



The Production and Distribution of Pottery at Pompeii: A Review of the Evidence; Part 2, the Material Basis for Production and Distribution

Author(s): J. Theodore Peña and Myles McCallum

Source: *American Journal of Archaeology*, Vol. 113, No. 2 (Apr., 2009), pp. 165-201

Published by: [Archaeological Institute of America](#)

Stable URL: <http://www.jstor.org/stable/20627566>

Accessed: 09-11-2015 16:04 UTC

REFERENCES

Linked references are available on JSTOR for this article:

http://www.jstor.org/stable/20627566?seq=1&cid=pdf-reference#references_tab_contents

You may need to log in to JSTOR to access the linked references.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.



Archaeological Institute of America is collaborating with JSTOR to digitize, preserve and extend access to *American Journal of Archaeology*.

<http://www.jstor.org>

The Production and Distribution of Pottery at Pompeii: A Review of the Evidence; Part 2, The Material Basis for Production and Distribution

J. THEODORE PEÑA AND MYLES McCALLUM

Abstract

This study, in two parts, reviews the evidence from Pompeii for the production and distribution of pottery. Part 1 (*AJA* 113 [2009] 57–79) considers the production of pottery. Part 2, the present article, examines the material basis for pottery production at Pompeii (i.e., the availability and use of the raw materials) and its distribution. A consideration of the raw materials for pottery production available in the greater Pompeii region and the compositional characteristics of pottery from Pompeii permit some general observations about where these vessels were likely manufactured. While a large portion was probably produced at or near Pompeii, substantial numbers of vessels, including thin-walled wares, lamps, and amphoras, were probably manufactured elsewhere in the region. Non-amphora pottery was probably distributed to consumers at Pompeii by three methods: sale at the workshop, sale at a shop, and sale by a peddler. Some classes of non-amphora pottery imported from outside the region are abundant enough to suggest that they reached Pompeii via regularly functioning distribution mechanisms involving middleman merchants and/or the captains/crews of merchant ships. Other classes of imported non-amphora pottery that occur in only small quantities probably arrived via less regular mechanisms. Wine and fish products originating in the territory of Pompeii were probably packaged in amphoras at facilities located along the coast, and newly manufactured amphoras were probably transported to these establishments for filling from production facilities elsewhere. Pompeii may well be anomalous for the large portion of its pottery that was manufactured beyond the immediate environs of the town.*

* The information regarding the use of raw materials among traditional potters in Campania was collected by J. Theodore Peña in the course of a grant held through the USIA Exchange Grant program while he was a member of the faculty of the University at Albany, SUNY. He undertook the neutron activation analysis (NAA) of the clays collected as part of this work while holding a postdoctoral fellowship in archaeological materials analysis at the Smithsonian Institution's Conservation Analytical Laboratory under the supervision of M. James Blackman and Pamela Vandiver, to whom he would like to express his appreciation for their support.

INTRODUCTION

Pottery represents the most abundant category of portable material culture in the archaeological record of the Roman world, and studies of the pottery industry have played a major role in efforts to elucidate both the craft and agricultural sectors of the Roman economy. Given the importance of pottery studies, it is surprising that there is no systematic review of the evidence for the production and distribution of pottery from that richest of Roman archaeological sites, Pompeii. This two-part article redresses this situation by assembling and interpreting the Pompeian evidence, considering both what it tells us about specific aspects of the production and distribution of pottery at Pompeii and about the pottery industry in the Roman world more generally. Part 1, which appeared in a previous issue of the *AJA*, reviewed the evidence for the production of pottery at Pompeii.¹ Part 2, the present article, reviews the evidence for the availability and use of raw materials for the production of pottery at Pompeii and the evidence for the distribution of pottery to and within the town.

To provide a geographical context, a conjectural reconstruction of the immediate economic territory of Pompeii during the Roman period was produced using the Thiessen polygon method (fig. 1). This territory, here termed the "Pompeii service area" (PSA) and defined as the territory for which Pompeii served as the

He would also like to express his appreciation for generous assistance provided by the staff of the Map Library at the University of Michigan's Harlan Hatcher Graduate Library, and the staff of the John Miller Burnam Classical Library at the University of Cincinnati. Myles McCallum would like to thank Christopher Parslow for providing unpublished photographs of a deposit of Schöne 6 table amphoras recovered in excavations carried out under his direction at the Praedia Iuliae Felicis.

¹ Peña and McCallum 2009.

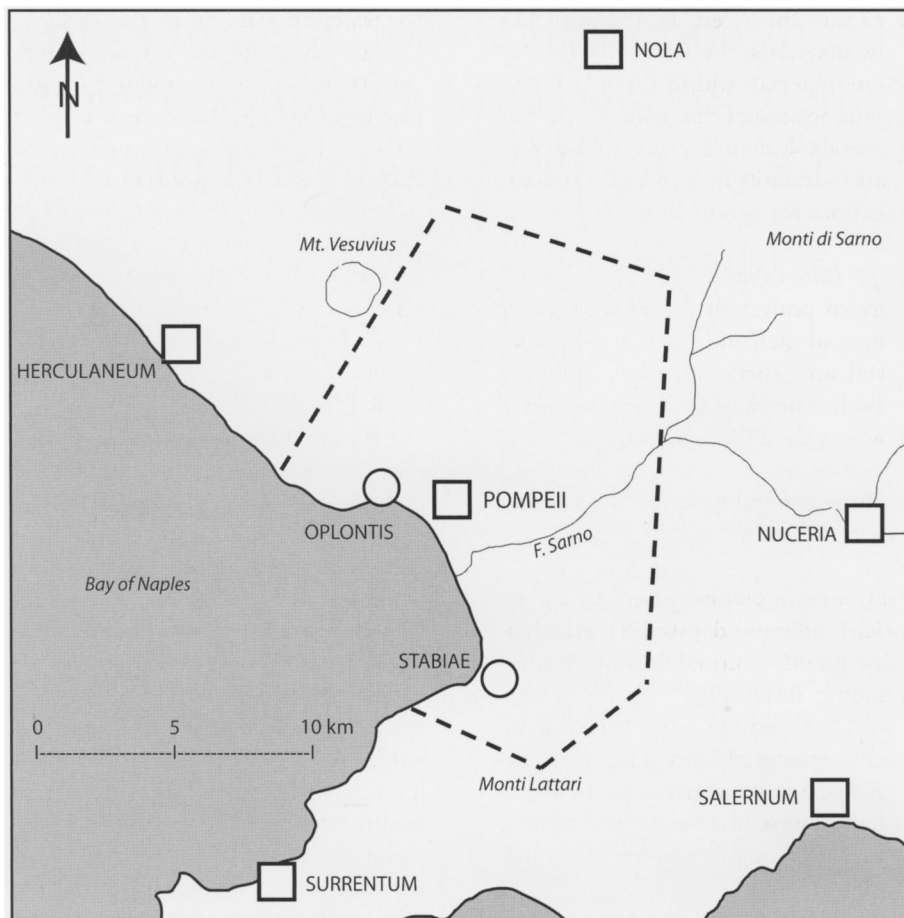


Fig. 1. Map of the southern side of the Bay of Naples, showing conjectured Pompeii service area.

principal local market center, is taken to correspond to the area around Pompeii that lay closer to the town in straight-line distance than it did to any of the five municipalities that were Pompeii's closest neighbors: Herculaneum, Nola, Nuceria, Salernum, and Surrentum.² This territory covers an area of approximately 200 km². Given the modest distances that separated Pompeii from its closest neighbors (Herculaneum: ca. 15 km; Nola: 22 km; Nuceria: 14 km; Salernum: 28 km; Surrentum: 18 km) and the well-developed road system, it seems likely that consumers, middlemen, and producers located in virtually any part of the PSA easily could have engaged in buying or selling at these other towns. For this reason, the combined service areas of Pompeii and these five municipalities are taken to con-

stitute what is here termed the "Pompeii extended economic territory" (PEET). The service area of Salernum was probably somewhat less closely integrated into this territory than the service areas of the other four municipalities because of the greater distance that separated Salernum from Pompeii and the tortuous nature of both the land and sea routes connecting the two towns. Pottery produced within the PSA is here termed "local," while that produced elsewhere within the PEET is termed "perilocal," and that produced outside the PEET is termed "imported."

THE MATERIAL BASIS FOR POTTERY PRODUCTION

The types of pottery manufactured within the PEET and the location of this production would have been

²Stabiae, destroyed during the Social War and not restored as a settlement center prior to 79 C.E., is not here taken into consideration. For an effort to define the Pompeii service area that recognizes Stabiae as a market center, see Purcell 1990, 112–13. For the boundaries of Pompeii's administrative territory, see Iorio 1992; Soricelli 2001.

determined to a significant extent by the availability of necessary raw materials. We first consider the distribution of these materials within the PEET and then examine the compositional characteristics of the various pottery classes likely manufactured within this territory, attempting to identify the raw materials employed and the locations for production.

The Raw Materials for Pottery Production

The manufacture of pottery in the Roman world required clay, water, and fuel, and regularly required tempering material and surfacing material (i.e., slip or glaze). As both water and fuel were probably broadly available across the PEET, they are not here considered.

Clay. There are three general types of clay available to potters working in the coastal zones of Campania (fig. 2):³

1. Marine clays: Generally extensive beds of argillaceous (clay-rich) sediment deposited on the seafloor and subsequently exposed through marine regression, folding, or faulting.
2. Volcanic clays: Localized deposits of unconsolidated argillaceous material formed by the in situ weathering of volcanic formations, the weathering of these in the course of downslope transport, or their alteration through exposure to hydrothermal activity.
3. Fluvio-lacustrine clays: Beds of argillaceous sediments of widely varying sizes deposited in stream and river channels, river floodplains and estuaries, and lake basins.

Marine clays are typically fine grained, calcareous, and highly plastic, with a low rate of shrinkage. These characteristics are well suited for the manufacture of fine, wheel-thrown forms and moldformed vessels.⁴ As the presence of calcium promotes the sintering of slips and the adhering of glazes while reducing a vessel's resistance to thermal stress, marine clays are well suited for the manufacture of gloss-slipped and glazed wares but unsuitable for cookwares. The fine texture of marine clays also makes them less suitable for the manufacture of forms with thick walls, as it is difficult

for water to migrate to the surface during drying. Volcanic clays, in contrast, are generally coarse, non-calcareous, and only moderately plastic, with a high rate of shrinkage. They are well suited for the manufacture of cookwares and thick-walled forms, such as storage vessels, but poorly suited for the production of delicate, wheel-thrown forms, moldformed vessels, and vessels requiring a gloss slip or glaze. The texture and properties of fluvio-lacustrine clays vary considerably, as these are determined by the lithology of the formations that make up the drainage basin in which they were deposited and both the morphology and hydrology of the basin. The Romans made a distinction between fine-grained, calcareous clays, such as marine clays, and coarser, generally more ferruginous clays, such as volcanic clays and many fluvio-lacustrine clays, terming the former *creta* and the latter *argilla*.⁵

The only sources of marine clay documented in the PEET are two exposures of the *M*⁵⁻⁴ formation, a deposit of Miocene date, located in the service area of Salernum (fig. 3). One of these is situated near Ogliara, a village in the foothills of the Monti Picentini, about 3 km northeast of Salerno (Roman Salernum) and about 28 km east-southeast of Pompeii.⁶ This outcrop has been intensively exploited for the manufacture of pottery and architectural ceramics since at least the 18th century; and throughout much of the 20th century, it was probably the most important source of commercially distributed potting clay in Campania. This clay was utilized by the *faenzari* of Vietri sul Mare for the manufacture of their renowned maiolica. It is less than ideal for the manufacture of ceramics on account of its high rate of shrinkage. One traditional potter working at Cerreto Sannito, in the province of Benevento, for example, indicated that he considered the commercially distributed clay from Montelupo Fiorentino, in Tuscany, to be superior, as vessels made from clay from the *M*⁵⁻⁴ formation tend to crack if dried in the sun.⁷ The maiolica producers at Vietri sul Mare overcame this shortcoming by adding chamotte (temper consisting of ground ceramic) to their ceramic paste.⁸ The producers of architectural ceramics currently active at Ogliara address this prob-

³ Mattias and De Casa 1974, 148–49; Ricq de Bourd et al. 1989, 258–61. The *Carta Geologica d'Italia*, at a scale of 1:100,000, provides a useful generalized overview of the potential distribution of potting clays in the PEET. This fundamental source is now available online at http://www.apat.gov.it/Media/carta_geologica_italia/default.htm (see esp. “Salerno,” “Ischia-Napoli,” “S. Angelo de’ Lombardi,” “Sorrento-I. di Capri,” “Amalfi”).

⁴ On the properties of marine and volcanic clays, see Peña 1992, 99–102, 105–14.

⁵ For this distinction, see Cato *Arg. Orig.* 402. For the tendency of Latin speakers to confuse these two terms, see Columella *De re rustica* 3.11.9.

⁶ See *Carta Geologica d'Italia* (“Salerno”) (http://www.apat.gov.it/Media/carta_geologica_italia/default.htm).

⁷ G. Barbieri, pers. comm. 1991. Barbieri is a traditional potter working at Cerreto Sannito.

⁸ A. D’Arienzo, pers. comm. 1991. D’Arienzo is a retired maiolica maker who had worked at Vietri sul Mare.

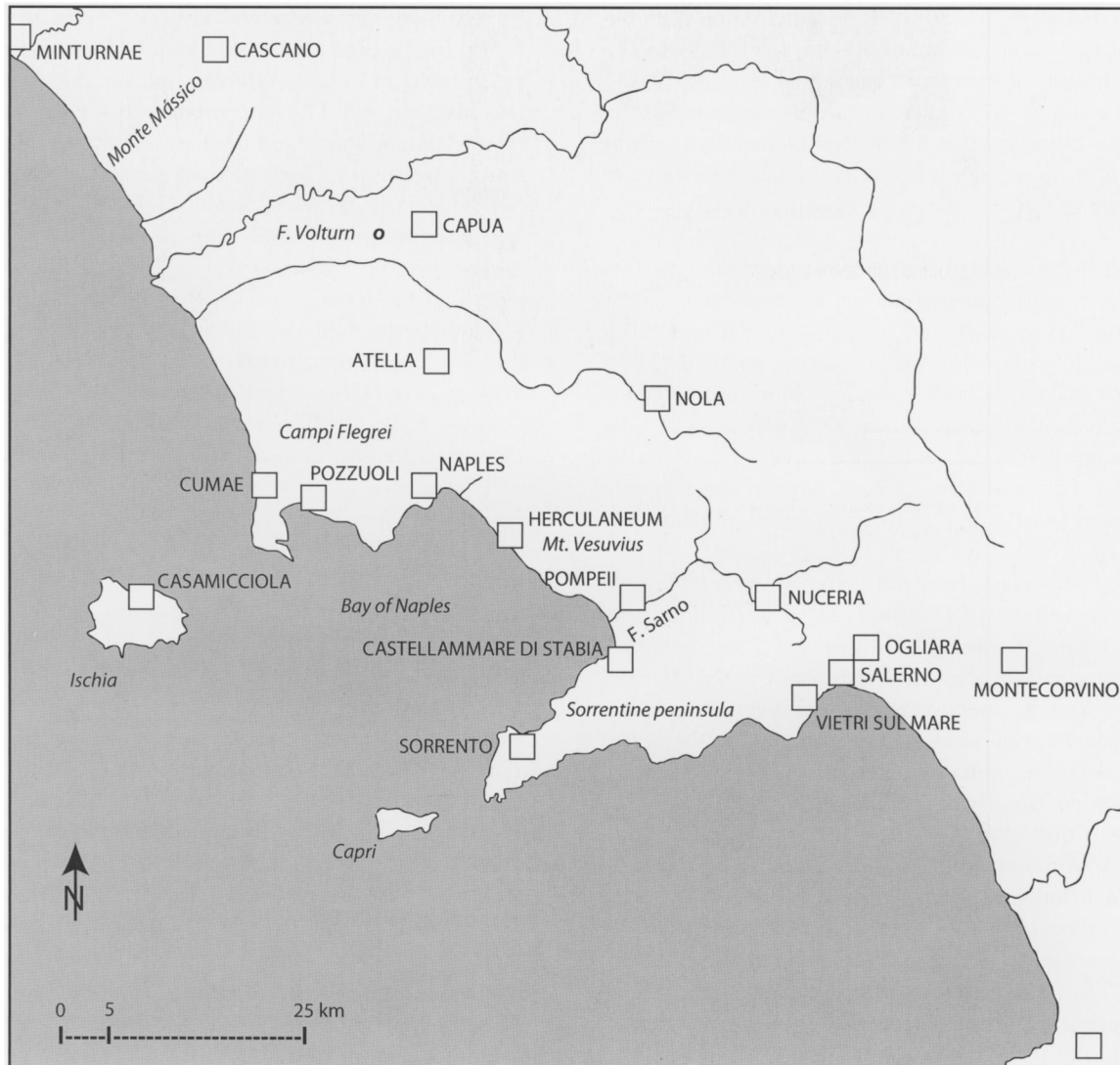


Fig. 2. Map of coastal Campania, showing locales and geographical features discussed in the text.

lem by mixing Ogliara clay with a coarser, less plastic clay from Ogliastro, in the Cilento, in a ratio of 3:1, adding a slight amount of clay imported from the area of Cagliari, in Sardinia.⁹

The other documented source of marine clay in the PEET is an outcrop of the same M^{5-4} formation located immediately to the west of Montecorvino, about 14 km east-northeast of Salerno and 39 km east of Pompeii.¹⁰ This outcrop also has been intensively exploited for

the manufacture of both architectural ceramics and pottery in the modern period. The high shrinkage rate of Montecorvino clay has meant that it is necessary to mix it with other materials to obtain a suitable ceramic paste. At Ceramica San Martino, an industrial-scale concern at Montecorvino that produces both wheel-thrown and moldmade pottery, potters employ a mixture of Montecorvino clay and Ogliastro clay in a ratio of 4:1,¹¹ while at the Vianova concern, which

⁹T. De Martino, pers. comm. 1991. De Martino is co-operator of the Fratelli De Martino concern. The Fratelli De Martino establishment, which is adjacent to the Ogliara outcrop, extracts clay from it for the manufacture of architectural ceramics and also distributes it commercially.

¹⁰ See *Carta Geologica d'Italia* ("S. Angelo de' Lombardi") (http://www.apat.gov.it/Media/carta_geologica_italia/default.htm).

¹¹ A. Caputo, pers. comm. 1991. Caputo is a potter employed at Ceramica San Martino.

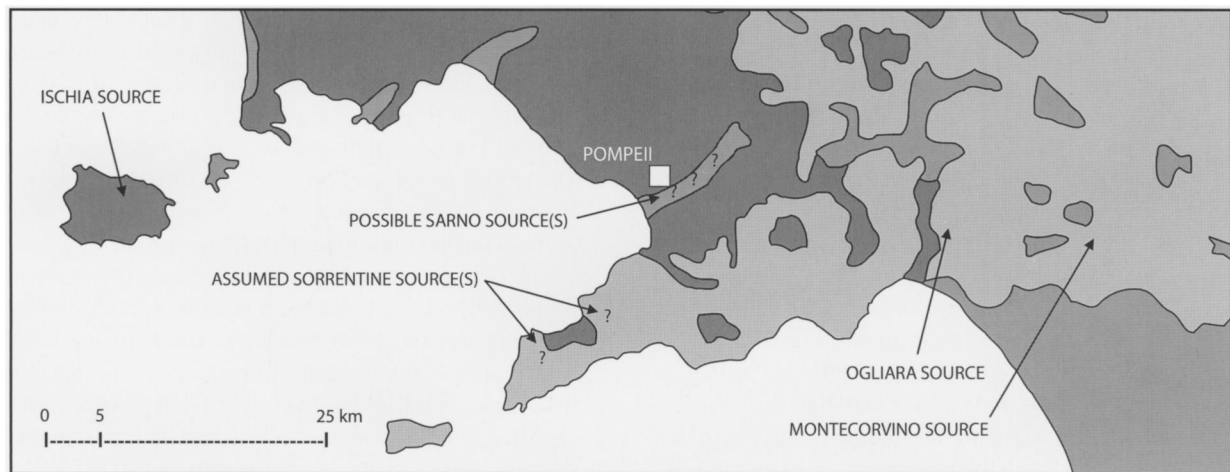


Fig. 3. Map of the Bay of Naples and adjacent areas, showing gross geology and clay sources. Dark-toned areas: volcanic formations; medium-toned areas: recent alluvium; light-toned areas: sedimentary formations (adapted from Servizio Geologico d'Italia 1978, foglio 3).

manufactures architectural ceramics and *orci* (large storage jars), Montecorvino clay is mixed with temper consisting of what is termed ground *tufo*.¹²

For this study, Peña collected five specimens of Ogliara clay and two specimens of Montecorvino clay, characterized these for their color in both raw and fired states, and assayed them in both raw and fired states for their chemical composition by means of neutron activation analysis (NAA). The results are presented in the appendix. The clays proved to be moderately to highly calcareous (i.e., with calcium values in the 7–10% range in the raw state and 9–13% in the fired state). At Ogliara, the concentration of calcium is inversely correlated with elevation above sea level. Other than the dilution effect associated with this phenomenon, there appears to be only modest compositional variability over the portion of the formation exposed at this outcrop.¹³ The Montecorvino specimens are generally similar to these. Clays from both outcrops are gray (5Y 5/1) in the raw state and fire to a pink color (4.5YR 6.5/4) in an oxidizing atmosphere, reflecting the moderate to high concentration of calcium.

Turning to volcanic clays, the alkaline (quartz-poor) formations characteristic of the Central Italian volcanic province, including the Somma-Vesuvius volcanic complex, are subject to argillification (alteration to

clay minerals) as a result of normal weathering processes.¹⁴ This has led to the formation of more or less extensive beds of argillaceous material in many locales. In some cases, these are large enough that during the modern period, they have been intensively exploited for commercial pottery production. At Cascano, near Sessa Aurunca, in northern Campania, for example, a cookware industry that markets its products over much of northern Campania and southern Lazio employs clay obtained from a deposit consisting of argillified material belonging to a formation of the Roccamonfina volcanic complex.¹⁵ Potters at Cascano assert that this deposit is unique within the region and yields clay with properties that allow them to produce cookwares with performance characteristics superior to those manufactured elsewhere.¹⁶ A similar phenomenon occurred at Vasanello, in northern Lazio, where a modern cookware industry thrived, employing volcanic clay obtained from a deposit consisting of argillified material belonging to a formation of the Vican volcanic complex.¹⁷ In the Bay of Naples region, it seems likely that the Campanian Cookware industry, which appears to have operated at or near Cumae from the second century B.C.E. to the third century C.E., exploited a deposit of volcanic clay situated somewhere in the vicinity of the town that permitted the manufac-

¹² The origin of this *tufo* was not ascertained, and it is not certain that this term necessarily refers to material of volcanic origin.

¹³ For the chemical composition of marine clays from several sources in Lazio, Umbria, and Tuscany, see Peña and Blackman 1994.

¹⁴ Lenzi and Mattias 1978; Foss et al. 2002.

¹⁵ Hampe and Winter 1965, 48–9; Rocca 1982.

¹⁶ G. Vellone and C. Vellone, pers. comm. 1991. These are the operators of one of the two cookware workshops then active at Cascano.

¹⁷ Peña 1992.

ture of cooking vessels with outstanding performance characteristics.

Weathering processes operating on formations of the Somma-Vesuvius complex deposited prior to the eruption of 79 C.E. led to the formation of scattered deposits of clay suitable for the manufacture of pottery within the service areas of Pompeii, Herculaneum, Nola, Nuceria, and perhaps also Surrentum in the Roman period.¹⁸ Since these deposits were presumably localized and now probably lie buried under several meters of volcanic ejecta deposited in the 79 C.E. and subsequent eruptions, their identification is problematic. Worth noting is that excavation below the 79 C.E.–ground level within the walls of Pompeii has led to the identification of argillaceous deposits in two locations: the Casa di Sallustio (VI.2.4) and the garden at the rear of the Casa della Nave Europa (I.15.1–3).¹⁹

Peña collected one specimen of Cascano clay and two specimens of Vasanello clay, both volcanic clays, characterized them for their color, and assayed them for their chemical composition (see appx.). These clays are noncalcareous, with most of the elements assayed present in concentrations substantially greater than those attested for the Ogliara and Montecorvino clays, with the exceptions of chromium and strontium, which are mostly present in substantially lower concentrations. The values for most elements vary considerably among the specimens, including between the two specimens from Vasanello. This suggests that compositional variability is the result of not just differences in the chemical composition of the two volcanic formations from which these clays derive but also that these are nonhomogeneous materials that contain fragments of volcanic rock and mineral grains of volcanic origin of varying sizes and in varying concentrations. These clays are brown or yellowish brown (7.5–9.5YR 5–4/4–3) in the raw state and fire to red or light red (2YR 5.8/6) in an oxidizing atmosphere because of the combination of a moderate concentration of iron and the absence of calcium.

The channel of the Fiume Sarno and its associated floodplain, which today extends no more than 200–300 m to either side of the channel, are the only areas within the PEET likely to have contained sizable deposits of fluvio-lacustrine clay suitable for the manufacture of pottery during the Roman period. The Sarno Basin is composed on its northwestern flank of

volcanic formations belonging to the Somma-Vesuvius complex, while its southeastern flank and its northeastern head are composed of formations belonging to the Somma-Vesuvius complex in the area close to the river and of carbonate sedimentary formations (e.g., limestone) in the area more distant from the river.²⁰ While the Sarno has a low flow rate during the summer, torrential rains during the remainder of the year can produce substantially higher flows, resulting in periodic flooding. It thus appears likely that on occasion the river has been capable of transporting fairly coarse sediment, and that during the Roman period, its channel and floodplain contained deposits of both clay and sand. These likely consisted of a mixture of volcanic and carbonate sedimentary materials. As the clay deposits were presumably localized and may now lie buried under volcanic ejecta from 79 C.E. and subsequent eruptions of Vesuvius, their identification is problematic.

Textual evidence indicates that there were one or more clay sources in the vicinity of Sorrento (Roman Surrentum) that were exploited for the manufacture of pottery during the Roman period. An epigram attributed to Macedonius (*Anthologia Graeca* 11.27) and probably composed between the late 30s and early 50s C.E., lauds three specific kinds of clay, apparently for the benefits they provide mankind as the raw material for the manufacture of vessels for the storage and/or drinking of wine. Among these is Συρρέντου κονίη (earth of Surrentum), which it characterizes as τρηχεῖα (rough) and μυρίπνοε (sweet breathing). Passages in Pliny the Elder and Martial, discussed below, probably indicate that Surrentum was an important center for the manufacture of both amphoras and drinking vessels during the first century C.E. This production presumably involved the use of local clay. In all likelihood, the material in question was marine clay obtained from an undocumented outcrop. Worth noting in this connection is that much of the Sorrentine peninsula from the eastern edge of Sorrento westward to the promontory's western tip consists of exposures of the *Ol*₂ formation, a marine formation of the Middle to Upper Oligocene composed of sandstones interbedded with gray marls, shales, and marly limestones.²¹ This formation occupies a position in the stratigraphic column equivalent to that occupied by the *M*^{3–4} formation in the Salerno area, and it thus

¹⁸ The last major eruption of Mount Vesuvius prior to the eruption of 79 C.E. appears to have occurred about 700 years earlier (Sigurdsson 2007, 46).

¹⁹ Jashemski 1974, 393; Anecchino 1977, 107–8.

²⁰ For the Sarno Basin, see Regione Campania, Autorità di

Bacino del Sarno 2007.

²¹ See *Carta Geologica d'Italia* ("Sorrento-I. di Capri") (http://www.apat.gov.it/Media/carta_geologica_italia/default.htm).

seems possible that it contains beds of marine clay with an origin, composition, and working properties similar to those of Ogliara clay and Montecorvino clay.

Elsewhere in the broader Bay of Naples region, there are one or more important sources of potting clay on the island of Ischia. These belong to the *q1* formation, a littoral/marine formation of the Upper Pleistocene that is compositionally distinctive and includes a substantial amount of volcanic material derived from the weathering of formations belonging to the Phlegrean volcanic complex.²² An exposure of this formation on the northern slope of Monte Epomeo, above the town of Casamicciola, contains clay beds that have been intensively exploited for the production of both pottery and architectural ceramics during the modern period.²³ Sersale and Porcelli report data for the major chemical constituents of six specimens of argillaceous material from Ischia, presumably belonging to the *q1* formation.²⁴ Five of these displayed values for calcium in the 0.11–0.80% range, while the sixth registered a value of 10.00%.

A program of chemical analysis employing X-ray fluorescence (XRF) carried out by Picon yielded important information regarding the use of Ischia clay in antiquity.²⁵ This involved the analysis of examples of Campana A Black Gloss Ware from Ischia and presumably manufactured there using *q1* clay, Campana A wasters found at Naples (Roman Neapolis) and presumably manufactured there, and examples of Campana A from several consumption and shipwreck sites. These materials all displayed a distinctive composition, with group mean values for calcium in the 4% range—notably low for gloss-slipped pottery—and low values (relative to other Black Gloss Ware pottery, Ogliara clay, and Montecorvino clay) for nickel, chromium, and vanadium, and high values for potassium, zirconium, and cerium.²⁶ Cluster analysis failed to reveal any significant partitioning among the specimens, leading Picon to conclude that they had all been manufactured with Ischia clay.²⁷ These results thus not only suggest that Ischia clay was employed for pottery manufacture during antiquity but also that it was exported to Neapolis for use by at least one pottery workshop there.²⁸ The practice of export-

ing clay—probably highly uncommon in the Roman world—was likely motivated by the dearth or absence of clay suitable for the manufacture of fine-bodied pottery in the environs of Naples, the convenience and low cost associated with maritime transport, and that the manufacture of Black Gloss Ware required only modest amounts of clay relative to many other kinds of pottery production.

Slip. The slip employed for the manufacture of pottery within the PEET during the Roman period was presumably obtained by separating out a fine fraction of potting clay by means of levigation.

Tempering Material. Volcanic sand was probably available throughout the PEET (except perhaps within the Salernum service area, where volcanic formations occur over only a very limited area) during the Roman period, and it was likely the material of choice for the tempering of pottery. It would have been abundant and easy to procure along both the shore of the Bay of Naples and the channel of the Sarno.²⁹ Volcanic sand is well suited for use as tempering material, as the mineral grains and rock fragments of which it is composed expand at roughly the same rate as clay minerals when heated, limiting the amount of thermal stress to which vessels are subjected during firing. This property renders volcanic sand particularly useful for the tempering of cookwares, as these are subjected to repeated cycles of heating and cooling during use.

Pottery Fabrics and the Location of Pottery Production

Pottery assemblages of the Roman period from Pompeii generally contain vessels belonging to several distinct wares of probable or possible local or perilocal origin. These can be assigned to five general groupings: commonware, cookware, thin-walled ware, lamps, and amphoras. By evaluating the compositional characteristics of the fabrics attested for these classes, it is possible to draw inferences regarding the raw materials and their production locales. This depends upon the assumption that the pottery workshops operating within the PEET and the broader Bay of Naples region employed clay and tempering material obtained from sources located somewhere in their immediate vicinity. That this was not always the case, however, is

²² See *Carta Geologica d'Italia* ("Isola d'Ischia-Napoli") (http://www.apat.gov.it/Media/carta_geologica_italia/default.htm).

²³ Artischia 2006 (citing Buchner 1992; Di Iorio 1997–1998). For a schematic section of this area, see Pichler 1970, 137, fig. 40.

²⁴ Sersale and Porcelli 1974, 178–79.

²⁵ Picon 1994, 43–4.

²⁶ Picon 1994, 27, table 1 (Group 4).

²⁷ Picon 1994, 45, fig. 10.

²⁸ For speculation that the production of Campana A at Naples involved the use of clay from some non-Ischian source compositionally similar to Ischia clay, see Morel 1998, 11; Olcese and Picon 1998, 32–3.

²⁹ For the composition of sand from the shore of the Bay of Naples and the Sarno Basin, see Garzanti et al. 2002, 6, fig. 2, nos. 21, 22; 7, fig. 3H; 9–13; Society for Sedimentary Geology 2006, tables 1, 2.

demonstrated by the apparent use of Ischia clay by workshops in Naples involved in the manufacture of Black Gloss Ware.³⁰

We begin with the petrographic analysis by Mannoni of a few score vessels belonging to the commonware, cookware, and amphora class groupings from the Casa dei Fiori/Casa del Cinghiale (VI.5.9.10/19).³¹ Mannoni identified five fabric groups (23 specimens) that appear likely to be of local or perilocal origin (Mannoni's Fabric Groups 1a–d, 5b). By combining Mannoni's results with the information presented above, it is possible to draw some general inferences regarding the types of potting clay and tempering material likely employed for their manufacture (table 1).

Fabric Groups 1a (n=15; 65%) and 1b (n=1; 4%) were manufactured using volcanic clay. This points to manufacture in the service areas of Pompeii, Herculaneum, Nola, Nuceria, and perhaps Surrentum. Fabric Group 1c (n=2; 9%) was likely produced using either fluvio-lacustrine clay with a natural volcanic component or fluvio-lacustrine clay combined with either volcanic clay or volcanic sand temper. This suggests manufacture in the service area of either Pompeii or Nuceria. Fabric Group 1d (n=3; 13%) was likely produced using calcareous fluvio-lacustrine clay with a natural volcanic component, calcareous fluvio-lacustrine clay combined with either volcanic clay or volcanic sand temper, or marine clay combined with either volcanic clay or volcanic sand temper. This points to manufacture in the service area of Pompeii, Nuceria, or Surrentum. Fabric Group 5b (n=2; 9%), if of local or perilocal origin, was likely produced from calcareous fluvio-lacustrine clay, calcareous fluvio-lacustrine clay combined with sedimentary temper, or marine clay combined with sedimentary temper. This suggests possible manufacture in the service area of Pompeii, Nuceria, Surrentum, or Salernum. It is important to note that these five groups do not represent the full range of fabrics attested among the corpus of pottery

of likely or possible local or perilocal origin from Pompeii. Mannoni's program of analysis was limited to commonwares, cookwares, and amphoras; he did not analyze any fine ware vessels that might have been manufactured using fine marine or fluvio-lacustrine clay or levigated marine or fluvio-lacustrine clay.

There have been several efforts to describe groups of vessels from Pompeii of local or perilocal origin and to characterize their fabrics as they appear in the hand specimen.³² The results of these studies can be combined with Mannoni's results and additional information to gain a broader understanding of the geography of pottery production within the PEET.

Commonware. Gasperetti carried out a study of 2,568 commonware vessels housed in the Granai del Foro storeroom at Pompeii.³³ These were mainly intact vessels recovered in excavations at various locations around Pompeii, largely in contexts dating to 79 C.E. She examined the vessels under a 10x hand lens, identifying five different fabrics, two of which—her Fabrics 1 and 2—appear to be of local or perilocal origin.³⁴ Table 2 summarizes these descriptions.

Gasperetti's Fabric 1 (n=1,209; 47%), a medium-textured, red to reddish-brown fabric containing dense, poorly sorted volcanic inclusions, may equate with Mannoni's Fabric Group 1c. The vessels that belong to it were likely manufactured with fluvio-lacustrine clay with a natural volcanic component or with fluvio-lacustrine clay combined with either volcanic clay or volcanic sand temper, likely at a location in the PSA and/or the Nuceria service area. That vessels in this or a similar fabric were manufactured at Pompeii can perhaps be inferred from a photograph of one of the *fritilli* (the so-called dice cups) recovered in the Via di Nocera pottery production facility and presumably manufactured there.³⁵ This vessel displays a somewhat dark matrix containing frequent, medium to large, dark inclusions that are likely fragments of volcanic rock and perhaps also grains of clinopyroxene.³⁶

³⁰ Also worth noting in this connection is the fact that some of the fuller's earth employed at Pompeii appears to have originated on the island of Ponza (de Vos and de Vos 1982, 103).

³¹ Mannoni 1984. The literature contains little additional information regarding the mineralogical or chemical composition of pottery from Pompeii and other sites in the PEET. For general characterizations of the results of a program of petrographic analysis carried out for 16 examples of cookware from Herculaneum, see Hōricht 1996, 129–30, 132–34. Bon-Harper (1999, 101–3) alludes to a program of chemical analysis carried out by means of NAA involving an unspecified number of vessels from Pompeii, including a lamp from the Via di Nocera pottery production facility and cookwares, commonwares, and lamps from the Casa di Giulio Polibio.

³² For descriptions of the fabrics of pottery probably manufactured in the PEET as they appear in the hand specimen, see Chiaramonte Treré 1984a, 141; De Sena and Ikâheimo 2003, 309, 317 n. 7; Grasso 2004, 19–20; Palma 2008.

³³ Gasperetti 1996.

³⁴ Gasperetti's Fabric 3, represented by just three vessels, is of apparent Aegean origin. Her Fabrics 4 and 5, represented by just seven vessels and one vessel, respectively, appear to be identical to Di Giovanni's Fabric 1 (infra n. 38), suggesting that the vessels manufactured in these fabrics, even if not cooking forms, should be classified as cookwares.

³⁵ For a discussion of this pottery production facility, see Peña and McCallum 2009.

³⁶ Cerulli Irelli (1977, 57) describes the fabric of these ves-

Table 1. Five Fabrics of Certain or Possible Local or Perilocal Origin Described in Thin-Section in Mannoni 1984.

Fabric Group	Matrix	Inclusions	Specimens	Possible Raw Materials
1a	ferruginous	abundant, large, unweathered alkaline volcanic material; small quartz and muscovite mica	CE 25, 116, 173, 190, 264, 407, 501, 623, 684, 934, 994, 1099/1, 1133, 1444, 2221	volcanic clay
1b	ferruginous	less abundant, large, mature alkaline volcanic material; small quartz and muscovite mica	CE 75	weathered volcanic clay
1c	nonferruginous; traces of calcium carbonate	abundant, large, mature alkaline volcanic material; small quartz and muscovite mica	CE 74, 605	fluvio-lacustrine clay with volcanic component; fluvio-lacustrine clay and volcanic clay or volcanic sand temper
1d	carbonate	abundant, unweathered alkaline volcanic material; absent to rare small quartz and muscovite mica	CE 80, 126, 1063	calcareous fluvio-lacustrine clay with volcanic component; calcareous fluvio-lacustrine clay and volcanic clay or volcanic sand temper; marine clay and volcanic clay or volcanic sand temper
5b	carbonate	sedimentary rock frags.; small quartz and muscovite mica	CE 992, 1579	calcareous fluvio-lacustrine clay; calcareous fluvio-lacustrine clay and sedimentary sand temper; marine clay and sedimentary sand temper

Gasperetti's Fabric 2 (n=1,348; 53%), a fine-textured, reddish-yellow to pinkish-white fabric containing fine volcanic inclusions, is probably subsumed within Mannoni's Group 1d. Vessels were likely manufactured with calcareous fluvio-lacustrine clay with a natural volcanic component or with either calcareous fluvio-lacustrine or marine clay combined with volcanic clay or volcanic sand temper, presumably at a location within the PSA, the Nuceria service area, and/or the Surrentum service area. If these vessels were pro-

duced by adding temper to marine clay from the M^{5-4} formation or a similar clay, it would appear that the potters had recourse to a practice similar to that adopted by modern potters, who either add temper to this clay or mix it with a coarser clay to compensate for its high rate of shrinkage.

Cookware. Di Giovanni studied 457 cookware vessels housed in the Granai del Foro storeroom at Pompeii.³⁷ This was a companion study to Gasperetti's study, and it employed similar methods. Di Giovanni identified

sels as "comune argilla grossolana senza ingubbiatura." The *fritillus* form is not included in either Di Giovanni's study of the commonwares in the Granai del Foro or Gasperetti's study of the cookwares housed in this facility. While it can-

not be excluded that the vessel shown in the photograph was manufactured in Gasperetti's Fabric 2, the inclusions appear to be too coarse for this fabric.

³⁷Di Giovanni 1996.

Table 2. Commonware, Cookware, and Amphora Fabrics of Certain or Likely Local or Perilocal Origin Described in the Hand Specimen in Gasperetti 1996 and Di Giovanni 1996 and in Thick-Section in Panella and Fano 1977.

Fabric Group	Color	Texture	Break	Inclusions	Common Forms
Gasperetti's 1	reddish brown to red (2.5YR 5/4–5/8)	rough, granular	irregular	frequent, large, dark (clinopyroxene grains, volcanic rock frags.); frequent, small, white (calcareous bodies? plagioclase feldspar grains?); rare, small to medium, colorless (sanidine grains, quartz grains?); rare, small, glistening (mica detrital plates)	bowl, jar, juglet, pitcher, lid ^a
Gasperetti's 2	reddish yellow to pinkish white (7.5YR 7/6–8/2)	fine	smooth	frequent, small, dark (clinopyroxene grains); rare, small, white (calcareous bodies?); rare, small, glistening (mica detrital plates)	jar, jug, juglet, bottle, pitcher, lid ^a
Di Giovanni's 2	red (2.5YR 5/8)	rough, vesicular	irregular	frequent, small, dark (clinopyroxene grains, volcanic rock frags.); rare, medium, white (plagioclase feldspar grains?); frequent, small to medium, colorless (sanidine grains); very rare, medium, rounded, red (volcanic rock frags., peds clay? iron oxide nodules?)	cookpot, <i>olla perforata</i> ^b
Panella and Fano's A	pink/beige, orange, dark red, red-brown	friable, very coarse	–	abundant, very small to small, shiny, black (clinopyroxene grains); rare, small, colorless (sanidine grains); rare, small to large, white (plagioclase grains? altered feldspar grains? calcareous frags.); abundant, very small to small, dark gray (feldspar? volcanic rock frags.); abundant, very small to small, brown (volcanic rock frags. peds clay? iron oxide nodules?)	Dressel 2–4, Type 3, Type 4?
Panella and Fano's F	dark red, red-brown, purple-red	very friable, very coarse	–	very abundant, very small to medium, shiny, black (clinopyroxene grains); rare, very small, white (plagioclase grains? altered feldspar grains? calcareous frags.); very abundant, very small to medium, gray (feldspar? volcanic rock frags.); rare, brown (volcanic rock frags. peds clay? iron oxide nodules?)	Dressel 2–4, Type 4, Type 3?

^a Gasperetti 1996, 24–52

^b Di Giovanni 1996, 69, 89–96

nine fabrics, of which just one (Fabric 2; n=202; see table 2) is a fabric of likely local or perilocal origin represented in significant amounts.³⁸

This coarse-textured, red fabric is probably subsumed within Mannoni's Fabric Groups 1a and 1b.³⁹ This suggests that the vessels were manufactured with volcanic clay, likely at a location within the PSA, the Herculaneum, Nola, and/or the Nuceria service areas, and perhaps also the Surrentum service area. The Via Superior pottery production facility, which appears to have specialized in the production of cookwares, presumably manufactured vessels in this fabric.⁴⁰

Thin-Walled Ware. From published descriptions of thin-walled ware vessels recovered in excavations at or near Pompeii, we can infer that the examples of this class grouping of probable or possible local or perilocal origin in use at the town during the Roman period were manufactured in at least two different fabrics.⁴¹ One is similar or identical to Gasperetti's Fabric 2. The other is a fine, nonferruginous, perhaps calcareous, fabric. This may have been manufactured using fluvio-lacustrine clay or marine clay and may differ from Gasperetti's Fabric 2 only in that it does not contain volcanic sand temper. The vessels in this fabric were presumably manufactured within the Pompeii, Nuceria, Surrentum, and/or the Salernum service areas.

Textual sources suggest that Surrentum was an important center for the production of thin-walled ware during the first century C.E. Pliny the Elder (*HN* 35.160) states that Surrentum was renowned for the production of a type of a vessel that he terms a *calix*, a word that he elsewhere uses to indicate either a drinking vessel or a cooking vessel.⁴² Two epigrams by Martial shed light on both the nature and function of these vessels. The first of these reads: "accipe non vili calices de pulvere natos | Sed surrentinae leve toreuma rotae" (do not accept *calices* born of some cheap dust, but rather the smooth shaping of a Surrentine potter's wheel) (Mart. 14.102). The second reads: "surrentina bibis? nec murrina picta, nec aurum | Sume: dabunt calices haec tibi vina suos" (Are you drinking Surrentine wines? Don't take up cups of mottled agate or

a gold one—these wines will provide you with their own *calices*) (Mart. 13.110). While the meaning of the second passage remains somewhat enigmatic, it most likely refers to and plays on the fact that Surrentum produced both wine and the cups for drinking it. Thus, Surrentine *calices* were finely formed vessels for drinking wine. The thin-walled ware class, which represents a significant component of pottery assemblages of the first century C.E. from Pompeii and other sites in the Bay of Naples region, includes various classes of unknown provenance that consist almost exclusively of delicate cups and beakers. No other class that regularly occurs in such assemblages presents itself as a plausible candidate for the vessels referred to in these passages, and it seems likely that these were some type of thin-walled ware. Similarly, we assume that a substantial portion of the thin-walled ware vessels from Pompeii manufactured in either or both of the fabrics noted above originated at or near Surrentum.

Lamps. Published descriptions of small groups of lamps from excavations carried out at or near Pompeii suggest that the lamps of probable or possible local or perilocal origin in use there during the Roman period were manufactured in at least two different fabrics.⁴³ One is similar or identical to Gasperetti's Fabric 2. The other is a nonferruginous, perhaps calcareous fabric with a texture ranging from fine to somewhat gritty and contains no visible inclusions. This may have been manufactured with fluvio-lacustrine clay and/or marine clay. The lamps in this fabric were presumably manufactured within the Pompeii, Nuceria, Surrentum, and/or the Salernum service areas.

According to Cerulli Irelli, the lamps recovered in the Via di Nocera pottery production facility and presumably manufactured there displayed a sandy, yellowish, poorly levigated fabric.⁴⁴ This may represent a coarse version of the second fabric noted above. Pavolini, in his study of the lamps from Pompeii and Herculaneum in the Museo Archeologico Nazionale di Napoli and the storerooms at Pompeii, identified one workshop (which stamped its products with the maker's mark "H") that he believed was located somewhere

³⁸ Di Giovanni's Fabric 1, represented by 232 vessels, is Cumaean Cookware fabric. His Fabrics 3 and 4, of North African origin, are represented by two and four vessels, respectively. His Fabrics 5 and 6, of apparent eastern Mediterranean origin, are represented by one vessel and 11 vessels, respectively. His Fabrics 7, 8, and 9, represented by one vessel, three vessels, and one vessel, respectively, are of unknown origin.

³⁹ Mannoni's Fabric Groups 1a and 1b probably also embrace Cumaean Cookware fabric (Di Giovanni's Fabric 1).

⁴⁰ For a discussion of this pottery production facility, see Peña and McCallum 2009.

⁴¹ Chiamonte Treré 1984b, 196–97; Ricci 1985, 347; Romanazzi and Volonté 1986, 76; De Caro 1994, 152–56.

⁴² Plin. *HN* 30.92, 35.175, 37.29 (drinking vessel); 29.95, 32.78, 32.122 (cooking vessel). For the use of *calix* in the Latin literary sources, see Hilgers 1969, 44–5, 130–34.

⁴³ Romanazzi and Volonté 1986, 87; De Caro 1994, 192–97.

⁴⁴ Cerulli Irelli 1977, 56. For a color photograph of a lamp apparently produced by the Via di Nocera pottery production facility recovered at the house at I.14.4, see Ciarallo and De Carolis 1999, 174, no. 197.

in the vicinity of these two towns.⁴⁵ Unfortunately, he did not provide a description of the fabric or fabrics in which these lamps were manufactured.

Elsewhere within the PEET, the collections of the Museo Archeologico Provinciale di Salerno include a large number of apparently unused double-spouted lamps and one double-spouted lamp so deformed that it must be a waster.⁴⁶ These materials, which were probably recovered in excavations carried out somewhere in Salerno, suggest that one or more lamp workshops were active there during the first and second centuries C.E. Among the maker's marks attested on the apparently unused lamps are "AVFI FRON," "C CLO SVC," "C IVN DRAC," "C CORN VRSI," and "KELSEI" (this last in Greek letters), while the single waster bears the mark "M NOVI IVST." This production presumably involved the use of Ogliara clay. All these maker's marks except "C CLO SVC" are known on lamps from Pompeii.⁴⁷ This raises the likelihood that at least some of the lamps from Pompeii in the second of the two fabrics noted above originated at Salernum.⁴⁸

Amphoras. The principal container for the packaging of Pompeian wine from the last quarter of the first century B.C.E. to the end of the town's existence was the Dressel 2–4 (fig. 4a). The several variants of the Dressel 2–4 of established or suspected Campanian origin, including those likely produced in the PEET, were manufactured in various coarse, reddish fabrics that contain a conspicuous component of poorly sorted volcanic sand. These typically include a substantial amount of clinopyroxene, a weak green to dark green mineral that, when embedded in a ceramic fabric, generally appears black to the naked eye, leading scholars to refer to these as "black-sand" fabrics.

Panella and Fano studied about 200 examples of the Dressel 2–4 from the Granai del Foro and other storage locations around Pompeii.⁴⁹ They identified 10 variants on the basis of differences in vessel morphology and fabric, labeling these Types 1–10. By examining polished thick-sections of a selection of these vessels under magnification, they identified six different fabrics: A–F.⁵⁰

The most abundant of Panella and Fano's 10 variants were their Types 3 (57% of the corpus) and 4 (15%),⁵¹ which presumably represent the variants of the Dressel 2–4 most widely employed at Pompeii for the packaging of wine during the final decades of the town's existence. The containers assigned to these two variants were manufactured in their Fabrics A and F, both black-sand fabrics (see table 2).⁵² According to Panella and Fano, Fabric F is somewhat coarser in texture than Fabric A and has a somewhat darker matrix. They state that most of the containers assigned to Type 3 were manufactured in Fabric A, suggesting that some examples were manufactured in Fabric F.⁵³ Type 4 containers were generally manufactured in Fabric F, although some examples displayed a lighter-colored fabric like Fabric A.⁵⁴ A maker's stamp on one Type 3 example indicates that it was manufactured at Surrentum, while *tituli picti* on one or perhaps two examples of this variant indicate that they were employed for the packaging of *surrentinum* (wine from Surrentum), and a *titulus pictus* that may have occurred on a third example indicates that it was employed for the packaging of *vesuvinum* (wine from Mount Vesuvius).⁵⁵ *Tituli picti* on two Type 4 examples indicate that they were employed for the packaging of *surrentinum metallianum*, a specific wine from Surrentum, while a *titulus pictus* on a third example indicates that it was for the packaging of *vesuvinum*.⁵⁶

Panella and Fano's Type 1 consists of a single morphologically distinct container that was manufactured in a fabric similar to Fabric A.⁵⁷ This vessel bears the maker's stamp "LEVMAC," which can be expanded as *L[uci] Eumac[hi]* ([workshop] of Lucius Eumachius). This is the only example from Pompeii of a Dressel 2–4 bearing this stamp. Several score examples are known from other sites across the Mediterranean, including Carthage (ca. 40 examples), Alexandria (ca. two to three dozen examples), Rome, Pozzuoli, Ostia, Monasterace, Smyrna, Tiddis, Sanitja, Ampurias, Fos, Hyères, Alesia, and Nijmegen (all one example each).⁵⁸ Where information is available regarding the fabric of the vessels bearing these stamps, it is in every case

⁴⁵ Pavolini 1977, 42.

⁴⁶ Museo Archeologico Provinciale di Salerno 1989.

⁴⁷ Pavolini 1977, 47–51.

⁴⁸ The widespread use of the *surmolage* technique for the copying of lamp designs and, along with these, the maker's mark means that one cannot assume that any specific lamp from Pompeii bearing a maker's mark attested on one of the apparently unused lamps or the waster lamp from Salernum was necessarily manufactured at Salernum.

⁴⁹ Panella and Fano 1977.

⁵⁰ Panella and Fano 1977, 144–48.

⁵¹ Panella and Fano 1977, 150–53.

⁵² Panella and Fano 1977, 145, 148.

⁵³ Panella and Fano 1977, 146, table 1.2.

⁵⁴ Panella and Fano 1977, 146, table 1.4–6.

⁵⁵ Panella and Fano 1977, 157–59.

⁵⁶ Panella and Fano 1977, 159–60.

⁵⁷ Panella and Fano 1977, 146, table 1.1; 149.

⁵⁸ van der Werff 1989, 372–73. The example from Rome, unpublished, was recovered in the Palatine East Project excavations.

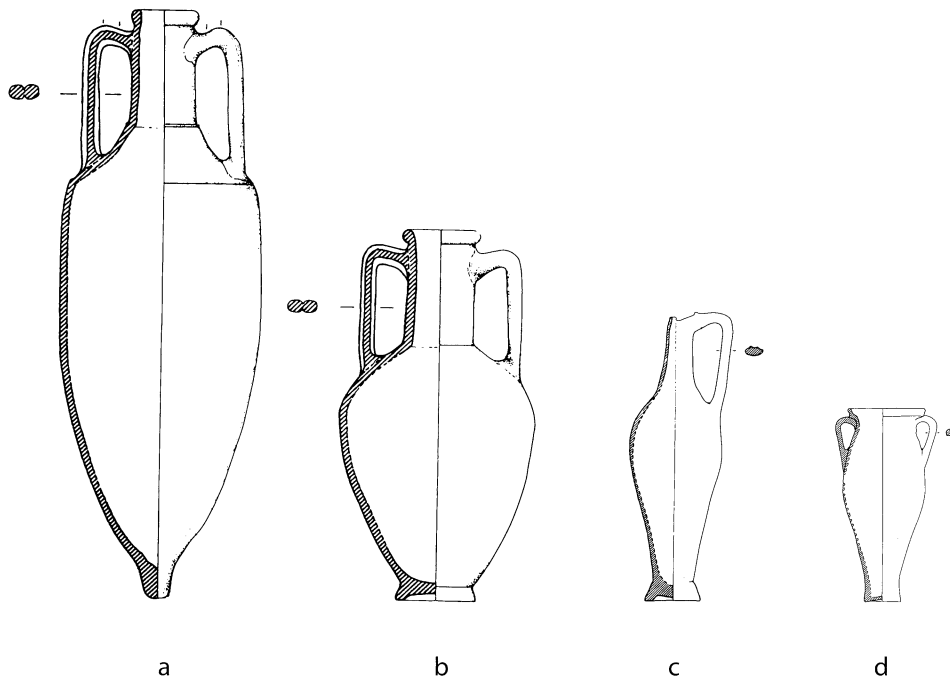


Fig. 4. Locally/perilocally manufactured amphoras: *a*, Dressel 2–4 (Panella and Fano Group 1/Freed Iucundus Amphora) (Panella and Fano 1977, fig. 14, right); *b*, table amphora (Panella and Fano 1977, fig. 26, right); *c*, Schöne 6 (De Caro 1994, fig. 45.141); *d*, Schöne 1 (De Caro 1994, fig. 44.140).

a black-sand fabric; and when datable, these vessels can be assigned to the last quarter of the first century B.C.E. The L. Eumachius of the stamps is presumably the individual named in a large number of tile stamps from Pompeii. Van der Werff assembled the evidence for these and for tiles bearing the stamp of L. Eumachius Eros, presumably a freedman of L. Eumachius, documenting at least 94 examples from numerous locations at Pompeii and in its immediate environs.⁵⁹ De Caro subsequently reported the recovery of an additional 26 pan tiles bearing the stamp of L. Eumachius and 12 pan tiles bearing the stamp of L. Eumachius Eros from the Villa Regina, a modest agricultural villa 2 km northwest of Pompeii.⁶⁰ Where there is evidence regarding their fabric, it is, again, in every case a black-sand fabric.⁶¹ From the large number of tiles bearing these two stamps, it is clear that these items were manufactured by a workshop located at or near Pompeii;

if the examples of the Dressel 2–4 bearing that stamp were produced by the same establishment, these must have been manufactured in this same area. That only a single amphora bearing the stamp of L. Eumachius is known from Pompeii is not a problem, given the almost 75 years between the cessation of the manufacture of these vessels and the eruption of Vesuvius. The Eumachii were a wealthy and politically prominent family at Pompeii during the late first century B.C.E. and early first century C.E., and it is generally assumed that the L. Eumachius of the stamp is the individual of this name who was the father of the Eumachia who, together with her son M. Numistrius Fronto, dedicated the splendid public building on the east side of the forum at Pompeii referred to as the Eumachia building, probably at some point between 14 and 23 C.E.⁶²

The association of the black-sand fabric with the Pompeii area was originally made by Tchernia and

⁵⁹van der Werff 1989, 360–61, fig. 7; 362, fig. 8; 373–74. For a recent review of the examples from the environs of Stabiae, see Magalhaes 2006, 54–5, 62, 68, 144–45. For a mortarium from Stabiae bearing a stamp that should probably be read as [L.] Eum[ach]i E[rotis], see Magalhaes 2006, 65, 161.

⁶⁰De Caro 1994, 81.

⁶¹Tchernia and Zevi 1972, 37–40, tables 2.3, 2.4; Steinby 1984, 268; Williams and Peacock 2005, 141.

⁶²van der Werff 1989, 361–64.

Zevi on prosopographical grounds, specifically the prominent role played at Pompeii during the period in question by the Eumachii.⁶³ Peacock and Williams subsequently added a geological argument on the basis of petrological evidence, noting that many architectural ceramics from Pompeii were in a black-sand fabric, while such fabrics were not attested in any other area within the Central Italian volcanic province.⁶⁴ Jongman, believing that Pompeii was not a major exporter of wine, has argued that these containers need not be from Pompeii or its territory,⁶⁵ but his arguments have not been widely accepted.⁶⁶ More recently, Freed reviewed the evidence for the probable provenance of several variants of the Dressel 2–4, concluding that two of those attested in a black-sand fabric, which she terms the Eumachius amphora (Panella and Fano's Type 1) and the Ladispoli amphora, were manufactured somewhere in the Pompeii area in the early period of Dressel 2–4 production (ca. 25 B.C.E.–25 C.E.), while a third, which she calls the Iucundus amphora (Panella and Fano's Type 3), was manufactured somewhere in the Pompeii area somewhat later in the first century C.E.⁶⁷

Tomber and Dore provide a generalized description of the Dressel 2–4 black-sand fabric as it appears in thin-section: a calcareous matrix containing fine to medium inclusions, including sanidine, clinopyroxene, quartz, and fragments of volcanic rock, with rare plates of biotite, and rare grains of hornblende and yellow garnet.⁶⁸ Elsewhere, van der Werff published a brief characterization of a thin-section made from an example of the Dressel 2–4 bearing a stamp of L. Eumachius, accompanying this with a photomicrograph.⁶⁹ His specimen contained frequent volcanic inclusions, including clinopyroxene, plagioclase, and sanidine, with lesser amounts of olivine, biotite, and yellow garnet. Inclusions that appear to be fragments of trachytic rock containing feldspar microlites are also visible in the photomicrograph. It is unclear whether van der Werff did not characterize the matrix of this fabric as calcareous through oversight or because it was, in fact, noncalcareous. Similarly, it is unclear what the absence of quartz inclusions in his description means.

Mannoni assigned the only example of the Dressel 2–4 in a black-sand fabric included in his program of petrographic analysis (specimen CE 1063) to his Group 1d (calcareous matrix with abundant fresh alkaline volcanic inclusions). The fabric description provided by Dore and Tomber appears to match this group. This indicates that at some point during ca. 25 B.C.E.–79 C.E., amphora producers at one or more locations in the Pompeii area manufactured examples of the Dressel 2–4 using calcareous fluvio-lacustrine clay with a natural volcanic component, calcareous fluvio-lacustrine clay combined with either volcanic clay or volcanic sand temper, or marine clay combined with volcanic clay or volcanic sand temper. The fabric description provided by van der Werff, however, may match Mannoni's Group 1a/1b (ferruginous matrix with fresh or weathered alkaline volcanic inclusions). While Mannoni analyzed no examples of the Dressel 2–4 that had a fabric of this kind, he did assign four examples of the Dressel 1 (the predecessor of the Dressel 2–4) to this group,⁷⁰ raising the possibility that during the second and/or first century B.C.E., amphora producers at or near Pompeii manufactured containers using volcanic clay in a fabric similar to Pompeian cookware fabric (Gasperetti's Fabric 2).

Also relevant to the question of the origin of Dressel 2–4 amphoras in a black-sand fabric is Pliny's assertion (*HN*14.34) that *numisiana*, a wine that he indicates was produced over a broad area extending from Terracina (Roman Tarracina) southward to Mount Vesuvius, retains its potency if it is placed in *testa surrentina* containers. Whether we should understand these vessels—presumably amphoras—to be containers actually manufactured at Surrentum or vessels of a form associated with Surrentum is unclear.⁷¹

On the basis of this evidence, we can conjecture that during the second half of the second century and the first century B.C.E., one or more workshops located in the PSA manufactured both the Dressel 1 and tiles using volcanic clay. The Dressel 2–4 was then introduced into these establishments' repertoires during the last quarter of the first century B.C.E., when a workshop owned by L. Eumachius engaged in the

⁶³Tchernia and Zevi 1972, 37, 39–40.

⁶⁴Peacock and Williams 1986, 87–8, 106; Williams and Peacock 2005, 141–42; see also Peacock 1977, 153.

⁶⁵Jongman 1988, 125–28.

⁶⁶For critiques of Jongman's position, see van der Werff 1989, 364–68; Purcell 1990, 112–14.

⁶⁷Freed 2000, 461. According to Freed, a fourth variant of this class, which she terms the Eros amphora, may also have been manufactured in the Pompeii area.

⁶⁸Tomber and Dore 1998, 88–9. For the chemical composition of Dressel 2–4s in black-sand fabrics, see Hesnard et al.

1989, 35–65.

⁶⁹van der Werff 1989, 359–60, fig. 6. Tchernia and Zevi (1972, 39, fig. 2) present six photographs at 10x magnification of what are apparently polished thick-sections of Dressel 2–4s in a black-sand fabric, including two bearing a Eumachius stamp.

⁷⁰Mannoni 1984, 347–48, nos. CE 173, CE 994, CE 1099/1, CE 1444.

⁷¹For the use of *testum* to refer to wine storage containers in the Latin literary sources, see Hilgers 1969, 286.

production of both this container (Freed's Eumachius amphora; Panella and Fano's Type 1) and tile,⁷² while a different workshop—or perhaps the same workshop at a later time, owned by the freedman L. Eumachius Eros—produced just the latter.⁷³ At roughly this same time, one or more workshops located in the territory of Surrentum also began to manufacture the Dressel 2–4 (Freed's Ladispoli amphora?), employing a mixture of marine clay from the Sorrentine source and either volcanic clay or volcanic sand.⁷⁴ The Pompeian workshop of L. Eumachius eventually abandoned production of the Dressel 2–4, leaving the field to the Sorrentine workshop/s, which supplied their products (Freed's Iucundus amphora/Panella and Fano's Types 3 and 4) to establishments requiring wine amphoras throughout the Bay of Naples region, including both the territory of Surrentum and the Mount Vesuvius area, and on occasion to establishments as far north as Terracina. These workshops came to dominate the market, leading to Pliny's reference to a container of this kind as a *testum surrentinum*.

A small container with a ring-footed base, ovoid body, and neck/rim/handles and fabric identical to those of the Panella and Fano's Type 3 and Type 4 variants of the Dressel 2–4 was also probably employed for the packaging of Pompeian wine during some or all of the period ca. 25 B.C.E.–79 C.E. (see fig. 4b).⁷⁵ This container, commonly referred to as a table amphora, or *anforetta*, presumably represents a fractional version of the Dressel 2–4.⁷⁶

⁷² A ceramic production facility near the Suio narrows in the Liri Valley provides a good parallel for the operations of the Eumachius workshop in that the establishment that operated there manufactured Dressel 1s, Dressel 2–4s, architectural ceramics, and also small amounts of commonware (Gasperetti 1996, 58).

⁷³ The 12 pan tiles bearing a stamp of L. Eumachius Eros found in situ in the roofing of the portico at the Villa Regina were concentrated in one area that appeared to have been subject to a repair, corroborating the inference that the workshop that produced these tiles was active later than the one that produced tiles bearing a stamp of L. Eumachius (see De Caro 1994, 81).

⁷⁴ Strabo (5.243), presumably writing at some point between ca. 10 and ca. 25 C.E., stated that recent experiments had demonstrated that *surrentinum* could withstand ageing. This discovery may have lain behind the initiation of the production of the Dressel 2–4 in the territory of Surrentum.

⁷⁵ Panella and Fano 1977, 151, 171, figs. 25, 26; Gasperetti 1996, 24; Timby 2004, 386, fig. 6.4; 387.

⁷⁶ Panella and Fano 1977, 151 n. 15.

⁷⁷ Anecchino 1977, 112; Curtis 1988, 31–5; De Caro 1994, 176; De Carolis 1996, 123; Rizzo 2003, 160–67. *Tituli picti* on several score examples of this container from Pompeii and Herculaneum indicate that it was employed for the packaging

of fish products (Curtis 1988, 31). Two small containers of likely local or perilocal origin were employed for the packaging of fish products produced at or near Pompeii during the first century C.E. One, the Schöne 6, commonly referred to as an *urceus*, has a slender, piriform body with a sloping shoulder, a tall, tapering neck leading to a narrow mouth with a cup-shaped rim, a disc base with a ring foot, and a single strap handle (see fig. 4c).⁷⁷ It appears to have been manufactured in a fabric similar or identical to Gasperetti's Fabric 2.⁷⁸ The other, the Schöne 1, has a body that tapers rapidly to a broad, flat base, a short, broad neck leading to a wide mouth with an everted rim, and two strap handles (see fig. 4d).⁷⁹ It, too, appears to have been manufactured in a fabric similar or identical to Gasperetti's Fabric 2.⁸⁰ Both containers were likely manufactured by the workshop or workshops that produced the commonwares in this fabric at Pompeii.⁸¹

Other Pottery. There is at present no published information regarding the fabric of either the late fourth-/early third-century B.C.E. Black Gloss Ware wasters recovered along the southern side of the Via Marina or the Black Gloss Ware and commonware wasters—perhaps dating as late as the second century B.C.E.—recovered in association with the kiln underneath the unnamed house at VII.15.9–10.⁸² The mold for Italo-Megarian Ware bowls recovered in the Porta Stabia excavations was manufactured in a fine fabric containing small black mineral grains, presumably clinopyroxene, hence a fabric similar to Gasperetti's Fabric 2.⁸³

of fish products (Curtis 1988, 31).

⁷⁸ De Caro 1994, 174–76, no. 141; Meylan Krause 2002, 124, 168, no. 119.

⁷⁹ Anecchino 1977, 112; De Caro 1994, 174; De Carolis 1996, 123. Gasperetti (1996, 24 n. 14) states that several examples of this form in the Granai del Foro bear *tituli picti* indicating that they were employed for the packaging of garum. This container is often identified as a container for fruit on the strength of its resemblance to a vessel appearing in a fresco from the Praedia Iuliae Felicis that is shown alongside two other vessels containing fruit (Anecchino 1977, table 52.10).

⁸⁰ De Caro 1994, 174, no. 140.

⁸¹ Parslow (1996, 168) reports possible Schöne 6 wasters from a fill deposit at the Praedia Iuliae Felicis dating to the middle of the first century C.E. Unpublished photographs of these vessels suggest, however, that they are regularly manufactured vessels discolored by burning.

⁸² For these vessels, see Peña and McCallum 2009, 57–8. Daszkiewicz et al. (2008) are currently undertaking a program of compositional analysis that involves the chemical and mineralogical characterization of specimens of the Black Gloss Ware and commonware associated with the kiln excavated underneath the house at VII.15.9–10.

⁸³ For this mold, see Peña and McCallum 2009, 58.

Architectural Ceramics and Opus Doliare. Steinby undertook a preliminary study of the corpus of roof tile, dolia, and mortaria from Pompeii housed in the various storage facilities on the site.⁸⁴ She found that the pan tiles could be assigned to three groups on the basis of their form, dimensions, fabric, and the shape and content of their stamp. Group 1, which consisted of only four examples, could be attributed to the Rome area on the basis of its fabric, dimensions, form, and the single stamp attested. Group 3, which represented roughly two-thirds of the materials examined, consisted of items clearly of local origin. These had dimensions and a form different from those attested for Group 1, were manufactured in a black-sand fabric, and bore rectangular stamps that in many cases recorded the names of members of families known to have resided at Pompeii. To this group belonged the tiles bearing stamps of L. Eumachius and L. Eumachius Eros. Group 2 (ca. one-third of the materials) displayed dimensions and technique identical to those of Group 3 but was manufactured in a different fabric. This was yellowish red to red, with a fine texture, displaying lumps of unmixed clay. The surfaces of these tiles were covered with small, black particles. These characteristics suggest that these items were produced from marine clay, with volcanic sand spread on the forming and/or drying surface to act as a parting agent.

Steinby was able to divide the stamped tiles in Group 2 into two subgroups on the basis of the stamp's shape. One subgroup had circular or semicircular stamps similar to those employed in the Rome area. Tiles bearing the stamps attested in this subgroup occur not just in Campania but also at Ostia and Rome, which lead Steinby to suggest an origin for these somewhere in northern Campania or southern Lazio. The other subgroup had rectangular stamps similar to those attested for Group 3, suggesting that it originated somewhat closer to Pompeii. Interestingly, two of the five stamped tiles reported in *CIL* as having been found at Surrentum bear a stamp that is represented among those belonging to this subgroup,⁸⁵ while a third bears a stamp that may also relate to this subgroup.⁸⁶ It thus seems possible that some or all of the tiles in this

subgroup were manufactured at or near Surrentum, employing marine clay from a Sorrentine source and volcanic sand.⁸⁷

The Group 1 and Group 2 tiles date to the first century C.E., and, as the latter group accounted for nearly one-third of the total number of tiles examined, it appears that during this period producers located outside the PSA came to command a substantial share of the town's market. Steinby suggested that this may have resulted from a combination of three factors: the growth of local demand, the poor quality of the locally manufactured Group 3 tiles, and that Pompeii was by that point integrated into a maritime trade system that allowed for the economical distribution of items such as roof tiles.⁸⁸

Virtually all the mortaria and a substantial portion of the dolia that Steinby examined proved to have been manufactured in the Tiber Valley.⁸⁹

THE DISTRIBUTION OF POTTERY AT POMPEII

The distribution of pottery in the Roman world involved the transfer of newly manufactured vessels from those who produced them to those who used them. In most cases, this was a matter of exchange in the form of sale for cash or credit or barter. Considerations of geography and vessel function suggest that the distribution of pottery at Pompeii involved three distinct sets of practices: (1) the distribution of locally/perilocally manufactured non-amphora pottery; (2) the distribution of imported non-amphora pottery; (3) the distribution of locally/perilocally manufactured amphoras.

The Pottery Market at Pompeii

The number of new ceramic vessels distributed at Pompeii each year must have been considerable. The Casa di Giulio Polibio (IX.13.1–3), a large atrium/peristyle residence, and one of the few houses at Pompeii for which there exists a more or less complete inventory of the portable artifacts recovered during excavation, yielded fragments of no fewer than 54 different gloss-slipped vessels, 97 vessels of thin-walled ware, and 1,262 commonware vessels.⁹⁰ These figures suggest that

⁸⁴ Steinby 1984, 266–68; see also Magalhaes 2006, 50–1.

⁸⁵ *CIL* 10 8042, 8058a, 8098a.

⁸⁶ *CIL* 10 8042, 8046.

⁸⁷ See Pagano (1990, 173–76) for the X-ray diffraction and petrographic analysis of a tile bearing an example of *CIL* 10 8042, 8098 from Herculaneum (Specimen 3184) that has a ceramic body with a macrograin component consisting of calcareous rock fragments and volcanic material, including potassium and plagioclase feldspar, clinopyroxene, biotite mica, magnetite, fragments of trachytic-phonolitic rock, and frag-

ments of volcanic glass. It also contains quartz, presumably in the form of micrograins. While Pagano states that the volcanic material in this specimen probably originated in the Campi Flegrei-Ischia area and cannot have originated in the area of the Somma-Vesuvius complex, the basis for this assertion is unclear.

⁸⁸ Steinby 1984, 268–69.

⁸⁹ Steinby 1984, 266; see also Magalhaes 2006, 65.

⁹⁰ Castiglione Morelli 1996, 105–8. The figures for the commonware category presumably include cookwares.

the populace of Pompeii probably acquired at least several tens of thousands of newly manufactured non-amphora vessels each year. Looked at over the shorter term, this would amount to the acquisition on average of at least a few score vessels each day.

Pottery was an inexpensive craft good in the Roman world, and it seems unlikely that the revenue generated by this activity was anything more than modest. The only evidence that Pompeii has produced regarding the price of pottery is a graffito scratched into a wall in the house at IX.7.25.⁹¹ This text consists of an itemized list of expenditures for food and other items over nine consecutive days, presumably compiled by an individual interested in keeping track of his or her outlays of cash. It includes entries for two items that are certainly or likely ceramic vessels and two that may perhaps be ceramic vessels. The first pair consists of an entry for a *pultarius* (cooking pot or jar), at 1 *as*,⁹² and an entry for a *patella* (skillet or plate),⁹³ also at 1 *as*. The second is an entry for a *sittula [sic]* (i.e., situla, or bucket)⁹⁴—which, given its price of 8 *asses*, was perhaps manufactured in some material more costly than ceramic, such as wood—and an *intynium [sic]*, perhaps to be understood as a lamp, at 1 *as*.⁹⁵ To place the price of 1 *as* in perspective, it can be noted that for three of the nine days recorded, the list includes outlays of 2 *asses* for bread for a slave, while for a fourth day it includes an outlay of 4 *asses* for this purpose.

The Distribution of Local and Perilocal Non-Amphora Pottery

The non-amphora pottery of local and perilocal origin (including commonware, cookware, thin-walled ware, and lamps) used at Pompeii may have been distributed by way of three methods: (1) sale at the production facility; (2) sale at a shop located at a distance from the production facility; (3) sale by a peddler.

The first method would have involved sale at a production facility located inside the town, such as the Via di Nocera pottery production facility (fig. 5[1]), or in its outskirts, such as the Via Superior pottery production facility (see fig. 5[2]). This might have en-

tailed either wholesale of a large number of vessels to a middleman or retailer, or the retail sale of a modest number of vessels to a consumer. The second method would have involved sale at a fixed facility distant from the production facility that was operated by the workshop or an independent seller. This might have entailed the wholesale of large numbers of vessels by the workshop to a middleman or retailer, the wholesale of large numbers of vessels by a middleman to a retailer, or the retail sale of a modest number of vessels by the workshop or a retailer to a consumer. The third method would have involved sale inside the town or in its outskirts without recourse to a fixed facility. This would have entailed the retail sale of a modest number of vessels by the workshop or an independent retailer to a consumer.

All three methods would be appropriate for workshops located inside Pompeii or in its outskirts; the second and third methods would be appropriate for those located farther away from the town—either inside the PSA or elsewhere in the PEET. Transport would have been overland (by pack animal, wheeled vehicle, or porter) or by sea, depending on the location of the production facility. If there were workshops at or near Surrentum producing thin-walled ware for perilocal markets, including Pompeii, maritime transport would be advantageous, given the fragility of the vessels in this class grouping, the rough terrain that separated Surrentum from Pompeii, and the likelihood that these vessels were marketed at several towns along the shore of the Bay of Naples.

The Via di Nocera pottery production facility provides possible evidence for the first of these three methods of distribution in the form of the stepped masonry counter located in its main doorway.⁹⁶ Vessels placed on the end of this counter would have been visible to passersby on the Via di Nocera, one of the town's busiest thoroughfares, and it seems likely that this fixture was constructed in part for display purposes.⁹⁷

The identification of instances of the second method of distribution—the sale of pottery at a shop located at some distance from the production facility—is

⁹¹ *CIL* 4 5380; Krenkel 1963, 59–60; Étienne 1966, 230–32.

⁹² For *pultarium* in the Latin literary sources, see Hilgers 1969, 264–65.

⁹³ For “patella” in the Latin literary sources, see Hilgers 1969, 239–41.

⁹⁴ For “situla” in the Latin literary sources, see Hilgers 1969, 282–83; Anecchino 1977, 111.

⁹⁵ Étienne (1966, 232) translates this word as “lamp,” presumably assuming it to be a corruption of *lychnus*. Krenkel (1963, 60) suggests that it should perhaps be read as *lignum tynium*, translating this term as “wooden wine bucket.”

⁹⁶ For this fixture, see Peña and McCallum 2009, 66.

⁹⁷ For retail counters at Pompeii, see Ellis 2004, esp. 373–75. There is little information available regarding the geographical distribution of the pottery manufactured at this facility. According to Ciarallo and De Carolis (1999, 174, no. 197), a lamp (Deneauve's Type 7a) recovered in the unnamed house at I.14.4 was made in one of the molds found stored inside Kiln 1. According to Bonghi Jovino (1984, 242), a lamp fragment recovered in the excavations at the Casa dei Fiori/Casa del Cinghiale, in Regio VI, belongs to a lamp identical to one of those found stored inside Kiln 2 (Cerulli Irelli 1977, table 29 n. 11).

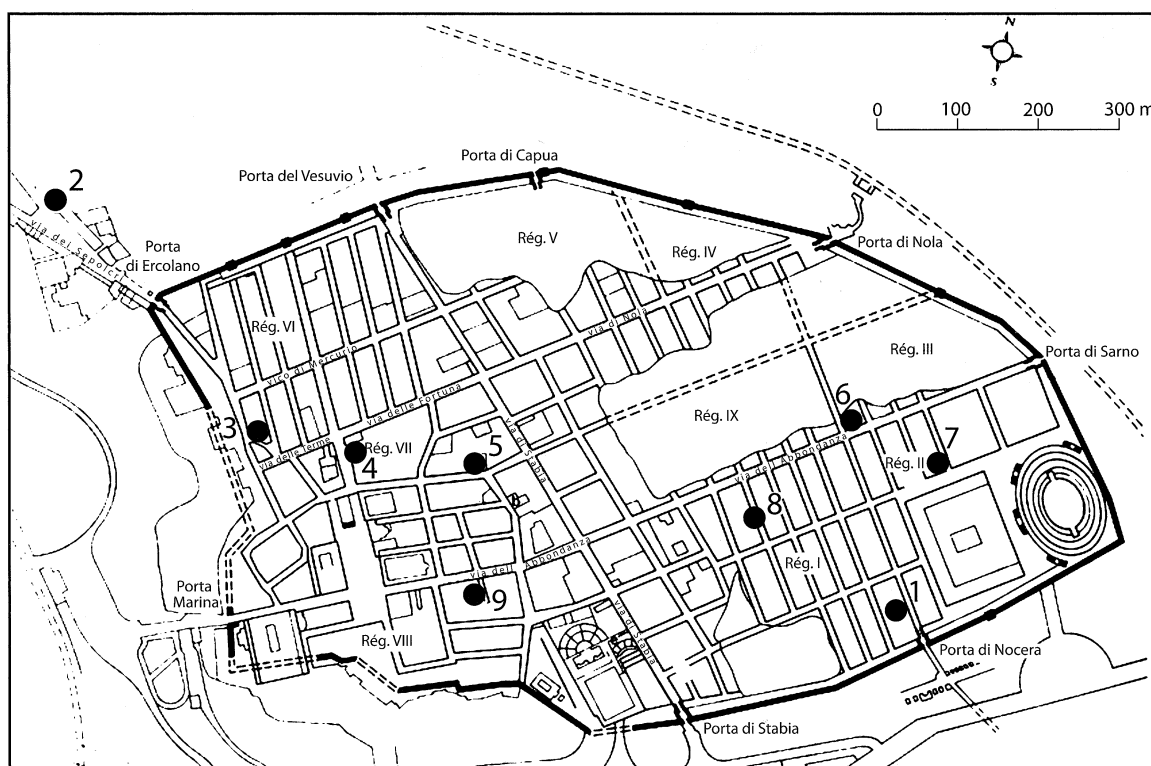


Fig. 5. Map of Pompeii, showing structures discussed in the text: 1, Via di Nocera pottery production facility; 2, Via Superior pottery production facility; 3, possible pottery shop at VI.3.17; 4, possible pottery shop at VII.4.3; 5, possible pottery shop at VII.2.46; 6, Taberna del Vasaio Zosimo; 7, Officina Vasaria di Nicanor; 8, Hospitium dei Pulcinella; 9, house with box of pottery at VIII.5.9 (courtesy Soprintendenza Archeologica di Pompei).

problematic. Since shops that served as venues for the sale of pottery required no specific architectural features, their identification depends upon the presence of frescoes, graffiti, and/or *dipinti* or a specific artifact assemblage.⁹⁸ However, frescoes, graffiti, and *dipinti* suggesting that a facility functioned as a pottery shop are rare and, when present, largely ambiguous in that they can be interpreted as indicating some other function. Or they may relate to a space's use either in the final period of the town's existence or at some substantially earlier time. We would expect a diagnostic assemblage to contain large numbers of unused vessels (i.e., vessels showing no evidence of surface attrition, sooting, incrustations, breakage, or modification) displaying a high degree of homogeneity in form, dimensions, forming, surfacing, decorative technique, and/or maker's stamps. Evidence from elsewhere in the Roman world indicates that pottery was sometimes

sold in specialized shops and sometimes in shops that dealt in a broad array of household items,⁹⁹ which might also include large numbers of unused, highly homogeneous, nonpottery items such as glassware, metal vessels, iron tools and implements, bone utensils, or whetstones. There are, however, few published descriptions of artifact assemblages from facilities at Pompeii that fit these descriptions. These tend to be quite sketchy, usually compiled during the 19th or early 20th century and employing descriptive terms of unclear significance, and they do not record the specific nature or condition of the objects.

Despite these limitations, there are three facilities inside the walls of Pompeii that we may consider as venues for the sale of pottery, on the basis of their artifact assemblages. The first is a three-room shop or shop/residence on the east side of the Via Consolare, immediately to the south of its intersection with

⁹⁸ For shops at Pompeii, see Gassner 1986; Pirson 2007, 468–69.

⁹⁹ Rhodes 1989, 49–50, 52–5.

the Vico del Farmacista (VI.3.17) (see fig. 5[3]).¹⁰⁰ It consists of an irregularly shaped front room and two smaller back rooms to its east. The front room (north and east walls: lgth. ca. 6 m; south wall: lgth. ca. 2 m; west wall: lgth. ca. 5 m) has a narrow doorway in its west wall opening onto the Via Consolare. Both the north back room (ca. 2 m north–south x 3 m east–west) and the south back room (ca. 3 m north–south x 3 m east–west) communicate with the front room via a narrow doorway in their west wall. The facility had a total area of about 25–27 m². In its final period of occupation, a doorway cut through the south wall of the front room linked it to the Caupona di Fortunato (VI.3.18–20); it appears that at this time it functioned as an annex to the Caupona. Excavation notes indicate that it yielded 33 ceramic lamps, three bronze cookpots, and a bronze tripod; therefore, Eschebach identified this facility as a residence with possible lamp shop.¹⁰¹ If so, it might have dealt in both imported lamps and locally/perilously manufactured lamps, including those manufactured at the Via di Nocera pottery production facility and at Salernum.

The second such facility is located in the Porticus Tulliana (VII.4.3–11), a strip building on the eastern side of the Via del Foro, immediately south of the Aedes Fortunae Augustae.¹⁰² The northernmost of the building's five units (VII.4.3) is a two-room shop or shop/residence consisting of a front room (ca. 2.5 m north–south x 4.5 m east–west) and a back room (ca. 2.5 m north–south x 2 m east–west) to its east connected by a doorway (see fig. 5[4]). At the right rear of the front room are three masonry steps that formed part of a staircase that provided access to a mezzanine. The facility had a ground-floor area of about 15–16 m² and a mezzanine of similar size. Excavation notes indicate

that numerous ceramic vessels were recovered on the premises, including 40 lamps with relief decoration, 2 mortaria, 4 cups, 2 cups with their lids, 8 *olearia* (flasks with a long neck), 2 cookpots or jars, 7 small cookpots or jars, and 11 lids.¹⁰³ This array of items suggests that the establishment that operated here specialized in the sale of pottery, including commonware, cookware, and lamps.¹⁰⁴ Some of these vessels were almost certainly of local or perilocal origin (e.g., the cookpots, *olearia*, lids), with some perhaps manufactured at the Via di Nocera pottery production facility (e.g., lamps) and some at the Via Superior pottery production facility (e.g., cookpots).

The third such facility is a one-room shop or shop/residence on the northern side of the Via degli Augustali, at the point opposite its intersection with the Vico del Lupanare (VII.2.46) (see fig. 5[5]).¹⁰⁵ Excavation notes from 1862 indicate that 104 lids were found in the “acque” (pools of rain water collected inside the excavation?) inside the “officina di un figulo” situated opposite the “bottega di Nonio,” stating that the same place had earlier yielded an extraordinary quantity of crockery near its doorway.¹⁰⁶ Eschebach, observing that the “bottega di Nonio” referred to was very likely the Officina Sutoria di Nonius Campanus, located at the northwest corner of Insula VII.1 (VII.1.41–42), concluded that the area of this find was the shop at VII.2.46. This facility—built into the front of the Casa del Orso (also known as the Casa del Orso Ferito) (VII.2.44–45), to the right of its entrance—has the shape of a parallelepiped (north, east, and west walls: lgth. of each ca. 5.5 m; south wall: lgth. ca. 6.0 m). The south wall has a doorway 3.8 m wide, which opens onto the Via degli Augustali, and there are the remains of a flight of stairs that presumably led to a mezzanine set

¹⁰⁰ For a detailed description of the architectural remains of this facility, excavated in 1809, see Carocci et al. 1990, 138–41. For brief descriptions, see Gassner 1986, 148–49; Eschebach 1993, 165.

¹⁰¹ Eschebach 1993, 165. Carocci et al. (1990, 139, 140), who make no reference to the finds from the facility, believe that during its final phase of operation, it functioned as a brothel.

¹⁰² This facility, excavated in 1824, has never been published. For brief descriptions, see Gassner 1986, 172; Eschebach 1993, 272–74.

¹⁰³ Fiorelli 1860–1864, 2:102–3. Eschebach (1993, 272) assigns several additional vessels to this facility, including 58 lids for pots or cups, 4 pots, 2 lamps, and numerous small vessels.

¹⁰⁴ Anecchino (1977, 107), citing Vinci (1830, 89), states that a shop located at VII.4.8 dealt in a variety of craft goods, including vessels in bronze, vessels in glass, and pottery, including lamps, cookpots with their lids, cups, and coin banks. This notice must be mistaken, as VII.4.8 is a passageway

through the Porticus Tulliana rather than a shop. The set of pottery forms listed is very close to that given for the shop at VII.4.3, differing from this only in the addition of coin banks, and it seems possible that Vinci was referring to this facility. If so, this establishment would appear to have dealt in a variety of household goods. Alternatively, according to Eschebach (1993, 273–74), one of the other shops in the Porticus Tulliana (VII.4.9) yielded a conspicuously large number of glass vessels, while a third (VII.4.11) produced a large number of bronze vessels, chiefly lamps, and it seems possible that Vinci conflated information pertaining to the finds recovered in these three facilities.

¹⁰⁵ For a detailed description of the architectural remains of this facility, excavated in 1862 and 1868, see Ehrhardt 1988, 15–16. For brief descriptions, see Gassner 1986, 168; Eschebach 1993, 263.

¹⁰⁶ Eschebach 1993, 263, citing Fiorelli 1861–1865, 13–15:88.

against the west wall. The facility had a ground-floor area of about 30 m² and a mezzanine of perhaps as much again. The presence of a large number of lids suggests that the establishment operating here sold cookware and/or commonware, presumably of local and/or perilocal origin.

Elsewhere, the Taberna del Vasaio Zosimo (III.4.1–1a), located at the southwest corner of Insula III.4, at the intersection of the Via dell'Abbondanza and the Via di Nocera (see fig. 5[6]), can be identified as a possible venue for the sale of pottery on the basis of a *dipinto* on its exterior.¹⁰⁷ This facility (ca. 15 m north–south x 7 m east–west) consists of six ground-floor rooms arranged in three tiers from south to north. The south tier consists of three rooms. To the west is a medium-sized room (ca. 4 m north–south x 5 m east–west) with a broad doorway (wdth. ca. 3.5 m) in its south wall opening onto the Via dell'Abbondanza that must have functioned as the facility's main entrance. Set into the west wall are a shallow cupboard to the south and a somewhat deeper niche, perhaps a lararium, to the north. To the east of this room are two small rooms connected to it by doorways in their west wall. The southern one (ca. 1 m north–south x 3 m east–west) was likely a stairwell, while the northern (ca. 2 m north–south x 2 m east–west) may have been a kitchen. The middle tier consists of two rooms set side by side connected by a doorway at the south end of their common wall. The room to the west (ca. 5 m north–south x 4 m east–west) is connected to the west room in the south tier by two doorways in its south wall (the western was blocked). The room to the east (ca. 5 m north–south x 3 m east–west) is connected to the north tier by a doorway at the west end of its north wall. The north tier consists of a single

large space, probably an unroofed courtyard (ca. 6 m north–south x 7 m east–west). It is connected to the east room in the middle tier by a doorway in its south wall, with a small doorway in its west wall that opens onto the Via di Nocera. When excavated, this room contained a fixture in its southwest corner that may have been a basin. The facility has a ground-floor area of about 100 m² and perhaps a mezzanine area of as much as 60 m².¹⁰⁸

A *dipinto* in red paint reading “VASA FAECARIA VEN” was found on the exterior of the south wall of the facility to the left of the broad doorway opening onto the Via dell'Abbondanza.¹⁰⁹ This presumably is “vasa faecaria ven(eunt)” (*faex* vessels for sale). Several graffiti scratched into the plaster of the west wall of the west room in the south tier shed further light on the activities of the establishment.¹¹⁰ The most noteworthy is an *index nundinarius*, a listing of the days on which periodic markets met in several different towns and cities, in this case, in seven towns and cities in Campania and at Rome.¹¹¹ Several more graffiti appear to be calculations to determine either the total number or combined price of a set of objects being bought from or sold to a named individual. The name Zosimos appears twice among these texts, raising the possibility that he owned or managed the establishment.¹¹²

Unfortunately, there is virtually no information available regarding the artifacts recovered inside the facility.¹¹³ It is important to note that there is no valid basis for the assertion that among the material recovered inside the facility was a large amount of pottery, including many fish-product containers.¹¹⁴

The *dipinto* on the facade appears to indicate that at some point an establishment on the premises was involved in the selling of vessels for packaging fish prod-

¹⁰⁷ This facility, excavated in 1916 and 1927, has never been published. For brief preliminary reports, see Della Corte 1916, 153–55; Spinazzola 1917, 248, 256; Della Corte 1927, 98–100. For reconstructions of the elevation of its facade, see Spinazzola 1953, pls. 57, 68. For brief descriptions, see Gassner 1986, 137; Van der Poel et al. 1986, 62–3; Eschebach 1993, 104–5.

¹⁰⁸ Spinazzola (1953, pls. 57, 68) reconstructs this facility with a second story with a projecting balcony on the side facing the Via dell'Abbondanza.

¹⁰⁹ *CIL* 4 7678. According to Della Corte (1916, 154), the text consisted of at least two lines, with just the first line legible. Spinazzola (1953, pl. 68) reconstructs the elevation of the facility, including a depiction of a *dipinto* other than the one in question to the left of the doorway, with little or no room for an additional *dipinto*, raising questions about the location where the text was executed.

¹¹⁰ *CIL* 4 8859–68.

¹¹¹ *CIL* 6 8863.

¹¹² *CIL* 6 8866a–b.

¹¹³ To the authors' knowledge, the only first-hand reference

in the literature to the materials recovered inside the facility is Spinazzola (1917, 256), who states that three bronze coins, an *olla* with lid, a small lid, a vessel for pouring, and two lamps were recovered in the upper part of the fill.

¹¹⁴ See, e.g., Sievers 1938, 66; Anecchino 1977, 107; de Vos and de Vos 1982, 134; Eschebach 1993, 104–5; La Rocca et al. 1994, 244. The origin of this belief appears to be a statement to this effect in Della Corte's *Case ed abitanti di Pompeii* (1965, 357–58), citing as its authority Spinazzola 1917, 256. This other source refers to only a very modest amount of pottery from the upper fill, however (supra n. 113), and in no way supports such an assertion. Elsewhere, Della Corte (1916, 154) speculates that, given the text of the *dipinto* appearing on the building's facade, the eventual excavation of the floor-level deposits in this facility might well yield “in gran copia urcei da salamoia” and “vasi di terracotta di ogni sorta,” and it appears likely that he somehow became confused on this point, recalling his own conjecture as an actual assertion that had been made by Spinazzola.

ucts. These were quite possibly examples of the Schöne 6 and/or Schöne 1. It seems unlikely, however, that an establishment would have specialized in the sale of just one kind of vessel, and, given the likelihood that they were manufactured by the same workshop/s that manufactured commonware, it seems possible that it also sold vessels belonging to this class grouping. The *dipinto* referring to *vasa faecaria* may simply have been intended to alert customers or potential customers to a specialty item available for purchase.

The presence of a fresco of a potter at work at his wheel on the exterior of the *Officina Vasaria di Nicanor* (II.3.7/9) (see fig. 5[7]) and a fresco of either four potters at work at their wheels or a single potter at work at his wheel at four different stages of work on the exterior of the *Hospitium dei Pulcinella* (I.8.10) (see fig. 5[8]) should perhaps be taken to indicate that one or both of these facilities sold pottery.¹¹⁵ This seems a particularly attractive interpretation in the latter case, for, whereas the size and layout of the *Officina Vasaria di Nicanor* leave open the possibility that it housed a pottery production facility at some point, such does not seem true of the *Hospitium dei Pulcinella*. The fresco on the exterior of this facility, which was plastered over at some point in or prior to 79 C.E., is located immediately to the right of a blocked doorway that once connected a room in its southeast corner with the unnamed street onto which it fronts. This room (ca. 3.5 north–south x 4.5 m east–west) is of a size that seems both adequate and appropriate for a small pottery shop.¹¹⁶ The fresco's date (ca. 100–50 C.E.) points to the period during which such an establishment might have operated on the premises.

Outside the walls of the town, excavations in 1781 in an unspecified location near the *Porta Ercolano* uncovered a room containing 109 *ollae perforatae* (planting vessels with several holes) of identical dimensions, stacked one inside the other in groups of six.¹¹⁷ It is unclear whether these were a set of newly manufactured vessels in storage in their production workshop (possibly the one based at the nearby *Via Superior* pottery production facility) prior to initial sale, a set of vessels that had been acquired by a wholesaler or retailer, or a set of vessels being stored by a consumer for eventual use.

Six other facilities at Pompeii have been unconvincingly or erroneously identified as venues for pottery sales. Eschebach identified four facilities in addition to those discussed above as pottery shops on the basis of the pottery assemblages recovered inside them (III.1.5, VII.4.26, VII.4.40–41, IX.1.33).¹¹⁸ In all four instances, however, the evidence does not appear to warrant this inference. The *Casetta dei Capitelli Etruschi* (I.5.1) has been identified as a pottery production facility or pottery shop because it includes a structure built out into the road in front, which might have served for the drying of newly formed pottery or the display of finished pottery.¹¹⁹ Finally, the *Bottega all'Insegna dei Vasi* (IX.11.4) has been identified as a pottery shop on the strength of a fresco on its facade that depicts several (apparently bronze) vessels.¹²⁰

Due to the uncertain nature of the evidence, it is difficult to generalize regarding the distribution of locally and perilocally manufactured pottery at Pompeii by the second of the three possible methods. The three possible pottery shops active in 79 C.E. that may have dealt in these wares are located immediately to the north of the so-called Altstadt quarter, roughly midway between the two pottery production facilities known to have been in operation during this period. This suggests that these establishments supplemented the two pottery production facilities as retail outlets, presumably serving both consumers who lived in this part of the town and those who found themselves frequenting it for marketing or other purposes. The establishment that operated at the *Officina del Vasaio Zosimo*, in Regio III, located at what must have been one of the busiest intersections in Pompeii, may have served consumers living in the town's northeast quarter. It is a point of some interest that one of the possible pottery shops is situated in the *Porticus Tulliana*, along the *Via del Foro*, immediately to the north of the forum, since this area contained a concentration of establishments involved in the retailing of housewares. In addition to this establishment, these included a shop that may have specialized in the sale of bronze vessels also in the *Porticus Tulliana* (VII.4.11),¹²¹ a shop that appears to have specialized in the sale of glassware, again in the *Porticus Tulliana* (VII.4.9),¹²² a second establishment that specialized in the sale of glassware located almost directly across the

¹¹⁵ For discussions of these two frescoes and the facilities at which they were executed, see Peña and McCallum 2009, 59–62, 76.

¹¹⁶ Maiuri 1953–1954, 91.

¹¹⁷ Anecchino 1982, 761–62. For *ollae perforatae* at Pompeii, see Di Giovanni 1996, 90.

¹¹⁸ Eschebach 1993, 101–2, 374, 377, 401.

¹¹⁹ Eschebach 1993, 31.

¹²⁰ Gassner 1986, 44, 215. See Eschebach (1993, 446) for the identification of this facility as a shop for the sale of bronze vessels or wine. For the depictions of the vessels, see Riz 1990, 78, nos. 115, 116; 82, no. 135.

¹²¹ Eschebach 1993, 274.

¹²² Eschebach 1993, 273.

Via del Foro in the range of shops along the east side of the Forum Baths (VII.5.25),¹²³ and a third such establishment around the corner from these in the Via degli Augustali, in the range of shops on the north side of the Macellum (VII.9.16).¹²⁴ This concentration of venues for the retail of housewares, located near Pompeii's center of political, social, and economic life, likely constituted a significant attraction for consumers from both the town and its territory.

That the possible pottery shop located in the Porticus Tulliana appears to have dealt in a variety of wares of probable local and/or perilocal origin, possibly including vessels manufactured in both the Via di Nocera pottery production facility and the Via Superior pottery production facility, suggests that it did not function as a retail outlet for a single pottery workshop but was rather an independent establishment that acquired its merchandise from multiple sources. In contrast, the possible pottery shop on the Via Consolare may have dealt just in lamps and may have been a retail outlet for a single pottery workshop, possibly the one that operated the Via di Nocera pottery production facility. The possible presence of a pottery shop in the Hospitium dei Pulcinella as early as ca. 100–50 B.C.E. suggests that establishments of this kind already existed at Pompeii in the late Samnite period or the Early Roman period.

Distribution by peddlers is difficult to demonstrate, as it would not have involved any purpose-specific implements or facilities likely to be preserved in the archaeological record.¹²⁵ One can imagine, however, that locally and perilocally manufactured pottery was retailed to consumers by itinerants who laid out small lots of vessels for sale in various public spaces around the town, such as the forum, the Palestra Grande, the area around the amphitheater and the vaults of its substructure, and the areas immediately outside the town's gates. They may also have gone door to door. This kind of activity is illustrated on the fresco from the atrium of the Praedia Iuliae Felicis (II.4.2–12) that depicts scenes set in and around porticoes, perhaps those in the forum and the Palestra Grande.¹²⁶ Of par-

ticular interest is a fragment that shows a man selling bronze cauldrons and cookpots.¹²⁷ He is depicted in the act of striking one of the vessels with a short rod, possibly to demonstrate its sound construction, while a man and a boy look on. Behind this group, a third man is shown holding up and examining a cookpot. Several additional vessels are depicted, arranged around these figures on the ground.

The Distribution of Imported Non-Amphora Pottery

Pompeian pottery assemblages of the first century C.E. show that during this period, the town was supplied with a wide range of cookwares, tablewares, utilitarian wares, and lamps manufactured outside the PEET, either elsewhere in the Bay of Naples region or farther afield.¹²⁸ These wares can be divided into those supplied to Pompeii in significant quantities (quantities substantial enough to suggest the existence of regularly functioning mechanisms for their distribution to the town) and those supplied in lesser quantities (quantities exiguous enough to suggest that they might have reached the town outside of regularly functioning distribution mechanisms). Those in the first category include Campanian Cookware (including Internal Red-Slip Cookware pans, bifid rim pans, flanged casseroles, and lids), from Cumae and perhaps other locales in the Campi Flegrei;¹²⁹ Production A Sigillata (also known as Tripolitanian Sigillata), originating at one or more production centers somewhere in the northern Bay of Naples area, including probably Naples;¹³⁰ Puteolan Sigillata, meaning Italian Sigillata from Puteoli;¹³¹ and Central Italian Sigillata, meaning Italian Sigillata from Arretium and perhaps other locales in central Italy.¹³² Those in the second category include Italian Glazed Ware, probably manufactured at one or more locations somewhere in central or southern Italy;¹³³ Firmalampen (factory lamps), from Modena and perhaps other locales in the Po Valley;¹³⁴ South Gallic Sigillata, from La Graufesenque, in southern France;¹³⁵ Baetican Thin-Walled Ware, from southern Spain;¹³⁶ African Cookware,¹³⁷ African Utilitarian Ware,¹³⁸ and African Sigillata A,¹³⁹ from Tunisia; Aegean Cookware, from

¹²³ Eschebach 1993, 291.

¹²⁴ Eschebach 1993, 312.

¹²⁵ For peddlers at Pompeii, see Magaldi 1930.

¹²⁶ Parslow 1998, 119–20.

¹²⁷ Museo Nazionale di Napoli, inv. no. 9063.

¹²⁸ See, e.g., the assemblage data presented in De Sena and Ikäheimo 2003, 310, tables 5, 6; 313–15.

¹²⁹ Pucci 1975; Chiosi 1996; Di Giovanni 1996, 66–8, 74–80, 82–7, 97–8.

¹³⁰ Soricelli 1987, 74–82; 2004, 300–1. For the provenance of Production A Sigillata, see Soricelli 1987, 82–3; Soricelli et

al. 1994.

¹³¹ Pucci 1977, 12–13; Soricelli 2004, 302–4.

¹³² Pucci 1977, 9–13.

¹³³ Di Gioia 2006.

¹³⁴ Pavolini 1977, 37–8.

¹³⁵ Pucci 1977, 16–19.

¹³⁶ Carandini 1977a.

¹³⁷ Di Giovanni 1996, 81, 88–9.

¹³⁸ De Sena and Ikäheimo 2003, 314.

¹³⁹ Carandini 1977b. For the provenance of African Sigillata A, see Bonifay 2004, 45–8.

one or more locales in the Aegean;¹⁴⁰ Çandarlı Ware, from the environs of Pergamon; Eastern Sigillata B, from the environs of Tralles and the Meander Valley; Eastern Sigillata A, from the area between Tarsus and Antioch; and Cypriot Sigillata, from Cyprus.¹⁴¹

Campanian Cookware, Puteolan Sigillata, and Production A Sigillata certainly or probably originated in the northern Bay of Naples/Campi Flegrei area. They were not only distributed throughout the Bay of Naples region but were also widely exported to peninsular and overseas markets.¹⁴² The emergence of the earliest of these industries, the Campanian Cookware industry, occurred during the second century B.C.E., contemporaneously with that of the Campanian Black-Gloss Ware industry at Naples. The development and maintenance of these two industries and the emergence of the Puteolan Sigillata and Production A Sigillata industries during the later first century B.C.E. depended on three factors: the existence of a large and well-integrated internal market within the greater Campania region, Puteoli's status as a major port, and the existence of a large extraregional market for Campanian wine. Vessels belonging to these three classes were probably regularly available for retail purchase at Pompeii, brought there by sellers attached to the workshops that manufactured them and/or by independent sellers.¹⁴³ In either case, it seems likely that those responsible for the distribution of these wares within the Bay of Naples area took advantage of what was the region's intensive cabotage traffic, arranging with a ship's master for passage to one or more towns lying along its route, including on some occasions Pompeii. Once the workshop representative or independent seller reached the harbor below Pompeii, he could have sought out a wholesaler or retailer interested in purchasing his consignment or retailed the vessels himself, either peddling them or setting up shop temporarily in a rented space.

The Central Italian Sigillata may well have reached markets in the Bay of Naples via Ostia/Portus, which probably functioned as a hub for the supply system that grew up to satisfy the massive demand for food-

stuffs, construction materials, craft goods, and fuel at Rome. Puteoli served as the main terminus for maritime traffic between the eastern Mediterranean and Italy during the first century C.E., while Campania supplied an appreciable amount of its own agricultural produce to the urban market; there must have been dense traffic not only between Puteoli and Ostia/Portus but also between many of the secondary and even tertiary ports along the Campanian coast and Ostia/Portus. It thus seems plausible that Central Italian Sigillata reached Campania aboard merchant ships and coasting vessels making the return voyage to Campania after offloading cargoes at the mouth of the Tiber. Given the substantially greater distances and that the goods in question probably changed hands at Ostia/Portus, it seems likely that the mechanisms for distributing Central Italian Sigillata to towns along the Bay of Naples were to some extent different from those for the supply of Campanian Cookware, Puteolan Sigillata, and Production A Sigillata to these markets. There is no epigraphic or literary evidence for the existence of specialized pottery merchants in the western Mediterranean during the imperial period, such as the *negotiatores cretarii* attested for some of the northern provinces,¹⁴⁴ nor have any shipwrecked merchantmen bearing a cargo comprised primarily, or even largely, of pottery been identified.¹⁴⁵ This suggests that the long-distance distribution of pottery by sea in this part of the empire was undertaken by general-purpose merchants and/or by the captains/crew of merchant vessels, who acquired small to moderately sized lots of pottery at their ports of call, reselling them along the route.¹⁴⁶ Consignments of Central Italian Sigillata may have reached the Bay of Naples by either or both of these methods. Nearly all the mortaria used at Pompeii during the first century C.E. and a significant portion of the dolia originated in the Tiber Valley, and it seems possible that these were distributed to Puteoli and/or Pompeii together with Central Italian Sigillata. Consignments of pottery brought as far as Puteoli might have been distributed to towns along the coast, including Pompeii, by the same independent sellers

¹⁴⁰Di Giovanni 1996, 81–2, 86; Gasperetti 1996, 49.

¹⁴¹Pucci 1977, 19–21. For the provenance of Eastern Sigillata B, see Lund et al. 2006.

¹⁴²Campanian Cookware and Puteolan Sigillata were distributed over much of the empire (Aguarod Otal 1991, 51–120; Pucci 1981, 108–10, 112–13, table 19). Production A Sigillata appears to have been distributed principally to coastal areas in southern Italy, Sicily, Tunisia, and Libya (Soricelli 1987, 83–5).

¹⁴³Perhaps indicative of the first of these two possible arrangements is an epitaph from Puteoli (*Eph. Epigr.* 8.102, no.

387), probably dating to the first century B.C.E., in which the deceased, a certain Marcus Modius Pamphilus, the freedman of Marcus, is termed a *figulus propolus* (potter-retailer) (Tuck 2005, 116, no. 176).

¹⁴⁴Rhodes 1989, 44–5; Aubert 1994, 213–14.

¹⁴⁵Parker 1992, esp. 532, 538.

¹⁴⁶The complex mechanisms for the distribution of pottery from the Koroni district of the Peloponnese during the 19th and 20th centuries may provide a useful set of analogues for those that served for the long-distance distribution of Roman pottery by sea (Blitzer 1990, 701–6).

who may have distributed Campanian Cookware, Puteolan Sigillata, and Production A Sigillata to these markets. Once consignments of Central Italian Sigillata reached Pompeii, they could have been marketed as were the other three classes of pottery.

There would have been regular merchant shipping between parts of the empire where the several classes of imported pottery that appear in less significant quantities originated and Ostia/Portus and/or Puteoli; and the casual acquisition of small consignments of vessels belonging to these classes by general-purpose merchants or ships' captains/crew who did not deal in pottery on a regular basis may account for the occasional appearance of examples of these classes on the market at Pompeii. Alternatively, examples of these wares may have reached Pompeii as the personal possessions of immigrants, visitors to the town, or Pompeian travelers or as special orders sent on request by a client or friend.¹⁴⁷

It is against the background of these observations that we can consider the most well-known piece of evidence regarding the distribution of imported pottery to Pompeii, namely the "crate" of 90 South Gallic Sigillata bowls and 37 Firmalampen found in the tablinum of the modest atrium house at VIII.5.9 (see fig. 5[9]).¹⁴⁸ Brief descriptions of this 1881 find were published by Fiorelli in 1881 and 1882.¹⁴⁹ According to Fiorelli, it consisted of "un deposito di tazze a vernice corallina e nera, e di lucerne (non ancora adoperate), disposte in ordine in una cassa di legno."¹⁵⁰ He further notes that in the same room, "si raccolse una quantita [*sic*] di polvere rossa (mattoni pesto o terra rossa?) conteunta in due casse di legno bruciate, come appare dalle tracce rimaste sul pavimento e sulle pareti."¹⁵¹ From the array of other objects recovered in the house, it is evident that it was occupied in 79 C.E.¹⁵²

Atkinson later published a study of the South Gallic Sigillata bowls from this "crate."¹⁵³ Thirty-six of these

are examples of the Dragendorff 29, and 54 are examples of the Dragendorff 37. From their stamps and decoration, it is clear that all were manufactured at La Graufesenque.¹⁵⁴ All 36 Dragendorff 29 examples bore a stamp: 23 for the maker Mommo, 5 for Vitalis, 2 each for Manduillis and Rufinus, and 1 each for Secundus, Mo(nticus?), and Patricius, and 1 illegible stamp. In contrast, only five or six of the Dragendorff 37 examples bore a stamp: two stamps of Memor, one each of Mommo and Mo(destus), one perhaps also of Mommo, and one possible illegible stamp. Pavolini examined the Firmalampen from this feature.¹⁵⁵ He identified all as true Firmalampen—that is, examples manufactured in the Po Valley, rather than imitations produced elsewhere, including perhaps at or near Pompeii.¹⁵⁶ Of the 37 lamps, 24 bore the stamp of Strobilus, 6 the stamp of Communis, 4 the stamp of Echio, and 2 the stamp of Fortis, while 1 was unstamped.

Fiorelli's comment that the lamps were unused presumably derived from the absence of sooting around the wick hole. In describing the South Gallic Sigillata bowls, Atkinson noted "all [were] completely preserved. Many of them show clear signs of fire. . . . No mark of wear was to be observed on the bases, some of which showed slight roughness such as would have been rubbed smooth by continuous use."¹⁵⁷ Thus, he concluded: "The discovery of so many bowls, more, one may presume, than would supply the needs of a single household, packed carefully together and associated with unused lamps, seems strongly to suggest that they represent a consignment lately received in Pompeii from a wholesale dealer in such wares. The presence of lamps of Fortis and Communis, whose factories are usually assigned to northern Italy, indicates that the bowls did not reach Pompeii direct from their place of manufacture in southern Gaul."¹⁵⁸

This interpretation has been accepted uncritically, and it has been widely and sometimes carelessly cited

¹⁴⁷ For this last practice, see Cic. *Att.* 6.1.13 (22 February 50 B.C.E.), in which Cicero, writing from Laodicea, informs Atticus, then in Epirus, that he has ordered for him the set of *rhosica vasa* that the latter had apparently requested. For the identification of *rhosica vasa* as Eastern Sigillata B, see Lund et al. 2006.

¹⁴⁸ Eschebach 1993, 380–81.

¹⁴⁹ Fiorelli 1881, 300, 322, 324; 1882, 275–77; see also Mau 1883, 174–75.

¹⁵⁰ Fiorelli 1881, 300.

¹⁵¹ Fiorelli 1881, 322, 324 (for this reddish material). Its color appears to exclude the possibility that it was raw potting clay, as this is generally light gray or brownish. Mau (1883, 174–75) refers to "terra rossa" contained in a single "cassa di legno." Atkinson (1914, 27) states that "Side by side with this box [i.e., the one containing the pottery] were found two others, con-

taining red powder, either pounded brick or red earth." Since Atkinson appears to have based his discussion of this feature entirely on information contained in Fiorelli (1881, 1882), his assertion that the two boxes in which the powder was found were set side by side with the one that contained the pottery appears to be unjustified.

¹⁵² Fiorelli 1881, 302, 322–24; Atkinson 1914, 27.

¹⁵³ Atkinson 1914; see also Dwiza 2005.

¹⁵⁴ Atkinson 1914, 29–30; Dwiza 2005, 431–49.

¹⁵⁵ Pavolini 1977, 37–8, 46–51.

¹⁵⁶ Pavolini 1977, 38. The attribution of these to workshops in the Po Valley has been corroborated by a program of chemical analysis involving similar lamps from Vindonissa carried out by Schneider 1994, 130–34.

¹⁵⁷ Atkinson 1914, 28.

¹⁵⁸ Atkinson 1914, 28.

in literature concerned with the mechanisms employed for the distribution of pottery in the Roman world. Ward-Perkins and Claridge, for example, wrote that the evidence “suggests that the Pompeian consignee had dealt through an agent in the north rather than directly with the potteries.”¹⁵⁹ Similarly, Webster pointed to the “so-called Pompeii Hoard, a group of samian apparently assembled in North Italy (as it was accompanied by a number of northern Italian lamps), and still in its original crate awaiting unpacking when buried in AD 79.”¹⁶⁰ Atkinson’s interpretation of this feature and the theories suggested by others can, however, be doubted on three points: (1) it is not certain that the vessels were in the packaging crate in which they had reached Pompeii when buried by the eruption; (2) it is not certain that the vessels were a consignment from a wholesale dealer that was destined for eventual retail sale; (3) if the vessels were a wholesale consignment, it is not certain that this was assembled in northern Italy.

Indeed, the packaging of a modest quantity of low-cost items such as pottery bowls and lamps in a purpose-made crate would not appear to be a cost-effective approach to their distribution, given the significant amount of materials and skilled labor that would have been required for the fabrication of a container of this kind.¹⁶¹ A more economical approach, and one that would have allowed for greater flexibility in arranging loads of pottery aboard ships, in the beds of wagons, and on the backs of pack animals or porters, would have been to pack the vessels inside soft, lightweight containers, such as baskets, nets, or cloth sacks. Evidence for this practice is provided by a third-century

C.E. relief from Narbonne that depicts two stevedores carrying nets containing pottery up a ship gangway.¹⁶² Elsewhere, Camarina B, a first-century C.E. wreck off the south coast of Sicily, produced an unspecified number of unused lamps of apparent North African origin packed in cloth sacks.¹⁶³ That the container and its contents were placed in the same room as two similar containers holding reddish powder of some kind indicates that all three receptacles were probably being used for local transport and/or storage.

While the group of 37 lamps does appear to represent the single largest set of lamps ever recorded at Pompeii, finds of groups of 10 or more lamps have been fairly common,¹⁶⁴ and, given the low cost and probable short use-life of these items, it may not have been unusual for households, dining establishments, and workshops to keep as many as a few dozen on hand.¹⁶⁵ While 90 South Gallic Sigillata bowls of just two different forms does seem to represent more vessels than would normally be required by a single household, these might have been a set of drinking vessels acquired for a *popina* or *caupona* or for furnishing the residences of a family of means.

If the bowls and lamps do, in fact, represent a wholesale consignment, it seems unlikely that this was assembled somewhere in northern Italy. South Gallic Sigillata destined for Mediterranean markets was presumably brought first to Narbonne (Roman Narbo) overland and/or by river craft.¹⁶⁶ There, consignments destined for markets in central and southern Italy were probably placed aboard ships bound for Ostia/Portus.¹⁶⁷ From Ostia/Portus, these may have reached Campania and eventually Pompeii by the same set of

¹⁵⁹ Ward-Perkins and Claridge 1978, 2:201.

¹⁶⁰ Webster 2005, 94.

¹⁶¹ The only other possible evidence for the packaging of Roman pottery in a wooden box known to the authors comes from Karanis, in Egypt, where it has been suggested that a simple wooden box “which contained a number of pieces of the red slip tableware imported from Roman Africa, may have been the same box in which the pottery had been shipped” (Gazda 1983, 26).

¹⁶² Rougé 1966, 181, pl. 6a; Nieto Prieto et al. 1989, 230, fig. 158; 231; Gianfrotta et al. 1997, 127.

¹⁶³ Parker 1992, 95, no. 164.

¹⁶⁴ Eschebach (1993) records the following additional instances of finds of 10 or more ceramic lamps within a single structure at Pompeii not thought to be a pottery workshop: I.2.7.8, 11 lamps (16); I.2.16, 13 lamps (17); I.3.24, 13 lamps (24); I.3.30, 14 lamps (25); VI.10.12, 20 lamps (196); VI.13.5, 14 lamps (204); VII.4.12.13, 10 lamps (274); VII.5.3, 10 lamps (287); VII.5.25, 12 lamps (291); VII.5.29, 20 lamps (292); VII.15.12–14, 12 lamps (345); IX.2.4, 19 lamps (405); IX.2.23, 12 lamps (410); IX.3.17, 10 lamps (417); IX.13.4–6, 20 lamps (450).

¹⁶⁵ Interesting in this regard is that the *Edictum de Pretiis*

(15.99) provides for the (presumably retail) sale of lamps in lots of 10 at a maximum price of 4 *denarii communes*, a figure just 2 *denarii communes* more than the smallest price recognized in this document.

¹⁶⁶ There is direct evidence for this practice from La Nautique, on the outskirts of Narbonne, where excavation uncovered a ditch filled with more than 514 unused South Gallic Sigillata vessels manufactured at La Graufesenque during the 50s or 60s C.E. (Fiches et al. 1978; Rhodes 1989, 51).

¹⁶⁷ Martin 1985, 128–29. The assumption that large quantities of South Gallic Sigillata were offloaded at Ostia/Portus during the second half of the first century C.E. is supported by the fact that this class represents a very substantial proportion of the gloss-slipped tableware component of pottery assemblages from both Ostia and Rome dating to ca. 70–100 C.E. For Ostia, see Martin 1992, 92; 1994, 118–20; Pavolini 1996, 226. For Rome, see Rizzo 2003, 201, table 31. The Cala Culip 4 wreck, dating to the 60s or 70s C.E., provides interesting evidence for the mechanisms that served for the distribution of South Gallic Sigillata along the coasts adjacent to Narbonne during this period (Nieto Prieto et al. 1989; Parker 1992, 157, no. 347; Millet 1993).

mechanisms that facilitated distribution of Central Italian Sigillata to the towns of coastal Campania. How true Firmalampen got to the Mediterranean market is less clear, although they were perhaps transported eastward along the Po Valley to ports on the Adriatic for distribution by ship. Substantial amounts of cargo from the Adriatic were offloaded at Ostia/Portus during the second half of the first century C.E., including wine and, to a lesser degree, oil, and small quantities of true Firmalampen may have reached west-central Italy as occasional cargo aboard ships along this route. Thus, it seems likely that if South Gallic Sigillata bowls and Po Valley Firmalampen were assembled into a wholesale consignment that found its way to a house in Pompeii in or shortly before 79 C.E., this occurred at Ostia/Portus. It cannot be excluded, however, that this occurred at Puteoli, or even at Pompeii itself.

Whatever the case, it should be noted that the vessels from this feature represent a substantial portion of the total amount of both South Gallic Sigillata and Firmalampen recovered at Pompeii.¹⁶⁸ This suggests that this group of items represents one or more acquisitions made outside the normal set of mechanisms for the supply of pottery to the town, perhaps by an individual—whether a wholesaler, retailer, or consumer is unclear—with unusual connections. Alternatively, it may reflect developments in the normal mechanisms for the supply of pottery to Pompeii shortly before its destruction.

It is uncertain whether the absence of imported pottery from the possible pottery shops discussed above is significant. The nature of the excavation notices leaves open the possibility that imported pottery was retailed there. At the same time, given the likelihood that imported pottery reached Pompeii primarily by ship or boat, it seems possible that vessels belonging to these classes were wholesaled and perhaps retailed at quayside and/or through shops near the town's harbor.

Pompeii, by virtue of its port, probably functioned not just as a local market center but also as a second-order central place for the Sarno Basin and the territory east of Vesuvius.¹⁶⁹ It thus seems possible that itinerant

wholesalers and retailers based at Pompeii played an important part in the distribution of imported pottery over much of the Campanian interior. The presence of an *index nundinarius* at the Taberna del Vasaio Zosimo that lists the days of market meetings at Nuceria, Atella, Nola, Cumae, Puteoli, Rome, and Capua is suggestive in this regard.¹⁷⁰ That the individuals who operated this establishment took the trouble to produce this device suggests that their activities involved the frequenting of markets at some or all of the centers on the list—most plausibly Nuceria, Nola, and Atella—perhaps to buy pottery manufactured there for distribution at Pompeii and/or selling imported pottery.¹⁷¹

The Distribution of Amphoras

Compositional and epigraphic evidence suggests that after the initial period of the production of the Dressel 2–4 (ca. 25 B.C.E.–25 C.E.), the majority of Dressel 2–4s used for packaging wine produced in the PSA were manufactured at or near Surrentum. The logic of such an arrangement becomes clear if one considers the practices likely employed for the packaging of wine produced in the PSA. As the vast bulk of this wine was probably acquired from owners of the estates where it was produced by merchants who intended to export it by sea, it would have been advantageous for both parties to centralize selling and bottling operations by concentrating these at a limited number of facilities located on the coast, including possibly Pompeii and its port. Wine could have been transferred to these facilities for sale and bottling by estate owners in reusable containers of some kind, most likely *cullei*—large leather containers made from the hide of a single cow and having a notional volume of 20 amphoras (524 liters)—that could be mounted on wagons. After purchase, the wine could be transferred to amphoras owned by the buyer for export and the *culleus* returned to the estate.

Bottling operations of this kind would have required large numbers of amphoras. Merchants interested in buying wine could bring many amphoras with them to the bottling facility, or the individuals who operated

¹⁶⁸ Pucci (1977, 17–18), in his study of the South Gallic Sigillata from Pompeii and Herculaneum in the Museo Nazionale di Napoli, identified 203 examples of this class, including the 90 examples from the feature here under consideration. Among these were 102 examples of the Dragendorff 29 and 63 examples of the Dragendorff 37. Pavolini (1977), in his study of the lamps from Pompeii and Herculaneum in the Museo Nazionale di Napoli and the storerooms at Pompeii, identified 91 true Firmalampen, including the 37 examples from the feature here under consideration.

¹⁶⁹ Purcell 1990, 112.

¹⁷⁰ Storchi Marino (2000, 103) suggests that this device may have been an adaptation of a more generalized *index nundinarius* posted elsewhere at Pompeii, quite possibly in the forum.

¹⁷¹ For an imaginative reconstruction of the activities of the individuals who operated this establishment, see Avisati 2003, 161–62. For the methods employed to distribute pottery over similarly sized territories in Sardinia and Alto Lazio/Umbria during the 20th century, see Annis and Geertman 1987, 167–70; Peña 1992, 95–6.

these facilities could stockpile amphoras on the premises, selling them as needed to the merchants. In either case, the fact that the amphoras were manufactured across the Bay of Naples at Surrentum rather than in some adjacent part of the PSA would have been a point of little consequence, as it probably would have proven more economical and convenient to convey containers by ship over the relatively modest distance involved (ca. 15–20 km from the harbor at Sorrento to the coast of the PSA) than to transport fewer containers overland over even a short distance. It would not have mattered that the source for these containers would have been somewhat remote from the locus of bottling operations, as merchants could have put in at Surrentum to purchase amphoras or could have bought them at the bottling facility.

A considerable amount of evidence supports the proposition that Pompeian wine was bottled in specialized facilities located along the coast. Most interesting is Oplontis Villa B.¹⁷² Dated to the second century B.C.E., it lies 3.2 km north-northwest of Pompeii, close to the pre-79 C.E. shoreline. In plan, it resembles a *horrea*, with ranges of rooms on two stories set around all four sides of a central peristyle courtyard. Enough of the area around the structure was excavated to show that it constituted what was, in effect, an insula flanked by roadways on at least two sides. The fragmentary remains of the second story indicate that this consisted of a set of well-appointed living quarters. The ground floor consisted of rows of storage and/or work rooms facing onto the courtyard and, backing onto these, rows of storage rooms or perhaps shops opening onto the building's exterior. There was a single entrance to the courtyard at the eastern end of the structure, wide enough to admit wheeled vehicles. The threshold bore a pair of deeply incised ruts, attesting to intensive traffic. A large number of amphoras—hundreds according to the published description—were found under the porticoes along the sides of the courtyard, stacked in inverted position in three tiers, with the mouth of the containers in the second and third tiers set over the spike of a container in the tier below them. Amphoras stacked in this way have been found in four or five food processing/storage facilities inside the city walls, and this was evidently the standard method for storing amphoras.¹⁷³ While no detailed description of these containers is available, most are said to have been

wine amphoras, with just a small number belonging to classes considered to be either olive oil or fish-product containers. In three published photographs, it is possible to glimpse roughly 50 of these vessels, all of which appear to be examples of the Dressel 2–4.¹⁷⁴ Two small stone ovens were each set against one of the columns in the colonnade. These may have served for melting pitch to line the amphoras prior to filling.¹⁷⁵ The remains of carbonized fruit (chiefly pomegranates) were recovered in some of the ground-floor rooms. Nowhere on the premises were there either *torcularia* for the pressing of grapes or *dolia* for the storage of must. Taken together, this evidence strongly suggests that this facility stored produce and bottled wine.

At Pompeii itself, a fresco from the shop at VI.10.1 depicts two men decanting wine from a *culleus* on a wagon into a pair of fusiform amphoras.¹⁷⁶ Elsewhere, the Villa Regina, a modest farmhouse at the center of an estate apparently involved in viticulture, located only about 2 km to the east of Oplontis Villa B, yielded few examples of the Dressel 2–4,¹⁷⁷ as one might expect if the wine produced there was bottled at some other location. Farther away, survey carried out around the Monte Mássico, in northern Campania, where the wide availability of fluvio-lacustrine clays allowed flexibility in locating amphora production facilities, has produced evidence that during the first century B.C.E., these establishments were situated along the coast, suggesting that wine was bottled there rather than at the estates.¹⁷⁸ During the first century C.E., these establishments shifted to inland areas, presumably reflecting a change in the arrangements whereby the wine produced in this region was bottled.

The packaging of fish products confected in the PSA probably occurred at facilities located along the coast. It seems probable that the *cetaria*—the facilities at which fish products were made—were sited on the coast to be near the three main ingredients: fish, salt, and fresh water.¹⁷⁹ Since many of these products were presumably distributed by sea, it is plausible that they were packaged at the point of production. A *dipinto* on the facade of the Taberna del Vasajo Zosimo suggests it was involved in the sale of containers for the packaging of fish products. This may have included examples of the Schöne 6 and Schöne 1, containers probably manufactured in the PSA, the service area of Nuceria, and/or the service area of Surrentum.

¹⁷² For this facility, see Fergola 2004, 100–11.

¹⁷³ Peña 2007, 82–97.

¹⁷⁴ D'Arms 1984, fig. 36; Fergola 2004, 20, 104.

¹⁷⁵ De Caro (1994, 227) states that two blocks of pitch were recovered at this facility.

¹⁷⁶ Jashemski 1967, 196, fig. 4; 1979, 224, fig. 326; Tchernia 1984, 89, 90, fig. 39; Avisati 2003, 124, fig. 124.

¹⁷⁷ De Caro 1994, 184.

¹⁷⁸ Arthur 1982, 31–3; 1991, 75, fig. 17; 85.

¹⁷⁹ Curtis 1988, 29.

While this establishment may have been an outlet for a workshop in the PSA manufacturing one or both of these containers (presumably along with various commonware forms), the presence there of an *index nundinarius* suggests that it served as a middleman distributor for vessels manufactured farther away, including perhaps the Schöne 6 and the Schöne 1. Worth noting is that Nuceria occurs in the list of towns included in the text.

CONCLUSION

The distribution of the raw materials for pottery manufacture across the PEET likely played a significant role in determining the geography of pottery production. This territory contains only two documented deposits of marine clay. Both lie in the service area of Salernum: at Ogliara and Montecorvino. There are also probably undocumented sources of marine clay on the western part of the Sorrentine peninsula. Sources of volcanic clay likely existed at several locations within the PEET, including locations within the PSA. It seems likely that there were sources of fluvial clay on the Sarno floodplain in the PSA and in the service area of Nuceria. Volcanic sand suitable for use as tempering material was likely available across most of the PEET.

The absence of a comprehensive program of mineralogical analysis of pottery from Pompeii of likely local and periloccal origin makes it impossible to know where the raw materials for the cookware, commonware, thin-walled ware, lamp, and amphora class groupings were from and where these classes were produced. We do know, however, that virtually all the commonware was manufactured in two fabrics. The first, a rough reddish-brown to red fabric with poorly sorted volcanic inclusions, was likely produced using a fluvial clay (probably from the Sarno floodplain) perhaps with the addition of volcanic sand temper. Vessels manufactured in this fabric were likely produced either in the PSA and/or in the Nuceria service area. The second, a fine reddish-yellow to pinkish-white fabric with fine volcanic inclusions, was likely produced using either a fluvial clay (again from the Sarno floodplain) or a marine clay (from the service area of Surrentum) with the addition of volcanic sand temper. Vessels manufactured in it were presumably manufactured in the PSA, the Nuceria service area, and/or the Surrentum service area. The Via di Nocera pottery production facility at Pompeii may have employed a paste of the first kind to manufacture some of the pottery that it produced. All the cookware was made from a coarse red fabric with poorly sorted volcanic inclusions, using a volcanic clay from somewhere in the PSA and/or the service areas of Herculaneum, Nola, Nuceria,

and Surrentum. The Via Superior pottery production facility at Pompeii probably employed a paste of this kind to manufacture its pottery.

Thin-walled ware was manufactured in two fabrics; one was similar to the fine fabric used for the manufacture of commonware, and the other was a fine, nonferruginous, perhaps calcareous, fabric. The latter may have been manufactured using fluvial clay (from the Sarno floodplain) or marine clay (from the service area of Surrentum and/or Salernum). Passages in Pliny the Elder and Martial suggest that Surrentum was a major center for the manufacture of thin-walled ware, raising the possibility that much of the pottery in these two fabrics originated there. Lamps were also manufactured in two fabrics; one was similar to the fine fabric used for the manufacture of commonware, and the other was a fine to gritty, nonferruginous, perhaps calcareous, fabric. The latter may have been manufactured using fluvial clay (from the Sarno floodplain) or a marine clay (from the Surrentum and/or Salernum service area). The Via di Nocera pottery production facility may have produced lamps in the latter fabric. Some lamps from Pompeii in this fabric may have been manufactured by one or more workshops located at Salernum.

The Dressel 2–4, the standard container for Pompeian wine from the last quarter of the first century B.C.E. to 79 C.E., was manufactured in a coarse red fabric containing poorly sorted volcanic material. While it is clear that sometimes this fabric was produced using some combination of a fluvio-lacustrine or marine clay and volcanic material—either clay or temper—some examples may have been made from volcanic clay. Vessels in the latter fabric were probably produced somewhere in the PSA during the later first century B.C.E. and early first century C.E., in at least one case by a workshop owned by L. Eumachius, which also manufactured roof tiles. Vessels in the former fabric were probably manufactured somewhere in the service area of Surrentum beginning in the late first century B.C.E. and continuing down to 79 C.E. and most likely beyond. Two small classes of amphora for packaging of Pompeian fish products, the Schöne 6 and Schöne 1, were produced in a fabric similar to the finer commonware fabric, presumably by the workshop or workshops that manufactured the commonware used at Pompeii.

Non-amphora pottery of local or periloccal origin was probably distributed at Pompeii by three methods: sale at the production facility, sale at a shop away from the production facility, and sale by peddlers. The presence of a stepped masonry counter at the Via di Nocera pottery production facility points to the first of these methods. Three facilities within the walls of Pompeii that may have functioned as pottery shops

point to the second method. An establishment at the Taberna del Vasaio Zosimo probably sold fish-product containers and perhaps also commonware. The presence of frescoes showing a potter or potters at work on the exterior of the Officina Vasaria di Nicanor and the Hospitium dei Pulcinella may indicate that these served as venues for the sale of pottery, in the latter case perhaps as early as ca. 100–50 B.C.E.

During the first century C.E., Pompeians used a wide variety of imported wares, including some that reached the town via regularly functioning distribution mechanisms (Campanian Cookware, Puteolan Sigillata, Production A Sigillata, Puteolan Sigillata, Central Italian Sigillata) and some that arrived by some other means (Italian Glazed Ware, Firmalampen, South Gallic Sigillata, Baetican Thin-Walled Ware, African Cookware, African Utilitarian Ware, African Sigillata A, Aegean Cookware, Eastern Sigillata A, Eastern Sigillata B, Çandarlı Ware, Cypriot Sigillata). Of the former category, Central Italian Sigillata probably arrived by general-purpose merchants and/or the captains/crews of merchant ships, in all likelihood via Ostia/Portus and perhaps also Puteoli. The other three classes may have reached Pompeii via a regional distribution network that involved independent sellers and/or sellers attached to the workshops. The several classes of pottery in the second category may have been distributed to Pompeii on a casual basis by general-purpose merchants and/or the captains/crews of merchant ships, or reached the town as the personal possessions of immigrants, travelers, or visitors, or as special orders sent by a client or friend. A wooden box containing 90 South Gallic Sigillata bowls and 37 Firmalampen found in the house at VIII.5.9 has frequently been interpreted as a consignment of vessels assembled by a pottery wholesaler in northern Italy that was destined for retail sale at Pompeii. It may, however, be a group of vessels intended for use by the extended household of a wealthy family or by a food service establishment, or, if a wholesale consignment, one most likely assembled at Ostia/Portus. Imported wares might have been retailed in the shops noted above or quayside or at Pompeii's port. The presence of an *index nundinarius* at the Taberna del Vasaio Zosimo raises the possibility that middlemen at Pompeii distributed imported pottery over a large portion of the Campanian interior.

Much of the wine produced in the Pompeii service area was probably bottled in facilities along the coast, such as Oplontis Villa B. The amphoras for this purpose, which from ca. 25 C.E. onward would have consisted chiefly of Dressel 2–4s manufactured in

the service area of Surrentum, were probably either acquired by wine merchants before arriving at the facility or stockpiled at the facility in advance. The fish products confected in the PSA were likely produced and filled at facilities located along the coast. The establishment that operated at the Taberna del Vasaio Zosimo probably played some role in providing the containers employed for this, which likely included examples of the Schöne 6 and the Schöne 1.

Pompeii of the first century C.E. may have been anomalous with respect to most other towns in Roman Italy for the high proportion of its pottery that was manufactured outside its service area. During this period, many of the amphoras used for the bottling of Pompeian wine were apparently manufactured in the Surrentum service area, as may also have been a large portion of the thin-walled ware cups and beakers in use in the town, while a large portion of the cookwares was probably manufactured in the Campi Flegrei. The evidence for *opus doliare* and architectural ceramics presents a similar picture, with nearly all the mortaria and a substantial portion of the dolia manufactured in the Tiber Valley and roughly one-third of the roof tiles manufactured somewhere outside the PSA, perhaps also in the Surrentum service area. This circumstance was presumably the result of a combination of two factors. The first was the absence of sources of marine clay in the PSA and perhaps a paucity or absence of sources of high-quality fluvio-lacustrine clay, coupled with the presence of sources of high-quality volcanic clay and moderate-quality marine clay elsewhere in the PEET and the broader Bay of Naples region. The second factor was Pompeii's coastal location coupled with the well-developed economy of the Bay of Naples region, as these made possible the economical distribution to Pompeii of pottery manufactured both elsewhere in the PEET and farther away. While this pattern of supply may be seen as representing an expression of the "dispersed hinterland" phenomenon that Horden and Purcell have argued was characteristic of economic life across much of the Mediterranean both in ancient times and the Medieval period,¹⁸⁰ more studies are needed to judge whether Pompeii is either representative of or—as we suspect—anomalous with respect to broader economic patterns.

Some suggestions for future work are (1) a detailed study of the ceramic ecology of the PEET to pinpoint specific locations of any sources of fluvial clay in the Sarno floodplain, volcanic clay in the extensive areas of volcanic geology, and marine clay on the Sorrentine peninsula; (2) a comprehensive compositional study of

¹⁸⁰ Horden and Purcell 2000, 115–22.

the locally and perilocally manufactured pottery from one or more excavations at Pompeii to identify raw materials for these wares, the likely locations of the manufacturing establishments, and the paste preparation practices for their production; (3) identification and study of vessels recovered at the Via di Nocera pottery production facility, the Via Superior pottery production facility, and/or the four facilities identified here as possible pottery shops; and (4) a study of the patterns in the consumption of pottery in Pompeii itself.

INSTITUTE FOR EUROPEAN AND MEDITERRANEAN
ARCHAEOLOGY
DEPARTMENT OF CLASSICS
THE UNIVERSITY AT BUFFALO,
STATE UNIVERSITY OF NEW YORK
BUFFALO, NEW YORK 14226
TPENA@ACSU.BUFFALO.EDU

DEPARTMENT OF MODERN LANGUAGES AND
CLASSICS
ST. MARY'S UNIVERSITY
HALIFAX
NOVA SCOTIA B3H 3C3
CANADA
MYLES.MCCALLUM@SMU.CA

Appendix: The Color and Chemical Composition of Some Marine and Volcanic Clays from Campania and Lazio

This appendix presents color and chemical composition data for seven specimens of marine potting clay from the area of Salerno, including five specimens from Ogliara and two specimens from Montecorvino, and three specimens of volcanic potting clay, including one from Cascano, in northern Campania, and two from near Vasanello, in northern Lazio. The color and compositional data obtained for the raw clay specimens are presented in table 3, while those obtained for the fired clay specimens are presented in table 4.

The five specimens of Ogliara clay were collected at the outcrop of the M^{5-4} formation to the south of the village on 8 May 1991. Two of these were taken from the quarry face then being worked by the Fratelli De Martino establishment near the highest part of the out-

crop, which, according to the *Carta Geologica d'Italia*, stands at an elevation of about 100 masl. Two more were taken from a weathered quarry face near the lowest part of the outcrop, which, also according to the *Carta Geologica d'Italia*, stands at an elevation of about 50 masl.¹⁸¹ One specimen was taken from a weathered road cut between these two locations at about 75 masl. The two specimens of Montecorvino clay were collected from the outcrop of the M^{5-4} formation that occurs to the west of the town, also on 8 May 1991. The first was obtained from the quarry face of a large clay pit being worked by a brick and tile factory located in the San Martino district to the south of the town. The other was obtained from a pile of clay at the Vianova brick and tile factory, situated in the Martorana district to the northwest of the town. According to an informant who worked at this establishment, the clay in this pile had been excavated on the grounds.

The specimen of volcanic clay from Cascano was obtained on 17 May 1991 from B. De Cresce, the operator of one of the two cookware production establishments then active at the town. According to Rocca, the cookware producers at Cascano extracted their clay at a locale known as Vallo, near Sessa Aurunca.¹⁸² One of the two specimens of Vasanello volcanic clay was obtained from Bruno Orlandi, a retired potter at Vasanello, on 20 June 1987. The other was obtained from Antonio Orlandi, the brother of Bruno Orlandi and an active art potter at Vasanello, on 23 June 1990. In both instances, the donor said the specimen came from the main source of cookware clay traditionally employed by Vasanello potters at a locale known as Le Terraie, a short distance outside town.¹⁸³

Each specimen of clay was characterized for its color and its minor constituent/trace element chemistry determined by means of NAA in both the raw and fired state. Color characterizations were made by matching the specimen with the closest chip in the Munsell Soil Color Chart, interpolating between chips where possible. Raw clay specimens were prepared for NAA by being crushed in an agate mortar. For the NAA of fired clays, about 5 g of raw clay were crushed in an agate mortar, deionized water was added until the clay became plastic, and the mixture was rolled into a small cylindrical pellet measuring about 1.5 cm long by 0.75 cm in diameter. The pellets were then fired in an electric muffle for two hours at 900°C in an oxidizing atmosphere, allowed to cool to room temperature, and then crushed in an agate mortar. For both raw and

¹⁸¹ Servizio Geologico d'Italia 1978.

¹⁸² Rocca 1982, 41–2.

¹⁸³ For fuller characterizations of this clay source and these

two specimens, including their clay mineral and aplastic mineralogy as determined by X-ray diffraction and thin-section, see Peña (1992), who refers to specimens as So3.1 and So3.2.

Table 3. Color and Chemical Composition of Raw Clay Specimens from Ogliara, Montecorvino, Cascano, and Vasanello.

Clay No.	Clay 76	Clay 79	Clay 77	Clay 78	Clay 80	Clay 63	Clay 64	Clay 75	Clay 40	Clay 41
Analytical No.	NAA 445	NAA 448	NAA 446	NAA 447	NAA 449	NAA 433	NAA 434	NAA 444	NAA 313	NAA 314
Provenance	Ogliara (100 masl)	Ogliara (100 masl)	Ogliara (75 masl)	Ogliara (50 masl)	Ogliara (50 masl)	Montecorvino/San Martino	Montecorvino/Martorana	Cascano	Vasanello	Vasanello
Color	gray (2.5Y 6/1)	gray (5Y 5.5/1)	gray (5Y 5.5/1)	gray (5Y 5.5/1)	gray (5Y 5.5/1)	gray (5Y 5.5/1)	gray (5Y 4.8/1)	brown (7YR 3.8/2)	brown (9YR 4.2/3)	yellowish brown (9.5YR 5/4)
Na (pct) ^a	0.50	0.45	0.49	0.48	0.47	0.68	0.93	1.40	0.51	0.52
K (pct)	2.03	1.96	1.98	2.11	2.07	1.91	2.07	4.18	1.98	1.95
Ca (pct)	9.71	9.16	8.81	7.93	7.26	7.87	8.51	<dl ^c	<dl	<dl
Sc (ppm) ^b	13.4	13.4	13.6	14.3	14.3	13.2	12.2	11.7	17.4	14.8
Cr (ppm)	117	119	122	128	125	111	103	52.0	84.7	105
Fe (pct)	4.38	3.78	3.68	3.71	3.72	3.62	3.40	5.16	5.90	4.72
Co (ppm)	10.2	11.7	17.6	15.3	12.9	12.5	13.2	17.4	36.7	22.7
Zn (ppm)	98.4	99.8	97.5	105	107	95.3	108	115.1	88.9	100
As (ppm)	4.52	4.08	5.01	3.97	3.52	3.70	9.73	24.4	59.8	81.7
Rb (ppm)	137	122	122	138	135	125	130	313	279	339
Sr (ppm)	485	527	535	483	533	465	327	698	344	347
Sb (ppm)	0.47	0.47	0.69	0.70	0.65	0.50	1.25	2.42	5.20	6.18
Cs (ppm)	6.62	6.62	7.14	7.59	7.62	7.01	6.37	30.8	93.5	202
Ba (ppm)	225	185	234	266	214	329	415	910	1040	690
La (ppm)	34.5	33.9	33.9	35.1	35.2	33.3	33.3	126	135	107
Ce (ppm)	59.4	60.3	59.4	62.4	61.5	58.7	58.9	223	338	182
Nd (ppm)	19.0	24.5	25.7	26.4	27.9	22.6	27.7	80.0	101	69.3
Sm (ppm)	5.07	5.14	5.13	5.24	5.26	5.02	5.27	13.3	16.6	11.6
Eu (ppm)	0.98	0.95	0.98	1.00	0.98	0.95	0.98	2.58	3.00	2.08
Tb (ppm)	0.67	0.78	0.73	0.79	0.72	0.66	0.72	1.59	1.63	1.35
Yb (ppm)	1.97	2.17	2.47	2.25	2.18	2.21	2.26	4.12	3.92	3.70
Lu (ppm)	0.35	0.33	0.29	0.28	0.34	0.33	0.31	0.67	0.60	0.57
Hf (ppm)	3.49	3.37	3.12	3.09	3.16	3.33	3.95	10.8	12.2	12.1
Ta (ppm)	0.99	1.13	0.95	1.04	1.08	1.00	1.06	2.65	1.92	1.80
Th (ppm)	9.7	9.8	9.5	9.8	9.9	9.5	9.9	49.3	71.4	41.4
U (ppm)	3.11	1.43	1.45	1.51	1.62	1.71	1.11	11.7	11.4	7.38

^a pct = percent^b ppm = parts per million^c <dl = below detection limit of about 0.9%

Table 4. Color and Chemical Composition of Fired Clay Specimens from Ogliara, Montecorvino, Cascano, and Vasanello.

Clay No.	Clay 76	Clay 79	Clay 77	Clay 78	Clay 80	Clay 63	Clay 64	Clay 75	Clay 40	Clay 41
Analytical No.	NAA 473	NAA 476	NAA 474	NAA 475	NAA 477	NAA 460	NAA 461	NAA 472	NAA 341	NAA 342
Provenance	Ogliara (100 masl)	Ogliara (100 masl)	Ogliara (75 masl)	Ogliara (50 masl)	Ogliara (50 masl)	Montecorvino/San Martino	Montecorvino/Martorana	Cascano	Vasanello	Vasanello
Color	pink/lt. reddish brown (4.5YR 6.5/4)	pink/lt. reddish brown (4YR 6.5/4)	pink (5YR 7/4)	pink/lt. reddish brown (4.5 YR 6.5/4)	pink/lt. reddish brown (4.5 YR 6.5/4)	lt. red/brown (3YR 6.5/4)	pink (5.5YR 7/4-8/4)	lt. red (2YR 5.8/6)	red (2YR 5/7.5)	lt. red/red (2YR 5.5/8)
Na (pct) ^a	0.55	0.52	0.57	0.54	0.49	0.82	0.78	1.46	0.55	0.55
K (pct)	2.27	2.28	2.22	2.38	2.06	2.17	2.16	4.14	2.03	2.07
Ca (pct)	12.4	12.4	12.9	11.2	9.35	11.9	11.0	<dl ^c	<dl	<dl
Sc (ppm) ^b	16.3	16.0	15.8	16.5	14.8	15.6	15.1	12.6	14.2	18.8
Cr (ppm)	144	139	143	146	129	138	129	55.8	105	97.3
Fe (pct)	5.26	4.47	4.30	4.47	7.45 ^d	4.34	4.21	5.27	4.60	6.22
Co (ppm)	16.1	13.7	17.0	17.7	41.4 ^d	15.4	13.7	18.4	21.5	42.2
Zn (ppm)	112	113	115	131	174 ^d	115	107	120	106	113
As (ppm)	4.74	3.67	4.98	5.27	45.2 ^d	7.13	3.78	25.0	64.9	90.0
Rb (ppm)	160	155	156	153	149	149	149	333	313	367
Sr (ppm)	525	562	582	533	446	502	543	706	338	250
Sb (ppm)	0.57	0.70	0.80	0.86	3.03 ^d	0.70	0.76	2.07	5.68	7.38
Cs (ppm)	8.13	7.96	8.38	8.93	8.00	7.67	8.05	33.2	113	245
Ba (ppm)	267	309	244	315	324	256	171	783	1330	706
La (ppm)	40.2	39.9	39.7	40.5	36.6	39.4	37.8	128	150	112
Ce (ppm)	69.7	69.5	69.3	70.8	63.8	69.5	66.2	229	406	192
Nd (ppm)	31.1	32.4	33.3	29.6	27.5	33.7	27.9	79.1	104	74.8
Sm (ppm)	5.96	5.93	5.79	5.86	5.35	6.08	5.51	12.8	18.2	12.4
Eu (ppm)	1.17	1.20	1.15	1.13	1.06	1.18	1.09	2.64	3.31	2.31
Tb (ppm)	0.77	0.73	0.78	0.82	0.70	0.87	0.83	1.47	1.72	1.39
Yb (ppm)	2.82	2.75	2.52	2.65	2.34	2.49	2.55	4.28	4.16	4.15
Lu (ppm)	0.37	0.39	0.37	0.40	0.34	0.36	0.35	0.58	0.70	0.58
Hf (ppm)	3.79	3.78	3.64	3.61	3.34	4.06	3.89	11.1	13.8	12.7
Ta (ppm)	1.22	1.21	1.10	1.09	1.06	1.09	1.16	2.72	2.02	1.82
Th (ppm)	11.5	11.5	11.3	11.3	10.1	11.4	10.9	51.8	77.8	44.0
U (ppm)	1.91	1.69	1.76	2.01	1.67	1.48	1.86	13.8	11.2	7.8

^a pct = percent^b ppm = parts per million^c <dl = below detection limit of about 0.9%^d suspect value

fired clay specimens, at least 500 mg of crushed material was dried in an electric oven at 110°C for 24 hours and allowed to cool for one hour in a dessicator. One hundred \pm 5 mg of this material was then transferred to a cleaned polyethylene microcentrifuge tube and weighed to 0.01 mg. The irradiation and counting of specimens were undertaken at the National Institute of Standards and Technology/Smithsonian Institution Conservation Analytical Laboratory NAA facility in Washington, D.C., during the summer of 1991, employing the irradiation and counting protocols employed by this facility at that time for the analysis of ceramic specimens.¹⁸⁴ Data were obtained for 26 elements: Na, K, Ca, Sc, Cr, Fe, Co, Zn, As, Rb, Sr, Sb, Cs, Ba, La, Ce, Nd, Sm, Eu, Tb, Yb, Lu, Hf, Ta, Th, and U.

The NAA of one specimen of Ogliara clay (Clay 80) in its fired state produced values for five elements (Fe, Co, Zn, As, Sb) that appear suspect when compared with those obtained in the analysis of this same specimen of clay in its raw state and with those obtained in the analysis of the other four specimens of Ogliara clay in their fired state, and these values should be considered problematic.

Works Cited

- Aguarod Otal, C. 1991. *Cerámica romana importada de cocina en la Tarraconense*. Zaragoza: Institución Fernando el Católico.
- Annechino, M. 1977. "Suppellettile fittile da cucina di Pompei." In *L'instrumentum domesticum di Ercolano e Pompei*, edited by A. Carandini, 105–20. Quaderni di Cultura Materiale 1. Rome: L'Erma di Bretschneider.
- . 1982. "Suppellettile fittile per uso agricolo in Pompei e nell'agro vesuviano." In *La regione sotterrata dal Vesuvio: Studi e prospettive. Atti del Convegno Internazionale, 11–15 novembre 1979*, 753–67. Naples: Università degli Studi di Napoli.
- Annis, M.B., and H. Geertman. 1987. "Production and Distribution of Cooking Ware in Sardinia." *Newsletter of the Department of Pottery Technology, University of Leiden* 5:154–96.
- Arthur, P. 1982. "Roman Amphorae and the Ager Falernus Under the Empire." *PBSR* 50:22–33.
- . 1991. *Romans in Northern Campania: Settlement and Land-Use Around the Massico and the Garigliano Basin*. Archaeological Monographs of the British School at Rome 1. London: British School at Rome.
- Artischia. 2006. *Artischia: Artigiani in mostra. Edizione 2006*. <http://www.artischia.it> (16 March 2007).
- Atkinson, D. 1914. "A Hoard of Samian Ware from Pompeii." *JRS* 4:26–64.
- Aubert, J.-J. 1994. *Business Managers in Ancient Rome: A Social and Economic Study of "Institores," 200 B.C.–A.D.* 250. Columbia Studies in the Classical Tradition 21. Leiden: Brill.
- Avvisati, D. 2003. *Pompei: Mestieri e botteghe 2000 anni fa*. Rome: Bardi.
- Blackman, M.J., S. Mery, and R. Wright. 1989. "Production and Exchange of Ceramics on the Oman Peninsula from the Perspective of Hili." *JFA* 16:61–77.
- Blitzer, H. 1990. "ΚΟΡΩΝΕΪΚΑ Storage-Jar Production and Trade in the Traditional Aegean." *Hesperia* 59: 675–711.
- Bonghi Jovino, M. 1984. *Ricerche a Pompei: L'insula 5 della Regio VI dalle origini al 79 d.C.* Vol. 1, *Campagne di scavo 1976–1979*. Rome: L'Erma di Bretschneider.
- Bon-Harper, S. 1999. "L'argilla nel contesto pompeiano." In *Homo faber: Natura, scienza e tecnica nell'antica Pompei*, edited by A. Ciarallo and E. De Carolis, 100–3. Milan: Electa.
- Bonifay, M. 2004. *Etudes sur la céramique romaine tardive d'Afrique. BAR-IS 1301*. Oxford: Archaeopress.
- Buchner, G. 1992. *I giacimenti di argilla nell'isola d'Ischia e l'industria figulina locale in età recente*. Naples.
- Carandini, A. 1977a. "La ceramica a pareti sottili." *L'instrumentum domesticum di Ercolano e Pompei*, edited by A. Carandini, 25–31. Quaderni di Cultura Materiale 1. Rome: L'Erma di Bretschneider.
- . 1977b. "La terra sigillata africana: La ceramica a patina cenerognola e a orlo annerito di età imperiale." In *L'instrumentum domesticum di Ercolano e Pompei*, edited by A. Carandini, 23–4. Quaderni di Cultura Materiale 1. Rome: L'Erma di Bretschneider.
- Carocci, F., E. de Albentiss, M. Gargiulo, and F. Pesando. 1990. *Le Insulae 3 e 4 della regio VI di Pompei: Un'analisi storico-urbanistica*. *ArchPer* 5. Archaeologica 89. Rome: Giorgio Bretschneider.
- Castiglione Morelli, V. 1996. "La ceramica comune nell'instrumentum domesticum della casa di C. Giulio Polibio a Pompei." In *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.–IIe s. ap. J.-C.): La vaisselle de cuisine et de table. Actes des Journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le Province di Napoli e Caserta. Naples, 27–28 mai 1994*, edited by M. Bats, 105–12. Naples: Centre Jean Bérard.
- Cerulli Irelli, G. 1977. "Una officina di lucerne fittili a Pompei." In *L'instrumentum domesticum di Ercolano e Pompei*, edited by A. Carandini, 53–72. Quaderni di Cultura Materiale 1. Rome: L'Erma di Bretschneider.
- Chiaromonte Treré, C. 1984a. "Ceramica grezza e depurata." In *Ricerche a Pompei: L'insula 5 della Regio VI dalle origini al 79 d.C.* Vol. 1, *Campagne di scavo 1976–1979*, edited by M. Bonghi Jovino, 140–92. Rome: L'Erma di Bretschneider.
- . 1984b. "Ceramica a pareti sottili." In *Ricerche a Pompei: L'insula 5 della Regio VI dalle origini al 79 d.C.* Vol. 1, *Campagne di scavo 1976–1979*, edited by M. Bonghi Jovino, 193–213. Rome: L'Erma di Bretschneider.
- Chiosi, E. 1996. "Cuma: Una produzione di ceramica a vernice rossa interna." In *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.–IIe s. ap. J.-C.): La vaisselle de cuisine et de table. Actes des Journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le*

¹⁸⁴For a description of these protocols and the degree of analytical precision attained for each of the elements assayed, see Blackman et al. 1989, 64–5.

- Province di Napoli e Caserta, Naples, 27–28 mai 1994*, edited by M. Bats, 225–33. Naples: Centre Jean Bérard.
- Ciarallo, A., and E. De Carolis, eds. 1999. *Homo faber: Natura, scienza e tecnica nell'antica Pompei*. Milan: Electa.
- Curtis, R. 1988. "A. Umbricius Scaurus of Pompeii." In *Studia Pompeiana & Classica in Honor of Wilhelm F. Jashemski*. Vol. 1, *Pompeiana*, edited by R. Curtis, 19–49. New Rochelle, N.Y.: Caratzas.
- D'Arms, J. 1984. "Ville rustiche e ville di 'otium.'" In *Pompei 79: Raccolta di studi per il decimonono centenario dell'eruzione vesuviana*, edited by F. Zevi, 65–86. Naples: Macchiaroli.
- Daszkiewicz, M., D. Cottica, E. Bobryk, and G. Schneider. 2008. "Pompeii as a Production Centre: An Archaeometric Approach." Paper read at the 2008 Congress of the *Rei Cretariae Romanae Fautores*, September, Cadiz.
- De Caro, S. 1994. *La villa rustica in località Villa Regina a Boscoreale*. Pubblicazioni scientifiche del Centro di studi della Magna Grecia dell'Università degli Studi di Napoli Federico II. Rome: L'Erma di Bretschneider.
- De Carolis, E. 1996. "Ceramica comune da mensa e da dispensa di Ercolano." In *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.–IIe s. ap. J.-C.): La vaisselle de cuisine et de table. Actes des Journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le Province di Napoli e Caserta, Naples, 27–28 mai 1994*, edited by M. Bats, 121–28. Naples: Centre Jean Bérard.
- Della Corte, M. 1916. "Pompei: Continuazione degli scavi in via dell'Abbondanza." *NSc* 13:148–58.
- . 1927. "Scavi sulla Via dell'Abbondanza (Epigrafi inedite)." *NSc* 3:89–116.
- . 1965. *Case ed abitanti di Pompei*. 3rd ed. Naples: Fausto Fiorentino.
- De Sena, E., and J. Ikäheimo. 2003. "The Supply of Amphora-Borne Commodities and Domestic Pottery in Pompeii, 150 BC–AD 79: Preliminary Evidence from the House of the Vestals." *EJA* 6:301–21.
- de Vos, A., and M. de Vos. 1982. *Pompei, Ercolano, Stabia*. Guide archeologiche Laterza 11. Rome and Bari: Laterza.
- Di Gioia, E. 2006. *La ceramica invetriata in area vesuviana*. Studi della Soprintendenza archeologica di Pompeii 19. Rome: L'Erma di Bretschneider.
- Di Giovanni, V. 1996. "Produzione e consumo della ceramica da cucina nella Campania romana (II a.C.–II d.C.)." In *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.–IIe s. ap. J.-C.): La vaisselle de cuisine et de table. Actes des Journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le Province di Napoli e Caserta, Naples, 27–28 mai 1994*, edited by M. Bats, 65–103. Naples: Centre Jean Bérard.
- Di Iorio, T. 1997–1998. "Tra vino e mare: Ischia e i D'Ambra tra 800 e 900." Tesi di Laurea, Istituto Universitario Orientale.
- Dwiza, K. 2005. "Ein Depotfund reliefverzierter südgalischer Terra Sigillata–Schüsseln aus Pompeii." *JRGZM* 51:381–587.
- Ehrhardt, W. 1988. *Casa dell'Orso (VII.2, 44–46)*. Häuser in Pompeii 2. Munich: Hirmer.
- Ellis, S. 2004. "The Distribution of Bars at Pompeii: Archaeological, Spatial and Viewshed Analyses." *JRA* 17: 371–84.
- Eschbach, L. 1993. *Gebäudeverzeichnis und Stadtplan der antiken Stadt Pompeii*. Cologne: Böhlau.
- Étienne, R. 1966. *La vie quotidienne à Pompéi*. Paris: Hachette.
- Fergola, L. 2004. *Oplontis e le sue ville*. Naples: Flavius.
- Fiches, I.-L., M. Guy, and L. Poncin. 1978. "Un lot de vases sigillés des premières années du règne de Néron dans l'un des ports de Narbonne." *Archaeonautica* 2:185–219.
- Fiorelli, G., ed. 1860–1864. *Pompeianarum antiquitatum historia*. 3 vols. Naples: Editore Prid. Non. Martias.
- . 1861–1865. *Giornale degli scavi di Pompei*. 31 vols. Naples: Scuola di archeologia in Pompei.
- . 1881. "Pompei." *NSc* 5:300–2, 320–24.
- . 1882. "Pompei." *NSc* 6:275–82.
- Foss, J., M. Timpson, J. Ammons, and S. Lee. 2002. "Paleosols of the Pompeii Area." In *The Natural History of Pompeii*, edited by W. Jashemski and F. Meyer, 65–79. Cambridge: Cambridge University Press.
- Freed, J. 2000. "Adoption of the Form of the Koan Amphora to the Production of 'Dressel 2–4' Amphoras in Italy and Northeastern Spain." *RCRFA* 36:459–66.
- Garzanti, E., S. Canclini, F. Moretti Foggia, and N. Petrella. 2002. "Unraveling Magmatic and Orogenic Provenance in Modern Sand: The Back-Arc Side of the Apennine Thrust Belt, Italy." *Journal of Sedimentary Research* 72:2–17.
- Gasparetti, G. 1996. "Produzione e consumo della ceramica comune da mensa e dispensa nella Campania romana." In *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.–IIe s. ap. J.-C.): La vaisselle de cuisine et de table. Actes des Journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le Province di Napoli e Caserta, Naples, 27–28 mai 1994*, edited by M. Bats, 19–64. Naples: Centre Jean Bérard.
- Gassner, V. 1986. "Die Kaufläden in Pompeii." Ph.D. diss., University of Vienna.
- Gazda, E., ed. 1983. *Karanis: An Egyptian Town in Roman Times*. Ann Arbor: Kelsey Museum of Archaeology.
- Gianfrota, P., X. Nieto, P. Pomey, and A. Tchernia. 1997. *La navigation dans l'antiquité*. Aix-en-Provence: Édusud.
- Grasso, L. 2004. *Ceramica miniaturistica da Pompei*. Quaderni di ostraka 9. Naples: Loffredo.
- Hampe, R., and A. Winter. 1965. *Bei Töpfern und Ziegeln in Südtalien, Sizilien und Griechenland*. Mainz: Römisch-germanisches Zentralmuseum zu Mainz and Rudolf Habelt.
- Hesnard, A., M. Ricq, P. Arthur, M. Picon, and A. Tchernia. 1989. "Aires de production des gréco-italiques et des Dr. 1." In *Amphores romaines et histoire économique: Dix ans de recherché. Actes du colloque de Sienne, 22–24 mai 1986*, edited by M. Lenoir, D. Manacorda, and C. Panella, 21–65. *CÉFR* 114. Rome: École Française de Rome.
- Hilgers, W. 1969. *Lateinische Gefäßnamen: Bezeichnungen, Funktion und Form römischer Gefäße nach den antiken Schriftquellen*. *BjB Beiheft* 31. Düsseldorf: Rheinland Verlag.
- Horden, P., and N. Purcell. 2000. *The Corrupting Sea: A Study of Mediterranean History*. Oxford: Blackwell Publishing.
- Hörcht, L. 1996. "Appunti sulla ceramica comune di Ercolano: Vasellame da cucina e recipienti per la preparazione degli alimenti." In *Les céramiques communes de Campanie et de Narbonnaise (Ier s. av. J.-C.–IIe s. ap. J.-C.): La vaisselle de cuisine et de table. Actes des Journées d'étude organisées par le Centre Jean Bérard et la Soprintendenza Archeologica per le Province di Napoli e Caserta, Naples, 27–28 mai 1994*, edited by M. Bats, 129–56. Naples: Centre Jean Bérard.
- Iorio, V. 1992. "Limiti e articolazione dell'Ager Pompeia-

- nus." *Opuscula pompeiana* 2:14–33.
- Jashemski, W. 1967. "A Pompeian Vinarius." *CJ* 62:193–204.
- . 1974. "The Discovery of a Market-Garden Orchard at Pompeii: The Garden of the 'House of the Ship Europa.'" *AJA* 78(4):391–404.
- . 1979. *The Gardens of Pompeii, Herculaneum and the Villas Destroyed by Vesuvius*. New Rochelle, N.Y.: Caratzas.
- Jongman, W. 1988. *The Economy and Society of Pompeii*. Amsterdam: J.C. Gieben.
- Krenkel, W. 1963. *Pompejanische Inschriften*. Leipzig: Koehler and Amelag.
- La Rocca, E., M. de Vos, and E. de Vos. 1994. *Pompeii*. Milan: Mondadori.
- Lenzi, G., and P.P. Mattias. 1978. "Materiali 'argillosi' della regione vulcanica sabatina 1°—argillificazione di formazioni piroclastiche." *Rendiconti della Società Italiana di Mineralogia e Petrologia* 31:75–99.
- Lund, J., D. Malfitana, and J. Poblome. 2006. "Rhosica vasa mandavi (Cic., Att. 6.1.13): Towards the Identification of a Major Ceramic Tableware Industry of the Eastern Mediterranean. Eastern Sigillata A." *ArchCl* 57:491–506.
- Magaldi, E. 1930. "Il commercio ambulante a Pompei." *AttiPontAcc* 40:61–88.
- Magalhaes, M. 2006. *Stabiae romana: La prosopografia e la documentazione epigrafica. Iscrizioni lapidarie e bronzee, bolli laterizi e sigilli*. Naples: N. Longobardi.
- Maiuri, A. 1953–1954. "Due singolari dipinti pompeiani." *RM* 60–61:88–99.
- Mannoni, T. 1984. "Caratterizzazioni mineralogico-petrografiche di alcune classi di reperti." In *Ricerche a Pompei: L'insula 5 della Regio VI dalle origini al 79 d.C.* Vol. 1, *Campagne di scavo 1976–1979*, edited by M. Bonghi Jovino, 346–51. Rome: L'Erma di Bretschneider.
- Martin, A. 1985. "South Gaulish Sigillata in Italy." *Opus* 4:125–39.
- . 1992. "Ceramica fine a Roma e a Ostia tra la seconda metà del I e II secolo." *RCRFA* 31–32:91–103.
- . 1994. "Nouvelles observations sur la sigillée sud-gauloise en Italie." In *Société Française d'Étude de la Céramique Antique en Gaule: Actes de congrès de Millau, 12–15 mai 1994*, edited by L. Rivet, 115–26. Marseille: Société Française d'Étude de la Céramique Antique en Gaule.
- Mattias, P.P., and G.C. De Casa. 1974. "Lazio." In *Giacimenti di argille ceramiche in Italia*, edited by F. Veniale and C. Palmomari, 147–76. Bologna: Gruppo Italiano A.I.P.E.A.
- Mau, A. 1883. "Gli scavi di Pompei 1881–1883." *BdI*: 174–77.
- Meylan Krause, M.F. 2002. *Domus Tiberiana: Analyses stratigraphiques et céramologiques*. BAR-IS 1058. Oxford: Archaeopress.
- Millet, M. 1993. "Samian from the Sea." *JRA* 6:415–19.
- Morel, J.P. 1998. "L'étude des céramiques à vernis noir, entre archéologie et archéométrie." In *Indagini archeometriche relative alla ceramica a vernice nera: Nuovi dati sulla provenienze e la diffusione*. *Atti del seminario internazionale di studio, Milano, 22–23 novembre 1996*, edited by P. Frontini and M.T. Grassi, 9–22. Como: New Press.
- Museo Archeologico Provinciale di Salerno. 1989. *Salerno Romana*. Salerno: Museo Archeologico Provinciale di Salerno.
- Nieto Prieto, J., A. Jover Armengol, P. Izquierdo Tugas, A.M. Puig Griessenberger, A. Alaminos Exposito, A. Martín Menendez, M. Pujol Hamelink, H. Palou Miquel, and S. Colomer Martí. 1989. *Excavacions arqueològiques subaquàtiques a Cala Culip 1*. Centre d'Investigacions Arqueològiques de Girona Sèrie Monogràfica 9. Girona: Centre d'Investigacions Arqueològiques de Girona.
- Olcese, G., and M. Picon. 1998. "Ceramiche a vernice nera in Italia e analisi di laboratorio: Fondamenti teorici e problemi aperti." In *Indagini archeometriche relative alla ceramica a vernice nera: Nuovi dati sulla provenienze e la diffusione*. *Atti del Seminario internazionale di Studio, Milano, 22–23 novembre 1996*, edited by P. Frontini and M.T. Grassi, 31–7. Como: New Press.
- Pagano, M. 1990. "Tegulae Campanae ad Ercolano." *Cron-Ercol* 20:157–76.
- Palma, R. 2008. "Ceramica utilitaria del Pompeii Forum Project: Rapporto preliminare dello studio dei reperti ceramici di uso domestico degli scavi del prof. J.J. Dobbins nell'area del Foro di Pompei." *RCRFA* 40:403–5.
- Panella, C., and M. Fano. 1977. "Le anfore con anse bifide conservate a Pompei: Contributo ad una loro classificazione." In *Méthodes classiques et méthodes formelles dans l'étude des amphores: Actes du Colloque de Rome, 27–29 mai 1974*, 133–77. *CÉFR* 32. Rome: École Française de Rome.
- Parker, A. 1992. *Ancient Shipwrecks of the Mediterranean and the Roman Provinces*. BAR-IS 580. Oxford: Tempus Reparatum.
- Parslow, C. 1996. "Preliminary Report of the 1996 Fieldwork Project in the Praedia Iuliae Felicis (Regio II.4), Pompeii." *RStPomp* 7:162–72.
- . 1998. "The 'Forum Frieze' of Pompeii in Its Archaeological Context." In *The Shapes of City Life in Rome and Pompeii*, edited by M.T. Boatwright and H. Evans, 112–38. New Rochelle, N.Y.: Caratzas.
- Pavolini, C. 1977. "Le lucerne fittili romane del Museo Nazionale di Napoli." In *L'instrumentum domesticum di Ercolano e Pompei*, edited by A. Carandini, 33–51. *Quaderni di Cultura Materiale* 1. Rome: L'Erma di Bretschneider.
- . 1996. "Mercato ostiense e mercato romano: Alcuni contesti ceramici a confronto." In *Roman Ostia Revisited: Archaeological and Historical Papers in Memory of Russell Meiggs*, edited by A. Gallina Zevi and A. Claridge, 223–42. London: British School at Rome.
- Peacock, D.P.S. 1977. "Pompeian Red Ware." In *Pottery and Early Commerce: Characterization and Trade in Roman and Later Ceramics*, edited by D.P.S. Peacock, 147–62. London: Academic Press.
- Peacock, D.P.S., and D. Williams. 1986. *Amphorae and the Roman Economy: An Introductory Guide*. London and New York: Longman.
- Peña, J.T. 1992. "Raw Material Use Among Nucleated Industry Potters: The Case of Vasanello, Italy." *Archeomaterials* 6:93–122.
- . 2007. *Roman Pottery in the Archaeological Record*. Cambridge: Cambridge University Press.
- Peña, J.T., and M.J. Blackman. 1994. "A Neutron Activation Study of Plio-Pleistocene Marine Clays from West-Central Italy: Compositional Variability and Implications for the Proveniencing of Italian Fineware Pottery." In *First European Workshop on Archaeological Ceramics*, edited by F. Burragato, O. Grubessi, and L. Lazzarini, 313–21. Rome: Università degli Studi di Roma "La Sapienza."
- Peña, J.T., and M. McCallum. 2009. "The Production and Distribution of Pottery at Pompeii: A Review of the Evidence; Part 1, Production." *AJA* 113(1):57–79.
- Pichler, H. 1970. *Italienische Vulkan-Gebiete II: Phleggräische Felder, Ischia, Ponza-Inseln, Roccamonfina*. Sammlung geologischer Führer 52. Berlin and Stuttgart: Borntraeger.

- Picon, M. 1994. "Les céramiques étrusco-campaniennes: Recherches en laboratoire." In *Ceramica romana e archeometria: Lo stato degli studi. Atti delle Giornate Internazionali di Studio, Castello di Montegufoni (Firenze), 26–27 aprile 1993*, edited by G. Olcese, 23–61. Florence: All'Insegna del Giglio.
- Pirson, F. 2007. "Shops and Industries." In *The World of Pompeii*, edited by J. Dobbins and P. Foss, 457–73. London and New York: Routledge.
- Pucci, G. 1975. "Cumanae testae." *La parola del passato* 30: 368–71.
- . 1977. "Le terre sigillate italiane, galliche e orientali." In *L'instrumentum domesticum di Ercolano e Pompei*, edited by A. Carandini, 9–21. Quaderni di Cultura Materiale 1. Rome: L'Erma di Bretschneider.
- . 1981. "La ceramica italia (terra sigillata)." In *Società romana e produzione schiavistica. Vol. 2, Merci, mercati e scambi nel Mediterraneo*, edited by A. Giardina and A. Schiavone, 99–121. Rome and Bari: Laterza.
- Purcell, N. 1990. "The Economy of an Ancient Town." *CR* 40:111–16.
- Regione Campania, Autorità di Bacino del Sarno. 2007. *Regione Campania, Autorità di Bacino del Sarno*. <http://www.autoritabacinosarno.it> (16 March 2007).
- Rhodes, M. 1989. "Roman Pottery Lost en route from the Kiln Site to the User: A Gazetteer." *Journal of Roman Pottery Studies* 2:44–58.
- Ricci, A. 1985. "Ceramica a pareti sottili." In *Atlante delle forme ceramiche. Vol. 2, Ceramica fine romana nel bacino Mediterraneo (tardo ellenismo e primo impero)*, 231–357. *EAA Suppl.* 3. Rome: Istituto della Enciclopedia italiana.
- Ricq de Boürd, M., E. Meille, M. Vichy, and M. Picon. 1989. "Les argilles utilisées pour la fabrication des amphores en Italie: Etrurie, Latium, Campanie." In *Amphores romaines et histoire économique: Dix ans de recherche. Actes du colloque de Sienne, 22–24 mai 1986*, edited by M. Lenoir, D. Manacorda, and C. Panella, 257–68. *CÉFR* 114. Rome: École Française de Rome.
- Riz, A. 1990. *Bronzegefäße in der römisch-pompejanischen Wandmalerei*. Deutsches Archäologisches Institut Rom Sonderchriften 7. Mainz: Philipp von Zabern.
- Rizzo, G. 2003. *Instrumenta Urbis I: Ceramiche fini da mensa, lucerne ed anfore a Roma nei primi due secoli dell'impero*. *CÉFR* 307. Rome: École Française de Rome.
- Rocca, M. 1982. "I vasi di Cascano e Corbara." In *Ceramica popolare del Lazio*, edited by E. Silvestrini, 41–3. Rome: Quasar.
- Romanazzi, L., and A.M. Volonté. 1986. "Gli scarichi tra Porta Nola e la Torre VIII." In *Nuovi contributi sulle fortificazioni pompeiane*, edited by C. Chiaramonte Treré, 55–113. Quaderni di Acme 6. Milan: Cisalpino-Goliardica.
- Rougé, J. 1966. *Recherches sur l'organisation du commerce maritime en Méditerranée sous l'empire romain*. École pratique des hautes études. Paris: S.E.V.P.E.N.
- Schneider, G. 1994. "Studies of Roman Lamps from the Northern Provinces and from Rome." In *Ceramica romana e archeometria: Lo stato degli studi. Atti delle Giornate Internazionali di Studio, Castello di Montegufoni (Firenze), 26–27 aprile 1993*, edited by G. Olcese, 127–42. Florence: All'Insegna del Giglio.
- Sersale, R., and C. Porcelli. 1974. "Campania." In *Giacimenti di argille ceramiche in Italia*, edited by F. Veniale and C. Palmolari, 177–94. Bologna: Gruppo Italiano A.I.P.E.A.
- Servizio Geologico d'Italia. 1978. *Carta geologica d'Italia al 500,000*. Rome: Servizio Geologico d'Italia.
- Sievers, H. 1938. "Beiträge zur Wirtschaftsgeschichte Pompejis." Ph.D. diss., University of Hamburg.
- Sigurðsson, H. 2007. "The Environmental and Geomorphological Context of the Volcano." In *The World of Pompeii*, edited by J. Dobbins and P. Foss, 43–62. London and New York: Routledge.
- Society for Sedimentary Geology. 2006. *SEPM: Society for Sedimentary Geology*. <http://www.sepm.org> (16 March 2007).
- Soricelli, G. 1987. "'Tripolitanian Sigillata': North African or Campanian?" *LibSt* 18:73–88.
- . 2001. "Divisioni agrarie romane e viabilità nella piana nocerino-sarnese." In *Pompei tra Sorrento e Sarno: Atti del terzo e quarto ciclo di conferenze di geologia, storia e archeologia, Pompei, gennaio 1999–maggio 2000*, edited by F. Senatore, 299–319. Rome: Bardi.
- . 2004. "La produzione di terra sigillata in Campania." In *Early Italian Sigillata: The Chronological Framework and Trade Patterns. Proceedings of the First International ROCT-Congress. Leuven, May 7 and 8, 1999*, edited by J. Poblome, P. Talloen, R. Brulet, and M. Waelkens, 299–307. Louvain, Paris, and Dudley, Mass.: Peeters.
- Soricelli, G., G. Schneider, and B. Hedinger. 1994. "L'origine della 'Tripolitanian Sigillata' / 'Produzione A della Baia di Napoli.'" In *Ceramica romana e archeometria: Lo stato degli studi. Atti delle Giornate Internazionali di Studio, Castello di Montegufoni (Firenze), 26–27 aprile 1993*, edited by G. Olcese, 67–88. Florence: All'Insegna del Giglio.
- Spinazzola, V. 1917. "Pompei: Continuazione degli scavi in via dell'Abbondanza." *NSc* 14:247–64.
- . 1953. *Pompei alla luce degli scavi nuovi di Via dell'Abbondanza (anni 1910–1923)*. Rome: Libreria dello Stato.
- Steinby, M. 1984. "La produzione laterizia." In *Pompei 79: Raccolta di studi per il decimonono centenario dell'eruzione vesuviana*, edited by F. Zevi, 265–71. Naples: Macchiaroli.
- Storchi Marino, A. 2000. "Reti interregionali integrate e circuiti di mercato periodico negli indici nundinari del Lazio e della Campania." In *Mercati permanenti e mercati periodici nel mondo romano: Atti degli Incontri capresi di storia dell'economia antica (Capri 13–15 ottobre 1997)*, edited by E. Lo Cascio, 93–130. Bari: Edipuglia.
- Tchernia, A. 1984. "Il vino: Produzione e commercio." In *Pompei 79: Raccolta di studi per il decimonono centenario dell'eruzione vesuviana*, edited by F. Zevi, 87–96. Naples: Macchiaroli.
- Tchernia, A., and F. Zevi. 1972. "Amphores vinaires de Campanie et de Tarraconaise à Ostie." In *Recherches sur les amphores romaines*, edited by P. Baldacci, 35–67. *CÉFR* 10. Rome: École Française de Rome.
- Timby, J. 2004. "Amphorae from Excavations at Pompeii by the University of Reading." In *Transport Amphorae and Trade in the Eastern Mediterranean: Acts of the International Colloquium at the Danish Institute at Athens, September 26–29, 2002*, edited by J. Eiring and J. Lund, 383–92. Danish Institute at Athens Monograph 5. Aarhus: Aarhus University Press.
- Tomber, R., and J. Dore. 1998. *The National Roman Fabric Reference Collection: A Handbook*. Museum of London Archaeology Service Monograph 2. London: Museum of London Archaeology Service.
- Tuck, S. 2005. *Latin Inscriptions in the Kelsey Museum: The Dennison & DeCrisco Collections*. Kelsey Museum Studies 9. Ann Arbor: University of Michigan Press.
- Van der Poel, H., L. García y García, and J. McConnell. 1986.

- Corpus Topographicum Pompeianum*. Pt. 3A, *The Insulae of Regions I–V*. Austin: University of Texas Press.
- van der Werff, J. 1989. "L. Eumachi: À propos d'une marque d'amphore trouvée à Nimègue." *Berichten van de Rijksdienst voor het Oudheidkundig Bodemonderzoek* 39:357–76.
- Vinci, G. 1830. *Descrizione delle ruine di Pompei*. 2nd ed. Naples: Palma.
- Ward-Perkins, J., and A. Claridge. 1978. *Pompeii AD 79*. 2 vols. Boston: Museum of Fine Arts.
- Webster, P. 2005. *Roman Samian Pottery in Britain*. Practical Handbooks in Archaeology 13. York: Council for British Archaeology.
- Williams, D., and D.P.S. Peacock. 2005. "The Eruption of Vesuvius and Campanian Dressel 2–4 Amphorae." In *Terra Marique: Studies in Art History and Marine Archaeology in Honor of Anna Marguerite McCann on the Receipt of the Gold Medal of the Archaeological Institute of America*, edited by A.M. McCann and J. Pollini, 140–48. Oxford: Oxbow.