Recent Discovery of an Urban Winery in Rirha (Sidi Slimane, Morocco), 2nd–3rd Century CE

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The Rirha site, in the fertile plain of Gharb, 8 km north of the present-day town of Sidi Slimane, lies along the right bank of a bend in the Beth wadi, a tributary of the river Sebou (fig. 1). The site was occupied continuously from the Mauretanian period (from the 6th/5th c. BCE) until Roman times (up to the 3rd–4th c. CE), then later after a hiatus, throughout the Middle Ages (from the 8th/9th c. to the 14th/15th c.).[1]

At the eastern end of the site, bordering a thick skirting wall – and what was probably a monumental gate – the first remains connected to a Roman artisanal winery were discovered.[2] It is located in a quarter that has yielded a Volubilitan peristyle *domus* and a thermal complex. Built in the last quarter of the 2nd c., it has been exceptionally well preserved thanks to a fire around the mid-3rd century.

In this study we present the preliminary findings of an ongoing study, detailing the remains uncovered, the traces of winemaking, and in general the importance of this discovery for our knowledge of the economy of Roman Africa.

The Winemaking Facilities in Rirha Unit 1

The winemaking facility covers an area of at least 250 m² (fig. 2a). On the eastern side it opens on to an alley, which may have run into a main street. Here there is a monumental entranceway, 2.5 m wide, framed by sculpted pilasters.

This gateway opens on to a "work room", comprising two areas (A and B): two flagged pressing rooms, raised above the earth floor and reached by at least one stairway (7) (southern press). They are marked by a sculpted cornice, probably once topped by a detachable wooden balustrade and high brick vaulting (fig. 2b). Crushing (1) and pressing (2) took place in the same areas. The grapes were presumably crushed in wickerwork filters or vats made of perishable materials, next to the press' bottom. The press was square-shaped and operated by a lever press[3], as indicated by the presence of a double anchoring block and a cylindrical counterweight (3).[4] The useful length of the *praelum* in the Rirha presses varies between 10 and 10.20 m, which makes them among the largest examples found in the region (fig. 3a).[5] The exceptional discovery of charred remains of a *praelum* in the southern press indicates that this was at least 0.58 m wide (4).[6]

Returning to the central corridor (C), this leads to the "processing room" (D), which runs behind the press areas. Only the southern half of this space, linked to the southerly press, has been explored. It was equipped with 4 wide-mouthed *dolia* (8), each with a

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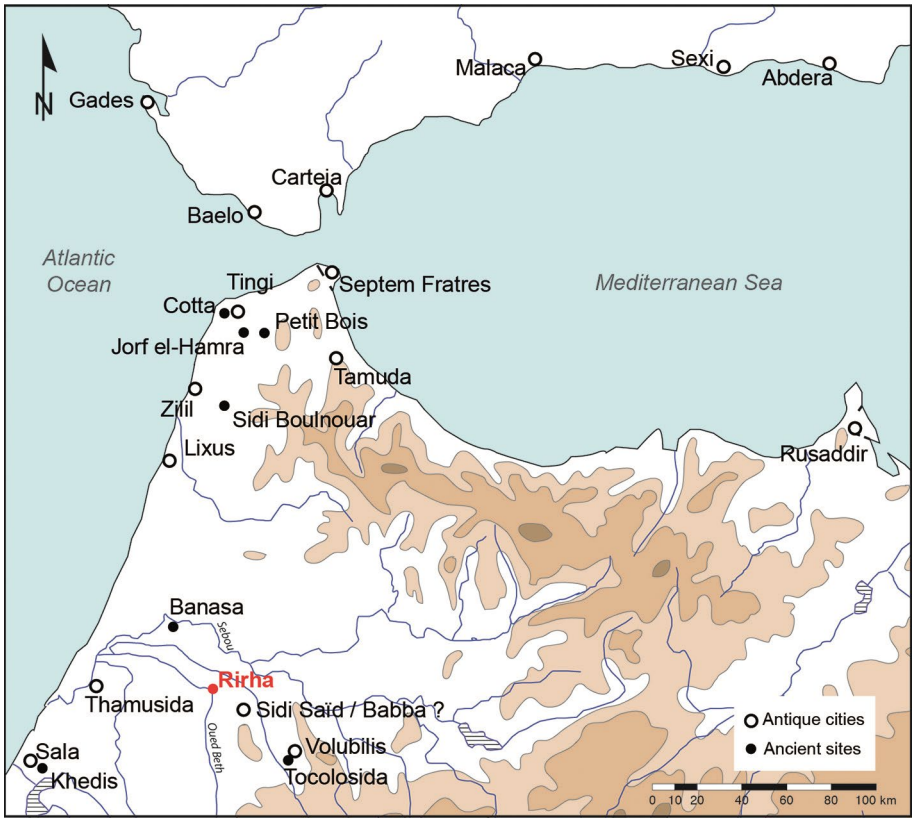

Fig. 1: Principal deposits in ancient Morocco and location of the Rirha site.

capacity of 170 l., enclosed in a brickwork skirting (fig. 3b).[7] Two other complete *dolia* backing on to the western wall suggest that this area could also have been used for storage (9), and perhaps also fermentation. The arrangements that have been uncovered include a water supply directly connected to a cistern (E), emphasising a concern to keep the production facilities clean.

Evidence of Wine Production

The fact that this was a winemaking facility was first evidenced by the discovery of large numbers of charred remains of grape pips, and then confirmed by chemical analyses.

Three primary deposits of charred grape residue were found on the floor of the "processing room" –one beneath the southerly press, and the others in circular patterns (0.9 m diameter) in the centre of the room. One of them was dry-sieved on 0.3 mm meshes to limit dissociation of the fruit parts and collect the smallest ones. This provided a total of 1877 remains with 94 % grape components mixed with seeds

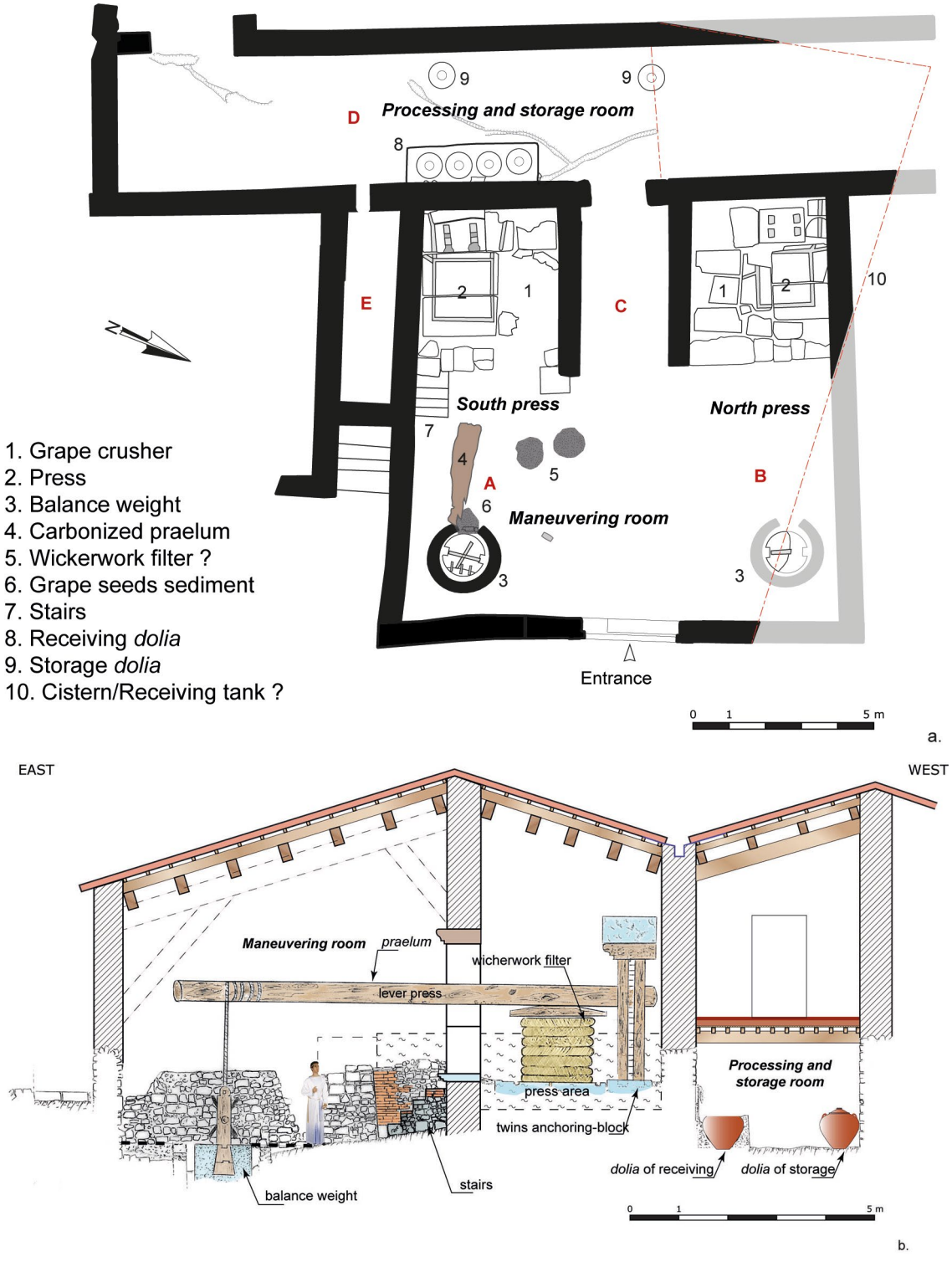

Fig. 2: Remains of winery at Rirha: (a) Explanatory ground-plan of production facility; (b) 2D hypothetical reconstructions of the southerly press.

Fig. 3: Detailed view of production equipment: (a) The southerly press with the counterweight in the forefront, the charred *praelum* and a cluster of grape pips in the centre, and the press area in the background (b) The row of *dolia* and the drains are in the centre, and the cistern on the right.

of cereals, pulses, a wild plant and fragments of grass stems. The grape residue consisted mainly of whole pips (87 %), pips with attached pulp or skin, folded berry skin, broken flattened berries, fruit pedicels and stem fragments (fig. 4.2–5). Some pedicels adhered to grass stems indicated that the fruit was thoroughly crushed. Ethnoarchaeological experiments suggest that the composition of the carbonized grape residues in the concentration studied closely resembles the grape by-products from the final pressing stage.[8] The lack of press basket traces (often made of doum palm) suggests that only its content was discharged. Ethnographic examples show that straw can be mixed in with these residues when the juice is poured into the containers. This straw thus serves to filter out solids: stalks, pips and tissues of the crushed fruit.[9]

In addition to these discoveries, analyses have been run on invisible impregnations on the walls of the four collecting *dolia* in the southerly press (tab. 1). All show markers of black (syringic acid from malvidin) grape (tartaric and malic acids) and alcoholic fermentation (succinic and fumaric acids), in addition to animal (ruminant) and vegetable (oleic, linoleic, sitosterol, stigmasterol) fatty acids, plus conifer seeds. These results indicate that the *dolia* were sealed with a mixture of conifer pitch and animal fat for easier application, and that they were filled with fermented black grape juice i.e. wine.

An Improved Characterisation of the Viticultural Economy of the Province of Tingitania

The reliable identification of a winemaking facility at Rirha is of great importance in that it provides a foundation for a better understanding of viticulture in Africa, where the ancient economy is mostly considered to be oil-based.[10]

In Roman Africa there would seem to have been less winemaking, despite numerous written[11] and pictorial sources[12], which could indirectly support the importance of wine in the economy of this part of the empire. Unlike the northwestern Mediterranean, where semi-interred *dolia* vaults are the principal signs of wine-making, in Africa such remains are rare. In fact, excepting the coastal part of Caesarean Mauritania,[13] wine seems rather to have been stored in amphorae or in small *dolia* placed directly on the ground.[14] This makes it difficult to distinguish between oil- and wine-making facilities, which can be done *"only on the basis of architecture and chemical or carpological analyses"*.[15]

In Tingitania, there are records of three oil-producing zones, and to a lesser extent wine producing, in the Tangiers region,[16] the Sala region,[17] and the Sebou basin.[18] These include 120 facilities largely interpreted as having been oil mills. However, there are certain indications in a dozen or so cases suggesting that some of them may have been used to produce wine. Northward, sites at Cotta,[19] Jorf el-Harma,[20] Petit-Bois,[21] and more recently Sidi Boulnouar,[22] seem to present characteristics of winemaking facilities.

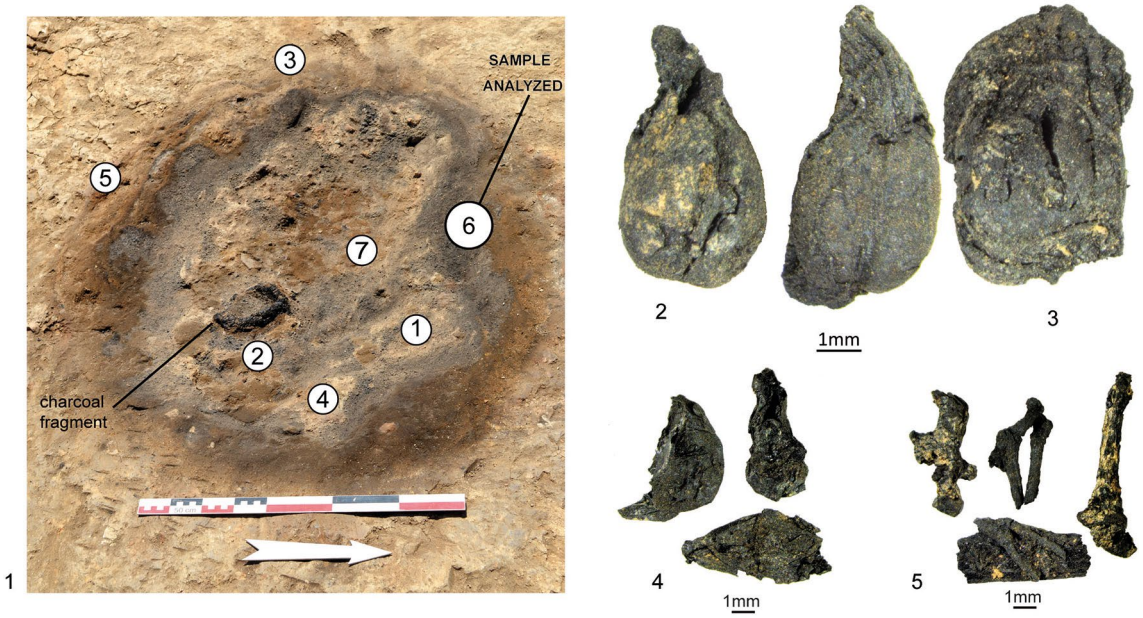

Fig. 4: Components from processed grape residue: 1. sampling in the circular concentration of carbonized grape waste (no. 6: sample analyzed); 2. charred grape seeds; 3. chared pressed grape seed covered by a fragment of the berry skin; 4. charred pressed berry skin; 5. charred grape stalk and pedicels.

n°	objet	animal fats						vegetable oils									resinous material					fruit		
		non ruminant	ruminant	milk product	itaconic ac.	heating (cholestadiénone)	beeswax	sebum / olive (squalène)	vegetable oils	heating (stigmastadiénone)	vegetable waxes	vegetable material	vegetable ashes	odd cétones (cooking)	subérine (2-OH acides)	chol / sito	coniferous resin	coniferous pitch	HPA diterpéniques	HPA triterpéniques	other resin	grape fruit	white/black grape	fermentation
1750	dolium	-	+	-	-	-	-	++	+	-	tr.	-	-	-	+	2.76	-	++	-	-	-	+++	black	+
1751	dolium	-	+	-	-	-	-	+	+	-	tr.	-	-	-	+	3.34	-	++	-	-	-	+++	black	+
1763	dolium	-	+	-	-	-	-	++	+	-	tr.	-	-	-	+	4.87	-	+	-	-	-	+++	black	+
1835	dolium	-	+	-	-	-	-	+	++	-	tr.	Fuco	-	-	+	0.89	-	+	-	-	-	+++	black	+

Tab. 1: Summary of the analyses of organic content in *dolia*.

In the Sebou basin, some installations at *Volubilis*[23] raise similar doubts. It might be worth reviewing the identification of the presses at Sala as oil mills, given that the locally made Sala 1 amphorae might not have contained oil as originally supposed.[24] All these facilities differ very little from oil factories, apart from the absence of mills and collecting basins. On the other hand, they exhibit some similarities, which seem to be characteristic to this province, such as the use of the same type of lever press,[25] or again the use of small Iberian-style *dolia*.[26]

This brief overview demonstrates the importance of a detailed study of wine producing equipment, thanks to the particularly well-preserved state of the excavation of the Rirha winery. Thanks to its exceptional state of preservation and the multidisciplinary approach that has been adopted, this major discovery will undoubtedly inspire advances in our knowledge of the wine producing economy of Roman Africa.

Notes

[1] The Rirha archaeological programme has been co-directed since 2005 by Mohamed Kbiri Alaoui and Abdelfattah Ichkhakh on the Moroccan side, and on the French side, from 2005 to 2012 by Laurent Callegarin (Casa de Velázquez, Madrid), from 2012 to 2016 by Claire-Anne de Chazelles (CNRS, UMR5140, ASM, Montpellier), then by Elsa Rocca and Charlotte Carrato since 2017. This research has always been supported by the French Ministry for Europe and Foreign Affairs, the National Institute of Archaeology and Heritage in Rabat, Casa de Velázquez and the Moroccan Ministry of Culture. Since 2013, the LabEx Archimede (programme "Investing in the future" of the Université Paul Valéry, ANR-11-LABX-0032-01) has played a central role in funding the research through the programme entitled "Gharb. Cultural identity in the Mauretanian area, from the Gharb to Morocco".

[2] We wish to thank Laurent Callegarin and Claire-Anne de Chazelles, French directors of the archaeological project during the first six years of the clearing of the complex, and Corinne Sanchez, director of the TP2C team of the ASM laboratory, UMR5140, Montpellier, for financing the English translation.

[3] This is a type Cc 311/12 press (Brun 1986, 86 fig. 28 and 100–103), the most common at Volubilis.
[4] The two counterweights (diameter 1.12 m) correspond to type 12 (Brun 1986, 120).
[5] At Volubilis, the arbores are between 4.70 and 9.20 m long (Akerraz – Lenoir 1981, 82).
[6] These are currently being researched by J. Ros (CNRS, UMR 5554, ISEM, Montpellier) and C. Vaschalde (UMR 5554, ISEM Montpellier).
[7] The grape juice was funnelled into one of the four *dolia* via a pipe placed after the press area drain.
[8] Margaritis – Jones 2006; Ros 2013.
[9] Ros 2013; Ros et al. 2016.
[10] Camps-Fabrer 1953; Brun 2004; Leveau 2005; Leveau 2008; Leveau 2011; El Bouzidi – Ouahidi 2016.
[11] Herodotus (IV, 195), Strabo (XVII, 3, 4) and Pliny (N. H., V, 1, 3).
[12] Leschi 1957; Rebuffat – Gabard 1990; Balmelle – Brun 2005.
[13] Amraoui 2017, 283.
[14] Brun 2003, 24; Brun 2004, 203.
[15] Brun 2003, 11.
[16] There are 31 known establishments in this region, among sites at Tangiers, Cotta, Jorf el-Hamra, Petit Bois, Daïat, Dchar Jdid/Zilil, Tamuda, Lixus and Sidi Boulanouar.
[17] There is evidence of two production facilities in this last location, plus four more in the hinterland.
[18] 11 in Banasa (Alaioud 2010), one in Rirha and 70 in Volubilis (Étienne 1960; Akerraz – Lenoir 1981; Es-Sadra 2010; Alaioud 2016).
[19] Ponsich – Tarradell 1965, 55–68; Ponsich 1970, 276 pl. LXXXVII; Brun 2004.
[20] Ponsich 1964, 243–252; Brun 2004.
[21] Ponsich 1964, 237–243; Brun 2004.
[22] Proceedings of the Tetuan conference (24–26 November 2016) "Mauritania and the Mediterranean World".
[23] Particularly considering certain facilities in the north-east quarter described by Étienne 1960: Maison au Bain des Nymphes, Maisons des Fauves, Maison de la monnaie d'or, Maison aux deux pressoirs, Maisons aux demi-colonnes, Maison à la bague d'or.
[24] Boube 1987.
[25] Type Cc311/12 (Leveau 2011, 62 f.), which could have had a screw during the 2nd c. on an original and specific type to Tingitania (Brun 2004, 257 f.).
[26] Carrato forthcoming.

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