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PRODUCTION TECHNOLOGY AND TRADE OF 4TH–1ST CENTURIES BC COOKING JARS FROM THE PONTINE REGION IN SOUTHERN LAZIO (ITALY)

Previous research conducted as part of the Pontine Region Project in southern Lazio has indicated that 4th–1st centuries BC cooking jars from the low-lying central part of this region were obtained through regional and supra-regional trade networks. Building upon this, the present paper examined cooking jars from three micro-regions within the Pontine region, i.e., the coastal area, the central plain and the foothills of the Lepini Mountains respectively, to reconstruct their production technology and trade networks.

The results indicate that the cooking jars from the three micro-regions occur in six compositions; four seem to have been imported from production areas either from the north (e.g., Rome and Tiber Valley) or from the south (e.g., Bay of Naples), while two compositions might have been produced in the Pontine region. Possible changes in the relative supply of cooking jars are traced and different trade routes to and within the three micro-regions are proposed.

Cooking jars – Production Technology – Trade – Thin Section Petrography – Pontine region (southern Lazio)

Introduction

The Pontine region is situated ca. 60 km south of Rome. It consists of a coastal plain, which is bounded by the Alban Hills and the Lepini and Ausoni Mountains to the north and east, and by the Tyrrhenian Sea to the west and south. The central part of the plain, known as the Pontine marshes, was reclaimed and opened with the construction of the *Via Appia* in the late 4th century BC (De Haas 2017a; Tol et al. 2021a). From then onwards, this area became densely populated with mostly small farms, whereas roadside settlements developed at *Ad Medias* and *Forum Appii* (fig. 1).

Preliminary research conducted as part of the Pontine Region Project has indicated that some cooking jars from *Ad Medias* and *Forum Appii*, dated between the 4th and 1st centuries BC, were locally produced, while most jars were obtained through regional and supra-regional trade networks (Borgers et al. 2017). Building upon this, two projects, which are carried out at the Universities of Vienna and Uppsala (by the first and second author respectively), examine cooking jars that have been collected during field surveys in three micro-regions of the study area. These include the coastal area east of *Antium* (Attema, De Haas and Tol 2011; Tol 2012; around present-day Anzio), the low-lying central plain (Tol and De Haas 2017) and the foothills of the Lepini Mountains south of *Norba* (De Haas, Attema and Tol 2012). The objectives of this study are twofold: the first is to identify the composition of the cooking jars, to gain insight in their production technology, and the second objective is to evaluate changes in their relative supply and propose possible trade routes to and within the three micro-regions.

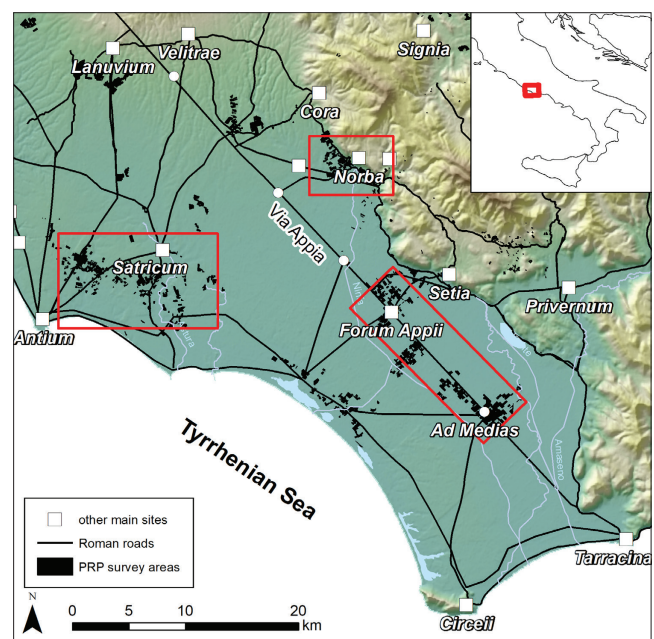


Fig. 1. The Pontine Region in southern Lazio, with indication of main Roman sites and infrastructure and the three micro-regions (in rectangles).

Method

A total of 80 samples of cooking jars (*ollae*), which occur on a wide range of rural sites in the Pontine region (e.g., Tol 2012, chapter 5, site 15106), dated between the 4th and 1st centuries BC, have been selected. They comprise two

types of jars: The first corresponds to Olcese's olla type 2 (Olcese 2003) and is defined by a high collared rim (**fig. 2a**). It occurs in the study region between the 4th and 3rd centuries BC (Mid-Republican period), and its distribution is mainly confined to Tyrrhenian central Italy. The second type corresponds to Olcese's type 3a (Olcese 2003) and displays an almond-shaped rim (**fig. 2b**). This shape occurs in the region between the 2nd and 1st centuries BC (Late Republican period). While very common in central Italy (Olcese 2003), this shape is also found on sites in northwestern Italy, southern Gaul and northeastern Spain (Olcese 1996), perhaps piggy-backing on the Late Republican central Italian wine trade as exemplified by the specimens recovered from the La Ciotat 3 wreck (Long, Volpe and Turchiano 2003).

In the first step, sherds were examined in hand specimen (macroscopic observation) and in thin section petrography (microscopic analysis). Using these techniques, it was possible to identify compositional groups or 'fabrics' and reconstruct the production technology, including raw materials (e.g., clay), paste recipe (e.g., temper), forming technique and firing technology (e.g., atmosphere). The interior base and colour of the jars were examined in hand specimen to identify the forming technique (Cuomo di Caprio 2017) and firing technology (Orton, Tyers and Vince 1993). For microscopic analysis, all samples were prepared as standard thin sections. Analysis of the thin sections focused on characteristics of the matrix, inclusions and voids for the identification of the raw materials, paste recipe and firing technology (Quinn 2013).

In the second step, the fabrics were compared with published work (including, e.g., Bertoldi 2011; Borgers 2022; Borgers, Tol and De Haas 2017; Capelli 2016; Thierrin-Michael 2003), to indicate possible areas of origin and infer trade networks of the cooking jars in the Pontine region and southern Lazio more widely. Possible changes in the supply of the cooking jars between the 4th–3rd centuries and the 2nd–1st centuries BC were evaluated to propose possible routes that may have been used to provision cooking jars to the three micro-regions. The results will be presented below.

Results

Macroscopic Analysis

Most cooking jars display spiral rhythmic grooves on the interior base. About half of the samples analysed are defined by a homogeneous reddish colour in hand specimen, indicating that they have been fired in a well-controlled atmosphere. Several other samples display a 'sandwich' colour, defined either by a grey core and reddish rim or by a reddish core and grey rim, while few samples are uniformly grey.

Microscopic Analysis

Six main fabric groups have been identified among the 80 samples studied (**table 1**). The main characteristics of each group will be summarised below.

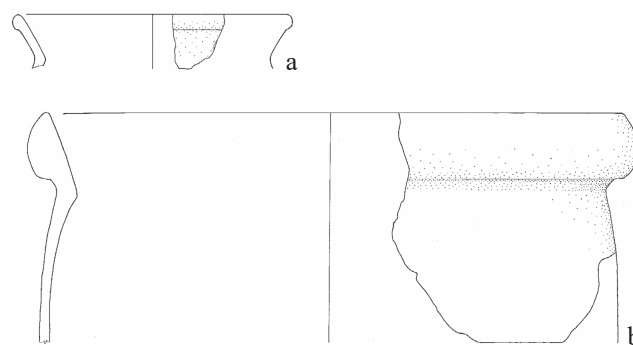


Fig. 2. Cooking jars (*ollae*) of (a) Olcese type 2 with rim diameter measuring 14 cm, and (b) Olcese type 3a with rim diameter measuring 29 cm (Olcese 2003), circulating in the Pontine region between the 4th–1st centuries BC.

With 34 samples ($n = 34$), Fabric 1 is the largest fabric group. It is defined by dominant sub-angular to rounded clinopyroxene, with common K-feldspar and iron-rich pellets ($< 2\text{--}3\text{ }\mu\text{m}$). Some biotite and quartz, as well as rare leucite and chert ($< 1.50\text{--}2\text{ }\mu\text{m}$), have also been identified. These coarse inclusions comprise between 10 and 30% of the matrix and seem to have been added as temper (**fig. 3a**). Both Olcese types 2 and 3a occur in this fabric. Fabric 1 has also been attested in Rome (Bertoldi 2011; Borgers 2022) and Ostia (Capelli 2016).

Fabric 2 ($n = 7$) is characterised by coarse quartz, clinopyroxene and K-feldspar, with common chert, biotite, and iron-stained chert. All these inclusions are rounded and comprise ca. 30% of the matrix, indicating that they have been deliberately added (**fig. 3b**). Only Olcese type 2 jars occur in this composition. This fabric shares broad similarities with the composition of the pottery that was produced at *Satricum* (Attema et al. 2003).

Fabric 3 ($n = 23$) is defined by coarse K-feldspar and quartz, while rare clinopyroxene and plagioclase complete the spectrum of coarse inclusions. As these coarse inclusions comprise ca. 30% of the matrix, they are likely to have been added (**fig. 3c**). Both types of cooking jars occur in this compositional group. Fabric 3 bears similarities to the 'Rome and Tiber Valley Fabric' (Olcese 2003) and has been found in Rome (Thierrin-Michael 2003).

Fabric 4 ($n = 2$) is defined by a fine fabric, with rare angular sanidine, clinopyroxene and igneous rock fragments. The clay is defined by numerous volcanic glass inclusions. Only Olcese type 3a jars occur in this composition (**fig. 3d**).

	Fabric 1	Fabric 2	Fabric 3	Fabric 4	Fabric 5	Fabric 6	Total
Type 2	26	7	7	0	4	5	49
Type 3a	8	0	16	2	1	4	31
Total	34	7	23	2	5	9	80

Tab. 1. Summary of the 80 samples analysed in thin section petrography and grouped per fabric and type.

To the authors' knowledge, Fabric 4 has not been identified elsewhere. The fabric has been compared with the geological background of the study area and combined with raw materials prospection, permitting to suggest that this fabric might have been produced at or near *Norba* (Borgers et al. 2023).

Fabric 5 ($n = 5$) is dominated by quartz in two size ranges (between 1.5–3 μm , and $> 4 \mu\text{m}$), accompanied by few feldspar, clinopyroxene and igneous rock fragments in large sizes up to 17 μm . The inclusions comprise 10 to 15% of the matrix, with the large quartz inclusions likely to have been added as temper (Fig. 3e). All the samples have an orange slip. Both Olcese types 2 and 3a cooking jars are present in this group. Based on the inclusions, this fabric likely originates in the central Italian Volcanic Province, extending from the northeast of Rome and the Alban Hills in southern

Lazio to the Bay of Naples in Campania (Peña 1992: 97, fig. 4; Verhagen, in prep.).

Fabric 6 ($n = 9$) is defined by coarse sub-rounded to rounded quartz combined with varying amounts of igneous rock fragments (granite), complemented with K-feldspars. Inclusions vary between 15 and 25% (fig. 3f). Both types of cooking jars occur in this fabric. Fabric 6 has similarities to fabrics attested in Rome (Bertoldi 2011) and Vasanello (Peña 1992: 113–114).

Production Technology

The results of the macroscopic and microscopic examination of two types of cooking jars (e.g., Olcese types 2 and 3a)

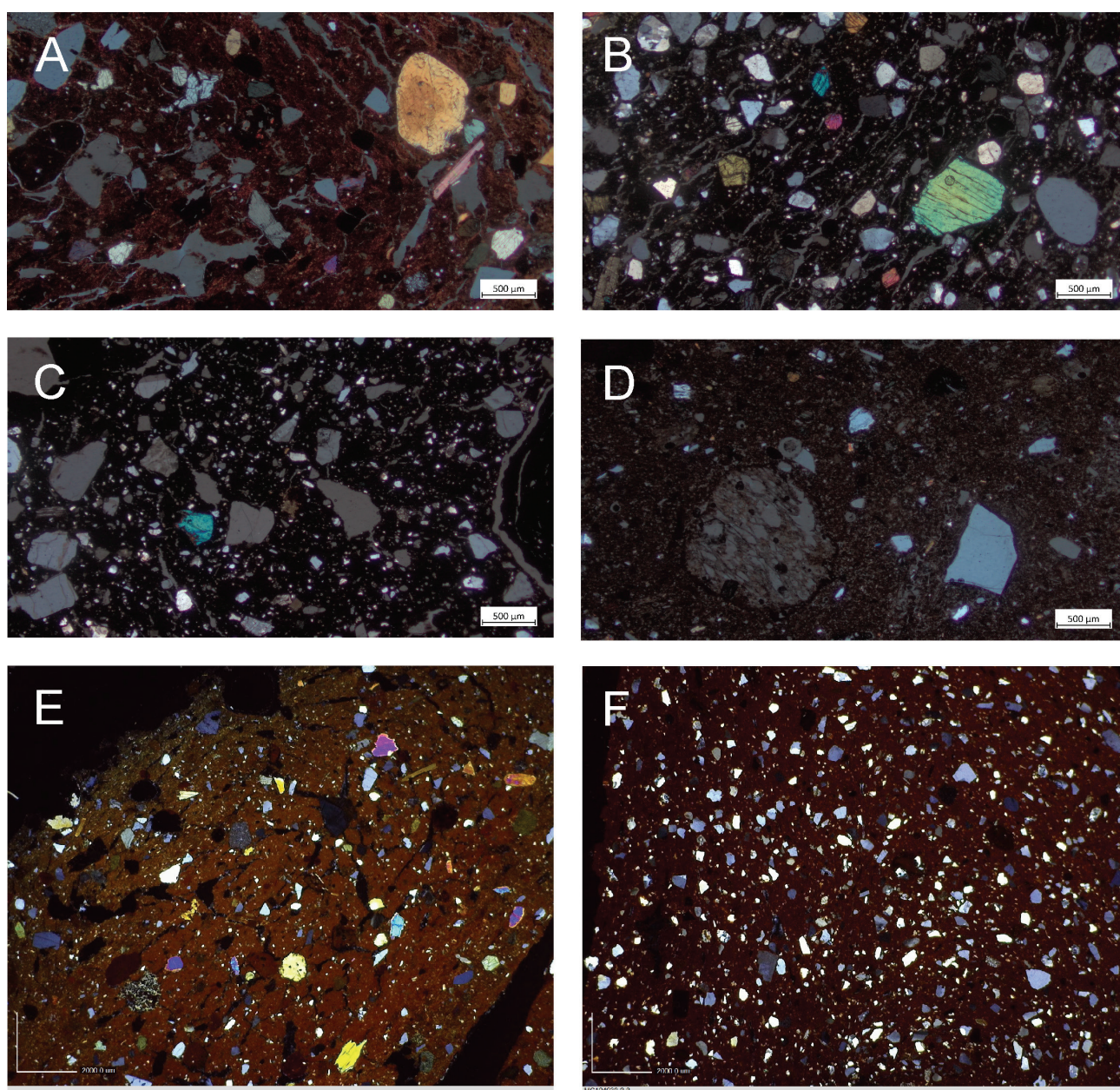


Fig. 3. Thin section micrographs of (A) Fabric 1, (B) Fabric 2, (C) Fabric 3, (D) Fabric 4, (E) Fabric 5 and (F) Fabric 6.

from three micro-regions in the Pontine region indicate that they were produced with a red-firing (iron-rich) clay. The jars were thrown on the fast wheel, as suggested by the spiral grooves on the interior base. The colour of the jars permits to infer aspects of the firing atmosphere. More specifically, jars displaying a homogeneous reddish colour were fired in a well-controlled oxidising atmosphere, while jars with a ‘sandwich’ colour were fired in an incomplete oxidising atmosphere. Conversely, the jars with a homogeneous grey colour were fired in a reducing atmosphere. The main distinction between the jars, however, lies in the various paste recipes, e.g., the deliberate addition of temper.

Distribution Patterns

Careful study of the fabrics and their occurrence in the three micro-regions permits to confirm previously identified regional and supra-regional distribution networks

of both types of cooking jars (Borgers, Tol and De Haas 2017; **table 2**).

Of the 49 samples of Olcese type 2 jars, dated to the Mid-Republican period (4th–3rd century BC), the majority (42 samples) appears to have arrived in the three micro-regions of the Pontine region through supra-regional networks. More specifically, 26 samples belong to Fabric 1, while seven samples belong to Fabric 3, which is thought to belong to the ‘Rome and Tiber Valley’ Fabric. Both Fabrics 1 and 3 occur in all three micro-regions of the study area. In addition, the four samples of Fabric 5, which has a generic origin within the central Italian Volcanic Province, occur exclusively in the central plain, while the five samples of Fabric 6, which occurs at Vasanello and the Tiber Valley north of Rome, have been identified in the coastal region and the central plain. The seven remaining samples belong to Fabric 2, which might have been produced in the Pontine region, most likely at *Satricum*. This fabric has been found in the coastal region and south of *Norba* (**fig. 4**).

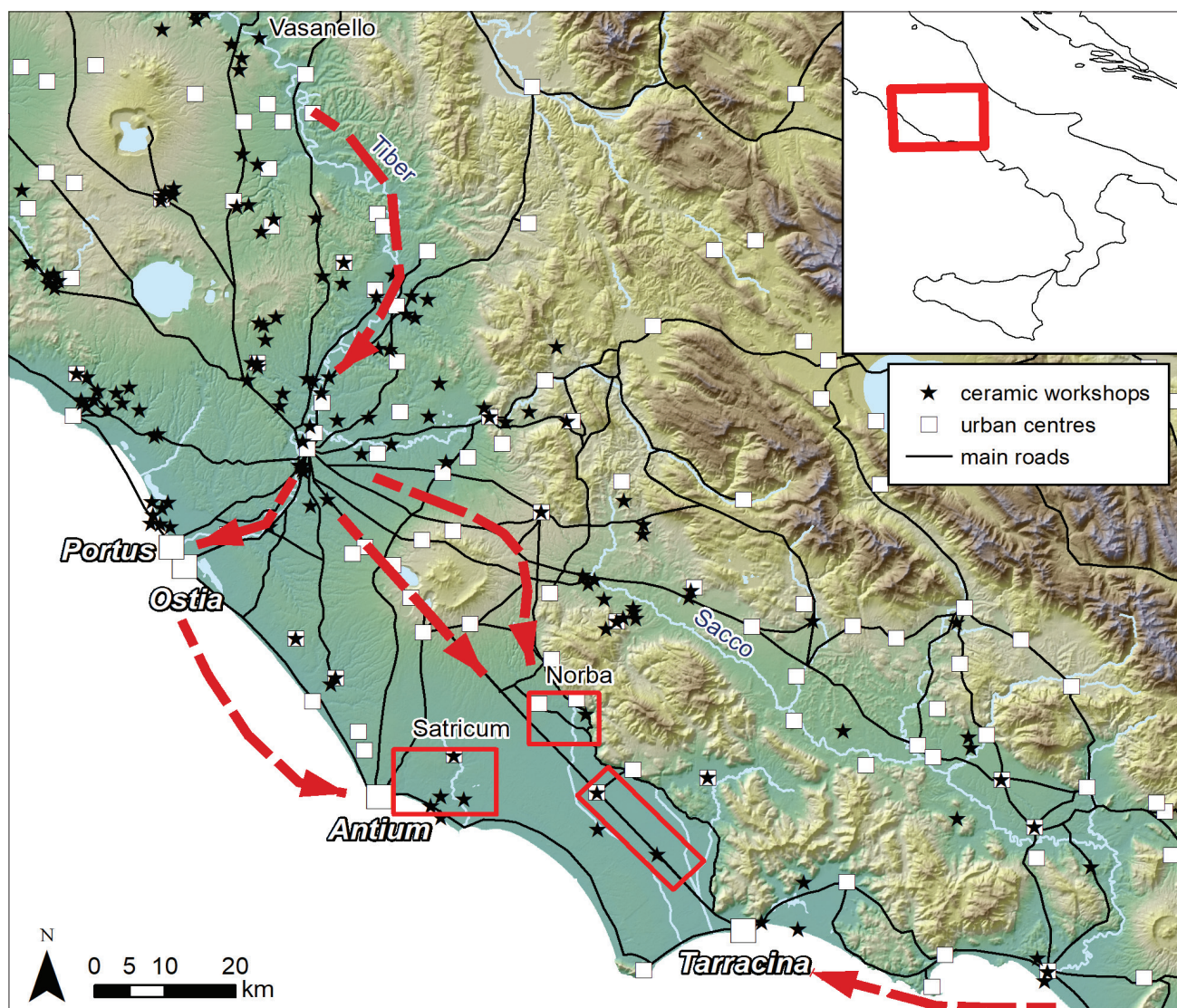


Fig. 4. Map showing the possible trade routes of cooking jars, which circulated in the Pontine region between the 4th–1st centuries BC.

	OLLA TYPE 2			OLLA TYPE 3A		
	coastal area	central plain	Lepini foothills	coastal area	central plain	Lepini foothills
Fabric 1	1	4	21	3	3	2
Fabric 2	4	0	3	0	0	0
Fabric 3	3	3	1	10	3	3
Fabric 4	0	0	0	0	0	2
Fabric 5	0	4	0	0	1	0
Fabric 6	3	2	0	0	4	0

Tab. 2. Distribution of 4th–1st century BC cooking jars (*ollae*) within the three micro-regions of the Pontine region.

A similar, albeit slightly more complex, picture emerges for the Late Republican period (2nd–1st centuries BC). Of the 31 samples of Olcese type 3a jars, 29 appear to have been imported in the Pontine region. More specifically, eight samples belong to Fabric 1, while 16 samples belong to Fabric 3. Both Fabrics 1 and 3 occur in all three micro-regions of the study area. In addition, 1 fragment belongs to Fabric 5, and 4 samples belong to Fabric 6. Both Fabrics 5 and 6 occur exclusively in the plain during this period. The two remaining samples belong to Fabric 4, which has been identified around *Norba* only and is thought to have been produced at or near this colonial town.

In summary, the supra-regional networks that were in place during the Mid-Republican era continued to exist during the Late Republican period. However, a change in regional networks within the Pontine region seems to have taken place, following on from changes in the activity of production centres. More specifically, pottery production at *Satricum* ceased by the 3rd century BC (Attema et al. 2003). This was followed by the start of ceramic manufacture near *Norba* (Borgers et al. 2023) and by the production of a variant of type 3a cooking jars, defined by a flattened rim and calcite temper, at or near *Ad Medias* in the central plain (Borgers, Tol and De Haas 2018). This variant with calcite temper has not been identified among the 80 samples analysed in this study, hinting at a local imitation of cooking jars that circulated in southern Lazio (Tol and Borgers 2016).

A dense infrastructural network accommodated the distribution of the two types of cooking jars. The import of cooking jars of the ‘Rome and the Tiber Valley’ fabric and wider central Italian Volcanic Province could have taken place along various routes, both by road and sea. For instance, cooking jars of the ‘Rome and the Tiber Valley’ fabric may have been transported on the Tiber River and then by road to the Pontine region through the Sacco valley or the *Via Appia*. Alternatively, cooking jars might have arrived in the Pontine region through the ports of Rome (e.g., Ostia) or *Antium*, and then distributed within the area by road. It is tentatively suggested that Fabric 5 was imported from the Bay of Naples in Campania, given its exclusive occurrence in the southernmost central plain (Verhagen in prep.). Cooking jars with this fabric might have been transported by sea and

arrived through the port of *Tarracina* (present-day Terracina). The continued use of similar coastal and inland trade routes was recently demonstrated for *terra sigillata* pottery dated to the Early Imperial period (Tol, De Haas and Attema 2021b). For regional trade, a combination of longitudinal routes (e.g., the *Via Pedemontana* and the *Via Appia*) and transversal connections between the Lepini Mountains, the *Via Appia* and coastal area will have accommodated the distribution of the various products between the three micro-regions (**fig. 1**; De Haas 2017b; Tol, De Haas and Attema 2021b).

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