



## **Capital Accumulation and Production: A View from the Roman World**

\*\*\*

ANNALISA MARZANO<sup>1</sup>  
UNIVERSITY OF READING

### ABSTRACT

The different perspectives brought by disciplines such as economics, sociology, and history have emphasized different aspects and characteristics as essential components of what makes “capitalism.” This variety of definitions has, in turn, raised the question of whether “capitalism” can be identified in past historical periods, including classical antiquity. This essay will be largely informed by the archaeological evidence from the Roman world and will explore two key components of capitalism: accumulation of capital and production.

The aim of the paper is to discuss the motivations behind the desire to accumulate wealth in the Roman early imperial period as revealed by archaeological examples. By focusing on case-studies, the paper will investigate the mechanisms behind the accumulation of capital in connection to the development of viticulture in Gaul and in Hispania Tarraconensis in the early imperial period; the growth in investment related to large-scale fishing and processing of fish products; and the intensification and growth of horticulture and arboriculture attested for the early first century AD. The key questions the essay will investigate concern who was able to accumulate capital in the Roman world and if, and to what degree, social mobility impacted on capital accumulation; and whether capital accumulation allowed for investment in innovation

---

<sup>1</sup> ORCID: 0000-0002-6485-9143.



and improvements in production or was largely used for conspicuous consumption, which characterized the highly competitive behavior of the Roman elite.

## ESSAY

In this essay, I take an archaeological perspective in addressing the question of who was able to accumulate capital in the Roman world and focus on three different types of production and geographic areas: 1) wine production in Gaul and Hispania Tarraconensis; 2) large-scale fishing/fish salting in a Mediterranean-wide context; and 3) arboriculture in Rome's *suburbium*. My discussion is concerned with a basic issue: was capital regularly used to ameliorate production or was it primarily directed at displays which enhanced one's status and standing in a community (e.g., owning a grand house; acquiring luxury goods; engaging in euergetism)?

This chapter does not aim at evaluating whether aspects of capitalism were present in ancient Rome; as explained by Neville Morley, “capitalism” carries so much ideological baggage with it and, while it is always possible to describe pre-modern societies as capitalistic, it is misleading.<sup>2</sup> Rather, as outlined by the organizers of this symposium, the focus is on “performative practices” of the pre-modern world that could be ascribed to capitalism, such as capital accumulation. There are several differently nuanced definitions of what “capital” is.<sup>3</sup> I use “capital” to refer to all the man-made resources available for production, that is, both financial capital, such as money and bullion, and physical capital, such as tools, equipment, workshops, etc.<sup>4</sup> It is a definition that does not cover all the possible ways in which “capital” has been understood by economists, economic historians, or sociologists – social capital is

<sup>2</sup> Neville Morley, *Theories, Models, and Concepts in Ancient History* (London: Routledge, 2004), 33–50.

<sup>3</sup> E.g., for Karl Marx “capital existed *within* the process of buying and selling, as money advanced only in order to get it back again”: *Encyclopedia of Marxism*, s.v. “Capital.”

<sup>4</sup> This is the definition adopted by the “Structural Determinants of Economic Performance in the Roman World” Project when investigating the topic in Paul Erdkamp, Koenraad Verboven and Arjan Zuiderhoek, eds., *Capital, Investment and Innovation in the Roman World* (Oxford: Oxford University Press, 2020).

evidently absent here – although, as we shall see, much of what the archaeology reveals about “tangible” capital does imply social capital.

### **From Farm to Villa**

Gaul and Hispania Tarraconensis are two territories which were “Romanized” relatively early. While in both regions viticulture had started before the “official” arrival of Rome, the colonization program pursued by Julius Caesar and Octavian/Augustus, largely aimed at settling military veterans, gave a major impetus to viticulture. The colonists, originating mainly from Italy, brought with them their knowledge and experience of Italian agriculture in general, and viticulture in particular. The wine produced in these territories soon became a major export item, reversing a trend that had seen a dominant presence of Italic wines up to mid-first century BC. Archaeology shows clearly the spread of viticulture in these provincial territories. In Gaul, a number of farms of Roman type were built by the recipients of land grants, and it appears that from the start these relatively modest establishments engaged in market-oriented agriculture with the preponderance of crops such as grapes and olives. Trenches for vineyards associated with colonial foundations have been identified in different areas of Gaul and dated to the early first century AD, such as those identified in the context of land centuriation in the territories of Roman Orange, Lapalud, Girardes, and Paris.<sup>5</sup> Also in non-Mediterranean Gaul – especially in the Tres Galliae and Germania – viticulture started wherever soil conditions were favorable as early as the arrival of the colonists in the region, as indicated by archaeological data such as planting pits, wine presses, amphora kilns, and agricultural tools connected to vine growing.

---

<sup>5</sup> Annalisa Marzano, “Capital Investment and Agriculture: Multi-Press Facilities from Gaul, the Iberian Peninsula, and the Black Sea Region,” in *The Roman Agricultural Economy*, ed. Alan Bowman and Andrew Wilson (Oxford: Oxford University Press, 2013), 107–42, at 111.

An example of the typical colonial farm can be found at two Gallo-Roman farms dating to the first century AD, excavated at Gasquino just outside Béziers. The farms were in the territory of the colony *Urbs Julia Septimanorum Baeterra* founded in 36 BC by Octavian to settle veterans of Caesar's *Legio VII Gemina*. The modest buildings were located c. 200 meters (656 feet) apart and were part of an intensively settled rural landscape: other farms were identified within a 1 km (.62 miles) radius, suggesting that each farm probably controlled 10-30 ha (24.7-74.14 acres) of land.<sup>6</sup> The main crop was grapes, as attested by archaeobotanical evidence, the presence of *cellae vinariae* with *dolia defossa* – a wine-making technique typical of Italy – and the thousands of planting trenches and drainage ditches typical of vineyards documented on the ground.<sup>7</sup> While other plants were grown – some cereals, fruit trees – from the start these farms focused on viticulture as their major cash crop. They were linked to the market economy and aimed at producing surplus wine, the sale of which would have allowed the owner to purchase other foodstuffs and whatever else he or she needed.

These farms were in use for about two hundred years and did not change substantially over time, in terms of size or décor. However, other sites in France and in Spain show a different evolution: although the initial installations were rather modest, within two or three generations the farms took up the appearance of proper villas, with larger residential quarters and storage and processing facilities. Roman farms excavated in Provence, Languedoc, and the Rhône Valley feature such changes during the Flavian period.<sup>8</sup> Presumably these data attest to successful wine production which generated financial capital that could be invested in the amelioration of residential and productive quarters. If we assume that the various examples of colonial farms later transformed into villas remained for the most part properties in the hands

---

<sup>6</sup> Isabel Figuera, et al., “Archaeobotany, Vine Growing and Wine Producing in Roman Southern France: the Site of Gasquino (Béziers, Hérault),” *Journal of Archaeological Science* 37 (2010): 139–49.

<sup>7</sup> At least 15 ha (37 acres) out of the 20 ha (49.42) investigated were occupied by vineyards in the first century AD.

<sup>8</sup> Marzano, “Capital Investment,” 112.

of the same initial colonial families, the evolution underwent by the sites indicates that the owners were able to accumulate capital out of successful viticulture and over time used it to better their social status but also to improve production.

The installation of wine presses is an important indicator of the willingness to invest capital in production. Unlike oil making, a press is not necessary to make wine; it is possible to just tread the grapes in order to extract the juice. However, adding a wine press increases extraction efficiency. The lever and the lever and screw presses were bulky installations that often occupied purpose-built rooms. Therefore, the installation of a wine press was an investment that required not simply the cost of the press itself, but also the construction and commitment of a dedicated space.

Several of the wine-producing villas identified in Gaul, when they became larger and more opulent by the late first century / early second century AD, also notably increased the production facilities by installing multiple presses.<sup>9</sup> Increase in the processing capacity for agricultural produce probably indicates that the more successful landlords expanded their landholdings, but the development of grape cultivars with higher yields, thus requiring larger processing facilities cannot be discounted. Large landlords with significant financial resources at their disposal invested also in watermills. The watermills allowed for a more rational use of the man or animal power available in relation to tasks that pertained to the food needs of the villa residents and workforce (the main commercial crop of these estates was grape/wine, not cereals), presumably in order to devote more resources to viticulture.<sup>10</sup>

---

<sup>9</sup> Marzano, "Capital Investment."

<sup>10</sup> Annalisa Marzano, "Classical Archaeology and the Ancient Economy," in *the Diversity of Classical Archaeology*, ed. Achim Lichtenberger and Rubina Raja (Turnhout: Brepols, 2017), 101–14, at 103–05.

Similar patterns can be recognized in Hispania Tarraconensis and specifically in the territory of the colony of Barcino (Barcelona), founded in 15-8 BC. In this region, commercial wine production aimed at export markets had started at least from the mid-first century BC.<sup>11</sup> However, it was only in a later phase that rural settlements displaying the architectural features readily associated with the Roman “villa” (courtyards, residential rooms with a certain level of décor, bath suites with hypocausts, etc.) appeared; the earlier wine producing centers were rather associated with proto-farms.<sup>12</sup> Similar to what was discussed for Gaul, also here, once the revenue from (presumably) the commercialization of wine started to come in, part of it was invested in “status enhancers”: the construction of a residence which conformed to “Roman” architectural typologies.

Research work by Spanish scholars has shown that the most important families of Barcino, well attested as magistrates and in other distinguished positions until the second century AD, were the prominent landowners involved in commercial wine production;<sup>13</sup> these families may have received larger plots of higher quality land at the moment of the colonial foundation.<sup>14</sup> They moved socially upwards, reaching equestrian or even senatorial status and establishing close links with other provincial elites or with notables in Rome itself.<sup>15</sup> Their own freedmen in turn experienced social mobility.<sup>16</sup> There are several instances where medieval toponyms indicate their derivation from names of estates that had belonged to individuals of servile origins, for

---

<sup>11</sup> See the Tarraconense 1 and Pascual 1.

<sup>12</sup> Oriol Olesti Vila, “Els inicis de la producció vinícola a Catalunya: el paper del món indígena,” in *El vi a l’antiguitat: economia, producció i comerç al Mediterrani Occidental. II col.loqui internacional d’Arqueologia romana* (Badalona: Museu de Badalona, 1999), 246–57.

<sup>13</sup> E.g., the Minicii, Valerii, Porcii. See Jordi Morera, Cesar Carreras and Oriol Olesti Vila, “Centres de producció amfòrica i territoris a la riba dreta del Llobregat: novetats de la terrisseria del Mercat (Sant Vicenç dels Horts),” *Pyrenae* 41, no. 2 (2010): 49–79.

<sup>14</sup> Oriol Olesti Vila and César Carreras Monfort, “Le paysage social de la production vitivinicole dans l’ager Barcinonensis: esclaves, affranchis et institores,” *Dialogues d’histoire ancienne* 39, no. 2 (2013): 147–89, at 152.

<sup>15</sup> Olesti Vila and Carreras Monfort, “Le paysage social,” 164.

<sup>16</sup> *Ibid.*, 170.

instance the *fundus Nisianus*, derived from a typically libertine *cognomen*, Nicius.<sup>17</sup> In some amphorae it is even possible to follow an individual in his advance from estate slave-manager to successful freedman. At the villa of Veral de Vallmora near Teià, a *signaculum* was discovered, bearing the inscription *Epictet(us) L(uci) P(edanii) Clementis* or “Epictetus, slave of Lucius Pedanius Clemens.”<sup>18</sup> The villa was a major wine-producing center and in this period had two dedicated press rooms, each with two large wine presses, an indication of considerable capital investment in production facilities.<sup>19</sup> Both individuals are well attested in the urban epigraphy of Barcino of the age of Trajan; one inscription shows not only that Epictetus had gained freedom, but also that he had achieved the top social advancement possible for a *libertus*, gaining entry among the *seviri augustales*.<sup>20</sup> *Liberti* who reached this position were wealthy and commanded influence in their local community, often able to marry into equestrian families.<sup>21</sup> It is extremely likely that Epictetus, while a slave with managing responsibilities on this estate, was able to accumulate capital that brought him not only his freedom but also influence in the local community. Freedmen normally continued to operate in the same line of business as when they were slaves, often forming business partnerships with their former masters. As for L. Pedanius Clemens,<sup>22</sup> he belonged to a prominent *gens* of Barcino; A L. Paedanius Clemens senior is attested as having received “all the honors” in Barcino and having held the post of *duovir quinquennalis* at Tarraco.<sup>23</sup>

---

<sup>17</sup> Ibid., 172. When the adjective is modeled on the *cognomen* rather than the *nomen* it shows a derivation from a servile/libertine name.

<sup>18</sup> Isabel Rodà de Llanza, et al., “Personatges de Barcino i el vi Laietà,” *Quaderns d’arqueologia i història de la ciutat de Barcelona* 1 (2005): 46–57.

<sup>19</sup> A total of three press rooms were identified, each with two presses, so six in total, but it seems that only four were ever in use in the same period. See Antoni Martín i Oliveres, Isabel Rodà de Llanza, and Carlos Velasco i Felipe, “*Cella vinaria* de Vallmora (Teià, Barcelona). Un modelo de explotació vitivinícola intensiva en la Layetania, *Hispania Citerior*,” *Histria Antiqua* 15 (2007): 195–211, at 200.

<sup>20</sup> IRC 4.106 = *CIL* 2.6155.

<sup>21</sup> Simon Keay, *Roman Spain* (London: British Museum Publications, 1988), 78.

<sup>22</sup> He is attested in two inscriptions: IRC 4.107–108.

<sup>23</sup> Georges Faber, Marc Mayer, and Isabel Rodà de Llanza, *Inscriptions romaines de Catalogne, 1: Barcelone (sauf Barcino)* (Paris: Diffusion de Boccard, 1984), 147–49; see IRC 4.69.

## Slaves as Entrepreneurs

The data from Barcino referenced above show that from the Flavian age until the second century AD freedmen are strongly represented in the monumental epigraphy as *seviri augustales* and proprietors of rural villa estates.<sup>24</sup> About 21% of Barcino's decurions attested in the second century AD have servile origins.<sup>25</sup> This notable upward mobility may have been aided by the fact that several of the founding families of Barcino achieved equestrian and senatorial status and moved on to higher appointments, opening many opportunities to freedmen and their descendants within the city. L. Licinius Secundus is such a case, if exceptional. He was a freedman of the general L. Licinius Sura, and in the second century AD achieved so much wealth and influence to be appointed at the same time as *sevir* in Barcino and Tarraco. He was the receiver of an impressive public display of homage right in Barcino's forum, where twenty-two statue-bases honored him. The dedicants included the town council of Barcino, of Ausa, the *seviri augustales*, the association of the Assotani, and various individuals.<sup>26</sup>

Roman society was highly mobile for an ancient society, especially when considering the transition from slavery to freedom, and such mobility in good part rested on the fact that slaves too were able to accumulate capital. A master could grant a *peculium*,<sup>27</sup> a starting capital in modern terms, to a slave, who, if successful in managing a given commercial activity, could purchase his/her own freedom when reaching a certain amount.<sup>28</sup> While the *peculium* could be revoked at any time by the master and, according to strict law, remained his/her property, common usage in fact considered it property of the slave, who managed it independently.<sup>29</sup> For

---

<sup>24</sup> Olesti Vila and Carreras Monfort, "Le paysage social," 181.

<sup>25</sup> Ibid., 183–84.

<sup>26</sup> Keay, *Roman Spain*, 78.

<sup>27</sup> The *peculium* could include property, money, and tools.

<sup>28</sup> E.g., see Tacitus, *Annals* 14.42. If the owner manumitted the slave during his lifetime, the *peculium* was normally given together with freedom, unless it had been specifically retained, as see Justinian's *Digest* 15.1.53 (*de Peculio*, Paul. *Liber 11 questionum*).

<sup>29</sup> Not all assets were necessarily granted by the master: a slave could acquire on his own initiative some of them. While the acquisitions stemming from the *peculium* were credited to the master, his liability did not exceed the



Keith Hopkins, the *peculium* system aimed at lowering the masters' costs of supervision by encouraging slaves to self-enforce their work performance, offering freedom as an incentive.<sup>30</sup> This widely used tool had important socio-economic implications and for some historian and economists, more recently Peter Temin, it is a feature that allows scholars to consider slaves as part of a unified labor force rather than a barrier to economic progress, because of the economic incentives offered by the *peculium* + manumission system.<sup>31</sup> Obviously, not all slaves would gain freedom one day, but the skilled slaves had very high chances of doing so, and many did, starting a process of upward mobility which often allowed their descendants to become members of the local elite.

As far as financial capital and investment in production are concerned, the *impression* we have is that freedmen were more likely to invest in production and technology than the elite. This impression rests on the fact that freedmen commonly referred with pride to their work and business activity; their funerary monuments often show them at work, including the depiction of tools of the trade. Because skills and success in business were the key to freedmen's social mobility, they would have had a very different attitude to manual work than the elites.

The famous first-century BC funerary monument of Marcus Vergilius Eurysaces the "baker" near Porta Maggiore in Rome exemplifies this. The figurative freeze shows the various phases of bread production, including the use of an animal-powered dough-mixer, a "machine" to which the large round elements decorating the tomb may refer. Eurysaces was no ordinary baker, but a *redemptor*, that is, a contractor for the state. His tomb has been suggested to

---

*peculium* itself. For a discussion of the economic relationships of masters-slaves in respect to the *peculium* from a legal perspective, see Richard Gamauf, "Slaves Doing Business: the Role of Roman Law in the Economy of a Roman Household," *European Review of History: Revue européenne d'histoire* 16 (2009): 331–46.

<sup>30</sup> Keith Hopkins, *Conquerors and Slaves: Sociological Studies in Roman History* (Cambridge: Cambridge University Press, 1978), 125–28.

<sup>31</sup> Peter Temin, *The Roman Market Economy* (Princeton: Princeton University Press, 2012).

celebrate not only his evidently successful business, but also the technological innovation adopted (the dough mixers), which was a labor- and time-saving device.<sup>32</sup> In other words, Eurysaces invested financial capital in improving the capital goods for this production activity. As discussed above, however, the idea that elite landlords were fundamentally disinterested in investing in technology connected to production has been revised in recent years. In the context of commercial viticulture, archaeological evidence does not show a sharp difference between the decisions taken on estates of aristocrats and freedmen of means in regards to investment in production facilities. While not all elite landlords were hands-on in running their agricultural estates and many technical innovations on existing equipment were done by those regularly using it,<sup>33</sup> what seems to have had a greater bearing on whether capital was invested in technology in the aid of production was whether the landlord had financial means and was an absentee owner or not.<sup>34</sup> For middling individuals, the possibility of investing in the amelioration of production facilities came if they acted as a group and pooled their resources, as shown, for example, by the case of presses in villages.<sup>35</sup>

### **Large-scale Fishing and Fish Salting**

We have very limited information on who was behind large-scale fishing operations in the Roman world and whether, like later historical periods, the boats and large fishing nets were owned by wealthy individuals who did not participate in the actual fishing but took a large share out of its profits. While archaeological evidence, with the high number of fish-salting establishments known and the wide geographic distribution of the products via the amphorae,

---

<sup>32</sup> Lauren Hackworth Petersen, “The Baker, His Tomb, His Wife, and Her Breadbasket: The Monument of Eurysaces in Rome,” *Art Bulletin* 85, no. 2 (2003): 230–57.

<sup>33</sup> Tamara Lewitt, “Invention, Tinkering, or Transfer? Innovation in Oil and Wine Presses in the Roman Empire,” in *Capital, Investment, and Innovation in the Roman World*, ed. Paul Erdkamp, Koenraad Verboven, and Arjan Zuiderhoek (Oxford: Oxford University Press, 2020): 307–54.

<sup>34</sup> Tamara Lewitt, “Absent-minded Landlords and Innovating Peasants? The Press in Africa and the Eastern Mediterranean,” in *Technology in Transition A.D. 300–650*, ed. Luke Lavan, Enrico Zanini, and Alexander Sarantis (Boston and Leiden: Brill, 2007), 119–39.

<sup>35</sup> Lewitt, “Invention, Tinkering, or Transfer?”

shows that large-scale fishing and fish processing were an important part of the economy of a number of regions, it is not completely clear who might have invested capital and been able to accumulate capital in this sector. While Roman fish-salting installations tended to be larger than earlier examples,<sup>36</sup> their size varied greatly; some can be called “factories,” others were smaller workshops, and thus the type of ownership, organization, capital, and labor requirements varied. The archaeological evidence suggests that the most successful fish-salting establishment either diversified production, turning to the salting of meat when the fishing season was over, or that they were located in areas where both seasonal fishing for migratory pelagic fish and fishing in coastal lagoons could take place.<sup>37</sup> The data show profit-seeking business decisions, but it is difficult to specifically assess degrees of capital accumulation in this sector or how the financial capital generated was used. It seems, however, that both elite and non-elite invested in this sector. In the late Republic, we see the possible involvement of *equites* in the case of the *garum*/salted fish attributed to a *s(ocietas) c(etariorum) G(aditanorum)*.<sup>38</sup> The only five names that appear in amphora stamps, who for Lagostena Barrios were the owners of the fish-salting workshops, may have been the *same* homonymous individuals of equestrian rank attested in literary sources for the second half of the first century BC.<sup>39</sup> In the imperial age, individuals of higher rank are linked with fishing/fish salting, including the emperor.<sup>40</sup> Archaeological evidence shows the presence, on elite coastal villa estates, of fish processing workshops.<sup>41</sup> It has been suggested that a very common iconographic composition found in Roman imperial

---

<sup>36</sup> Dario Bernal Casasola and Antonio Sáez Romero, “Fish Salting and Amphora Production in the Bay of Cadiz (Baetica, Hispania): Patterns of Settlement from the Punic Era to Late Antiquity,” in *Thinking about Space: The Potential of Surface Survey and Contextual Archaeology in the Definition of Space in Roman Times*, ed. H. Vanhaverbeke, et al. (Turnhout: Brepols 2008), 45–113, at 55–57.

<sup>37</sup> Annalisa Marzano, *Harvesting the Sea: The Exploitation of Marine Resources in the Roman Mediterranean* (Oxford: Oxford University Press, 2013), 115–22.

<sup>38</sup> Lazaro Lagóstena Barrios, “Nuevas consideraciones sobre la *societas cetariorvm gaditanorvm*,” in *Baetica renascens*, ed. José María Maestre Maestre, et al. (Cadiz & Malaga: 2014), vol. 1: 93–108.

<sup>39</sup> *Ibid.*,” 103–07.

<sup>40</sup> E.g., see the *titulus* “*ex officina Augg(ustorum)*,” attested on a Baetican Dressel 7-11 amphora for *salsamenta*.

<sup>41</sup> Annalisa Marzano, “Maritime Villas and the Resources of the Sea,” in *The Roman Villa in the Mediterranean Basin: From the Late Republic Through Late Antiquity*, ed. Annalisa Marzano and Guy P. R. Metraux (Cambridge: Cambridge University Press), 125–40.

mosaics from North Africa, the “bountiful sea” theme, may indicate that the owner’s wealth in part derived from the exploitation of marine resources.<sup>42</sup> If this hypothesis is correct, it would mean that the capital generated by the production and commercialization of preserved fish in part at least ended up in conspicuous consumption. Elite interest in fishing and fish salting as a source of revenue has left traces in the legal sources. A passage in the *Digest* on the prohibition to fish for tuna imposed as a clause in the sale contract when a wealthy proprietor sold one of his two adjacent coastal estates indicates that the seller was trying to protect his economic interests and his tuna-fishing business by eliminating possible future competition.<sup>43</sup> In the later imperial period some very distinguished individuals certainly owned part of their wealth to large-scale fishing operations, such as Andronicus, the governor of Cyrenaica, mentioned by Synesius.<sup>44</sup>

There is one piece of evidence, which attests both who financed and who was directly involved in large-scale fishing, an inscription from Parium on the Marmara Sea, dating to the imperial age.<sup>45</sup> The inscription relates to a business partnership established with the purpose of leasing from the municipality a lookout for fishing for migratory fish. It is generally believed that Publius Avius Lysymachus, the individual who took the lease from the municipality,<sup>46</sup> was a freedman.<sup>47</sup> From this same text we see that all but one of the five individuals who were the probable owners of the large fishing nets (the inscription refers to them as *diktyarchesantes* or “master of the fishing nets”) and therefore the co-owners/co-financiers of the business, bear Latinized *tria nomina* indicating Roman citizenship. The fifth individual, called Epagathus, is

---

<sup>42</sup> Marzano, *Harvesting the Sea*, 21–28.

<sup>43</sup> *Dig.* 8.4.13 pr. (attributed to Ulpian). Marzano, *Harvesting the Sea*, 246–47.

<sup>44</sup> Syn., *Ep.* 57.239–246; Marzano, *Harvesting the Sea*, 114.

<sup>45</sup> *I. Parion* 5 = *IGRP* I.817.

<sup>46</sup> P. Avius Lysymachus is defined as “the one who is the *archones*” = chief contractor.

<sup>47</sup> The opinion of Jeanne Robert and Luis Robert, “Inscriptions de l’Hellespont et de la Propontide,” *Hellenica* 9 (1950): 78–97, which I follow.

clearly of peregrine Greek status. Three of these “masters of the fishing nets” are freedmen, or descendants of freedmen, of the same master, since they all share the *praenomen* and *nomen* Publius Avius and may have been related to each other.<sup>48</sup> This text suggests that, as in the case of other commercial or artisanal activities, freedmen played a prominent role as business owners. But we cannot say whether the freedmen in question were acting also on behalf of their ex-master or had received a loan from him to start the business. All the individuals named in this inscription were part of a *societas* to which each contributed money, labor or skills. Business partnerships were the solution for middling individuals who did not have sufficient capital and other means to start a business. Since eventual profits would have been divided proportionally to what each *socius* had contributed, it is very likely that only those who had invested the most and were co-financing the business would have been able to accumulate capital out of successful operations.

The evidence revealed from amphora stamps and *tituli picti* can shed some light on the owners of the fish-salting businesses and on how production and distribution were organized, although often we do not know whether the painted inscriptions referred to the producers, to the traders, or only to the shippers and what their relationship with the amphora stamps was.<sup>49</sup> However, on the basis of studies of the amphora evidence from southern Spain, it is possible to present some observations on the individuals involved. In the Augustan period, Latin names of servile and libertine status, but also *dua nomina* of possibly freeborn individuals, appear.<sup>50</sup> In the Julio-Claudian period the amphorae seem to suggest that the producers and owners were the same

---

<sup>48</sup> It is possible that P. Avius Lysymachus, who is mentioned in the text as both the chief contractor and one of the masters of the fishing net, was P. Avius Bithus’s brother.

<sup>49</sup> Julio Martínez Maganto, “Inscripciones sobre ánforas de salazón: interpretación sobre la estructura y significación comercial de los *tituli picti*,” in “*Ex Baetica Amphorae*”: *Conservas, aceite y vino de la Bética en el Imperio Romano. Actas del Congreso Internacional, Sevilla-Écija, 17 al 20 de Diciembre 1988* (Écija: Editorial gráficas sol, 2000), vol. 4: 1207–19.

<sup>50</sup> Lazaro Lagóstena Barrios, *La producción de salsas y conservas de pescado en la Hispania Romana (2 a.C.–6 d.C.)* (Barcelona: Universitat de Barcelona, 2001), 301.

freeborn individuals, who had however limited production and distribution capacity.<sup>51</sup> Starting from the 40s AD, a tendency towards consolidation of holdings can be detected, with an increase in the attestations of names of citizens: on the amphorae, names of individuals, interpreted as referring to the names of the producers, appear together with numerals, ranging from V to XX. These numerals are seen as references to individual ateliers under the supervision of the same person.<sup>52</sup> If this interpretation is correct,<sup>53</sup> then one individual would have been in charge of a considerable number of production units, suggesting a concentration of ownership and/or management, the possible result of some business owners emerging as more successful.

Therefore, as far as fishing and fish salting are concerned, as in the case of viticulture, we see the involvement of different strata of society. Freedmen may have had a more prominent role, but it is also true that compared to the wealth of evidence, textual and archaeological, on elites and commercial agriculture, the Mediterranean-wide evidence for large-scale fishing is not as abundant. There is of course the issue that whereas agriculture occupied such an important role in the ideology of the Roman elite and was seen as the “proper” source of wealth about which one could write and boast, fishing and fish salting were not in this category, so the identification of direct elite involvement is more elusive.

### **Arboriculture in Rome’s *suburbium***

The appearance of commercial fruit and vegetable cultivation on a substantial scale requires a market with sizeable aggregate demand located within a reasonable distance to allow the

---

<sup>51</sup> Ibid., 295.

<sup>52</sup> Lagóstena Barrios, *La producción*, 302.

<sup>53</sup> On the contrary, Dario Bernal Casasola and Enrique García Vargas see in these cases the indication of the number of amphorae purchased by the named individual from a wholesale trader, see their “Talleres haliéuticos en la Hispania romana,” in *Artífices idoneos artesanos, talleres y manufacturas en Hispania. Reunión científica, Mérida (Badajoz, España), 25–26 de octubre, 2012*, ed. Macarena Bustamante Álvarez and Dario Bernal Casasola (Mérida: C.S.I.C., 2012), 295–318, at 313.

distribution of the fresh produce. Some Latin literary sources, such as the texts of Pliny the Elder and Columella, suggest that there was an intensification in horticultural production in the environs of Rome starting with the Augustan age. Rome's increased urban population, estimated to have reached about one million in the early first century AD, had a sizeable and concrete impact on the use of land around Rome, with the growth of horticultural cultivations and *pastio villatica*.<sup>54</sup> Years ago, it was suggested that water infrastructure, such as the cisterns found at a number of villa sites near Rome, should be related to irrigation for high value crops, such as fruit trees, since the cisterns do not seem to have fed the residential part of the villa.<sup>55</sup> These structures would represent investment of financial resources on the part of the wealthy to improve, or make possible, fruit cultivation for the urban market. It should be noted, however, that we do not have uncontroversial proof that market arboriculture was the instigator of the investment; it could equally have been a case of status display, with irrigation being used for ornamental gardens.<sup>56</sup> There is one instance, however, that is a clear indication of investment of capital in irrigation infrastructure on the part of a very prominent landowner: the empress Livia. An inscription from the area of Sutrium to the north of Rome commemorated the construction of a rural aqueduct by Augusta Iulia (i.e. Livia) for the benefit of the *vicani*, the residents of a *vicus*, probably Vicus Matrini on the Via Cassia.<sup>57</sup> Such improvements in infrastructure were foremost euergetic, but Livia as the benefactor and, very likely, the major proprietor of the area, may have consciously reasoned that providing an aqueduct for the villagers would increase their agricultural productivity, thus benefitting her own properties.

---

<sup>54</sup> Neville Morley, *Metropolis and Hinterland: the City of Rome and the Italian Economy, 200 B.C.-A.D. 200* (Cambridge: Cambridge University Press, 1996).

<sup>55</sup> Robert Thomas and Andrew Wilson, "Water Supply for Roman Farms in Latium and South Etruria," *Papers of the British School at Rome* 62 (1994): 139–96; Andrew Wilson, "Villas, Horticulture and Irrigation Infrastructure in the Tiber Valley," in "*Mercator placidissimus*": *The Tiber Valley in Antiquity. New Research in the Upper and Middle River Valley*, ed. Filippo Coarelli and Helen Patterson (Rome: Quasar, 2008), 731–68.

<sup>56</sup> Roman ornamental gardens do not imply unproductive plants; agricultural "productivity" as represented by fruits or novel edible plants and/or herbs was at the core of Roman ornamental gardens. In addition to archaeobotanical evidence, e.g., from Pompeii, garden wall paintings depict a variety of fruit trees.

<sup>57</sup> *CIL* 11.3322; Wilson, "Villas, Horticulture." It does not seem that the aqueduct was feeding baths located in the *vicus*.

When we turn to literary texts of the early imperial period and the mention of cases of very successful commercial arboriculture, however, it is freedmen that we find in the spotlight. Take the case of the freedman Aegilius, who, at the time of Seneca, owned the farm in Liternum that had belonged to the great Scipio nearly three centuries before.<sup>58</sup> Seneca visited him and described him as an expert in arboriculture. Or Gaius Furius Chresimus, who, according to Pliny, was “extremely unpopular because he got much larger returns from a rather small farm than the neighborhood obtained from very large estates,” to the point of being accused of casting spells on his neighbors’ crops, whereas good care of his “capital goods” (tools, slaves, oxen) and hard work were the cause.<sup>59</sup>

There is one very good archaeological example of financial capital being invested in improving production in the context of large-scale arboriculture and it concerns archaeological discoveries made near S. Giovanni in Laterano in Rome. We do not know who the owner of this estate might have been or her/his social status, but it was clearly a very wealthy person. A large area devoted to horticultural use and featuring very substantial water-management structures, including a reservoir that held more than 4 million liters (1.05 million gallons) of water and a waterwheel to lift water for irrigation, was discovered. Other infrastructure improving cultivation and access to and from the estate comprise terracotta waterpipes, drainage channels, and a road 100 m (328 ft) long and 4 m (13.1 ft) wide. The dating for the major phases of this farm estate, including the reservoir, the road, and the pipeline, is the reign of Tiberius (14-37 AD). Archaeobotanical evidence has shown that different fruits were grown here – apples, figs, grapes, and peaches – fruits whose cultivation had started in Italy only some years earlier. Although the archaeologists could not investigate the total area of this horticultural farm estate,

---

<sup>58</sup> Seneca, *Ep.*, 86 (Richard M. Gummere, trans. *Seneca. “Epistles.” Volume 2*, Loeb Classical Library 76 [Cambridge: Harvard University Press, 1920], 310–21).

<sup>59</sup> Pliny, *Naturalis Historia*, 18.41 (H. Rackham, trans. *Pliny, “Natural History,” Volume 5*, Loeb Classical Library 371 [Cambridge: Harvard University Press, 1950], 279).



estimates for the total area that would have been under cultivation are c. 16,400 m<sup>2</sup> (4.05 acres).<sup>60</sup>

These finds show a considerable orchard where substantial capital investment was made in creating permanent infrastructure in order to improve productivity and assure viability over time. Not only was this estate engaging in large-scale horticulture for Rome's market and investing financial capital in infrastructure and labor-saving technical solutions (e.g., the water lifting device), it had also invested in novel cultivations (the peach), clearly showing an awareness of the market potential for such novelties. One of the questions we would like to answer is, of course, who owned this property. Currently there are no clear clues and probably we will never know; however, if we rely on the testimony of literary sources, it is equally possible to posit an elite owner or a wealthy freedman. As we have seen for provincial viticulture, social status was certainly not a differentiating element in assessing who might have been willing to invest in the amelioration of agricultural production.

## Conclusions

The three case studies discussed in this chapter, with their focus on archaeological evidence, have illustrated who was able to accumulate capital in the three production sectors examined and how this capital might have been used. In the case of wine production in two important western provinces, it seems that we can distinguish an evolution in the use of financial capital, as far as the surviving material evidence is concerned. First there would have been a focus on social enhancers (amelioration of the residential sector; transformation of a modest farm into a “villa” with a range of amenities) and only later, or concurrently, we would have had investment in improving, or increasing, the equipment related to production (e.g., increased number of

---

<sup>60</sup> Rosella Rea, “Une grande exploitation aux portes de Rome,” *Dossiers d'Archéologie* 377 (2016): 48–51, at 49 and 51. The area archaeologically investigated measures c. 14,000 m<sup>2</sup> (3.46 acres).

presses; addition of a water mill). It is, however, important to remember that before seeing *physical* evidence for capital investment, there could have been investment in other goods related to improving production which would not have left a record in the archaeology. The investment in cuttings of a better grape cultivar to be grafted onto existing plants, for instance, would not have left traces but could go a long way in explaining the greater commercial success of some farmers. The sites at Gasquinoy I have mentioned above give perhaps a clue as to why those two modest farms did not follow the trajectory leading to a transformation into villas. DNA analysis of the many grape pips recovered showed that on these two farms the vines planted were a combination of wild, intermediate, and cultivated vines.<sup>61</sup> Could this simultaneous wild-intermediate-cultivated vine situation at Gasquinoy be due to the difficulties faced by small/medium veteran farmers in establishing their vineyards with vine types suited to the local environment? Could the presence of *wild* varieties suggest that they had no other possibility to acquire young vines from somewhere else? We might have here a tangible indication of the difference between the resources available to *wealthier* owners of large estates and those of *poorer* small and medium farmers, whose social and commercial network were not as strong.

It is always risky to generalize too much from what is, by nature, a fragmentary record, but the trend that sees the transformation of modest farms into larger elegant villas is observable in both Gaul and Hispania and roughly according to a similar chronology. Viticulture involved, as key players able to accumulate capital and make decisions on how to use it, not just elite and freedmen, but also slaves. Slaves, freedmen, and local notables were able to accumulate capital within their different legal and social constraints, and to advance socially. Part of this capital was reinvested in production, but a good portion was directed towards status enhancers, ranging

---

<sup>61</sup> Laurent Bouby et al., “Bioarchaeological Insights into the Process of Domestication of Grapevine (*Vitis vinifera* L.) during Roman Times in Southern France,” *PLoS ONE* 8, no. 5 (2013): np.

from the beautification of rural and urban residences to euergetism. This was not always an “unproductive” display. A larger house or paying for public spectacle was relevant to social capital. Social influence, establishing links with other key players via social interaction such as the hospitality in one’s villa and so forth, were all part of a complex set of relations and connections which often impinged on business activity: the possibility of obtaining credit, finding buyers or shippers for one’s produce, and so forth. As observed by Paolo Tedesco, capital in the Roman context essentially meant credit and financial intermediation, things that are often behind the many public displays of gratitude to a patron or benefactor seen in inscriptions.<sup>62</sup> In a sense, spending financial resources for some of these social enhancers was not completely divorced from production and one’s business activity, but as important a part of capital investment in production as it might have been installing a new press.<sup>63</sup> When market conditions were right, landlords would readily invest financial capital in upgrading production, both in terms of capital goods and of novel productions, as shown by the discoveries at S. Giovanni in Laterano in Rome.

In the case of large-scale fishing/fish salting, the available evidence indicates that individuals of different social background were active economic players and able to accumulate capital. The fact that fishing and fish salting could be activities carried out on coastal villa estates suggests that while ownership of landed properties was a top priority for elites and those aspiring to become part of the elite, both elite and non-elite individuals invested capital in a range of production activities. Those with limited financial means could pool resources by forming partnerships, and possibly also by sharing some of the logistics related to production

---

<sup>62</sup> Paolo Tedesco, “Was there Roman Capitalism?,” *Mediterraneo Antico: Economie Società Culture* 19, no. 1-2 (2016): 11–21, at 15.

<sup>63</sup> Recent research has focused on the economic role of associations, e.g., Taco Terpstra, *Trading Communities in the Roman World: a Micro-Economic and Institutional Perspective* (Boston and Leiden: Brill, 2013) or Wim Broekaert, “Partners in Business: Roman Merchants and the Potential Advantages of Being a *collegiatus*,” *Ancient Society* 41 (2011): 221–56.

(e.g. acquiring the large amounts of salt and the amphorae needed). The site of Troia in Portugal, one of the largest Roman fish-salting sites known, consisted of many different salting workshops, some large and others small. The area where these workshops were built seems to have been surveyed and parceled out, possibly by intervention of the local authority.<sup>64</sup> Such agglomerate of individual production units could indicate similar arrangements as those seen at La Graufensénque in France, where many individual pottery workshops shared kilns and possibly organized communally the supply of fuel, clay, etc.

To sum up, what the analysis above shows, is that capital accumulation and investment in production in the three sectors examined occurred within a relatively complex market economy and that, as one would expect, economic decision-making in respect to production occurred within specific social constraints, primarily the expectation that part of the wealth would be used in search of social advancement and distinction.

---

<sup>64</sup> Iñes Vaz Pinto, Ana Patricia Magalhães and Patricia Brum, “An Overview of the Fish-Salting Production Centre at Tróia (Portugal),” in *Fish and Ships: Production and Commerce of ‘Salsamenta’ during Antiquity*, ed. Emmanuel Botte and Victoria Leitch (Arles: Errance, 2014), 145–57.

## Bibliography

### *Primary and Reference*

Blunden, Andy, ed. *Encyclopedia of Marxism*. Marxist Internet Archive (marxists.org). <https://www.marxists.org/glossary/about/index.htm>. Accessed 24 September 2019.

Cagnat, René, ed. *Inscriptiones Graecae ad res romanas pertinentes*. Chicago, 1975.

*Corpus Inscriptionum Latinarum*. <https://arachne.uni-koeln.de/drupal/?q=en/node/291>

Justinian. *Digest*. Theodor Mommsen and Paul Krüger, ed. and trans. *The Digest of Justinian*. 4 Volumes. Philadelphia: University of Pennsylvania Press, 1985.

Pliny the Elder. *Naturalis Historia*. H. Rackham, trans. *Pliny, "Natural History."* Volume 5. Loeb Classical Library 371. Cambridge: Harvard University Press, 1950.

Seneca. *Epistulae*. Richard M. Gummere, trans. *Seneca. "Epistles."* Loeb Classical Library 75-77. 3 Volumes. Cambridge: Harvard University Press, 1917-1925.

Synesius Cyrenensis. *Epistulae*. Edited by Antonio Garzya. Rome: Istituto Poligrafico, 1979.

Tacitus. *Annals*. John Jackson, trans. *Tacitus. "Annals."* Loeb Classical Library 322. Cambridge: Harvard University Press, 1937.

### *Secondary*

Bernal Casasola, Dario, and Antonio Sáez Romero. "Fish Salting and Amphora Production in the Bay of Cadiz (Baetica, Hispania): Patterns of Settlement from the Punic Era to Late Antiquity." In *Thinking about Space: The Potential of Surface Survey and Contextual Archaeology in the Definition of Space in Roman Times*, edited by Raymond Brulet, Jeroen Poblome, H. Vanhaverbeke and F. Vermeulen, 45–113. Turnhout: Brepols, 2008.

Bernal Casasola, Dario, and Enrique García Vargas. "Talleres haliéuticos en la Hispania romana." In *Artifices idoneos artesanos, talleres y manufacturas en Hispania. Reunión científica, Mérida (Badajoz, España), 25–26 de octubre, 2012*, edited by Macarena Bustamante-Álvarez and Dario Bernal Casasola, 295–318. Mérida: C.S.I.C., 2014.

Bouby, Laurent, et al. "Bioarchaeological Insights into the Process of Domestication of Grapevine (*Vitis vinifera* L.) during Roman Times in Southern France." *PLoS ONE* 8, no. 5 (2013): np. <https://doi.org/10.1371/journal.pone.0063195>.

Broekaert, Wim. "Partners in Business: Roman Merchants and the Potential Advantages of Being a *collegiatus*." *Ancient Society* 41 (2011): 221–56.

Erdkamp, Paul, Koenraad Verboven and Arjan Zuiderhoek, eds. *Capital, Investment and Innovation in the Roman World*. Oxford: Oxford University Press, 2020.

Faber, Georges, Marc Mayer and Isabel Rodà de Llanza. *Inscriptions romaines de Catalogne, I: Barcelone (sauf Barcino)*. Paris: Diffusion de Boccard, 1984.

Figuera, Isabel, et al. "Archaeobotany, Vine Growing and Wine Producing in Roman Southern France: the Site of Gasquinoy (Béziers, Hérault)." *Journal of Archaeological Science* 37 (2010): 139–49.

Gamauf, Richard. "Slaves Doing Business: the Role of Roman Law in the Economy of a Roman Household." *European Review of History: Revue européenne d'histoire* 16 (2009): 331–46.

Guzmán, Oller L. "La Layetania interior en época augústea: un ejemplo de reordenación territorial en la Hispania Citerior Tarraconense," *Dialogues d'histoire ancienne* 42, no. 1 (2016): 137–75.

Hackworth Petersen, Lauren. "The Baker, His Tomb, His Wife, and Her Breadbasket: The Monument of Eurysaces in Rome." *Art Bulletin* 85, no. 2 (2003): 230–57.

Hopkins, Keith. *Conquerors and Slaves: Sociological Studies in Roman History*. Cambridge: Cambridge University Press, 1978.

Keay, Simon J. *Roman Spain*. London: British Museum Publications, 1988.

Lagóstena Barrios, Lázaro. *La producción de salsas y conservas de pescado en la Hispania Romana (2 a.C.–6 d.C.)*. Barcelona: Universitat de Barcelona, 2001.

———. "Nuevas consideraciones sobre la *societas cetariorum gaditanorum*." In *Baetica renascens*, edited by José María Maestre Maestre et al., 93–108. Volume 1. Cadiz and Malaga: Federación Andaluza de Studios Clásicos, 2014.

Lewitt, Tamara. "Absent-minded Landlords and Innovating Peasants? The Press in Africa and the Eastern Mediterranean." In *Technology in Transition A.D. 300–650*, edited by Luke Lavan, Enrico Zanini and Alexander Sarantis, 119–39. Boston and Leiden: Brill, 2007.

———. "Invention, Tinkering, or Transfer? Innovation in Oil and Wine Presses in the Roman Empire." In *Capital, Investment, and Innovation in the Roman World*, edited by Paul Erdkamp, Koenraad Verboven, and Arjan Zuiderhoek, 307–54. Oxford: Oxford University Press, 2020.

Martínez Maganto, Julio. "Inscripciones sobre ánforas de salazón: interpretación sobre la estructura y significación comercial de los tituli picti." In "*Ex Baetica Amphorae*." *Conservas, aceite y vino de la Bética en el Imperio Romano. Actas del Congreso Internacional, Sevilla–Écija, 17 al 20 de Diciembre 1988*, 1207–19. Volume 4. Écija: Editorial graficas sol, 2000.

Martín i Oliveras, Antoni, Isabel Rodà de Llanza, and Carlos Velasco i Felipe. "Cella Vinària de Vallmora (Teià, Barcelona). Un modelo de explotación vitivinícola intensiva en la Layetania, Hispania Citerior (s.I a.C. – s.V d.C.)." *Histria Antiqua* 15 (2007): 195–212.

Marzano, Annalisa. "Capital Investment and Agriculture: Multi-Press Facilities from Gaul, the Iberian Peninsula, and the Black Sea Region." In *The Roman Agricultural Economy*, edited by Alan Bowman and Andrew Wilson, 107–42. Oxford: Oxford University Press, 2013.

———. “Classical Archaeology and the Ancient Economy.” In *The Diversity of Classical Archaeology*, edited by Achim Lichtenberger and Rubina Raja, 101–14. Turnhout: Brepols, 2017.

———. *Harvesting the Sea. The Exploitation of Marine Resources in the Roman Mediterranean*. Oxford: Oxford University Press, 2013.

———. “Maritime Villas and the Resources of the Sea.” In *The Roman Villa in the Mediterranean Basin: From the Late Republic Through Late Antiquity*, edited by Annalisa Marzano and Guy P. R. Metraux, 125–40. Cambridge: Cambridge University Press, 2018.

Morera, Jordi, Cesar Carreras, and Oriol Olesti Vila. “Centres de producció amfòrica i territoris a la riba dreta del Llobregat: novetats de la terrisseria del Mercat (Sant Vicenç dels Horts).” *Pyrenae* 41, no. 2 (2010): 49–79.

Morley, Neville. *Metropolis and Hinterland: The City of Rome and the Italian Economy, 200 BC -200 AD*. Cambridge: Cambridge University Press, 1996.

———. *Theories, Models, and Concepts in Ancient History*. London: Routledge, 2004.

Olesti Vila, Oriol. “Els inicis de la producció vinícola a Catalunya: el paper del món indígena.” In *El vi a l'antiguitat: economia, producció i comerç al Mediterrani Occidental. II colloqui internacional d'Arqueologia romana*, 246–57. Badalona: Museu de Badalona, 1999.

Olesti Vila, Oriol, and César Carreras Monfort. “Le paysage social de la production vitivinicole dans l'ager Barcinonensis: esclaves, affranchis et *institores*.” *Dialogues d'histoire ancienne* 39, no. 2 (2013): 147–89.

Olivers, Antoni Martín i, Isabel Rodà de Llanza, and Carlos Velasco i Felipe. “*Cella vinaria* de Vallmora (Teià, Barcelona). Un modelo de explotació vitivinícola intensive en la Layetania, *Hispania Citerior*.” *Historia Antiqua* 15 (2007): 195–211.

Rea, Rosella. “Une grande exploitation aux portes de Rome.” *Dossiers d'Archéologie* 377 (2016): 48–51.

Robert, Jeanne, and Luis Robert. “Inscriptions de l'Hellespont et de la Propontide.” *Hellenica* 9 (1950): 78–97.

Rodà de Llanza, Isabel, et al. “Personatges de Barcino i el vi Laietà.” *Quaderns d'arqueologia i història de la ciutat de Barcelona* 1 (2005): 46–57.

Tedesco, Paolo. “Was there Roman Capitalism?” *Mediterraneo Antico: Economie Società Culture* 19, no. 1-2 (2016): 11–21.

Temin, Peter. *The Roman Market Economy*. Princeton: Princeton University Press, 2012.

Terpstra, Taco. *Trading Communities in the Roman World: a Micro-Economic and Institutional perspective*. Boston and Leiden: Brill, 2013.

Thomas, Robert, and Andrew Wilson. “Water Supply for Roman Farms in Latium and South Etruria.” *Papers of the British School at Rome* 62 (1994): 139–96.

Wilson, Andrew. “Villas, Horticulture and Irrigation Infrastructure in the Tiber Valley.” In “*Mercator placidissimus*”: *The Tiber Valley in Antiquity. New Research in the Upper and Middle River Valley*, edited by Filippo Coarelli and Helen Patterson, 731–68. Rome: Quasar, 2008.

Vaz Pinto, Iñes, and Ana Patricia Magalhães. “An Overview of the Fish-Salting Production Centre at Tróia (Portugal).” In *Fish and Ships: Production and Commerce of ‘Salsamenta’ during Antiquity: Production et commerce des ‘salsamenta’ durant l’Antiquité. Actes de l’atelier doctoral, Rome 18-22 juin 2012*, edited by Emmanuel Botte and Victoria Leitch, 145–57. Arles: Errance, 2014.