Cine Comico, also suggest that halieutic activities were developed by Gadir settlers from the early days of the Canaanite colony.

In spite of the faunal particularities and local fishing techniques, the available archeo-ichthyological regional evidence seems to be sufficient to confidently believe that there were significant economic structures in the archaic western colonies that depended upon fishing (and that there was a certain impact of fish by-products in the dietary habits of tartessian elites even from pre-colonial times). Whether these products consisted of whole or chopped salted-fish and / or salty fish sauces close to *gàron* cannot be determined at the moment. These data sketch a colonial western world where some specialized fishing (and perhaps with a certain volume of surplus) had already occupied an important place in the subsistence economy and played a role, that is to be determined accurately, in commercial networks.

14. Aubet 1997.

15. Aubet 1993.

16. Rodríguez 1999.

17. Aguayo 2001, p. 74-77.

18. Roselló, Morales 1994.

19. Córdoba, Ruiz 2005.

4. The "crisis of metal trade" and the Late-Archaic changes

The end of the Archaic period is set, in historical terms, as a tremendously rich and complex stage, a time of transition for the western Phoenician world that worked as a hinge between the colonial phase and the emergence of a new context of interactions (with a definite prominence of cities and citizenships). This genesis of multiple urban settlements inherently resulted in deep changes that shaped a new face for the Phoenician settlement in the West: self-government, new socio-cultural and political identities, innovative economic and trade mechanisms, etc. However, this new order seems to have been created more from a reformation of continuing archaic processes, than from a break from the preceding stage of Canaanite colonies. So continuities and changes within a continuing stream can be noted, at least in terms of fishing, pottery production and other industrial tasks.

One of the most active discussions has been focused on the so-called 'crisis of metal trade' (which developed from the first half to the mid / late-6th c. BC). This was especially significant in the Huelva area because of the abandonment of several settlements closely linked to the extraction-transformation and circulation of silver. These sudden changes probably created a possible gap in the regional economy, once opulent and thriving. In the Atlantic coast of south-west Iberia, it had been assumed that the regional response turned (at least on the coast) towards an exponential increase of halieutic activities, especially through the proliferation of settlements linked to the production and distribution of fish by-products and salt, following the example shown by the literary sources referring to *Gadir*. To summarise, the fact is that *Gadir* likely was the main beneficiary by this drift towards the rising urbanisation at the end of archaic period.

5. A case study for Classical and Hellenistic periods: *Gadir/Gades*

As noted in the section of this paper dedicated to classical texts, there is no archaeological or historical room for doubt about the involvement of other areas of the Straits in the maritime and fish-processing activities and the profits of this growing business. This occurred in a classical Mediterranean world characterized by large commercial exchange networks and a revolution in eating habits. However, in contrast to what has been observed so far for the archaic period, the verifiable archaeological record in the Gadiritan hinterland

is prolific, while for other western cities this information is only just becoming known; official information is either partially released or unpublished, so unfortunately there are no alternative models for comparison with the Gadiritan case by now.

Faced with this panorama, and with the full conviction that other models were developed in the mediterranean shore of southern *Iberia* or coastal *Mauritania*, currently the Gadiritan pattern results such as the main case study for the region, being supported by more archaeological, literary and zoo-archaeological data (fig. 4). As a general framework, the first steps of the increase in urbanisation must have entailed the establishment of a stable and legally organized territorial hinterland, with poorly defined limits at the moment, but at least extending all along the insular territory from the *Erytheia* (in the north) to the main sanctuary on the southern boundary. In this area of different landscapes, as well as extensive intertidal marshes suitable for the development of saltworks there was potential for several fishing strategies and techniques, and for pottery production²⁰.

The interaction with the mainland shore is not fully clarified. Nor is the relationship with the great-fortified centres (Castillo de Doña Blanca, Chiclana) or the coastal ridges closest to the insular territory (like the marshes located between the salty creek of Zurraque and Melkart sanctuary itself, or the west coast of current El Puerto de Santa María). Each side has provided archaeological evidence relating to pottery production or/and fish-salting activities and significant data about fisheries and fish consumption during the classical/hellenistic period. Although so far this information has been analyzed altogether as part of pre-Roman settlement patterns of Cadiz Bay, we must keep in mind the lack of security about if these fortified villages and industrial facilities were shaping an unique economic or political entity (*Gadir*).

5.1. Salt-fish factories in the main island

5.1.1. Some suggestive traces from Camposoto area

The fish-processing facilities and fishing locations were distributed both on the Atlantic coasts of the island and on the mainland coast of current El Puerto de Santa María, the closest to *Erytheia* island and the northern end of *Kotinoussa* (but, as noted, we can only clearly

20. Sáez 2008.

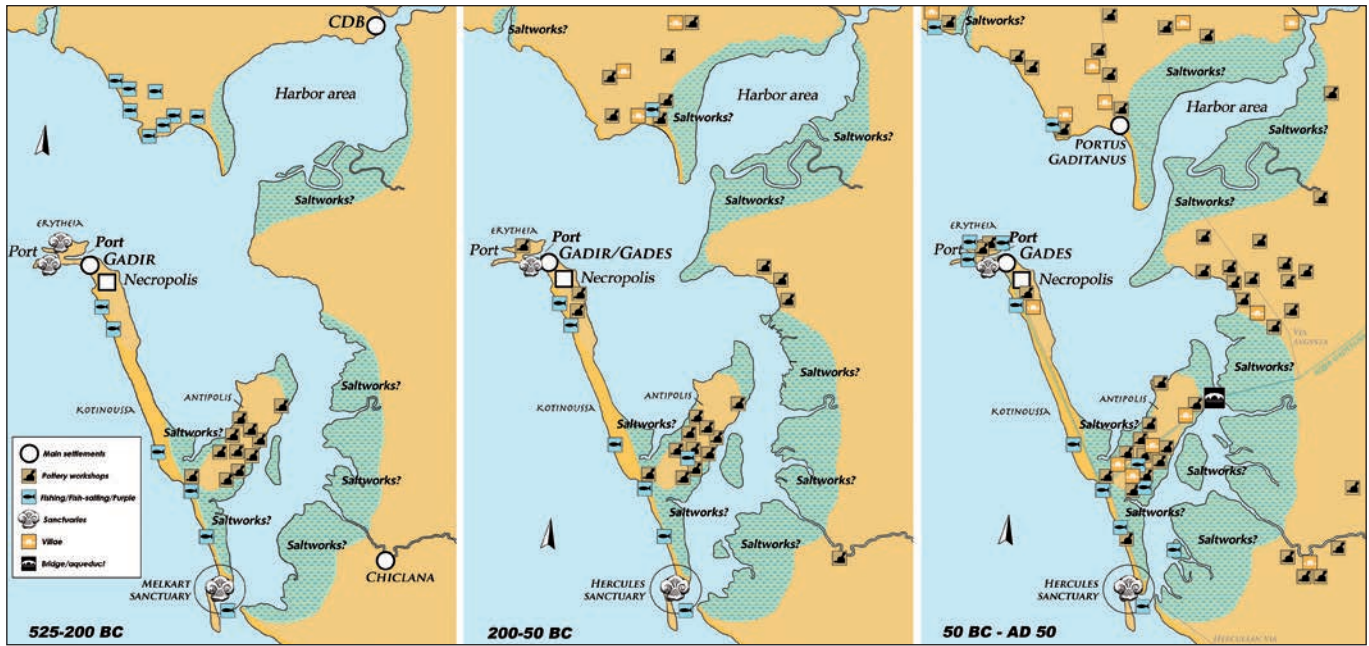


Fig. 4. Schematic synthesis of the evolution of settlement patterns in the Bay of Cadiz from the late-archaic stage until the early Roman imperial phase (© A. Saez).



Fig. 5. Summary of the main archaeological landmarks in Camposoto beach area indicating major sites and geo-archaeological hypotheses (© A. Saez from Google Earth).

assure a Gadiritan origin only for the group of facilities located on the insular territory). The detailed analysis developed through the last decade has shown that this type of insular fish-salting facilities is represented by at least two illuminating examples (Plaza de Asdrubal and San Bartolomé, both unpublished), but probably the number of fishing areas on the Atlantic insular coast

and in the Gadiritan harbour surroundings had to be much higher.

In fact, a growing quantity of archaeological evidence suggests that the long stretch of shoreline nowadays known as Camposoto beach (fig. 5), adjacent to the sanctuary of Melkart location, could have hosted some of

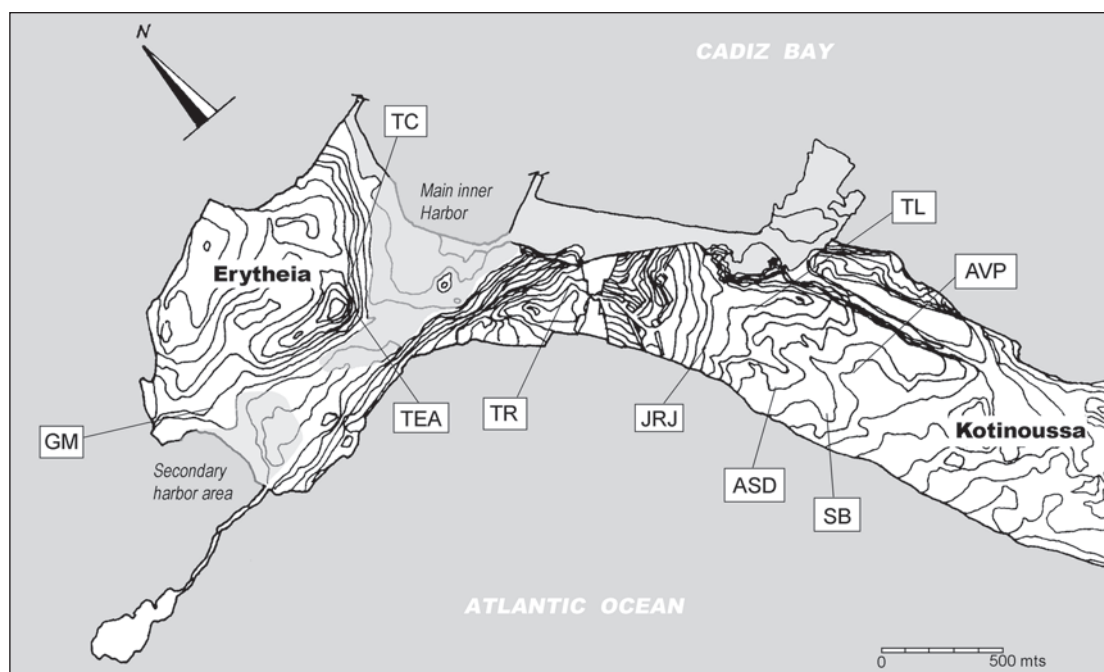


Fig. 6. Main sites located in ancient *Erytheia* Island linked to fishing, fish-processing and/or pottery production in punic and roman periods: Gregorio Marañón (GM), Teatro Andalucía (TEA), Teatro Cómico (TC), Troilo (TR), Juan Ramon Jimenez (JRJ), Plaza de Asdrubal (ASD), San Bartolome (SB), Tolosa Latour (TL), Avenida de Portugal (AVP). © A. Saez.

such facilities (Sáez/Díaz 2012). Recent excavations on the small island of Sancti Petri itself, at the south end of the sandbar, yielded pottery and other finds dating from the 5th/1st c. BC, possibly related to these industrial activities (this rocky island has indeed a long tradition for the installation of tuna-traps, an activity which continued until a few decades ago). In sum, although it is still a poorly researched area, it seems plausible that at several points along this insular paleoshore (initially located about 200 m west of today's coastline) at least some fish-processing factories and fisheries from the Punic period would have been settled.

5.1.2. Salt-fish factory of Plaza de Asdrúbal

In the north of the insular territory (fig. 6) rescue excavations have recovered valuable information about at least two examples of fish-processing facilities equipped with basins and other specific structures. The northernmost, Plaza de Asdrubal Square (Cadiz), has been excavated during several campaigns between the eighties and mid-nineties, with outstanding results in the excavations of 1997-1998²¹. These latest digs have enabled an industrial building to be analyzed (surrounded

by the Gadiritan Punic and late-punic necropolis). It was provided with at least two pairs of oval basins for salting and other paved rooms adjoining (fig. 7). Also documented were waste pits, fish bones and fishing gear. The earliest evidence of activity points to a first phase dated to the 5th c. BC, continuing through various stages until the Roman early-imperial period.

5.1.3. Salt-fish factory of San Bartolomé

The second of these factories in the northern insular hinterland was partially excavated during 2007-2008 in San Bartolomé/Chinchorros area of modern Cadiz. Its general plan and dimensions were closely similar to the preceding complex, with several rooms paved with *opus signinum* and at least two pairs of oval basins intended for salting, in addition to abundant pits filled with waste materials (including large quantities of amphorae, with very few faunal remains). This fish-processing factory was in operation from the beginning of the 5th c. BC until the last decades of 2nd c. BC.

5.2. Salt-fish factories of continental coast

Since the eighties, in the northern mainland coast of the bay a significant number of settlements were also

21. Muñoz, Frutos 2009; Muñoz 2012.

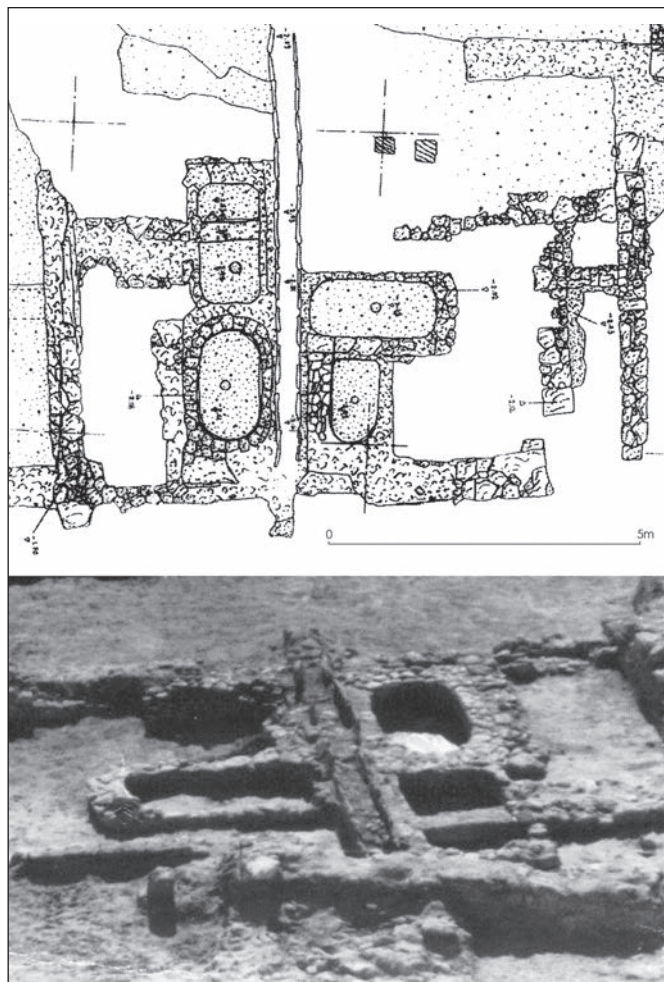


Fig. 7. Plan and aerial view of the oval basins located in the Plaza de Asdrúbal salt-fish factory in the excavations of 1997-1998 (after Muñoz, Frutos 2009)..

identified. These have been associated with the production of Punic salted-fish (notably after the excavation of Las Redes site in 1980/1983²²). Surface surveys conducted by the local museum of El Puerto de Santa María traced more than twenty-five sites, but only a really small group have been extensively surveyed or excavated. It is therefore difficult to determine whether all points were truly fish-processing facilities or other types of industrial or rural secondary settlements²³.

5.2.1. Fresh data from Puerto-19 site

Excavations conducted between 1996-1997 on the site of Puerto-19 headed by J. M. Gutierrez²⁴, have

22. cfr. Muñoz *et al.* 1988.

23. Ruiz *et al.* 2006.

24. Gutierrez 2000.

allowed these theoretical models about these continental salt-fish factories to be investigated thoroughly. In this sense, it is necessary to highlight that the results of the campaigns in P-19 suggest that this a settlement pattern should be discarded, and that cases as represented by Puerto-14 (isolated pits/wasters and working pavements) actually probably were working spaces and dumps linked to industrial building complexes (as exemplified by the 1997 Sector 1 at Puerto-19). The 1996 campaign focused on the excavation of the main building of the factory (fig. 8), excavating several oval basins, pavements, walls of several rooms and courtyards and lots of Punic pottery and remains of fishing gear.

The settlement was founded sometime in the second half or last third of the 6th c. BC in an elevated sandy area near the ancient coastline. This foundation phase is well characterized by the presence of pits full of ceramic sherds and ashes located under the main rooms of the complex (beneath the basins), perhaps as a result of ritual practices. Above these pits a square building equipped with several specialized spaces was built, one of them reserved for a pair of oval basins, with a large outdoor courtyard in which perhaps amphora containers were stored ready to be filled. Around this building, small pits or accumulations of materials were located (mainly pottery), perhaps related to manufacturing and daily consumption processes of artisans and of the fish-processing factory.

Archaeological levels associated with this first phase provided abundant pottery remains, especially local amphorae Ramon T-11213, a type traditionally associated with the overseas trade of salted-fish by-products. Also, other interesting elements were recovered, like bronze/lead fishing gear (hooks, net weights) and ceramic tableware (local red-glaze or coarse, attic black-gloss wares, etc.). These were linked to the daily consumption processes developed by artisans/workers. Much of this material was documented in Sector 1 (excavated in 1997), a secondary outdoor working area close to the main building of the factory.

This first building was abandoned towards the last quarter of the 5th century BC. On its remains was built a new smaller building with a different orientation, also characterized by a rectangular plan and equipped with a couple of basins. Wasters and pits grew in significant quantity around the perimeter of the factory, affecting previous structures. Phases II and III, linked to the activity of this second building, would had extended from the beginning of the 4th c. BC to the final stretch of 3rd c. BC, when the settlement was finally abandoned.



Fig. 8. Aerial view of the results of 1996 campaign in Puerto-19 (© J. M. Gutiérrez).

Finds associated with these later stages were mainly recovered from large landfills in the vicinity of the building equipped with basins (like the outstanding deposit UE-136). We must highlight the large number of ‘fishy’ amphorae and tableware and other ceramics used by the workers of the factory, plus lead net weights, bronze hooks and other fishing gear. The presence of abundant remains of grape seeds (*vitis vinifera*, identified by Prof. G. Pérez Jordà from University of Valencia) and possible bronze billhooks, raise the possibility that in addition to salted-fish Puerto-19 could also had been devoted to agricultural (wine) production²⁵.

5.3. The Punic urban plan of *Gadir* and the pottery workshops

The continuous steady excavating over the last couple of decades has enabled after much consideration the existence of an intense and organized occupation of the plains and low hills of the ancient *Antipolis* Island to be proposed. Thus, this southern side of this insular territory turned into a suburb of the city focused mainly on marine resources and specially pottery production between ca. 525/206 BC²⁶. These pottery workshops possibly were established following a reasonably regularized pattern composed of stable ‘plots’ that would have been generated in this insular area not before the late 6th c. BC (as the currently available archaeological data suggests). The large area of the hinterland devoted to pottery (amphora) production, with dozens of

contemporary centres of production (producing enough for ceramic self-sufficiency for daily issues and obviously for maritime trade), could help to illustrate the deep local economic (and demographic?) changes and growth.

In these insular pottery kiln sites, undoubtedly prevailed amphora production output at all times (**fig. 9**). But as far as we know, almost each workshop was ‘mixed’, where the manufacture of other ceramic classes or categories was a daily task (including red-glazed and grey tablewares, coarse and cooking wares, net weights or terracottas). Altogether, these Gadiritan kilns produced large quantities of transport containers that would had been essentially aimed at supplying local fish-salting facilities and external commerce²⁷.

The importance of salted-fish production and trade remained indelibly imprinted in many of the amphorae that carried to the Atlantic and Mediterranean bounds. Seals, whose iconography often includes (among other topics) scenes representing tuna, dolphins, other fishes, artisans during the packaging process, etc., illustrate very well the importance of fishing and trade activities in Gadiritan everyday life (**fig. 10**). These stamps on local amphorae emerged in *Gadir* from the 4th c. BC, but available data suggest that it would be from the second half of the 3rd c. BC and especially during the 2nd c. BC when the use of these marine and industrial iconographies increased.

25. López, Ruiz 2007.

26. Sáez 2008.

27. Ramon *et al.* 2007.

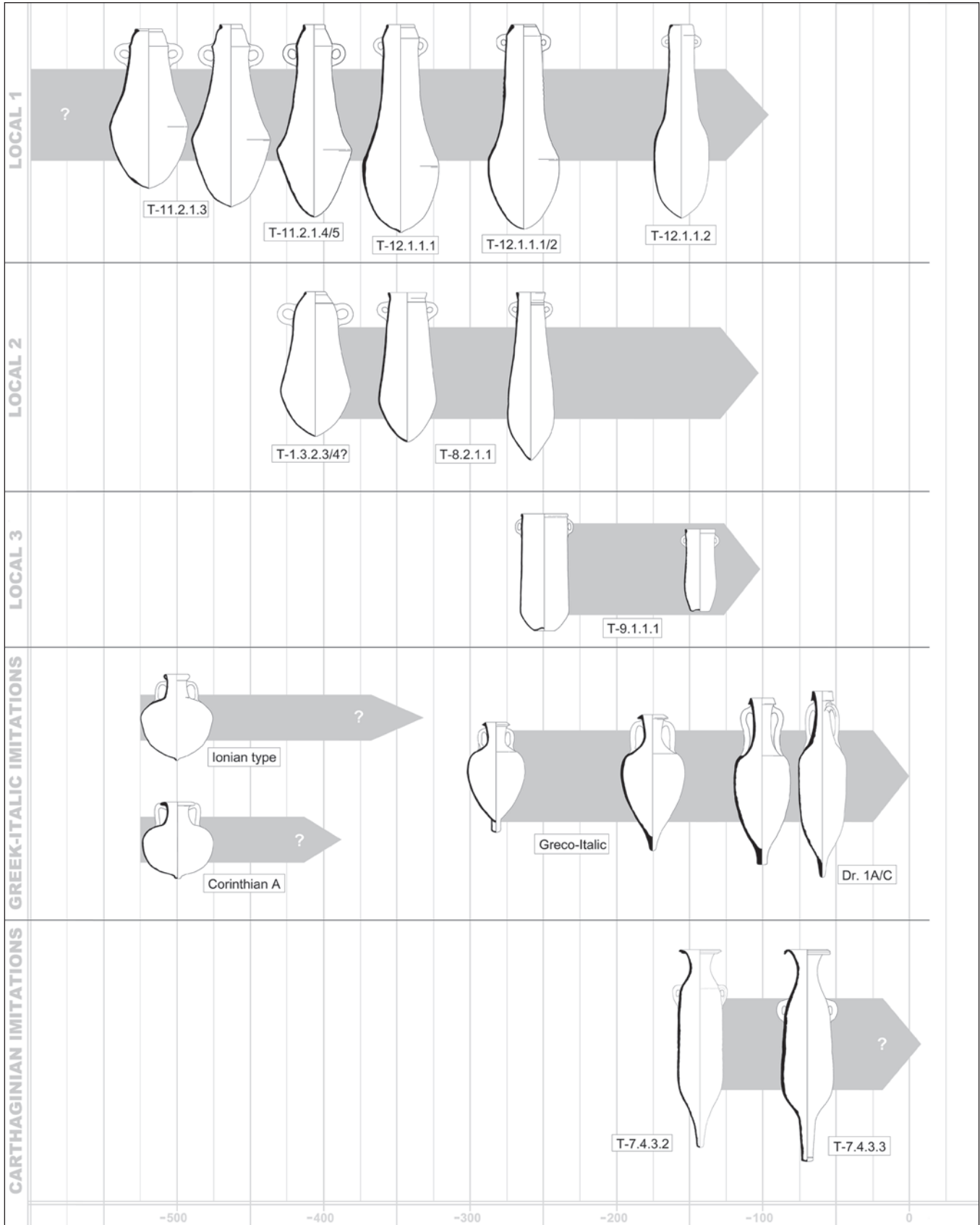


Fig. 9. Evolution of main types of amphorae produced in the pottery workshops of *Gadir/Gades* between late-archaic stage and the Augustan period (© A. SAEZ after Ramon 1995).

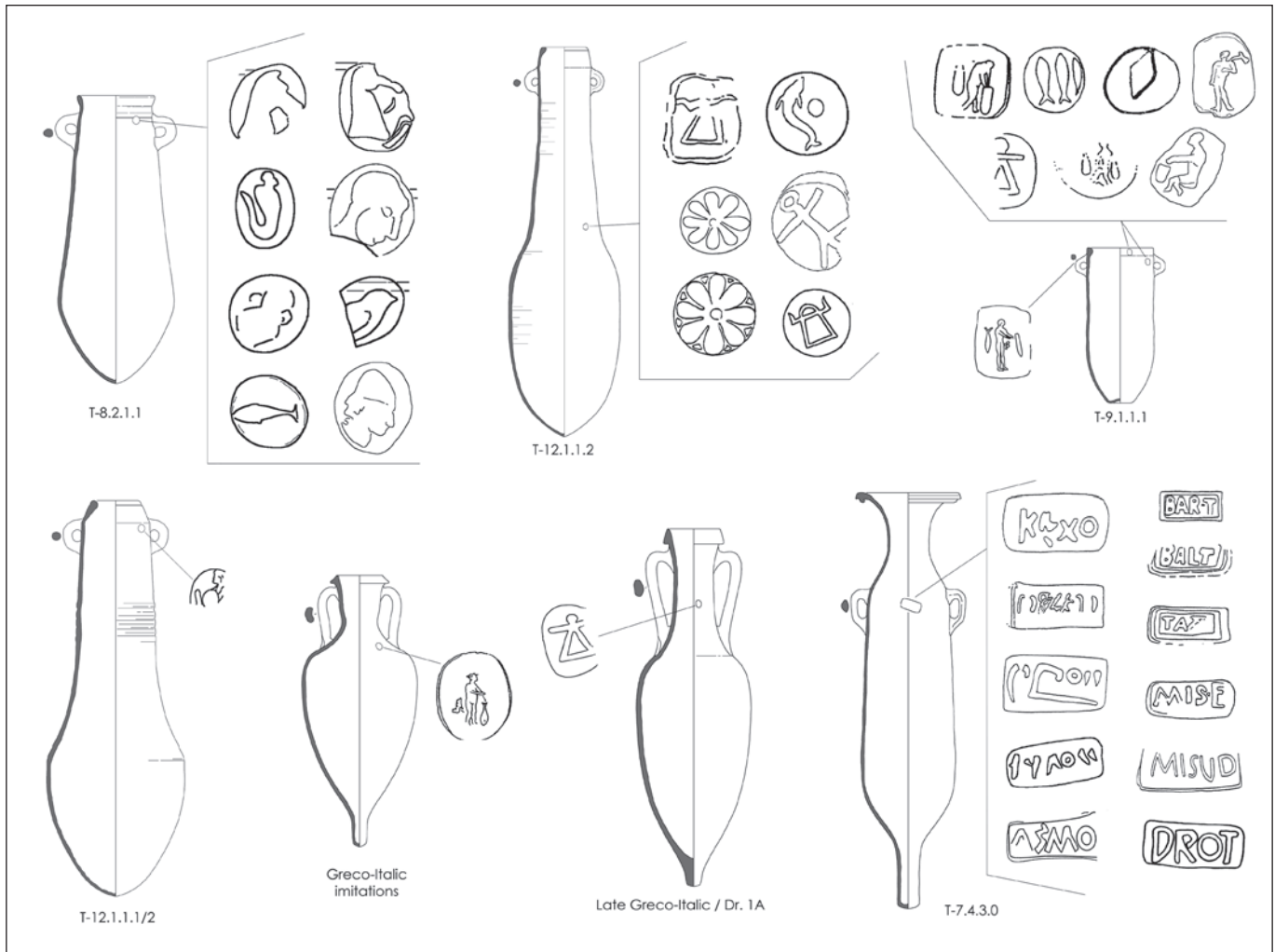


Fig. 10. Local amphora types and iconographies and epigraphic contents of their stamps (4th-2nd c. BC) (© A. Saez).

6. Gadir/Gades. Evolution and romanization of urban plan and economy

The discussion about the long phase of integration and adaptation of these traditional Punic industrial networks into the Roman world, developed among the 2nd/1st centuries BC, has become a topic relevant to this specialized historiography in the last decades, with approaches that have revolved primarily around the study of the pottery workshops and their settlement/exploitation patterns. More recently, the emergence of intensive rural exploitation (roman villa model) in the Iberian Peninsula and especially in the hinterland of *Gadir/Gades* has been added to this debate²⁸. Overall, the available information does not seem to point to a linear and homogeneous

transitional process for the entire region, there being significant distinguishing nuances between both sides and shores of the Strait region.

In the case of Cadiz Bay, recent archaeological research has revealed a remarkable phenomenon of persistence in the same place for centuries for both pottery workshops and fish-processing facilities (with successive phases and remodelling). But all pre-Roman industrial cells did not share this general trend. Thus, the continental complexes generally continued to function just until *ca.* 206 BC (like continental fortified villages, CBD and Chiclana), whilst in the insular hinterland pottery production and fish-processing facilities continued firing and salting, at least until the end of the 2nd c. BC, and in several cases, extended their life-cycle until the latter decades of 1st c. BC or even the first half of 1st c. AD.

28. López 1995; García 1998; Lagóstena 2001.

Local pottery workshops and fish-salting centres, both from a socio-economic point of view and physically (structures, spatial patterns, technologies, etc.), experienced successive 'romanizing' impulses, particularly obvious in the archaeological record since the mid-2nd c. BC. From these first stages rapid changes can be identified, like the rise and crystallization of new concepts about territorial planning, changes in social structure and legislation, introduction or growth of slavery for industrial purposes (at least to a perceptible level), technological innovations, productivity over quality, diversification of products and external markets, etc.

6.1. "Hybrid" industrial facilities during Late-Hellenistic period in *Gades*

From the late-2nd c. BC progressively a new model of local industrial facility seems was generated, the seed of the later production centres of the early-imperial Roman period. New fish-processing establishments, larger and frequently integrating small/medium *figlinae* and other activities gradually replaced the preceding Punic territorial scheme. These new local complexes either occupied areas traditionally only used by potters, or more usually expanding and reshaping Punic fish-salting factories already in operation.

In Luis Milena (in the central area of the *Antipolis*), the Punic pottery workshop became (maybe during the 2nd c. BC) a bigger settlement with large building/s (equipped with oval basins and several rooms paved with *opus signinum*) and the activity of potters probably continued (fig. 11). Recent excavations in 2007 have also identified pits filled with large quantities of murex shells, evidence of its systematic exploitation in order to obtain the valuable purple dye dating from the first quarter of 2nd c. BC²⁹. Similar examples of this evolution of former Punic fish-processing facilities (or pottery workshops) have also been verified on the opposite boundary of the Gaditan insular territory (Plaza de Asdrúbal could be the most outstanding case, abandoned as well during the early-imperial period).

6.2. The last step on the way: changes during Augustan period

As noted before, the end of the historical process, both on the coast of *Tingitana* and in *Baetica*, would

had led to a general renovation of this marine industry in late-Republican decades with the introduction of new technological advances and commercial-productive parameters. Small traditional factories would have been unable to compete in this new scenario, in which possibly oligarchic Punic elites themselves would have chosen to join the drift towards increasing volume of production and trade even if it meant assuming social/economic imported formulas from the Italian sphere. It is still too soon to determine accurately how this affected each urban centre individually, but certainly it seems that the coastal section located between *Gades* and *Carteia* should have been one of the main experimental contexts regarding this evolution of western 'salted-fish economy'³⁰.

New huge factories (*cetariae*) appeared in *Gades*, during the last decades of 1st c. BC. They were equipped with numerous quadrangular basins, placed close to the main portuary channel, along the Atlantic coast and maybe other propitious locations around the seashore of Cadiz Bay³¹. Some examples have been excavated at Teatro Andalucía (fig. 12), La Caleta and Cine Cómico, in former *Erytheia* Island, then perhaps part of an industrial suburb that also included pottery workshops and other infrastructure (as *officinae tinctoriae* for purple dye exploitation). These supplementary activities would have been located in the immediate surroundings of the harbour and the *cetariae*³². Moreover, probably all marshlands of the bay would have been used for the installation of salt-works. The emergence of large private rural *villae* also helped the multiplication of *figlinae* (specially amphora production), which spread through both the insular and the continental coastal countryside³³.

To summarise, until coming under the great transformations of the Augustan period (within just over a hundred years), the traditional industrial landscape designed by the productive and territorial Punic system would have been reduced to a new fully romanized context, characterized by large suburban factories and *villae* frequently equipped with *figlinae*. The foundations of this system would have been established in the last decades of the republican period, but the activity of some of these new *cetariae* and *figlinae* continued to the beginnings of Late Antiquity.

29. Bernal *et al.* 2011.

30. Arévalo, Bernal 2007.

31. Expósito 2007.

32. Bernal *et al.* 2008.

33. Bernal and Sáez 2008.

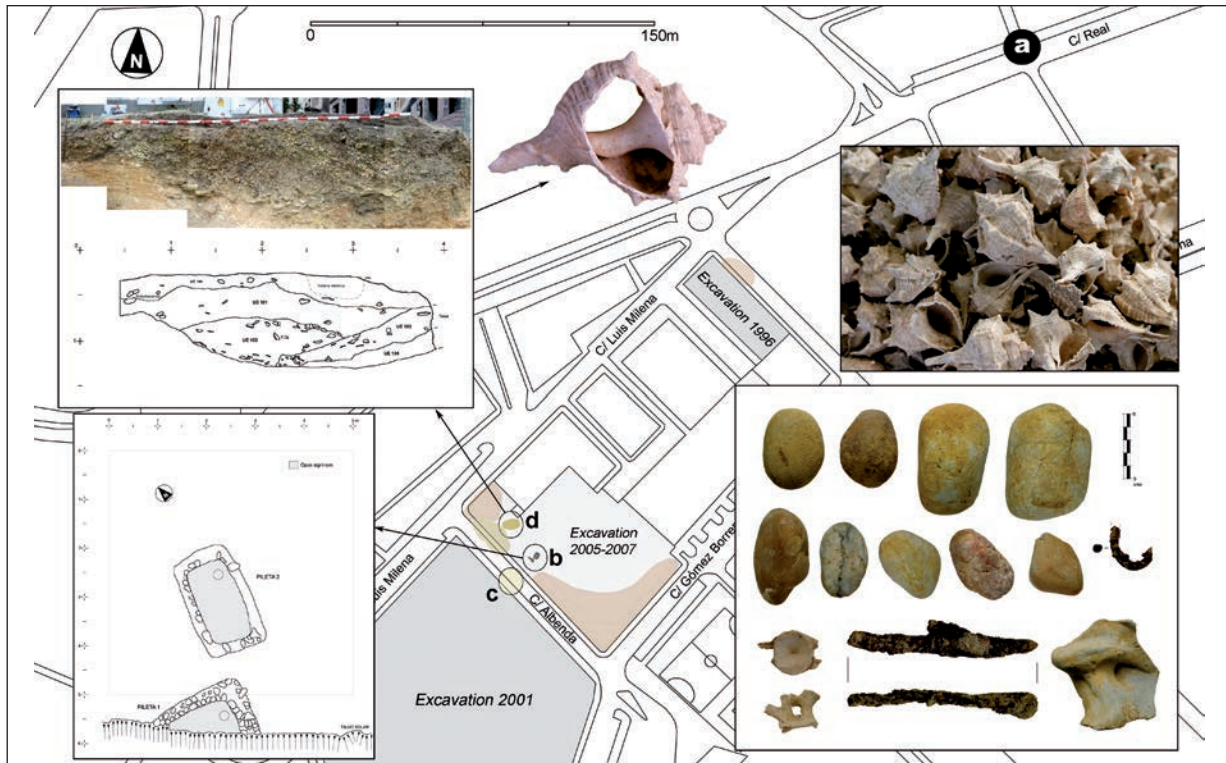


Fig. 11. Location of the sites of Calle Real (a) and Luis Milena in the central part of ancient *Antipolis*. Are also indicated the location of the pseudo-oval basins (b) of Luis Milena, remains of buildings and pavements of *opus signinum* (c) and a dump linked to pottery production and purple dye fulfilled with murex shells. Bottom right, possible crushing stones, iron hook, iron spear, fish bones and pottery refuse (after Bernal *et al.* 2011).

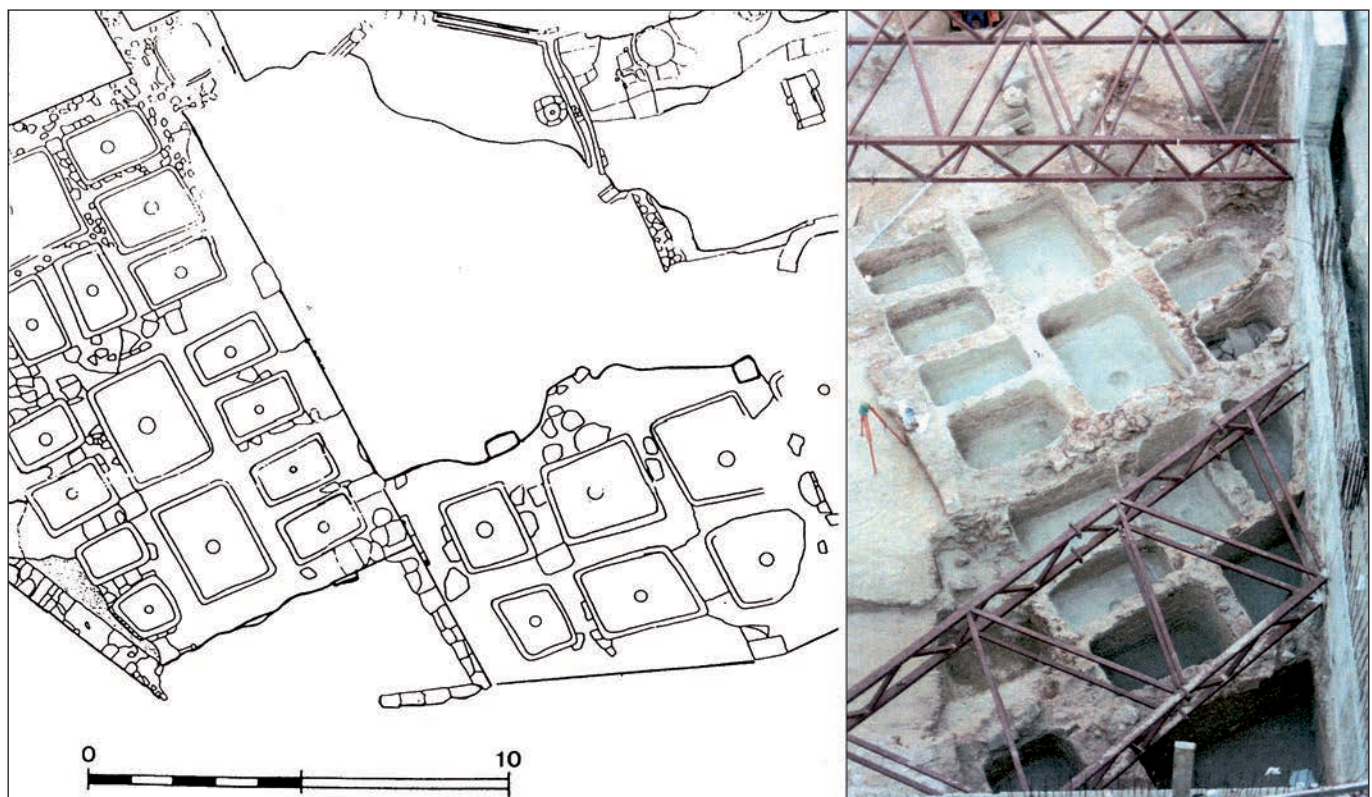


Fig. 12. Plan and photograph of roman fish-processing factory of Teatro Andalucía (after Muñoz, Frutos 2009) .

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