# From Oil to Wine? A Balanced View on the Production of the Most Representative Agricultural Products of Antiquity

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Olive oil and wine, which are considered as the two most representative agricultural products in the ancient Mediterranean, have been overvalued by archaeological studies because their production and trade leave lasting archaeological remains of presses, vats, jars and amphorae. In contrast, the archaeology of cereal has only produced a few granaries and millstones. However, the introduction of systematic sieving is now used to find the grains. Carpology is thus changing the outlook as its results now offer the opportunity to study the diffusion of precisely identified cereals and to quantify their proportions in agricultural areas.[1] For the study of wine and oil, we now have a wide range of indicators ranging from stone and masonry remains to grape seeds, pollen and biochemical analyses that provide accurate answers.[2] But to fully understand the issues faced by current research, we need to travel back in time to those early studies.

For a long time, historians and archaeologists have had only scattered, incomplete and biased written sources, representations of uncertain, polysemic or simply erroneous interpretations, heaps of amphorae sherds and remains of presses or vats at their disposal. The typological classification of amphorae has taken a long time to establish and remains incomplete and unsatisfactory. The study of amphorae was initiated by epigraphists of the late 19th century, who were interested in inscribed examples from Rome and Pompeii[3] but naturally, they only looked at those bearing inscriptions. These data took a long time to converge with those collected by field archaeologists; many wine amphorae types were attributed to oil and vice versa. It was not until the last quarter of the 20th century that we reached a more complete picture of the main amphorae types, thanks to underwater excavations.[4] Recent bio-chemical analyses show the complexity of commercial phenomena; besides the main trade flows – Italian wine to Gaul; Baetican oil to Rome, etc. – how much local trafficking was there? How did triangular businesses affect and complicate these network systems?[5] An isolated amphora, or even a short series, which is found on an archaeological site is not certain evidence of a commercial network as it could be reused several times. At most it could simply be an indication of trade or exchange that must be integrated within larger contexts.

With regard to the presses, their massive remains, highly visible in North Africa at the end of the 19th century, caused misinterpretations elsewhere: all press remains were systematically attributed to oil mills (fig. 1).[6] Northern Roman Syria is another classic example: G. Tchalenko[7] identified all the presses for oil processing and he reconstructed a more or less monocultural landscape of olive trees, while recent studies show that the majority of production facilities were actually for wine (fig. 2–3).[8] At the opposite end of the ancient world, in Lusitania, the large presses of the Roman villae of São Cucufate[9] or Torre di Palma[10] were first attributed to the production of oil while, in my opinion,

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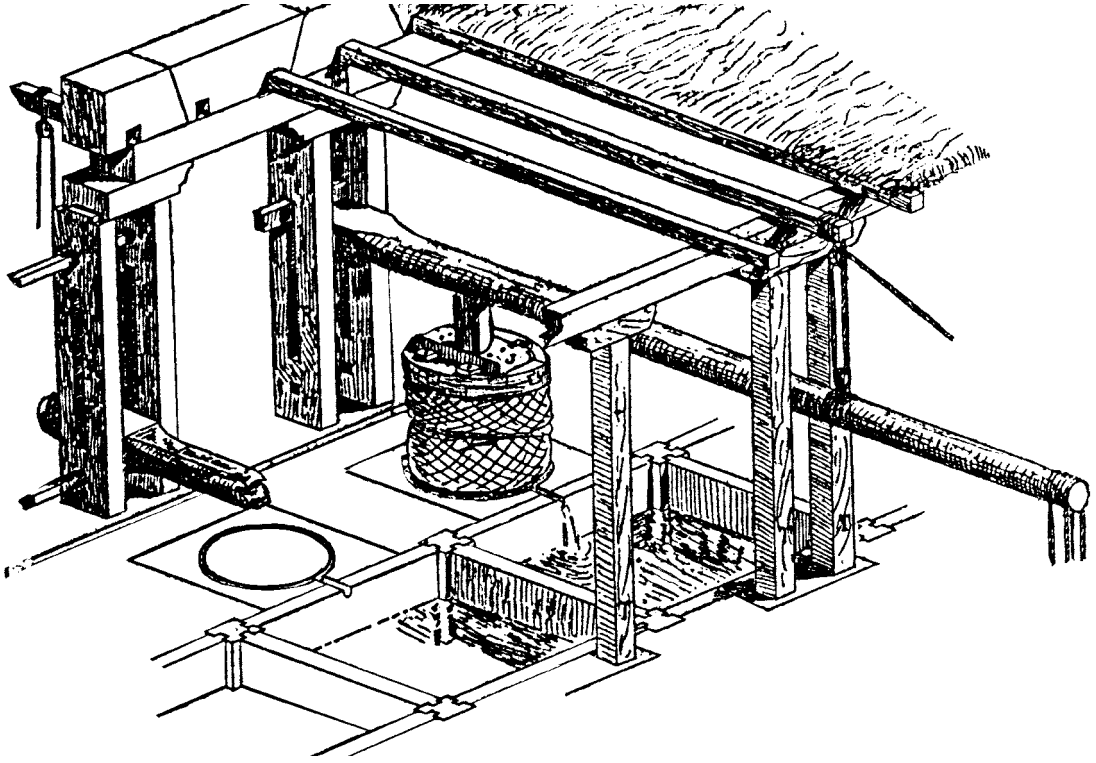

Fig. 1: An oil plant in Africa as interpreted by Saladin 1887.

they are actually wineries (fig. 4).[11] We can add the examples of the so-called huge olive oil factories in the region of Satafis in Mauretania Caesariensis, which are actually wine making plants (Khirbet Agoub) (fig. 5).[12] Recently, I revisited my conclusions about the villa of S. Michel at La Garde (Var, France), where, besides a production of oil ascertained by oil mills and olives stones, we are now able to identify wine-making tanks thanks to biochemical analysis by Nicolas Garnier (unpublished). They show that part of the pressing installations were used for making wine. A strange structure installed during the 3rd century AD in a vat built earlier could be interpreted as a cellar with supports for wooden casks (fig. 6).[13] Finally, the villa of S. Michel is coming back to a well documented series.

In addition, as early as the 2nd century BC, Cato, our most trustworthy and accurate guide, warns us that there is no difference between oil and wine presses except for the greater height of the latter (Agr. 18 and 19). In fact only the discovery of annex facilities helps to distinguish between the two productions: the presence or absence of olive mills, of decantation tanks or of pitched dolia.[14] Today, the determination is also based on the seeds gathered through systematic sieving and the bio-chemical analyses.

Carpology presents two major interests. On the one hand, the presence of grape seeds or olive stones indicates the nature of the production and on the other hand the shape of these seeds allows us to match the ancient varieties with current ones.[15] There

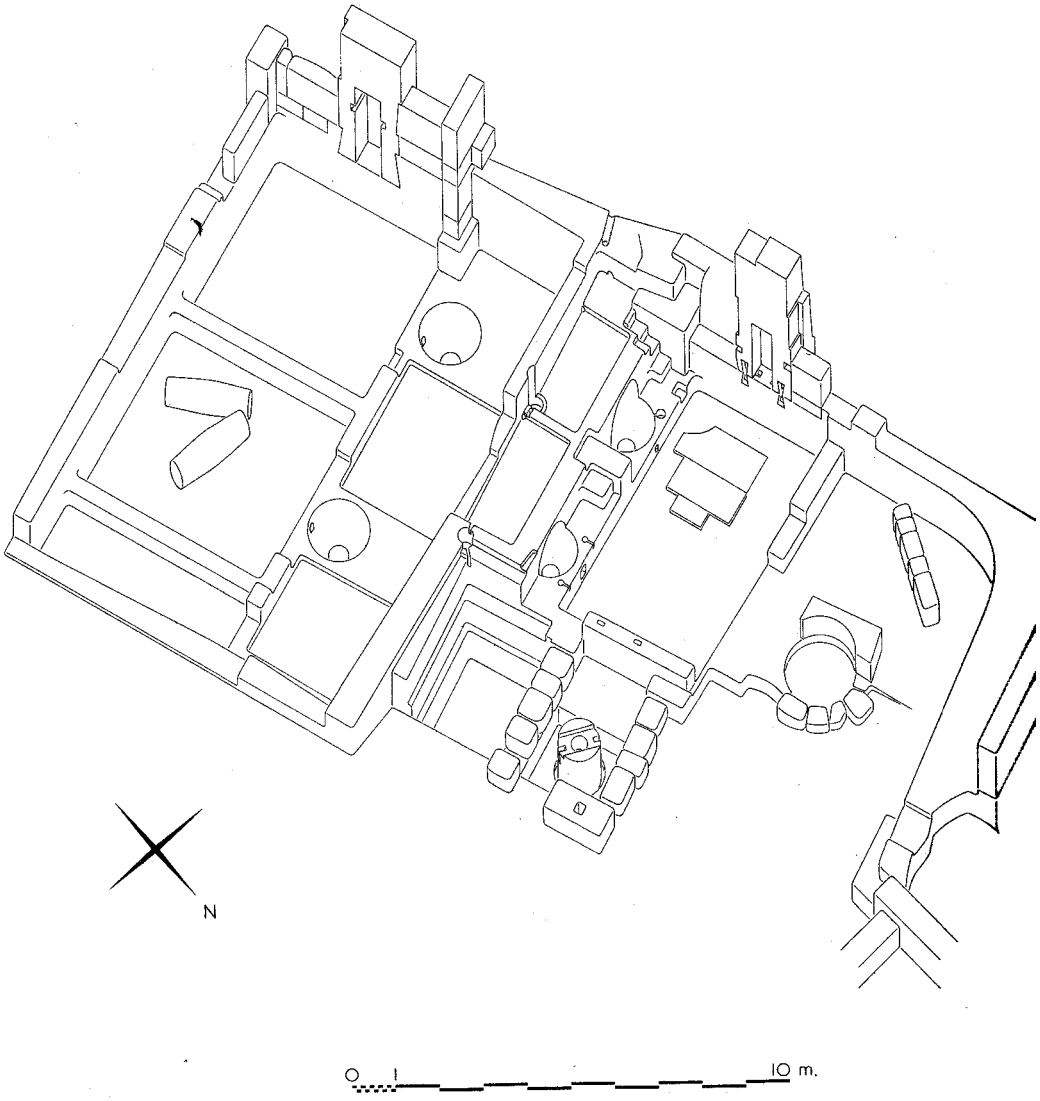


Fig. 2: Axonometry of presses at Behyo (Syria), interpreted as oil presses.

are many examples of the first use of this type of agriculture: at Dikili Tash in Greece during the Neolithic period;[16] at Longola (Poggiomarino) at the beginning of Iron Age in Italy;[17] at Alt de Benimaquia, Denia, in Iron Age Spain;[18] at the villa of Piriac-de-Mer in Roman Gaul,[19] or at Rirha in Morocco[20] where grape seeds support the interpretation of the remains as wineries; at Scaffa Piana in Corsica during the Neolithic period;[21] and in Palestine, olive pits indicate the production of oil. Carpology is now an indispensable partner in any interpretation.

In the last decade, biochemical analyses also provided significant contributions to the interpretation of production facilities and amphora contents. Nicolas Garnier has traced the history of this development from the pioneering 19th century works

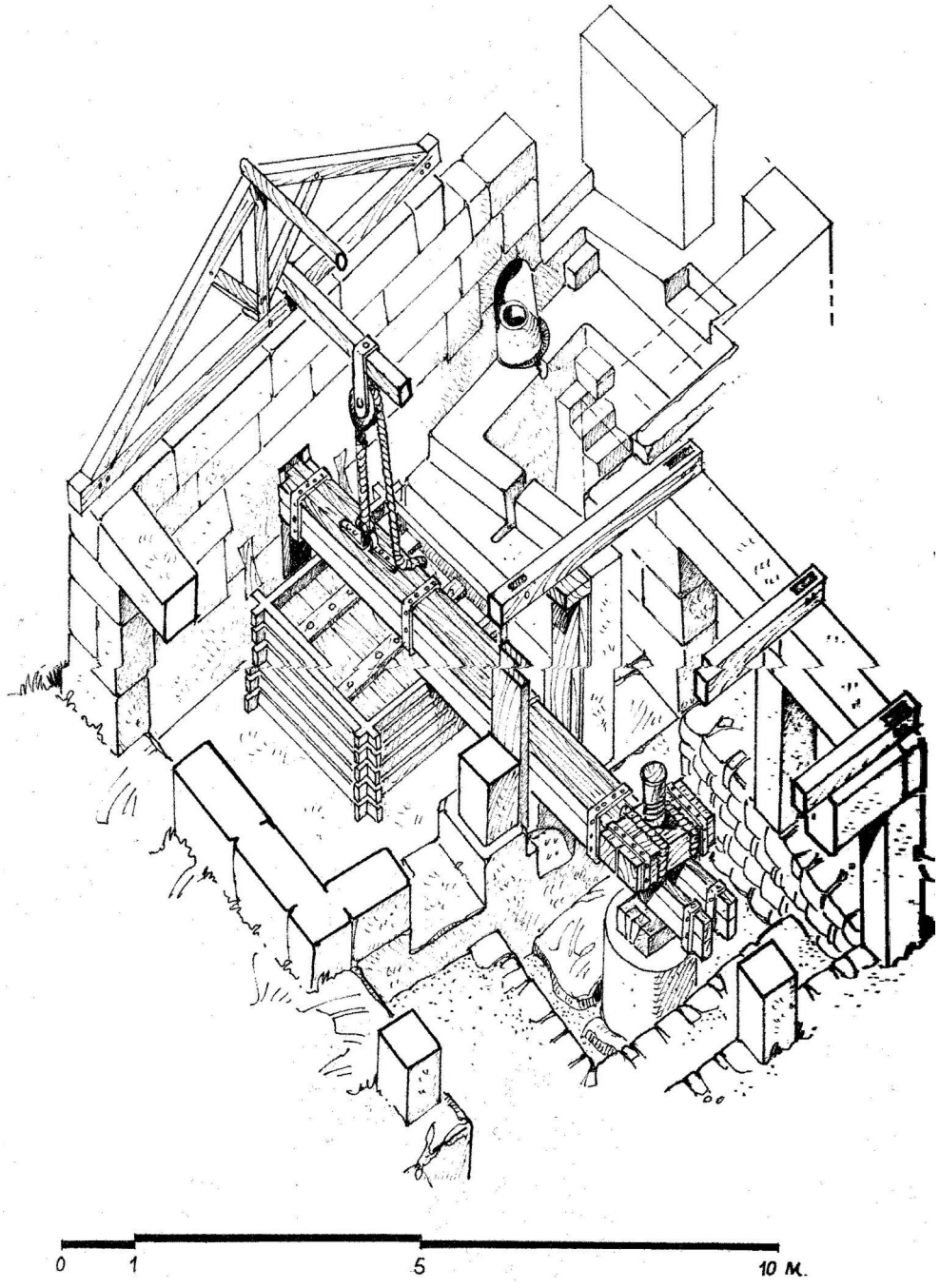


Fig. 3: The wine making plant n°3 of Dehes (Syria).

to the performance of modern instruments, such as GC-MS, and adapted extraction methodologies. This is one of the essential paths of progress in our understanding of technical and economic phenomena and one of the pillars of our work today.[22]


Fig. 4: Plan of the press complex in the villa of São Cucufate (Portugal).

We now have the technical means, though often not the financial resources, to revisit the very foundations of the development and decline of wine and oil production and to estimate their respective proportions by trying to detect the biases and the lacunas of the documentation. In terms of trade, the overwhelming domination of the Dressel 20 amphorae in Imperial Rome spread the idea of a strong production of olive oil widely marketed during antiquity. This observation, true for the first three centuries of the Roman Empire, has been abusively extended to other periods. Let us look at various problems researchers are facing, starting from the archaic period.

We suspect, and it is being increasingly corroborated, that the production of wine and oil began in various areas of the Mediterranean long before the arrival of Phoenician or Greek settlers from the east. The exploitation of the olive in the Iberian Peninsula began during the Neolithic and wine and oil were produced in Italy from at least the Bronze Age and probably the Neolithic. But the quantities were limited with little or no marketing.

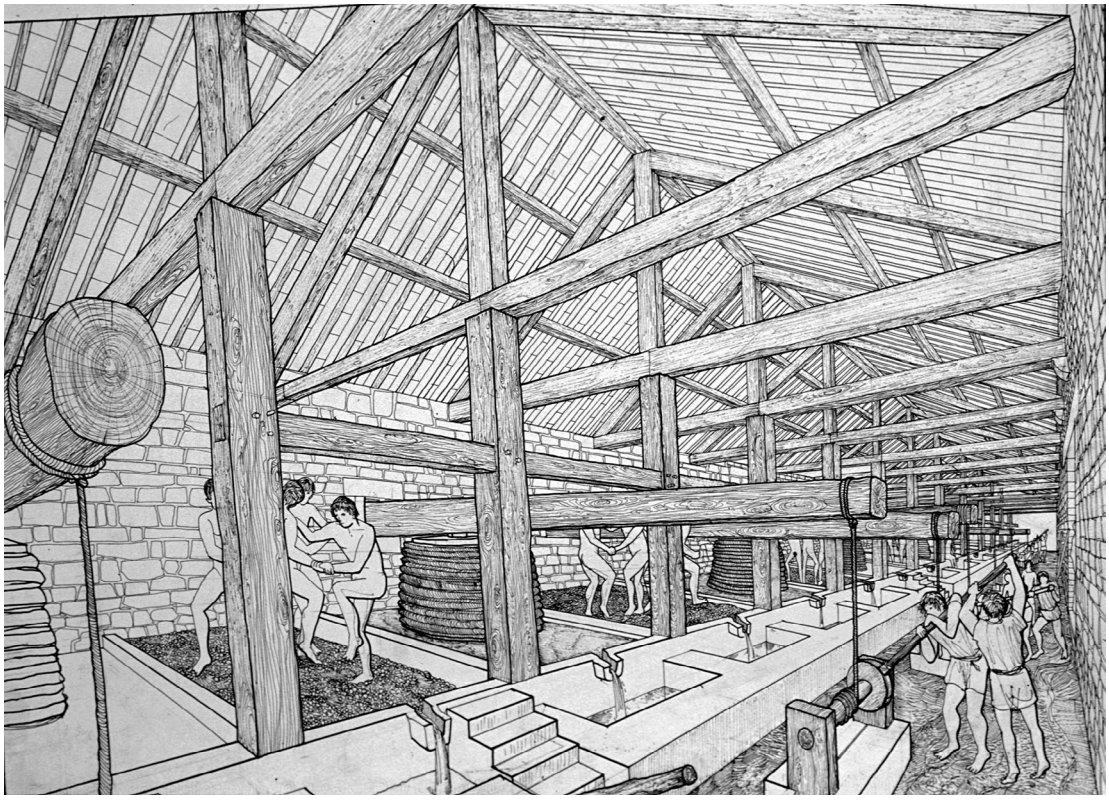

Fig. 5: Suggested reconstruction of the wine making plant at Khirbet Agoub (Algeria).

From the Archaic period, we can trace the emergence of commercial networks through amphorae. For a long time the allocation of the SOS and Corinthian A amphorae for the transportation of oil created an oil trade but this attribution was based on a methodologically unacceptable combination of material and literary sources, and these amphorae actually carried luxury wine for export.[23] Only expensive wines could pay for such long journeys from Greece to Italy and these luxury wines were buried in the graves of powerful people. For instance, a Corinthian amphora A was found in the tomb of Pontecagnano 926 and a SOS amphora in the tomb Artiaco 104 at Cumae, both tombs also contained precious metal vases used for drinking wine.[24] Consequently, all the theories developed about the supply of the newly founded colonies, about the slow growth of colonial viticulture and the alleged slow beginnings of the cultivation of the olive tree must be dramatically revised.[25] It is obvious that the Greeks brought with them their knowledge and their cultural needs that required, as soon as they seized the land, the cultivation of olives trees and vines in order to produce oil for external use and wine, considered as a basic drink, as a drug, as a necessary mediation with the gods and as a comfort beverage with a double purpose: psychotropic and convivial.

The production facilities of this early period remain poorly documented because they were often very simple and made of perishable materials (wooden treading floors, textile


Fig. 6: Two vats of the villa Saint-Michel at La Garde (France) transformed into a wine cellar during the 3rd c. AD. Note the small walls probably supporting wooden barrels.

torsion presses). However, stone-based presses are known through archaeology in Ischia, Lattes, Crimea, etc. and many rock installations date back to this period. I quote for example the case of the wine devices of Las Pillilas at Requena (Spain)[26] or the ones near Agrigento in Sicily, dated from the Classical and Hellenistic periods.[27] These facilities largely widespread in Greece, Sicily, Sardinia,[28] Malta,[29] Algeria,[30] Spain,[31] Portugal[32] were generally part of a domestic or local economy. The wine was stored in multipurpose jars, often amphorae reused several times,[33] and they were mainly transported in wineskins. These parameters distort our perception of domestic production and local consumption, which was the dominant model at all times. Archaeologists focus on what they can find and count, especially amphorae that highlight commercial phenomena, but these trade flows were often marginal in terms of volume, even if iconic. This remark can be applied to the entire ancient period, even more so when wooden barrels became widely used concurrently with ceramic containers.[34]

Before the development of the metropolises in the Hellenistic period, trade dealt only with luxury products like fine wines, perfumes, fabrics, jewels, slaves, etc., and rarely basic products, except during a food crisis or shortage.[35] But after the 3rd century BC, in cities such as Rome and Alexandria,[36] population growth meant that the surrounding countryside was no longer able to supply foods and it became necessary to import these goods in increasing quantities e.g. cereals, salted meat and fish, oil and common wines.

Large commercial networks were boosted by specific demands from powerful social elites living in regions deprived of vines, such as inland Gaul: Marseille and then Tyrrhenian Italy, then coastal eastern Spain made great profits from these needs created by a very specific cultural and political context.[37]

These two phenomena: the growth of capital cities of powerful states and strong socio-cultural demand from peripheral populations introduced major changes in production techniques, the specialization of agriculture and the geography of production. From the 2nd and 1st centuries BC, some regions began to specialize some of their productions: the Tyrrhenian coast, Sicily, and the Greek islands in viticulture and Apulia, Istria and Baetica in olive oil. Installations that were previously very artisanal, and archaeologically almost imperceptible, became massive, like the model farms proposed by Cato and illustrated by many villas like the villa Prato at Sperlonga amongst others (fig. 7).[38] The treading floors and the presses were, from this time, built of stone and wooden beams, the vats made out of masonry, and the cellars equipped with many dolia. Export trade was carried out by larger boats loaded with greater quantities of amphorae. But once again, archaeologists can only observe the main visible phenomena, those that F. Braudel rightly called "Les jeux de l'échange".[39] Indeed researchers attached great importance to urban development, but all local production and consumption continue to escape our perception, for the most part due to the lack of measurable indices. Local wine was still transported in skins, sometimes huge, like those carried by tank carts, and often it was poured into reused amphorae. As for oil, the study of its trade is focused on the supply of people with high purchasing power: urban populations, especially in Rome, and the

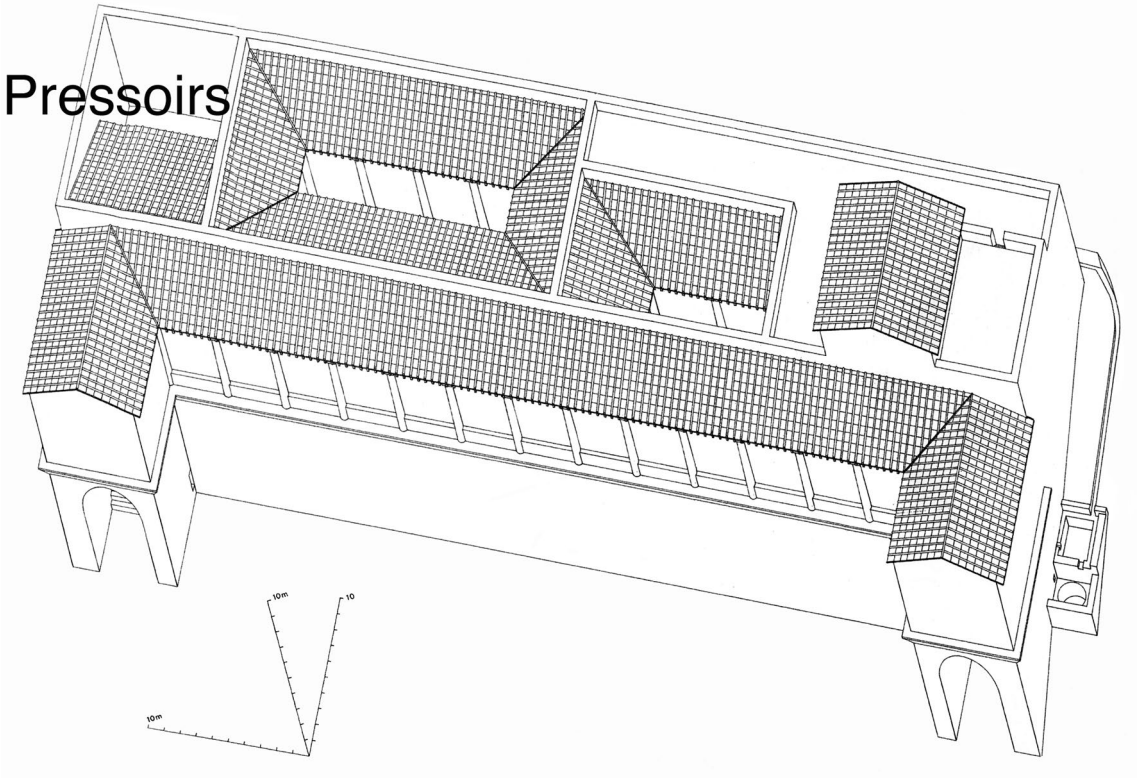


Fig. 7: Axonometry of the Villa Prato.

soldiers. Outside these privileged categories, the demand was satisfied with local olive oil but also with seed oils, in Egypt for example,[40] or walnut oil,[41] and mainly animal fat, which was readily available everywhere.

Even during the early Empire and the peak period of the production of wine and oil in the Mediterranean, we can detect commercial vineyards only through their production and diffusion of amphorae: Baetica, Tarraconnensis, Narbonnensis, Campania, Cilicia, Africa, in particular. These great networks are now well known thanks to the multiplication of studies, but the works of A. Tchernia, B. Liou, and A. Hesnard[42] have revealed that the production of some of these large vineyards can never be quantified because a significant part of the wine was shipped in bulk, transported in dolia secured in the hold of merchant ships. On the other hand, we should also consider smaller containers, flat-bottomed small amphorae or jugs, which were used for marketing prized wines, such as wines from the region of Ephesus[43] or those of northern Campania.[44] Work is needed to rehabilitate these small containers whose value could be equivalent to that of larger common wine amphorae.

Even with this advanced research, some commercial vineyards will continue to escape our notice, such as those of Western and Northern Europe. Since the origins of these productions, from at least the 1st century BC, the vineyards of the Po Valley, then a century later those of Lusitania, of Aquitania, of Lugdunensis, of Belgica, of Germania,

of Britannia and of Pannonia produced their wine in wooden devices (treading floors, presses, vats) and marketed it in barrels. The remains of these productions are limited to grape seeds, planting trenches, fragments of staves or trenches for wooden presses, like the one recently excavated at "Lieu-Dieu" (Boulazac, Dordogne) (fig. 8).[45] However, exports to the Roman forts of the limes, as early as the first century, were mostly in barrels. The illuminating works of E. Marlière on the fort of Vindolanda (Hadrian's Wall) show that, at the end of the 1st and beginning of the 2nd centuries AD, less than 1% of the wine supply reached this military post in amphorae.[46]

Of course, the situations vary greatly from one province to another. In the Eastern Mediterranean Basin, ceramic containers were still massively used for both production and marketing. However, in the Western Basin, probably as early as the end of the 1st century AD, the use of barrels spread in the Iberian Peninsula, in Italy and even in Africa.[47] The recent discovery at Arles of a an inscribed jug containing a sample of white wine from Alba near Rome (Albanum) proved that wine from Central Italy was marketed in barrels towards the end of the 1st century AD.[48] The diffusion of this technical innovation replaced the complex system of wine transportation in dolia installed in special ships.[49] These ships disappeared under the Flavian dynasty probably because the built-in dolia were replaced by the lighter and more versatile wooden barrels. And we should consider the hypothesis they were used to ship oils, as was done during the Middle Ages and the 16–18th century. We need to ask new questions: how widespread was the container revolution introduced by wooden barrels? We know that it touched wine and salted fish, so why not olive oil?

During Late antiquity, our understanding of viticulture is further distorted by the increasing use of all sorts of wooden devices, which deprives archaeologists of essential evidence. In Gaul, entire vineyards, for example those of the Loire valley known by Gregory of Tours or those of the region of Reims attested by the testament of Saint-Remy have so far not left little traces. We could multiply the examples.

In summary, new research, supported by carpological and biochemical analyses, offers a more balanced vision of wine and oil production. In the northern part of the western Mediterranean, presses are mainly devoted to wine production. In the south, in Spain, and in Africa, the remains seem mostly to be associated with olive oil production, with the notable exception of Egypt, which is almost exclusively devoted to wine. For trade, the overwhelming dominance of amphorae Dressel 20 in Rome led to the idea of a huge oil production widely marketed during antiquity. This observation, true for the first three centuries of the empire, has been erroneously extended; however, advances in amphorae typologies, mineralogical and biochemical analyses are re-establishing a more accurate picture of the chronological and regional dynamics of wine and oil production and trade. Here again, progress can be made. I pointed out that a major part of wine and oil productions escape the archaeologist: this includes family productions, almost undetectable in installations made of organic materials, local productions often performed in rock carved devices (the Italian palmenti or Spanish lagares) and marketed


Fig. 8: Recently excavated wine making installation of Le Lieu-Dieu (Boulazac, France). Note that the remains of the press, made entirely of wood consist only of a trench and post holes.

in skin containers (utres, cullei), and in certain regions (Alpes, Cisalpina, Lusitania, Tres Galliae, Germania, Britannia), all the wine was produced and marketed in wooden vats and barrels. As we improve our knowledge, we are able not only to clarify our positive knowledge, but also to identify the gaps, which are and will remain considerable.

We must be aware of these shortcomings in the construction of our reasoning on both technical and economic evolutions. Some gaps are structural. The general disappearance of wooden instruments forever deprives us of the majority of evidences on the vineyards where they were used. Other gaps may be partially filled. The biochemical analyses now identify the contents of ceramic containers, even if they were filled successively with different liquids. Carpological studies reveal the production of wine or oil in sites where the other remains are not characteristic. The archaeology of planting reveals vineyards even where there are no traces of winepresses such as in the region of Bourges.[50] New archaeological research on rock presses is gradually shedding light on their chronology.[51] Distinguishing areas of light and shadow in our knowledge already represent huge progress in our research, which is fed by the following papers.

## Notes

[1] About Gaul, see Matterne 2001 and Ozoulias 2014.

[2] Pecci et al. 2013a; Pecci et al. 2013b; Garnier 2016.

[3] Dressel 1899; Mau – Schöne 1909.

[4] On the misidentifications in Gaul, see Laubenheimer 2016.

[5] For example, see the possible triangular commerce of olive oil from Africa to Alexandria and of ben oil (moringa peregrina) from Alexandria to Arles: Djaoui et al. 2015.

[6] For example: Saladin 1887; Cowper 1899; Gsell 1901, 30 f. For recent surveys: Leveau 1984; Ben Baaziz 2000; Sehili 2009; Hobson 2015; Ahmed 2018.

[7] Tchalenko 1953–1958 followed by Callot 2004. For similar errors concerning Gallia Narbonensis: Brun 1987 (but with nuances, 223–227).

[8] Brun 2004b, 111–123; Callot 2017; Limbergen 2017.

[9] Alarcão et al. 1990; *contra*: Brun 2005, 288–290.

[10] Heleno 1962; Maloney – Hale 1996, 275–294; *contra*: Brun 1997.

[11] Brun 2004b, 288–300.

[12] Brun 2004b, 233–238.

[13] Brun et al. 1989; Brun 2005, 88–92.

[14] These questions are checked in Brun 2004a, 5–36. The production and use of the dolia have been recently studied by Carrato 2017.

[15] Terral et al. 2004.

[16] Valamoti et al. 2015.

[17] Cicirelli et al. 2008.

[18] Gomez-Bellard et al. 1993.

[19] Hervé-Monteil et al. 2011, 197.
[20] Carrato et al. 2018.
[21] Magdeleine – Ottaviani 1983.
[22] Garnier 2012; Garnier – Valamoti 2016.
[23] Brun 2011a; Sourrisseau 2011.
[24] Pontecagnano: D'Agostino 1977; Cumae: Guzzo 2000, 135–147.
[25] On the beginnings of olive tree cultivation in Italy, see Brun 2011b.
[26] Martinez Valle in this volume.
[27] Olcese et al. in this volume.
[28] Rovina 2008; Loi 2017.
[29] Anastasi in this volume.
[30] Laporte 1975 interpreted as oil presses; *contra*: Brun 2004b, 238 f.
[31] For example at Kelin: Quixal et al. 2016 and more generally: Contreras – Vicente Elias 2015.
[32] For example in the Sierra di Estrela: 2007; at Valpaços: Medeiros Freitas 2017.
[33] Garnier – Pecci, Proceedings of the congress about amphora trade, Cadix, oct. 2015.
[34] Marlière 2002.
[35] The food crises were caused mainly by poor harvests of cereals caused by the weather or the pests and it was then necessary to import grain thanks to "low level connectivities" (Horden – Purcell 2000, 144 f.) but oil also could became scarce. An example of such a shortage, for which it is difficult to distinguish the needs for nutrition from the cultural needs of oil used for the care of the body, is given by the inscription IG, II-2, 903. In the 2nd century BC, a scarcity of oil occured in Athens because of a bad harvest; a generous trader having in his boat 56 000 litres of oil planned to sell in the Pont-Euxin, agreed to sell with a loss in the city and was honored with public recognition (Gauthier 1982).
[36] For Rome, the situation is now well known: see Morley 1996. Alexandria imports massively Greek and Mediterranean wines as well as African oil.
[37] On this question: see Tchernia 1986; Dietler 1992; Poux 2004.
[38] Broise – Lafon 2002.
[39] Braudel 1979.
[40] Sesame, castor, radish, etc. These oil seeds are well known thanks to papyrological documentation: Sandy 1989.
[41] It seems that the imitations of Dressel amphoras manufactured in northwestern Gaul were used to market walnut oil in this region: Baudoux 1996, 106–110.
[42]Corsi-Sciallano – Liou 1985; Tchernia 1986, 285 f.; Hesnard et al. 1988; Marlier 2008; Sciallano – Marlier 2008.
[43] Lemaître 1997.
[44] Brun 2011a.
[45] Bost – Bohny 2017.
[46] Marlière – Torres Costa 2005.
[47] Marlière – Torres Costa 2007.
[48] Djaoui – Tran 2015.
[49] Liou – Sciallano 1985; Hesnard et al. 1988.

[50] Dumasy et al. 2011.
[51] Olcese et al. in this volume; Depalmas et al. in this volume.

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Fig. 1: after Saladin 1887. – Fig. 2: Tchalenko 1953–1958. – Fig. 3: Callot 2017. – Fig. 4: A. Alarcão – Étienne – Mayet 1990; B. Brun 2004b, 290. – Fig. 5: drawing by J.-Cl. Golvin. – Fig. 6: by the author. – Fig. 7: Broise – Lafon 2002. – Fig. 8: photo by C. Bost.

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