

Liquid Gold: The Olive Oil Trade between Baetica and Rome

By

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## **Abstract**

The thesis provides an overview of the olive oil trade between the city of Rome and its colony, Baetica, focusing on the 1st-3rd centuries AD. Topics covered include the procedure for making oil, a discussion of how the oil was packaged for shipment, hypotheses about what routes might have been taken to deliver each shipment, and estimates on the total consumption of Baetican oil in Rome. A special attention was placed on linking the records of people involved in the trade to their jobs and business functions. To accomplish this work, epigraphic records from statue bases, amphorae and dedicatory plaques were analyzed. Additional sources include excavation reports, maps, scientific data and ancient literature. Research involved integrating current research, drawing from sources produced in a variety of languages, the dominant Spanish, then English, Latin and Italian. In all, the paper represents a linking together of ancient sites, names and trade protocols in one place, resulting in an explanation of how the trade functioned, from production to consumption.

## Liquid Gold: The Olive Oil Trade between Baetica and Rome from the 1<sup>st</sup>-3<sup>rd</sup> c. CE

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## Introduction

Olive oil was an all-purpose and essential product in the Roman world. It was used in cosmetics and for bathing, in cooking and kitchen functions, as well as for lighting. Estimates suggest consumption of olive oil in Rome may have exceeded 25,000,000 liters, or 20-25 liters per capita, each year, and would have constituted at least a third of a Roman's daily calories.<sup>1</sup> Demand for olive oil would have been extremely high. To meet the demand for the product, to be sold at a high volume and an affordable price, the city had to look beyond its metropolitan borders. While olives were grown in the rural parts of Italy, the largest imports of the oil were purchased from a region of the Roman Empire located on the modern Iberian Peninsula, known as Baetica.

Scholars hypothesize it was the Phoenicians who first brought the olive tree to the Iberian peninsula around 800 BCE.<sup>2</sup> Late Republican coins from the settlement at Ulia have olives depicted upon them, suggesting at that time the area already celebrated olives as a source of its prosperity.<sup>3</sup> Labelled by Columella as “the queen of trees,” the olive tree produced fruit with relatively little attention needed, and unlike a grape vine, could remain unpruned without withering away, but rather would continue to produce fruit on its own until the farmer came to pay attention to it again.<sup>4</sup> The production of olive oil began with cultivating olive trees, which would have been grown in large groves. The trees began producing fruit in quantity in five to seven years after first planting.<sup>5</sup> Olives flourished in Baetica's temperate climate and irrigated, high-yielding soils.<sup>6</sup>

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<sup>1</sup> Hitchner 2012, pp. 72.

<sup>2</sup> Lanza 2011, pp. 18.

<sup>3</sup> The full name of the settlement is *Colonia Julia Traducta*, in Andalusia. Curchin 1991, pp. 150.

<sup>4</sup> Columella, *On Agriculture* 5.8, *Ex quibus bacca iucundissima est Posiae, speciosissima Regiae, sed utraque potius escae, quam oleo est idonea.*

<sup>5</sup> Haley 2003, pp. 40.

<sup>6</sup> Haley 2003, pp. 36.

By the 1<sup>st</sup> century CE, the peak of its olive oil production and exportation, the region of Baetica had been under Roman control for nearly three hundred years. These centuries of Roman governance were preceded by two hundred years of legions sent on campaigns to overtake the land from the peninsula's fourteen distinct indigenous tribes and foreign settlers.<sup>7</sup> The conquest took place in phases, beginning with the driving out of the Carthaginians from Turdetania, the southern region of the peninsula, in the late 3<sup>rd</sup> century BCE.<sup>8</sup> After quelling rebellion from native Turdetanian kings and chieftains, the Romans established their administration of the eastern and southern peninsula in 197 BCE, and pushed to conquer the peninsula further. From 155-133 BCE the Romans fought the Celtiberian Wars, in which control over the central inland peninsula was solidified.<sup>9</sup> The year 133 BCE signals the end of major resistance to Rome.<sup>10</sup> The two-hundred-year conquest of Spain was characterized by continuous, haphazard warfare necessitated by the "mosaic" of indigenous tribes that had to be overtaken one by one.<sup>11</sup>

The Roman province of Baetica was created between 16 and 13 BCE, when Augustus split Hispania Ulterior in two parts: thoroughly Romanized Baetica and more rebellious Lusitania.<sup>12</sup> Cordoba was set as Baetica's capital. The province was subdivided into smaller administrative districts, or *conventus*: *Hispalensis*, *Cordubensis*, *Astigitanus* and *Gaditanus*. The most fertile agricultural land on the peninsula was located within the borders of *Hispalensis*, and *Cordubensis*, especially along the Baetis

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<sup>7</sup> Keay 1998, pp. 46.

<sup>8</sup> Keay 1998, pp. 29.

<sup>9</sup> Keay 1998, pp. 32.

<sup>10</sup> Keay 1998, pp. 42.

<sup>11</sup> Keay 1998, pp. 42.

<sup>12</sup> Curchin 1991, pp. 53.

River (modern-day Guadalquivir), was also agriculturally productive.<sup>13</sup> Baetica also had mineral wealth and in the town of Gades, a busy Mediterranean port.

Roman settlement in Baetica was varied. The Romans made colonies, such as Urso, on the foundations of existing indigenous settlement, or established Roman governments in mixed indigenous-Roman sites such as Cordoba.<sup>14</sup> There were also colonies for army veterans, like Astigi.<sup>15</sup> Existing indigenous towns were originally seized as *civitates stipendiariae*, tribute payers, but during the reign of Julius Caesar and after, these communities could be granted *municipium* status, giving Latin citizenship to their residents and Roman citizenship to their magistrates upon completion of service.<sup>16</sup>

The fertility of the Guadalquivir Valley, the central region of the province, allowed for landowners to develop steady incomes from cereal production, expand their landholdings, and to begin growing cash crops such as olives. The area's farms likely practiced polyculture, growing a combination of these cash crops; the larger estates would have been able to specialize in one.<sup>17</sup> As the productive countryside fueled the growth of towns with market centers and Roman amenities, fertile Baetica became the most urbanized of the Iberian provinces.<sup>18</sup>

Baetica became a main exporter of olive oil to Rome. The study outlines the steps of producing, packaging, transporting and selling olive oil from Baetica for Roman markets. In terms of production, the standard ancient world methods for pressing olives into oil is outlined, with examples from specific mills and presses excavated from sites in

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<sup>13</sup> Keay 1998, pp. 14.

<sup>14</sup> Curchin 1991, pp. 103.

<sup>15</sup> Curchin 1991, pp. 114.

<sup>16</sup> Curchin 1991, pp. 104.

<sup>17</sup> Fornell Munoz 2007, pp. 106.

<sup>18</sup> Curchin 1991, pp. 126-127.

Baetica provided. Following the trajectory of amphorae filled with olive oil as it was moved across the empire, puts a great emphasis on geographic and logistical information, and enabled the building of a model for a possible trade route that merchants would have likely followed. As a substantial number of people drew their livelihoods from the production and transport of the good, it is fruitful to create a job inventory of the functions required for the trade to be possible. This job inventory provides insight on the wide variety of people involved in olive oil production and trade, from landowners and government officials to artisans and sailors to porters and manual laborers.

To accomplish the project, the writings of ancient authors, the ideas of modern scholars, and archaeological excavations were consulted. Ancient authors such as Columella and Pliny the Elder gave detailed descriptions of all aspects of olive growing, harvesting and oil production. Further primary sources that are useful in research are law codes governing trade between Baetica and Rome. Archaeological surveys are also extremely beneficial to understanding the topic, providing the evidence of the actual areas where olives were grown and oil was pressed. The excavation of shipwrecks pinpoints the routes sailed by merchant ships. Altogether, the different sites from the archaeological record provide a map of potential trade routes. Much work has been carried out to excavate the amphora landfill known as Monte Testaccio in Rome, and the body of amphorae and epigraphic marks uncovered at the site are highly useful in understanding how the oil was inventoried, measured and protected against fraud and contamination. The study of amphora shards additionally provides a possible source of names of landowners, oil producers, merchants and trade officials. These names offer an interesting link to dedicatory inscriptions in Baetica, as proof of how wealth from the



olive oil trade transformed the province. In conclusion, the following chapters build un current understanding to elaborate how the olive oil trade operated between Baetica and Rome in terms of production, diffusion and consumption.

## Chapter One: Baetica

Martial remarked on the abundance of olives in Baetica, writing “O Baetis, whose locks are bound with a chaplet of olive-leaves.”<sup>19</sup> The principal region in Baetica for olive growing and oil production was centered on the Baetis river valley, a fertile triangle between *Colonia Iulia Romula Hispalis* (present day Seville), *Corduba Colonia Patricia* (present day Córdoba) and *Colonia Augusta Firma Astigi* (present day Ecija).<sup>20</sup> As shown in Figure 1, the river Baetis, now known as the Guadalquivir, forms the hypotenuse of this triangle of towns, flowing from Corduba to Hispalis and out to the Atlantic Ocean; the Genil River flows perpendicularly to the Guadalquivir, connecting Astigi to the site of Palma del Rio midway between Corduba and Hispalis.

### Oil Production

Farmers in the region began the oil production process by growing groves of olive trees. Once mature and producing, the olive fruits needed to be collected. Olives were harvested in Baetica by the same system utilized across the entire Mediterranean for centuries: by beating the trees. Laborers used rake-like instruments to beat the trees with enough force that the ripe fruit would fall from the tree’s branches.<sup>21</sup> Alternatively, harvesters climbed ladders and pulled the fruit down by hand, as depicted in the late 3<sup>rd</sup> to early 4<sup>th</sup> century relief of olive harvesters from Cordoba (Fig. 2). The least labor intensive way to harvest was to let the olives ripen to the point of falling off the branches on their own into receptacles placed beneath the trees, though the quality of the fruit and its oil would decline the longer the olives were left on the branches.<sup>22</sup>

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<sup>19</sup> Martial, *Epigrams* 12.98, *Baetis olivifera crinem redimite corona*.

<sup>20</sup> Ponsich 1998, pp. 175.

<sup>21</sup> Foxhall 2007, pp. 126.

<sup>22</sup> Foxhall 2007, pp. 126-8.

Once harvested, the olives could be processed into oil. The olives were crushed, pressed to release liquid, and then the liquid was decanted, allowing the pure oil to rise to the top to be siphoned off. First, harvested olives would have been collected in storage areas. Once there were enough ripe olives stored, the olives would be milled or crushed, so that the fruit would more easily release juice in the pressing phase.<sup>23</sup> While a mortar and pestle would have been a common household tool for crushing olives, for larger quantities, as needed for trade production, Romans developed a *trapetum*, or Catonian-type mill, a type of giant mortar and pestle with convex millstones that would have been pulled by oxen or multiple men to grind the olives down (Fig. 3). The millstones were specifically designed to rest the perfect distance from the *trapetum* base to break apart the olives while leaving the olive pit intact.<sup>24</sup> The milling began when olives were poured into the *trapetum*'s basin, which was fitted with grindstones suspended vertically by a hole in their centers on a horizontal axis so that the distance from the bottom of the stone to the basin was the height of an olive pit. When the axle was turned, the grindstones rotated around a central pillar, pushing the olives against the sides of the basin and causing them to burst open.<sup>25</sup>

The result of the milling was an olive paste, which would be formed into disks, and stacked onto presses.<sup>26</sup> The presses, or *torcularia*, most common to the region were hanging weight presses, where the olive paste would be pressed underneath a board weighed down by several hanging counterweights.<sup>27</sup> The oil, which constitutes 20-30%

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<sup>23</sup> Tyree and Stefanoudaki 1996, pp. 174.

<sup>24</sup> Cato mentions in his *De Agri Cultura* that olive oil tastes best when the pits remain unbroken. Tyree and Stefanoudaki 1996, pp. 171.

<sup>25</sup> Tyree and Stefanoudaki 1996, pp. 173.

<sup>26</sup> Rossiter 1981, pp. 353.

<sup>27</sup> Romero Perez 1997-8, pp. 122.

of the fruit by weight, would flow from the press by connecting funnels into receiving amphorae.<sup>28</sup> The olive juice contained both oil and *amurca*, a watery liquid with organic solids, which had to be filtered out of the pure oil.<sup>29</sup> In some cases, the liquid was poured into a dual-chambered receptacle, called a *dolium*, sunk into the floor, and laborers would ladle the oil, which would rise to the top above the *amurca*, out of one side and into the other. When all the oil had been scooped over, the remaining *amurca* could be thrown out, the empty side cleaned, and the process be repeated as many times as needed for the oil to be completely purified.<sup>30</sup> At some sites, such as Granaraccio in Italy, the base of the separation tank had a small opening that connected to a second tank, and by which the heavy *amurca* would pass through (Fig. 4).<sup>31</sup> Filtered oil was finally transferred into portable amphorae for transport.<sup>32</sup>

### **Agricultural Patterns**

Andalucía has the archaeological remains of one thousand Roman presses, most along the banks of the Guadalquivir and Genil Rivers.<sup>33</sup> Of these Roman oil presses, 161 have been excavated at sites known to have been ancient olive groves.<sup>34</sup> It is key to note the distinction between olive-growing and oil-making; the archaeological remains record where oil was made, not specifically where olives were grown. Based on the common agricultural patterns of today's Andalucía, and what crops are grown where today, we can assume the majority of rural sites in the Hispalis-Corduba-Astigi triangle would have

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<sup>28</sup> Kipple and Ornelas 2000, pp. 378.

<sup>29</sup> Rossiter 1981, pp. 353.

<sup>30</sup> Rossiter 1981, pp. 354, 358.

<sup>31</sup> Rossiter 1981, pp. 358-359. No dates are cited for the site, but it is believed to be from imperial period.

<sup>32</sup> Rossiter 1981, pp. 359.

<sup>33</sup> Curchin 1991, pp. 151.

<sup>34</sup> Hitchner 2012, pp. 76.

grown olives in some capacity, so we can further infer with confidence that olives were grown at the sites where oil-making infrastructures remain.

What cannot be assumed is that oil-making occurred at all sites which cultivated olives.<sup>35</sup> The size of the farm may have likely been the most important determinant in terms of whether or not the estate produced oil. Most likely, only medium to large estates produced olive oil from their crops.<sup>36</sup> Thus when archaeological remains of oil production equipment are found at a site and examined, it is likely that the villa they belong to sat on a medium to large estate.

Unfortunately, in most cases the land holding records do not exist to confirm this hypothesis.<sup>37</sup> Lines of centuriation, the remains of the delineating grid system imposed by colonizing Romans that denoted landownership or parceling, would help archaeologists connect villa remains to the lots of land the villa would have sat on, and determine how many acres would have yielded olives to be processed at each estate. However, centuriated landscapes, often have not been firmly recognized in modern Spain.<sup>38</sup> It is only in the last twenty years that environmental patterns and historical data have been analyzed together to distinguish Roman centuriation lines from geological marks from a previous or later period.<sup>39</sup> Additional developments in geographical information systems (GIS) are furthering the study of land boundaries.<sup>40</sup>

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<sup>35</sup> Saez Fernandez 1987, pp. 149.

<sup>36</sup> Romero Perez 1997-8, pp. 131.

<sup>37</sup> Fornell Muñoz 2007, pp. 109.

<sup>38</sup> Palet and Orengo 2011, pp. 384.

<sup>39</sup> Palet and Orengo 2011, pp. 384.

<sup>40</sup> Palet and Orengo 2011, pp. 384.

## The Rural Villa and Its Productions

A Roman rural villa typically consisted of three parts: *pars dominica* or *urbana*, where the owner and family lived, *pars rustica*, where the laborers and slaves lived, and the *pars frumentaria*, where agricultural processing took place.<sup>41</sup> Therefore information about olive oil production is found in the *pars frumentaria*, most frequently in the form of pieces of mills, presses, or holding vats used in decanting that remain at villa sites.<sup>42</sup> Examining the archaeological remains, however, does not always provide clear evidence for distinguishing an oil-making facility versus another type of agricultural production site.<sup>43</sup> Although larger landholders would have specialized in one or two cash crops, many Baetican *fundi*, or estates, would have practiced polyculture, the practice of raising multiple crops, and rotated their equipment for different processes at the different growing seasons as needed.<sup>44</sup>

Additionally, the three crops of the Mediterranean triad of olive oil, wine and bread, share many similar elements in processing procedures. Olive oils are made by grinding, pressing and decanting. Grapes for wine and olive for oil are pressed in a nearly identical manner, while grain has parallel grinding processes to oil. Therefore, when a site has only remains of a mill, it is unclear whether it functioned for olives or grain. For example, a stone fragment from a mill, specifically a piece of the mill's drilling instruments, was found at the fourth to fifth century AD site of La Almazara de Fuente Grande.<sup>45</sup> The piece is a cylindrical-cone with a diameter of 60 cm, height of 36 cm, and

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<sup>41</sup> Fornell Muñoz 2007, pp. 107.

<sup>42</sup> Fornell Muñoz 2007, pp. 107.

<sup>43</sup> Brun 1993, pp. 512.

<sup>44</sup> Fornell Muñoz 2007, pp. 106-107.

<sup>45</sup> Lagostena Barrios 2007, pp. 166.

a central hole with a 12 cm diameter.<sup>46</sup> Though archaeologists can determine the fragment was part of a mill, they cannot distinguish whether it came from an olive mill or a grain mill, because it could have been used for crushing up either item.<sup>47</sup> When only milling instruments remain at a site, because of a lack of organic remains, it is impossible to tell if olives and grapes are both pressed and later stored in vats. When only press remains are left, it cannot be determined whether it was meant for grapes or olives. Identifying, for example, a counterweight remaining from a press at the Villa Liedana as strictly for grapes or only for olives is impossible without additional remains.<sup>48</sup> When a combination of mills and vats remain, it becomes easier to puzzle out which processes they were used for. The most fortunate excavations, in terms of linking a villa to an olive oil producing purpose alone, are those where all three phases of oil-making are preserved.

The villa of El Gallumbar is the foremost example of Baetican oil production because milling, pressing and filtration phases all can be identified at the site (Fig. 5,6).<sup>49</sup> The villa, situated 4.5 kilometers to the southeast of Antequera on the banks of the Genil River, a little outside of the main Baetis river valley triangle, was in use from the second half of the 1<sup>st</sup> century AD into the late 2<sup>nd</sup> century.<sup>50</sup> The site was excavated in 1987, revealing evidence of olive storage, milling, pressing and decanting at the villa.

A laborer at El Gallumbar would have collected harvested olives in the most western room, which is thought to be the *cella olearia*. Notable for its heavy *opus incertum* walls, the room would have provided storage, acting as a holding area for olives

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<sup>46</sup> Lagostena Barrios 2007, pp. 166.

<sup>47</sup> Lagostena Barrios 2007, pp. 166.

<sup>48</sup> Saez Fernandez 1987, pp.184.

<sup>49</sup> Haley 2003, pp. 57.

<sup>50</sup> Romero Perez 1997-8, pp. 118.

before pressing, whether merely as a result of the volume of olives needing to be pressed or because the olives were not yet ripe enough to be pressed (Fig. 7).<sup>51</sup> Bordering the *cella olearia* was a small room lead excavator Manuel Romero Perez labeled the *antesala*; it contained a *trapetum*, and *canalis*, a special vat with four compartments, which the excavators speculate may have been used as storage for pits removed before or during the milling.<sup>52</sup> The next room would have contained the *torcularium*, or press, the remains of which are the *lapis pedicinus*, the horizontal base of the press, and the *ara*, a pipe that would have directed freshly pressed olive juice into another *canalis* storage basin (Fig. 8).<sup>53</sup> Directly next to the pressing room is a space marked archaeologically by two pits connected by a channel carved into the floor.<sup>54</sup> The first pit has a 2,500 liter capacity, while the second has a capacity of 650 liters.<sup>55</sup> The pits would have held heavy earthenware *dolia* vats, used in the final purifying and decanting step; olive liquid would have been poured over the *labra*, a filter for impurities like pits and stems, into the first *dolium*.<sup>56</sup> After being allowed to rest, the pure oil would have risen to the top of the *dolium* and the *amurca* would have passed through the floor channel into the second *dolium*, which was fitted inside the second pit (Fig. 9).<sup>57</sup> While El Gallumbar is known in general as a first-order example of oil processing, in particular, the villa's remains help inform our understanding of the oil decanting process.

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<sup>51</sup> Romero Perez 1997-8, pp. 121.

<sup>52</sup> Romero Perez 1997-8, pp. 121.

<sup>53</sup> Romero Perez 1997-8, pp. 122.

<sup>54</sup> Romero Perez 1997-8, pp. 127.

<sup>55</sup> Romero Perez 1997-8, pp. 127.

<sup>56</sup> Fornell Muñoz 2007, pp. 108.

<sup>57</sup> Romero Perez 1997-8, pp. 127.



In the modern city of Granada is the Villa de los Mondragones, a Roman villa inhabited from the 1<sup>st</sup> to 7<sup>th</sup> centuries AD (Fig. 10).<sup>58</sup> The *pars frumentaria* is well preserved at the villa, with remains of an oil manufacturing site: a *cella olearia*, *torcularium*, and *tabulatum*.<sup>59</sup> The olive oil equipment and the structures housing them are believed to date to the 4<sup>th</sup> century.<sup>60</sup> The *cella olearia* is trapezoidal, and its northern concrete wall separates the storage room from the grinding area.<sup>61</sup> The milling zone is divided in three bays by interior walls which were added after the exterior walls had been built.<sup>62</sup> The remains of the press platform are rectangular, with a width of 5.4 m and a length of 22.4 m; four sandstone pillars also remain, but are believed to be of a later date.<sup>63</sup>

A third villa, Los Pinos I, contains evidence for both grinding and decanting operations, allowing archaeologists to infer this *fundus* was principally an olive oil producing site (Fig. 11).<sup>64</sup> The villa's large oil complex is believed to have been constructed in the first half of the 1<sup>st</sup> century AD, and is located near the modern city of Fuentes de Andalucía, in the province of Seville.<sup>65</sup> The site contains an underground structure (6 x 2.69 m) and had hydraulically lined walls that are only 1.1 meter high, making the ceiling of the room much too low for anyone to comfortably walk through (Fig. 12). Excavators hypothesize that this structure might have acted as a cistern or storeroom, with its hydraulic lining acting as a waterproofing agent for storage of a liquid

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<sup>58</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 475.

<sup>59</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 485.

<sup>60</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 488.

<sup>61</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 485.

<sup>62</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 487.

<sup>63</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 485.

<sup>64</sup> Peraza and Alarcón 2013-4, pp. 126-128.

<sup>65</sup> Peraza and Alarcón 2013-4, pp. 126.

product and a humidity protectant.<sup>66</sup> At the north/central area of the site, there is a basin (2.36 x 1.46 x .61 m) with a stone perimeter, which perhaps demarcated the basin as a cleaning area for olives about to be pressed.<sup>67</sup> At the southern end of the same area of the site, evidence of pressing structures remain. There is a circular press base (2.47 meters in diameter) and a channel to another basin where oil from the press would have collected (Fig. 13).<sup>68</sup> Also remaining on site are the bases of three rotary circular mills, thought to be of the *mola hispaniensis* type (Fig. 14)<sup>69</sup>, and a rectangular pit (8.5 x 6.15 m) that was divided into six quadrangular decanting basins (Fig. 15).<sup>70</sup> The final space at the villa is a room (25 x 5.5 m) with 19 *dolia* pits, possibly a *cella olearia* for storing the final product.<sup>71</sup>

The villas El Gallumbar and Los Pinos I provide evidence for all three phases of the olive oil producing process. Evidence also exists at many villa sites for one or two of the phases; in these cases, where only grinding or only pressing evidence remains, there is no guarantee that the site was an exclusive olive oil producer. Whether only for oil or not, however, the number of sites with evidence of the manufacture of foodstuffs provides a fuller picture of the agricultural productivity of Baetica. In terms of the first milling stage, a well-preserved *trapetum* piece was uncovered at another villa, La Reina.<sup>72</sup> The olive mill worked by grinding olives beneath two grindstones that moved in

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<sup>66</sup> Peraza and Alarcón 2013-4, pp. 130-133. In Italy, many sites, such as Monte Canino, Ponte Crusta and Vicovaro, have collection tanks and rooms with concrete lined walls and floors for the purpose of proofing the space; the special lining here could have been following an Italian model (Rossiter 1981, pp. 358).

<sup>67</sup> Peraza and Alarcón 2013-4, pp. 134.

<sup>68</sup> Peraza and Alarcón 2013-4, pp. 134.

<sup>69</sup> The *mola* were the grindstones of an olive mill; the *hispaniensis* type is mentioned by Cato in his inventory of an olive oil production site (Cato *De Agri Cultura* 10.4 “*molas asinarias unas, trusatiles unas, Hispaniensis unas*”), and is thought to be very closely related to the convex *trapetum* grindstone.

<sup>70</sup> Peraza and Alarcón 2013-4, pp. 137-138.

<sup>71</sup> Peraza and Alarcón 2013-4, pp. 142.

<sup>72</sup> Saez Fernandez 1987, pp. 165.

a circle around a central pole. They were fixed to the pole by a horizontal axis that fit through their centers; the axis could be driven by laborers or animals.<sup>73</sup> The grindstone found at La Reina was orb shaped, 83 centimeters in diameter and 17 centimeters deep; its center hole had a diameter of 17 centimeters.<sup>74</sup> At an additional villa, Cerro Cabeza Baja, in modern day Jaen province, the late 1<sup>st</sup> century AD flat stone surface of an olive mill remains, with dimensions of 1.4 x .8 meters.<sup>75</sup>

Other archaeological evidence does not pertain to strictly one phase of olive oil production step, but rather to a miscellaneous category. Archaeologists working at Cerro Cabeza Baja made the discovery of several *aolia*, or pruning and tree-cutting tools.<sup>76</sup> At Cuesta del Espino, in Cordoba province, clay funnels were uncovered, possibly used to fill amphorae with oil.<sup>77</sup> Infrared spectrographic images, which utilize more of the light spectrum to show details on objects not visible to the naked eye, were taken at the site of Cuevas del Becerro. The images revealed sterified, or fossilized, oil remains on amphora shards; these traces of olive oil make certain the presence of olive oil at the site.<sup>78</sup>

Modern scholars have worked to calculate the expected oil productivity of an ancient olive grove. To do so, they reference modern crop yields over a decade with two bumper, three mediocre and five typical crops, which is the typical ten year harvest pattern, to understand how many olives are typically harvested.<sup>79</sup> Then this information is merged with an estimated fruit to oil yield ratio stated by Pliny the Elder in his *Natural*

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<sup>73</sup> Tyree 1996, pp. 174.

<sup>74</sup> Saez Fernandez 1987, pp. 168.

<sup>75</sup> Haley 2003, pp. 120.

<sup>76</sup> Haley 2003, pp. 120.

<sup>77</sup> Haley 2003, pp. 115.

<sup>78</sup> Haley 2003, pp. 58.

<sup>79</sup> De Sena 2005, pp. 7.

*History* to estimate how much oil could be pressed from the fruit.<sup>80</sup> According to Pliny, six Roman pounds of olive oil were pressed from every *modius* of fruit, a 22.7% yield.<sup>81</sup> A region with 56,000 hectares of olive groves would have been able to produce an average of fifteen million liters of oil a year.<sup>82</sup> A one meter by one-half meter *dolium* at the Italian villa site of Scalia has a 500 liter capacity.<sup>83</sup> Assuming that size to be standard, the *dolia* room at Los Pinos I, with nine *dolia*, had capacity for 500 liters x 19 vats, or 9,500 liters total. If the region at large was capable of producing fifteen million liters of oil, the productivity of each individual estate was very, very small, or Los Pinos I was a relatively small villa.

### **Problems and difficulties**

The physical proof of olive cultivation and oil production in Baetica is abundant. Drawing connections between physical sites and their owners, however, has been made difficult by high levels of deterioration at the *villae*.<sup>84</sup> Additionally, the ancient literary record on the Baetican agricultural economy is small.<sup>85</sup> There are no written documents recording land ownership, especially regarding the exact boundaries of individual properties.<sup>86</sup> The gaps in written testimonies, paired with rural sites which have in many cases been erased by subsequent building and settlement (among which only a small portion have been excavated), impairs a full understanding of land ownership and the construction of landholding chronologies for the region.<sup>87</sup> For example, the Villa de los

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<sup>80</sup> De Sena 2005, pp. 7.

<sup>81</sup> Pliny the Elder, *Natural History* 15.4.14, *itaque vulgo non amplius senas libras singulis modis exprimi dicunt*; De Sena 2005, pp. 7.

<sup>82</sup> De Sena 2005, pp. 7.

<sup>83</sup> Rossiter 1981, pp. 356

<sup>84</sup> Hua 2009, pp. 226.

<sup>85</sup> Mattingly 1988, pg. 33.

<sup>86</sup> Hua 2009, pp.226.

<sup>87</sup> Fornell Muñoz 2007, pp. 109.

Mondragones was occupied for five centuries, and underwent renovations and expansions that have changed its structure; the grindstones of the mill were removed from their original after the 3<sup>rd</sup> century of use and reused in the walls when a residential area was added on to the structure.<sup>88</sup> The villas, in their current excavated states, cannot always be trusted to be an accurate representation. The majority of evidence collected about the people involved in olive oil production and trade, then, comes not from these villa sites, but from inscriptions, whether from honorary statuary or those made on oil amphorae, which will be discussed in Chapter Two.<sup>89</sup>

### **Looking ahead**

This chapter has described the production process of olive oil, starting with growing the olives and then crushing, pressing and decanting them into oil. Once the oil was made, those involved in its trade faced the challenge of moving the product in a safe and cost-efficient manner across the Mediterranean to markets in Rome. The next chapter will deal with how moving the product was accomplished in an organized way, from the design and labeling of transport amphorae to their movement down waterways to the coast and eventual long-distance shipping.

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<sup>88</sup> Rodriguez Aguilera, Flores, Aguilera and Tovar 2013, pp. 488.

<sup>89</sup> Remesal Rodriguez 1998, pp. 185-189.

## Chapter Two

*“Italy relies upon external resources and the life of the Roman people is tossed daily upon the uncertainties of sea and storm.”*

*-Tacitus, Annals, 12.43*

The owners of the olive *fundi* were members of the wealthiest senatorial class of Baetians, sharing family lineages with emperors Trajan and Hadrian.<sup>90</sup> But, Roman social conventions and legal codes led the highest classes of people to look down upon making money directly through labor or commerce. Elite landowners were directed by Cicero to only make money in moral ways.<sup>91</sup> Trade was not considered to be a moral economic pursuit; senators were even forbidden by law to engage in seafaring trade.<sup>92</sup> From the *Plebiscitum Claudium* of 219-218 BC, neither a senator nor his son was allowed to own a ship with a cargo hull greater than three hundred amphorae.<sup>93</sup> Therefore, olive grove owners were prevented by prevailing attitudes and legal codes from actually taking place in the trade of their harvests.<sup>94</sup> They had to distance themselves from the export of their oil, which was accomplished by the work of middlemen, traders and freedmen whom the landowners sponsored.<sup>95</sup> Once the oil was produced, the landowners would sell it off to traders active in the region, and production and trade were kept in separate spheres.<sup>96</sup>

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<sup>90</sup> Kingsley, Decker and Gerth 2014, pp. 7.

<sup>91</sup> Cicero *De Officiis* II, XXIV, 87

<sup>92</sup> D’Arms 1981, pp. 48.

<sup>93</sup> Livy *History of Rome* 21.63 “*atque uno patrum adiuvante C. Flaminio tulerat, ne quis senator cuive senator pater fuisset maritimam navem quae plus quam trecentarum amphorarum esset haberet—id satis habitum ad fructus ex agris vectandos, quaestus omnis patribus indecorus visus.*”

<sup>94</sup> Remesal Rodriguez 2013, 53.

<sup>95</sup> D’Arms 1981, pp. 48.

<sup>96</sup> Remesal Rodriguez 2013, 53.

Archaeologists speculate that oil was transported out of the olive *fundi* in skin sacks carried by mules or other pack animals. Before it could be sent across the Mediterranean Sea to Rome, it had to be properly packaged for such a journey.<sup>97</sup> This step called for the creation of a specific transport amphora for the oil; a standardized shipping container would maximize efficiency and ease to conduct trade across long distances. The rise of the mass shipments of goods from Baetica, many of them liquids, like oil and wine, caused the amphorae used as containers to be more and more specialized according to the products they carried.<sup>98</sup> Figure 16 depicts how the amphorae were streamlined over time. The first century AD began with many amphorae types being used for the same product, but by the end of the third century AD, only one or two amphorae were being used per product.

The standard container type that Baetican olive oil was transported in is known today as the Dressel 20.<sup>99</sup> The Dressel 20 amphora, named for archaeologist Heinrich Dressel, is also known as the Beltran V, Ostia I, Callender 2, or “globular amphora.”<sup>100</sup> All of these titles refer to a terracotta amphora with a sphere shaped body that curves out from a narrow, short neck with two short handles, which were distinctively thick and sharply bent, as can be seen in Figure 17.<sup>101</sup> The majority also have a small knob on the base for stability, and a tapering lip at the top.<sup>102</sup> Amphorae of the type are taller than they are wide, with a circumference at the container’s widest point of about two-thirds the height, which measures between 62 and 78 centimeters.<sup>103</sup>

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<sup>97</sup> Campbell 2012, pp. 253.

<sup>98</sup> Bevan 2014, pp. 388.

<sup>99</sup> Johnson 2012, pp. 126.

<sup>100</sup> Peacock and Williams 1986, pp. 136.

<sup>101</sup> Peacock and Williams 1986, pp. 136.

<sup>102</sup> Peacock and Williams 1986, pp. 136.

<sup>103</sup> Hughes 2010, pp. 18.

The Dressel 20 was a Baetican shape, and used exclusively for the transportation of olive oil.<sup>104</sup> When archaeologists discover an amphora of this type, whether at a site in Hispalis, Britain or Rome, they can assume with certainty that the vessel and the oil within came from Baetica, as oils from other regions were shipped in their own distinctive amphorae. Archaeologists document at least 100 sites producing Dressel 20 amphorae, pottery workshops called *figlinae*.<sup>105</sup> As mapped in Figure 18, the sites are principally found in the Baetis Valley between Hispalis and Corduba.<sup>106</sup> Their concentration along the Guadalquivir and Genil riverbanks allowed for easy accessibility for the potters to obtain the clay for making the jars.<sup>107</sup> The quartz, quartzite and potash amphora fabric with flecks of chert, limestone and mica reflects the soils of the region.<sup>108</sup> The placement of *figlinae* on the riverbanks also made it easy for riverboats to load and carry the finished products away.<sup>109</sup> As one *figlina* would not have just one kiln, but several, 150-200 kilns may have been firing amphorae across the 100 potteries operating in the Guadalquivir Valley.<sup>110</sup> During a five-month firing season, a site at La Catria had production capabilities of making 1,400 amphorae; expanding that estimate to all the known kilns in the region reveals that at the height of the olive oil trade, 200,000 to 300,000 amphorae could have been produced annually.<sup>111</sup>

Workers at the Dressel 20 kiln sites would fill amphorae with oil; each jar had an average capacity of 70 liters of oil, weighing about 100 kilograms when full.<sup>112</sup> The filled

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<sup>104</sup> Kingsley, Decker and Gerth 2014, pp. 2; Peacock and Williams 1986, pp. 76.

<sup>105</sup> Remesal Rodriguez 1998, pp. 188; Ponsich 1974

<sup>106</sup> Funari 1996, pp. 2.

<sup>107</sup> Campbell 2012, pp. 252.

<sup>108</sup> Peacock and Williams 1986, pp. 140.

<sup>109</sup> Remesal Rodriguez 1998, pp. 188.

<sup>110</sup> Kingsley, Decker and Gerth 2014, pp. 3.

<sup>111</sup> Kingsley, Decker and Gerth 2014, pp. 3.

<sup>112</sup> Broekaert 2011, pp. 598.



amphorae would then be marked in different, significant ways so that shippers and merchants could easily identify, quantify and track their inventory. Surviving marks provide information on where the amphorae came from, the quantity of oil within and the dates the oil was traded-- details which make amphorae invaluable sources to study trade.<sup>113</sup> The markings can be broken down into three categories: stamps, inscriptions and graffiti.<sup>114</sup>

Stamps imprinted the initials of the *tria nomina* of the olive oil producer or estate owner on the jar.<sup>115</sup> On occasion, instead of the initials of a person, names of estates were stamped, such as *ARVA SALS*, which denotes an estate on the Guadalquivir halfway between Hispalis and Corduba, at Arva, or Pena de la Sal.<sup>116</sup> The recovery of amphorae from Germany, Britain and Northern France marked with the same stamps provides evidence of the organization and reach of these olive oil producers.<sup>117</sup> The stamps were either *in ansa*, on the handle, *radice ansa*, on the lower portion of the handle, or *in uentre*, on the amphora body (Fig. 19).<sup>118</sup>

The second category of marks, inscriptions or *tituli picti*, were painted on the amphorae in black ink, before and after the pots were fired. The inscriptions were placed in different places on the jar according to the information they provided, following the composition shown in Figure 20.<sup>119</sup> Position *alpha* was along the amphora's neck. These marks, which were always numerical values ranging from 79.5 to 107.5, signified the

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<sup>113</sup> Parker 1973, pp. 363.

<sup>114</sup> Funari 1996, pp. 3.

<sup>115</sup> Peacock and Williams 1986, pp. 10, 136.

<sup>116</sup> Peacock and Williams 1986, pp. 11; the stamp is fig. 3.5 in M.H. Callender's 1965 Oxford University Press publication, *Roman Amphorae*.

<sup>117</sup> Funari 1996, pp. 84-85.

<sup>118</sup> Funari 1996, pp. 5.

<sup>119</sup> Funari 1996, pp. 4.

weight of the empty jar.<sup>120</sup> *Tituli picti* in position *beta* were placed on the upper body, and consisted of a genitive word in capital letters, noting a merchant who owned the product inside the amphora.<sup>121</sup> After third-century seizures of oil producing estates in Baetica by emperor Septimius Severus, the *beta* inscriptions read *fisci rationis patrimoni(i) provinciae Baeticae*.<sup>122</sup> *Gamma* inscriptions marked the main body, and represented yet another number, signifying the weight, in pounds, of the vessel's contents (usually falling between 178.5 and 219.5).<sup>123</sup>

The final type of inscription, *delta*, are found on the right-side handle of the amphora when holding the jar so that the neck inscriptions are facing the reader.<sup>124</sup> The *delta* inscription is the most complex. It sometimes consisted of five lines, which documented the date, the names of any tax/customs officials or trade overseers, the place of origin and the place of export.<sup>125</sup> Jose Remesal Rodriguez suggests the *delta* inscription followed the formula of "received in the district of [Hispalis, Astigi, Corduba] in the place of [port or estate], containing [numeric value] pounds of oil. This control was placed by [the owner of the estate or shipping representative], on behalf of [name of merchant] in [year]."<sup>126</sup> Interpretation of these inscriptions provide an enormous quantity of specific information about the trade, useful for calculating trade metrics.

The final type of amphora marks were graffiti. These markings were applied pre-firing by the potters, and post-firing by merchants.<sup>127</sup> The graffiti included dates, names,

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<sup>120</sup> Funari 1996, pp. 4, Peacock and Williams 1986, pp. 13.

<sup>121</sup> Funari 1996, pp. 4.

<sup>122</sup> Peacock and Williams 1986, pp. 13; for example, *CIL* 15.04123.

<sup>123</sup> Funari 1996, pp. 4; Peacock and Williams 1986, pp. 13.

<sup>124</sup> Funari 1996, pp. 4.

<sup>125</sup> Funari 1996, pp. 4, Peacock and Williams 1986, pp. 13.

<sup>126</sup> Remesal Rodriguez 2002, pp. 788-789.

<sup>127</sup> Funari 1996, pp. 5.

acronyms and quick notes or remarks.<sup>128</sup> On the nob on a Dressel 20 amphora's base recovered in Alcestor, Warwickshire, United Kingdom, someone inscribed the graffito *SVRINAE VIRILIS*, “[property] of Surina Virilis.”<sup>129</sup> The phrase is considered to be the signature of the potter, though alternate hypotheses propose it could be the name of the shipper, merchant, or client.

Workers filled and appropriately marked the amphorae. Then, skiffs called *lyntres*<sup>130</sup> small enough to navigate the Guadalquivir and its tributaries passing down five hundred and sixty kilometer river, guided by a sail, oars, or both, would dock at the kiln sites.<sup>131</sup> The olive harvest and oil production season took place from December through February, whereas the transportation time of February through April, would have coincided with the highest water levels in Baetican rivers.<sup>132</sup> Laborers would have needed to walk the boats, however, using towropes at different points of the year and at less navigable points along the river.<sup>133</sup> On the Guadalquivir between Hispalis and Corduba, the *lyntres* would have made eight stops on the right bank, at Italica, Ilipe Magna, Naeva, Canama, Arva, Axati, Detumo and Carbula, and four on the left bank, at Brenes, Tocina, Guadajoz and Palma del Rio.<sup>134</sup> At each port, the boat would have added more amphorae to its cargo until reaching a carrying capacity between seventy and eighty amphorae.<sup>135</sup>

The *lyntres* made stops at amphorae kilns to collect the olive oil that was collected there to be packaged for market, and deliver it to the large river ports of Hispalis,

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<sup>128</sup> Funari 1996, pp. 5.

<sup>129</sup> Funari 1996, pp. 7.

<sup>130</sup> Alternatively, *linter*.

<sup>131</sup> Campbell 2012, pp. 209, 247.

<sup>132</sup> Campbell 2012, pp. 253.

<sup>133</sup> San Nicolas Pedraz 2002, pp. 279.

<sup>134</sup> Campbell 2012, pp. 252.

<sup>135</sup> Campbell 2012, pp. 252.

Corduba and Astigi. These cities served as collection sites, where sizable inventories of olive oil amphorae would amass before being further transported.<sup>136</sup> After a suitable volume of amphorae had been assembled, slightly larger boats called *scapha* were used to deliver the oil to ports on the Mediterranean such as Tarraco and Gades.<sup>137</sup> The *scapha*, sailed by a *scapharius*, were cargo boats designed to transport goods upriver and across harbors.<sup>138</sup> Once brought to the coastal harbors, the amphorae were transferred to a third, seafaring ship for the final journey to Rome.<sup>139</sup>

The *lyntres* and *scapha* that transported the Dressel 20 amphorae full of oil within Baetica could not stand up to the several thousand kilometer journey across the Mediterranean to reach Rome. Traveling from Gades to Portus involved sailing a distance of 2,164 kilometers (Fig. 21). Alternately, merchants could take their wares overland, following the road network across the southern coast of modern France and down the Italian peninsula to Rome, a journey of 2313 kilometers (Figure 22). An analytical reading of Diocletian's Price Edict, dated to AD 301, and an Egyptian papyrus on the transport of wheat from AD 42 allows for the costs of transportation via road, river and sea to be compared.<sup>140</sup> Throughout the centuries of those two documents, land transport was much more expensive than either river or sea, and travel by sea was much less expensive than river travel.<sup>141</sup> Using the example of wheat, which the trade in olive oil would have paralleled, found on the ancient documents mentioned previously, traders

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<sup>136</sup> Remesal Rodriguez 2013, 50.

<sup>137</sup> Remesal Rodriguez 2013, 50.

<sup>138</sup> Campbell 2012, pp. 209-210, 460.

<sup>139</sup> Remesal Rodriguez 2013, 50.

<sup>140</sup> Campbell 2012, pp. 216.

<sup>141</sup> Campbell 2012, pp. 215.

would have encountered a ratio of cargo value to transport cost of 1 for sea, 4.9 for river and 28-56 for land.<sup>142</sup>

Oil amphorae were loaded into the composite cargoes, cargoes which contained many different Baetican products, of large sea vessels.<sup>143</sup> The estimated route in Figure 22 demonstrates how from Gades, ships passed through the Strait of Gibraltar, and hugged the Iberian coast up to Tarracco. As the ships came to each port, they could stop and load more products. The route in Figure 21 displays how ships might end their coast-hugging pattern after departing from Tarracco, and sail directly across the Mediterranean to Portus, passing between the islands of Sardinia and Corsica.

Shipwrecks provide not only valuable data on the routes the amphorae travelled to get to Rome, but preserve the layout and composition of the ship's cargo at one specific time. Figure 23, a map of all excavated shipwrecks containing Dressel 20 amphorae, provides a sketch of alternate routes oil traders may have taken. For example, rather than cut across the Mediterranean from Tarracco, captains could have continued sailing short distances between the ports along the coast, following the shoreline of modern France and the upper Italian peninsula.

Off the coasts of Italy, France and Spain, archaeologists have documented fifty-six wrecks containing Dressel 20 amphorae, with a peak number of twenty-nine wrecks from the Claudian-Flavian period.<sup>144</sup> The cargo uncovered at the site of the Port-Vendres II wreck (dated AD 40-50) documents what we understand to be the principal products of the Baetican economy: oil, wine, *garum*, ceramic thin-ware bowls and tin ingots.<sup>145</sup> The

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<sup>142</sup> Campbell 2012, pp. 216.

<sup>143</sup> Kingsley, Decker and Gerth 2014, pp. 6.

<sup>144</sup> Kingsley, Decker and Gerth 2014, pp. 6.

<sup>145</sup> Mayet 1999, web.

amphorae were cushioned with heather bundles beneath and between them.<sup>146</sup> The ship held about one hundred and fifty Dressel 20 amphorae.<sup>147</sup> The contemporary Arles IV wreck, which sank between AD 25-40, held comparatively about five hundred Dressel 20 amphorae among a total one to two thousand oil, wine and *garum* amphorae.<sup>148</sup> The cargo of another ship, the Culip D, allows excavators to track the route of the boat before it sank off the coast of Spain in AD 70-80.<sup>149</sup> The composite cargo, which held roughly 100,000 artifacts, contained products from Baetica and Gallia Narbonensis.<sup>150</sup> The Baetican portion of its cargo consisted of seventy-six Dressel 20 amphorae.<sup>151</sup> The ship assumedly loaded new goods into the hull at each port. The three wrecks provide testimony to the great variety in cargo size between ships and traders.

As Rome had a population of over one million people beginning in the first century AD, the city represented an alluring market for Baetican merchants. The demand for oil was great, and traders matched it by bringing their supply of oil across the Mediterranean to Rome's harbor at Portus in search of making a sizable profit. The true economic situation was much more complex than consumer demand being met by merchant supply, however. The supply of oil to Rome was heavily influenced by imperial policies and legislations. Emperors viewed keeping the food supply plentiful as key to preserving peace in the capital city. One of Augustus's lasting legacies was his skillful use of "bread and circuses," pacifying and pleasing the city's poorer masses to keep them from rioting. A fundamental part of this program was the creation of the *praefectura*

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<sup>146</sup> Kingsley, Decker and Gerth 2014, pp. 6.

<sup>147</sup> Parker and Price 1981, pp. 222.

<sup>148</sup> Soreide 2011, pp. 32.

<sup>149</sup> Kingsley, Decker and Gerth 2014, pp. 6.

<sup>150</sup> Kingsley, Decker and Gerth 2014, pp. 6.

<sup>151</sup> Kingsley, Decker and Gerth 2014, pp. 6.

*annonae* in AD 22.<sup>152</sup> The system promised a regularly scheduled dole of grain to some of the most impoverished and freeborn Roman plebs, providing sustenance in hopes of keeping food riots and discontent at bay.<sup>153</sup> The rations offered only a supplement to the food the residents purchased themselves, but funded by Augustus's contributions, tributes and taxes in kind raised from Rome's colonies, it was a reminder of the emperor's wealth, strength and interest in his people. The procurement of the grain was overseen by a prefect, the first of which, Turranius Gracilis, was Baetican.<sup>154</sup> The prefect set a *frumentum emptum*, fixed price, for grain imports, and mandated sales under a system of *indictiones* from specific *annona* related *navicularii* to gather the grain to be handed out; eventually, at the 3<sup>rd</sup> century AD, oil would receive the same treatment.<sup>155</sup>

The popularity of the grain rations, and the political stability they ensured, led later emperors to expand the *annona*'s authority beyond grain to other foodstuffs. In AD 274, Aurelian added pork and wine dispersals to the grain dole, and olive oil, as a staple in the Roman diet, was also included.<sup>156</sup> Initially, the intervention by the state in the oil trade did not include free oil distribution to the residents of Rome, but included policies that stimulated the oil market and guaranteed oil would be available for purchase at a reasonable cost.<sup>157</sup> A law from the last quarter of the second century AD, written by Q. Cervidius Scaevola, counselor of Marcus Aurelius, set out explicit terms for a type of tax break offered to merchants and sailors entering an *annona* contract: they would invest half their fortunes in bringing grain to Rome, and the state would release them from five

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<sup>152</sup> Remesal Rodriguez 2013, pp. 53.

<sup>153</sup> Whittaker 1989, pp. 22.

<sup>154</sup> Remesal Rodriguez 2013, pp. 54.

<sup>155</sup> Broekaert 2011, pp. 597.

<sup>156</sup> Broekaert 2011, pp. 592.

<sup>157</sup> Broekaert 2011, pp. 593.

years of obligation to *munera publica*.<sup>158</sup> Though the law was passed before the addition of oil to the *annona*, it contained a key clause that allowed oil trade to be much more profitable. It promised that goods they brought alongside grain destined for the *annona* would not be subject to port fees.<sup>159</sup> As a result, oil could be brought from Baetica in a composite cargo with *annona*-designated grain, and be exempt from port fees. Policies like this were essential, as the Roman government did not have a navy or merchant fleet of its own to use to procure merchandise.

A line from the biography of Antoninus Pius suggests that the emperor was the first to provide rations of oil alongside existing *annona* handouts,<sup>160</sup> yet evidence is scant whether any of the Antonine emperors did more than encourage oil merchants to sell to Rome.<sup>161</sup> The Antonines most likely offered incentives to oil shippers to come frequently to the capital specifically to sell olive oil. This tendency may be supported by a spike in the number of shipwrecked vessels with cargoes containing only Baetican oil, rather than multiple products, under their reigns.<sup>162</sup> An inscription at Ostia installed by *negotiatores olearii* praises their patron M. Petronius Honoratus, who served as *praefectus annonae* from 144-146, putting him in control of procuring and distributing proper quantities of product, and redeeming the incentives promised to sailors.<sup>163</sup> A reproduction of the inscription is shown in Figure 24. The inscription documents a financial relationship between the oil merchants and an *annona* official. The praise bestowed on him by the

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<sup>158</sup> Dig. 50.4.5, *Naucularii et mercatores olearii, qui magnum partem patrimonii ei rei contulerunt, intra quinquennium muneris publici uacationem habent.*

<sup>159</sup> Peacock and Williams 1986, pp. 58.

<sup>160</sup> *SHA Ant. P.* 8.11, *vini olei et tritici penuriam per aerarii sui damnum emendo et gratis populo sedavit.*

<sup>161</sup> Broekaert 2011, pp. 592.

<sup>162</sup> Broekaert 2011, pp. 612.

<sup>163</sup> *CIL* 14.4458.



Baetican oil traders demonstrates their pleasure with working with him, or a desire to flatter the man and receive even better treatment in the future.

Over time, the government held increasing influence over the oil trade in Rome. During the early third century AD, Septimius Severus was likely the first emperor to include oil rations in the *annona* distributions. The emperor's biography mentions his donations of olive oil to the Roman people.<sup>164</sup> In 197, Severus seized oil-producing farms in Baetica owned by allies of the defeated rebel Clodius Albinus.<sup>165</sup> Stamps on Dressel 20 amphorae from these *fundi* after their confiscation, dated to AD 207 to 211 bear the letters "AVGGGNNN," or "Augusti nostri," a reference to Severus and his sons.<sup>166</sup> While the seizure of olive estates has been analyzed as the confirmation of the oil donations referenced in Severus's biography, the product received from the seizures would not have brought about a significant enough amount of oil for the emperors to cover the amount promised for *annona* distributions.<sup>167</sup> The action, however, demonstrated political strength, and holding the estates increased the imperial presence in the region, should the Baetians consider joining another rebellion.

The Severans were especially praised in Baetica. One inscription from 212-17 AD at Malaca praises Septimius Severus as the founder of the Roman Empire.<sup>168</sup> Severus promised ship owners that he would bear the liability of the vessel and its cargo of oil amphorae in the event of a shipwreck.<sup>169</sup> With the risk of sailing removed, and a permanent market for their oil guaranteed, traders were incentivized to enter *annona*

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<sup>164</sup> *SHA Sev.* 18.3, *ac populo Romano diurnum oleum gratuitum et fecudissimum in aeternum donavit.*

<sup>165</sup> *SHA Sev.* 12.

<sup>166</sup> Broekaert 2011, pp. 596; *CIL XV* 2558a, 2565, 2570; Bruun and Edmonson 2015, pp. 684.

<sup>167</sup> Broekaert 2011, pp. 596.

<sup>168</sup> *CIL* 2.1969, *fundatoris imperii Romani filio*, from a dedication to Caracalla.

<sup>169</sup> Broekaert 2011, pp. 599.

contracts. The spur in oil trade had a positive effect on other Baetican goods, as additional products could be sailed from Baetica to Rome alongside *annona*-designated oil with essentially no cost for their transport.<sup>170</sup>

Between *annona* incentives and market forces, 74,000-92,600 amphorae of Baetican oil were brought to Rome each year.<sup>171</sup> How was such a large volume of oil transported? The average Mediterranean ship's hull had a carrying capacity of around 500 to 1,000 amphorae of the size of a Dressel 20, but due to the tendency to combine different products in one hull, the normal inventory of Dressel 20 amphorae needs to be estimated as slightly lower.<sup>172</sup> A calculation of these rough numbers gives an idea of 100 to 150 ships sailing from Baetica to Rome to meet the capital's demand.

Pliny the Elder wrote that a ship could reach Rome from Gades in ten days,<sup>173</sup> but this may have been a record time worth noting rather than an average.<sup>174</sup> Given the discrepancies between modern and ancient units of measure and the possible inaccuracy of ancient authors, scholars have devised algorithms to create dependable estimates of the time journeys would have taken in antiquity. One simulation, The Stanford Geospatial Network Model of the Roman World, ORBIS, compiles ancient road and water networks with mileage and velocity data to calculate the distance, speed and duration of trips between two sites.<sup>175</sup> Values are produced for sea or land routes, with computers manipulating the basic formula (T)ime = (D)istance / (V)elocity to account for currents and winds, which changed across routes and seasons.<sup>176</sup> The shipper's time was further

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<sup>170</sup> Whittaker 1988, pp. 54.

<sup>171</sup> Broekaert 2011, pp. 597.

<sup>172</sup> Broekaert 2011, pp. 598; Greene 1986, pp. 26.

<sup>173</sup> Plin. *Nat.* 19.1.

<sup>174</sup> Greene 1986, pp. 28.

<sup>175</sup> Scheidel 2015, pp. 2.

<sup>176</sup> Arcenas 2015, pp. 1.

restricted by the period of time during which the conditions of Mediterranean were suitable for sailing, defined by Vegetius as April/May to November.<sup>177</sup> Using the ORBIS algorithm, a journey over sea from Gades to Ostia, made during the optimal sailing season, would take seventeen days.

Combining Pliny's figure with the modern estimate, and allowing time to load and unload the oil, a direct, round trip journey required a month to a month and a half.<sup>178</sup> A trader could make six, possibly seven, journeys from Gades to Rome over one year. To complete the 100-150 voyages needed to bring 74,000-92,600 amphorae to Rome, 17 to 25 different traders and at least that many ships needed to be active, assuming each trader made 6 trips on different boats. If traders made fewer voyages, or took their goods to places other than Rome, the number of merchants needed to bring oil to the capital would increase. Hence there was a strong need for economic incentives and state intervention to keep oil flowing to Rome, especially once free rations of oil were promised in the later empire.

Sailing-averse Roman traders had to balance the cost efficiency of sea travel with the risks of fatal storms, piracy and shipwrecks that accompanied it.<sup>179</sup> These liabilities of long-distance commerce are those that state economic policy makers had to counteract to ensure oil was regularly delivered to Rome, especially since the government had no merchant ships of its own to sail. *Navicularii* were inclined to accept the government-offered incentives, which safeguarded transportation that was already quicker and more

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<sup>177</sup> Vegetius *Epit.* 4.39.

<sup>178</sup> Scheidel 2015, pp. 1.

<sup>179</sup> Scheidel 2015, pp. 5; Peacock 1986, pp. 55.

cost efficient than land travel. As previously stated, however, in an effort to reduce further the risks of the open sea, they kept the route of their ships close to the coasts.<sup>180</sup>

### **Ephigraphic evidence and the people involved**

The olive oil consumed in Rome passed through many hands before it reached the city's kitchens, tables and bathhouses. A great number of workers, from estate owners to potters to sailors to merchants to government officials, were necessary to get the oil from Baetica to its final destinations. Luckily, the large volume of epigraphic sources about the oil trade, coming from stamps or inscriptions on the amphorae as well as dedicatory inscriptions in public spaces, provides detailed insight into identifying job categories and specific names of those involved in oil commerce.

From epigraphical sources emerges a vocabulary set specific to Baetican-Roman oil trade. Some merchants were *negotiatores*, others *mercatores*, or *navicularii*, or *diffusores*.<sup>181</sup> While these terms are all roughly translatable to “trader” or “merchant,” the shades of meaning that arise between them are significant in breaking down the different ways a transaction of olive oil could take place. *Negotiatores* and *mercatores* may have been the titles given to two classes of merchant.<sup>182</sup> A *negotiator* was an upper tier merchant-investor. He took no part in creating the product or preparing it for market, instead seeking ready-for-market olive oil to sell at retail.<sup>183</sup> In fact, through the first century BC, *negotiatores* are only referenced in terms of financing trade. Not until the beginning of the first century AD were they described as involved in the actual

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<sup>180</sup> Kingsley 2014, pp. 6.

<sup>181</sup> Remesal Rodriguez 2006, pp. 353.

<sup>182</sup> Peacock and Williams 1986, pp. 64.

<sup>183</sup> Remesal Rodriguez 2006, pp. 353.

commerce.<sup>184</sup> *Negotiatores* mentioned in inscriptions were facilitators of the *annona*, suggesting they were not commanded by government administrators, but worked within its regulations; most likely, they received benefits and privileges for their compliance.<sup>185</sup> They worked as middlemen, whether for themselves or the state.<sup>186</sup> A *mercator* was a smaller scale merchant who was personally involved in the trading process, making direct sales between producers and consumers.<sup>187</sup> While *mercatores* would band together to jointly rent a ship or individually rent a portion of the ship's hull space, a *negotiator* would pay for a sailor to shuttle his goods on a private charter.<sup>188</sup>

*Navicularii* were ship owners and merchant-sailors rather than retailers. They were described as the servants of the *annona*; they were paid directly by government prefects to do the job of sailing the oil across the sea.<sup>189</sup> Oil traded by *navicularii* would be carried on the trader's own ship. The *navicularius* put deputies, the *nauclerus* or *magister navis* on his ship to keep track of its cargo.<sup>190</sup> The fourth job title, *diffusor*, was a merchant, perhaps synonymous to the *negotiator*, though some inscriptions show it was explicitly tied to the *annona*.<sup>191</sup>

The *gens Iulia*, a reputable family dynasty of olive oil merchants, is among the best documented of all groups of traders.<sup>192</sup> The names of members of the family are preserved on stamps and inscriptions, and the volume of this evidence testifies to the enormous presence the *Iulii* held in the oil market, which encompassed multiple cities

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<sup>184</sup> Peacock and Williams 1986, pp. 64.

<sup>185</sup> Remesal Rodriguez 2002, pp. 794.

<sup>186</sup> Peacock and Williams 1986, pp. 60.

<sup>187</sup> Remesal Rodriguez 2006, pp. 353.

<sup>188</sup> Mayet 1999, web.

<sup>189</sup> Remesal Rodriguez 2002, pp. 794.

<sup>190</sup> Peacock and Williams 1986, pp. 64.

<sup>191</sup> Remesal Rodriguez 2006, pp. 353.

<sup>192</sup> Berni Millet and Pi 2013, pp. 168.

over several generations. The family consisted of four branches: Caius, Lucius, Marcus and Tiberius.<sup>193</sup> Three of the family lines were biologically Julian; the fourth, the Caius clan, was descended from Alfius Theseus, who was adopted by the Julians in AD 154.<sup>194</sup> Every member of the Julian syndicate earned enough from trading Baetican oil to carry them to the most privileged positions of merchant society.<sup>195</sup>

Eight *beta* inscriptions mention C. Julius Valerianus, revealing that the merchant was working in Astigi in the year 161.<sup>196</sup> Valerianus is mentioned again on a surviving *signaculum de plombo*, or lead-slug, the stamping instrument that would have been used to imprint amphorae at the *figlina*.<sup>197</sup> The slug, housed in the Real Academia de la Historia in Madrid, has a diameter of 10.1 centimeters, and bears an image of a Dressel 20 amphora inscribed with “Iuliourum” (Fi. 25).<sup>198</sup> The amphora emblem is surrounded by two concentric rings, between which it reads “*C IVLI VAL’ET IVL / IVLI / OR’VM,*” which expands to “*C. Iuli Valer(eriani) et Iuli(iani) / Iuli-/orum.*” This text identifies C. Julius Valerian and his business partner and family member, C. Julius Julian.<sup>199</sup>

In the city of Hispalis, an 2<sup>nd</sup> century AD honorary statue was erected for another Julian oil merchant by the name of Marcus Julius Hermesianus, of which the base remains (Fig. 26).<sup>200</sup> M. Julius Hermesianus was a contemporary of C. Julius Valerianus and C. Julius Julianus.<sup>201</sup> The inscribed base identifies Hermesianus as a *DIFFUSORI*

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<sup>193</sup> Berni Millet and Pi 2013, pp. 169.

<sup>194</sup> Berni Millet and Pi 2013, pp. 169.

<sup>195</sup> Berni Millet and Pi 2013, pp. 167.

<sup>196</sup> Berni Millet and Pi 2013, pp. 169-170; CIL XV.

<sup>197</sup> Berni Millet and Pi 2013, pp. 167.

<sup>198</sup> Berni Millet and Pi 2013, pp. 167.

<sup>199</sup> Berni Millet and Pi 2013, pp. 168.

<sup>200</sup> EDCS-23900238; Remesal Rodriguez 2006, pp. 351.

<sup>201</sup> Berni Millet and Pi 2013, pp. 169.

*OLEI AD ANNONAM*, working in Rome and Puteoli.<sup>202</sup> The inscription names his son, M. Julius Hermes Frontinianus, as the inheritor of his olive oil business.<sup>203</sup> A separate statue base in Astigi from the Antonine period<sup>204</sup> praises Hermes Frontinianus for his olive oil work, and similarly points to an unnamed son to continue the family legacy (Fig. 27).<sup>205</sup> The two bases record three generations of one family involved in the olive oil trade.

Hermesianus's dedicatory inscription credited him as a *diffusor*.<sup>206</sup> Other *diffusores*, bearing no familial or syndicate relationship to the *Iulii*, included C. Sentius Regulianus,<sup>207</sup> D. Caecilius Abascantus,<sup>208</sup> and D. Caecilius Onesimus.<sup>209</sup> The *Caecilii* represented another important olive oil family. One of their most distinguished relatives, D. Caecilius Hospitalis, held the position of *curator* over a *collegium* of *diffusores* in Ostia.<sup>210</sup> *Collegia* were formal organizations of workers from one industry or profession, with social and business or political negotiation purposes. *Collegia* membership offered single traders and members of family enterprises alike the power to bargain and influence, and gave a degree of prestige to their professions.<sup>211</sup>

The *scapharii hispalenses* who sailed the river skiffs carrying oil to ports in Baetica also banded together into a *collegia*.<sup>212</sup> They made an honorary inscription at Hispalis in praise of Sextus Iulius Possessor, the *procurator* governing the oil trade of the

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<sup>202</sup> Remesal Rodriguez 2006, pp. 351.

<sup>203</sup> Remesal Rodriguez 2006, pp. 351.

<sup>204</sup> *CIL* II.1481.

<sup>205</sup> Remesal Rodriguez 2006, pp. 352.

<sup>206</sup> Remesal Rodriguez 2006, pp. 351.

<sup>207</sup> *CIL* VI.29722.

<sup>208</sup> *CIL* VI.01885.

<sup>209</sup> *AE* 1980.00098.

<sup>210</sup> *CIL* 6.29722.

<sup>211</sup> Campbell 2012, pp. 208.

<sup>212</sup> Remesal Rodriguez 2013, 51.

province (Figure 28).<sup>213</sup> As deputy of the emperor, he acted to organize and pay for the activities of the *scapharii* to ensure the Guadalquivir was easily navigated and the trade functioned smoothly.<sup>214</sup> The *procurator* and his deputy officials were also in charge of collecting customs dues and taxes at Hispalis, Astigi or Corduba before the amphorae could be shipped to the coast and to sea.<sup>215</sup> Before Possessor was *procurator*, he worked as an *auditor* in Rome. The inscription of the *scapharii* defines his position as having three roles: the gathering and inspection of oil, providing for its import, and compensating the skippers financially.<sup>216</sup>

It seems the majority of those involved in oil commerce were freeborn Roman male citizens descended from families of wealthy lineages who had been trading oil for generations. Not every merchant, however, fit this description. Some of the oil tradespeople were freed slaves, working under the direction of former owners or patrons. During the mid-second century, a merchant named Sextus Fadius Secundus paid the way for his former slave, Sextus Fadius Lamyrus, to live in Astigi and work in the oil trade.<sup>217</sup> Additionally, not all the merchants were men. A *signaculum* from Rome testifies to the business dealings of Coelia Mascellina, a female oil importer working in the second century.<sup>218</sup>

Transporting a mass volume of olive oil from Baetica to ports servicing Rome involved an equally large number of people to do the jobs of packaging, measuring, regulating and sailing. The elites who owned the oil producing estates removed

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<sup>213</sup> *CIL* II.01180.

<sup>214</sup> Remesal Rodriguez 2013, 51; Campbell 2012, pp. 260.

<sup>215</sup> Kingsley, Decker and Gerth 2014, pp. 7.

<sup>216</sup> Broekaert 2011, pp. 613.

<sup>217</sup> Remesal Rodriguez 2013, 52.

<sup>218</sup> *CIL* 15.8166.



themselves from the commercial activities of olive oil, requiring a secondary network of traders and merchants to move and sell their goods. On the opposite end of the Mediterranean, Roman government officials were challenged to supply consistently the city's markets with oil. In later years, the officials additionally were faced with the question of how to bring in a surplus of oil to allow for oil *annona* handouts. All of these logistical challenges were complicated by the fact that Rome did not have official merchant ships at its command. City planners drew up systems of tax and customs deductions and social incentives to entice sailors, in turn requiring a network of overseeing officials to ensure the programs operated as intended. As such, middlemen were absolutely essential to the success of Baetican-Roman olive oil exchange. When the oil producers were kept from participating directly in trade, and the main party interested in the good's import was nearly three thousand miles away and had no merchant fleet to procure it on its own, the labors of third-party potters, merchants and sailors made the trade conceivable.

### **Chapter Three: Oil Reaches Rome**

Olive oil arriving at Rome's port cities had already completed a journey of over a thousand miles from rural *fundi* to amphora kilns along the Guadalquivir, down the river to the coast of Baetica, and across the Mediterranean Sea. Bringing the goods to the Italian peninsula, however, did not complete the exchange. Oil had to be unloaded and moved to markets, where it could be purchased, or in the case of oil designated for the *annona*, distributed. Roman consumers then used the oil in multiple ways, including cooking, cosmetics, and fuel. Once emptied, the amphorae had to be disposed. This step was closely regulated by the government. The disposal process is better understood by studying Monte Testaccio, a "land fill" of Dressel 20 amphorae. This chapter involves a discussion of all of these segments on the receiving end of the olive oil transaction, in order to complete the overview of the route oil took to reach Roman consumers, and to form an understanding of the consumption side of the olive oil exchange.

#### **The ships reach Italy**

Rome was the endpoint for Baetican oil merchants looking to sell their inventories. The city, however, was located fifteen miles inland, up the Tiber River from the Mediterranean coast. The large freight ships that were capable of sailing across the sea could not navigate the small, upstream trajectory of the river. As such, ships docked at either Ostia, Portus or Puteoli to unload their cargoes.<sup>219</sup>

Until AD 45, unloading at these places brought risks. Ostia lacked a natural harbor, and only shallow-draft ships could come close enough to dock to coastal wharves.<sup>220</sup> Larger ships, which could be up to 118 feet in length, were incapable of

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<sup>219</sup> Mattingly and Aldrete 2000, pp. 144-145.

<sup>220</sup> Campbell 2012, pp. 316.

sailing up to the coast.<sup>221</sup> These vessels were forced unload while still at sea via barges that came off the coast to meet them. During the transfer, ship and barge were subject to churning tides and storms, causing accidents and goods thrown overboard.<sup>222</sup> Many of the largest ships, dissatisfied with the risk of unloading on a barge at sea,<sup>223</sup> bypassed Ostia and sailed an additional distance of 214 kilometers<sup>224</sup> south to Puteoli on the Bay of Naples. From the natural port there, olive oil was reloaded onto smaller ships that would sail back to the mouth of the Tiber and up to Rome.<sup>225</sup>

When the largest freight ships skipped over Ostia for the more secure conditions at Puteoli, foodstuffs were delayed in reaching Rome. To address this problem, Emperor Claudius established a man-made port, Portus, four kilometers north of Ostia, in AD 45.<sup>226</sup> Unfortunately, the port did not provide complete protection against the forces of the Mediterranean. In AD 62, a storm wrecked two hundred ships while they were docked at Portus.<sup>227</sup> The risks associated with using Portus influenced ships to continue to use the harbor at Puteoli, until Emperor Trajan constructed a new Portus, building inland from Claudius's harbor, with a larger, hexagonal basin that effectively sheltered moored ships (AD 100-112, Fig. 29).<sup>228</sup> By the second century, Portus was a substantially busier harbor than Puteoli.<sup>229</sup>

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<sup>221</sup> Casson 1998, pp. 114.

<sup>222</sup> De Donato 2003, pp. 54-55.

<sup>223</sup> Greene 1986, pp. 29.

<sup>224</sup> <http://orbis.stanford.edu>

<sup>225</sup> Mattingly and Aldrete 2000, pp. 145.

<sup>226</sup> De Donato 2003, pp. 56.

<sup>227</sup> Tacitus, *Annals* 15.18, "*quamvis ducentas ferme naves portu in ipso violentia tempestatis.*"

<sup>228</sup> Mattingly and Aldrete 2000, pp. 146.

<sup>229</sup> De Donato 2003, pp. 57.

When a freighter, or *corbita*, as commercial ships were commonly called, approached Portus, events followed a set schedule.<sup>230</sup> First, the ship was met by *lenunculi*, a type of boat designed for use in harbors and manned by several oarsmen, the *lenuncularii*.<sup>231</sup> Papers had to be presented by the incoming ship for approval from the harbormaster. Fees for use of the port were paid by the captain of the *corbita*, following which the harbormaster assigned the ship to a dock. The ship was then towed to its berth by the *lenuncularii*, specifically the members of the guild *lenuncularii tabularii auxiliarii*.<sup>232</sup> Ships docked in their assigned berth, and the unloading process began.

Portus was surrounded by warehouses, *horrea*, on five sides.<sup>233</sup> These buildings would temporarily house the cargoes unloaded from docked ships until merchants procured riverboats to take the oil up the Tiber.<sup>234</sup> Porters called *phalangarii* carried amphorae off ships and into the warehouses,<sup>235</sup> and in case any amphorae fell into the harbor in the process, *urinatores* stood by, ready to dive after the overboard cargo (Fig. 30).<sup>236</sup> The *horrea* were multistoried buildings with enormous storage areas. For example, the *Grandi Horrea* at Ostia, although used for grain rather than olive oil,

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<sup>230</sup> De Donato 2003, pp. 47.

<sup>231</sup> Mattingly and Aldrete 2000, pp. 148.

<sup>232</sup> Mattingly and Aldrete 2000, pp. 148. There were three guilds of *lenuncularii*. The largest were the harbor towers, *tabularii auxiliarii*, which had 258 members at Ostia in AD 192 (*CIL* 14.251, *CIL* 14.341). The second guild, *lenuncularii pleromarii auxiliarii*, met ships upon entering the Tiber, to take part of their cargoes so the incoming ships would be light enough to navigate the river. In AD 200, the *pleromarii auxiliarii* only had sixteen members (*CIL* 14.252). Their small membership was most likely due to ships being less willing to undertake a risky trip up the river when Trajan's secure harbor was available for unloading goods onto boats specifically constructed for the river; the job was turning extinct. The last guild, the *lenuncularii traiectus Luculli*, were ferrymen operating at points around the harbor.

<sup>233</sup> De Donato 2003, pp. 57.

<sup>234</sup> Campbell 2012, pp. 316.

<sup>235</sup> Mattingly and Aldrete 2000, pp. 149. On pp. 156, Mattingly notes that the *phalangarii* do not seem to have organized into guilds. The lack of organization among *phalangarii* raises questions about whether these workers were free laborers or enslaved. The seasonal nature of sea-faring commerce makes it difficult to believe the porting jobs would have been done by slaves, who would then be idle in the off season. Most likely, *phalangarii* were urban plebs, who would have searched for sources of income through temporary, unskilled jobs.

<sup>236</sup> Mattingly and Aldrete 2000, pp. 149.

contained sixty-four rooms, with capacity for 5,660-6,960 metric tons.<sup>237</sup> The warehouses were designed to store goods safely, in terms of protection both from theft and spoilage. The walls were thick, ranging from sixty centimeters to one meter, and doors were secured with multiple locks and bolts, offering protection from thieves and animal pests.<sup>238</sup> To keep goods fresher for longer periods, the warehouses were designed with careful ventilation features: raised floors and small cracks along the eaves of the roofs.<sup>239</sup>

A careful inventory was tallied of the olive oil unloaded from ships into the *horrea*. It was at this time that *portoria*, customs dues, may have been levied. The fees would have been between two to five percent of the value of the olive oil.<sup>240</sup> Regulating this fee system was part of the job of the warehouse *procuratores* and government prefects. An inscription from AD 175 at Ostia names C. Pomponius Turpilianus as “*procurator ad oleum in Galbae Ostiae portus utriusque*,” or the procurator of oil in the warehouses of Galba (Rome), Ostia, and Portus.<sup>241</sup> During the reign of Antoninus Pius, Turpilianus would have overseen the passage of oil from the ports to warehouses. The title procurator suggests the job was a government appointment. Perhaps the olive oil kept at the Horrea Galbana in particular was designated for the *annona*.<sup>242</sup> Sextus Iulius Possessor, the official mentioned in Chapter Two as being honored by the *scapharii hispalenses*, began his career as “*adiutor praefecti annonae ad horrea Ostiensia et Portuensia*,” prefect of the *annona* at the warehouses of Ostia and Portus.<sup>243</sup> Possessor would have supervised the flow of *annona*-designated goods in multiple warehouses.

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<sup>237</sup> Hermansen 1981, pp. 228.

<sup>238</sup> Mattingly and Aldrete 2000, pp. 147.

<sup>239</sup> Mattingly and Aldrete 2000, pp. 147.

<sup>240</sup> Duncan-Jones 1990, pp. 194.

<sup>241</sup> Holleran 2012, pp. 76. *CIL* 14.20.

<sup>242</sup> Mattingly and Aldrete 2000, pp. 153.

<sup>243</sup> *IDRE* 02.00435

Lesser officials known as *tabularii* would measure the weights of amphorae and the oil they contained, keeping the numbers in indorsed inventories.<sup>244</sup> They used state-regulated scales and tools to pronounce official figures. The *tabularii* checked that the measurements taken in Baetica and inscribed on the amphorae as *tituli picti* were still correct. The weight checks benefited the government, as they forced traders to pay honest customs dues and taxes on their wares. Oil merchants, however, also benefited from an accurate inventory. The updated information would make them aware if any oil was siphoned off by thieves while the amphorae were warehoused.

### **The oil reaches Rome**

The oil would not sit long in warehouses at Ostia and Portus. Merchants needed to make arrangements to deliver their oil up the Tiber to its final destination of Rome. To do so, it is likely the traders made a trip to the marketplace at Ostia known as the Piazzale delle Corporazioni (Fig. 31). This piazza was surrounded by a colonnade and sixty-one bordering rooms or *stationes*.<sup>245</sup> Floor mosaics at the entrance to each room depicted different products and industries. Scholars infer the mosaics described the businesses of the merchants occupying each room. Each room would have been rented by a guild or *collegium*, and used as office space to plan and negotiate commercial enterprises.<sup>246</sup> Certain guilds can be identified in the mosaics, such as the caulkers or rope-makers, as well as groups of sailors from specific places, like the *navicularii Turritani* of Sardinia.<sup>247</sup> Of all the rooms at the *piazzale*, we can suppose our Baetican merchants would have

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<sup>244</sup> Mattingly and Aldrete 2000, pp. 151.

<sup>245</sup> Peacock and Williams 1986, pp. 66.

<sup>246</sup> Terpstra 2014, par. 9.

<sup>247</sup> Terpstra 2014, par. 9.

visited *Statio 43*, where an inscription indicates the space belonged to the *corpus codicariorum*, the Tiber shippers.<sup>248</sup>

The *codicarii* held an essential function in supplying Rome with goods imported from around the Mediterranean.<sup>249</sup> They sailed *naves codicariae*, a particular type of river craft designed for flexibility in moving upriver or downstream (Fig. 32).<sup>250</sup> The riverboats had one mast at the front of the vessel, which could be raised for sailing downriver and lowered for towing against the current. Ropes were attached to the mast, and the seventy-ton boats were physically pulled by men, known as *helciarum*, or pack animals walking on tow paths following the banks of the river.<sup>251</sup> Oil traders would make agreements with the *codicarii* to complete the two to three day trip up the Tiber.<sup>252</sup> Amphorae would be taken from the warehouses and loaded onto the *naves codicariae*, which waited in manmade canals connecting *Portus* to the Tiber.<sup>253</sup>

Once a riverboat was hired, however, traders had to wait longer before their amphorae of oil could be transported to Rome. An agreement being made between the merchant and *codicarii* did not mean a riverboat was available at that time. Furthermore, the extremely traveled, busy Tiber had to be clear enough for another boat to pass through. The *naves codicariae* moved very slowly as they were towed upriver. They blocked other boats from passing easily, as they were towed using ropes on either bank of the Tiber, and would have occupied the full width of the river.

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<sup>248</sup> *CIL XIV*, 4549, 43. [C]ODICARI DE SVO.

<sup>249</sup> Mattingly and Aldrete 2000, pp. 149. The importance of the *codicarii* is reflected by the continued presence of their guild through the 4<sup>th</sup> century AD.

<sup>250</sup> Campbell 2012, pp. 316

<sup>251</sup> Mattingly and Aldrete 2000, pp. 149.

<sup>252</sup> Campbell 2012, pp. 317. Alternately, the merchants could take their goods overland to Rome by either the *via Ostiensis* or *via Portuensis*, which was a much shorter journey of only half a day, but would have been much more expensive and thus less favorable.

<sup>253</sup> De Donato 2003, pp. 57.

Congestion on the river would have been formidable. To estimate the amount of traffic on the river, we consider the amounts of foodstuffs being moved from Ostia to the capital each year. The largest shipment from Ostia to Rome would have been grain, with estimates placed at 237,000 metric tons carted up the Tiber annually by *naves codicariae*.<sup>254</sup> In addition to that figure, a minimum of 26,000 metric tons of olive oil and 160,000 metric tons of wine also transported by *naves codicariae*.<sup>255</sup> In total, at least 423,000 metric tons of grain, oil and wine awaited passage to Rome every year. Dividing this total among each *codicariae* of seventy-ton capacity, 6,043 Tiber trips would have to be made annually simply to keep the capital city fed.<sup>256</sup> One week can be assumed for each boat to load, reach Rome, unload and sail back to Ostia. A sailing season of between six and ten months, with roughly four-and-one-third weeks per month, allows for between twenty-six and forty-three shipments to be completed by *codicariae*. This translates to an estimated either 233 or 141 riverboats operating during any given week of the sailing season on the Tiber. The number of boatloads grows even further when inedible products are added to the estimate. Indeed, there were enough *naves codicariae* in operation that when one hundred were destroyed in the fire of Rome in AD 64, Tacitus reports that no damage was done to the food supply and price of foodstuffs.<sup>257</sup> High levels of organization would have been necessary to keep boats sailing regularly.

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<sup>254</sup> Campbell 2012, pp. 317.

<sup>255</sup> Mattingly and Aldrete 2000, pp. 155.

<sup>256</sup> Mattingly and Aldrete 2000, pp. 155; Campbell 2012, pp. 317.

<sup>257</sup> Mattingly and Aldrete 2000, pp. 155; Tacitus *Annals* 15.18. “And to hide his anxious fears about foreign affairs, Nero threw the people’s corn, which was so old as to be spoilt, into the Tiber, with the view of keeping up a sense of security about the supplies. **There was no addition to the price**, although about two hundred ships were destroyed in the very harbour by a violent storm, and **one hundred more, which had sailed up the Tiber, by an accidental fire.**”

In Latin, “*quin et dissimulandis rerum externarum curis Nero frumentum plebis vetustate corruptum in Tiberim iecit quo securitatem annonae sustentaret. Cuius pretio nihil additum est, quamvis ducentas ferme navis portu in ipso violentia tempestatis et centum alias Tiberi subvectas fortuitus ignis absumpsisset.*”



Even with such coordination, shippers would have to wait in line before their cargo could be taken to Rome. When river traffic allowed our merchant's leased *codicariae* full of olive oil to pass up the Tiber, the boat was hauled upstream thirty-two kilometers to the wharves of Rome's commercial district, known as the Emporium.<sup>258</sup>

The Emporium district was located to the southwest of the Aventine Hill, past the bend in the river at Tiber Island.<sup>259</sup> Although the Emporium's port facilities were active from the second century BC onward, renovations to the wharves and loading quays in the second century AD expanded and improved the volume of traffic the port could handle.<sup>260</sup>

Riverboats drew up to manmade landing areas of brick and stone, docking with ropes to travertine blocks. While the port stretched for a kilometer, the number of vessels which could dock at one time was limited by the nature of the river. The Tiber's flow forced boats to dock parallel to the shore, rather than perpendicularly.<sup>261</sup> Boats docked this way took up much more space than they would have otherwise. Yet again, heavy organization and patience was needed to facilitate the huge inventories of imported goods flowing into Rome on the river.

Just as Portus was surrounded by granaries and warehouses, the Emporium area of Rome was notable for its high concentration of storage buildings for imported

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Duncan Jones 1990, pp. 149. However, it must also be kept in mind that market prices were established by official government valuations. These official price structures would be manipulated in times of crisis to prevent price shocks and shortages, which in turn would have caused mobs and unrest among the city's poor. Whether a fire, a poor harvest, or other unexpected event caused a disruption to trade and the flow of goods to Rome, the emperor was capable of set prices in such a way that foods and necessities were still affordable and available. The lack of change in price and supply after the fire of AD 64 was likely a combination of the high number of *codicariae* and the emperor's bandaging of the market.

<sup>258</sup> Cornell 2000, pp. 50.

<sup>259</sup> Cornell 2000, pp. 51.

<sup>260</sup> Campbell 2012, pp. 317.

<sup>261</sup> Campbell 2012, pp. 317.

goods.<sup>262</sup> The largest of the warehouses built adjacent to the unloading wharves was the *porticus Aemilia*. The storage facility was first built in 193 BC and renovated with durable concrete in 173 BC.<sup>263</sup> The renovation and expansion made possible the continued use of the *porticus* as a holding place for recently unloaded goods for hundreds of years further. As amphorae of olive oil were unloaded from the riverboats, they were hauled into the *porticus Aemilia*, as well as the area's other warehouses, such as the enormous *Horrea Galbae*, for storage before final sale and consumption.

A shopper at a Roman marketplace was not going to purchase and take home an entire seventy kilogram Dressel 20 amphora. The large size and durability of the Dressel 20 amphorae were vital to protecting the olive oil against the potential damages it would encounter over its sea voyages. Once in the marketplace, however, the cumbersome vessels were no longer needed. The discovery of over thirteen million Dressel 20 fragments at urban markets around Rome clarifies that the olive oil was delivered to marketplaces while still in the large amphorae.<sup>264</sup> The olive oil, however, would need to be repackaged in smaller vessels after its purchase by consumers so that it could be easily transported to homes for individual or family use. Customers could request a specific volume of oil, which would be siphoned out of the Dressel 20. The customer's purchase would be transferred into a small amphora, perhaps supplied by the buyer, then weighed and paid for.

After several transactions, the Dressel 20 amphora would be emptied, and need to be removed from the marketplace to make room for the next shipment. Empty amphorae

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<sup>262</sup> Cornell 2000, pp. 51.

<sup>263</sup> Cornell 2000, pp. 51.

<sup>264</sup> Johnson 2013, pp. 125. These amphorae fragments range in date from the time of Augustus to Gallienus, representing a 270-year period.

were bulky and took up lots of space. While some transport amphorae could be refilled and reused, the amphorae used for shipping olive oil could not be. The interiors of many transport amphorae had a slip lining covering the interior wall, meant to seal the material of the amphorae and protect the vessel and the product it carried from interacting.<sup>265</sup>

Olive oil, however, reacted negatively over time to a slip lining, dissolving it and releasing strong, negative odors and flavors.<sup>266</sup> Therefore, once used, the amphorae were not suitable to be reused as vessels for foodstuffs, as cleaning out the residues and resealing the amphora interiors was too difficult.<sup>267</sup> Even if the amphorae could be cleaned out, there would be inhibiting costs involved in moving empty ones back to their places of origin for reuse at the beginning of the trade loop. Additionally, the amphorae were marked with *tituli picti*, and distinguishing between markings of the original and subsequent uses would cause problems.<sup>268</sup>

The empty amphorae were now practically useless as transport vessels. They were frequently reemployed, however, in functions other than the trade of goods.<sup>269</sup> At an AD 125 site in Alphen aan den Rijn, the Netherlands, thought to have had a military purpose, eight Dressel 20 amphorae with tops removed were found set into the building's floor with remnants of calcium and phosphate.<sup>270</sup> The amphorae had been reused as urinals. In

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<sup>265</sup> Peña 2007, pp. 69.

<sup>266</sup> Peña 2007, pp. 69.

<sup>267</sup> Peña 2007, pp. 70, 119.

<sup>268</sup> Peña 2007, pp. 65.

<sup>269</sup> Peña 2007, pp. 120. Peña divides all archaeological discoveries of repurposed Roman amphorae into twenty-seven categories, as follows, "storage container, water jar, urinal, basin, beaker or bowl, incense burner, grinding palette, strainer, boundary marker, libation conduit, funnel, brazier or hearth, lamp cover, prop or support, polishing or grinding implement, amphora stopper, token or gaming piece, weight, *ostrakon*, label, ossuary, sarcophagus, planter, architectural element, element in a drain, and element in a geotechnical or hydrogeological feature."

<sup>270</sup> Peña 2007, pp. 140. It bears mentioning that these amphorae were most likely exported directly to army camps in this region of Europe, not first to Rome, then transported post-consumption to the site.

an alternate and more sophisticated reuse, the amphorae could also act as fill and lightening agent in concrete constructions.<sup>271</sup> In an unnamed *horreum* at Ostia dating between AD 120-130, the cross vaulting above the doorways is made of concrete mixed with twelve Dressel 20 amphorae.<sup>272</sup> The Circus of Maxentius, AD 308-312, includes Dressel 20's in the vaults supporting the *cavea*.<sup>273</sup> Examples of Dressel 20 amphorae used to enable architectural features in new building constructions can be found through the fifth century AD.<sup>274</sup> The practice of reusing old amphorae for uses other than the transport of oil was a common one.

### **Monte Testaccio**

While repurposing was a common solution to the question of what to do with the empty Dressel 20 amphorae, the government seems to have been particularly interested in controlling the discard of Dressel 20 amphorae emptied within the city of Rome. The greatest percentage of the Baetican oil amphorae were disposed of in a Dressel 20 amphorae landfill, in a manner systematically laid out by government authorities.<sup>275</sup> The amphorae were to be deposited at a specific place between the Aurelian Wall and the bank of the Tiber, adjacent to the Emporium district just behind the warehouses.<sup>276</sup> Over time, their deposition built the *Mons Testaceus* or “mound of potsherds,” known today at Monte Testaccio (Fig. 33).<sup>277</sup> The manmade hill stands today at thirty-five meters high, and its base covers an area of 22,000 square meters.<sup>278</sup> Monte Testaccio is believed to

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<sup>271</sup> Peña 2007, pp. 174.

<sup>272</sup> Lancaster 2005, 70, 72. *Regio I, Insula 20*, doorway I.

<sup>273</sup> Lancaster 2005, pp. 75-77.

<sup>274</sup> Lancaster 2005, pp. 83.

<sup>275</sup> Johnson 2013, pp. 126.

<sup>276</sup> Coarelli 2007, pp. 346; Johnson 2013, pp. 124.

<sup>277</sup> Coarelli 2007, pp. 346.

<sup>278</sup> Johnson 2013, pp. 124.

have been in use from the reign of Augustus to AD 255, dates confirmed by amphorae inscriptions found on the site.<sup>279</sup> The hill is built from approximately 53,359,000 amphorae, and no actual dirt (Fig. 34).<sup>280</sup> The hill contains an enormous amount of archaeological evidence testifying to the size and scale of the olive oil trade. The massive collection of fragments at one spot underscores the volume of transactions that had taken place.

Monte Testaccio, because of the sheer volume of amphorae shards with epigraphic inscriptions it contains, provides an excellent economic record of the olive oil trade and the relationship between Rome and Baetica.<sup>281</sup> As such, Monte Testaccio has been the subject of a series of excavations to make that fiscal information accessible. As early as 1742, the Roman government tried to protect the site from being mined for material to fill roads and be used in other construction projects by penalizing anyone caught stealing its amphorae fragments.<sup>282</sup> Scholarly work on the site began with Heinrich Dressel himself in the late nineteenth century, who proved the mountain was formed from Baetican amphorae.<sup>283</sup> The most extensive archaeological campaigns, however, began in the 1980s by E. Rodriguez Almeida, and were further continued by J.M. Blasquez Martinez and J. Remesal Rodriguez.<sup>284</sup> The campaigns have published over thirty thousand inscriptions thus far from excavated amphorae.<sup>285</sup>

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<sup>279</sup> Johnson 2013, pp. 124-125.

<sup>280</sup> Johnson 2013, pp. 124; Blasquez Martinez 1992, pp. 185.

<sup>281</sup> Blasquez Martinez 2012, pp. 109-110.

<sup>282</sup> Remesal Rodriguez 2006, pp. 276-277. Unfortunately, the edict was probably not highly enforced or followed; a nearly exact copy of the warning was published again in 1744. Any focus on conserving the site, however, was an improvement from former disregard for Monte Testaccio, such as in the fifteenth century when Vatican artillery drilled by firing at it.

<sup>283</sup> Blasquez Martinez 1992, pp. 180.

<sup>284</sup> Blasquez Martinez 1992, pp. 180.

<sup>285</sup> Blasquez Martinez and Remesal Rodriguez 2012, pp. 111.

To excavate Monte Testaccio, teams of archaeologists designate a section of the hill at the surface and dig down to a certain depth, cleaning and analyzing all the shards in that portion of the trash heap.<sup>286</sup> The amphorae at lower depths are older and more recent closer to the surface, but amphorae of one time period do not fall into perfectly horizontal strata. Rather, similarly dated fragments are clustered in groups that reflect how they were deposited (Fig. 35).<sup>287</sup> When the amphorae were brought to the site, they were loaded onto pack animals, which would climb up the hill to a platform, where a worker unloaded the amphorae and threw them down Monte Testaccio.<sup>288</sup> Fragments from the same period were thrown from the platform in the same direction, and have settled in their current places based on the way the amphorae fragments broke upon hitting the ground.

The original base of Monte Testaccio was formed in a different way than the subsequent layers above. Whole amphorae were broken in half, and the pulverized remains of the top half would be put inside the bottom half.<sup>289</sup> The amphora bottoms were lined in rows to form the base of the hill, and then a new layer was begun. The process repeated until the first platform for smashing amphorae was constructed in the mid-second century AD.<sup>290</sup> A second, smaller and slightly higher platform was added at the time of Severus Alexander to accommodate the growing hill.<sup>291</sup> Between the layers, workers poured whitewash or lime to kill mosquitos and other unwanted pests, work

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<sup>286</sup> For example, the 2012 campaign dug out a thirty square meter trench section of Testaccio with a depth of six and a half meters. Blazquez Martinez and Remesal Rodriguez 2012, pp. 110.

<sup>287</sup> Blazquez Martinez and Remesal Rodriguez 2010, pp. 34.

<sup>288</sup> Blazquez Martinez 1992, pp. 153. Each mule could carry about four amphorae.

<sup>289</sup> Ezban 2012, Web.

<sup>290</sup> Blazquez Martinez 1992, pp. 180.

<sup>291</sup> Johnson 2013, pp. 126.

against the smell of rancid oil, and keep disease and bacteria from spreading out of the trash site and into the city.<sup>292</sup>

Ninety to ninety-five percent of the amphorae at Testaccio are the Dressel 20 type from Baetica, and the remaining five to ten percent are African I and II types, also for oil, from Tunisia and Tripolitania.<sup>293</sup> The proportion changes in the third century horizons, where the excavated material is seventy-five to eighty percent Baetican and twenty to twenty-five percent African.<sup>294</sup> The decrease in Baetican imports as the number of African imports increased reflects a change in where Rome procured its resources. Whether because of a difference in costs or a change in government policy and *annona* incentives for trade, by the third century, Baetican oil was competing with African oil for the market in Rome. Monte Testaccio documents an increasing challenge to the Baetican dominance over the oil trade from African traders in the third century, but it also confirms the huge volume of the oil trade between Baetica and Rome. Contained in the amphorae hill are the vessels that carried 1.75 million kilograms of olive oil across the Mediterranean during the first, second and third centuries AD.<sup>295</sup> While the lifecycles of the majority of Dressel 20 amphorae ended at Monte Testaccio, those 1.75 kilograms oil they previously held would be diffused across homes and public places in Rome to be consumed.

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<sup>292</sup> Blazquez Martinez 1992, pp. 185.

<sup>293</sup> Blazquez Martinez 1992, pp. 186.

<sup>294</sup> Blazquez Martinez 1992, pp. 186; Johnson 126. Earlier excavations in the 1980s estimated deposits were consistently eighty percent Baetican, twenty percent African, but these numbers have changed by archaeologists to reflect the greater chance of the thicker African amphorae to resist crushing and appear to be more represented at Monte Testaccio than they were in reality.

<sup>295</sup> Remesal Rodriguez 2006, pp. 280.

## Oil consumption

Not every kilogram of oil that was consumed in homes, however, was first purchased at market by the consumer. From the time of Septimius Severus onward, a portion of the total amount of oil unloaded from Tiber boats was rationed out for free dispersal to the lowest socioeconomic class of Roman citizens. As mentioned previously, a specific type of Baetican merchant, perhaps the *negotiator* or *diffusor*, dealt in procuring oil for the *annona*, denoting the function of their imports with the amphora inscription *Fisci rationis patrimoni(i) provinciae Baeticae*.<sup>296</sup> Romans eligible for *annona* supplementary rations of grain and olive oil were required to be poor, male, free citizens over the age of ten, a group that numbered 150,000-200,000 at the time of Julius Caesar and most likely never exceeded 250,000 during the duration of the program.<sup>297</sup> At most, one fourth of the city's households received *annona*-designated oil, which was distributed in a portion only large enough for one family member, a quantity expected to bolster and stretch what the urban *plebs* were able to purchase for themselves, rather than provide completely the entire amount of olive oil the family would have needed.<sup>298</sup>

Scholars have worked to pinpoint the exact quantity of olive oil a Roman would have purchased each year. To estimate that quantity properly, first the amounts of different foods a Roman would have consumed needs to be calculated. The standard Roman diet can be found by analyzing the chemical remains of skeletons in conjunction with the caloric values of various dietary staples. The Roman diet was composed mainly of grain, olive oil and wine, with additional calories coming from seasonal fruits and

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<sup>296</sup> Peacock and Williams 1986, pp. 13; for example, *CIL* 15.04123.

<sup>297</sup> Mattingly and Aldrete 2000, pg. 146.

<sup>298</sup> Mattingly and Aldrete 2000, pp. 146.



vegetables and limited meats.<sup>299</sup> An average (non-elite) Roman would have needed to eat 2,326 calories daily to remain healthy, and would have reached that caloric threshold by eating grain, olive oil and wine, foods that required little preservation to remain fresh.<sup>300</sup> Additional calories would derive from produce and meats when available. Meat was not heavily consumed among the lower classes, due to a combination of price, availability and ability to keep it from going bad.<sup>301</sup> The bulk of the diet would be millet grain, which was easily and cheaply procured.<sup>302</sup> Researchers analyzed decaying bone samples excavated from an Imperial cemetery in Rome, gathering information on the number of stable carbon isotopes remaining in the body.<sup>303</sup> The types of carbon isotopes and their concentrations, specifically from samples of bone apatite, can be related to the specific carbohydrate sources the person once ate. In the case of these Roman bone apatite samples, a high level of C<sub>4</sub> was found, which is thought to be related to a high proportion of millet in the diet.<sup>304</sup> This chemical evidence validates an estimate that, out of 2,326 daily calories, 1,949 would come from grain-based sources.<sup>305</sup> The remaining calories would come from a combination of olive oil and wine. Olive oil, being more calorically dense than wine, would have provided a greater amount of calories in a smaller daily portion. A Roman may have used a fourth of a cup of olive oil daily, or about 500 calories consumed from olive oil each day, whether in baking, roasting, or drizzling.<sup>306</sup>

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<sup>299</sup> Killgrove and Tycot 2013, pp. 28.

<sup>300</sup> Mattingly and Aldrete 2000, pp. 143, 154.

<sup>301</sup> A study of Imperial skulls found in Roman cemeteries reveals orbital lesions that can be linked to chronic iron-deficiency anemia. Meat products contain high levels of iron. A diet lacking meat could have contributed to the anemic conditions of these specimen. Scheidel 2010, pp. 7.

<sup>302</sup> Killgrove and Tycot 2013, pp. 29, 36.

<sup>303</sup> Killgrove and Tycot 2013, pp. 29.

<sup>304</sup> Killgrove and Tycot 2013, pp. 29.

<sup>305</sup> Mattingly and Aldrete 2000, pp. 154.

<sup>306</sup> Mattingly and Aldrete 2000, pp. 154.

More liberal estimates suggest oil would have constituted at least a third of a Roman's daily calories.<sup>307</sup> Allowing for the minimum estimate of one-fourth cup every day adds up to twenty liters of olive oil needed per person over a year.<sup>308</sup> This is a minimum amount representing the minimum amount of olive oil used as food, and does not include oil used for other purposes, like lotion, soap, or lamps. More generous estimates might double that number.

Even though Baetican oil remained the principal olive oil imported in Rome through the third century AD, it was more likely to be purchased by consumers living at a middle to low income level than elites.<sup>309</sup> The highest social classes would have purchased oil in large quantities, but of the most esteemed types. The most expensive oils were known as *omphacium* oils, pressed from still unripe olives that produced an almost clear liquid with the lightest scent prized for perfumes, medicinal tonics and fine cosmetics.<sup>310</sup> *Omphacium* oils were produced from the highest quality olives, which were thought to come from the Italian groves at Campania, near Naples.<sup>311</sup> *Viridium* oil was suitable for eating, pressed from the ripest olives harvested at the end of the season when turning black.<sup>312</sup> *Viridium* oil from Venafrum, a town in the olive-renowned Campania region was specifically lauded for being excellent on salads.<sup>313</sup> The most coveted and flavorful oil was to have come from Liburnia, Dalmatia.<sup>314</sup>

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<sup>307</sup> Hitchner 2012, pp. 72.

<sup>308</sup> Mattingly and Aldrete 2000, pp. 154. Twenty liters is a very conservative estimate. Italians in modern Methana consume more than double that number, at fifty liters per year; Kilgrove 2013, pp. 28. However, twenty liters is much higher than the twelve-liter annual ration of olive oil for members of the army suggested by Cato.

<sup>309</sup> Johnson 126.

<sup>310</sup> Faas 1994, pp. 166.

<sup>311</sup> Casson 1998, pp. 25.

<sup>312</sup> Faas 1994, pp. 166.

<sup>313</sup> Faas 1994, pp. 166.

<sup>314</sup> Faas 1994, pp. 166. Modern day Croatia.

In contrast, oil from Baetica was imported in mass quantities and distributed to consumers at an affordable price point. It was not considered a fine or prized commodity, but an affordable staple. Baetican oil was useful for a variety of culinary and home situations. Savvy cooks could even follow a recipe to transform their Baetican oil into a more luxurious variety. Roman culinary author Apicius instructs cooks to add helenium or calamint, cyperus-root and bay leaves to an amphorae of oil, and then to allow it to sit for at least three days, promising that guests will believe they are tasting Liburnian oil.<sup>315</sup> By the end of the third century, African oils from Tunisia and Tripolitania began to replace Baetican imports as the general purpose oil. The dynamics of this change in imports are too complex to address in this paper, but the large volume of these imports reveals a change in previous stigma against African oils, which were seen as low quality oil dregs, useful only to burn as fuel.<sup>316</sup>

Bathhouses and gymnasia were also sites of olive oil consumption. Rather than ingested, oil was used at these places as a lubricant and cleanser. Bodies were covered in oil and then stripped clean with metal tools. At a gymnasium in Tauromenium, a town in Italy, during the period 195-167 BC, 3,700 liters of oil were used for this purpose each year.<sup>317</sup> In Barcino, modern day Barcelona, a retired soldier named Lucius Caecilius Optatus donated two hundred denarii worth of olive oil to the public baths every year on June the tenth, a gift that functioned as a sign of his generosity and wealth.<sup>318</sup>

Oil was a product that was both a necessity of Roman life and a liberal gift, and the city had a nearly endless demand for it. Yet, it was no simple task to provision Rome.

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<sup>315</sup> Flower and Rosenbaum 1958, pp. 155.

<sup>316</sup> Faas 1994, pp. 167.

<sup>317</sup> Mattingly and Aldrete 2000, pp. 162.

<sup>318</sup> Casson 1998, pp. 83.

The city's location upriver from a coast with no natural harbor presented physical challenges to getting food into the city. A manmade harbor had to be constructed on the Mediterranean coast at Ostia, and the number of shipwrecks and accidents must have made merchants wary to trust their goods would remain safe within it. The creation of positive trade relationships, though, was essential, as the capital's population of one million people required a quantity of food it could not obtain without importing an extensive amount of foodstuffs. The city's systems for bringing in the foodstuffs it needed were elaborate and multi-stepped, and functioned with enough efficiency to keep its citizens supplied. Harbormasters had to bring efficiently incoming ships to port, and unloading teams had to work effectively to bring goods onto the shore. Warehouse overseers had to keep a careful inventory of the cargoes being unloaded into their facilities, and government customs fees had to be procured. Then the shipments had to be hauled up the congested, slow moving Tiber to Rome, where storage sites and warehouses again had to make detailed inventories and checks on measurements. At the point of purchase, the oil had to be siphoned out the amphorae, leaving empty, seventy liter vessels to be disposed of. Yet, over a 250-year period, approximately 1,732,500,000 kilograms of Baetican olive oil flowed through this multi-stepped path to reach Roman consumers.<sup>319</sup> The oil was not only purchased, but distributed at no cost to the poorest

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<sup>319</sup> Remesal Rodriguez 1998, pp. 198.

To really understand the amount of oil Rome imported from Baetica, it may be helpful to put our estimated values in a modern context. As explained previously, amphora deposits at Monte Testaccio allow archaeologists to estimate that roughly 1,732,500,000 kilograms of oil were imported over two hundred and fifty years. When that quantity is split evenly over the time period, approximately 6,930,000 kilograms were brought to the city each year. What would 6,930,000 kilograms of olive oil look like today? Compare that figure to a standard eighteen-ounce bottle of olive oil available for purchase on grocery store shelves. In theory, the Romans imported 13,580,490 modern eighteen-ounce bottles of olive oil each year, or 3,395,122,500 bottles over the two-hundred-fifty-year period of Baetican oil trade.

citizens, a vital instrument of both nutrition and mob control. How Baetican oil reached the capital at such a great scale is a testament to the organization of the traders, industry workers and government bodies involved.

## Conclusion

The study of the trade of olive oil connects to much more information than the logistical basics of how much was traded and from where. The import of olive oil was interconnected with public policies, like the expanded *annona* handouts to include more than grain, but oil and pork as well. It was also tied to prevailing social constructs, such as the inappropriateness of the land owning elites who made the oil to market and trade the yields of their harvests, forcing them to entrust the sale of the oil to secondary merchants. These merchants were divided into several different classes: independent actors, representatives of large oil syndicates, or government contractors. They left their names, or the names of their guilds and patrons, on the amphorae that carried the oil to markets in Rome. Thus the trade of oil involved not only the oil producers and merchants, but potters at amphora kilns to produce the necessary containers to trade the oil across the Mediterranean. Additionally, all the merchants needed the ships and sailing expertise of sailors to take the oil to Rome, from the conductors of river rafts, to the captains of ocean freighters to the dock workers operating skiffs at the ports. Once the oil reached the Italian peninsula, another group became involved, this time consisting of government officials, who weighed the amphorae and assessed taxes and fees. The oil had to be stored at warehouses, which were operated by another set of managers, physical laborers and guards. When the amphorae finally arrived at the city, the oil was sold by local purveyors at markets to local consumers. Empty oil amphorae met their final end when disposed of at Monte Testaccio.

A trade involving such a large number of people operating at locations thousands of miles apart required extreme regulation. The evidence for strict control exercised by the Roman government is abundant. The markings on each amphora follow the same

pattern, a type of standardized shipping label with each type of value put in the same spot for easy interpreting by officials. The plentiful number of names left on inscriptions of these trade officials, with titles like *procurator* or *auditor*, gives an impression of how many people were employed by the government to enforce regulations. Finally, deposition patterns of amphorae at Monte Testaccio, particularly how the amphorae from one specific period in time were thrown in the same areas, illuminate that the government was interested in regulating the olive oil trade all the way through the final disposal of the shipping containers.

Conducting research on the topic draws from a variety of sources. Texts by ancient authors provide background on a number of different themes related to the subject, from prevailing attitudes towards olive oil from Baetica, recommendations for how to plant olive groves and press the fruit into oil, and estimates as to the size and scope of the trade. Modern excavations offer data from villas, kiln sites, ports, shipwrecks, warehouses, markets, and even trash collection spaces. Honorary inscriptions give us the names of specific people involved in the regulation of the trade. Epigraphy from amphora shards helps us understand how much oil was transported per shipment and aids in calculations used in estimating the volume of oil produced and traded, as well as lists names of merchants, officials and estates. Legal codes add another layer to the story of how the olive oil trade was initiated and regulated.

Studying the production and trade of Baetican olive oil is a pursuit aided by a rich and large library of sources to pull from, enabling further scholarship beyond the scope of this paper. While this paper focuses on oil traded between Baetica and Rome, olive oil from the southern Iberian peninsula was not sold exclusively to the capital city. Dressel

20 amphorae have been excavated at sites in Germany, France, and northern Africa, particularly Alexandria.<sup>320</sup> Olive oil from Baetica appears to have been rationed out to soldiers in army camps on the empire's fringes as part of the *annona militaris*.<sup>321</sup> The *annona militaris* system, functioning similarly to the distribution system for the urban *plebs*, would have provided soldiers on the *limes* with sufficient foodstuffs while in service. The systems of military rationing would have required another set of administrators and officials to oversee their smooth functioning. Various trade routes would have been utilized, and sailors and shippers needed to sail and haul the amphorae across diverse regions to the army camps.

Studying the Baetican olive oil trade reveals the global nature of Roman markets. Rome supplied itself through products imported from other places. When imports of Baetican olive oil eventually decreased by the third and fourth centuries AD, it was not because Romans increased their consumption of domestic oils and stopped importing foreign oil. Rather, the Romans had begun importing larger quantities of oil from Northern Africa, another provincial area of the empire. Baetican olive oil represents a substantial portion of olive oil imports, yet olive oil is only one of a whole host of imported products. Dietary staples of wheat and wine were also imported from non-Italian sources. Additional investigation of these imports would serve to form an understanding of how Rome utilized its provinces and foreign regions. Such study would both construct a model of the import economy of the Roman empire as an interdependent system, and the empire's colonial systems.

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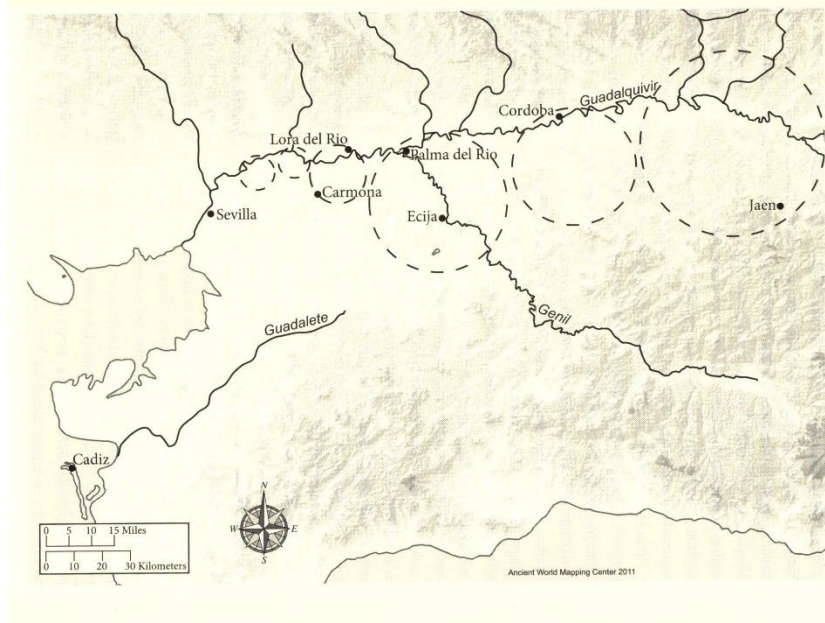
<sup>320</sup> Remesal Rodriguez 1992, pp. 173, 174.

<sup>321</sup> Remesal Rodriguez 1992, pp. 173.



## Figures

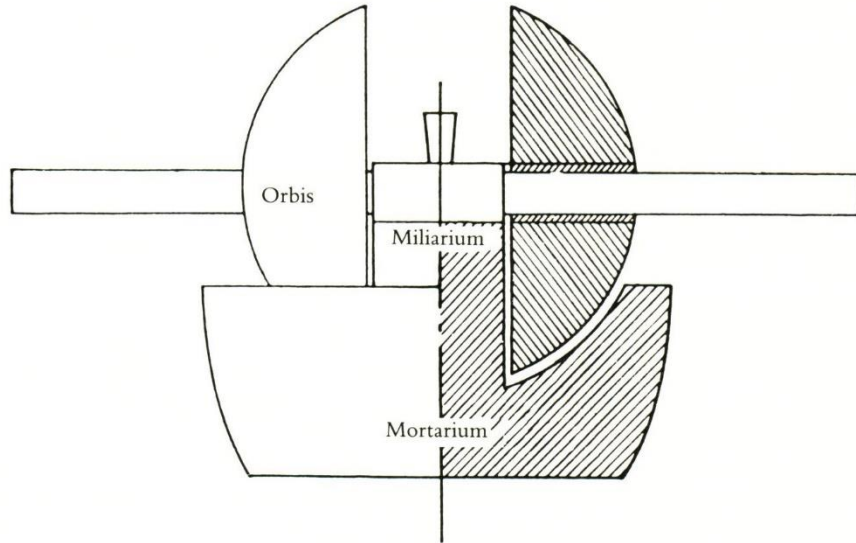
**Figure 1.** Map of areas of olive cultivation in the Baetis/Guadalquivir Valley. Campbell 2012, pp. 251.



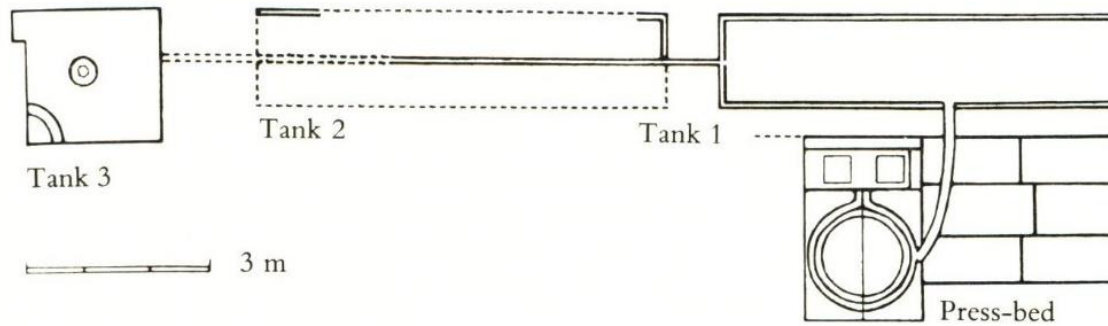
**Figure 2.** Relief of the olive pickers, marble relief, ca. 3<sup>rd</sup> - 4<sup>th</sup> c. AD. Cordoba. Archaeological Museum of Cordoba.



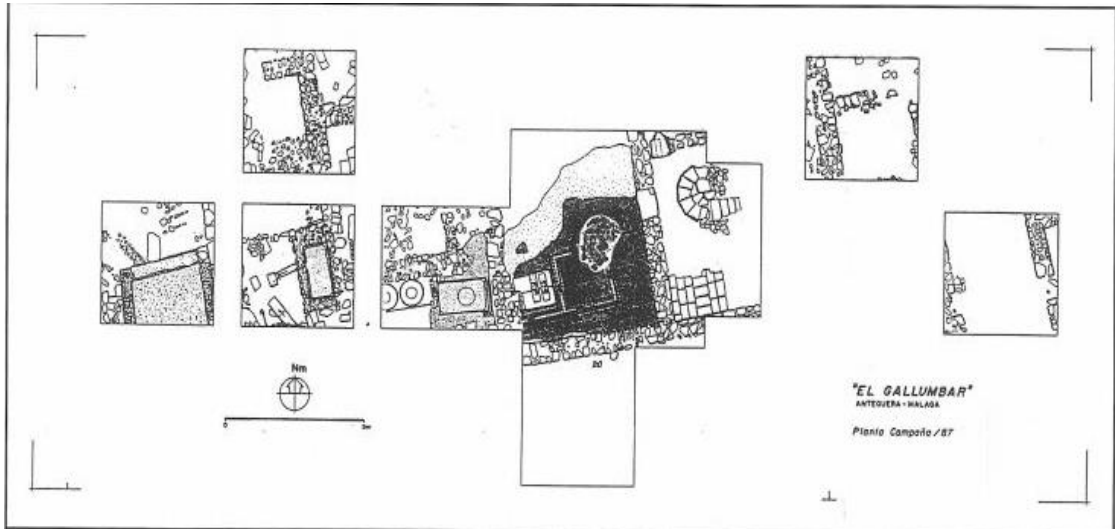
**Figure 3.** An example of a *trapetum*. Peacock and Williams 1986, pp. 34.



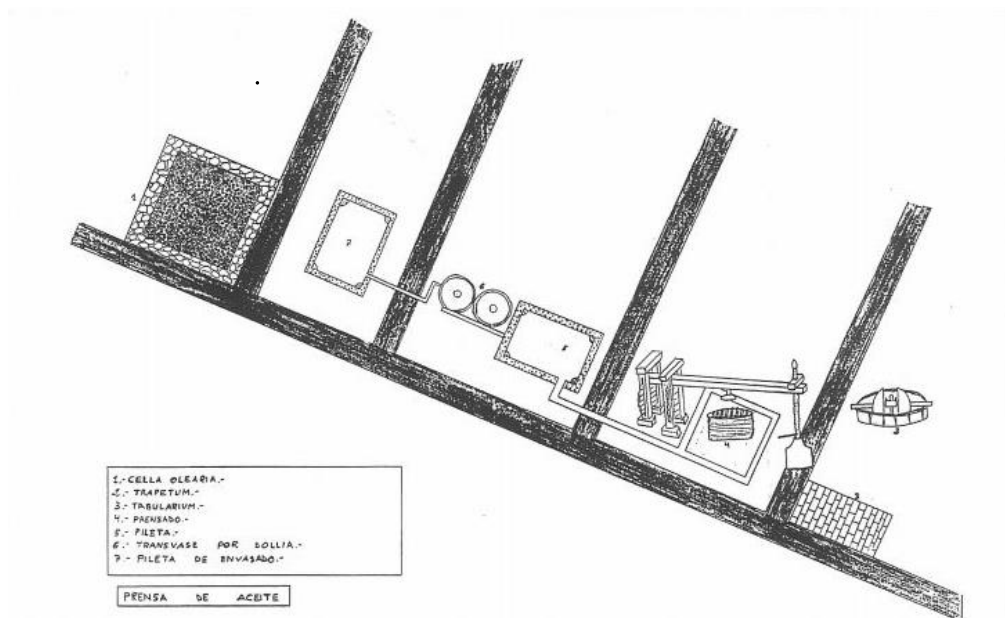
**Figure 4.** Sketch of the press and settling tanks from Granaraccio. Peacock and Williams 1986, pp. 35.



**Figure 5.** Drawing showing the plan of the Villa de Gallumbar. Romero Perez 1997-8, pp. 119.



**Figure 6.** Drawing of the oil production structures at El Gallumbar. Romero Perez 1997-8, pp. 120.



**Figure 7.** The believed base of a *trapetum* at El Gallumbar. Romero Perez 1997-8, pp. 133.



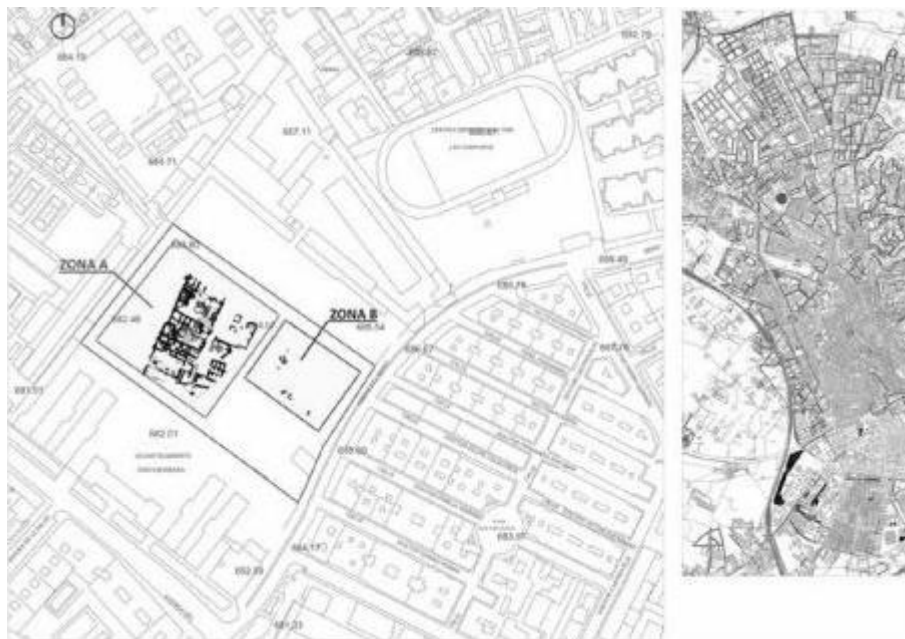
**Figure 8.** The pressing room remains at El Gallumbar. Romero Perez 1997-8, pp. 134.



**Figure 9.** *Dolia* holes at El Gallumbar. Romero Perez 1997-8, pp. 134.



**Figure 10.** Area of the archaeological excavation of the Villa de los Mondragones. Rodriguez Aguilera 2013, fig. 1.



**Figure 11.** Aerial view of the excavated area of Los Piños I. Peraza 2013-14, fig. 1.



**Figure 12.** Underground structure with hydraulic lining. Peraza 2013-14, fig 5.



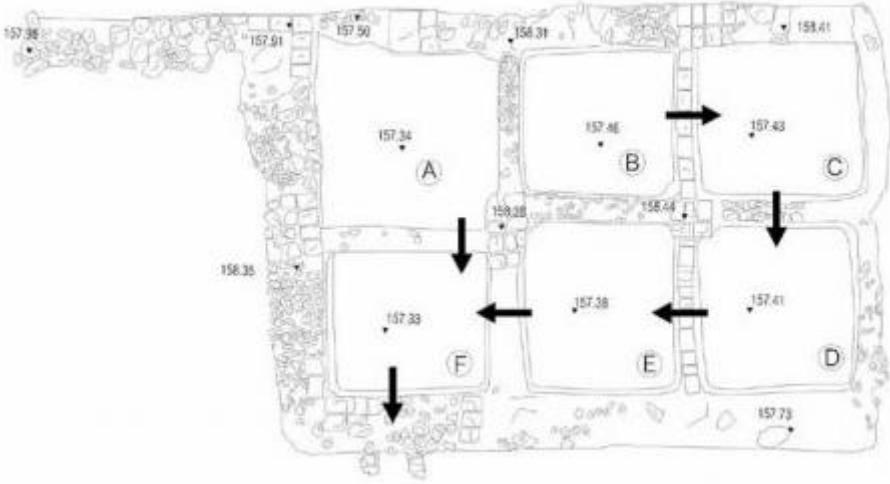
**Figure 13.** A circular press base. Peraza 2013-14, fig 8.



**Figure 14.** Cylindrical rotary mills. Peraza 2013-4, fig. 13.

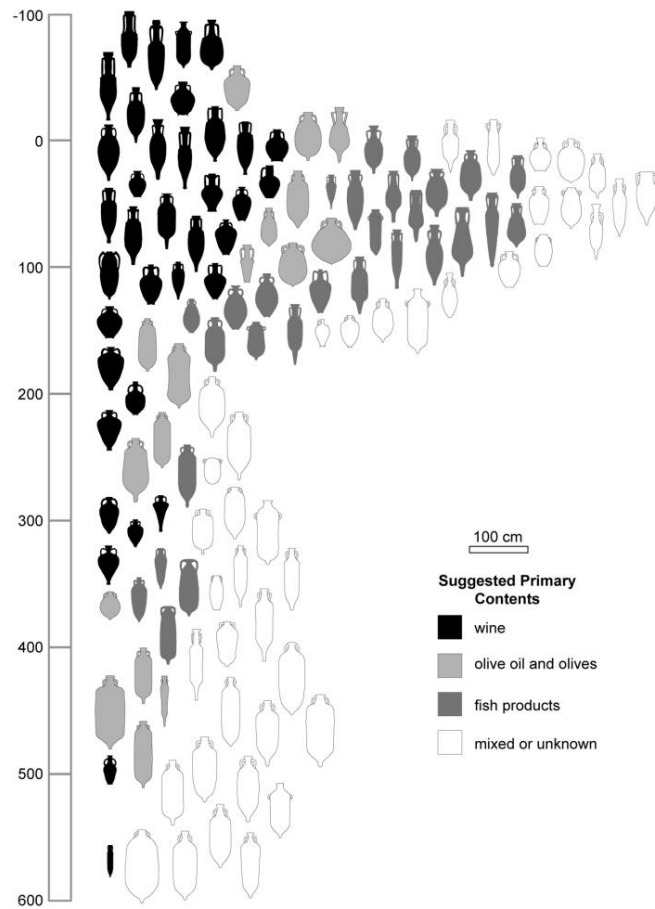


**Figure 15.** The proposed flow of oil through decanting basins. Peraza 2013-4, fig. 14.

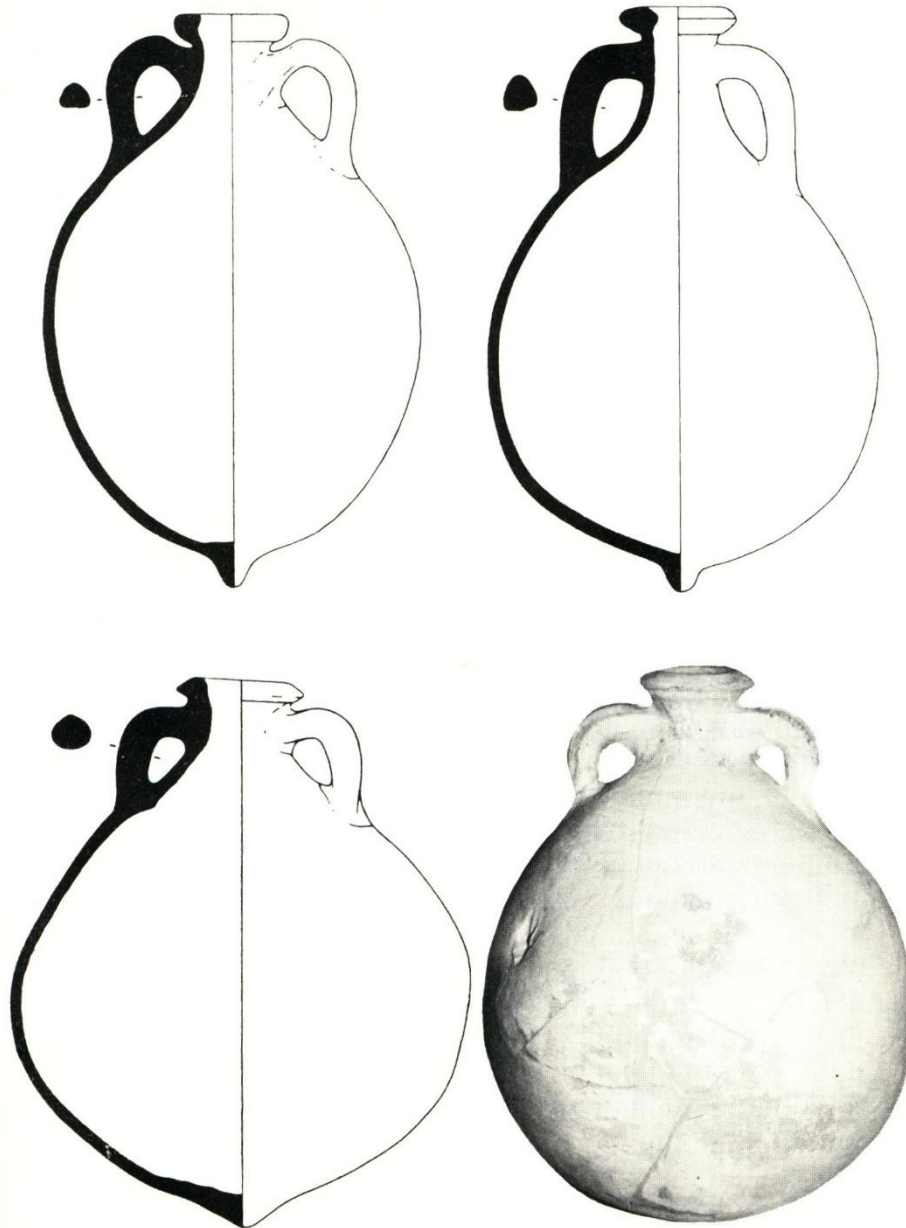




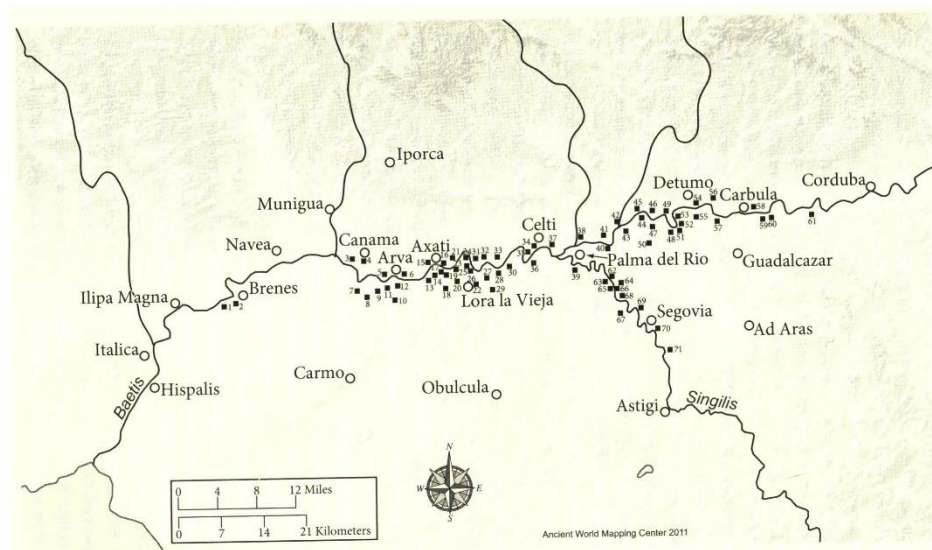
**Figure 16.** Graph depicting the concentration of food products into streamlined amphora shapes over time. Bevan 2014, pp. 394.



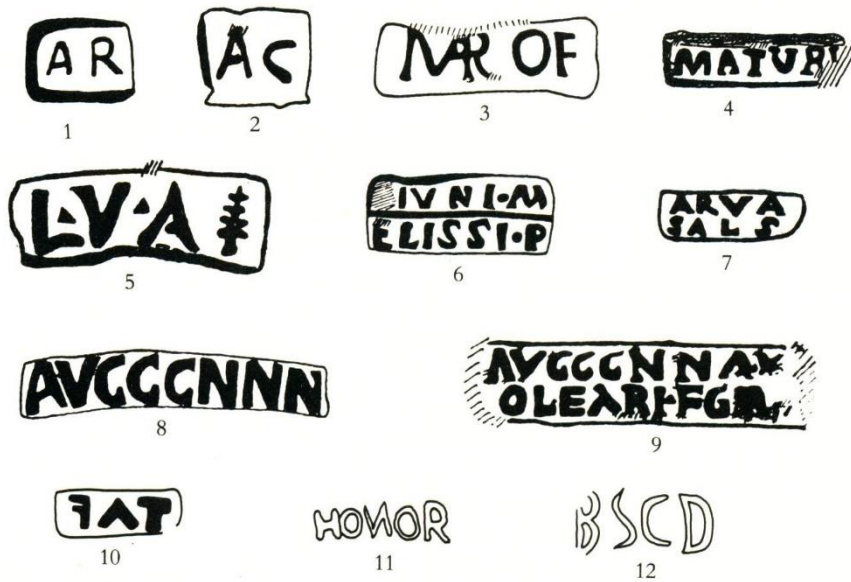
**Figure 17.** Dressel 20 amphora sketches and example. Peacock and Williams 1986, pp. 193.



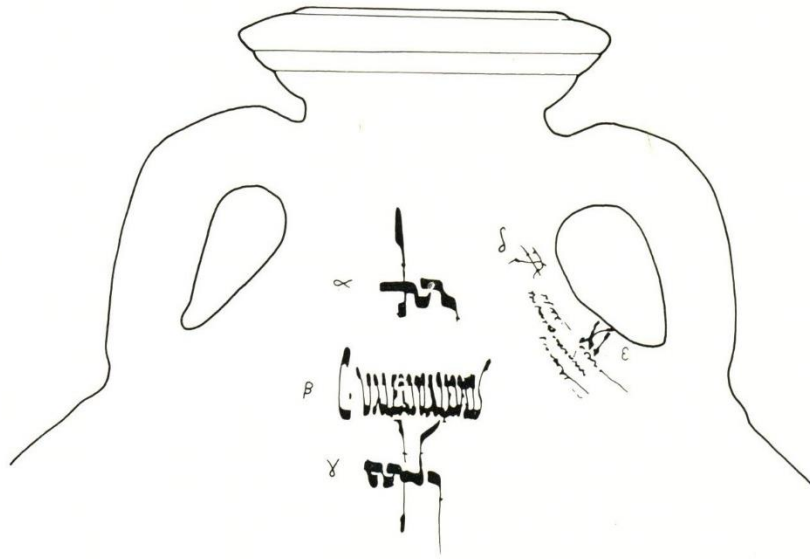
**Figure 18.** Dressel 20 producing sites, concentrated along the Guadalquivir River. Campbell 2012, pp. 254.



**Figure 19.** Examples of amphorae stamps. Numbers 5-9 are from Dressel 20 amphorae, and 8-9 are specifically imperial stamps on Dressel 20 vessels. Peacock and Williams 1986, pp. 10.



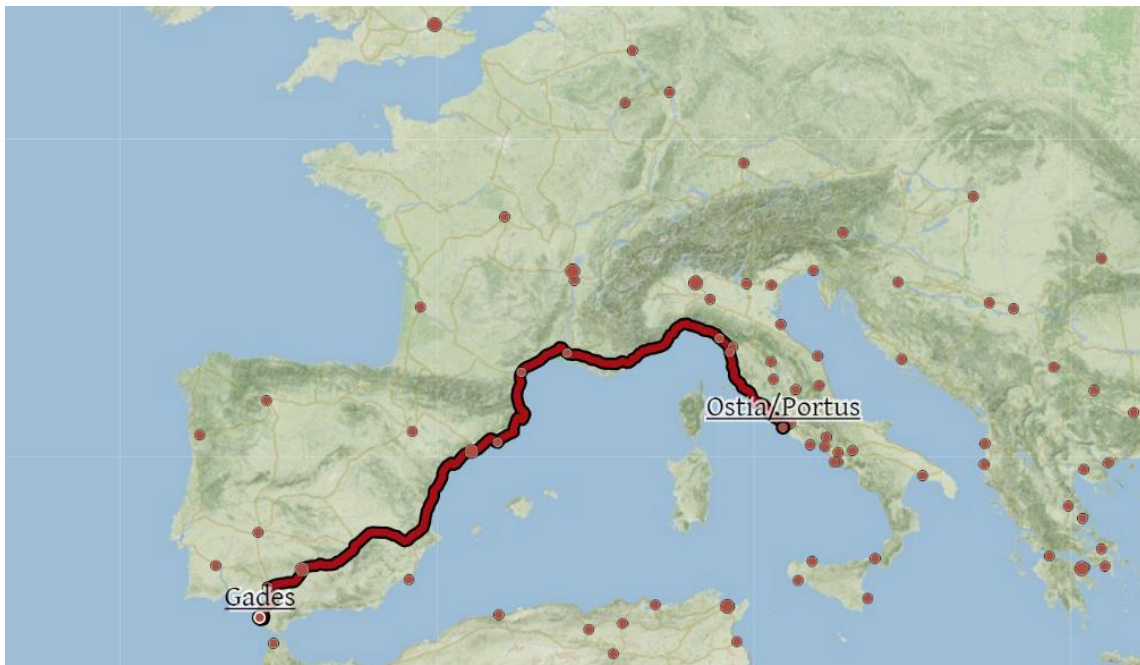
**Figure 20.** Interpreting a *tituli picti* mark. Reading top-down on the middle section: *alpha*, *beta*, and *gamma*. By the right handle is the *delta* mark. Peacock and Wiliams 1986, pp. 14.



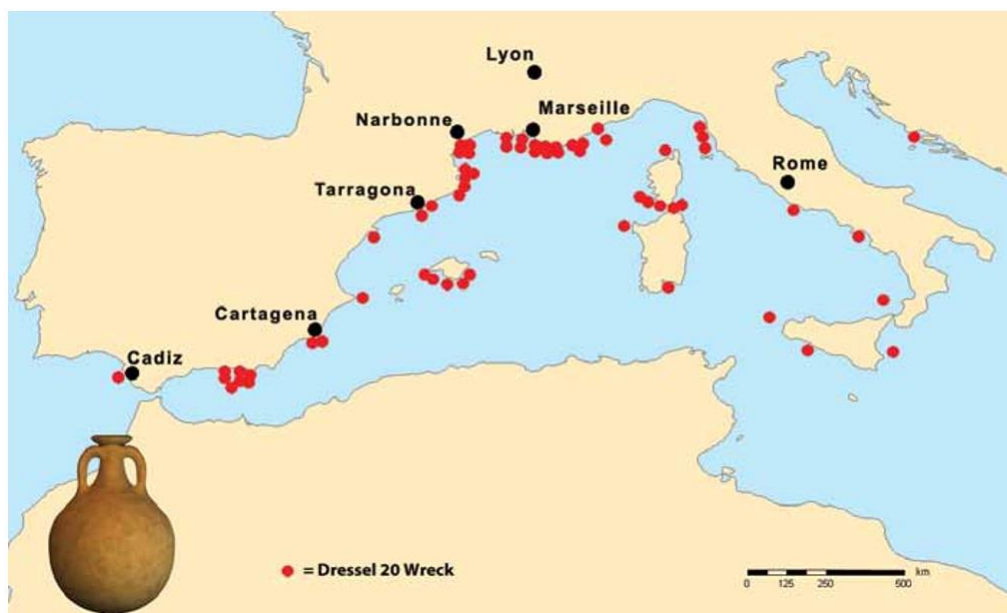
**Figure 21.** Map showing the most direct potential route taken by oil shippers from Gades to Ostia/Portus. Created at orbis.stanford.edu.



**Figure 22.** Map showing the coast-hugging, longer potential route from Gades to Ostia/Portus. Created at orbis.stanford.edu.



**Figure 23.** Map showing excavated shipwrecks where Dressel 20 amphorae have been found. Kingsley, Decker, and Gerth 2014, pp. 8.



**Figure 24.** Reproduction of inscription to M. Petronius Honoratus. *CIL* 14.4458.

M · P E T R O N I O · m. f  
QVIR · HONORAT O  
PRAEF · COH · I · RAETorum  
TRIB · MIL · LEG · I · MINERviae  
5 P · F · PRAEF · ALAE · AVG · P · F. thrac  
PROC · MONET · PROC · XX · hered  
PROC · PROV · BELG · ET · DVAR  
GERMANIAR · PROC · A RATIO n  
AVG · PRAEF · ANNON · PRAEF  
10 AEGYPTI · PONTIF · MINORI  
NEGOTIATORES · OLEari  
EX BAETICA · PATRONO  
CVRATORIBVs  
CASSIO · FAVSto  
15 CAECILIO · HOnorato

**Figure 25.** Lead *signaculum* of C. Julius Valerian and C. Julius Julian. Berni Millet and Pi 2007, pp. 167.



**Figure 26.** Inscribed statue base dedicated to Marcus Julius Hermasianus. Photo from [http://edabea.es/helper/img\\_wrapper.php?copy=%C2%A9+Joaqu%C3%ADn+L.+G%C3%B3mez-Pantoja+ex+im.+Remesal&img=5960.jpg](http://edabea.es/helper/img_wrapper.php?copy=%C2%A9+Joaqu%C3%ADn+L.+G%C3%B3mez-Pantoja+ex+im.+Remesal&img=5960.jpg)

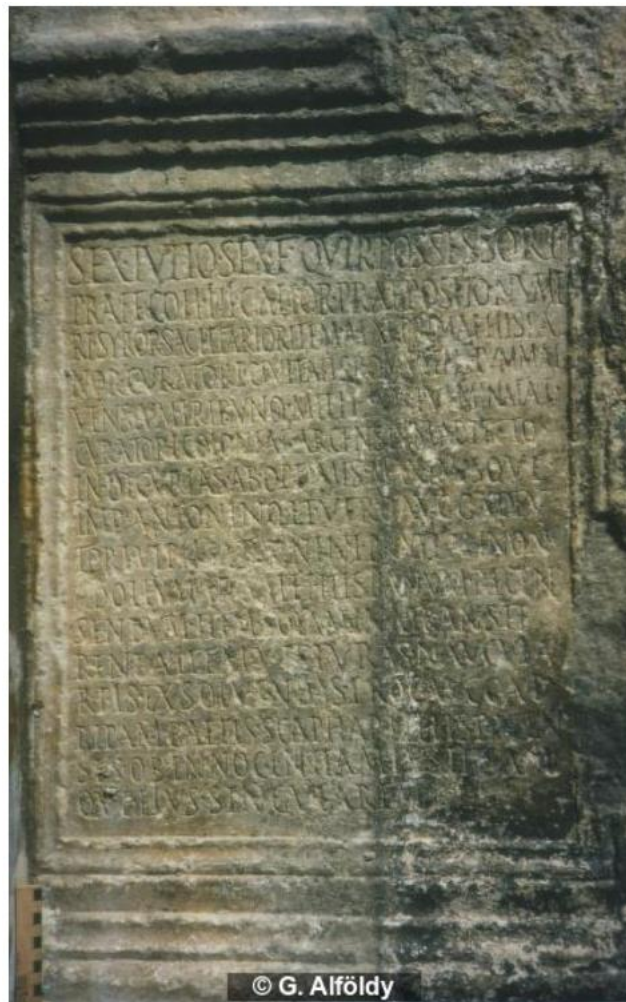




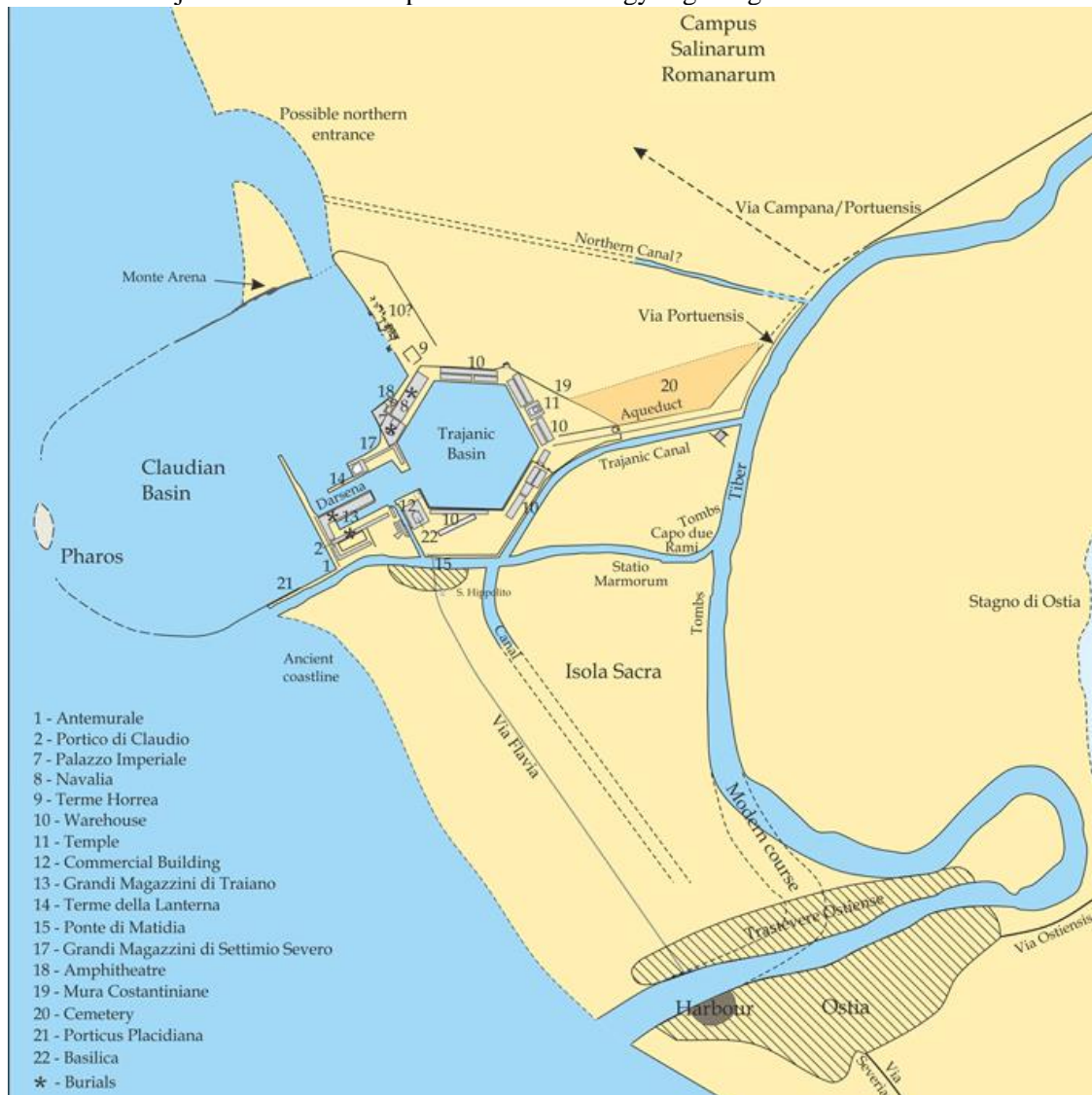
**Figure 27.** Inscribed statue base dedicated to Marcus Julius Hermes Frontinianus and his son. Photograph by G. Kurtz Schaefer, [http://cil.bbaw.de/dateien/cil\\_view.php?KO=KO0016927](http://cil.bbaw.de/dateien/cil_view.php?KO=KO0016927)



**Figure 28.** Honorary inscription to Sextus Iulius Possessor by the *scapharii hispalenses*. Photo from <http://edh-www.adw.uni-heidelberg.de/edh/foto/F010324>



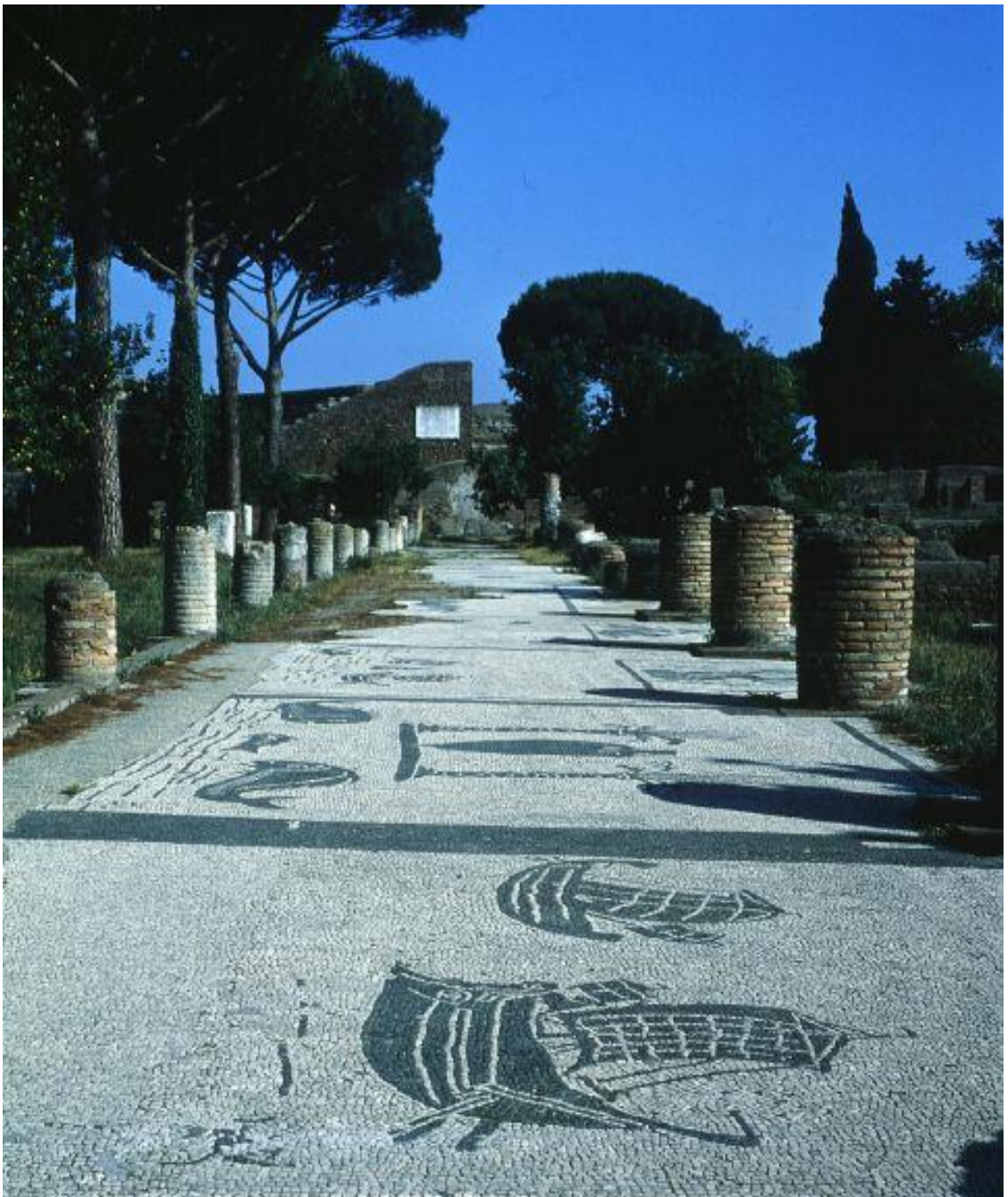
**Figure 29.** Map of Portus and Ostia, showing the placement of Claudius's original Portus harbor and Trajan's renovation. <http://www.archaeology.org/images/MA2015/Portus/>



**Figure 30.** Mosaic depicting the unloading of cargo ships, from the Piazzale delle Corporazioni. Photo by A. Chene, Centre Camille Julian. De Donato 2003, pp. 53.



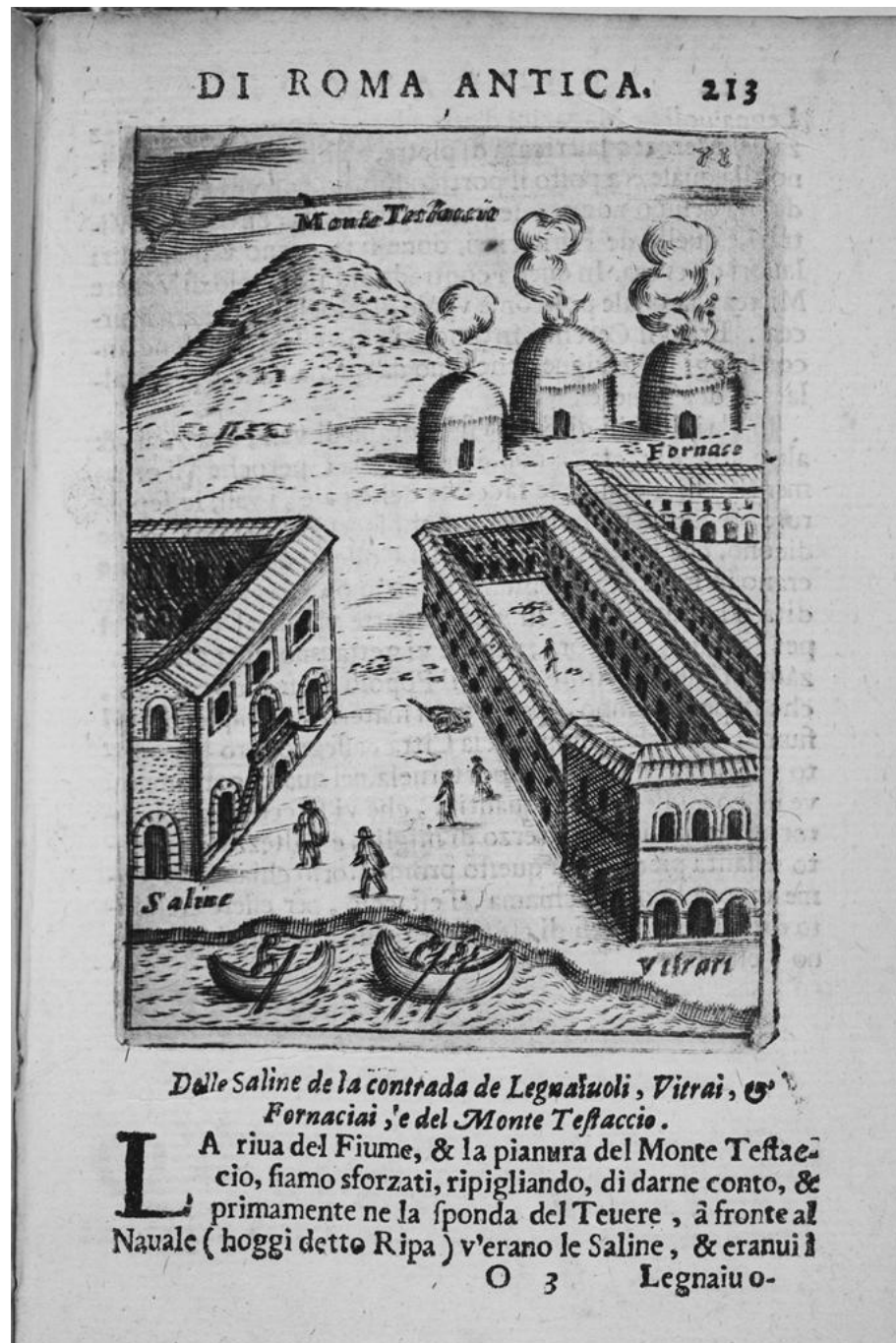
**Figure 31.** The floor mosaics marking entrances to different professional organization booths at Piazzale delle Corporazioni. Orti, Gianni Dagli, The Art Archive PDAA393482.



**Figure 32.** Another mosaic from Piazzale delle Corporazioni, perhaps depicting what the *naves codicariae* would have looked like. De Donato 2003, pp. 15.



**Figure 33.** An artistic rendering by anonymous of Monte Testaccio from 1633. Totti, Pompilio. *Ritratto di Roma antica*. Rome: Andrea Fei, 1633.

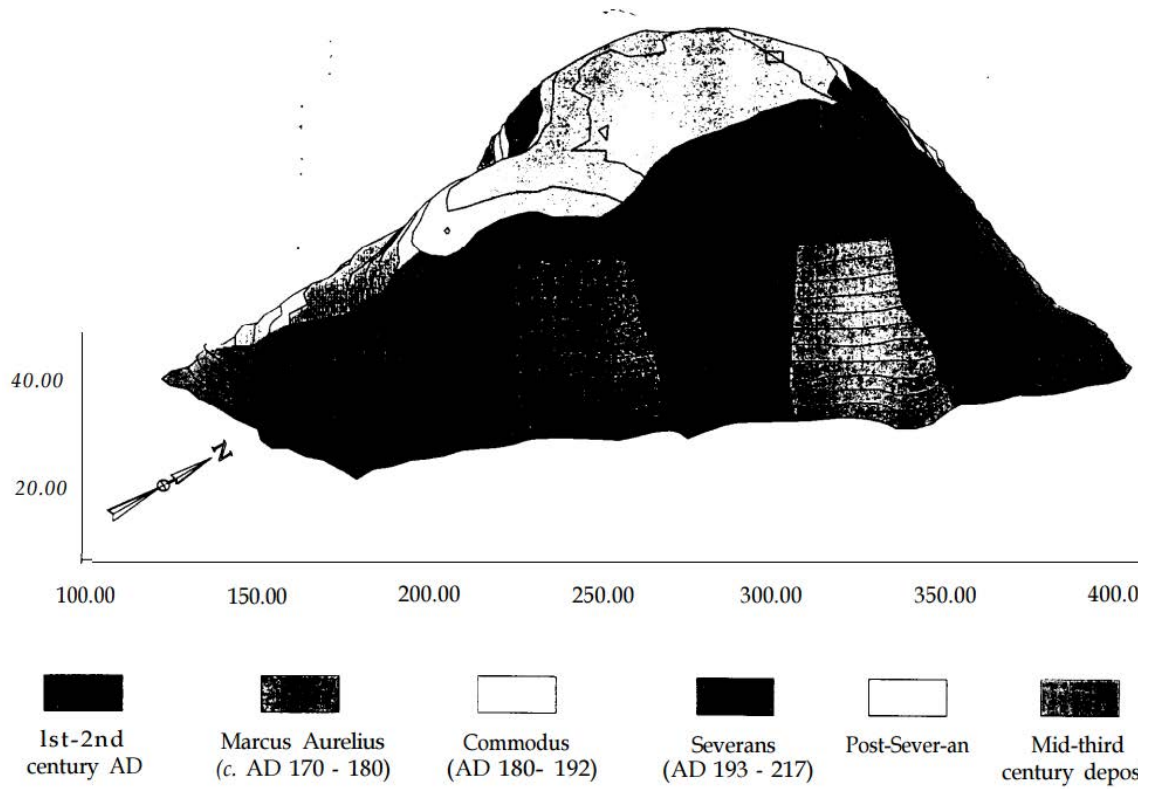


**Figure 34.** Monte Testaccio shard wall. Ezban 2012.





**Figure 35.** Remesal Rodriguez 1998, pp. 195. Graph showing the deposition strata of Monte Testaccio amphora shards by age.



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