www.maajournal.com

Mediterranean Archaeology and Archaeometry
Vol. 23, No 2, (2023), pp. 159-173
Open Access. Online & Print.

DOI: 10.5281/zenodo.8179459

RECONSTRUCTING THE LIFE CYCLE OF 3RD CENTURY B.C.E. COOKING JARS. A CASE STUDY FROM A RITUAL DEPOSIT AT CIAMPINO, ROME (ITALY)

Borgers, B.[1], Fischetti, A. L.[2]

[1]University of Vienna, Department of Classical Archaeology, Franz Klein-Gasse 1, 1190 Vienna, Austria
[2]Royal Netherlands Institute Rome, Via Omero 12, 00197 Rome, Italy

Received: 08/03/2023
Accepted: 23/07/2023
Corresponding author: Barbara Borgers (Barbara.Borgers@univie.ac.at)

ABSTRACT

This paper examines the life cycle of cooking jars from a well of a rural farm in Ciampino, Rome, dated to the Mid-Republican period (4th–3rd centuries B.C.E.). Towards this aim, 39 cooking jars were selected and analysed combining detailed macroscopic observation and thin section petrography. More specifically, thin section petrography was used to reconstruct the production technology of the cooking jars, including raw materials, paste recipes, forming and firing technology. Macroscopic observation of the cooking jars serves to identify evidence for use and discard, and focuses on vessel completeness, accretion, and attrition.

The results suggest that most jars from the well were produced in the region of the Alban Hills (*Colli Albani*), while a minority seems to have been imported from the Tiber Valley region, north of Rome. Hand specimen observation confirmed that the jars were almost complete, consisting of few and large fragments; they were used very little, if at all, indicating that their deposition in the well was structured and occurred rapidly. Combined with other evidence from the well, comprising Black Gloss 'Herakles' bowls, it is suggested that the production, use and discard of the cooking jars formed part of the ritual closure of the well.

KEYWORDS: Cooking jars, provenance, technology, ritual deposit, thin section petrography, pyroxene, Mid-Republican era, leucite, birefringent matrix

1. INTRODUCTION

In ancient Rome's suburbs at Ciampino (Fig. 1), excavations have revealed a rural site that was conveniently located at the crossroad of the *Via Vecchia Romana* and the *Via Marcandreola*. The site consisted of a small farm, dated to the Mid-Republican period (4th–3rd centuries B.C.E.), and two wells that were joined by an underground channel. The layout of the settlement changed during the Late-Republican period (2nd–1st centuries B.C.E.), when the farm developed into a Roman villa. At this time, one well and part of the pipeline were plastered and continued to be used as a cistern. The second well, however, was no longer used and backfilled with ceramics and animal bones (Fischetti, 2022).

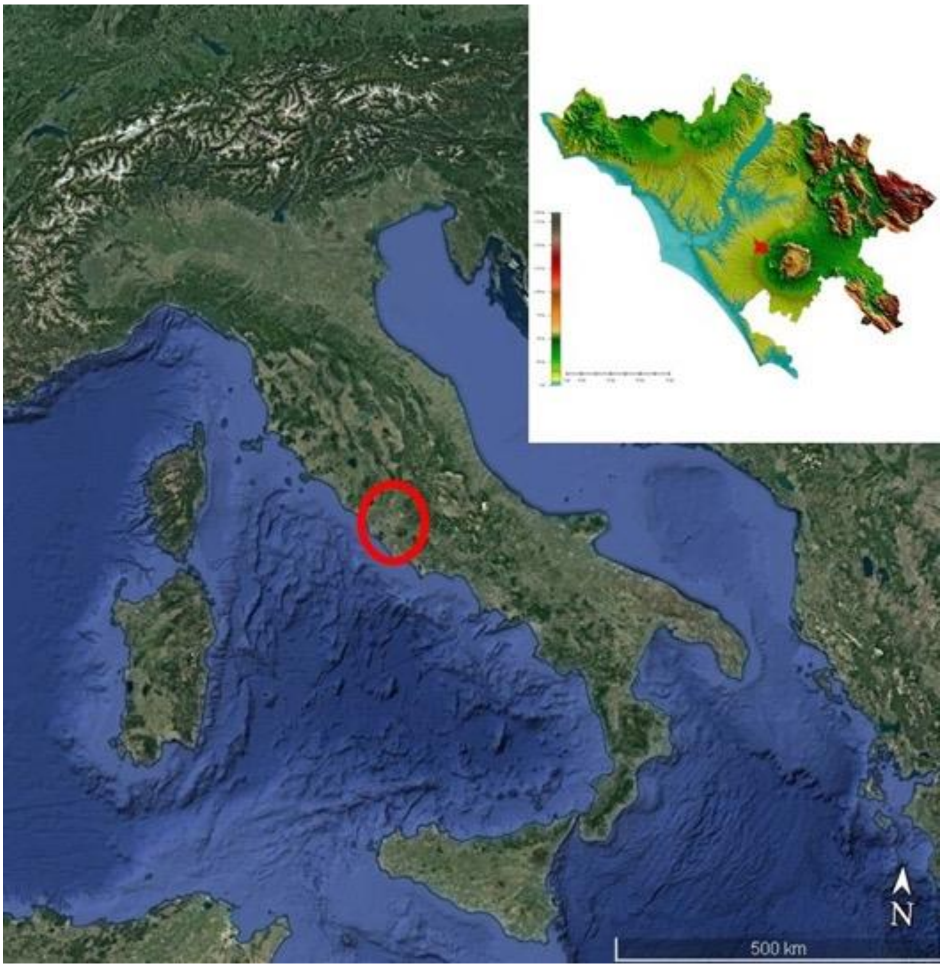

Figure 1. Location of the Via Vecchia Romana site in Ciampino (marked in red) and wider Latium in Italy.

The pottery from the second well comprised a large quantity of cooking jars, in addition to some storage jars (*dolia*), flagons and ceramic building material, as well as Black Gloss ware and amphoras. The cooking jars, flagons and *dolia* have been dated to the 3rd century B.C.E., while the Black Gloss ware (known as 'Herakles' bowls) and amphoras date to the 2nd century B.C.E. Following from this, these diagnostic pottery wares serve as a *terminus post quem* for the closure of the well (Fischetti, 2017; 2022).

Due to their abundance on archaeological sites, cooking jars hold significant potential for studying their production technology and trade. Research has been carried out on cooking jars from various sites in the region, dated between the Mid-Republican and Early Imperial eras. For instance, research has focused on the production technology of pottery waste from workshops at Rome (Olcese, 2003) and Vasanello, located in the Tiber Valley (Peña, 1992). Other studies have examined the composition and trade of cooking jars, dated between the Mid-Republican and Early Imperial eras from several sites, including Rome (Bertoldi, 2011; Schuring, 1986; 1987; Thierrin-Michael, 2003), Ostia (Capelli, 2016) and the Pontine region, ca. 60 km south of Rome (Borgers *et al.*, 2017). Building upon this work, the present paper aims to reconstruct the production technology of the cooking jars from the rural site at Ciampino and to identify trade patterns. A further aim of this paper is to understand whether the production or deposition of the cooking jars might have been related to the closure of the well.

Consequently, this article has three objectives: first, it aims to reconstruct the production technology of the cooking jars from the second well. Attention is paid to the various steps of the production sequence, including raw materials, paste recipes (such as temper), forming, finishing, and firing technology. The second objective of the study is to identify the provenance and distribution of the cooking jars. To achieve this, an integrated approach is adopted, which incorporates macroscopic observation and microscopic analysis. The data are interpreted against the geological background of the site and compared with other compositional studies of cooking jars to tentatively infer possible production locations and distribution of the cooking jars studied. The third objective aims to reconstruct the use of the cooking jars and to infer their lifespan. More specifically, the aim is to determine whether the use-life of the cooking jars was short (e.g., linked to one specific event at a particular time and place), or long (e.g., linked to various events over time).

2. THE SITE OF *VIA VECCHIA ROMANA*

While some ceramic fragments belong to the Late Archaic era, suggesting that the site at Ciampino may have been frequented at that time, it seems that the oldest inhabitation dates to the Mid-Republican period. The site consisted of a rural farm that was inhabited until the Early Imperial period (Fischetti, 2022). During its longevity, the farm was restructured on several occasions. However, for the purpose of this paper, attention is focused on the oldest phase, dated to the Mid-Republican era.

The remains of the rural farm consist of northeast- and southwest-oriented structures that appear to delimit four rooms. Two of these rooms are connected by a 12 m wall (US 156 in Fig. 2) and differ in width: one measures about 2.30 m and the second room about 6.50 m. It has not been possible to determine the size of the rooms, due to the poor state of preservation, but traces can be discerned for at least 9 m. Of the two remaining rooms, only the foundations have been found (US 206, 270, 271 and USM 253, 233 in Fig. 2). The precise dimensions are not known, as they are partly covered by more recent walls and cut by the modern road. The largest room, however, was square-shaped and at least 15 m wide, while the smaller room had a floor made of blocks of volcanic tuff, which occurs in the region and is known as 'peperino' or *lapis albanus* (Fischetti, 2022).

Figure 2. Aerial photograph of the Via Vecchia Romana site, Ciampino (Rome).

Two wells were associated with the farm (*pozzo* 1 and *pozzo* 2 in Fig. 2). Built to collect and store water, the depth of the first well measured 5 m, while the second well could be investigated up to a depth of 4.6 m, as it was waterlogged. The wells were chiselled into the *peperino* and connected by an underground channel, which is approximately 45 m long, 1.8 m high and about 1 m wide.

During the Late-Republican period, the layout and location of the settlement changed: a part of the farm was rebuilt and gradually turned into a Roman villa, located to the north-west of the site. For this second habitation phase attest the foundations of a wall as well as a substantial destruction layer comprising decorative elements of a floor made in waterproof mortar (known as *opus signino*) and diagnostic Black Gloss ware and *Terra sigillata* pottery. At this time, the two wells were separated, and their function seems to have altered.

More specifically, a wall was constructed to interrupt the underground channel. One well (e.g., *pozzo* 1 in Fig. 2) and half of the channel were plastered (e.g., with *cocciopesto*); this well became a cistern. The presence of a terracotta channel at the rim of the well and a large quantity of scattered splinters of carbonate rock around it are thought to be waste resulting from the maintenance of an aqueduct. Indeed, this well continued to be in use during the Late-Republican and Early Imperial periods and may have become an integrated part of an extensive system that was connected to a nearby aqueduct, such as the *Aqua Marcia* (Fischetti, 2022). As for the second well (e.g., *pozzo* 2 in Fig. 2) and the remaining part of the channel, they fell out of use and were filled with large quantities of pottery (Fig. 3).

Figure 3. The second well (pozzo 2) at the Via Vecchia Romana site, which fell out of use and was filled with pottery.

About half of the ceramic finds from the second well consisted of cooking jars (Minimum Number of Individuals = 272). There was no soil between the accumulated ceramic objects in the well, suggesting that their deposition occurred in a reasonably short period of time. This is supported by the high quantity and date of the cooking jars, which largely stem from the 3rd century B.C.E. However, two Black Gloss bowls, known as Herakles bowls (Ferrandes, 2006) and a Rhodian amphora comprise the youngest material in the well and have been dated to the 2nd century B.C.E. One bowl displays a painted 'H' on the interior base, while the other has a pierced base. This has been taken to suggest that they may have been deposited in the context of a ritual that was dedicated to Herakles, the divine protector of water and agricultural activities (Fischetti, 2017; 2022).

3. MATERIALS AND METHOD

Five different types have been identified among the ovoid-shaped cooking jars (Fischetti, 2022), each of which is described in turn. Type 1 jars are defined by an indistinct rim (Fig. 4, n. 81), which occur between the end of the 4th and 3rd centuries B.C.E. in Rome (Olcese, 2003, Type 1). Type 2 jars are characterised by an almond-shaped rim (Fig. 4, n. 82, 83A, 83B, 84) –- a type which circulated in Rome and southern Latium between the 4th and 2nd centuries B.C.E.

(Olcese, 2003, Types 2, 3a and 3; Borgers *et al.*, 2017). Type 3 jars have a triangular rim (Fig. 4, n. 85A, 85B, 85C, 85D, 86) and occur in Rome from the 4th century B.C.E. (Olcese, 2003, Type 4b). Type 4 jars are defined by a short horizontal rim (Fig. 4, n. 87), whilst type 5 jars display a continuous profile rim (Fig. 4, n. 88). The two latter types occur simultaneously in Ostia between the 3rd and 1st centuries B.C.E. (Olcese and Coletti, 2016: 398-399).

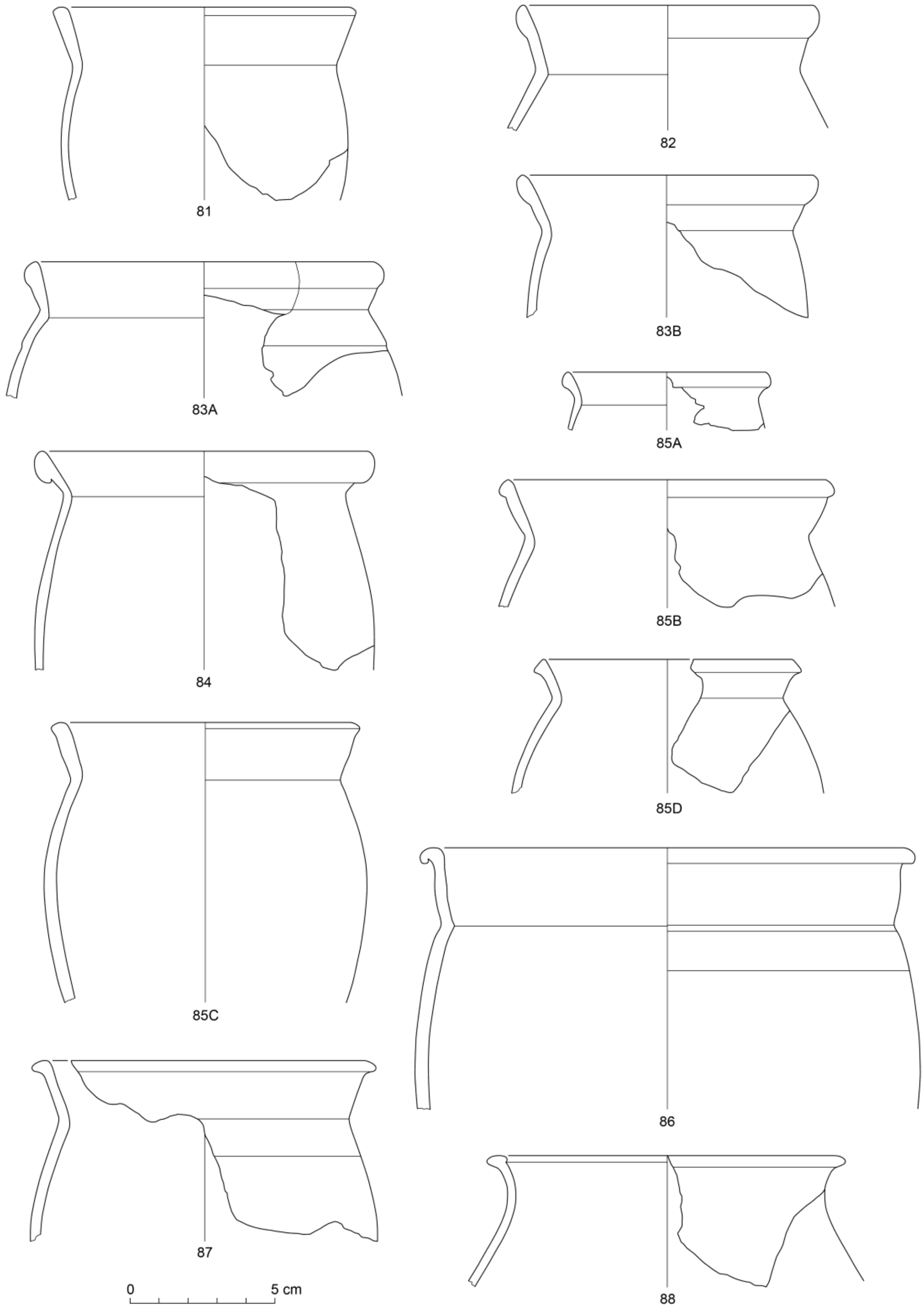

Figure 4. Five different rim types of Mid-Republican cooking jars from the Via Vecchia Romana site. Type 1 with an indistinct rim (n. 81), type 2 jars are defined by an almond-shaped rim (n. 82, 83A, 83B, 84), type 3 jars display a triangular rim (n. 85A-85D, 86), type 4 jars with a short horizontal rim (n. 87), and type 5 jars display a continuous profile rim (n. 88).

Of all (272) cooking jars and lids recovered during the excavations, 39 fragments were chosen for further examination. They were selected to represent the range of types of cooking jars and lids found in the well. The list of samples taken is presented in Table 1. All cooking jars were examined in detail, combining macroscopic observation with thin section petrography, with the aim of reconstructing their life cycle: from clay sources used in production, through distribution, to the social context wherein they were used (Peña, 2007; Gosden and Marshall, 1999).

The interior base and colour of all 39 cooking jars were examined at the Royal Netherlands Institute Rome; the aim was to identify aspects of forming technique (Cuomo di Caprio, 2017: 110-15, 146-47), and firing atmosphere (Orton *et al.*, 1993: 136-138; Bratitsi *et al.*, 2018). Furthermore, it was possible to reconstruct the use-life of the cooking jars, based on the observation of accretion (e.g., deposition of carbon from the vessel's exposure to fire) and attrition (e.g., abrasion caused by tools during daily use) on the surface of the jars analysed (Banducci, 2014). Moreover, BDG 86 Red product was applied on the ceramic surface for the removal of black stains, which might have been caused by manganese oxides and hydroxides contaminating ceramics during burial (Bandini *et al.*, 1989; Bandini, 1994; 2009; Carraro, 2021). Finally, the degree of completeness of the vessels and the rounding at the edges of the sherds were recorded to assess whether the deposition of the cooking jars in the well may have been deliberately structured (Banducci, 2014; Evans, 2007; Höpken and Fiedler, 2018; Martens, 2007).

Fragments of all 39 cooking jars were prepared as thin sections. To this aim, the samples were cut with a saw with a diamond-tipped blade to a small 'chip'. The resulting chips were then impregnated with polyester resin, polished, and subsequently bonded to a glass slide. Once dried, the majority of the polished and impregnated ceramic chips were cut off, and the thin sections were ground down to a standard thickness of 30 μm (Quinn 2022: 23-26), permitting to analyse them with a Leica DM4500P polarising light microscope at the Department of Lithospheric Research, University of Vienna. The ceramic thin sections were classified, following the description system proposed by Quinn (2013: 73-79). This facilitates the detailed characterisation of inclusions, clayey matrix (or groundmass) and voids. Structural and textural criteria were also noted to identify the presence of specific technological practices, such as added temper (Quinn, 2013: 156-171). Small-sized clasts (15–20 μm) are taken to be naturally present in the clay (Ionescu *et al.*, 2011).

4. RESULTS

4.1. *Macroscopic Observation*

All the cooking jars display rhythmic grooves on the interior base, indicating that they have been thrown on the fast wheel. Most samples analysed are defined by a light reddish colour both on the surface and in the core (Table 1), indicating that they have been fired in a well-controlled oxidising atmosphere. Two samples display a 'sandwich structure', comprising a reddish surface and grey core colour (e.g., CRV15, CRV31; Table 1), and were fired in an incomplete oxidising atmosphere. One sample is uniformly grey (e.g., CRV36; Table 1), following from firing in a reducing atmosphere.

Six samples stand out from the dataset for two main reasons: first, their surface seems to have been smoothed, and they display a reddish yellow colour (e.g., CRV2, CRV9, CRV11, CRV24, CRV25, CRV26; Table 1**)**. Second, their rim diameter is slightly larger (ca. 25 cm), in comparison with the rim diameter of the other cooking jars, which typically varies between 10 and 18 cm.

Not a single exterior or interior rim, wall, or base of the cooking jars analysed displays evidence for accretion, which would have resulted from vessels' contact with fire (e.g., cooking practices). In the few cases of doubt (Fig. 5), BDG 86 product was applied on the ceramic surface. The black stains disappeared after a few minutes (Fig. 6), confirming the hypothesis that they were the result of post-burial contamination. Only one fragment of a lid (e.g., CRV36) displayed evidence for carbon blackening. Using Banducci's (2014) scoring system of 1 to 5, which indicates the opacity degree of the blackening marks, this fragment displayed score '2' that can be described as 'obviously darkened, but (original) vessel colour still visible' (Banducci, 2014: 201).

Table 1. Macroscopic, mineralogical, and petrographic classification of the 39 cooking jars from the Via Romana Vecchia site at Ciampino, Rome, analysed. Core colour, texture, and structure of the clayey matrix, as seen in macroscopic and thin section analysis, including the optical characteristics of the matrix (Mx): ↑Δ – High birefringence, ≈Δ – Moderate birefringence, ↓Δ – Low birefringence, Is – Isotropic. Fsp – Feldspar; Px – Pyroxene; Qz – quartz; Fe – Iron Pellets; Clay – Clay Pellets; Chm – Chamotte; Rock – Rock Fragments; ● – Present; Mineral abbreviations according to Warr (2021).

Crt. No.	Sample No.	Type	Thin Section Group	Texture	Structure	Mx	Fsp	Bio-tite	Px	Qz	Fe	Glass	Leu-cite	Clay	Chm	Rock	Chert	Core Colour
1.	CRV2	1	2	Mod to Well sorted	Semi-Fine	Is	●	●	●	●	●	●						Reddish Yellow
2.	CRV3	1	1	Mod. sorted	Coarse	≈Δ to ↓Δ	●	●	●	●	●	●	●	●				Light Red
3.	CRV4	1	1	Mod. sorted	Coarse	↑Δ	●		●	●	●	●				●	●	Light Red
4.	CRV5	1	1	Mod. sorted	Coarse	↑Δ	●	●	●	●	●	●					●	Light Red
5.	CRV6	1	1	Mod. sorted	Coarse	↓Δ	●	●	●	●	●	●				●		Light Red
6.	CRV7	2	1	Poorly sorted	Very Coarse	↑Δ	●		●	●	●	●		●				Light Red
7.	CRV8	2	1	Poorly sorted	Very Coarse	≈Δ	●		●	●	●	●	●				●	Light Red/Grey
8.	CRV9	2	2	Well sorted	Fine	Is	●		●	●	●	●						Reddish Yellow
9.	CRV10	2	1	Mod. sorted	Coarse	↑Δ	●	●	●	●	●	●	●	●				Light Red
10	CRV11	2	2	Well sorted	Fine	Is	●	●	●	●	●	●				●		Reddish Yellow
11	CRV12	2	1	Poorly sorted	Very Coarse	↑Δ	●	●	●	●	●	●		●			●	Light Red
12	CRV13	2	1	Mod. sorted	Coarse	≈Δ to ↓Δ	●		●	●	●	●	●	●	●			Light Red
13	CRV15	2	1	Poorly sorted	Very Coarse	≈Δ	●		●	●	●	●						Red/Dark Reddish Grey
14	CRV16	2	3	Poorly sorted	Very Coarse	↑Δ	●	●	●	●	●	●				●	●	Reddish Yellow
15	CRV17	2	3	Mod. sorted	Coarse	↑Δ	●	●	●	●	●	●		●		●	●	Reddish Yellow
16	CRV18	3	1	Mod. sorted	Coarse	↑Δ	●	●	●	●	●	●	●					Light Red
17	CRV19	3	1	Mod. sorted	Coarse	↑Δ	●	●	●	●	●	●				●		Light Red
18	CRV20	3	3	Mod. sorted	Coarse	≈ Δ to ↑Δ	●	●	●	●	●	●						Reddish Yellow
19	CRV21	3	1	Poorly sorted	Very Coarse	↑Δ	●	●	●	●	●	●		●		●	●	Light Red
20	CRV22	3	1	Poorly sorted	Very Coarse	≈Δ to ↑Δ	●	●	●	●	●	●	●	●	●		●	Light Red
21	CRV23	3	1	Poorly sorted	Coarse	↑Δ	●	●	●	●	●	●	●		●	●	●	Light Red
22	CRV24	3	2	Well sorted	Fine	Is	●	●	●	●	●	●						Redd. Yellow/Dark Redd. Grey
23	CRV25	3	2	Well sorted	Fine	Is	●	●	●	●	●	●						Reddish Yellow
24	CRV26	3	2	Mod. sorted	Fine	Is	●	●	●	●	●	●	●		●			Reddish Yellow
25	CRV27	3	1	Mod sorted	Coarse	↓Δ	●	●	●	●	●	●				●		Light Red
26	CRV28	3	1	Mod. to Well sorted	Mod. Coarse	≈Δ to ↓Δ	●	●	●	●	●					●		Light Red
27	CRV29	2	1	Poorly sorted	Very coarse	↓Δ	●	●	●	●	●	●	●					Light Red
28	CRV30	4	1	Poorly sorted	Coarse	↑Δ	●	●	●	●	●	●				●		Light Red
29	CRV31	4	1	Mod. sorted	Coarse	Is	●	●	●	●	●	●	●					Light Red/Dark Reddish Grey
30	CRV32	5	1	Mod sorted	Coarse	≈Δ	●	●	●	●	●	●					●	Light Red
31	CRV33	1 Lid	1	Mod sorted	Mod. Coarse	≈Δ to ↓Δ	●	●	●	●	●	●			●			Dark Reddish Grey
32	CRV34	1 Lid	1	Poorly sorted	Coarse	↑Δ	●		●	●	●	●		●			●	Light Red
33	CRV35	2 Lid	1	Mod. sorted	Coarse	≈Δ to ↓Δ	●	●	●	●	●	●				●		Light Red
34	CRV36	3 Lid	1	Mod. sorted	Coarse	≈Δ to ↓Δ	●	●	●	●	●	●					●	Dark Reddish Grey
35	CRV37	2 Lid	1	Mod. sorted	Coarse	Is	●	●	●	●	●	●						Light Red
36	CRV38	2 Lid	1	Mod. sorted	Coarse	≈Δ	●	●	●	●	●	●				●		Light Red
37	CRV 39	2 Lid	1	Mod. sorted	Coarse	≈Δ	●	●	●	●	●	●	●	●				Red
38	CRV40	1 Lid	1	Poorly sorted	Coarse	↑Δ	●	●	●	●	●	●	●				●	Light Red
39	CRV41	1 Lid	1	Poorly sorted	Very Coarse	↑Δ	●		●	●	●	●	●				●	Red

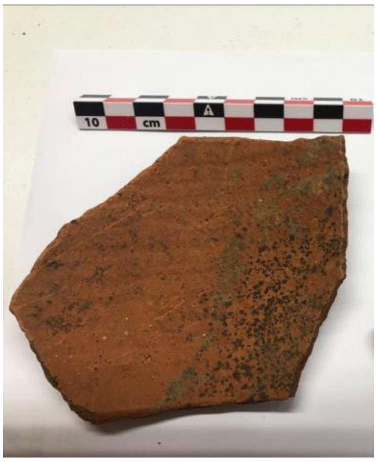

Figure 5. Sherd with black stains, prior to application of BDG 86 Red product.

Figure 6. The same sherd without black stains, after application of BDG 86 Red product.

Similarly, not a single cooking jar displays evidence for abrasion on the interior rim or neck (which would have resulted from regularly stirring foodstuffs during cooking practices, for instance). This might be taken to suggest that the cooking jars analysed were used little, if at all, for cooking.

Finally, most, if not all, cooking jars were found almost complete, albeit broken, in the well. The vessels could be refitted easily, given that they broke in few and large fragments. Moreover, using Banducci's (2014) three levels to record the degree of rounding, most, if not all sherds analysed had fractures that were classified as 'sharp'.

4.2. Thin Section Petrographic Analysis

Examination of the 39 ceramic thin sections indicates that there are three main groups present in the assemblage (Table 1). Each group will be described concisely, while the detailed microscopic observations will be published on the 'Fabrics of the Central Mediterranean' database (www.facem.at).

The inclusions and voids of the samples analysed are well-oriented and their texture varies from poorly or moderately sorted (e.g., Groups 1 and 3) to well-sorted (e.g., Group 2). Variability has also been observed in the structure of the samples, from coarse or very coarse (e.g., Groups 1 and 3), to fine or semi-fine (e.g., Group 2; Table 1).

Group 1 is defined by coarse sanidine feldspar and pyroxene inclusions and comprises 30 samples (N = 30). The size of the sanidine feldspar and pyroxene varies (200–300 μm, rarely 500 μm; Figs 7, 8), suggesting that they have been deliberately added. Other coarse inclusions include rock fragments, such as volcanic glass (400–500 μm), leucite, basalt, leucitite (Fig. 9), and rare chert (200–300 μm). Rare, rounded quartz and plagioclase feldspar inclusions are also identified. Several samples additionally contain chamotte fragments. The clayey matrix comprises small-sized quartz, biotite, and andradite inclusions, as well as rounded clay pellets and iron pellets. Most samples have a birefringent matrix, indicating a low firing temperature, whereas very few display a moderate to low birefringence, indicating a medium to high firing temperature (Table 1).

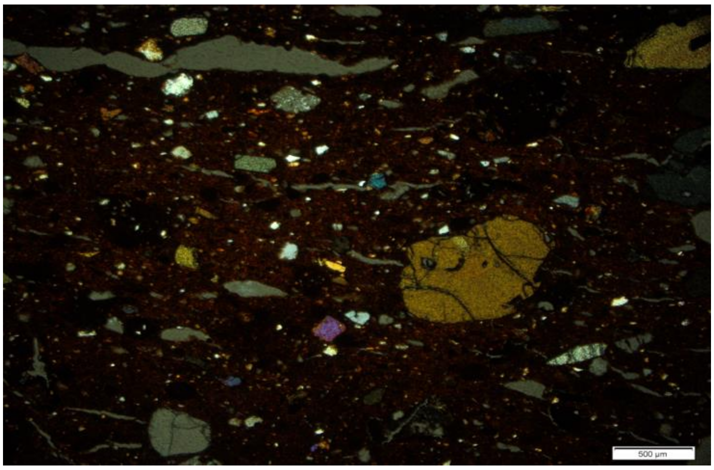

Figure 7. Micrograph of Group 1 sample (CRV27), defined by coarse sanidine feldspar and pyroxene (large, yellowish colour, centre right) in matrix with low birefringence.

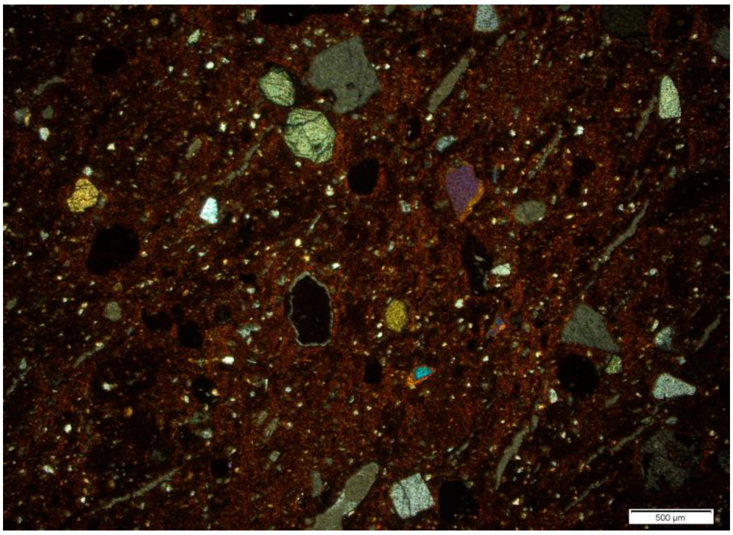

Figure 8. Micrograph of Group 1 sample (CRV19), defined by coarse sanidine feldspar and pyroxene (yellowish, and blue-green inclusions) in birefringent matrix.

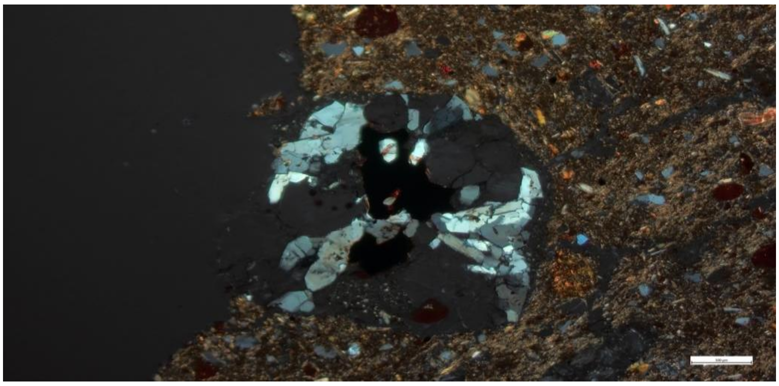

Figure 9. Micrograph of Group 1 sample (CRV3), defined by large leucite-bearing phenocryst (in the centre) in birefringent matrix.

Group 2 (N = 6) is characterised by a dark brown clayey matrix with fine quartz and biotite inclusions (Figs 10, 11). Coarse inclusions are dominated by volcanic glass fragments (500–700 μm). Typically, they are dark brown or opaque with voids and small-sized quartz or feldspar inclusions, which are difficult to identify confidently. Other coarse grains consist of rare rounded pyroxene and sanidine feldspar (100–150 μm, rarely > 500 μm) inclusions, as well as manganese and iron pellets (200–500 μm), as well as very few quartz (100–150 μm) and leucite (< 150 μm). One sample additionally contains chamotte fragments. All samples appear to have been fired at a high temperature, as suggested by their isotropic matrix. There are broad similarities in the clay of Group 2 and the clay of Group 1. However, it is difficult to confirm this with certainty, because the samples from Group 2 are high fired, and their matrix is isotropic (Table 1).

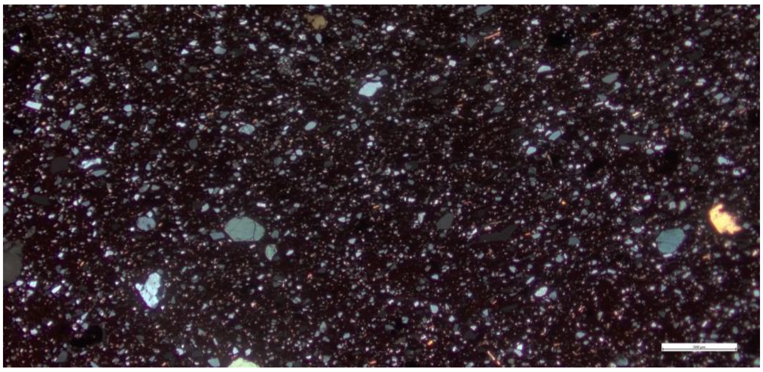

Figure 10. Micrograph of Group 2 sample (CRV26), defined by a fine clayey matrix with low birefringence.

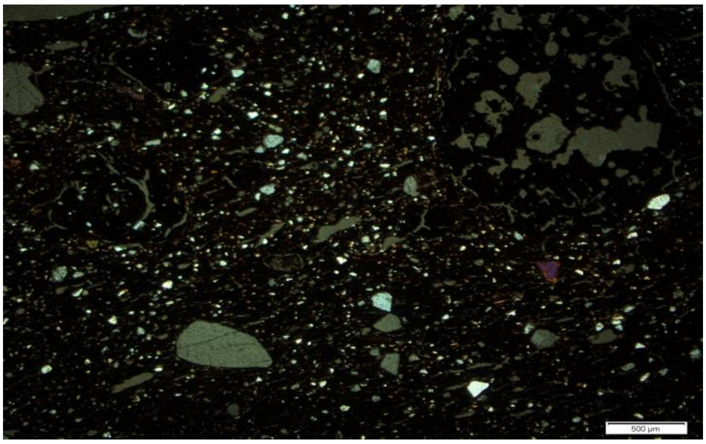

Figure 11. Micrograph of Group 2 sample (CRV9), defined by a fine isotropic clayey matrix with a large volcanic glass fragment (top right)

Group 3 (N = 3) is defined by coarse sanidine feldspar inclusions (200–300 μm, rarely > 300 μm). The shape of the sanidine feldspar grains (e.g., sub-angular), their texture (e.g., moderately to poorly sorted), and structure (e.g., coarse to very coarse) and frequency (e.g., 25–30% of the clayey matrix) suggest that they have been deliberately added (Figs 12, 13). Rare pyroxene inclusions (100–200 μm), quartz, albite, as well rock fragments (e.g., basalt (?), 200–250 μm), volcanic glass and chert are also present. The matrix is characterised by fine quartz and biotite (15–20 μm), as well as clay pellets and numerous pumice fragments (100–200 μm). All three samples display a birefringent matrix, indicating a low firing temperature (Table 1).

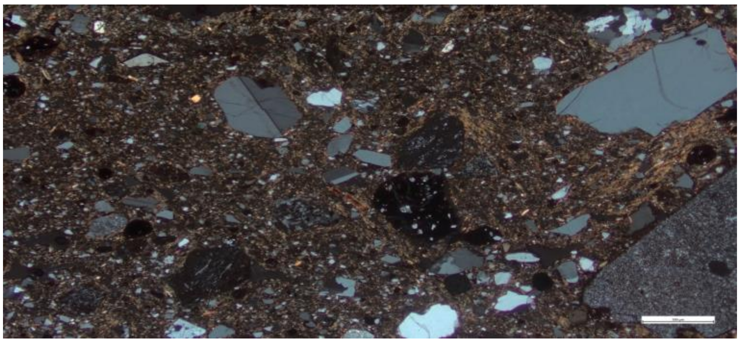

Figure 12. Micrograph of Group 3 sample (CRV17), defined by coarse sanidine feldspar (top right) and additional quartz (bottom centre) in a matrix with birefringence.

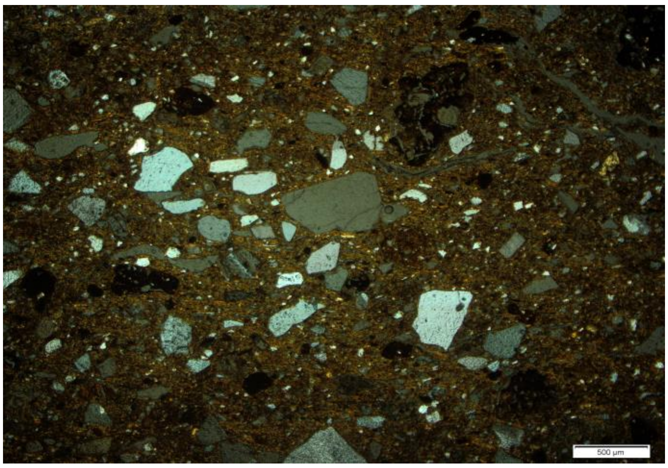

Figure 13. Micrograph of Group 3 sample (CRV16), defined by numerous coarse sanidine feldspar inclusions distributed in a birefringent matrix.

5. DISCUSSION

The rural farm at the *Via Vecchia Romana* is located in the Ciampino plain, which is funnel-shaped and approximately 30 km^2 wide (Fig. 14). The plain consists of the *Conglomerato del Tavolato* (Tavolato Formation), which is associated with the latest activity of the volcano, located in the *Colli Albani* (Alban Hills), dated to the Holocene. The Tavolato Formation comprises alternating volcanic units and sandy-silty clay deposits of fluvial origin. Overlying Mesozoic-Cenozoic limestones, the plain is part of the Alban Hills, which belong to the Roman Province (De Benedetti *et al.*, 2008).

The volcanic rocks in the Alban Hills consist mainly of pyroclastic deposits and minor lavas, ranging from ultrapotassic tephrite to leucitite and strongly exhibit silica-undersaturated leucite-bearing rocks, as well as few melilite-bearing rocks. Main phenocrysts include clinopyroxene and leucite, while olivine occurs in minor amounts, and plagioclase is virtually absent (Peccerillo, 2017: 108). During the Mid-Pleistocene, thick (paleo)soils developed on weathered pyroclastic material. They exhibit prominent translocation of reddish-brown clay and are accompanied by residual accumulation of iron and manganese compounds (Ugolini and Dahlgren, 2002).

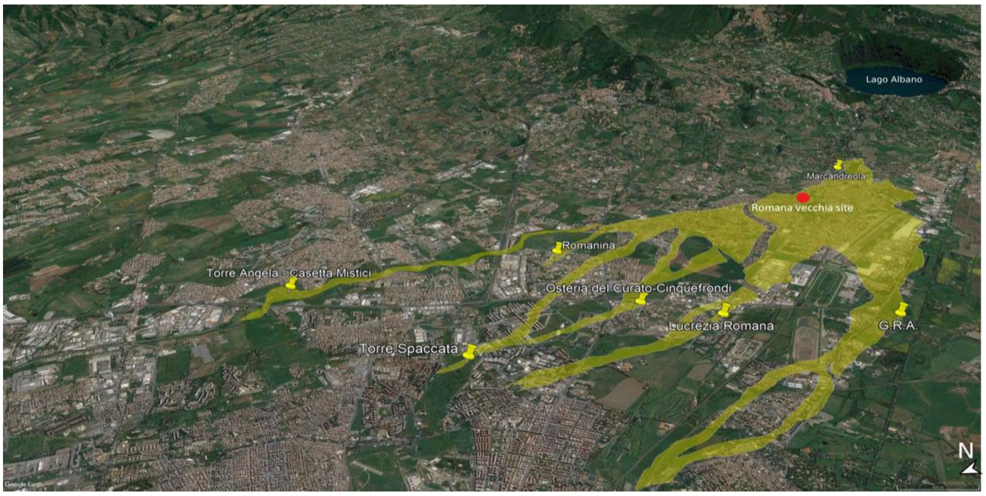

Figure 14. The Ciampino Plain, consisting of the Conglomerato del Tavolato (Tavolato Formation), which is associated with volcanic activity in the Colli Albani (Alban Hills)

In the absence of Mid-Republican kilns and pottery waste in the Alban Hills, the composition of the coarse inclusions of the jars studied have been used to tentatively infer possible locations of origin. Most, if not all, of the 39 samples analysed contain coarse, single grains of volcanic origin, including pyroxene, sanidine feldspar or leucite inclusions, as well as pyroclastic rocks, including pumice. The size, texture, and structure of the coarse inclusions vary, suggesting that they have been deliberately added. All these inclusions occur in the Alban Hills, and their presence in the jars studied can be taken to tentatively suggest that they have been produced within this broader region.

The presence of some specific inclusions in the jars, however, has the potential to infer a more precise location of production. For instance, leucitite rock inclusions, which are present in Group 1 jars (Fig. 9), are common in the Alban Hills (Peccerillo, 2017: 84). The shape of the coarse inclusions in the jars of this group might be a further indication of their provenance. More specifically, all added coarse inclusions tend to be rounded and poorly sorted, suggesting that they derive from an alluvial deposit. All five jar types were produced with this composition (Table 1).

The presence of numerous manganese and iron compounds in Group 2 jars (Figs 10, 11) indicates that a soil, developed on volcanic deposits, might have been used as a base clay. Macroscopic observation suggests that the jars of this group stand out for two reasons: their surface seems to have been smoothed, and they have a larger rim diameter in comparison with the other jars in the assemblage. Given that rim diameter can be used as a proxy for volume (Banducci, 2014), Group 2 jars are defined by a larger volume in comparison with the other ones studied. Types 1, 2 and 3 jars occur in this composition (Table 1).

Group 3 jars are defined by coarse sanidine feldspar (Figs 12, 13), as well as some quartz and plagioclase inclusions. The latter two types of inclusions are virtually absent from Group 1 and 2 jars, and typically they do not occur in large quantities in the Alban Hills. This might be taken to suggest that they were produced outside the Alban Hills. Jars with this composition occur in Types 2 and 3 (Table 1).

Group 1 jars are characterised by a low to moderate firing temperature, as indicated by their birefringent matrix in thin section (Figs 8, 9). Most samples have also been fired in a well-controlled atmosphere, as suggested by their homogeneous surface and core colour (Table 1), except for two samples whose grey core indicates that the oxidising process was incomplete (Orton *et al.*, 1993: 136-138; Bratitsi *et al.*, 2018). Four samples in this group have been fired at a high temperature, as indicated by their moderate to low birefringent matrix witnessed in thin section analysis (Fig. 7). Finally, one lid, displaying a grey colour, was fired in a reducing atmosphere (Table 1). Macroscopic observation has confirmed that this grey colour has been caused by accretion, following from contact with fire. All five jar types occur in Group 1 (Table 1).

By comparison, Group 2 jars are defined by a high firing temperature. This is indicated in thin section petrography by their isotropic matrix (Figs 10, 11). Cooking jars of types 1, 2 and 3 occur in Group 2 (Table 1).

Based on the upstanding rim of type 3 cooking jars, it has been noted that they might have been used for storage, rather than for cooking (Di Giuseppe *et al.*, 2004). Consequently, one might not expect to find evidence for attrition or accretion on this type of jars. However, not a single jar in the studied assemblage displays evidence for accretion or attrition, supporting the hypothesis that they may not have been used for a long time, if at all. Moreover, other indications, including their completeness and particular fracture pattern, as well as their stratigraphy in the well, further indicate that the jars may have been part of a one-time ritual event.

6. CONCLUSIONS

In this article, 39 cooking jars from a closed deposit in a well of a rural farm at Ciampino, located in Rome's suburbs, were examined in more detail. The combination of detailed macroscopic observation with thin section petrography has made it possible to identify three main groups among the cooking jars studied. All jars were produced with a red-firing clay, as indicated by the presence of iron pellets. Most vessels are defined by coarse sanidine feldspar and pyroxene inclusions, varying in size and frequency (e.g., Groups 1 and 3; Table 1). Some vessels contain additional chamotte fragments. All jars seem to have been thrown on the fast wheel and the majority was fired in a well-controlled oxidising atmosphere. Most vessels were fired at a moderate temperature (e.g., most jars of Groups 1 and 3), while some were fired at a high temperature (e.g., some samples of Group 1 and Group 2). Given that all jars were produced with similar raw materials and have been formed and fired in a similar way, suggests that potters generally shared knowledge of production technology.

With 30 samples, Group 1 jars form the largest group in the assemblage studied. Jars with this composition seem to have been distributed at the regional level, given that they occur on sites in Ostia (Capelli, 2016; Mineralogical Group 5) and the Pontine region, ca. 60 km south of Rome (Borgers *et al.*, 2017; Fabric 2). The presence of leucitite rock fragments is indicative for an origin in the Alban Hills.

In this area, two workshops are known to have produced cooking ware, including Tivoli and Palestrina, and their activity has been dated to the Early Imperial period (Olcese, 2003). Compositional analysis has confirmed that production waste from Palestrina exhibits rare leucitite inclusions, whilst those from Tivoli are defined by leucite crystals (Thierrin-Michael, 2003; Olcese, 2003: 80-81). The preliminary study of pottery waste from the two production sites is a first step towards their characterisation. However, a detailed and comprehensive study of this material would doubtless shed light on their scale and output and would permit insight in their production period.

Group 2 jars stand out for at least four reasons: they are characterised by a fine fabric with coarse manganese and iron compounds, they are defined by a comparatively large volume, they display a smoothed surface and have been fired at a high temperature. Jars of this group have not yet been identified on other sites in the region. This might be taken to suggest that they were produced with raw materials from the Tavolato Formation in the Ciampino plain, but further research is necessary to support this hypothesis.

Group 3 jars are characterised by coarse dominant sanidine feldspar and additional plagioclase and quartz inclusions. The composition of Group 3 jars bears similarities to the production waste from Vasanello, which is defined by dominant sanidine and additional plagioclase inclusions (Peña, 1992), and located in the Tiber Valley region, north of Rome. This production waste is dated to the Late Republican and Early Imperial periods and is known as the 'Rome and Tiber Valley' fabric (Olcese, 2003). Coarse ware in this fabric was distributed at the regional level. For instance, it has been identified on several sites in Rome (Thierrin-Michael, 2003; Bertoldi, 2011; Schuring, 1986; 1987), Ostia (Schuring, 1986; 1987) and the Pontine region (Borgers *et al.*, 2017; Fabric 1). However, it has also been distributed at the supra-regional level, for instance, to Albintimilium in northern Italy (Olcese, 1990). Even if the pottery waste from Vasanello dates to the Late Republican and Early Imperial periods, the production seems to have been circulating in the area from the Mid-Republican period onwards – a hypothesis that has been put forward elsewhere (Borgers *et al.*, 2017).

The results of the integrated study of the Mid-Republican cooking jars from the rural site at Ciampino have at least two implications. The first is that the study has successfully characterised the cooking jars in terms of detailed macroscopic observation, petrography, and mineralogy. It presents a further step in our understanding of the production technology and trade of this pottery ware in Central Italy during this period. The study also indicates the potential to indicate a provisional provenance, based on the petrographic and mineralogical evidence in the pottery, even if no workshops from the Mid-Republican era have been found in the study region. The next step in the research is to conduct clay prospection in the area (Xanthopoulou *et al.*, 2020), to clarify the hypotheses presented here in more detail.

The second implication is that the deposition of the cooking jars might have been part of the ritual closure of the well. This is suggested by their high abundance, their completeness, as well as their fracture pattern. Macroscopic observation further indicates that the cooking jars show neither evidence for attrition or accretion, nor do these differently sized jars display evidence for multiple functions. This suggests that the jars were very used little, if at all, for cooking foodstuffs and had a short use-life. Moreover, the results of this study indicate that most jars have the same composition, whose origin is likely in the Alban Hills, even if no workshops, dated to the Mid-Republican period, are known in the area. Taken together, these indications on the jars are taken to suggest that they might have been produced and used for a one event at the site. Further to this, combined with the contextual and stratigraphic evidence –– i.e., the presence of Herakles bowls and lack of soil sedimentation between the deposited pottery in the well, it might be conjectured that the jars formed part of the ritual closure of the well.

This brings us to the broader dimension of depositing objects in natural or artificial watery places, a practice that has been noted on Republican sites in central Italy (Belelli Marchesini and Michetti, 2017), and Roman contexts in Britain (Evans, 2007; Merrifield, 1987), to name but a few. For these contexts, it is important to bear in mind that the practice aimed to offer non-functional objects to the gods. Moreover, the practice may have concerned both the individual (or personal) household and the community at the same time. In the case of the rural site at Ciampino, this explains why the cooking jars from the well were almost –– but not entirely –– complete. Furthermore, the practice might have served to appease the deities, who protected water and agricultural activities, when the owners of the rural farm closed the (second) well. This practice might have occurred at the individual or household level. At the same time, it might have been a reference to landownership or boundary delineation at the broader community level - i.e., when the rural settlement was reconstructed and transformed into a proper villa, and the (first) well connected to a public aqueduct nearby.

Author Contributions: Conceptualization, B.B.; methodology, B.B. and A.F.; formal analysis, B.B.; investigation, B.B.; data curation, B.B.; writing—original draft preparation, B.B.; writing—review and editing, B.B and A.F..; visualization, B.B and A.F.; project administration, B.B.; funding acquisition, B.B. All authors have read and agreed to the published version of the manuscript.

ACKNOWLEDGEMENTS

The authors would like to thank the staff at the Royal Netherlands Institute Rome (KNIR) for access to the laboratory and for their permission to analyse the jars compositionally. The authors also thank the anonymous reviewer for their comments, which have improved the paper.

FUNDING

The research presented in this paper forms part of the project 'Cooking Ware as Indicator for Regional Trade: A View from 4th-1st centuries B.C.E. Central Mediterranean', University of Vienna, and has been financed by the Austrian Science Fund (FWF Project T-1085 G).

DATA AVAILABILITY STATEMENT

All scientific data are held by the corresponding author and can be accessed for comparative purposes with prior arrangement.

REFERENCES

Banducci, L.M. (2014). Function and Use of Roman Pottery: A Quantitative Method for Assessing Use Wear. *Journal of Mediterranean Archaeology*, Vol. 27.2, pp. 187-210.

Bandini, G., Diana, S., Guidi, G. (1989). Rimozione di macchie nere da reperti ceramici, vitrei ed ossei. *Notiziario dell'Enea/Energia e Innovazione, anno 35 - n. 7*-Rome, *ENEA*, pp. 1-10.

Bandini, G. (1994). Metodo combinato per la rimozione da ceramiche di macchie causate da composti ferro-manganese *"FAENZA". Bollettino del Museo Internazionale delle ceramiche in Faenza*, pp. 15-17.

Bandini, G. (2009). Le classi ceramiche: problematiche di conservazione. *Le Classi Ceramiche. Situazione degli studi. Atti della X Giornata di Archeometria della Ceramica.* CNR-Istituto di scienza e tecnologia dei materiali ceramici Faenza, pp. 199-212.

Bertoldi, T. (2011). *Ceramiche comuni dal suburbio di Roma*. Università di Roma "Tor Vergata", Studi di Archeologia, Vol. 1, Roma.

Borgers, B., Tol, G.W., De Haas, T.C.A. (2017). Roman cooking vessels (ollae): a preliminary study of the material from the Pontine region, Central Italy. *Science and Technology of Archaeological Research*. 41st International Symposium on Archaeometry (Kalamata, Greece): Proceedings, Vol. 3.2, pp. 314-325.

Bratitsi M., Liritzis I., Vafiadou A., Xanthopoulou V., Palamara E., Iliopoulos I., Zacharias, N. (2018). Critical assessment of chromatic index in archaeological ceramics by Munsell and RGB: novel contribution to characterization and provenance studies. Mediterranean Archaeology & Archaeometry, Vol.18.2, pp. 175-212

Carraro, S. (2021). L'intervento conservativo. In *Architetture perdute. Decorazioni architettoniche fittili dagli scavi tra Palatino, Velia e valle del Colosseo. VII-IV secolo a.C.,* C. Panella, C. Rescigno, A.F. Ferrandes (eds.), pp. 291-298.

Capelli, C. (2016). I gruppi mineralogici. In *Ceramiche da contesti repubblicani del territorio di Ostia*, Immensa Aequora, Vol. 4, G. Olcese, C. Coletti (eds.), pp. 196–198.

Cuomo di Caprio, N. (2017). *Ceramics in Archaeology. From Prehistoric to Medieval times in Europe and the Mediterranean: Ancient Craftsmanship and Modern Laboratory Techniques.*

De Benedetti, Funiciello, A.A.R., Giordano, G., Diano, G., Caprilli, E., Paterne, M. (2008). Volcanology, history, and myths of the Lake Albano maar (Colli Albani volcano, Italy). *Journal of Volcanology and Geothermal Research*, Vol. 176, pp. 387-406.

Evans, J. (2007). Styles of Pottery Deposition at a Roman Rural Site in Hampshire. In *Roman Finds. Contexts and Theory*. Proceedings of a conference held at the University of Durham, R. Hingley and S. Willis (eds.), pp. 176-185.

Ferrandes, A.F. (2006). Produzioni stampigliate a figurate in area etrusco-laziale tra fine IV e III secolo a.C. Nuove riflessioni alla luce di vecchi contesti. *Arch. Classica*, pp. 73-132.

Fischetti, A.L. (2022). *Dalle Rotte alle Strade: infrastrutture e insediamenti nei Colli Albani dalle origini all'età romana.* Published PhD Thesis, University of Groningen, 339 pp.

Fischetti A.L. (2017). Un insediamento rustico ai margini del suburbio di Roma. In *Oltre Roma Medio Repubblicana. Il Lazio fra i Galli e la Battaglia di Zama*. Atti del Convegno Internazionale Rome, 7-9 giugno 2017, F. M. Cifarelli, S. Gatti and D. Palombi (eds.), pp. 391-396.

Di Giuseppe, H., Bousquet, A., Zampini, S. (2004). Produzione, Circolazione e uso della ceramica lungo il Tevere in epoca repubblicana. In *Mercator Placidissimus. The Tiber Valley in Antiquity. New research in the upper and middle river valley*, H. Patterson and F. Coarelli (eds.), pp. 587-612.

Gosden, C., Marshall, Y. (1999). The Cultural Biography of Objects. *World Archaeology*, Vol. 31.2, pp. 169-178.

Höpken, C., Fiedler, M. (2018). Roman Pottery in Ritual Contexts: Types, Fabrics and Manipulations. *Journal of Roman Pottery Studies*, Vol. 17, pp. 11-21.

Ionescu, C., Hoeck, V., Ghergari, L. (2011). Electron microprobe analysis of ancient ceramics: a case study from Romania, *Applied Clay Science*, Vol. 53.3, pp. 466–475.

Martens, M. (2007). Creating Order in Waste: Structured Deposits in Roman Times. In *Roman Finds. Contexts and Theory*, R. Hingley and S. Willis (eds.), pp. 150-155.

Merrifield, R. (1987). *The Archaeology of Ritual and Magic*. B.T. Batsford.

Olcese, G. (2003). *Ceramiche Comuni a Roma e in area romana: produzione, circolazione e tecnologia (tarda età repubblicana – prima età imperiale*). Mantova: Documenti di Archeologia, Vol. 28.

Olcese, G. (1990). Roman Coarse Ceramics from Albintimilium (Ventimiglia, Italy): an example of archaeometric and archaeological studies. In *International Symposium in Archaeometry*, E. Pernicka and G.A. Wagner (eds.), pp. 495-504.

Olcese, G., Coletti, C. (2016). *Ceramiche da contesti repubblicani del territorio di Ostia*. Immensa Aequora, Vol. 4. Edizioni Quasar: Roma.

Orton, C., Tyers, P., Vince, A. (1993). *Pottery in Archaeology*. Cambridge Manuals in Archaeology. London.

Peccerillo, A. (2017). *Cenozoic Volcanism in the Tyrrhenian Sea Region*, Springer, Berlin.

Peña, J.T. (2007). *Roman Pottery in the Archaeological Record*. Cambridge University Press. Cambridge.

Peña, J.T. (1992). Raw Material Use among Nucleated Industry Potters: The Case of Vasanello, Italy. *Archeomaterials,* Vol. 6, pp. 93–122.
Quinn, P.S. (2022). *Thin Section Petrography, Geochemistry, and Scanning Electron Microscopy of Archaeological Ceramics*. Archaeopress, Oxford.
Quinn, P.S. (2013). *Ceramic Petrography: the interpretation of archaeological pottery and related artefacts in thin section*, Archaeopress, Oxford.
Schuring, J.M. (1986). The Roman, early Medieval and Medieval coarse kitchen wares of the San Sisto Vecchio in Rome: continuity and break in tradition. *BABesh*, Vol. 61, pp. 158-207.
Schuring, J.M. (1987). Supplementary note to the Roman, early Medieval and Medieval coarsekitchen wares of the San Sisto Vecchio in Rome: the distribution of the fabrics. *BABesh*, Vol. 62, pp. 109-129.
Thierrin-Michael G. (2003). Petrographische Charakterisierung und Differentiation der römischen Produktion. In C*eramiche Comuni a Roma e in area romana: produzione, circolazione e tecnologia (tarda età repubblicana – prima età imperiale*), G. Olcese (ed.), pp. 55–59.
Ugolini, F.C., Dahlgren, R.A. (2002). Soil Development in Volcanic Ash. *Global Environmental Research,* Vol. 6.2, pp. 69-81.
Xanthopoulou, V., Iliopoulos, I., Liritzis. I. (2020). Characterization techniques of clays for the archaeometric study of ancient ceramics: a review. *Scientific Culture*, Vol. 6.2, pp. 73-86.
Warr, L.N. (2021). IMA–CNMNC approved mineral symbols. *Mineral Mag*, Vol. 85.3, pp. 291–320.