Wine Making in the Iberian Peninsula during the Roman Period: Archaeology, Archaeobotany and Biochemical Analysis

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Both wild grapevines and olive trees have been recorded by archaeologists in the Iberian Peninsula from a very early date, going back to the Neolithic period. Many different types of evidence have been found for the presence of both cultivations throughout prehistory, especially from the Chalcolithic.[1] However, according to the information we have available, we cannot yet confirm the existence of exploitations of these species for wine or oil production before the Phoenician presence. At the same time, domesticated varieties of grapevines and olive trees have not been recorded prior to the 9th century BC.[2]

Data currently available confirms that viticulture was introduced to the Iberian Peninsula by Phoenician colonists. Recorded evidence for domesticated grapevine comes from the site of Castillo de Doña Blanca, during the 8th century BC.[3] Before this date, the site of La Orden-Seminario in Huelva shows rectangular-shaped rows of holes which prove grapevine cultivation in Iberia, at least in the 9th century BC (fig. 1, a).[4]

Type R-1 wine amphorae, produced in the Cadiz area from the 8th century BC, suggest, in parallel with the evidence above, the development of significant wine production from the beginning of Phoenician colonization.[5] However, the first wine production plant identified in Iberian contexts comes from the 7th century BC. This suggests that perishable materials were used for the first winemaking activities in the Iberian territories.[6]

On the one hand, one of the earliest examples of wine production is evidenced at the Iberian settlement of La Font de la Canya in Barcelona. Remains of pressed grapes (seeds, stems and branches) dated between 650 and 600 BC were found inside a silo, as well as R-1 wine amphorae (fig. 1, d).[7] On the other hand, by the end of the 7th century or the beginning of the 6th century BC, major wine production occurred in Las Pilillas, Requena (Valencia), where rock-cut platforms and vats were used for treading and pressing the grapes with lever presses (fig. 1, b, c).[8]

Additionally, another notable example of winemaking at that time is the well known site of Alt de Benimaquía, a fortified Iberian *oppidum* on the Mediterranean coast, where four treading vats, amphorae R-1 (both Phoenician and local replicas) and thousands of *vitis vinifera* pips were discovered (fig. 1, e).[9] Moreover, the most ancient presence of biochemical markers of wine has been located in the winery of Coll del Moro de Gandesa (Tierra Alta, Tarragona). These analyses by A. Pecci are not yet published.[10]

During the Roman period, a significant increase in wine and oil production takes place. Together with the three major production lines (wine from Tarraconensis; wine and oil from Baetica), aimed at interprovincial trade, a high volume of production of wine and oil in nearly every region of the Iberian Peninsula has recently been recorded. At present we know more than 700 sites containing evidence of pressing facilities (fig. 2).

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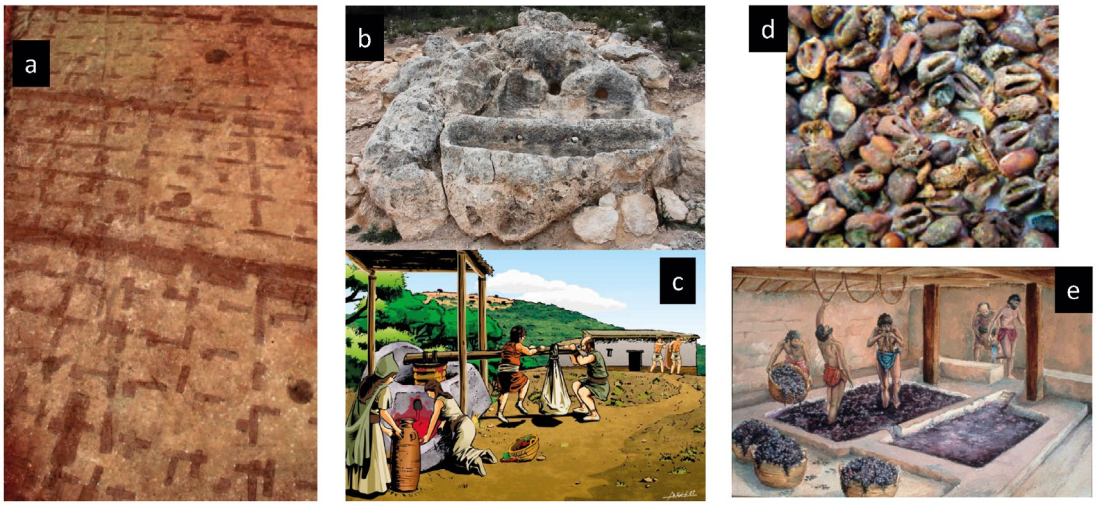

Fig. 1: Sites with evidence of wine production in pre-Roman times. a: vineyard trenches at Orden-Seminario, Huelva; b: View of one of the rock cut treading vats at Las Pilillas, Requena; c: Reconstruction of the activities in the winery of Las Pilillas; d: Remains of pressing found at the site of Font de la Canya, Barcelona; e: Cellars of Alt de Benimaquia, Alicante.

More than 250 of them are known through excavations,[11] whose results do not solve the main interpretive problem, which is, in many cases, distinguishing which product was being processed – oil or wine.

The difficulty of distinguishing between oil and wine making installations was highlighted in the article by J.P. Brun in 1993.[12] Although the ability to identify specific devices for either product have greatly improved, the contribution of archaeobotany and archaeobiochemistry are now crucial to achieve more accurate results. These types of analysis are more suitable for smaller exploitations since devices made of perishable materials do not leave clear remains and are very hard to identify. Fortunately, in recent years these methods have been applied more frequently in the Spanish-Portuguese archaeology; providing fresh data on winemaking in ancient times. Archaeobotany and archaeobiochemistry also contribute to improve the ability of researchers to discriminate winemaking facilities from oil mills.

We will begin with the most important wine area in Hispania: Tarraconensis. This production is now well known thanks to the study of the containers and of the winemaking plants. The wine produced in the coastal area of Catalonia was exported from the second half of the 2nd century BC until the end of the 2nd century AD.[13]

The recently excavated site of La Sagrera, located in the current urban area of Barcelona, illustrates this production model. The excavation of this suburban villa showed that three successive wineries were built.[14] Biochemical analyses carried out by Nicolas Garnier in 2016, not yet published, on behalf of the Servei d'Arqueologia of

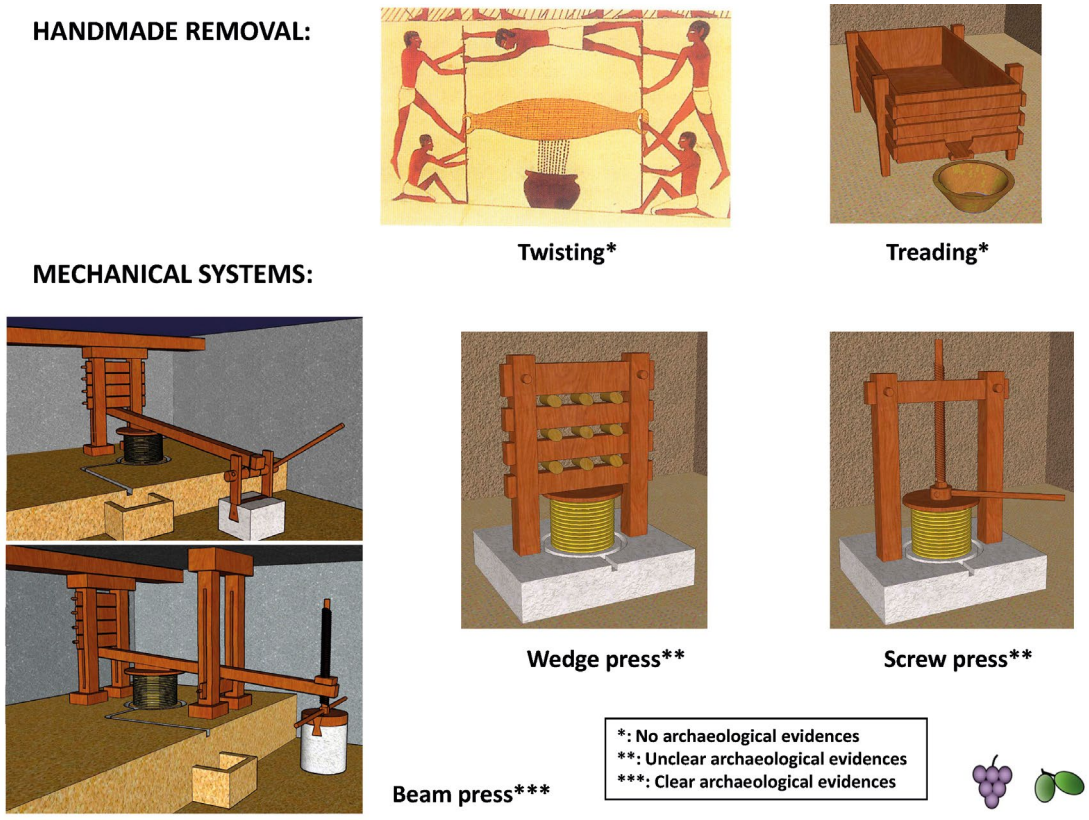

Fig. 2: Devices used for wine and oil making, showing their potential archaeological remains.

Barcelona, provided interesting data about the organization of production at four stages and helped to revise the identification of a late phase of the wine production. The wine presses used the *arca lapidum* system. The lever press is weighted by a wooden box filled with stones and rubbles. This type of press is characteristic of major Tarraconensis production plants. Well known today by archaeologists, it remained unnoticed in previous excavations.[15]

Although the wine production of Tarraconensis is well known, it would be interesting to carry out analysis on the remains of a group of sites such as the sites of Olivet d'en Pujol and Tolegassos, in Girona, whose productions are debated. These two rural settlements present large open-air storage areas with *dolia defossa* that were originally interpreted by their excavators as cereal warehouses,[16] but the *dolia* were probably uses as winemaking containers, as everywhere else.

Biochemical analyses have been carried out at the site of Fonte do Milho, in Portugal, in order to answer the old debate on the functionality of the press. The pressing structures of this Lusitanian site were traditionally interpreted as for oil production, following the long historiographic tendency to identify any press as for oil. In fact, in the area with

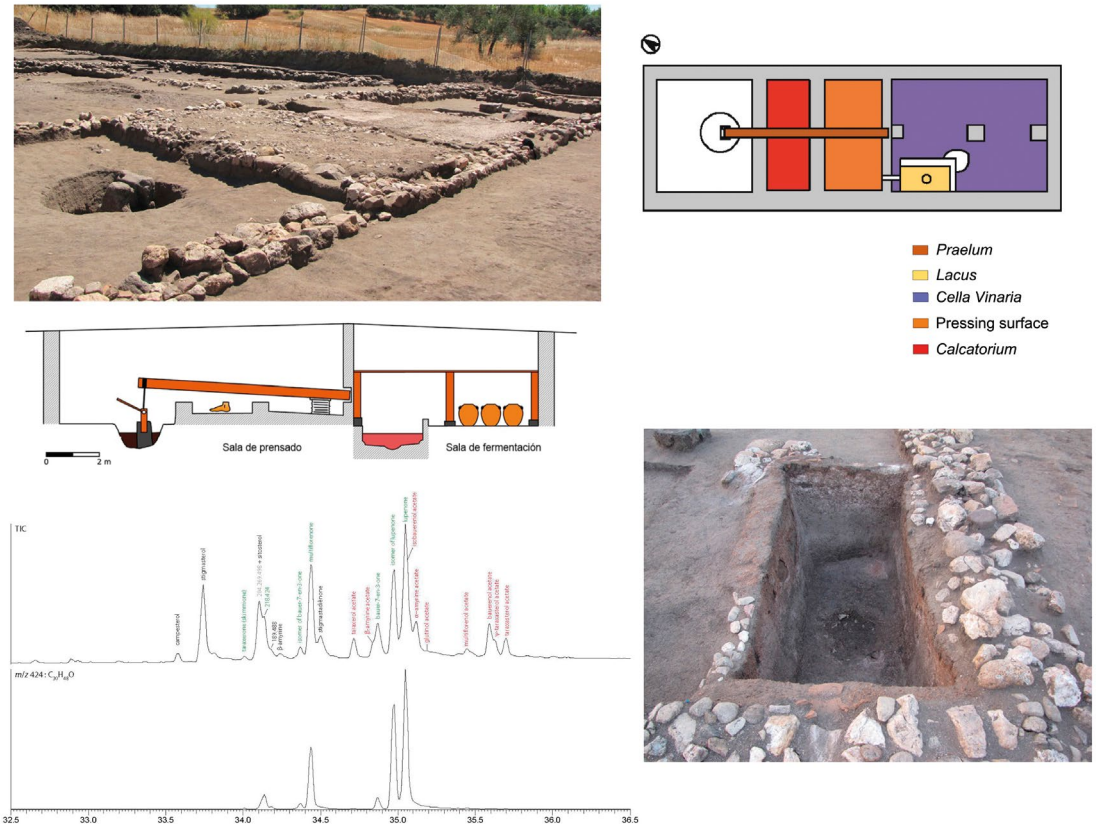

Fig. 3: General view, plan, section, detail and chromatogram of the *lacus* of Los Palacios in Madrid.

dolia defossa located in this fortified village, we know that red wine was produced in Roman times, but the precise chronology is not yet known.[17]

The interpretation of the rural site of Los Palacios, near Madrid[18] also relies on biochemical analysis of residues. In this case, the plan of the installation with a double treading floor and a large cellar with central pillars led to identification of a *calcatorium* and a *cella vinaria* (fig. 3). This preliminary interpretation has been confirmed by the analyses carried out by N. Garnier, who detected fermentation processes of white wine in the *lacus*. This structure, dated at the end of the 1st century AD, was later reused to store *asteraceae* herbs.[19]

Analytical techniques have also been essential to interpret the *pars fructuaria* of the Roman villa of Carranque near Toledo. This site is famous for its mosaics and for the existence of a large manorial-type building. An area originally interpreted as a kitchen was reinterpreted as a productive sector composed of an oil mill and a winery, occupied throughout the 4th century AD (fig. 4, a).[20] To the east of the central patio, which forms the core of the buildings, installations linked to olive oil production were found. Due to the state of preservation, we obtained few clues for identifying the product except for the presence

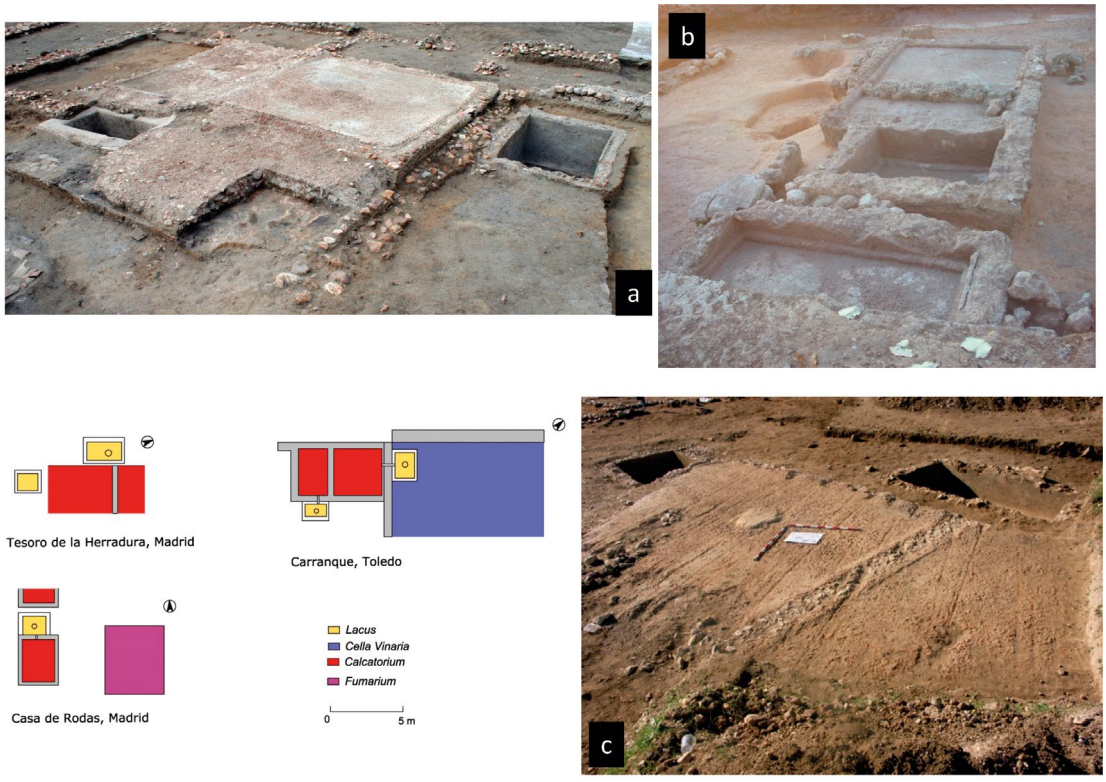

Fig. 4: Treading floors possibly used as bases of central screw presses. a: Carranque, Toledo; b: Casa de Rodas, Aranjuez; c: Tesoro de la Herradura, Madrid.

of a double vat, which was thought to represent evidence of decantation structures. The biochemical analysis detected the traces of animal fat that was mixed with the plaster for waterproofing the floor and the presence of vegetal oil.[21] In the buildings located to the west of the patio, seed flotation and carpological analysis helped the functional interpretation of two *opus signinum* floors connected with two vats. The remains of carbonized *vitis domestica* pips, found inside one of the tanks confirmed the production of wine in this sector of the *villa*. Although we thought originally that the two floors were used for treading the grapes, the difference in size between them and the capacity of the vat (*lacus*) suggest the use of a wooden central screw press in the northern structure.[22]

The identification of these devices at Carranque, simpler in structure, allows to characterize a specific model for wineries in the central part of the Iberian Peninsula. These are small facilities without beam presses, in which the grape juice is obtained by combining foot treading and pressing, possibly with screw presses. Other examples similar to Carranque are found at the sites of Tesoro de la Herradura and Casa de Rodas, in the Madrid region (fig. 4).[23]

In the interior of the Peninsula, the wineries are not equipped with *dolia defossa* (albeit with some exceptions), but with small free-standing containers similar to those

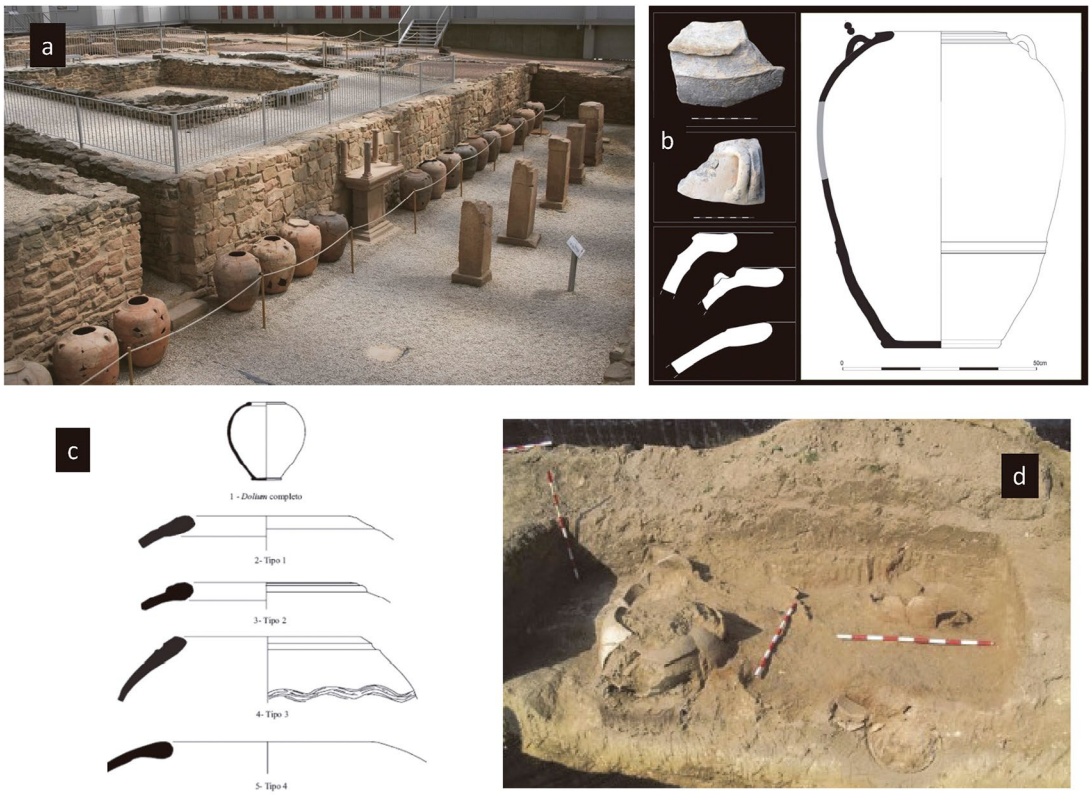

Fig. 5: Free-standing ceramic containers for winemaking (*orcae*). a: *Cella vinaria* of Las Musas, Navarra; b: Rasero de Luján, Cuenca; c: Rumansil, Murça do Douro; d: Cortijo de la Marina, Sevilla.

located in the paradigmatic winery of Las Musas villa in Navarra (fig. 5, a). As they are free standing and easily removed, these containers, called *orcae* in Latin literature are difficult to use for identifying winemaking processes since, unlike *dolia defossa*, they do not leave holes or many remains. That is why it is so important to carry out carpological and biochemical analyses of these ceramics and tanks. The use of these *orcae* follows a local tradition in the Ebro Valley, the interior of the Peninsula and in the regions of Baetica and Lusitania (fig. 5).[24]

These containers are displayed in long buildings, covered with gable roofs and divided into two or three naves which are separated by rows of pillars. In this building, it is common to find a tank intended for liquid transfer. Although we cannot rule out other interpretations about the uses of these containers, such as storage of agricultural yields, we tend to interpret this rural building type as characteristic for winemaking.

This model was also used at the site of Prazo, in the northern part of inland Lusitania:[25] biochemical analyses identified a coating made of conifer pitch in the *lacus* discovered in the building, proven to be a *cella vinaria* (fig. 6). Although the use of wooden barrels cannot be dismissed, free-standing containers were more likely to be used in

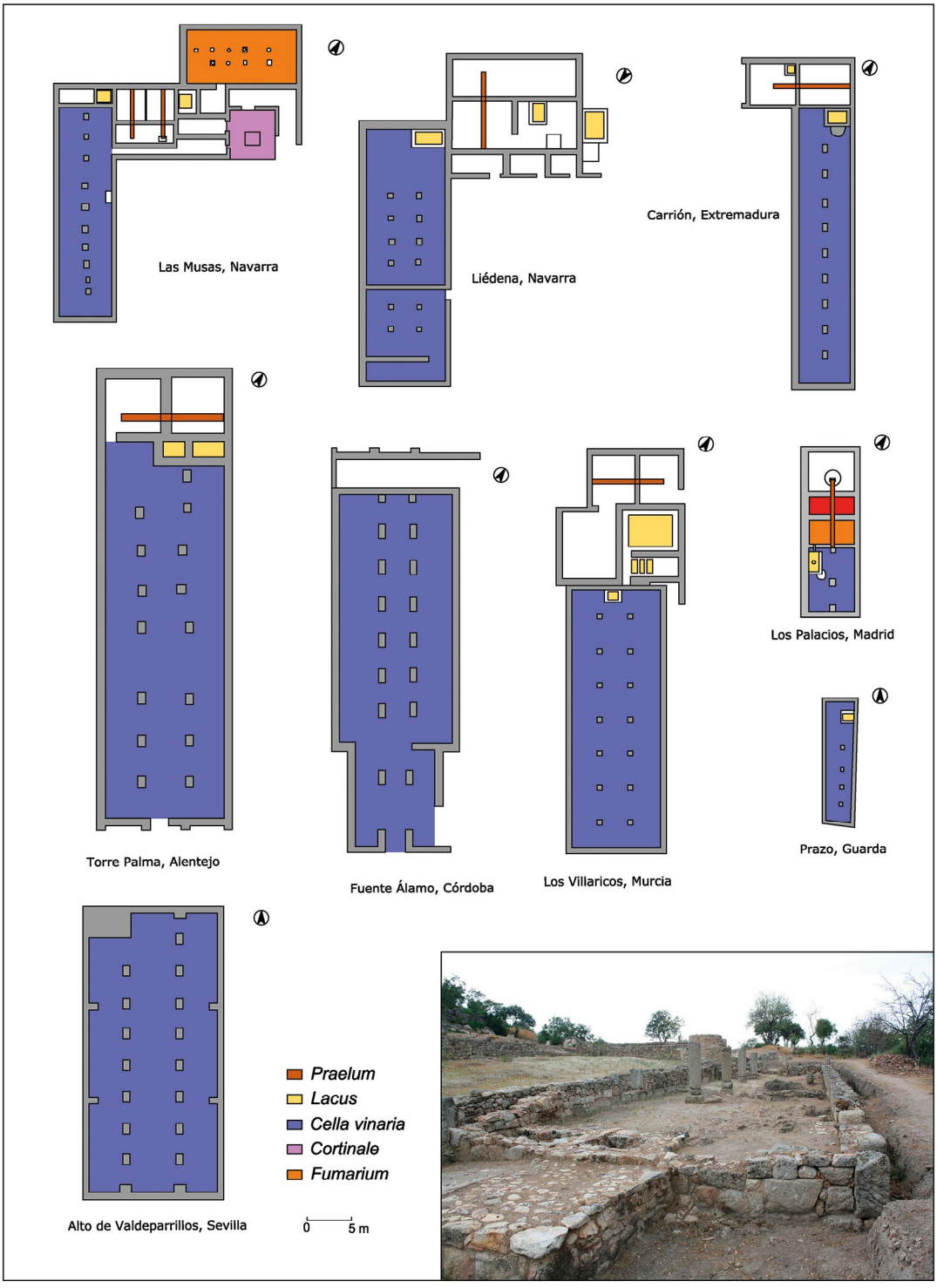

Fig. 6: Plans of long buildings divided into naves and a general view of the *cella vinaria* at Prazo.

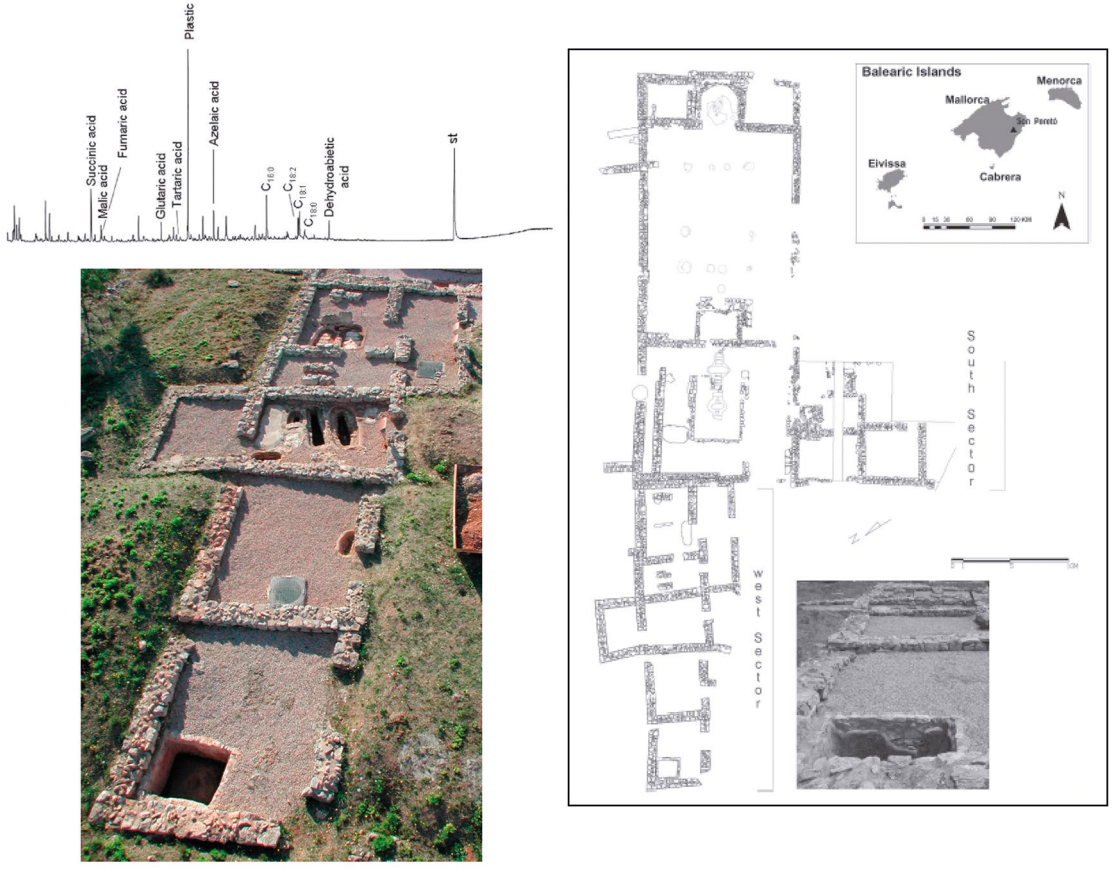

Fig. 7: General view, plan and chromatogram of Late Antique site of Son Peretó, Mallorca.

these buildings. In Lusitania, these containers linked to wine fermentation have been discovered at Rumansil II, Carrión, Aldea do Grilo and Vale do Mouro, among others.[26]

In turn, these types of analysis also should play an essential role in the identification and study of Late Antique wine and oil production. These products were still largely consumed by the Hispanovisigothic and Byzantine population of the Iberian Peninsula.[27] However, we lack substantial data about oil and wine making and commercialization, due to the small scale of production and trade. We imagine that the extraction system obtained crushed grapes by treading and pressing with central screw presses made entirely out of wood. These methods were probably applied at the site of Son Peretó in Majorca. In this rural settlement, occupied between the 5th and 8th centuries AD, which had a religious building, the only evidence of wine production is a vat whose functionality would have been unnoticed without biomolecular archaeology (fig. 7).[28]

The same is true for Pla de Ses Figueres, on the island of Cabrera, dated to the 5th and 6th centuries AD.[29] In this site, a vat located in an area surrounded by heaps of *murex* was originally thought to produce purple dye. However, the sediments containing tartaric

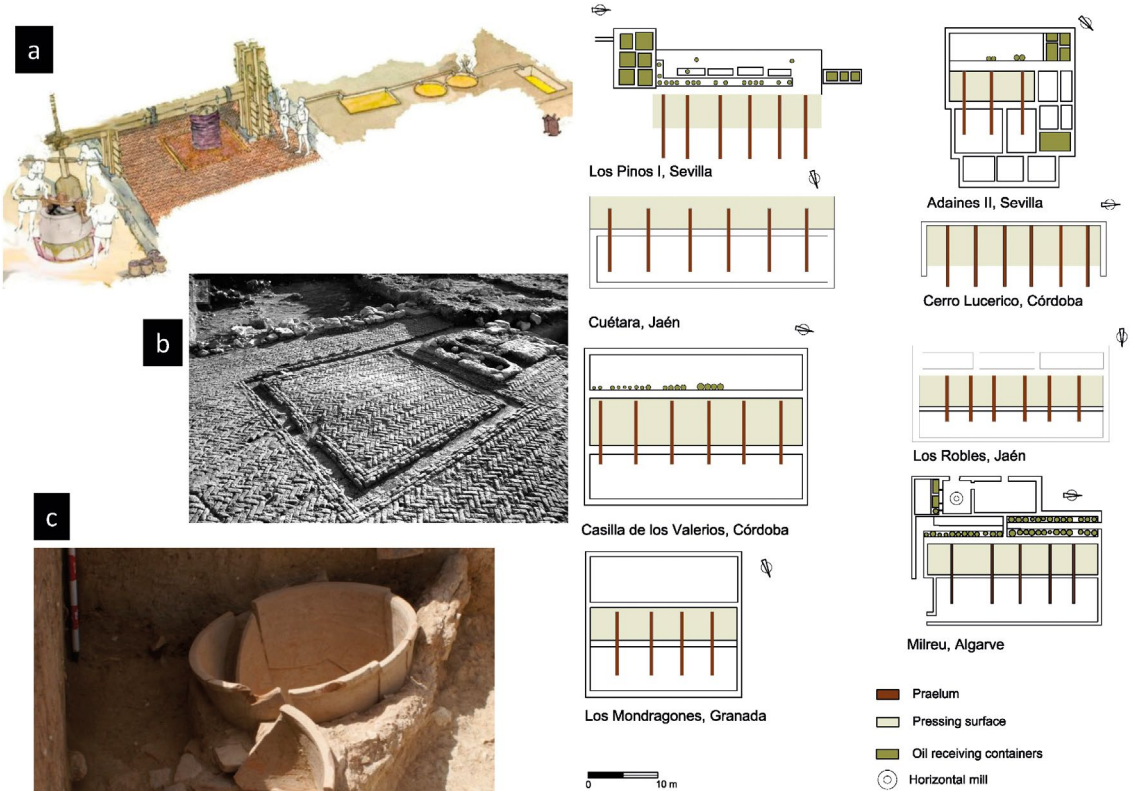

Fig. 8: Plans of oil mills from Baetica. a: Reconstruction of the oil mill of Gallumbar, Antequera; b: Pressing room of Gallumbar, Antequera; c: *Dolia* of Adaines II, Sevilla.

and hydroxycinnamic, acid, discovered through biochemical analysis, proved that this space was related to winemaking.[30]

We should also briefly mention the current state of research about oil mills in Hispania: firstly, because of the relevance of this production throughout the Roman period and across the peninsular territory; and secondly, because a better knowledge of these remains improves our capacity to distinguish oil mills from wineries.

In the last decade there has been a revolution in our knowledge of the oil processing facilities in the southern area of Hispania. Numerous oil plants have been excavated and published providing technical guidelines for further studies. From the Augustan period, we detect a dominant productive and technological model for the oil mills in this region: 1. they are equipped with lever and screw presses; 2. they are mostly horizontal mills; 3. they use decantation devices using gravity; 4. wide-mouth *dolia* are used for decantation and storage; 5. the floors are made in *opus latericium* (fig. 8).[31] This model continued during the period of peak production of Baetic oil, until the Late Empire.

During the last few years, carpological and biochemical analyses have also became more common, further developing this scientific revolution. For example, carpological studies were carried out in the recently excavated site of Las Delicias, in the Genil river

Valley. The study of 335 carbonized olive stones, mostly used for fuelling amphorae kilns located nearby, uncovered a great variety of olive varieties, including wild olives.[32] The future will surely bring even more exciting results.

Notes

[1] Reference to Buxó 1997; Pérez-Jordá 2013 and a summary in Peña Cervantes 2010, 152.

[2] L. Chocarro and G. Pérez-Jordá point out this issue in their very recent review on carpological studies in the Iberian Peninsula (Chocharro – Pérez-Jordá 2018, 21). In relation to the impact of the Phoenician colonization, we also refer to Buxó 2008; Peña Cervantes 2010, 152–158; Pérez-Jordá 2015 and Pérez-Jordá et al. 2017.

[3] Ruiz Mata 1995.

[4] Echeverría – Vera 2015.

[5] Reference to Ramón 1995, 2006 and 2010 and Sáez Romero 2018, amongst others.

[6] In previous publications, we have emphasized on the importance of using components made of perishable materials to produce wine and oil. The use of this type of tools creates a 'silent production', which is conditioning our knowledge on ancient productive processes. See Peña Cervantes 2010, 21–40 and 2014, 218–228.

[7] López et al. 2015.

[8] Martínez Valle 2014; Quixal et al. 2016.

[9] Gómez Bellard – Guérin 1993.

[10] Jornet et al. 2016.

[11] Reference to Peña Cervantes 2010 and 2014 on the study of productions premises; and to Peña-Chocarro et al. 2017 in relation to available carpological studies.

[12] Brun 1993, 511–537.

[13] The bibliography that is available about Tarraconensis wine is extremely large. We can refer, among many works, to Revilla 2006; López Mullor – Martín 2008; Prevosti – Martín i Oliveras 2009; Martín i Oliveras et al. 2017. For a comprehensive summary, reference to Peña Cervantes 2014, 239–241.

[14] Alcubierre et al. 2014.

[15] On this recently discovered system, we refer to Martín i Oliveras 2012 and Peña Cervantes 2011–2012, 49 f.

[16] Casas 1989.

[17] Garnier 2017, 104–105.

[18] Major et al. 2014.

[19] Garnier 2017, 108.

[20] García-Entero et al. 2011–2012.

[21] Garnier 2017, 107.

[22] Peña Cervantes 2017, 61.

[23] Peña Cervantes 2017.

[24] On these types of containers, see Peña Cervantes 2011–2012, 51–53. About the central part of the Peninsula, see Peña Cervantes 2017 and about Andalusia: Peña Cervantes 2016, 308–311.

[25] Pereira – Silvino 2015.

[26] Peña Cervantes 2014, 232.

[27] Peña Cervantes 2005–2006 and 2008.
[28] Pecci et al. 2013.
[29] Riera 2013.
[30] Pecci et al. 2013.
[31] Peña Cervantes 2016.
[32] Bourgeon et al. 2017.

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Fig. 1a: Echeverría – Vera 2015; b: by the author; c: Quixal et al. 2016; d: López et al. 2014; e: Gómez Bellard – Guérin 1993. – Fig. 2: by the author. – Fig. 3: Major et al. 2014; Garnier 2017. – Fig. 4a: García-Entero et al. 2011–2012; b: Oñate – Penedo 2012; c: Vega et al. 2017. – Fig. 5a: by the author; b: Urbina – Morín 2013; c: Silvino et al. 2017; d: Castro et al. 2004. – Fig. 6: by the author. – Fig. 7: Cau et al. 2012; Pecci et al. 2013. – Fig. 8a, b: Romero – Vargas 2016; c: Corzo 2016.

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