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# ***Pistore Panem Petimus: Specialization in the Late-Roman Baking Industry***

Jared Benton

## **Abstract**

*The traditional Roman baker (pistor) is typically thought of as having been horizontally specialized; that is to say he or she performed all the tasks involved in converting raw materials (grain, salt, and water) into bread. This means that they were, in early modern terminology, both millers and bakers. The two professions are generally thought to have vertically specialized within the industry sometime at the end of antiquity. Previously, scholarship has only casually treated this instance of specialization and for the most part it is thought to have been driven by technological innovation, specifically the watermill, which took milling out of the workshop and put it in the hinterland or on the outskirts of cities. In this paper, the argument is made that technological innovation did not drive this specialization, but rather that socially stratified workforces and the vertically integrated strategies of urban businessmen introduced perspectives that transcended the workshop's social and economic needs, allowing for the two tasks (milling and baking) to be separated from one another both spatially and professionally.*

## **Keywords**

BAKERS, PISTORES, SPECIALIZATION, WATERMILLS, VERTICAL SPECIALIZATION, VERTICALLY INTEGRATED ECONOMIC STRATEGIES

## **Introduction**

Ancient bakers, *pistores* in Latin, not only baked bread, but they also milled grain into flour, or at least that is the generally accepted truth. The functional split of the miller and the baker is thought to have occurred in the late 3rd century or early 4th century AD, a response to the advent of the watermill.<sup>1</sup> Yet watermills had been around—and probably in use—for centuries before the 4th century AD and still Roman bakers continued to mill their own grain.<sup>2</sup> Relying on such technological determinism to explain developments in Roman industries prevents us from seeing how ancient craftsmen made economic decisions, which was certainly not by waiting for the next innovation. Moreover, the idea that ancient *pistores* were miller-bakers and their Medieval counterparts exclusively produced bread, but not flour, is reductive and neglects the economic complexity of the ancient world and regional variation in foodways and in networks of producers and service providers. The simplistic narrative of specialization occurring at the end of antiquity, compelled by technological innovation, has largely been driven by textual and juridical evidence that pertains largely to Rome.<sup>3</sup> A survey of the archaeological remains of bakeries reveals that the situation was far more complex during both antiquity and the Middle Ages. Moreover, scholarship on the subject has probably been conflating two separate phenomena: vertically integrated economic strategies implemented

<sup>1</sup> Erdkamp 2005, 253-54; Marquardt 1886, 423; Sirks 1991, 307; Tengström 1974, 76 ff.; Wacke 1992, 648. On the social and professional lives of bakers in the western Roman world, see most recently Benton (2020).

<sup>2</sup> Brun 2007; Wikander 2008.

<sup>3</sup> Sirks 1991.

by a socially stratified commercial baking industry and vertical specialization. Parsing these two phenomena suggests that the former may have played a role in the latter, but that the ultimate specialization of separate millers and bakers occurred later than the late 3rd century AD.

### **Etymologies and businessmen: integrated economic strategies and a socially stratified baking industry**

Although specialization in the late-antique baking industry is often alluded to, it has not been the subject of intensive study. Nevertheless, there is a coherent narrative about how millers and bakers became separate occupations that deserves to be revisited and critiqued. The etymology of occupational or professional terms, largely derived from inscriptions and ancient literary sources, has formed the basis of which tasks scholars assign to various craftspeople. Sirks uses shifts in legal jargon and the etymology of the words for ‘bakery’ to suggest a shift in the practices of commercial bakers.<sup>4</sup> He notes that the word for bakery in juridical evidence had been, since at least 200 BC, *pistrinum*, literally the ‘milling’ or ‘grinding place’. But around 350 AD, the legal texts began using the term *paneficium*, literally the ‘bread making place’ or ‘the duty of baking bread’. From this, Sirks infers that bakeries, at least some of those in Rome, were baking but not milling. A similar phenomenon is evident in north Africa where the terminology for bakers in certain cities shifts in the early 4th century from *pistores*, to *furnarii*.<sup>5</sup>

The underlying hypothesis of Sirks’ narrative is that the meaning of the word for ‘bakery’ reflects the productive reality within the workshops. But this was never true of *pistrina*, which we know often housed both milling and baking, despite being called simply the ‘milling place’. Varro, for instance, speculated that the derivation of *pistrinum* came from the verb *pinsere*, to grind or pound.<sup>6</sup> Yet we know that *pistrina* were places of both milling and baking by the end of the 1st century BC, and Varro’s need to explain the etymology of *pistrinum* suggests that the original meaning of the word had long been forgotten. Moreover, the first mention of *pistor*, which is found in Plautus’ late 3rd-century BC play, the *Asinaria*, should mean something akin to ‘miller’, but the playwright writes *pistore panem petimus*, ‘we seek bread from the *pistor*’.<sup>7</sup> The etymology of the *pistrinum* clearly did not reflect the industrial realities occurring within them; in turn, why must a *paneficium* be a place where baking occurred, but not milling?

Rather than a change in the operation of the bakery, the shift from *pistrinum* to *paneficium* might instead be a consequence of a shift in the social fabric of the baking industry of large urban centers. The jurists’ use of *paneficium* rather than *pistrinum* coincided with a general shift in baking terminology in Rome that began in the 2nd or 3rd centuries AD and culminated in Late Antiquity, a transformation that is tied to the social stratification of the baking industry in Rome and in some other major urban centers. *Pistores*, sometimes referred to as miller-bakers, continues to be the term for the voluntary association of bakers in Rome and at Ostia (the *corpus pistorum* or the *collegium pistorum*) well after the 3rd century AD, but the

<sup>4</sup> Sirks 1991, 307.

<sup>5</sup> CIL 8.16921 = ILLg 1.579; Amraoui 2017, 200-01.

<sup>6</sup> Varro, *On Agriculture* 1.63.

<sup>7</sup> Plautus, *Asinaria* 200.

titles of the associations' officers begins to display increasing complexity as early as the 2nd century AD.

Such positions within the *collegium* are referred to as the *quinquennalis*, *aedile*, *senator*, and *pater*. Honorifics deployed within the ranks of a single *collegium* suggests that its membership was diverse and socially stratified. Participation in the Roman baking industry by individuals of varying power and wealth is corroborated by titles adopted by a number of individuals in the Roman empire. During the second half of the 20th century, most scholars of the ancient economy were in agreement: Roman elites did not participate—or were socially incentivized to eschew participation—in economic activity in bakeries.<sup>8</sup> In the post-Finley era, this issue has been repeatedly revisited, but often within the context of the 'social status of agents in the Roman economy'.<sup>9</sup> Such work largely focused on the social status of master craftsmen and on elite animosity toward working folk, but more recent work has come to challenge those narratives and has shown the intersections of social status, wealth, and professional activity were more prosaic than the Finleyan model might suggest. Tran, for example, identifies Caerellius Iazemis, who was not only *quinquennalis* of the *collegium pistorum* of Ostia, but also *codicarius* (shipper) and *mercator frumentarius* (grain merchant).<sup>10</sup> Schoevaert argues that such complementary activities suggest Iazemis was more than a simple baker, who was confined to the practice of his profession.<sup>11</sup> Schoevaert further argues that the man's cognomen, Iazemis, is neither Latin nor Greek, and Valjus identifies the name as Cappadocian, a region reputed for the quality of its bread.<sup>12</sup> A similar situation is evident also at Hierapolis in Phrygia, a town similar in size to Pompeii.<sup>13</sup> M. Aur. Papianos Plychon (Μ. Αὐρ. Παπιανὸς Γλύχων) gave 100 *denarii* to the association of linen manufacturers, the secretaries of which were required to distribute the interest to the group's members.<sup>14</sup> If the association broke this trust, the money was to go to the bakers' association (ἐργασίας τῶν ἄρτοποιῶν). Papianos was connected with two different occupational associations, the members of which came from different occupations altogether. In at least one case, there is potential for elite investment in commercial baking. Licinius Privatus was originally a member of *collegium fabrorum tignuarium*, the builders' association at Ostia, then joined the *collegium pistorum* as a *quaestor* and *quinquennalis*.<sup>15</sup> Tran argues that this shift in participation happened with Privatus' acquisition of several bakeries.<sup>16</sup> We know that he was also a man of wealth and power from other inscriptions, including one that recorded his donation of 50,000 HS to the city and his subsequent induction into the order of the local decurions. Perhaps the adoption of *paneficium* over *pistrinum* did in fact reflect a shift in the productive reality of bakeries in Rome, but one can make the case that it was merely part of a larger complex phenomenon of nomenclature that was informed by the needs of participants

<sup>8</sup> E.g., see Moeller (1976), whose work on the fullers of Pompeii suffered from a number of theoretical and evidentiary missteps, offers a notable exception.

<sup>9</sup> Andreau 2002, 209.

<sup>10</sup> *CIL* 14.4234; Tran 2006, 223-29.

<sup>11</sup> Schoevaert 2018, 192.

<sup>12</sup> Valjus 1998, 259-64.

<sup>13</sup> The size of an ancient settlement alone does not determine population because population density varied from city to city, predicated on the nature of each city's urban environment. Ostia had *insulae*, or large apartment complexes; Pompeii was characterized by atrium houses. Hierapolis resembles Pompeii in both urban character and size, leading Ahren (2017, 132) to estimate that the city had about 12,000 inhabitants.

<sup>14</sup> Guizzi and Ritti 2012, 659, no. 15; See *SEG* 62.1218 for discussion in *apparatus criticus*. Special thanks to Elizabeth Meyer for bringing this inscription to my attention and to Mali Skotheim for finding a better citation.

<sup>15</sup> *CIL* 14.374.

<sup>16</sup> Tran 2006, 105.

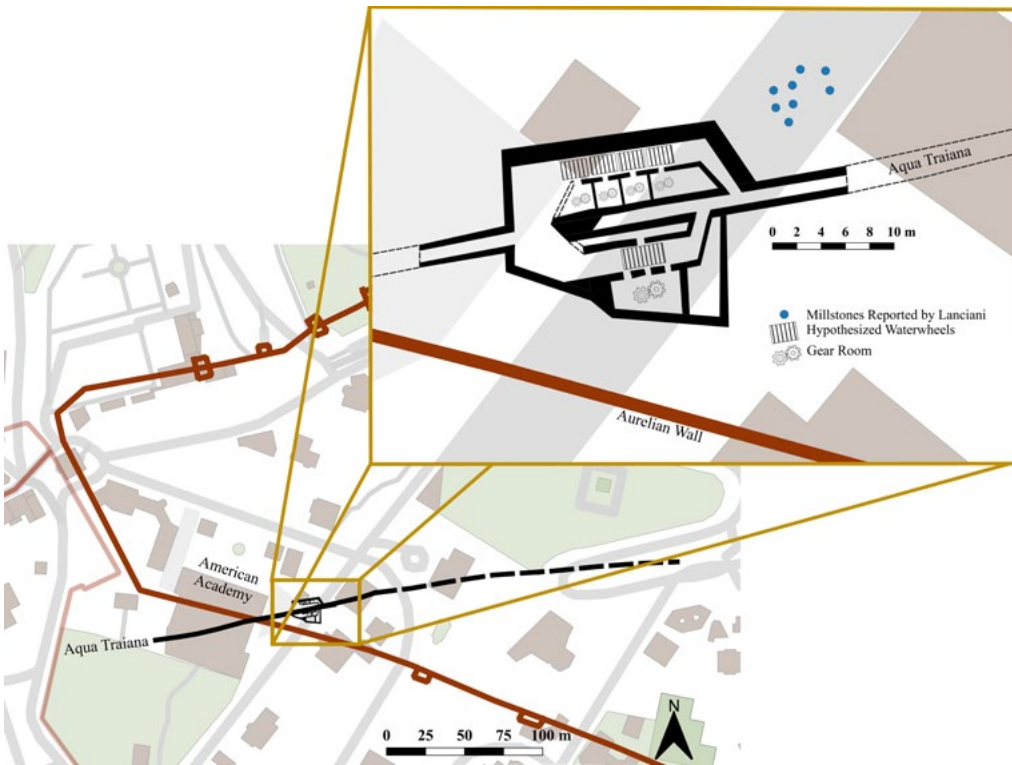


Figure 1: Water mill on the Janiculum hill in Rome. (Adapted from Wilson 2000, figs. 1, 4, and 5)

in the Roman baking industry such as *Iazemis* and *Privatus*, who not directly involved in production and may well have operated complicated systems of supply. Such systems may have included bakeries that did not mill their own flour, quite literally baking places distinct from more traditional *pistrina*.

### The teleology of technological innovation and specialization

Scholars that date the split of the miller and the baker to the later 4th century find parallels for this shift with the adoption of the water mill, which they say removed milling from bakeries to places with water sources. Indeed, the water mills found in Rome on the Janiculum (Figure 1), dated to the 3rd century AD, are consistent with the shift in juridical terminology a century later, and Procopius singles out water mills as playing an important role in provisioning Rome, probably with bread but perhaps also with flour for home baking.<sup>17</sup> This hypothesis has merit in the broadest strokes of history; the availability of new technologies surely affected how craftsmen made choices, but the underlying assumption is that craftsmen were actively searching for technologies with higher productivity and were constantly seeking to increase their production levels and thereby their profits. There is some good evidence to support this, particularly in the increasing size of millstones in commercial bakeries from the 3rd

<sup>17</sup> Procopius, *Gothic Wars* 5.19.8-19; Bell 1994, 73-89; Wikander 1979, 13-36; Wilson 2000, 219-46.

century BC to the 2nd century AD.<sup>18</sup> Such a framework for innovative technologies and their relationship with technology is teleological in that we are describing eventual outcomes of specialization and technological innovations, not the initial causes of such phenomena. In this case, we see that specialized millers, freed from the tether of proximity to customers, eventually relocated to more rural areas deploying water or wind-powered mills. But we do not really know that the hydraulic mill played a role in the specialization of separate millers and bakers, even if they came to define commercial milling later.

In fact, we have evidence that hydraulic mills and miller-bakers coexisted for centuries before specialization. We find that water-milling technology was actually available long before the late 4th century AD. Vitruvius and Strabo describe such devices as early as the 1st century BC.<sup>19</sup> Even if they were only implemented in the 3rd century AD and later, for which there is significant evidence to the contrary, Wikander notes that the mills on the Janiculum could not have provided for more than 5 or 6% of the City's population.<sup>20</sup> Furthermore, there is a section in the *Codex Theodosianus*, entitled *De pistoribus et catabolensibus* ('Concerning Bakers and Pack-Animal Drivers'), the entirety of which is dated to the late 4th century AD.<sup>21</sup> At no point in the text are the millers addressed separately from the bakers. Moreover, there is reason to believe that the water mills in Rome were largely state run; the operators of the water mills are referred to as *apparitores*, some sort of civil servants. The first reference to millers as a group dates to the second half of the 5th century in the edict of Dynamius, the city prefect.<sup>22</sup> Indeed, most scholars confronting the relationship of the Roman miller-baker to the water mill acknowledge the likelihood that some *pistores* may have continued to mill in their bakeries after the fourth century AD, which demands redress because if such craftsmen are motivated by increasing production and profits, why would they have ignored an innovative technology that represented a massive increase in productivity, such as the hydraulic mill?<sup>23</sup>

All of this presents a confusing portrait of commercial baking during the 1st to the 5th centuries AD that, I believe, results from the limited sample of evidence. For instance, the evidence presented by Sirks and others pertains almost exclusively to Rome and Ostia. One cannot infer a model of empire-wide specialization from the jurists or epigraphy in Rome and Ostia. Similarly, the work of Tengström, Erdkamp, and Sirks was largely focused on the provisioning of Rome, not the ancient economy broadly speaking. It is worth examining what other evidence exists for specialization in the Roman baking industry writ large. A Greek inscription from Side in Pamphylia (Turkey), dating to the first half of the 3rd century AD, commemorates the harmony between two different groups of professionals whose titles appear to be based on individual processes in the production of bread:

[...] ὕρ γ Κενδεας Κενδεου τῆ ὁμόνοιά τῶν συνβιωτῶν ἀλευροκαθάρτες καὶ ἀβακίταις ὁμονοίας χάριν ἀνέστησα τὸ κίόνιν εὐτυχοῦμεν.<sup>24</sup>

<sup>18</sup> Peacock 2013, 80-91.

<sup>19</sup> Vitruvius, *On Architecture* 10.5.2; Strabo, *Geography* 12.3.30. For fuller discussion, see: Moritz 1958, 193-96; Oleson 1984, 118-20; Wikander 1979, 15-16. See also Sherwood *et al.* (2020, 42-44).

<sup>20</sup> Wikander 2002, 130.

<sup>21</sup> *Codex Theodosianus* 14.4.0.

<sup>22</sup> *CIL* 6.1711; Sirks 1991, 349.

<sup>23</sup> Tengström 1974, 77.

<sup>24</sup> *SEG* 33.1165. κίόνιν = κίονιον. Translation by the author.

I, Kendeas son of Kendeas, have set up this small pillar of *Concordia* so that we the flour-sifters and the dough-kneaders might prosper living together in harmony.

The first profession mentioned, the ἀλευροκαθάρτες, is a combination of ἄλευρος, ‘flour’, and καθαρτής, ‘cleanser’. The second derives from ἀβάκιον, ‘slab’, and σταῖς, ‘dough’.<sup>25</sup> Despite the hopeful sentiments of the inscription, van Nijf suggests that the emphasis placed on ὁμόνοια, ‘harmony’, might indicate ‘considerable tensions between different specialists’ in the commercial baking industry.<sup>26</sup> This inscription raises a number of interesting questions about exploitation of labor and possible union-like associations, but, for our purposes here, one is tempted to identify this as an example of vertical specialization in a large urban center, with one group needing reconciliation—or at least co-existence with—another group. Side was a large city with population estimates as high as 60,000, similar to that of Ostia, making the temptation to see vertical specialization, which often correlates with population size, all the more enticing.<sup>27</sup> What is interesting, however, is that both processes alluded to in the titles (sifting and kneading) would occur after milling and thus have no bearing on the specialization of millers and bakers into separate occupations. One does not imagine that there was a specific workshop for, and specialists focused on, the sifting of flour. Mitchell assumes that the two groups are two different bakers’ associations.<sup>28</sup> Her work was focused on the language of reconciliation, not economic complexity, but it is an interesting suggestion. Such names would be almost like nicknames, of the sort preferred by modern roller derby teams, that are related to the profession, but not meant to indicate the specific tasks performed while at work.

An early sixth-century rental contract among the papyrus documents discovered at Oxyrhynchus records the lease of a bakery by two craftsmen, Cataminas and Abraham, described as both bakers and millers (κριβανεῖς καὶ μυλόναρχοι).<sup>29</sup> This father-son enterprise attests that at least some bakers, as late as the 7th century AD, were still baking and milling. Moreover, the bakery itself was already outfitted with three ovens and up to four millstones. It is worth noting, however, that the author of the contract feels obliged to explain that the craftsmen are both millers and bakers, rather than using one word to encompass both tasks. The need to explain the craftsmen’s activities may simply be pleonastic, establishing their credentials to meet the terms of the lease. It may, on the other hand, suggest that not all craftsmen in the business of milling and baking performed both tasks and clarification was necessary.

The inscription from Side and the papyrus contract from Oxyrhynchus serve to highlight several flaws in how we have studied commercial baking and milling in the Roman world. Legal texts and inscriptions such as the one from Side are often unclear and contain little information about what really went on in workshops. One of the challenges in studying ancient craftsmanship is that we have a relatively large number of inscriptions, legal opinions, and historiography, but very little in the way of contracts, leases, or ledgers, which would provide more direct evidence for the activity in bakeries. Even if we found two or three additional

<sup>25</sup> van Nijf 1997, 15, 236.

<sup>26</sup> van Nijf 1997, 15, n. 57.

<sup>27</sup> For population estimates of Ostia, see Meiggs (1973, 532-34) and Schoevaert (2018, 77-78).

<sup>28</sup> Mitchell 1993, 64, 106; Lau 2010, 100.

<sup>29</sup> POxy 1890.

documents, such as Cataminas' contract, they would almost certainly pertain to a small area in Egypt.<sup>30</sup> In other words, all of this textual data is anecdotal rather than empirical.

### Expanding the evidence base: the evidence from workshops

Etymologies and specific occurrences of craftspeople from a single region make bad proxy-data for the productive realities of industries in Roman cities empire-wide.<sup>31</sup> The reliance on such evidence is all the more confusing considering the fact that we actually have the material remains of bakeries. A growing body of scholarship has been examining workshops and the various technologies and features found inside them, but it is not always clear how to infer process and activity from the often poorly preserved workshop. As such, it is worth reviewing what we mean when we say 'specialization'. The division of labor, wherein certain producers or service people focus on specific tasks and not others, is often framed in terms of *vertical* or *horizontal* specialization.<sup>32</sup> Ruffing elegantly summarizes the distinction:

Horizontal specialization describes the diversity of goods and services produced in a society by using different professional formations or work roles. Thus, for example, the demand for skills for the production of amphorae is different from that for the production of shoes or textiles, and so on. The number of goods and services produced in an economy in this way is proportional to the number of specializations. Vertical specialization, on the other hand, describes the number of separate work roles and skills used in manufacturing a single product. A good example is the building of an ancient ship, which requires a set of different skills: carpentry, ironwork (for nails), rope-making, as well as textile production (for the sails). Moreover, both the building process itself and the supply of building materials and finished products need to be coordinated.<sup>33</sup>

For our purposes, the horizontal specialization in the commercial baking industry occurred when households stopped baking bread and began buying it from specialist bakers, which is really a topic for a separate article. Instead, the specialization of the miller and the baker would fall under the category of vertical specialization and, to continue Ruffing's example, in this case bread would correspond to the boat. The final product was baked by the baker, but a number of ingredients, such as flour or salt that might have been produced by a vertically specialized craftsman, such as the miller or a *saunier*, 'salt-worker', could have contributed to the final product. In some ways, milling establishments independent of baking, such as the hydraulic mills, are important, but only as long as we also find bakeries without millstones. The existence of mills does not necessarily preclude miller-bakers, but the two together would strongly suggest vertical specialization was occurring if not complete.

Specialization of commercial bakers happened in the eastern Mediterranean much earlier than in the west. There is evidence for commercial bakers in Linear B tablets<sup>34</sup> and throughout Mesopotamia, Egypt, and the Levant during the Bronze Age. Commercial bakers are attested

<sup>30</sup> Venticinque 2016, 32.

<sup>31</sup> The need not only to collect appropriate proxy-data, but also to interpret it within a framework, is discussed frequently in recent scholarship. See: Greene 2005, 43; Lo Cascio 2008; Scheidel 2009; Van Oyen and Pitts 2017, 4.

<sup>32</sup> Bernard 2016, 73-75; Bowman and Wilson 2009, 27.

<sup>33</sup> Ruffing 2016, 117.

<sup>34</sup> *ar-to-po-qa*. *Arto-* (bread) *-poqos* (maker). See Chadwick (2014, 91) and Ventris and Chadwick (1959, 130).





Figure 2: Bakery at VII.ii.22 in Pompeii, viewed from the vicolo Storto. (Photograph by J. Benton)

in Greece in a number of honorific inscriptions during the Iron Age. The earliest evidence for commercial baking in Italy and in the western Mediterranean, resembling the form of later Roman bakeries, are in Sicily at Morgantina and at Megara Hyblaea. The University of Texas excavations of a third-century BC house at Morgantina revealed two rotary millstones of the type typically found in Morgantina and an oven domed with broken fragments of tile, brick, and pottery.<sup>35</sup> Excavators were unsure of whether the oven and the millstones dated to the same period, but the mere presence of the two technologies in the same building during the 3rd century BC suggests a point of departure for specialization within the industry and indicates where commercial baking might have headed in the subsequent centuries. At Megara Hyblaea, excavators found a domed oven with more formal construction and masonry integrated into the surrounding walls, dating to only a century later than that at Morgantina.<sup>36</sup> Despite no millstone being found in the bakery, excavators identified several masonry circles which they interpreted as platforms for millstones. If true, milling and baking were linked early, adhering to a model of horizontal specialization but not vertical.

In general, baking and milling occurred in the same workshops throughout the Roman world. The bakeries of Pompeii and Herculaneum have been the subject of several intensive studies, first by Mayeske in 1973 and recently by Monteix.<sup>37</sup> Their work revealed that over three-quarters of the 31 or so bakeries in Pompeii contained both millstones and ovens, such as the so-called bakery of Popidius Priscus at VII.ii.22 (Figure 2). At Herculaneum, both of the two extant bakeries contained ovens and millstones. At Ostia near Rome, ovens were found in eight workshops, but only three of the eight had millstones.<sup>38</sup> There were, however, paving stones and evidence for robbed out millstones in another three bakeries.<sup>39</sup> There is even evidence for a water mill at Ostia inside one of the bakeries.<sup>40</sup> The two bakeries found at Augusta Emerita in Spain both had evidence for milling: in one, a millstone was found in the

<sup>35</sup> Walthall *et al.* 2018, 8. For millstones at Morgantina see Santi *et al.* (2015).

<sup>36</sup> Tréziny 2018, 264–66.

<sup>37</sup> Mayeske 1973; Monteix 2009, 2010, 2011, 2016; Monteix *et al.* 2012, 2013, 2014.

<sup>38</sup> Ostia I 2, 2 and 6; I 3, 1; I 3, 5; I 9, 2; I 12, 4; I 13, 4; I 17, 1; II 6, 7.

<sup>39</sup> Calza 1923, tav. 5, fig. 1.; Bakker 1999, 90–100.

<sup>40</sup> Bakker 1999, 98 and 110–11.

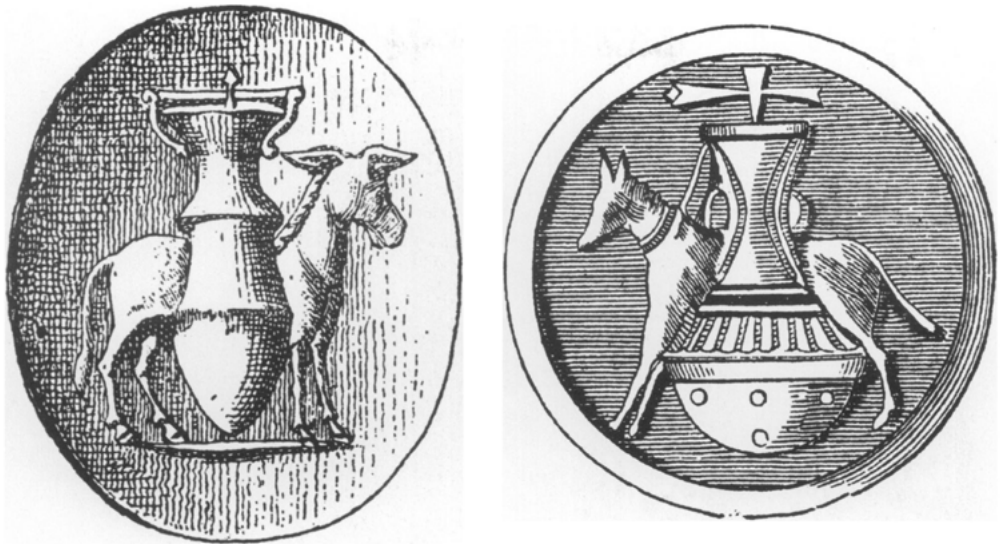


Figure 3: Millstone iconography, which show a donkey-driven mill on a gem (left) and an animal-driven mill on a circular marble plaque that acted as a shop sign (right). Both from Pompeii, and both are now lost. (After Blümmer 1912, figs. 20 and 21)

House of the Amphitheater and in the other, from an excavation on Calle Almendralejo, a neat platform that once clearly supported a millstone was brought to light.<sup>41</sup> Of the eight bakeries at Volubilis in Morocco with fixed masonry ovens, only two lacked millstones when they were excavated.<sup>42</sup> This correspondence is not only true of the bakeries in first-, second-, and third-century contexts, it is also evident in bakeries in operation after the 3rd century. The three late fourth- or early fifth-century bakeries found at Djemila in Algeria each contained a millstone.<sup>43</sup> At the one bakery at Thibilis, also in Algeria, of a similar date, a millstone was found nearby.<sup>44</sup>

The persistence of milling in Roman-era bakeries should probably not come as a surprise, given what little we know about bakers, particularly those of the empire's smaller urban centers. Although we tend to turn to the famous Tomb of the Baker Eurysaces, in Rome, that monument is unique in almost every regard.<sup>45</sup> There are, however, a number of other funerary monuments of bakers from around the western Mediterranean dating to the 1st, 2nd, and 3rd centuries AD. Like the tombs of many ancient craftspeople, these bakers' tombs tended to show technologies from their occupation, but specifically images that highlighted the quality of the bakers' products and their skill in producing them. Tran has convincingly demonstrated that the iconographic habit of such craftspeople highlighted their *artificium*, or

<sup>41</sup> Bustamante Álvarez *et al.* 2014, 38-44, figs. 22 and 27.

<sup>42</sup> The bakery on insula with the Maison au Bassin Tréflé and the bakery on insula with the Maison aux Colonnes. For Tréflé, see Étienne (1960, 74, pl. 18). For Colonnes, see Euzennat (1957, 210), Thouvenot (1945, 137), and Thouvenot (1949, 58).

<sup>43</sup> Allais 1954, 352; Amraoui 2017, 113-14; Ballu 1909, 77; Leschi 1953, 260.

<sup>44</sup> Gsell 1918, 90.

<sup>45</sup> See, for example, Petersen (2003).

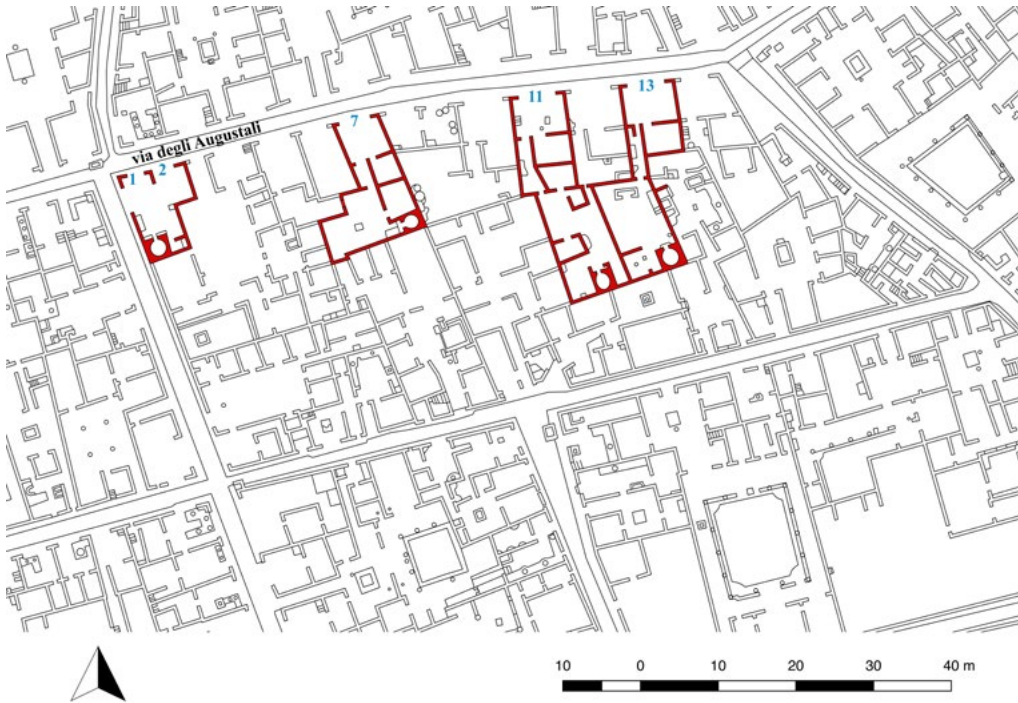


Figure 4: Bakeries without millstones on the via degli Augustali in Pompeii (VII.12.1-2, 37, VII.12.7, VII.12.11, and VII.12.13). (Plan by J. Benton)

skill.<sup>46</sup> For commercial baking, certain technologies, including the oven, the kneader, the sift, and the millstone, might showcase the *artificium* and quality product of the baker. Schörle and Wilson, publishing a previously unpublished travertine relief depicting a scene of commercial baking, survey the known iconography from bakers' tombs, professional advertisement, and personal accoutrement.<sup>47</sup> Of the technologies present on artistic media, millstones appear on almost all of them, ranging from sarcophagi and cenotaphs to shop signs and signet rings. The millstone is often the only technology depicted and the image may well have served as a visual shorthand for both the production of bread and the occupation of the deceased or inhabitant (Figure 3). The *quinquennales* of the *collegium pistorum*, Marcus Caerellius Zmaragdo and Lucius Salvius Epictetus, flanked their names on their second-century monument with freestanding millstones.<sup>48</sup> With so much symbolic capital wrapped up in the millstone, it is perhaps not surprising that ancient bakers were loath to abandon milling as part of their repertoire.

Despite the presence of millstones in bakeries after the 3rd century AD and the seemingly symbolic capital of millstones to bakers, there is some evidence that bakers who did not mill their own flour may have existed at a fairly early time in the Roman world. In fact, there are a number of bakeries from the 1st century AD onwards that had no millstones in them and no real indications of milling, such as platforms or pavers. Many of the bakeries, such as the bakery at I.iii.1 in Pompeii, the bakery in the insula that also contained the House of the

<sup>46</sup> Tran 2016, 246-61.

<sup>47</sup> Wilson and Schörle 2009.

<sup>48</sup> *CIL* 6.1002.

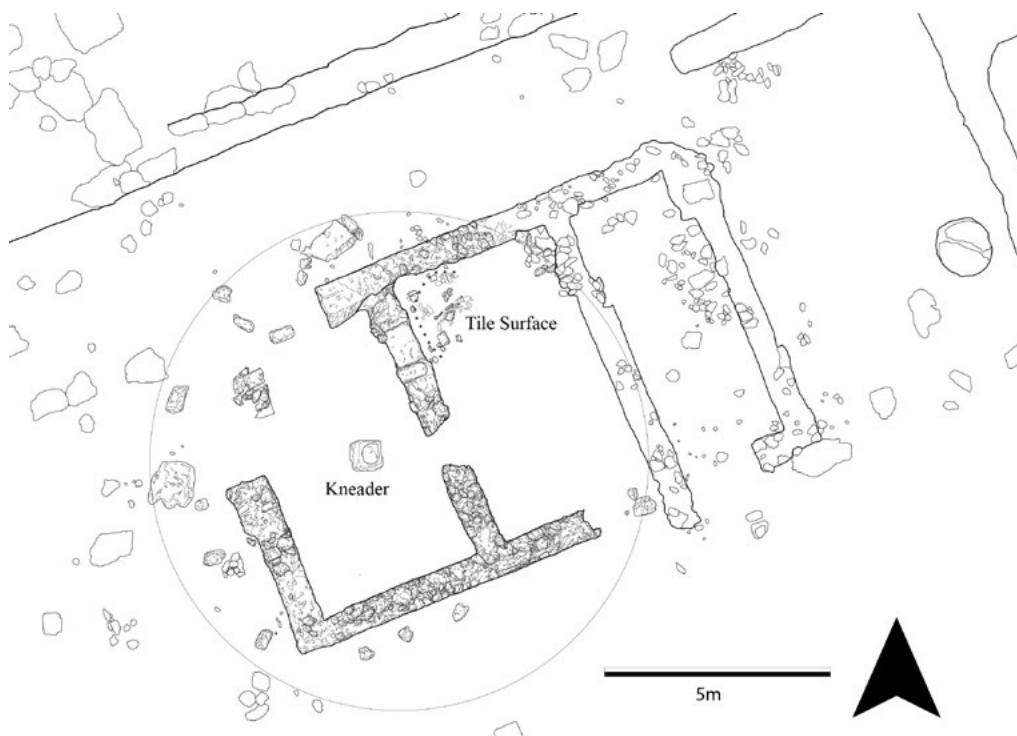


Figure 5: Maison aux Basin Tréflé at Volubilis. (Plan by J. Huemoeller)

Planetarium in Italica, or the bakery next to the Maison aux les Colonnes in Volubilis, had no millstones, but they had space for them and one suspects the millstones were removed when the workshops ceased to function as bakeries. There are, however, bakeries at Pompeii, Ostia, Italica, and Volubilis in which milling may never have occurred. Millstones were not found in these bakeries, but there was also little room for fixed masonry millstones. On the via degli Augustali in Pompeii, a series of purpose-built shops within insula VII.xii included four bakeries, none of which contained millstones (Figure 4).<sup>49</sup> These shops have garnered a great deal of speculation. Fiorelli suspected that the millstones may have been present at some point, but that they were removed shortly before the eruption of Vesuvius.<sup>50</sup> Mayeske suggests—in an effort to reconcile the material remains with the ancient literature—that such bakeries may have been pastry-shops run by *pistores dulcarii*, ‘pastry chefs’, and that these four bakeries may have bought their grain from other nearby bakers.<sup>51</sup> The bakery within the insula that contained the Maison au Bassin Tréflé at Volubilis provides a similar example: a bakery without a millstone in what appears to be a purpose-built shop, not linked with elite housing with little space for milling in addition to the mixer and oven (Figure 5).<sup>52</sup> One must concede that milling could have occurred in these spaces, especially in Volubilis, where the

<sup>49</sup> Pompeii VII.xii.1, 7, 11, 13.

<sup>50</sup> Fiorelli 1875, 283.

<sup>51</sup> Mayeske 1973, 120-24; Robinson 2005, 96. Monteix acknowledges this old interpretation in his early work (2009, 325), but in his subsequent work (2016) he takes a less textual based and more process-driven approach to interpreting the spaces.

<sup>52</sup> One caveat here: almost all commercial space in Volubilis seems to be purpose built; it is one of the defining traits of the city’s urban character. See Es-Sadra (2010).

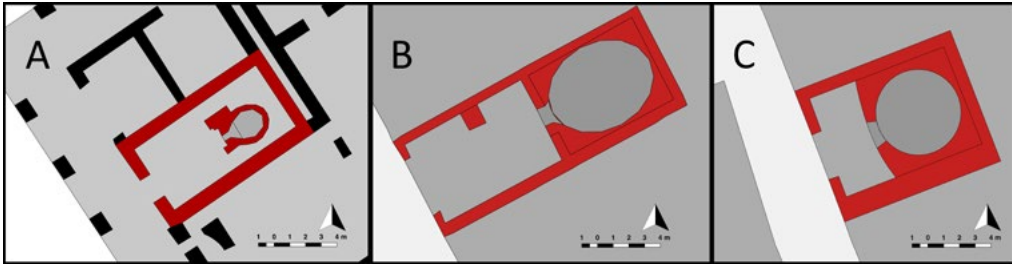


Figure 6: One-room bakeries: (A) bakery near the House of the Birds in Itatica; (B) I 3, 5 at Ostia; (C) I 17, 1 at Ostia. (Plans by J. Benton)

annular lightweight millstone in use there could easily have been removed. But the bakeries on the via degli Augustali, and to a lesser extent that of the Maison au Bassin Tréflé, had all the other features of commercial bakeries in a shop that was purpose built. It seems unlikely that such resources were invested and technologies installed, such as hot water pipes through the oven, but milling was performed with small portable technologies and not the fixed millstones known throughout the rest of Pompeii.

There was a third strain of millstone-less bakery at Itatica and Ostia that was definitely not just a bakery that lost its millstones. These bakeries were also in purpose-built shops, but they consisted of a single room with a solitary, centrally located oven (Figure 6). They had wide doors, similar to single-stall shops throughout the Roman empire. The second bakery at Itatica, for example, on the same insula as the House of the Birds, was a single room with a large doorway and an oven right in the center.<sup>53</sup> Similar structures are found also at Ostia. The shops at I 3, 5 and I 17, 1 were each a single room accessed from a wide door.<sup>54</sup> The ovens were much larger than their contemporaneous counterparts at Itatica, as wide as 5m. The single-room bakery at I 3, 5 was on the same insula with the Caseggiato dei Molini, one of Ostia's massive bread factories; the two may even have communicated at one point in the building's history. This might suggest that the single-room bakeries did produce bread, but the purpose of these single-room oven shops remains to be seen. For our discussion here, they definitely did not host the full range of processes in the production of bread and whatever was baked in their ovens consisted of goods processed at other locations.

### Vertically integrated strategies as a catalyst for specialization

The archaeological evidence seems to suggest that specialized bakers who did not mill their own flour may have been a phenomenon that existed as early as the 1st century AD and may well have had its roots at the very moment of horizontal specialization, even if the dominant habit was for bakers to both mill flour and bake bread. In some cases, flour may have been the final product for consumers who wanted to make their own loaves. As such, specialization in the ancient Roman baking industry could then be recast in these terms: horizontal specialization existed in the ancient baking industry with *pistores* focused on the final product (i.e., bread), but vertical specialization did not occur until Late Antiquity and the Middle Ages. But it

<sup>53</sup> Caballos Rufino *et al.* 1999, 70; Caballos Rufino and León Alonso 2010, 90, fig. 7.7.

<sup>54</sup> On property I 3, 5, see: Bakker 1999, 34; Calza 1917, 180; Oome 2004, 12-21; Oome 2007, 233-46. For property I 17, 1, see Calza *et al.* (1953, tav. XIV, no. 4) and Heres (1982, 428, fig. 77).

also seems like specialization, which is sometimes treated as an all-or-nothing and sudden phenomenon, may have occurred over centuries informed by a number of variables, including technological innovation, local traditions, and tastes. Moreover, vertical specialization coincided with—and was probably coeval with—increasing social stratification within the industry. One of the interesting aspects of the bakeries that clearly had no milling occurring in them is that they tend to be in planned, purpose-built workshops, often clustered near other industries. These two facts suggest that the emergence of businessmen, participants in the baking industry who were not directly involved in the production process, may have played a role in facilitating or causing the eventual vertical specialization of two separate professions: millers and bakers. The causes of specialization have obviously been studied before. Ruffing notes that specialization in general has traditionally been thought, since the work of Smith, to have been incentivized by market competition. That is to say, having competitors drove producers to increase their productivity through the adoption and implementation of new, more advanced technologies and methods. But Ruffing and others have also noted that there is a close correlation between population size and levels of specialization; greater levels of specialization exist in communities with larger populations.<sup>55</sup> Indeed, Hawkins notes that the very nature of associations of craftsmen in large cities with ‘thick markets’ (those with high numbers of customers and vendors) differs from those of smaller towns with less commercial exchange.<sup>56</sup>

Part of the difficulty in understanding the nature of specialization in the late Roman baking industry is that we have been conflating specialization of the sort described above with another economic phenomenon: vertical integration of production. Silver describes the two forms of vertical integration, forward and backward, as well as vertical disintegration:

Sometimes entrepreneurs interested in producing a given product undertake operations/processes upstream (backward) or downstream (forward) from that product. Economists refer to enterprises carrying out successive operations/processes as ‘vertically integrated’. Thus, for example, a merchant interested in marketing wine produces the wine himself and transports it to the market in his own ships (backward integration). Or a producer of pots extracts clay (backward integration) and sells the pots in his own shops (forward integration). [...] On the other hand, entrepreneurs sometimes focus on a single operation/process. The wine merchant purchases wine from the farmer and pays a shipper to transport it; the pot-manufacturer purchases clay and sells his pots to itinerant merchants. When upstream and downstream operations/processes are integrated by means of a market interface, economists say that enterprises are ‘vertically disintegrated’. It should be noted, however, that enterprises are rarely if ever completely integrated or disintegrated.<sup>57</sup>

If we conceive of the workshop, not as an independent, autonomous unit, but rather as a piece in a larger system, then a workshop without evidence for one or more of the processes related to the full operation sequence need not be considered vertical specialization, at least not in the way it is often framed. For example, the bakeries without millstones in purpose-built shops (Figure 6) might be better understood as cogs in a larger production line that encompassed

<sup>55</sup> Loomis 1998, 251-54; North 1992, 141; Ruffing 2016, 118-19; Temin 2001; Wilson 2008.

<sup>56</sup> Hawkins 2016.

<sup>57</sup> Silver 2009, 171.





Figure 7: One of two sixth-century ovens. Church Complex, Cosa. (Courtesy E. Fentress; appears in Fentress 2004, pl. 18).

a number of different workshops. This would have required, however, a participant in the commercial activity who would be adequately removed from the workshop and its operation to have the means and the incentive to acquire workshops as assets and craft a forwardly and/or backwardly integrated strategy for the commercial line.

Broekaert has shown that our evidence for vertical integration is more plentiful than is often understood.<sup>58</sup> Furthermore, he identifies the case of Iazemis as an example of backward vertical integration. First, Iazemis secured his own shipping rather than using others. Second, he obtained his own supply of grain as *mercator frumentarius*. With a vertically integrated strategy, bakeries without millstones and mills without ovens could still have been vertically integrated, albeit dislocated from another. Such bakeshops and millhouses could have been part of a coherent economic system consisting of assets belonging to the same owner or owners whose interest lay in enacting a production strategy that might have been forwardly or backwardly integrated, or both. It is easy to imagine someone such as Iazemis forming a backward integration strategy which would have included securing grain, milling it at one location, and finally baking the bread at an altogether separate location. For indirect participants, such as Iazemis, the financial benefits of compartmentalized production and implementation of innovative technologies may have trumped the symbolic capital of milling and millstones, which was so important to the craftsman miller-baker operating small workshops. Moreover, in thick markets such as those described by Hawkins, profitable strategies were grounded in quantity, not quality. As such, businessmen would have been incentivized to adopt technologies with higher productivity, such as the water mill. It is perhaps no coincidence that the adoption of the water mill in Rome, so many years after its invention, the emergence of stand-alone bakeshops, and evidence for vertically integrated economic strategies all coincided. As such, it might be almost impossible for us to delineate vertical specialization and the implementation of vertically integrated economic strategies.

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<sup>58</sup> Broekaert 2012.

There can be no doubt, however, that during the Middle Ages in Europe, baking and milling were performed by separate commercial specialists. As the thick markets and large cities of the Roman world evolved or dissolved, the driving force of vertical specialization in the baking industry may have been the emergence of the church and monasteries as centers of administration and—by extension—commercial activity. The sixth-century contract for the rental of a bakery was between two bakers of Oxyrhynchus and a wealthy heiress named Serena, daughter of Peter, whose property was on a monastery. The seventh-century ovens found by excavators at Cosa, in which no millstones were found, was also on church grounds (Figure 7).<sup>59</sup> The ninth-century Plan of Saint Gall clearly shows that mills and bakeries were separate spaces. Perhaps the relocation of commercial baking from small workshops scattered throughout ancient urban centers to fixed spaces on church grounds and monasteries offered the ideological break necessary to allow economic concerns to outweigh the symbolic capital of milling and millstones to Roman *pistores*, thereby opening the door for vertical specialization within the industry. In fact, the Rule of Benedict shows that economic strategies that were being considered were within church leadership; the rule advises that a monastery should be self-sustaining, including mills and bakeries, among other on-site resources and workspaces.<sup>60</sup> Wikander has repeatedly noted that water mills were viewed as one of the main ways to fulfil such a milling requirement, particularly evinced in the hagiographies of Late Antiquity and the early Middle Ages.<sup>61</sup> The church may well have acted in much the same capacity as the businessmen of Rome of an earlier period, such as *Iazemis*; they too were implementing a vertically integrated economic strategy.

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### Abbreviations

<i>CIL</i>	<i>Corpus Inscriptionum Latinarum</i> . 1853–present. Berlin: Akademie der Wissenschaften.
<i>ILAlg</i>	<i>Inscriptions latines de l'Algérie</i> . 1922–present. Paris: Éditions Champion.
<i>POxy</i>	<i>Oxyrhynchus Papyri</i> . 1898–present. London: British Academy.
<i>SEG</i>	<i>Supplementum epigraphicum graecum</i> . 1923–present. Leiden: Brill.

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<sup>59</sup> Fentress 2004, 72–78.

<sup>60</sup> Benedictus of Nursia, *Rule of Saint Benedict* 66.6–7.

<sup>61</sup> Wikander 2014, 213–14.



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