Chapter II  POTTERY

‘... the earth produces so much clay that the pottery-workshops will never have to be without; besides the artefacts made on a potters-wheel, jars invented for our wine, drainage-pipes, tiles and bricks are made of earthenware and accordingly King Numa established as the seventh guild, the guild of the potters'.

Pliny, NH 5, 159.

2.1 Introduction

In this chapter I discuss for central Italy the development of modes of production for the ceramic industry such as household production, household industry and workshop industry. These terms require definition for which I will use the descriptions by Peacock.2

Household production supplies a family with its essential ceramics, such as vessels for the preparation of food and storage jars. The family is self-sufficient in its ceramic needs. The pottery is usually made annually during a limited number of months with simple technology employing neither turntable nor wheel. The pottery is fired in an open fire and the vessels produced, are not intended for trade. It is interesting to note that household production is ethnographically seldom recorded and leaves scarcely any archaeological traces.3

Household industry is rather similar to household production with the exception that the families were no longer self-sufficient. Specific ceramic products are obtained from specialist potters. Household industry implies a tendency towards commerce. The distribution of the pottery is limited and usually restricted to the region of origin. The production techniques of the vessels remain elementary and besides open firings, a simple updraught kiln was occasionally used. An advance on this rudimentary mode of production is the use of a turntable. The women, who maintained this industry, were sometimes assisted by men but did not employ a potters' wheel. The production is an annually subsidiary activity during several months but always subject to the more important agricultural demands. Household industry is predominantly associated with low status of the producers who had to produce for others in order to provide for the basic needs of their family. The nucleation of household industries usually occurs in marginal agricultural regions.4 Furthermore, household industries are difficult to detect in an archaeological context since they rarely produce sound archaeological evidence. The archaeological allocation of a household industry to a specific site relies on details such as distinctive stylistic traits, potters' marks and specified fabric descriptions and these details are rarely available. Household industry for pottery may not have been an important mode of production in central Italy between 800 and 500 BC because it is associated with agriculture and marginalisation. Peacock reports that nucleation of household industries is related to marginal agricultural regions and these regions gradually became settled during this period.5 It is debatable whether in these circumstances people did occupy marginal agricultural land and thus were forced to augment their subsistence with pottery production. As will be

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2 Peacock 1982, 6-51. Peacock's Chapter 2 is entitled Towards a model for Roman pottery studies. He also examines in this chapter the manufacture and the estate production. Judging from the archaeological data so far available, these modes of production are not relevant for the period that is discussed.


5 see section 1.5.
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substantiated, the economic development in central Italy originally favoured craft specialisation in urban centres leading to the workshop mode of production rather than the production of specific wares in an agricultural marginal region. During the 5th and later centuries this probably altered. Population pressure and associated marginalisation of the agricultural base of households likely developed from the 5th century BC. The marginalisation can be observed in the changing settlement patterns during this period and would eventually have affected the social position of potters. Increasing social and economic pressure is also reflected by the disappearance in the decades around 500 BC, of various secondary settlements such as Acquarossa, Poggio Civitate and Laurentina-Acqua Acetosa.

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6 For a discussion on the principle of marginalisation of the pottery production see for example: Arnold 1989, 199.

In contrast to the household modes of production, workshop industries are recorded by archaeology due to the lay out of buildings and industrial installations. Workshop industries are characterised by the use of the potters' wheel and a kiln since these devices secure the production of enough quality vessels to sustain the potter and his family. The wheel and kiln are fixed constructions situated within or near a workshop. The above description of workshops does not exclude the use of the turntable which is particularly suited for the production of large vessels such as the storage jars or dolia. Figure 8 presents some workshop plans which illustrate the principles involved. In this figure four workshop plans which have been recorded in ethnographic studies, are compared with four workshops which were excavated. Archaeological investigations can record facilities such as kilns, wetting tanks and various working and storage areas. Besides illustrating the installations required for a ceramic workshop, Figure 8 illuminates the relationship between ethnography and archaeology. In addition, this figure presents an indication of aspects examined in the section archaeological evidence of this chapter since it exemplifies the functional features of workshop layouts.

Fig. 8. Four ethnographic and four archaeological plans of pottery workshops. (archaeological plans left; ethnographic plans previous page)
The activities performed in a workshop in antiquity are depicted in Figure 9. One can detect various activities such as the preparation of the clay, modelling, wheel throwing, painting and firing. One of the scenes in this figure clearly illustrates an open workshop area which may have existed in courtyards or stoa-like buildings.

Workshop industries signal markets which are essential for the disposal of the produced ceramics. Therefore they are associated with a different economy when compared with the household modes of production. *The success of the workshop will depend upon a balance between clay, fuel and markets, but the precise weighting will vary from one workshop to another*.8

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8 Peacock 1982, 25. The ratio in weight of fuel to clay can vary from 10:1 to 3:1 but this does not necessarily denote that potters had to settle near woodlands. There are examples of workshop industries that rely on prunings and wastage of farming.

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*Fig. 9. Activities in pottery workshops as depicted on Greek vases.*
Within the workshop mode of production, various arrangements are distinguished. One can for example, differentiate between the individual rural workshop and the nucleated industries which may be either urban or located in the countryside.

The individual workshop is a small pottery which mainly produces coarse ceramics intended for the local market. Fine-wares are seldom made in these modest workshops. The actual difference between the individual workshop and more complex household industries is limited.

Nucleated workshop industries can be subdivided in urban and rural nucleated workshops of which the urban variety is more common.

Urban nucleation develops with the increase of demand if adequate clays and fuel are present. Due to fire hazard and the nuisance of smoke, it is not uncommon to find the urban potteries on the fringe of urban centres or along the main entrance roads. Some of the archaeological examples examined in this chapter, display these location characteristics though reallocation outside the urban centre is so far not attested before the Archaic period. Urban workshops tend to be larger both in equipment and in workforce when compared to the potteries described above. On average a workshop employs six to eight men. There is also a tendency to become full-time and work throughout the year. Nonetheless, full-time profession is not a requirement for workshop industries. Pottery production in workshops can be combined with farming. An important characteristic for urban industries is that they generally produce a wide variety of pottery types.

Rural, nucleated workshop industries are located near suitable resources and often generate more specialised wares. Moreover, a rural location eventually relies on middlemen for distribution.

Other authors who have arrived at similar descriptions of these various modes of production from a corpus of ethnographic data, are van der Leeuw and Arnold. The above descriptions represent models. It is not always possible to distinguish one mode of production from another since one method may evolve and variations within one model are manyfold. These variations within the modes of production have been recorded by ethnography but can equally apply to the archaeological record. This makes it difficult to construe the development of the various modes of production at a particular site unequivocally. For example, simple systems of household industry can occur simultaneously with technically and commercially more advanced ones. The disparity of modes of production is especially noteworthy for circumstances in central Italy where the impasto tradition continues while simultaneously fine wares and workshop conditions are recorded. This seemingly equivocacy of the pottery production in central Italy is one of the subjects examined in this chapter.

The modes of production for ceramics have been presented above as a hierarchical design from simple to more complex arrangements. I have introduced characteristics for each production method but simultaneously I would like to emphasise that a simple division does not correspond with reality nor with the available evidence. For example, it would seem from the descriptions that one of the main characteristics of a workshop is the potters’ wheel. However the distinction between the products made on a heavy turntable which required men for manouevring, and the products modelled on a fast wheel, are arbitrary. Another complication involves the primary

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9 Scheibler makes a distinction between workshop-types and the number of craftsmen involved: Scheibler 1984. A family workshop would employ 2 to 5 people while the master workshop could provide work for 5 to 10 people, mainly assistants and according to the economic development also slaves. Nucleation of workshops could lead to a concentration of 30 to 40 people working in pottery production and combining communal tasks. Large industrial complexes would employ up to 100 potters. Scheibler considers the Attic pottery workshops of the 6th century BC to be master workshops, with a master who was seconded by some assistants while producing fine table wares.


12 Peacock 1982, 23.
evidence on the early production of fine wares in central Italy.

Pottery made on a fast wheel is commonly classified as fine table ware. For central Italy, I have not been able to locate reports on actual remains of early workshops producing such fine table wares. Reports on remains of workshops are more common for Southern Italy. For example, at Gela on Sicily a kiln and the associated pottery was published by Adamesteanu. This workshop is dated to the late 7th and early 6th centuries BC. The massive kiln was situated on the edge of the Archaic town. Adamesteanu ascribes several vessel types to this workshop such as oinochoai, plates, amphorae and stamnoi. The ceramics were decorated with Geometric and Corinthian motives as well as paintings of griffins, birds, dogs, a sphynx with a male bearded head, and a warrior with helmet and shield. The products of this workshop were mainly distributed in Gela but also to the nearby Siculoi settlement of Butera. Although for central Italy, no primary evidence for workshops producing fine table wares, is known, attributions of such workshops to specific centres are manifold. These attributions are based on secondary evidence such as stylistic, chronological and quantitative examination. The distribution pattern has been occasionally studied for specific groups of decorated pottery (Fig. 6). My research is based on primary information but one reason for including occasionally the stylistic attributions is that they indicate the simultaneous existence of several workshops in the major towns of central Italy, thus implying urban nucleation. Moreover, the fine ware production demonstrates the rapid transformation of the production modes during the late 8th and 7th centuries BC. The change is recorded by:

1. those ceramics which are local imitations of imported vessels, and
2. the bucchero production.

An illustration of the first group of ceramics is based on:
- imported Geometric pottery that activated the production of Italo-Geometric pottery which was produced from about 750 BC;
- the Phoenician red slip ware that inspired the local impasto rosso tradition of the Orientalising Period;
- the Corinthian pottery which was the archetype for the Etrusco-Corinthian wares produced locally from the middle of the 7th century onwards to approximately 540 BC;
- Attic Black Figure vases that provided a model for the Etruscan Black Figure pottery which was produced from around 540 to 450 BC;
- Attic Red Figure vases which were copied in Etruscan Red Figure wares that are dated from the middle of the 5th to the 3rd centuries BC.

These examples can be read as a sequence of external influences and concerns the production techniques as well as the typology. Occasionally, Etruscan vessels were the prototype for Attic artefacts. A kyathos type from Vulci was most probably the prototype for the Attic kyathos which first appeared in the Nikosthenes workshop around 530-
Each step in the above mentioned sequence has been attributed to immigrant craftsmen who applied their skills within the urban centres of central Italy. In some cases there are good reasons to suggest the presence of immigrants for example, when ‘Meistersignaturen’ are available or when a specific style or decoration technique became, without precedent, established at a particular site. However the internal logic of the sequence presented above suggests another option. New decorative techniques could have been adopted by workshops already established and which used the imported pottery as prototypes to copy. The production at Vulci for example, of Black and subsequently Red Figure vases might well have been a local technological adaptation and does not require actual immigration. Another illustration from Vulci of a possible internal development can be perceived from a comment by Spivey: ‘the lingering influences of the last phases of Etrusco-Corinthian, which seem based in Vulci and which may run down to 540 or so, are worth taking into account of the Micali painter’s formation’. Thus on stylistic grounds it is suggested that the Micali painter who produced Etruscan Black Figure pottery, was influenced by the final Etrusco-Corinthian wares produced at Vulci. In my opinion a stylistic distinction between influence and actual training would be hard to ascertain as long as primary evidence is missing.

The second ware group that confirms the rapid development of the production of table wares in central Italy, is bucchero. The term bucchero is applied to the black or grey, lustrous ceramic vessels produced in various regions of central Italy from the 7th to the 4th centuries BC.

Bucchero is considered to be the ‘céramique nationale de l’Age d’or des Etrusques’. Early bucchero production probably evolved from the manufacture of dark, fine impasto vessels and was first produced in southern Etruria. The bucchero paste was obtained through a finer levigation than the dark impasto. The characteristic black colour of bucchero evolves around the firing conditions in the kiln. The pottery was fired in a highly controlled reducing atmosphere. Previously, it has been suggested that various components such as carbon or manganese-dioxide were added to the paste in order to obtain the intense black colour since it was established by archaeometric analyses that bucchero contained both carbon and magnetite. These substances could, however, derive from the firing process itself. Cuomo di Caprio has recently described some experiments which illuminate the firing process of bucchero. Unfired, conventionally made pottery was placed in a container filled with carbonaceous material or sawdust. The container was carefully sealed after which it was fired in a kiln. During firing, a highly reducing atmosphere is obtained in the container and this results in an intense black colour of the fired vessel that is comparable to the bucchero ware. Firing pottery in these circumstances also accounts for the

22 cf. Martelli 1989, Colonna 1975. Martelli presents some Etruscan signatures and introduces the hypothesis that the Pittore della Nascita di Menerva can be identified as kasnalisce.
23 Spivey 1987, 77-8, fig. 19.
25 Rasmussen 1979, 2.
26 Francaviglia et alii 1975, 228.
27 Del Vita 1927, 194.
28 Leoni and Trabucchi 1962; Francaviglia et alii 1975.
29 Cuomo di Caprio reports that mixing clay with carbon would reduce the plasticity of the clay. A reduction of plasticity makes the manufacture of bucchero sottile strenuous. Experiments indicate that clay mixed with carbon powder was hard to throw on a wheel: Cuomo di Caprio 1993, 219.
presence of carbon in the fabric.\textsuperscript{30} This specific procedure of placing artefacts in a sealed container filled with carbon is also reported for the diffusion of carbon in iron and for the granulation technique.\textsuperscript{31} It appears to me that this distinctive method of manufacture for various materials and artefacts is compelling since the close association between \textit{bucchero} and metalwares in typology would be supported by a related production technique.

Both, the fine \textit{impasto} and \textit{bucchero} vessels imitate metalwares\textsuperscript{32} as well as ivory artefacts.\textsuperscript{33} For instance, metal \textit{oinochoe}, jugs, \textit{kyathoi} and goblets have served as prototypes for the \textit{bucchero} production. Moreover, it is likely that the decorative techniques of \textit{bucchero} such as ribbing, incision and relief decoration, originated from metal models. A peculiarity within the \textit{bucchero} repertoire are those vessels which have received a lamination of silver or gold plate.\textsuperscript{34} The similarities between on the one hand metal and ivory artefacts and on the other hand \textit{bucchero} vessels implies a close relationship between potters and other craftsmen.

\textsuperscript{30} Cuomo di Caprio presents this firing experiment for \textit{bucchero} as a hypothesis: Cuomo di Caprio 1993, 220-1.

\textsuperscript{31} See section 3.2 and 3.4.

\textsuperscript{32} cf. Rasmussen 1979; Rathje 1983, 12-4; Markoe 1992, 64; Minoja 1993.

\textsuperscript{33} Gran-Aymerich 1993, 21.

\textsuperscript{34} Ramage 1970, 39-41; Gran-Aymerich 1993, 30.
Bucchero probably originated at Caere around 700 BC\textsuperscript{35} from where its production spread to other neighbouring centres such as Veii, Tarquinia and Vulci.\textsuperscript{36} In the beginning the bucchero production is characterised as limited because the vessels were carefully made as individual artefacts. From southern Etruria, its manufacture spread to various sites to the north and south (Fig. 10). This diffusion is related to a standardisation of the artefacts because they became produced in series. During the late 6th and 5th centuries BC, the bucchero is known in a limited range of forms and its distribution was confined to the local market.\textsuperscript{37} Thus the production of bucchero gradually evolved from prestige ceramics for banquets to semi-luxury vessels and eventually to common table wares. This evolution is one of the essential features of manufacture in central Italy and is one of the themes of this study since it records the devaluation process of artefacts made in workshops.\textsuperscript{38}

Figure 10 presents most of the sites to which local manufacture of bucchero has been assigned. If these attributions are acknowledged then many of the main Etruscan settlements had a workshop in which at least bucchero was produced.\textsuperscript{39} These workshops could have produced both fine impasto vessels as well as bucchero. This combination of different wares in one workshop is attested for Vetulonia. At this site, a pottery workshop produced during the 7th century BC, dark impasto as well as bucchero vessels. Both ware groups are decorated with a selection of 15 stamps. So far kantharoi, kyathoi, bowls, lids and an aryballos have been attributed to this workshop.\textsuperscript{40} The production in one workshop of several wares, including bucchero, is also suggested by the wasters from a kiln excavated at S. Pietro a Sieve (loc. I Monti). This kiln is situated just outside a necropolis of substantial size which indicates a considerable settlement near the production site. De Marinis reports that the wasters from the kiln included bucchero, bucchero sottile, various fabrics of impasto and depurated wares. The ceramics from this site are dated to the 7th and early 6th centuries BC.\textsuperscript{41} Furthermore, the production site at S.Pietro a Sieve demonstrates that the manufacture of bucchero is not restricted to the sites recorded in Figure 10.

2.2 General geological perspective

Geology and pottery production can be associated through the raw materials, clay, temper and occasionally slip and paint. In theory it should be possible to correlate earthenware to distinctive geological outcrops.\textsuperscript{42} However a one to one relation is often not feasible because the raw materials are processed by the potter and particular mineral assemblages may be characteristic for vast geological regions.

Ethnographic data have shown that clay- and temper sources are preferably located within 1 km reach of a pottery making community. Communities hardly ever go beyond 7 km in order to obtain their basic resources for

\textsuperscript{35} Bartoloni 1989, 211.
\textsuperscript{36} For example Gualterio has documented the bucchero production at Tarquinia: Gualterio 1993.
\textsuperscript{37} Gran-Aymerich 1993, 22-3.
\textsuperscript{38} cf. sections 3.3 and 3.4.
\textsuperscript{39} Mannoni examined by thin-section analyses, bucchero from Pontegagnano, Caere, Tarquinia, Pisa as well as some 'imported' bucchero from other archaeological sites: Mannoni 1993, 223-7. Mainly on account of the small number of samples and sites this research was not conclusive for the identification of production places and the distribution pattern of bucchero.
\textsuperscript{40} Gregori 1991.
\textsuperscript{41} de Marinis, 1991. The site was recently excavated and to my knowledge details are not published. Near the kiln several foundations of modest structures are reported as well as evidence for metalworking. The combination of various crafts on one location is not uncommon for the 7th century BC as will be documented in this study, especially in chapters II and III.
\textsuperscript{42} I would like to thank drs. A. Arnoldus-Huysendveld for her remarks on the geological aspects discussed in this thesis.
pottery production.\textsuperscript{43} Slip and paint resources are obtained from greater distances.\textsuperscript{44} This implies that the immediate geological surroundings of a pottery making community requires detailed examination first when the provenance of pottery is inspected. Therefore most of the geological provenance studies for pottery in central Italy concentrate on the adjacent environment of a given settlement. One of the methods used to correlate geological minerals with pottery is thin-sectioning. Thin-sections have been made from pottery found at various archaeological sites in central Italy. Whenever possible the minerals determined in these sections, were related to the minerals recorded in geological studies. The minerals in the pottery ideally correspond with the geological minerals near the site being examined. This approach is based on the paradigm that the basic resources for pottery production, clays and temper, are mined not far from the workshop.

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\textit{Fig. 11. General geological map of the present province of Lazio.}

\textsuperscript{43} Arnold 1985, 35-57.

\textsuperscript{44} Preferably within a 10 km range but distances of 200 km or more are occasionally reported: Arnold, 1985, 52-3.
The present province of Lazio which includes Latium Vetus and a major part of Etruria is characterised by extensive layers of volcanic origin from the Quaternary period (Fig. 11). The volcanic layers cover the pre-existing soils. The various volcanic regions which were active are located in the Monti della Tolfa (the area around Allumiere and Cerveteri), the Monti Volsini (the area around the Lago di Bolsena), the Monti Cimini (the area around Viterbo), the Monti Sabatini (the area around the Lago di Bracciano), the Colli Albani (Vulcano Laziale) and the area around Frosinone (Vulcani della Ciociaria o Ermici). Each of these six regions have some specific tufa outcrops as well as some characteristic peperinos. The deposits of the Vulcano Laziale are exemplified by abundant leucite minerals while the Vulcano Sabatino are distinguished by much fine-grained lava with large crystals of feldspar and nepheline. In the Tolfa, Alumiere and Cerveteri region large agglomerates of trachyte occur and in the Monti Cimini and Volsini plagioclase trachytes and leucitic phonolites are frequent. Specific sedimentary rocks can be found on the right bank of the river Fiora, from the region of Grosseto to the region of Viterbo. Limestones of various geological origin are found throughout Lazio.

Marls and calcareous clays are encountered at various locations. In addition to pyroclastic material, the Quaternary deposits of central Italy consist of littoral, lagoonal, lacustrine and fluvial deposits (sand, loam, clays and travertines) as well as manganese and iron oxide deposits.

It may appear from the general geological perspective that it is possible to differentiate the pottery production of sites in central Italy on geological grounds. This can be viable for particular cases but many sites have at least some geological features in common. I would like to illustrate this with two examples.

In Latium Vetus at the end of the 7th century BC, vast proto-urban settlements emerged all along the contact area between volcanic outcrops and coastal sediments. Sites such as Castel di Decima, Laviniun, Ardea and Satricum occupied comparable geomorphological positions. The territories of these sites contain volcanic layers from the Vulcano Laziale, marine and fluviolacustrine deposits as well as aeolian deposits. Thus, the potters of quite a few sites in Latium Vetus had in theory access to various clay and temper sources of similar geological origin. The second example correlates the geological situation around Caere and Tarquinia. Coastal deposits of pliocene clay and marls are present in both territories. Furthermore, they both contain palaeogene sedimentary rocks which have weathered by prolonged marine activity in later periods. The volcanic quaternary tuffs are specific for the immediate surroundings of Caere and provide some typical minerals. One of the sedimentary rocks is characteristic for Tarquinia. Therefore it is in theory difficult to distinguish impasto pottery from Caere or Tarquinia on the basis of the minerals present in the impasto. Some of the geological features are, however, distinctive and these could determine the provenance of characteristic ceramic artefacts of both centres.

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45 These layers cover a surface of about 8,000 km².
46 The term used in geology is trachytic phonolites. These are fine-grained lava with large crystals of feldspar and nepheline originating from an extrusive igneous rock of intermediate character (containing 52 to 66% silica by weight), belonging to the alkaline basalt volcanic suite.
47 These rocks formed in the Permian period and consist of argillaceous schists, micaceous-arenaceous schists, quarzite and quarzitic conglomerates.
49 The geological information derives predominantly from: Sabella 1954, 9-13, 222.
50 An area of 5 km around Caere and Tarquinia was examined based on the Carta Geologica d’Italia al 500.000 (foglio 2) and information by: Mannoni 1993.
51 Mannoni 1993, 223. This characteristic calcareous rock contains particles of carbonate cement, microfauna and maybe also rounded quartz grains but it hardly contains mica.
52 Fabric descriptions from specific sites like Satricum, Caere, Poggio Civitate and Acquarossa are discussed in combination with geomorphological features in section 2.6.
Resource specialisation involves the selective use of particular resources such as certain clays for the manufacture of certain wares.\textsuperscript{53} In central Italy bucchero and pale Archaic wares suggest the use of specific clay deposits though cogent research is required. Francaviglia suggests that specific clayey tuffites were employed for the bucchero production from the late 7th to the late 6th centuries BC.\textsuperscript{54} However clayey tuffites are found throughout central Italy which indicates that potters had easy access to such deposits. Archaeometric research of the bucchero from Caere which is reported by Burkhardt, has not been able to locate the clay source of vessels dated to the 7th and first half of the 6th centuries BC. Nevertheless, clayey tuffites cannot be excluded on account of the associated volcanic minerals, but Burkhardt's research did indicate that during the second half of the 6th century BC a different clay deposit was used for bucchero production.\textsuperscript{55}

Pale Archaic wares were produced from the late 6th century BC and are known from many sites in south Etruria and Latium Vetus.\textsuperscript{56} Though in previous centuries Italo-Geometric and Etrusco-Corinthian vessels were made as table-wares from pale firing clays, the upsurge in pale Archaic wares is associated with fabrics which contain coarse inclusions. Apart from architectural terracottas, pale Archaic wares are especially common for large vessels such as teglie and pithoi. Some jars, bowls and jugs are also classified as pale Archaic wares. Curri and Sorbelli suggest that these wares were manufactured from calcareous marls which would produce pale coloured terracottas with a porous texture.\textsuperscript{57} The porous texture makes the artefact less heavy in comparison with the fired products of most other clay types and thus clays which fire into porous fabrics are suitable for large artefacts such as the ancient tiles. A slight disadvantage is that calcareous marls can be more friable.\textsuperscript{58} The hypothesis that specific deposits of calcareous marls were exploited for the manufacture of pale Archaic wares has not been tested with archaeometric techniques and samples of such wares from different sites. It remains, therefore, a suggestion. Moreover, marls and calcareous clays are common in central Italy and, therefore, potters were not restricted to one specific clay deposit. Other suggestions for the source of pale Archaic wares are alternative clay sources such as specific clayey tuffites that might produce a pale colour during firing or manufacturing techniques that could be manipulated. Nevertheless, during the late Archaic period, potters throughout central Italy consciously strove to obtain a pale colour for some of their products and thus will have employed specific resources and may also have adapted their manufacturing techniques.\textsuperscript{59}

\textsuperscript{53} Rice 1991, 262.

\textsuperscript{54} Francaviglia \textit{et alii} 1975, 228-30. In this case the term 'weathering' includes chemical changes due to hydrothermal (post volcanic) processes.

\textsuperscript{55} A plastic, marine clay with few inclusions of which the microfossils and foraminiferae are characteristic: Burkhardt 1992.

\textsuperscript{56} Pale Archaic wares are also classified as \textit{impasto chiaro}, \textit{impasto chiaro sabbioso} or coarse creamware/coarse buff or pink ware: cf. Bouma 1996, 329.

\textsuperscript{57} Curri and Sorbelli 1973.

\textsuperscript{58} Curri and Sorbelli 1973, 261-3.

\textsuperscript{59} I would like to thank Sarah J. Vaughan of the Wiener Laboratory of the American School of Classical Studies at Athens for drawing my attention to a related discussion on Cycladic white wares from Akrotiri on Thera. For the manufacture of the distinctive local white bodied wares, the potters from Akrotiri did use during the Early Cycladic period, two clay sources pointing to 'the existence of parallel (and possibly competing) material traditions'. The potters employed either locally-available carbonate-rich volcanic clays or local non-calcareous volcanic clays. The carbonate-rich clays might derive from weathered tuffite incorporating old volcanic materials. By the Middle Cycladic period only the calcareous clays were delved and for specific wares manipulated by processing, higher firing temperatures and more controlled firing conditions. Clear white fabrics could be produced by means of a combination of exposure to elevated firing temperatures, that is over 1000°C, and the use of an oxygen-poor firing atmosphere. Oxidizing firing conditions produced only pale pinkish fabrics: Vaughan \textit{et alii} 1995. Arnoldus-Huyzendveld points out that whitish clayey tuffites as fluvio-lacustrine deposits are fairly common in central Italy. Sometimes these deposits are calcareous. An advantage for early exploitation of these deposits is that they occur on the surface because they are formed during a final stage of volcanic phenomena and are, therefore, not covered by more recent layers: personal communication.
2.3 Preparation of raw materials

The raw materials for ceramic production can be manipulated in numerous ways. Potters usually modified clays in their natural state in order to obtain particular characteristics. The preparation methods can depend on the function of the ceramic artefact to be produced or on the production technique involved. Thus, the fabric of a cooking-jar needs to have thermal shock resistance because the function of the jar requires repeated heating and cooling. This can be achieved by specific non-plastic inclusions such as feldspars, augite and hornblende. On the other hand, a potters' wheel requires a very plastic clay and non-plastic inclusions of a small particle size because otherwise the inclusions would cut the potters' hands.

The preparation methods for the raw materials primarily involve removing matter from the clay or adding material to it. I will restrict the discussion to the preparation techniques of levigation and tempering because these techniques are frequently recorded in the archaeological record.

Levigation entails mixing the clay with enough water to dissolve the clay and to allow the coarser fraction to settle out of the suspension. The upper stratum will be purified clay which could be used for wheel-throwing. Levigation can be achieved in large levigation tanks though smaller containers occur more widely. In central Italy, tanks and containers have been frequently excavated near kiln complexes but are not always interpreted as such. A distinction can be made between levigation in stagnant water, in running water or by employing sifting. Levigation in stagnant water would require a basin or tank preferably linked to a water supply as was discovered at Laurentina-Acqua Acetosa, Lavinium and Marzabotto. Levigation in running water would involve at least two basins which are correlated and positioned in a descendent order (Fig. 12). The clay is placed in the first basin and mixed with water. The running water will transport the clay particles to the next tank while the heavy and coarse particles will...
remain at the bottom of the first reservoir. The system of successive basins can involve three or more basins each rendering finer clay particles. I suggest that levigation by running water was practised at the pottery workshop of Caere. An early levigation system is reported at Anagni. This system is dated to the second half of the 7th century BC, based on the associated pottery. It consisted of a large oval pit filled with clayey soil and mixed with sand and fragments of impasto and faunal remains. To the north a series of smaller basins associated with canals were excavated. These basins were filled with levigated clay. It is deduced that the oval pit, smaller basins and the canals represent an early levigation system for clays. Unfortunately, the Anagni levigation structure cannot be related to other workshop remains.

Plastic and very plastic clays such as those from the montmorillonite group are not suitable for levigation since they crack during firing when purified. Experiments with clays from Satricum showed that the marine clays when levigated deform during firing while some clayey tuffites provide satisfactory results when purified. The experiments demonstrate that certain clay deposits are less suitable for levigation and thus required tempering by non-plastics when employed for ceramic production. In addition, it is noteworthy that some of the levigated clayey tuffites from Satricum rendered after firing, properties that coincide with characteristics of figulina pottery such as the powdery surface.

The other preparation technique presented in this section involves tempering. The quality of the clay can be adjusted by adding non-plastic material to the clay. Non-plastics may be naturally present but could also be added by the potter. For example, fabrics with a high percentage of non-plastics (25 to 35%) have been used in central Italy for moulding and it is probable that these fabrics are the result of intentional tempering. The size of the non-plastic material reduces shrinkage during drying as well as the drying time itself. This could be a reason for the substantial amount of non-plastics in the architectural terracottas and many heavy and large ceramic vessels like storage jars.

Certain non-plastics such as feldspars, augite and hornblende affect resistance to thermal shock of cooking-jars. Moreover, thermal shock resistance can be manipulated by increasing porosity. The desirable pore size would be between 0.5 and 1 cm. and is obtained by using organic tempering material such as straw and grasses. These materials burn out during firing and leave pores of suitable size. Deliberate tempering with organics in order to produce a specific fabric with appropriate thermal shock resistance and insulation characteristics was noticed in the lining of one of the kilns at Satricum but is not reported for the cooking jars.

Tempering experiments by Schiffer and Skibo with untempered paste and pastes mixed with either fine sand or organics (horse-manure) in substantial quantities (approx. 30 to 40%), demonstrated that sand temper yielded the most rapid drying rate. Moreover, sand tempered fabrics heated more effectively. Untempered wares lost much of their strength and have the least resistance to thermal shock. The tempered wares 'did not undergo any significant strength reductions after thermal shock'. These experiments indicate that tempering had significant effects to such extent that one can assume that potters in antiquity were aware of them. For example, the drying time was reduced.

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67 A system with successive basins was for example, recovered at Athens: Young 1951, 230-49.

68 See section 2.6.4.

69 Gatti 1993 b, 301.

70 Shepard 1956, 376; Cuomo di Caprio 1985, 22.

71 I would like to thank Elly Weistra and Leo van der Holst for the experiments.

72 Figulina pottery is wheel thrown and made from a depurated paste. They fire characteristically into a white or pale colour: Bouma 1996, 395–402. It was probably locally produced at Satricum during the 5th and 4th centuries BC from a deposit of clayey tuffites.

73 See section 2.6.1.

74 Schiffer and Skibo 1987, 603-7.
by more than 40% when sand was added to the untempered paste. Furthermore, heating water was noticeable more
effective in sand tempered vessels. It is, therefore, likely that the tempering of pastes with inorganic non-plastics in
order to produce cooking jars was intentional in central Italy since the effects are considerable. The large amount of
augite in the cooking jars of the Archaic period is particularly remarkable since augites are one of the minerals best
suited to achieve thermal shock resistance.75

Mixing and kneading the clays with non-plastics or with other clays required provisions in workshops such as
paved areas. These areas are common in workshop contexts and are reported frequently in section 2.6. Other
provisions in the workshops for the mixing and kneading of the paste are probable since this production step has to
be done intensively in order to remove pockets of air, disperse the non-plastic particles evenly and to make the clay
smooth and homogenous.76 After mixing and kneading the prepared paste, the clay vessels can be modelled.

2.4 Forming and finishing methods

After preparing the paste, ceramics can be formed by:
- modelling by hand,
- modelling by mould or
- modelling on a potters' wheel.
A combination of the various modelling techniques is possible as well.

Modelling by hand requires no particular tools. The ceramics are formed with the potters' hands and the motor
patterns may evolve around pinching/pressing, coiling and slab building.77

The simplest way is to take a ball of soft clay and make a series of even pinches outward from the centre. With
this method, one can make small vessels with simple form and a crude and irregular finish. Many of the miniature
vessels in central Italy have been made in this way which can also produce slightly larger vessels. By pressing a ball
clay outwards and modelling the walls of the vessel accordingly one can produce simple mugs and bowls.

Coiling involves manipulating a series of clay coils in order to form the walls of a container. The base is usually
a flat piece of clay on which the rolled out coils are gradually built up winding round and round. The coils can be
joined by pinching and irregularities can be removed using pebbles or other tools, thus creating a smooth surface.
Coiling can produce elaborate forms and the finishing techniques can be intricate. A combination of coiling and
rotation can produce vessels which are sometimes hard to distinguish from wheel thrown pottery. The use of a
rotating base on which the ceramic vessel is modelled can be considered a stage towards the potters’ wheel since the
motor patterns are related. Actually the difference between on the one hand vessels which are initially formed by
coiling and then shaped on a wheel and on the other hand wheel thrown vessels, is not obvious. A recent study of
3rd millennium BC ceramics from Mesopotamia, Iran and India indicates that containers which were previously
thought to have been wheel thrown were in fact made by coiling and subsequently wheel finished. Coil-built
roughouts can, however, be identified by specific non-rectilinear grooves where coils are joined even if they are
compressed by subsequent rotation.78 In central Italy, the vessels with large dimensions such as storage jars and
basins, are regarded as having been made by coiling and turning. A well known ethnographic example illustrates
how potters on Crete made pithoi by a combination of coiling and turning on a turntable. These potters from

76 Peacock 1982, 54; Rhodes 1979, 71.
Thrapsanos travelled in groups to different parts of the island in order to make and market their storage jars.  

Slab building can be used for rectangular shapes. Flat sheets of clay are rolled out or sliced from a lump of clay with the appropriate plasticity. The slabs are joined together when they have been dried to a leather-hard consistency. Some of the hut-urns and temple models from central Italy may have been made with slabs of clay. The mere placing of a slab of clay on top of a semi-cylindrical support is the basis of the production of cover-tiles or imbrices.

Pulitani reproduced some Iron Age ceramics which are dated mainly to the 9th and early 8th centuries BC, in order to study the ceramic production at Osteria dell'Osa. The vessels are characterised by hand forming and were frequently incised, impressed or decorated with plastic elements. They obtained a careful surface treatment and an undeveloped formal differentiation makes it probable that individual ceramic types were used for various functions. The ceramics that were specially made for the funerary ritual such as the hut-urns, had some noticeable defects which caused the disintegration of some parts of these impasto objects. Pulitani reproduced most of the vessels by coiling on a flat base. For larger vessels such as the hut-urn, relatively thick clay strips with a rectangular section were used. The surface treatment involved burnishing in order to supress coarse particles, to close the pores and to obtain a dense interior and exterior. Meticulously made vessels were burnished several times during the drying stage and eventually polished with a piece of leather for a lustrous surface. The 13 reproduced vessels were subsequently fired in an open fire for 24 hours employing 20 kg carbon which corresponds with about 130 kg wood. The fire was covered with straw and soil and a temperature of about 600 to 700°C was obtained. In order to prevent the extinction of the fire on account of insufficient oxygen, two vent-holes were made which caused a limited draught and the relatively clear red-brown colour of the ceramics. It was deduced from these experiments that the various production stages were probably incorporated within other household activities. The manufacture of the ceramics was time-consuming when compared to other production techniques such as moulding and wheel-throwing. One vessel was made in one hour while another took three hours depending on its size and surface treatment. The manufacture of the hut-urn, for example, took two and a half hours. Collection of the clay and the firing process may have been organised by the community. It is suggested that the pottery production at Osteria dell'Osa has aspects of household production though household industries cannot be excluded. Bietti Sestieri especially mentions the manufacture of large dolia 'which may have required the use of kilns, as is indicated by their colour, usually a homogenous red or light red'.

Master craftsmen who modelled by hand, produced the monumental terracotta statues which were employed for adornment of buildings such as the Archaic temples in central Italy. These life-sized terracottas were modelled and sculpted in clay. They are associated with artisans such as Vulca, Damophilos and Gorgasos who are mentioned by the ancient writers. The statues were constructed from hollow segments. Details were sculpted with tools such as scalpels and scrapers. The large terracotta statues had to be hollow for drying and firing purposes and the separate segments of the statues were accurately attached to each other in order to fire them as one piece. During construction the clay statues were probably supported in order to prevent sagging and collapsing. A series of life-
sized ceramic human figures, a sphinx and some animal akroteria were positioned along the ridgepole of the Archaic courtyard building of Poggio Civitate. These sculptures are dated around 600 BC and belong to the oldest monumental terracotta statues of central Italy.85

The development of the coroplast tradition can be outlined by the imposing terracottas excavated on sites such as Caere, Veii, Rome, Pyrgi and Satricum.86 Originally the artisans used clays which fired to dark colours while during the late 6th and early 5th centuries BC cream-coloured fabrics became dominant. Life-sized ceramic, funerary monuments such as the sarcophagi degli esposi from Caere which are now exhibited in the Villa Giulia and the Louvre have to be included in an examination of the monumental terracottas from central Italy.87

It is generally assumed that the craftsmen who made the monumental terracottas worked on commission and were itinerant. Lulof for example, proposes that the craftsmen who decorated the temple in Satricum, were also responsible for the terracotta decoration in Ardea, Rome and Falerii.88 Nonetheless, Briguet suggests that a local coroplast school existed at Caere during the 6th and early 5th centuries BC on account of the numbers of terracottas excavated.89 At Lavinium a coroplast workshop was established during the 5th century BC.90

The second modelling technique involves moulds and results in the production of ceramics in series. Manufacture is quick and the outcome is uniform. A mould is a negative model of an original, positive image which can be made from any hard and resistent material such as wood, stone, metal or even clay which was subsequently fired. It is important that the shape of the original can be reproduced in an open or two-piece mould because undercuts, that is sharp angles less than 90° necessitate the assemblage of a series of moulds which counteracts mass-production. The mould itself is made of materials such as terracotta or wood. The paste is pressed into the mould and dried to a leather-hard stage. It is possible that some of the original water content of the clay is absorbed by the mould though an excessive absorption would make the clay adhere to the surface of the mould and thus makes it difficult to remove the artefact. This depends on the absorption capacity of the mould which can be regulated by immersion in water. Moreover, it is possible to apply a suitable interlayer between mould and paste such as carbon dust. Shrinkage of the paste makes it easy to remove the artefact from the negative eventually.91

Early moulds in central Italy are related to architectural terracottas. Simple moulds, basically wooden frames, were used for the manufacture of roof-tiles or tegulae. These are attested in central Italy from the middle of the 7th century BC.92 At Poggio Civitate, a mould of a canopic head was found dated to the late 7th century BC and which had been used for making a terracotta revetment system.93 This mould is carefully made of a fine-grained clay which had been subsequently fired. Other terracotta moulds from the late 6th to the 5th centuries BC that were employed for the production of terracotta antefixes are known from Vulci and Falerii.94

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86 See for a discussion on the manufacture of these monumental statues: Lulof 1991, 115-37.
87 cf. Briguet 1989. See also section 2.6.4.
89 Briguet 1989, 102, 214-8.
90 See section 2.6.2.
94 Santuari d’Etruria 1985, 46-8. The moulds in this catalogue represent a selection of the moulds known in central Italy. Other moulds are mentioned in section 2.6.
Moulds may also have been used for the production of ceramic vessels. Circular or cylindrical containers can be made by employing a rotating wheel and a mould. The mould is placed on a wheel and lined with clay. Pressure is then applied by hand or with a template which is gradually brought towards the mould as it rotates. This action squeezes away any excess clay to produce a vessel of the required thickness. The method is suitable for producing flat forms. A well known example of a combined use of mould and wheel is the production of *terra sigillata* whose moulds may have been made directly from metal prototypes. In central Italy some of the ceramic bowls dated to the 7th century BC and imitating metal wares, may have been modelled by a combination of moulds and rotating wheel. These carinated bowls are characterised by a clear, rounded angle between the body and the shoulder and a long out-curved rim. The surface is burnished to a black lustre and the shape imitates bronze *paterae*.

Another method of moulding involves pouring a homogenous mixture of clay or slip into an absorbent mould. A thick layer of clay builds up as the water is drawn into the mould. When the desired thickness has been reached, the excess slip is poured off and the clay allowed to dry. This process is most commonly used for casting complex hollow shapes such as figurines. Slip casting is, to my knowledge, not attested for central Italy during the period 800 to 400 BC.

The third modelling technique involves wheel throwing which signals workshop conditions and emerging markets. In Etruria and *Latium Vetus*, the variation of pottery shapes with particular forms for specific functions such as fine ceramic drinking sets with *kotylai*, *skyphoi* and *oinochoai*, rapidly increased over the 8th and 7th centuries BC. This development is associated with a certain degree of standardisation because the vessel shapes became more uniform than the types in the previous period. It reflects an intensification of production which can be partly attributed to the use of the potters’ wheel. The fast wheel was an important innovation allowing for the more efficient production of pots. The mean time for the production of wheel-turned pottery is a fraction when compared with the time involved for the manufacture of ceramics modelled by hand. For example, a medium sized vessel can be produced on a wheel within 6 minutes. Nevertheless, Arnold appropriately comments that this rate of production

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95 Hodges 1976, 26-8.

96 Cuomo di Caprio 1985, 81-4; Friis Johansen 1960.

97 Some of these bowls were coated with a black-firing slip. A *tazza cratere* with a diameter of 28 cm from *Satricum* was made on a wheel from a red-firing clay which had been subsequently coated with a heavy slip which coloured black during firing. Bietti Sestieri also hints at the employment of moulds for the production of vessels with an elaborate plastic decoration: Bietti Sestieri 1992 b, 94. See also: *Santuari d’Etruria* 1985, 54.

98 Consult for instance, Maaskant-Kleibrink for an impression of the increase of pottery types and wares during this period: Maaskant-Kleibrink 1987, 108-11.

99 This can be related to the hand modelling experiments by Pulitani which were mentioned above: Bietti Sestieri 1992 a, 439-46.
cannot be maintained because the potter must spend time digging and preparing clay, firing, selling the finished vessel and maintaining his workshop.\textsuperscript{100}

The fast wheel consists of a heavy disc of wood, stone or clay, set upon a substructure fixed with a free-turning, vertical pivot (Fig. 13). Probably the simple pivoted, fast wheel was generally used in antiquity. It requires assistance as depicted in Figure 14. There is no evidence for the existence of more complicated designs of potters' wheels in central Italy during the period examined.\textsuperscript{101}

Throwing clay involves first centring a ball of clay on a rotating wheel. Subsequently the walls of the vessel can be pulled up assisted by the centrifugal force, by directing pressure with both hands. Two parameters are important, the velocity and the duration of the rotation movement. For small vessels a relatively high velocity is required while for large vessels the duration of the rotation movement needs to be prolonged in order to allow the potter to pull up the walls. The various sections of an elaborate vase-form such as the foot and body, may be modelled separately, joining the parts later on. The basic vessel form is manipulated on the wheel while additions such as handles and outlets are attached later.\textsuperscript{102}

![Fig. 14. Ancient illustrations of wheel-throwing.](image)

Wheel throwing was introduced to central Italy during the 8th century BC. A ware group that was made in Italy by employing this new manufacturing technique is the Italo-Geometric pottery. Pottery classified as Italo-Geometric is made of refined clay on a potters' wheel and fired in a kiln with separated firing and combustion chamber. The production of Italo-Geometric pottery which is based on the Greek-Geometric pottery, can be detected from the third quarter of the 8th century BC. One of the more important production centres is located at Vulci while Bisenzio,


\textsuperscript{101} cf. Hodges 1970, 159; Moorey 1994, 147-8. Both authors discuss the introduction in Antiquity of a kick-wheel or true potters' wheel.

\textsuperscript{102} For a more detailed account of the various options of a potter while using a wheel cf. Cuomo di Caprio 1985, 69-78.
Veii and Tarquinia are also mentioned as sites where workshops were established. On stylistic grounds Rizzo suggests a local production of this type of pottery at Caere and Bartoloni postulated that from the first half of the 8th century BC, Greek craftsmen produced fine ware pottery at Rome. The precise location of some of the early pottery-workshops which imitated Greek-Geometric vessels requires more cautious statements. Nevertheless, it is acknowledged that imported Greek geometric pottery as well as their local imitations are synchronic in southern Etruria from approximately 750 BC. For Latium Vetus another account is given. After examining the pottery of Greek type in this region, Beijer could still report for the first half of the 7th century BC that vases of depurated clay in the Greek tradition do not seem to be an essential part of the Latial material culture.

In the archaeological literature, ceramics modelled on a potters' wheel, are equated with the workshop mode of production. In this context Peacock considers the potters' wheel as well as the kiln to be indicative because they improve both the quantity and quality of the ceramics produced. The potters' wheel and the kiln are fixed installations and, therefore, the debate on itinerant versus sedentary craftsmen is hardly relevant for potters who modelled their vessels on a fast wheel. The establishment of workshops which made the livelihood of the potter essentially subject to the exchange of ceramics, requires economic incentives and emerging market conditions. Thus, the consequences of the introduction of the potters' wheel are comprehensive and not merely entail technological aspects but above all economic and social transformations. The evolution is usually not abrupt and, therefore, the introduction of the potters' wheel within a local framework requires above all time and reflects not histoire événementielle but slower rhythms. I, therefore, consider that in Etruria the use of the potters' wheel remained exceptional before the second half of the 7th century BC until the expansion of the Etrusco-Corinthian wares and the bucchero production. In Latium Vetus the fast wheel did not become a regular feature before the late 6th, early 5th centuries BC and is associated with the advance of wheel-thrown vessels of depurated wares and clay, that is the argilla figulina tradition.

While examining wheel-throwing, I would like to stress the continuing employment of the turntable or slow wheel as one of the modelling techniques for the production of the impasto pottery. A distinction between

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104 Rizzo 1989.


108 Carafa in his study on pottery from Rome that is dated from the late 8th to early 5th centuries BC predominantly presents impasto ceramics: Carafa 1995. He also quantifies the various fabrics that were encountered during excavations on the northern slopes of the Palatine. The coarse wares are the main group (45 % of about 29,000 sherds). This ware group is known from the late 8th century BC but is most intensively encountered during the 6th century BC. The vessels which are produced include jars, bowls, basins and storage jars. Coarse wares are probably partly modelled on a turntable or slow wheel since the fabric still contains various coarse-grained inclusions such as augite, micas and crushed stones. The fabric is not particularly suited for modelling on a fast wheel and the surface features which indicate rotation are probably caused by modelling on a slow wheel. From his study it can be deduced that figulina and bucchero production at Rome is limited at least until the late 6th century BC when compared to the impasto output. This corresponds with other sites in Latium Vetus. Bouma while presenting the archaeological evidence from Satricum, considers that the production of depurated wares started in the late 6th century BC while figulina is attested in 5th and 4th century layers: Bouma 1996, 312-402. At Laurentina Acqua Acetona figulina is known from contexts that date to the late 6th and early 5th centuries BC: Bedini in Grande Roma, 1990, 175-77.

109 The terminology slow wheel and fast wheel require specification. The slow wheel is considered to be a turntable or a wheel that is rotated with low velocity while the fast wheel is a potters' wheel with a high velocity. The terms can be ambivalent because it is not always possible to distinguish between a high or low velocity while examining pottery surfaces. Both techniques can be represented as an inclined plane or gradient. Moreover, the rotation of a potters' wheel can be adjusted in order to obtain a low velocity which makes it a slow wheel. In the archaeological literature impasto pottery is associated with the wheel or tornio: cf. Bouma 1996, 312-3; Carafa 1995, 18. A distinction between a slow or fast
ceramics modelled on a slow wheel or on a fast wheel can be arbitrary.\textsuperscript{110} It has been demonstrated by experiments and ethnographic examples that surface features which indicate the use of a potters' wheel are usually ambiguous and can also be attributed to other modelling techniques.\textsuperscript{111} The use of a slow wheel or turntable in central Italy may still represent a household industry although the turntable can also occur in workshops usually in combination with other modelling techniques. The ware denominations \textit{impasto} and \textit{figulina} are crucial for a discussion on slow or fast wheel and, therefore, require a closer examination.\textsuperscript{112}

\textit{Impasto} is commonly used for fabrics with a fair amount of inclusions which are still visible with the naked eye, approximately granule- to medium-size; 4 to 1/4 mm. in diameter.\textsuperscript{113} Pastes with a considerable percentage of inclusions of this size are usually not suitable for throwing on a potters' wheel. These non-plastic inclusions increase the rigidity of the paste and thus reduce the plasticity because they moderate the amount of water-absorbing surfaces. Good water-absorbing characteristics are essential for a potters' wheel as it ensures an optimal plasticity of the paste. Throwing clay involves the greatest structural reorganisation of the paste when compared with other modelling techniques and, therefore, necessitates an optimal plasticity and a high water content. Coarse \textit{impasto} pastes have adverse characteristics for modelling on a wheel with high velocity. Moreover, pastes for wheel-throwing contain smaller inclusions than pastes used for hand-forming techniques because they otherwise would cut the potters' hand.\textsuperscript{114} In the study by Courty and Roux, there is a significant distinction between on the one hand the coarse fraction of the pastes which were hand modelled with or without the use of a turntable and on the other hand the coarse fraction of pastes which were wheel-thrown. Both the amount of the coarse fraction as well as their size is less.\textsuperscript{115}

\textit{Figulina} is levigated clay with scarcely any visible inclusions on a macroscopic level. It may contain fine to silt size non-plastics and is usually coated with a wash or slip. In central Italy it usually fires to a pale to reddish yellow colour and can be characterised as a powdery fabric.\textsuperscript{116} The \textit{figulina} paste is adjusted for modelling on a fast wheel and thus reflects workshop conditions.

110 Peacock 1982, 23.

111 Courty and Roux 1995. Van der Leeuw discusses the various techniques which have been documented for the production of globular or nearly globular pots with a simple everted rim: van der Leeuw 1993. Quite a number of different modelling techniques and approaches were reported for the manufacture of this specific vessel shape.

112 This discussion is hampered by the few fabric descriptions available for central Italy and the vague definition of various wares. The term \textit{impasto} is used for numerous fabrics while also \textit{figulina} is a collective name for depurated pastes of different geological origin. Momentarily, the Archaeological Institute of the University of Groningen is preparing a fabric and ware description for archaeological ceramics from southern \textit{Lazio}.

113 \textit{cf.} Shepard 1956, 118; Cuomo di Caprio 1985, 28. The size and amount of the inclusions is usually not specified in the archaeological literature. Bouma reports terms commonly used besides \textit{impasto} that is \textit{simple pottery}, \textit{ceramica comune} etc.: Bouma 1996, 312-3. He also presents some descriptions of \textit{impasto}. See also Gierow on advanced \textit{impasto D} which is turned on a wheel: Gierow 1966, 244.


115 Courty and Roux present five examples of pastes for hand modelling including those which were used for moulds and turntables. These pastes have on average 28% coarse inclusions with a mean size of 300 \(\mu\text{m}\). In contrast are the pastes which were wheel thrown. These contain on average about 16% coarse inclusions with a size of about 110 \(\mu\text{m}\).

Except for the manufacture of buccherio, it appears that during the 8th and 7th centuries BC, the potters’ wheel was predominantly employed for imitating Greek painted pottery.\textsuperscript{117} I, therefore, conclude that in central Italy, the majority of the pottery was not modelled on a potters’ wheel but was made with other manufacturing techniques. Further on this conclusion will be related to the upsurge of building activities in central Italy from the middle of the 7th century BC. These activities gave another impulse to the process of craft specialisation within the ceramic industry.

So far, I have discussed individual modelling techniques though some of the table wares from the Orientalising Period stand out on account of their intricate execution which reflects a combination of various modelling and decoration techniques. The effect of combining modelling techniques is a sharp increase in labour or in modern terms energy expenditure, because the manufacture of a vessel is separated into modelling phases.\textsuperscript{118} This separation requires drying stages between the modelling phases before the vessel is completed. Time investment during the manufacture of this type of pottery in fine impasto or buccherio was much larger when compared with the same types of vessels in Italo-Geometric and Etrusco-Corinthian fabrics made on a potters’ wheel. Moreover, the surface treatment of the early fine impasto and buccherio pottery was more time-consuming because they were burnished to lustre while the painted pottery imitating imported vessels was given scarcely any surface treatment at all. This marks two different socio-economic systems for the late 8th and early 7th centuries BC:

- one system in which production time is economically indirectly significant (the amount of time to make a vessel is not immediately translated into value) and
- one system in which increased efficiency became necessary.

Both systems merged in central Italy from about 650 BC when the ceramic artefacts became more and more standardised and eventually mass produced which reflects enhanced economic efficiency.

\begin{figure}[h]
\centering
\includegraphics[width=0.8\textwidth]{fig15.png}
\caption{Fine impasto kotyle from Ficana}
\end{figure}

\textsuperscript{117} Bietti Sestieri makes a similar remark for Latium Vetus during the 8th century BC: Bietti Sestieri 1992 b, 240. On account of the literature that is mentioned in the previous pages, I consider this remark still valid for the 7th century BC.

\textsuperscript{118} For a critical assessment of the concept energy expenditure see: Voutsaki 1995, 9.
The manufacture of some of the most sophisticated bucchero vessels provides an illustration of a combination of modelling techniques and records the manufacturing time involved. The basic shapes are wheel-turned in one or more sections while the decoration techniques include moulding appliques and handmodelling decorative elements. These elements are predominantly borrowed from metal techniques such as stamped motives, ribbing, relief decoration and incision. Some of the ribbing is so deep that it may derive from actual moulding. Other intricate examples include oinochoe terminating in carefully modelled animals heads and chalices with caryatids.\textsuperscript{119} Figure 15 illustrates a kotyle from Ficana while Figure 16 represents ceramic vessels from tomb 7 at Poggio Buco. Both figures illustrate ceramic vessels which were modelled and decorated while using various techniques. The producers of these elaborate vessels competed with the workshops that imitated the Greek painted pottery which was made more effectively on a potters' wheel. This may have been one of the motives for the adaptation of the local pottery producing system which resulted during the second half of the 7th century BC in a production of fine impasto and bucchero pottery in series. This process is accurately illustrated by the Figures 15 and 16. The kotyle from Ficana is a highly crafted, individually made artefact while the vessels from Poggio Buco are made in series. In fact, both figures illustrate the successful transformation of the local pottery producing system during the 7th century BC. This system had to compete with an emerging market system which involved Levantine and Greek communities and their respective manufacturing structures. A continuing standardisation of the local pottery production accounts for the long-term changes in bucchero manufacture which evolved from prestige ceramics into semi-luxury vessels. Eventually bucchero became one of the fabrics for common table wares.\textsuperscript{120}

After modelling the ceramics, the artefacts require drying before they are fired. The physical water content of the clay has to evaporate, otherwise steam in the pores may damage the pottery during firing. Drying has to be thorough and gradual and usually lasts several days.\textsuperscript{121} During drying, the water in the clay evaporates at the surface of the artefact through capillary action. The ceramic object shrinks due to the loss of water. Non-plastic inclusions preferably with a range of sizes counteract excessive shrinkage. Finishing methods for functional or decorative purposes are commonly applied during the drying phase. This may involve joining sections of the artefact to each other, such as separately thrown components of the vessel, moulded pieces and handles. Incising, carving, stamping and burnishing are also done at a stage when the body has still a suitable plasticity. Furthermore a wash, slip or engobe is applied when the artefact is semi-dry.

The only remains an archaeologist can expect to find as a reminder of this phase of the pottery production are drying facilities. These may be provisional but can also form part of a building. Facilities enhance the control over the production sequence and are, therefore, usually associated with workshops. One of the functions of the southeast building at Poggio Civitate which is a monumental, open, spacious structure with a triple row of columns and dated to the second half of the 7th century BC, was to accommodate space for drying ceramics.\textsuperscript{122} Also at Marzabotto, workshops with drying facilities were reported for the 5th century BC.\textsuperscript{123}

\textsuperscript{119} cf. Rasmussen 1979, 2-3, 96; Strøm 1981; Bonamici 1972; 1974, 30-1, 45-6. Poggio Buco tomb 7 contains many vessels esp. no. 57 and 58, which illustrate a combination of modelling techniques: Bartoloni 1972, 75-107. Some of these vessels are illustrated in figure 16.

\textsuperscript{120} Gran Aymerich 1993, 22-3.

\textsuperscript{121} Arnold 1989, 62-71.

\textsuperscript{122} See section 2.6.6.

\textsuperscript{123} See section 2.6.7.
2.5 Firing

The last step in ceramic production is the firing. During firing to about 700°C clay minerals decompose, a process which is irreversible because these minerals will no longer re-form when exposed to water. Sintering occurs from 400°C and is the major source of cohesive strength in ceramic bodies while vitrification develops at more elevated temperatures depending on the chemical composition of the clay.\textsuperscript{124} The temperature obtained in the kiln affects the physical properties of the ceramic artefact. Therefore control over these temperatures became essential with increasing specialisation. This control over the firing conditions and temperature is the principle governing the development from open fire to more complicated kiln structures.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{fig16.png}
\caption{Some ceramic vessels from tomb VII at Poggio Buco.}
\end{figure}

\textsuperscript{124} For a detailed description of the processes occurring during firing see: \textit{cf.} Shepard 1956; Rye 1981; Rice 1987.
The employment of a pottery kiln instead of an open- or pit fire is an indication for a complexer organisation of the pottery production. Thus it is relevant to establish when kilns were first built in central Italy.

In an open fire the ceramics are in direct contact with the ignited fuel. This results in dark discolorations on the pottery where the ceramics are in contact with ash or fuel. Moreover, in an open fire, the rate of the temperature rise is difficult to regulate.

In a pottery kiln, the fuel is separated from the ceramics by a raised oven floor and this enhances the control over firing conditions and temperature. It also results in a more homogenous colour of the ceramics. In antiquity, the kilns in pottery workshops are usually updraught kilns with a grate which segregates the firing chamber from the source of heat below (Fig. 17). The firing chamber contains the ceramics while the combustion chamber holds the fuel. The heat will go from the combustion chamber to the firing chamber and smoke and gases from the combustion will be emitted through a vent or blow-hole on top of the firing chamber. The draught will go upwards, hence its name. For Italy, Cuomo di Caprio has examined numerous kiln-remains and derived a typology of which a shortened version is presented in Figure 17. This figure illustrates the two main categories:
type I: with a round or oval shape and
type II: with a square or rectangular plan.
The substructures of pottery kilns can vary to such extent that I prefer not to differentiate between the various methods of building the combustion chambers. Usually, the substantial, raised oven floor has to rest on a central pedestal or another support such as wall, cross wall or arch. Pottery kilns are normally covered on the inside with a specially prepared lining that insulates and withstands high temperatures. The substructures of the kiln are commonly constructed in the ground and can, therefore, be expected to leave archaeological traces. The upper structures and the cover of the kiln are rarely ever found.

Within a traditional kiln, the atmosphere alternates between oxidising to reducing and vice versa during the firing cycle. The conditions can be influenced by the stoker when he delays or increases the amount of new fuel which has to be added to the combustion chamber. This can be combined with a regulation of the air access in order to acquire incomplete combustion and thus reducing conditions in the kiln. The temperatures which are obtained either in an open fire or in a kiln can vary significantly depending on several factors such as the position of the vessel within the kiln or wind-force. Maximum temperatures recorded for an open fire range from 680°C to 920°C and for an updraught kiln from 715°C to 1,075°C. This range of temperatures indicates the temperature at which ceramics in central Italy were fired. Francaviglia et alii suggest on account of the calcite content that bucchero from Veii, Pyrgi and some other sites was fired at temperatures lower than 750°C. Elevated temperatures of around 1,010-1,020°C have been reported by McDonnell and Kars for the late Archaic terracotta statues from Satricum.

Fuel is essential for the manufacture of ceramics and deforestation on account of industrial activities is often used as an argument for change in the pottery craft. Peacock stresses, however, that pottery workshops develop a symbiotic relationship with their environment. This implies that fuel requirements are related to the resources which are locally available and these range from straw, dung, prunings, wood to other combustibles. The ratio of pottery to fuel by weight, is about 1:2 to 1:3. Higher ratios can occur depending on the kiln type, firing cycle and rate of oxidation. The firing cycle from the moment the fire is started until the removal of the ceramics from the kiln, depend on the firing method. An open firing does not have to last longer than one hour while the firing cycle can continue for several days in an updraught kiln.

Arnold has commented on the investment in capital and labour in building a kiln. He considers that any investment could counteract further specialisation on account of the poverty of potters. The capital investment would have

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127 Cuomo di Caprio 1993, 217.
128 Rye 1981, 98-104. Rye documented the lowest temperature in the open-fire/kiln while the maximum temperature was reached. It can be deduced that the temperature difference in a fire at one moment can be more than 200°C.
129 Francaviglia et alii 1975, 228-30. Calcite disappears from calcareous clays at extensive heating around 750°C. Calcite was completely absent in the major part of the bucchero samples except those from Pyrgi (c. 16%), Veii (c. 8%), Marsiliana (1-2%), Poggio Buco (1-2%) and one sample from Marzabotto (1-2%).
132 Peacock 1982, 103.
133 Arnold 1989, 215; Peacock 1982, 25. Peacock reports a ratio of 1:10. Also the ratio that was reported in the experiments by Pulitani, is much higher than 1:2 or 1:3: Bietti Sestieri 1992 a, 439-46.
135 Arnold 1989 219-24. The occasionally rigorous systemic approach of Arnold towards pottery production which is based on contemprory ethnographic research, can only be applied to archaeological data with constraint. In Antiquity for example, it is dubious whether the construction of kilns involved a capital investment.
been limited in antiquity since most of the resources for building a kiln were locally available. The labour investment for constructing a kiln is illustrated by experimental research. Rostoker and Gebhard demonstrate that a relatively small group of about seven men, could make in about two years, all the terracotta rooftiles for the temple of Poseidon at Isthmia in Greece, which is dated to the first half of the 7th century BC. Within two years approximately 1,900 rooftiles were produced, including the eaves and ridge tiles. The modern potters who executed the experiment, constructed a kiln of 1.5 by 1.5 m. and 2 m. height, according to the specifications of ancient Greek pottery kilns that had been excavated. The weight of the kiln was about 4 tons which mainly consisted of sun-dried clay bricks and the raised oven floor. It was built by three men in about three weeks using local materials. This indicates that the labour investment for building a kiln was considerable but confined when compared with the total assignment which amounted to roughly two years. Nevertheless, the knowledge for constructing a massive kiln such as the one in the experiment as well as the labour investment, reflects workshop conditions whether it was a permanent or semi-permanent workshop. For a semi-permanent workshop that went from commission to commission, it implies that the investment for constructing a substantial kiln is related to the commission at hand. In central Italy these commissions are probably associated with large building complexes such as temples and monumental courtyard houses. In this context it is relevant to mention that Enei reports tiles of different manufacture in small rural buildings around Caere. This may indicate that tiles for smaller rural sites were not made on commission.

I have referred to the debate on itinerant versus sedentary craftsmen in Chapter I, but it is appropriate to examine this fundamental issue again in relation to the production of ceramics and the associated kiln structures. The debate is essential since it is closely related to a reconstruction of the urbanisation process in central Italy. As mentioned before, craftsmen who employed a potter's wheel are likely to have been sedentary. Another group of ceramics in demand from about 650 BC, are ceramic building materials. Due to the size of these ceramics as well as the quantity involved, it is unlikely that bulk transport over large distances occurred. In addition, the manufacture of terracotta building materials is seldom a household activity. Although the production technology is simple, the firing requires kilns of sufficient size to contain these ceramics. The dimensions as well as the weight of the tiles dictates the proximity of a market in order to reduce transportation costs. Nevertheless, since the equipment for the production of tiles is simple, the workmen are more mobile than potters. Teams of workers are known to have travelled to suitable markets and rural building sites. Thus, primary evidence from a rural context are necessary in order to

136 Rostoker and Gebhard 1981.

137 Many kilns in Antiquity were not as elaborate as the kiln that was reconstructed by Rostoker and Gebhard and accordingly the investment for construction would be even less. However, most of the 6th century BC kilns that are documented in central Italy and which are presented in section 2.6, correspond with the kiln of the Isthmia experiment.

138 The labour investment for constructing a kiln denotes semi-permanent conditions. The dimensions of these kilns is partly related to the size of the tiles in central Italy during the period that is examined. The firing of these large tiles would require substantial kiln structures as will be demonstrated in section 2.6. Moreover, a kiln is merely one of the edifices they had to construct, in order to meet workshop arrangements for the manufacture of considerable amounts of architectural terracottas. Therefore, I consider that a group of artisans who worked on commission, would stay at least several months at a building site, sometimes even more than a year. This indicates that they were semi-permanent.

139 Enei 1993, 35. The small buildings are dated to the 7th and 6th centuries BC.

140 The measurements of tegulae are about 63 by 46 cm and of imbrices 60 by 10 cm though these measurements may vary considerably. Wikander has published a detailed list with the measurements of tegulae at various sites in central Italy: Wikander, Ö., 1993 b. The exceptional size of the ancient tiles makes it difficult to apply the ethnographic data on the production of building materials as analogy, especially when the output is considered: cf. Peacock 1982.

141 Hampe and Winter have reviewed modern pithos makers on Crete who travel from village to village in order to produce and market their vessels: Hampe and Winter 1962, 4-11. Another example is reported by Renfrew who implies travelling craftsmen on account of the use of identical incised cylinders on a hearth at Lerna and on pithoi at Tyrins and Zagouries: Renfrew 1972, 344.
analyse semi-permanent conditions. I was, however, unable to locate for central Italy during the period 800 to 400 BC, workshop remains that clearly relate to semi-permanent conditions basically on account of a scarcity of evidence from the countryside. All the workshops examined in the next section relate to settlement centres.

Fig. 18. Two early ovens from Sorgenti della Nova.

Primary evidence on pottery manufacture found in the countryside may either signify a semi-permanent workshop or a rural workshop. Edlund reports for Etruria and the Greek colonies, a limited number of workshops associated with rural sanctuaries or other building complexes. However she interprets the evidence as small industrial centres and not as semi-permanent workshops.\(^{142}\) The example of a rural workshop in Etruria is the Etruscan-Roman villa at Blera.\(^{143}\) This villa is associated with the production of tiles and architectural terracottas and the excavators suggest that the local manufacture started during the late Archaic period. The production continued for more than five centuries though most of the evidence is dated between the 4th and 2nd centuries BC. The findings at Blera do not represent a semi-permanent workshop but emerging estate production.\(^{144}\) The evidence implies a preoccupation with pottery manufacture by a prominent Etruscan-Roman family who owned the land as well as the villa.\(^{145}\) It, therefore, seems that the extant workshop remains from a rural context do not date from before the late Archaic period and that they do not represent semi-permanent conditions.

The debate on itinerant versus sedentary craftsmen will be discussed elsewhere, primarily because the itinerant artisan is dominant in the archaeological literature. At this stage I would like to continue with the development of the firing technology.

The pyrotechnological development in central Italy is not merely reflected by kiln structures for the production of ceramics but the advance of firing technology is also indicated by cooking facilities or metallurgical activities. Early

\(^{142}\) Edlund 1983.

\(^{143}\) Berggren and Andrén 1969; Edlund 1983.


\(^{145}\) Berggren and Andrén 1969.
evidence of an attempt to control firing conditions during cooking, are the forni excavated at Sorgenti della Nova (Fig. 18). This site is occupied during the period late Bronze to early Iron Age while most finds are dated to the 11th and 10th centuries BC. Two ovens were found, one of which has a diameter of slightly more than 100 cm. and a height of 60 cm. As is illustrated in Figure 18, they are both dome shaped and have an outlet for smoke near the highest point. The excavators report that the ovens were probably used for preparing food in direct or indirect contact with fuel. The opening in the front could have been used for putting in fuel as well as food. It is likely that these and similar ovens in central Italy, are related to the preparation of food. They demonstrate a conscious effort at controlling firing conditions and temperature because ovens have the advantage of insulating the firing process.146

A deliberate attempt to control firing conditions before 800 BC, is implied by Bietti Sestieri for the manufacture of large ceramic storage jars during the Latial period II (900 to 770 BC). Although she mentions that in this period most of the smaller vessels were fired in an open fire, it is suggested that the large storage jars may have been fired in a kiln because they normally have a homogeneous red or light red colour.147 Furthermore, regulation of the firing conditions is demonstrated by some pottery dated to the second quarter of the 8th century BC. In some tombs in central Italy, it is reported that sets of identical impasto bowls fired in different conditions, accompanied the deceased. Some of the bowls have been fired in oxidising conditions resulting in a reddish colour while others were fired in reducing conditions which turned them into a dark colour.148 These cases illustrate an advance in the control of firing conditions before the arrival of the Levantines or Greeks on the mainland of Italy. This may signal the existence of household industries for specific wares during the late 9th and early 8th centuries BC. Unfortunately, this hypothesis is not supported by factual evidence of simple updraught kilns. Two early kiln structures dated to the 8th century BC are known from Rome and Lavinium but these are interpreted by the excavators as structures for open fires because the raised oven floor was not found.149 These provisions for firing from Rome and Lavinium are, however, permanent structures and 'they represent an intermediate stage between open firings and true kilns'.150 Therefore they indicate conditions of household industries.

Updraught kilns of type I are described in the next section in contexts dated from the 7th century BC but as is indicated above, they can be expected to have existed in central Italy during the 8th century BC. A similar account can be given for kilns of type II. They are reported in 6th century BC settlements but due to the early tiles dated to the second half of the 7th century BC, kilns of type II probably were constructed in central Italy from the Orientalising Period.151

146 Negroni Catacchio, 1982, 12-3, 49-50, 99. Negroni Catacchio presents ovens and early pottery kilns: Negroni Catacchio 1995, 275-83. The pottery production at Sorgenti della Nova is marked by the employment of a range of clays. Geochemical analyses denote that quite a few clay deposits were utilised. Moreover, it is reported that the potters were not very specialized: Negroni Catacchio 1982, 53. Bonghi Jovino and Treré mention an oven structure from a layer that is dated to the 10th to 8th centuries BC at Tarquinia. They consider this structure to be similar to the ovens from Sorgenti della Nova: Bonghi Jovino and Treré 1987, 61. An interesting oven is reported from the important, archaic villa dell’Auditorium: Terrenato et alii forthcoming. This oven had about the same dimensions as the other ovens reported by Negroni Catacchio: Negroni Catacchio 1995, 275-83. Its construction is however different since it was built from pieces of tuff assembled with clay. The excavators of the villa dell’Auditorium imply that the oven might have been used either to prepare food or to fire pottery. On account of the similarities with oven structures that are reported by Negroni Catacchio, and the function of the room next to the oven, I consider it to be related with the preparation of food. The firing of pottery would have required a structure with internal technical features and these are not reported by the excavators of the villa dell’Auditorium. See also Guidi et alii on the ovens from Cures Sabini: Guidi et alii 1996.

147 Guidi 1984, 72; Bietti Sestieri and De Santis 1987, 43.

149 Carafa for the structure in Rome and Fenelli for the remains at Lavinium: Carafa 1995, 255; Fenelli 1984, 341-4. However, the form and plastering of the structure at Lavinium is indicative for an updraught kiln: see section 2.6.2.

150 Rye 1981, 98.

151 Although tiles can be fired in round kilns, it is generally assumed that the rectangular shape of a kiln does accommodate the tiles better while stacking. Especially for the large sized tiles in Antiquity, the square or rectangular kiln has to be considered as the most appropriate type. See for words of caution: Cuomo di Caprio 1979, 91.
2.6 Archaeological evidence

The discussion of the archaeological evidence is primarily based on sites where actual production units are discovered. The information presented in this section is related to settlements where kilns and other workshop remains were excavated. I have selected those sites where the evidence is relatively intact which means with a context presenting features that allow for a reconstruction of the character of the pottery production.152

Of all the workshop structures, kilns are most likely to have been preserved though almost never intact. Related evidence such as the raised oven floor, the firing chamber, the covering, fuel or wasters may not have been preserved. The presence of a kiln at a site does not necessarily indicate the existence of a workshop. It could also imply household industries or semi-permanent workshops. As is indicated above, a workshop producing mainly bricks, tiles or storage jars could travel from site to site. In order to interpret a kiln at a site, supplementary findings are incorporated such as additional industrial remains, information that indicates the range of locally manufactured vessels and the features of the settlement itself. Occasionally, I reinterpret the data that were published on the industrial structures.

2.6.1 Satricum

During the 7th and 6th centuries BC the proto-historical site of Satricum functioned within a system of large, late Iron Age and Archaic centres, of which Ardea, Lavinium and Ficana can be mentioned. The ancient settlement at Satricum was located at the present-day Borgo Le Ferriere near the Pontine plain, on the easternmost border of Latium Vetus. It is situated approximately 60 km south-east of Rome. The settlement originated on a number of tuff plateaux in the lower basin of the river Astura. The Astura, the most important river in Latium south of the Tiber, connects Satricum with the sea.

The oldest kiln at Satricum, capital A in Figure 19, was built in the 7th century BC on the outskirts of the acropolis in square C27.153 Of this kiln, only part of the combustion chamber was preserved. It is circular with an attached praefurnium (Fig. 20).154 It belongs to the first category in the classification of Cuomo di Caprio.155 The kiln was made by digging a pit into virgin soil in which the support of the raised oven floor was placed. This support was made of local tuff blocks of which many large, burned fragments were found inside the combustion chamber. It is possible that the raised oven floor was also made of tuff slabs. No furnace lining was found while the construction appears elementary. Due to the firing of the virgin soil, the dimensions of the combustion chamber and praefurnium could be measured as 140 cm wide and 165 cm long while the height was preserved for about 30 cm.

Between the tuff and grumi of the kiln, pottery was found that had been exposed to a firing temperature which was too high for the fabric. The excavated pottery included bowls, jars and cooking stands, many of which were decorated with plastic cord decoration (Fig. 21).156 The fabric of the pottery inside the kiln was consistent in colour, clay matrix and tempering material. This uniformity encouraged an investigation into the provenance of the clay and

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152 This section is, therefore, not a compilation of all the sites in central Italy where kilns are reported.
153 The kiln and its contents are dated to the late 7th century BC. This was confirmed by the pottery that was associated with wasters which were recovered from a trench that was excavated nearby the kiln, on the slope of the acropolis. About 400 fragments of wasters were recorded most of which were fairly thin, between 3 and 8 mm. The thickness indicates the production of fine table wares. The wasters were shapeless and their forms could not be identified though an Etrusco-Corinthian bowl was found among the associated pottery.
154 The praefurnium is the flue leading from the stokepit to the combustion chamber.
156 Parallels of similar pottery was excavated elsewhere, for example, at Lavinium: Castagnoli et alii 1975, 14-9.
the tempering material. One of the local clays derives from the marine terraces. These terraces arose from changes in the sea level during the Early Holocene to Wurmian Age.\textsuperscript{157} The marine terrace at Le Ferriere contains quartz, sub-rounded fragments of flint and to some extent local volcanic minerals. These minerals are mixed with the clay in varying quantities. Samples of a marine clay deposit were fired and thin-sectioned. These were subsequently compared with sections made from the pottery samples from the kiln. The thin-sections from the clay deposit and the pottery from kiln A are similar especially when one considers the possible processing techniques of the clays in antiquity. For example, a thin-section of the fired clay deposit contains about 30\% quartz, 1-2\% plagioclase, 2-3\% chert and some biotite while a thin-section of an impasto bowl found inside the kiln, contained the above plus grog and volcanic rock fragments indicating that the paste for the ceramics was mixed with other non-plastic inclusions. The processing of the clay with crushed volcanic rock fragment accounts for the presence in the fabric of the bowl of augite, volcanic glass fragments and some garnet.\textsuperscript{158}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{map.png}
\caption{Map of Satricum; A, B and C indicate the location of the pottery kilns.}
\end{figure}

\textsuperscript{157} Sevink \textit{et alii} 1984, 104.

\textsuperscript{158} Making statements about the provenance of pottery by relating local clays with excavated pottery is precarious since similar clays occur elsewhere in Latium Vetus. Nevertheless, in view of the presence at Satricum of kilns, wasters, suitable clays and identical mineral compositions of both clay deposits/tempering materials and pottery, it must be concluded that local resources were employed for the native pottery production.
After establishing from the kiln remains, the character of the pottery produced at *Satricum* during the late 7th century BC, similar pottery found at the settlement can be investigated. Among this there were many *impasto* sherds from the huts excavated in the last century. Our excavation has yielded for example, sherds of a *holmos* from a destruction layer of a 7th century BC timber building. The fabric of this *holmos* resembles the fabric of the pottery found in the kiln. The quartz and tempering material of the *holmos* is smaller in size but this could be due to the processing of the paste. The similarities in colour, clay matrix and minerals between the pottery from the kiln and the *holmos* make it likely that the stand was produced at the site. Thus, it is probable that in addition to the coarse wares found in the kiln, more advanced products such as the *holmos*, were produced locally.

There is no evidence for the use of a fast potters' wheel at the site at this stage. The fabrics which can be associated with local production are *impasto* fabrics which are difficult to model on a fast wheel. On account of the primitive kiln construction and the character of the pottery produced, the mode of production at *Satricum* should be interpreted as a household industry. This does not exclude a continuing household production of some of the wares for preparing food. However other ceramics at the site reflect the progressive features of this industry. Beijer has demonstrated that the local pottery was partly made with advanced modelling techniques. The thin walled

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159 Beijer 1991 a.
amphorae, for example, are made of a fine-grained impasto on a wheel from the early 7th century BC. The wasters found nearby the kiln were mostly fairly thin and might actually testify the manufacture of fine impasto table wares. Vessel types associated with this industry are carefully made kantharoi, anforiskoi and bowls. The pottery was decorated and burnished to lustre. It was manufactured both for the local market as well as for exchange with other sites in Latium Vetus. Thus, the local ceramic products of the 7th century BC demonstrate an increase in specialisation but infrequently an increase in efficiency which would indicate appropriate workshop conditions.

Fig. 21. Satricum, pottery that was found in kiln A.

One topic of the early specialised pottery production at Satricum remains to be discussed and that is the attribution by Gran-Aymerich of a bucchero workshop to the site (Fig. 10). Local bucchero manufacture is supported by the existence of potters who produced fine impasto table wares. These wares can be partly correlated to similar bucchero vessels at the site, especially the bucchero amphorae. Fifteen of these amphorae, dated to second half of the 7th century BC, were found in votive deposit I. These amphorae were also produced in fine, dark impasto and the impasto amphorae are well represented in the tombs. These amphorae are dated earlier but some are contemporaneous with the bucchero amphorae which suggests a transition around 640-630 BC. At Satricum, the settlement, necropolis and the cult place were partially excavated which makes it possible to analyse the distribution of the three main wares, that is impasto, depurated and bucchero wares in these different contexts. The

160 Beijer 1991 b. Beijer considers that the fine-grained impasto is modelled on a tornio veloce: Beijer 1991 b, 84. In my opinion this remains a suggestion which requires further analysis. The labour-intensive decoration and surface treatment of these vessels are conflicting with the use of a potters' wheel and workshop conditions.

161 Bouma et alii 1995, Fig. 3, 189.
distribution illustrates that *bucchero* fragments remain an exceptional find in the habitation context (3%) while it occurs regularly in the tombs and cultplace, respectively 15% and 34%. The hypothetical local *bucchero* production would have continued for about a century and amounts to hundreds of vessels but not thousands. If *bucchero* was produced at *Satricum* than it must have been in combination with the production of other wares as suggested by the wasters from the kiln excavated at S. Pietro a Sieve.\(^{162}\) The production of *bucchero* at the site was a subsidiary activity, not full-time. This pattern is likely to have continued in later periods. During the 5th and 4th century BC, *amphoriskoi* were made of what has been labelled alternatively greyish *bucchero*, *impasto buccheroide, bucchero malcotta* or imitation *bucchero*.\(^{163}\) The later *amphoriskoi* are no longer associated with the *impasto* tradition but with the depurated wares.\(^{164}\) It is, therefore, likely that they were produced locally during the 5th century BC in combination with levigated wares.

\[^{162}\text{See section 2.1.}\]


\[^{164}\text{Refiring experiments in oxidising conditions with *bucchero* from *Satricum* demonstrated that the late 7th, early 6th centuries BC *bucchero* fired into a red fabric containing much quartz. This fabric resembles in physical properties the clay from the marine terraces; *Bucchero* from the 5th century BC obtained a pale colour after refiring and a consistency similar to the *figulina* pottery from *Satricum*.}\]
The second kiln at Satricum was of a more advanced type, capital B in Figure 19. It has a rectangular shape and dates to the late 6th century BC. The kiln was found along the edge on the south side of the acropolis and is about 3.7 m long, 2.7 m wide and its height was preserved up to 55 cm (Figs. 22 and 23). The combustion chamber with praefurnium was preserved. It is classified as kiln type II. Similar kilns of the same date are found in Laurentina-Acqua Acetosa166 and in Southern Italy167. However, none of the kilns of type II are dated before the 6th century BC. The combustion chamber was filled with debris from the kiln structure, pottery and wasters. The blocks of tuff which formed the substructure of the kiln were dug into a layer which contained 7th century BC wares. The remains of the structural features of the kiln were identified as fragments from arches and brick-like material all of which are tempered with organic matter such as grasses. I excavated more than 100 kg of the brick-like material. The bricks were probably used for building the arches and the upper structure of the kiln.

Fig. 23. Satricum, settlement features which can be related to kiln B.

The pottery inside the kiln consisted of wasters of storage jars, plain jars, bowls and tegulae (Figs. 24 and 25). The fabrics of the wasters include pale and red firing ceramics. Among the pale Archaic tiles there are several

165 In the typology of Cuomo di Caprio, the second kiln at Satricum is a kiln type IIc for it has two parallel main corridors and probably arches supporting the raised oven floor: Cuomo di Caprio 1979, 75-80.

166 Bedini 1981, 254-7; 1990 a, 173. See section 2.6.3.

167 Cuomo di Caprio 1979, 83-6.
examples decorated with a black oblique stripe (Fig. 25). It was evident from the wasters that both pale and red firing pastes were used in the ceramic industry at Satricum during the late 6th century BC. The fabric and mineral-content of the pale Archaic tiles and pottery was similar to the fabric and mineral-content of the temple decoration dated around 500 BC. It is, however, noteworthy that the decorated pale Archaic tiles found in the substructure of the kiln, are not reported for the late Archaic temple. This demonstrates that tiles were produced in this kiln which except for the fabric, cannot be directly related to the construction of the temple.

Fig. 24. Satricum, pottery that was found in kiln B.

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168 A parallel though with red lines was found on the Forum Boarium in Rome: Gjerstad 1960, fig. 272. The substructure of the second kiln at Satricum contained both well-fired tegulae and wasters on which the black decoration flows over the surface of the roof tile (Fig. 25).

169 For a review of 6th century architectural terracottas from the temple see: Knoop 1987.
The paste for moulding the pale Archaic tiles was probably made from a primary clay, a clayey tuffite, which occurs at several places in and around Satricum.\textsuperscript{170} The associated minerals of the tuffs and clayey tuffites are quartz, biotite, augite, olivine, rock fragments, leucite, volcanic glass and occasionally chert and garnet. These minerals were found to be the same as identified in the thin-sections of the temple decoration.\textsuperscript{171} Several clayey tuffites in and around the site were augered. None of these produced a pale colour when fired though a buff fabric was obtained. The missing pale firing clay may be due to deficient prospecting of the clayey deposits around Satricum or the pale colour may result from specific processing techniques used in antiquity. Evidence from the clay survey demonstrates that potters who worked at Satricum, could and obviously did utilise the various clays and tempers which were locally available. The main sources are the marine terraces and the clayey tuffites. It is concluded that the bulk of the architectural terracottas and pottery excavated at the site, was produced from local clays and temper. The differences noted, for example in the various decoration schemes of the temple, are likely to be due to different processing techniques of the clays, altered firing conditions or to the use of different clay deposits in the area, as the minerals found in the terracottas occur locally. Some scholars ascribe the provenance of the various fabrics of the temple decoration to areas either north of Rome, Campania or the Alban Hills.\textsuperscript{172} This view is not supported because local resources are not considered by these authors. It seems highly unlikely that in the 6th century BC the materials used for the terracotta decorations of the temples, were imported from other regions while the tuff blocks used for the construction of the same temples were quarried nearby.\textsuperscript{173} Nor does the amount of clay necessary for the building activities at Satricum support a distant provenance. Sixteen to seventeen tons of clay were needed for covering the first temple with the required 1,400 tiles.\textsuperscript{174} This figure does not include the imbrices nor the architectural decoration of the temple. The architectural terracottas, that is the rooftiles from the oikoi and courtyard buildings are not incorporated in this figure. Within 50 years the second temple was constructed at Satricum and because of its magnitude would have required substantially more architectural terracottas than temple I. The erection of temple II is correlated with a reconstruction of the acropolis necessitating further output from a workshop.\textsuperscript{175} Moreover, the debris in the second kiln from Satricum demonstrated that the local workshop did not just produce architectural terracottas but also vessels such as basins, jars and storage jars that were partially made from the same paste as the architectural terracottas. This contradicts the assumption by Torelli who considers that by the late Archaic period, the manufacture of ceramic building materials became distinct from the production of ceramics.\textsuperscript{176}

The correlation between the ceramics found in kiln B with pottery from the settlement is weak because there are few sealed deposits that can be dated to the late Archaic period.\textsuperscript{177} Therefore a concluding remark about the mode of

\textsuperscript{170} For a geological map of the area around the site see: Maaskant-Kleibrink 1987, 17-22. The deposits of reworked pleistocene tuffs which are indicated on her map VIII on page 18, might have been employed by the potter or coroplast. I refer also to the formations \textit{tg} on the Carta Geologica del Servizio Geologico d’Italia, 1:100.000, foglio 158, Latina. These reworked tuffs could unfortunately not be sampled. Arnoldus-Huyzendveld recalls some deposits of whitish clayey tuffites along the Astura: personal communication. These deposits might have been suitable for the production of pale archaic and \textit{figulina} wares. See also section 2.2.

\textsuperscript{171} Kars \textit{et alii} 1987, 60; McDonnell and Kars 1990.

\textsuperscript{172} Kars \textit{et alii} 1987, 62-3; Knoop 1987, 227-31.

\textsuperscript{173} Arnoldus-Huyzendveld 1981; Maaskant-Kleibrink 1987, 19.

\textsuperscript{174} Rendelli 1990, 139.

\textsuperscript{175} Maaskant-Kleibrink 1992, 108-46.

\textsuperscript{176} Torelli 1983.

\textsuperscript{177} Sealed archaeological deposits are tombs, votive deposits and layers within a stratigraphy. There are no tombs from the archaic period as there are hardly any tombs from this period anywhere in Latium Vetus. The \textit{impasto} pottery from the oldest votive deposit which is dated from the 8th to the 6th centuries BC has been hardly published while deposit II dates from the beginning of the 5th to the late 3rd centuries BC. The late Archaic settlement neither retained much pottery because the foundation walls of the 6th century BC buildings were covered with a thin
production during the 6th century BC must remain general. The amount of building activity at Satricum during the second half of the 6th century BC would have enhanced craft specialisation by increasing the demand for architectural terracottas. Tiles for covering various small buildings, the oikoi and sacellum, were made at the site from around 600 BC. The fabric of the red tiles is similar to the fabric of the coarser impasto vessels at the site and are, therefore, correlated to the local pottery industry. Starting from the advanced household industry formulated for the 7th century BC, this industry continued during much of the 6th century BC though the range of impasto pottery types was significantly smaller and there was less variation than in the previous period. The ceramic vessels are of simple shape and hold significant amounts of non-plastics. They were modelled on a turntable or wheel though not on a fast wheel for the paste contained many non-plastics and was, therefore, unsuitable for an accelerated rotation. Increased efficiency of the pottery production prevented the manufacture of the labour intensive vessels which were recorded in the previous century. The limited repertoire of the impasto from the 6th century BC, mainly jars, storage jars, bowls and teglie, is transcribed to pale Archaic wares. This characteristic indicates the affinity between the modes of production for both wares. On account of the confined range of the ceramic repertoire and the correlated standardisation of the vessels produced, it is likely that simple household production ceased. The increase in specialisation of the pottery craft at Satricum is associated with the manufacture of ceramic building materials and materialised in the construction of kiln B and its associated buildings.

The presence at the site of a semi-permanent workshop commissioned to decorate Temple I, is probable because so far, the fabric of the architectural terracottas ascribed to this temple, are not attested for other ceramic artefacts in the settlement. This fabric appears to have been used merely for the construction of Temple I which implies the involvement of a semi-permanent workshop. The craftsmen associated with this workshop, would have functioned within a workshop context and remained at the site for a considerable time. It is likely that during their stay at the settlement, there was some exchange of knowledge with the local potters in terms of kiln constructions, raw materials, firing conditions and modelling techniques. These local craftsmen could have applied this information to the manufacture of terracottas and rooftiles needed for the other buildings on the acropolis which were constructed during the second half of the 6th century BC. It is remarkable that after the construction of temple I, the rooftiles at Satricum were frequently made of a pale impasto. In addition, I consider that a non-resident artisan was involved in the construction of kiln B because the fabric of the furnace lining is specific and is not attested for other ceramics at the site. The paste of this lining was deliberately tempered with organics of about a 7th century BC context.

178 A similar account is given by Wikander who points to the close relation between the production of plain tiles and pottery: Wikander, Ö., 1993 a, 137-9.

179 For a report on the archaic pottery see: Maaskant-Kleibrink 1987, 114-7. At Rome the increase in coarse wares during the 6th century BC has been reported by Carafa. The range of coarse wares is limited and is restricted to jars, bowls, lids, basins and a few plates: Carafa 1995, 126-225.

180 See for example, Carafa for a comparison between the 6th century BC pottery that was made in coarse wares and the impasto chiaro sabbioso: Carafa 1995. For Satricum I refer to: Maaskant-Kleibrink 1987, 114-9.


182 I refer to Rendelli for a calculation of the ceramics that were required for the construction of Temple I: Rendelli 1990, 139. The experiment at Isthmia, Greece, provides an illustration of the commission at hand: see section 2.5.

183 Another option would be that some of the craftsmen that were associated with the semi-permanent workshop, remained at Satricum in order to construct the other buildings.

0.5 to 1 cm length, in order to obtain a porosity which insures an appropriate thermal shock resistance and insulation characteristics.\textsuperscript{185}

![Fig. 25. Satricum, pale archaic decorated tiles that were retrieved from kiln B.](image)

Temple II at Satricum was constructed around 500 BC probably also with the assistance of an itinerant workshop.\textsuperscript{186} However the paste for the terracottas of this temple has been employed at the site for the manufacture of a range of other ceramic artefacts notably dolia and teglie. From the content of the combustion chamber of the second kiln it is deduced that in addition to the pale Archaic wares, red-firing ceramics were made.\textsuperscript{187} It appears that a distinction between semi-permanent and resident conditions becomes extremely ambiguous in relation to kiln B. The workshop associated with this kiln, produced a wide variety of ceramics. The kiln itself reflects proper workshop conditions while the wasters of the pale Archaic tiles are related only by their fabric to the temple terracottas and not in decoration. Workshop conditions are further indicated by the permanent character of the surviving associated structures. The corner of a building is at exactly 90° to the kiln and a well and drainage system were excavated nearby (Fig. 23). The market for the products of this ceramic workshop was chiefly local and the

\textsuperscript{185} See section 2.3.

\textsuperscript{186} Lulof 1996, 204-8.

\textsuperscript{187} Maaskant-Kleibrink notices that type II of the tegulae is frequently made of a light impasto but that red impasto tiles occur as well during the second half of the 6th century BC: Maaskant-Kleibrink 1987, 117. Wikander even suggests for Acquarossa, the existence of a roof with rows of white imbrices contrasting with red tegulae: Wikander, O., 1993 a, 154.
demand was primarily dictated by the building activities at *Satricum*.188

The third production site at the settlement was located about one kilometre to the west of the acropolis, near the *agger* and to the south of the road to Nettuno, capital C on Figure 19. The actual kiln was excavated during the last century and contained votive terracottas dated to the 4th century BC. These votives include a head, an *uterus* and a foot (Fig. 26).189 A mould for forming a foot was discovered as well. Two areas with concentrations of kiln material were recently surveyed which indicates that there could have been at least two kilns at this location. The pottery and blocks of tuff found during the survey, suggest that this area was inhabited. The survey material included substantial fragments of a raised oven floor which shows that at least one of the kilns was massive and that the kiln had separate combustion and firing chambers. The survey also yielded wasters of tiles, imbrices and other pottery of the 5th and 4th centuries BC. Therefore this workshop was involved in the production of votive terracottas as well as domestic pottery and rooftiles. Thin-sections of the ceramics found in this area, contain a variety of minerals which occur locally. The clay matrix of ceramics from the pottery corresponds with the clay of the marine terraces, a deposit of which was identified adjacent to the kilns.190 The workshop was situated next to a suitable clay deposit as well as along a major road. This location would have facilitated exchange especially with devotees who arrived at the site to participate in the religious rituals.

![Fig. 26. Satricum, mould and votive terracottas that were found in and near kiln C.](image)

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188 The various structures at the site as well as the restructuring of the buildings on the temple hill at *Satricum* around 500 BC is described by: Maaskant-Kleibrink 1992, 108-46.

189 Della Seta 1918, 320; Castagnoli 1963, 515; Bouma 1996, 418.

190 For a detailed report on this location and the survey see: Nijboer et alì 1995.
The artefacts found during the survey constitute so far the only published evidence for domestic houses and pottery production during the post-Archaic period.\(^{191}\) No buildings on the plateaux are excavated which can be positively dated to this period while the existence of necropleis on two of the plateaux does not make extensive habitation likely. Nevertheless, the pottery production can be correlated with the two small necropleis dated to this period, the large votive deposit II on the temple hill and two other votive deposits at the site. The close relationship between the area surveyed and votive deposit II is substantiated by the similarities amongst the pottery in ordinary wares from both contexts. The resemblance is displayed both in morphology, that is vessels and types as well as in technology, which is shown by colour, texture and surface treatment.\(^{192}\) On account of the contextual and stratigraphical evidence from deposit II and parallels from other sites in central Italy, most of the ordinary ware in the surveyed area can be dated to the late 5th and 4th centuries BC with a limited number of items dating to the full 5th century BC. From the contents of votive deposit II it was calculated that the demand for pottery by those who offered at the sanctuary, was significant. The workshop could have produced 300 to 400 ceramic artefacts a year over a period of almost two centuries, just to supply the pilgrims with the pottery needed for their ceramic offerings. The standardisation obtained and the fabrics of the jars offered which included depurated wares and \textit{figulina} modelled on a potter’s wheel, do not indicate household industry but workshop conditions.\(^{193}\) The plain vessels predominate during this period and their execution does not imply a high degree of specialisation. The repertoire of the workshop was directed towards productivity and commodities with practical value. During the 6th and 5th centuries BC, production had been increased at the expense of labour intensive decoration techniques and surface treatments. The potters who lived here, made and exchanged pottery and votive offerings for pilgrims as well as ceramics required for the households at \textit{Satricum} and for the funeral rites. Its location would have facilitated exchange which was probably conducted at the workshop. As such the potters were of importance for the continuity of activities at the site. It is not possible to decide whether they were full-time employed or combined the production of pottery with agriculture.\(^{194}\) A part-time occupation appears likely because the traces of the settlement pattern are dispersed and scarce for the 5th and 4th centuries BC.\(^{195}\) The limited size of the settlement does not reflect urban conditions and this makes it unlikely that there was more than one workshop. This workshop produced a range of fabrics and wares while employing various modelling techniques.

The evidence for the ceramic industry at \textit{Satricum} has presented three production sites which indicates continuity but each reflects different circumstances.\(^{196}\) The interpretation of these circumstances remains occasionally ambiguous because the site did not develop progressively into an urban centre. The pottery production of the 7th to the late 6th centuries BC is difficult to classify as either household industry or workshop activity. It has characteristics which can accommodate the definitions of both modes of production presented at the beginning of this chapter. The economic development of the settlement is truncated. During the 7th century BC goods from all over the Mediterranean changed hands at \textit{Satricum} in what can be described as a centre of trade. This created an intensification of the pottery craft since fine \textit{impasto} vessels and possibly even \textit{bucchero} started to be produced locally. However at this stage the production was labour intensive and not related to the efficiency characteristic of

\(^{191}\) In recent years the Department of Archaeology of the University of Amsterdam has excavated settlement traces on and around the acropolis of \textit{Satricum} but these data have not yet been published.

\(^{192}\) Nijboer \textit{et alii} 1995, 10-4.

\(^{193}\) Bouma provides a detailed description of wares and typology of the ceramics in votive deposit II: Bouma 1996, 305-419.

\(^{194}\) Seasons which are less used for agricultural work are the most suitable for pottery production: \textit{cf.} Arafat and Morgan 1989, 315, 328.

\(^{195}\) I refer to Bouma and Kleibrink for a reconstruction of the site during the 5th and later centuries: Bouma 1996; Kleibrink 1997. See also section 1.7.

\(^{196}\) An analysis of the local ceramic industry is based on the certainty that at least 90\% of all the ceramics which were excavated, are locally produced from resources nearby: \textit{cf.} Bouma \textit{et alii} 1995, 189-92.
the workshop mode of production. During the 6th and 5th centuries BC, the economy of Satricum was reduced from interregional/regional to local importance. In this period, the pottery production received two important impulses which increased demand. Workshop conditions were established by the building activities and later the production of votive offerings. In addition, coroplast masters, possibly accompanied by some assistants, were requested for the construction of the 6th century temples. They were probably responsible for the execution and design of the temple. It does not seem plausible that the whole workforce needed for constructing the temples and other buildings at Satricum travelled from place to place. Most of the labour must have been executed by local workforce probably assisted and instructed by coroplast masters for decorating the temples. Satricum had lost much of its significance as a regional centre by the 5th century BC. The archaeological evidence so far available, suggest that its raison d'être in the following period revolved around the religious institutions. The activities around the sanctuaries generated the conditions for continuing workshop conditions. However the quality of the output became increasingly basic and this must have contributed to the marginalisation of the potters’ craft at the site.

2.6.2 Lavinium

Lavinium is located about 30 km south of Rome on a vast plateau, 80 to 90 m above sea level and about 4 km from the Tyrrenhean coast. The town was separated from the coastal dunes by marshy lowland and had a good natural harbour at the mouth of the Fossa di Pratica known in antiquity as the Numicus.\(^{197}\) In this study Lavinium is the second example of a settlement where a continuity in pottery production can be demonstrated by the kilns and

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\(^{197}\) Guaitoli 1990, 182; Sommella 1974, 291-2.
related structures. All in all six kilns were excavated at the site. They date from the 8th to the 3rd centuries BC (Fig. 27). The four kilns discovered in the urban area and indicated by the capital A in Figure 27, are discussed first. These kilns and the associated structures are illustrated in Figure 28. The excavators suggest that the oldest kiln of this complex is dated to the 8th century BC and does not yet have a separation of firing and combustion chamber. The pottery is fired in direct contact with the flames. It was dug into the soil and stratigraphically situated under the huts. The kiln was circular in shape and the furnace lining contained much organic material. The pottery and bone material associated with this feature, cannot be related to firing of pottery because it occurs in or near the kiln due to the collapse of the layers which were originally on top of it. The majority of the pottery was thus dated to the 7th while some sherds could be dated to the 8th century BC. The presence of local earthenware with clear colours suggests that during the 8th and 7th centuries BC more advanced kilns were built at Lavinium. According to Fenelli, most of the kilns at Lavinium accumulated material from later periods and thus are difficult to date precisely. The kiln which is dated to the 4th century BC in Figure 28, is associated with some wasters, furnace lining and a considerable quantity of pottery which can be dated to the 5th and 4th centuries BC. This material is homogenous in fabric and is characterised as coarse *impasto* modelled on a turntable or wheel. It included household vessels such as lids, plates and jars. The two kilns dated to the 3rd century BC might to some extent have been employed for firing votive objects. Except for coarse *impasto* wares, it is hard to relate the pottery kilns from this section of the town to a range of ceramic artefacts which were actually fired here. Wasters and related ceramics have not been reported.

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198 The separate kilns and structures are reported in various articles: Fenelli 1984, 341-4; Enea 1981, 170; Giuliani and Somella 1977, 370.

199 Figure 28 is based on Fenellis' 1984 article. She presented this section of the ancient town in an illustration which included numerous dams of the excavation grid. For clarity, our draughtsman Huib Waterbolk and I made a reconstruction drawing without indications of the excavation grid. We present walls as a singular feature which were previously bisected by dams in Fenellis' illustration. This reconstruction is presented in Figure 28.

200 Fig. 27 is based on Fig. 15 in the 1984 article by Fenelli. She presents the contours of the 8th century kiln as a keyhole type, that is kiln type I in the typology by Cuomo di Caprio: see section 2.5. Moreover, this kiln was plastered with furnace lining. A rudimentary kiln as suggested by the excavator is less likely to have the shape of kiln type I nor to have been plastered. Since details on the context of this kiln and its excavation have not been published it remains ambivalent whether this kiln is as primitive as suggested by the author.

201 Prof. dr. M. Guaitoli and dr. M. Fenelli were so kind to allow me to look at the material which is associated with the kilns and other structures, in March 1995.

202 Fenelli 1984, 342. About 12 boxes were inspected which were labelled *Settore S101 III*, *Svuotamente della fornace allargamento dell'elemento circolare sotto le tegole*. The majority of the boxes contained jars, lids and plates. It was characterized as *impasto grezzo tornito*. The jars had an outcurving rim and a strongly profiled, overhanging and undercut lip.

203 Fenelli 1984, 343.
The reconstruction drawing in Figure 28 makes it possible to associate these kilns with actual workshops remains. The well, water supply and basin have the same orientation as the walls and, therefore, may have been built simultaneously. Moreover, all kilns in Figure 28 have a similar alignment and are related to the direction of the building. The ground plan of the workshop structures in the urban section can be compared with the layout of the workshop remains near the XIII altars, just outside the town (Fig. 29). These are dated to the Archaic period and, in my opinion, the structural remains of the workshop inside the town should be dated accordingly.204

The well, water supply and basin in Figure 28 were excavated in the vicinity of kilns and are constructed for preparing clays. The basin which had a diameter of about 4m and which was approximately 1m deep was supplied by water through the well and drainage system. The material associated with the basin included some buff-coloured powdery, unfired clay which contained many coarse inclusions. I, therefore, agree with Fenelli that the basin was used for the levigation of clay which caused the coarse inclusions to settle first. The cistern was no longer in use by the mid 3rd century BC.205

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204 Fenelli presents the archaeological features as individual contexts without making structural correlations. Therefore she is much less specific about continuation of industrial activities in this section of the town and does not mention the possible existence of an Archaic workshop: Fenelli 1984.

205 Fenelli 1984, 343.
The kiln indicated by the letter B in Figure 27, is bisected by the city wall. It is reported that it contained pottery dated to the first half of the 6th century BC. This kiln was probably in use during the late 7th, early 6th centuries BC because it was dismantled during the erection of the fortifications. Further details of this kiln are not reported.

The last kiln complex of Lavinium to be presented here, is a double kiln which was excavated next to the XIII altars and an associated building (Fig. 29). Two construction phases were identified. The first phase dated around the middle of the 6th century BC, consists of a central room of 16 by 8 m and is indicated in dark grey in Figure 29. This building was probably used as living quarters but also as a store for votive objects and domestic pottery since a large quantity of bucchero and impasto vessels was found. More than 200 loom weights were excavated which might have had a more practical function other than as votive offerings. During the second phase, several chambers were added to the building. The complex was destroyed by fire around the middle of the 5th century BC. The extension of the Archaic building has been related to the pottery workshop which is attested by the kilns. The elongated rooms and the various independent entrances suggests they functioned as storerooms. The portico structure reflects the open areas which are a common feature of workshops in antiquity. The large quantity of

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206 Giuliani and Sommella 1977, 370. Fig. 9 in their article presents a plan of the remains of the kiln, the fortification wall and the SE gate.

207 Sommella 1974, 278.

household vessels which have been discovered near the building, indicates a secular purpose. This may be associated with the kilns and the workshop activities. However the identification of the building cannot be determined unequivocally because the nearby altars imply a religious connotation.210

The demand for ceramics at Lavinium was affected by the increase in the number of households through settlement nucleation during the 8th century BC and by the formation of an urban centre during the 6th century BC. In the late 7th and early 6th centuries BC the huts were replaced by buildings with stone foundations and tiles.211 Originally the tiles were made of a red firing fabric but during the second half of the 6th century BC they became slightly larger, moulded from a pale firing paste and decorated with red or brown stripes similar to the tiles fired in kiln B at Satricum. Besides being used for covering roof-constructions, tiles were used for pavements during the Archaic period.212 The buildings that have so far been excavated in the urban layout of Lavinium, are secular. They are either associated with production activities and located in the northern section of the urban area or with public functions and established in the central area. Unfortunately they are preserved fragmentarily which makes it almost impossible to hypothesise on the early building phases. During the 6th century BC Lavinium prospered to judge by the construction works.213 The urban area was furnished with tuff fortifications, gates, public buildings while several facilities such as wells, reservoirs and drainage systems, controlled the waterworks of the town. This was the period in which the many sanctuaries of Lavinium thrived. The urban centre became gradually less inhabited from the late 4th to the 3rd centuries BC. The decline of the urban centre during the 3rd century BC is marked by a contraction of the occupied area, the desertion of the workshop locations and the neglect of the extramural sanctuaries.214

The demand for pottery increased both by the religious offerings and by the construction activities which required substantial amounts of ceramic building materials. Lavinium was known to the Romans as civitas religiosa on account of its many religious institutions. According to tradition some of their most venerated cults such as Vesta and the Penates, originated in Lavinium. It was also home to the Aeneas legend. Two sanctuaries are connected to this legend: the Heroon with the XIII altars and the sanctuary near the mouth of the Numicus where Aeneas came ashore.215 At Lavinium, cult activities are reported from about 650 BC at the north-east sanctuary and a few decades later at the Minerva sanctuary. At the first sanctuary, 30,000 miniature vessels were deposited which date from the second half of the 7th to the beginning of the 6th centuries BC.216 Deposition of offerings at the sanctuary of the XIII altars starts around 570-560 BC. The bulk of the ceramics offered at the sanctuaries, was domestic. Vessels such as jars, lids, storage jars and teglie were excavated in large quantities. The pale coloured vessels produced from

209 cf. Zimmer 1990, 180-1; section 2.6.6. See also Fig. 9 in this study which presents some workshops in Antiquity, one of which has a portico.

210 Damgaard Andersen 1993, 77.

211 Guaitoli 1990, 185.

212 Fenelli 1984, 337.

213 Sommella 1974, 284; Fenelli and Guaitoli 1990.

214 Fenelli 1984, 344. The urban decline was a slow process which can be related to the wars between Rome and the Latin League, a loss of political power and a change of commercial routes which became redirected by the development of the ports of Pozzuoli and Ostia as well as by the construction of the Via Appia.

215 For a recent review of the various cult activities that are reported at Lavinium, I refer to: Bouma 1996 Volume III, 46-53, Appendix A, 158. The sanctuary at the mouth of the Numicus dates back to the first half of the 5th century BC. It continues until the 3rd century BC and is identified as the sanctuary of Sol Indiges. The actual shrine may have been at the centre of a large quadrangular precinct with sides of 110 m each.

216 Guaitoli 1990, 184. Fenelli mentions 17,000 miniature vessels: Fenelli 1984, 331.
levigated clay, were introduced during the late 6th, early 5th centuries BC. As in *Satricum* the introduction of depurated clays in significant quantities can be associated with the local employment of the potters' wheel. During the 5th century BC a local coroplast workshop was established which made terracotta sculpture from nearly life size and above. The excavated kilns cannot be directly related to this workshop that was primarily active during the 4th century BC. It produced the terracotta votive statues that were dedicated at the XIII altars and at the sanctuary of Minerva. The votive deposit near the sanctuary of Minerva for example, contained over one hundred of these statues.

It is probable that terracottas, tiles, cooking jars, lids and other kitchen and table wares were produced en masse in Lavinium during the period late 7th to 4th centuries BC. Three fabrics can be distinguished:

- coarse *impasto* or *impasto grezzo* as jars, bowls, lids, teglie, storage jars and cups,
- pale *impasto* or *impasto chiaro* as teglie, jugs and bowls and
- depurated clay as jugs, bowls, plates and craters.

It seems likely that the workshops which made artefacts of pale *impasto* made both tiles and some vessels such as teglie and eventually votive objects. The *Silva Laurentina* could have provided the wood for firing while one of the clay sources for the potters was probably the plioene deposits of clay around the urban area (Fig. 27). This deposit is remarkable pure and plastic and belongs to the better clays of *Latium*.

The inspection of the ceramics associated with the kilns, did not result in a more precise determination of the wares produced at Lavinium. Furnace lining and some wasters were identified but these did not assist a more detailed reconstruction of the local ceramic industry. A definite publication of the Lavinium excavations could establish which wares and vessels are present at the site in substantial quantities. Among these are definitely the coarse wares and some depurated fabrics. For example, workshop conditions are implied for the 5th century BC by the volume and standardisation in fabric and in vessel types of the coarse *impasto* made on a turntable or slow wheel. The demand for these ceramics was affected by the increase in the number of households from the 8th to the 5th centuries BC, the need for rooftiles and architectural terracottas as well as by the numerous offerings at the sanctuaries from the 7th to the 3rd centuries BC.

For the the reasons mentioned above, both the kiln remains and the increase in demand for ceramics imply the existence of more than one workshops in or near the urban centre at a given time. During the late 6th, early 5th centuries BC there was probably a workshop at the XIII altars as well as one in the NE section of the urban area. As mentioned for *Satricum*, these workshops were mainly involved in the production of functional *impasto* wares. *Figulina* indicates the use of a fast wheel and started to be produced from the late 6th century BC. The establishment of a local coroplast workshop during the 5th century BC demonstrates a higher degree of specialisation during this period than could be established for *Satricum*.

### 2.6.3 Laurentina-Acqua Acetosa

This site is located on the outskirts of present Rome on the Via Laurentina near Tor de Cenci. It is well known for its cemetery which dates back to the early 8th century BC, has its *floruit* during the 7th century and lasts into the 5th century BC which is demonstrated by a number of tombs from the late 6th and 5th centuries BC. So far, 175 tombs were recovered while others remain to be excavated. The few tombs from the late 6th century BC are noteworthy considering the absence of tombs from this century at other settlements in *Latium Vetus*. There is also some habitation evidence from the site (Fig. 30). Laurentina-Acqua Acetosa is important for this study because it presents

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217 Fenelli 1984, 342.

218 Fenelli 1984, 343. Arnoldus-Huyzendveld notes that this deposit is calcareous and that a similar formation occurs along the coast at Nettuno: personal communication.

early evidence for the nucleation of workshops.

Three rectangular kilns were discovered by Dr. Bedini during excavations in 1978 and 1980-81 in an Archaic extension of the original settlement. The location of the kilns within the building complexes is illustrated in Figure 31. Bedini published some preliminary reports on the Archaic buildings with a short description of the kilns. The buildings are dated from the second half of the 6th to the first half of the 5th centuries BC on the basis of the associated pottery. The context of the Archaic buildings is significant since it reveals an early urban plan which has not been testified before for Latium Vetus except by Carandinis' recent excavations around the Palatine, Rome. Several buildings in this Archaic quarter were erected along roads, in line and occasionally separated by passages. This indicates the distribution of building plots to households. The houses were situated on the border of a plateau opposite the protohistoric habitation area and were excavated just outside the original settlement. The area was previously used as a burial ground from the early 8th to the early 6th centuries BC which means that the buildings as well as the kilns cannot be dated before the early 6th century BC. The kilns were identified as pottery kilns on the basis of design, furnace lining and remains of the raised oven floor. The measurements of the substructure of the three kilns have been described as fairly similar, each being 250 to 260 cm long and about 170 cm wide. The depth of the firing chamber of kiln 1 is at least 80 cm. Bedini notes the structural difference between kiln 1 and the kilns 2 and 3 though actual details await final publication. A detailed report on the kilns will be hampered by the fragmentary preservation of the remains. Thus it remains uncertain whether the kilns are contemporaneous or if kiln 1 is slightly earlier in date than kilns 2 and 3. However there are indications that three separate buildings

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223 Bedini 1981, 257.
224 Bedini 1990 a, 173.
were in use as pottery workshops during the late 6th and early 5th centuries BC. The arguments for this reconstruction are:

1. the combustion chambers of kiln 2 and 3 are related to the layout of the buildings V,2 and V,3 since they follow the orientation of walls, roads and passages. The kilns are integrated into the architecture of the buildings. The substructure of kiln 1 in building V,1 has a slightly different orientation and thus may have been made before the construction of the building V,1;

2. the walls of the rooms in which the kilns are situated are substantial and made of tuff. This is a construction method which is exceptional since it does not incorporate the usual wooden frame for the wattle and daub walls. A tuff wall makes a building more fire-resistant. The wall could even have belonged to the upper structure of the kiln;

3. in addition, the buildings have water supply, reservoirs and basins which can be associated with the preparation of the clay. Figure 8 presents some workshop plans which reveal that kilns can be located within buildings and that all workshops accommodate a wetting tank, and

4. room 2 of building V,1, north of the kiln is furnished with yellow or grey tuff slabs which is exceptional when compared with other Archaic buildings. The function of this room and the slabs may be related to preparing or modelling clay.

An impression of the ceramics made by these workshops, is presented in the majority of the entries in the catalogue of *Grande Roma* and by the published ceramics that were found in both tombs dated to the late 6th and 5th centuries BC. The ceramics are characterised by the excavators as homogenous and consisted mainly of burnished and reddish *impasto, impasto chiaro* and ordinary *bucchero*. The vessels include jars, cooking jars, storage jars, large bowls, plates and cooking stands. The typology of the *impasto chiaro* is more diverse while the depurated wares mainly consist of plates and small jugs. Bedini kindly showed me the artefacts excavated in or near the kilns. The pottery from these kilns resembles the ceramics related to the late 6th century BC kiln at *Satricum*. The kiln from building V,1 was lined with a red fired paste and the associated pottery mainly consists of reddish tiles and storage jars. The ceramics correlated with the kiln in building V,2 comprise jars and storage jars and red and pale tiles and *imbrices*. Furthermore, it is accompanied by *figulina* material. The artefacts related to the kiln in building V,3 include pale coloured furnace lining and fragments of the raised oven floor. The furnace lining contained many cavities from organic material and as such resembles the late 6th century BC furnace lining from *Satricum*. The associated ceramics include reddish tiles, jars, a cooking stand, *teglie* as well as pale coloured jars. The fabric of the reddish *impasto* associated with the three kilns, appears homogeneous in colour, hardness and mineral content. It contains the usual volcanic mineral suite of *Latium Vetus* such as biotite, augite, leucite and tuff particles. The crude inscription on a tile which was written in the clay before firing implies that the potters could read and write.

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227 Bedini 1981, tav. LII.


229 Bedini 1983.

230 Bedini 1981, 256.

231 Bedini 1990 a, 177.
Fig. 31. Laurentina-Acqua Acetosa, Archaic industrial quarter with nucleation of pottery workshops.

The evidence from Laurentina-Acqua Acetosa records nucleated workshops, that is workshops which existed simultaneously. They were involved in the production of tiles and common household wares. These workshops clearly represent urban and not rural nucleation because of the civic layout and their position just outside the original settlement, near a major access road to the town. Urban nucleation is characterised by a wide variety of pottery types such as kitchen and table wares, storage jars and other vessels which corresponds with the ceramic evidence from Laurentina-Acqua Acetosa. Usually urban nucleated workshops provide both the town as well as the hinterland with pottery. Potters tend to become full-time employed and on the whole they co-operate. The front of the workshops measures between 8.6 and 14.5 m while their depth cannot be reconstructed due to the poor preservation of the buildings. The potters probably lived in substantial buildings which reflects conditions at Caere and Marzabotto, two sites which will be examined below. Neither the architecture of the workshops nor their literacy suggests a subordinate social status of the potters though they are likely to have been incorporated in the social organisation of gentes.

The importance of the original protohistoric settlement is reflected in the affluence of the 7th century tombs. During the Archaic period, the demand for ceramics increased due to the growth in the number of households and

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232 Even if the suggestion by Bedini is accepted that these kilns slightly predate the Archaic buildings and that they are the remains of a previous industrial quarter, they would still denote nucleated workshops: Bedini 1990 a, 173.


235 Bedini 1990 b.
the building activities. In addition to the urban area with the workshops, other Archaic buildings are reported which are predominantly located to the south-east of the original proto-historic settlement (Fig. 30). The 5th century BC at Laurentina-Acqua Acetosa is marked by a sharp reduction of the archaeological information and desertion of the Archaic buildings around 460-450 BC. Some of the sections of the previous habitation area became burial grounds. 236 This decline of the site is reflected by other settlements in Latium Vetus such as Ficana237 and Satricum and can be related to a general shift in Latium Vetus towards warfare and political instability from the late 6th century BC onwards. 238

2.6.4 Caere

Caere is one of the major Etruscan towns and is located at a short distance from the Tyrrhenian coast about 40 km north-west of Rome. It was the only Etruscan town with a thesaurus in the sanctuary of Apollo at Delphi. Moreover, it had three ports, Pyrgi, Alsium and Punicum. Trade with foreigners was directed from the early 6th century BC at these ports. 239 Like many other sites in central Italy, Caere is best known for its necropoleis. A complex social stratification is not only recorded by the tombe principesche but also by the opulent contents of tombs of intermediate level. 240 The urban centre extended over a plateau of approximately 150 hectares. Two habitation nuclei can be distinguished during the late 9th and early 8th centuries BC on the SW and NE side of this plateau. Caere emerged as a significant Etruscan centre from the late 8th, early 7th centuries BC. Gradually the plateau became completely settled. Based on the distribution of wells and other archaeological evidence dated from the 7th to the 4th centuries BC, it is deduced that the whole plateau became inhabited during this period. These centuries correspond with the maximum expansion of the town. 241 was calculated that at its peak, about 25,000 people could have lived at Caere. This figure seems high but is an average of the number of inhabitants given for the primary Etruscan towns of the 6th century BC. These numbers vary from 5,000 to 50,000 inhabitants for towns such as Caere, Tarquinia, Vulci, Veii, Chiusi, Populonia and Volterra. The figure for Caere is based on the extensive necropoleis which cover about 400 hectares. Huergon has calculated from the density of graves per unit that during a period of 650 years, 400,000 people with a mean age of 40 years, were buried around Caere. These numbers give an average of 25,000 inhabitants for the period 700 to 50 BC. 242 Calculations such as these seem haphazard and can easily be criticised for a number of reasons. 243 Therefore it is not my intention to present the figure of 25,000 inhabitants as a fact for Caere during the 6th and 5th centuries BC but rather as an indication for its civic character. 244

236 Bedini 1981, 257.
237 Pavolini 1981.
241 Cristofani et alii 1988, 85.
242 Huergon 1961, 176.
243 The criticisms would either increase or decrease the number of inhabitants that was calculated by Huergon. For example, the density per unit can be questioned as well as the period of 650 years. Huergon considers the period 700 to 50 BC while the necropoleis started earlier. Both comments when applied to the calculations would decrease the figure of 25,000. On the other hand he did not consider the issue of selective representation in burial customs. If he would have applied this concept than the number of inhabitants would increase.
244 There are scholars who consider 5,000 inhabitants a threshold for a city: cf. Wells 1984, 15-8. This threshold was definitely passed at Caere during the 7th century BC.
The demand for ceramics was considerable due to the economic growth of the town and its territory (Fig. 32). Figure 32 illustrates the urban area and some of the necropoleis, roads and secondary centres in the hinterland of Caere. The relationship between the urban centre and its territory is reported in detail by recent surveys.\textsuperscript{245} Enei, for example, did a survey of a section of the Caeretan region between 1985 and 1988 and his research reinforces the impression that during the 7th and 6th centuries BC, there was a considerable increase in the number of sites in the countryside. A demographic expansion is recorded which is related to a systematic colonisation of the territory, similar to the colonisation noticed in the territory of Veii.\textsuperscript{246} Enei recognised 113 settlements. Some of these sites were located almost next to each other in the most fertile areas. They were separated by just 150 to 200 m which suggests regular agricultural plots. A limited number of sites covered an area that was larger than 1,000 m\textsuperscript{2} while a significant number extend over an area of 400 to 900 m\textsuperscript{2}. The evidence implies small square or rectangular buildings

\textsuperscript{245} Enei 1993; Maffei and Nastasi 1990.

\textsuperscript{246} Potter 1985, 72-92.
of 20 to 50 m² covered with tiles of diverse provenance. The buildings may have been accompanied by wooden structures. The pottery found, included storage jars, cooking stands, loom-weights and grindstones. Much of the ceramics is made from a red-brown impasto while the table wares are predominantly bucchero. Attic pottery is rare though transport amphorae of different origin were frequently encountered. The evidence from the necropoleis in the surveyed region indicates the existence of:

a. urban necropoleis,
b. rural burial grounds with a limited number of tombs and
c. rural extensive necropoleis dated to the 7th and 6th centuries BC which cover several hectares and contain many graves including monumental tombs.

The evidence indicates a strong concentration of rural settlements in the course of the 5th and 4th centuries BC.²⁴⁷ The surveys in the territory of Caere did not record any sites where pottery was produced. This makes it possible to speculate that ceramics were distributed via the urban workshops.

The archaeological evidence on the urban development of Caere was recently augmented by excavations under the direction of Cristofani.²⁴⁸ Though these excavations have revealed much information for workshop activities, a pottery workshop was not discovered. The only kiln at Caere was found by Mengarelli in 1913 who interpreted the area as a sanctuary.²⁴⁹ Cristofani has expressed his doubts about this interpretation and proposed an industrial

²⁴⁷ Enei 1993, 34-42.

²⁴⁸ Cristofani et alii 1988; Cristofani 1992; 1993. The publications of 1992 and 1993 are predominantly catalogues of the pottery that was recovered in a huge basin of 12.20 to 12.80 by 4.75 to 5.25 m and 4.0 to 6.9 m deep. This basin was cut into the native tuff of the plateau on which Caere was built. The basin was originally a quarry for tuff blocks during the late Archaic period. Based on the pre-cut blocks at the bottom of the quarry it was calculated that about 2,000 blocks were extracted. It is noteworthy that this quarry existed in the centre of the plateau as if not hindered by previous and neighbouring buildings. The extraction of tuff blocks could have been related to specific building activities. The debris in the quarry contained mainly pottery but also fragments of columns and building blocks which can be related to the urban buildings at Caere during the second half of the 6th century BC. The basin was filled with material from destruction layers and contains fragments from the 7th till the early 5th centuries BC. On account of the quantity and variety of the ceramics in the basin, the pottery sequence that was published in the catalogues, presents a detailed outline of ceramics in central Italy from an urban context.

²⁴⁹ Mengarelli 1936.
function.\textsuperscript{250} This suggestion by Cristofani is based on the layout and context of the complex (Fig. 33).

The kiln had a rectangular plan with walls of tuff blocks which were levelled towards the interior of the kiln. The internal measurements are 180 by 340 cm and the kiln was bisected into two corridors by tuff slabs, 24 cm wide and 105 cm high. The floor level of the west corridor consisted of six large, pale terracotta tiles of 62 by 52 cm and 4.5 cm thick. The borders of the tiles were placed in the soil in order to make a flat floor. The internal walls were lined with a mixture of clay and sand which subsequently became to some extent vitrified because of the extreme temperatures obtained in the kiln. The surface of the tuff was also altered by the high temperatures. It was suggested that the firing chamber could be closed with two tuff slabs. The publication and plan of the site by Mengarelli require a reinterpretation. Most of the associated structures are related to waterworks. Mengarelli found several reservoirs, wells, subterranean waterways and drainage systems. The main elements of the plan presented are the kiln, the central water reservoir, the piscina and the drainage system which represent a coherent layout and which must have functioned simultaneously.\textsuperscript{251} The subterranean basins A, B and C can be reconstructed as a series of basins at different levels which were probably used for preparing clays.\textsuperscript{252} Mengarelli interpreted this area as a sanctuary even though the plan of the temple was not discovered. This interpretation is partly based on the excavated architectural terracottas which dated from the 6th to the 3rd centuries BC. Ceramics of the same period were considered to be votive offerings. Some Hellenistic vessels were painted or inscribed with the letters HPA, Hera. These sherds are the main reason for interpreting the area as a sanctuary of Hera. The scarce evidence on the sanctuary itself does not correspond with the complex as presented in Figure 33. Though a sanctuary could have existed nearby due to some of the votive offerings, the excavated complex by Mengarelli cannot be interpreted as a temple. The foundation walls and water works correspond with the layout of a pottery workshop as those found at Marzabotto where the workshop in Regio IV, Insula 2 also included a substantial water reservoir and kilns.\textsuperscript{253} Four fragmentary moulds were published by Mengarelli which demonstrate the close relation with a workshop. The moulds indicate a late Archaic and 5th century BC production.\textsuperscript{254} In the area of the workshop some fragments of

\textsuperscript{250} Cristofani \textit{et alii} 1988, 87-90.

\textsuperscript{251} A recent investigation of the area revealed that only the major water reservoir was preserved: Cristofani \textit{et alii} 1988, 88.

\textsuperscript{252} Mengarelli describes an ingenious subterranean system of waterworks which probably functioned in relation with the pottery workshop. It is essential for the following to acknowledge that Mengarelli and his assistants could draw a detailed map of this underground system and thus were able to enter in order to explore its workings. He describes that the basins A, B and C are correlated: Mengarelli 1936, 69. Once the first basin was filled with water, any excess of water would be drained by an opening or pipe into the next reservoir and once this was filled, the excess of water would be conducted into the third basin. A subterranean drainage could empty basin C of any excess water. This description by Mengarelli accords with a classical report of the installation that is required for refining clays: Hodges 1976, 20. Hodges describes this process as elutriation or levigation: \textit{The clay is mixed with water until the heavier particles have subsided. The remaining fluid is then decanted and the finer clay allowed to settle out of this. The process may be carried out in a small way using tubs or on a large scale employing settling tanks.} The correlated basins at Caere are associated with a pottery kiln and this strengthens the hypothesis that they have to be interpreted as a sequence of settling tanks. The basins at Caere are however subterranean and I do not know any other underground system of levigation in running water. Series of basins at different levels are known at Athens in the Kerameikos: Young, 1951, 245-6, fig. 16. Probably they also existed at Arezzo: Peacock 1982, 54. Tanks A, B and C in Fig. 33 are associated with three wells and an opening to the underground tanks. It is likely that the basins were supplied with water by the wells through the opening. It could be that the clays were initially prepared in the open air and when necessary, subsequently submitted to levigation in a series of tanks underground. A skylight did provide tank C with daylight. Underground storage of pretreated clays might in addition assist workability of the clay: Rhodes 1979, 70-1.

\textsuperscript{253} See section 2.6.7.

\textsuperscript{254} Mengarelli 1936, 76-7, 81, fig. 4 and \textit{Tavola} XXVII: Andrén 1940, 64. Mengarelli relates these moulds to terracottas that are dated from the 5th to 3rd centuries BC. The moulds for a nimbus from a female or satyr antefix is dated to the early 5th century BC. This mould can be related to terracottas known from \textit{Caere} and \textit{Pyrgi}. The other fragmentary mould was intended for the manufacture of a large antefix with satyr and menade such as were recovered at \textit{Satricum} and that are dated around 500 BC. The fourth mould was employed for the manufacture of a terracotta statue of a young man. Mengarelli dates this mould to the 3rd century BC though an earlier date cannot be excluded. On other Archaic terracottas from this area, I refer to: Nardi 1989, 52-5.
Archaic painted terracotta slabs and tiles were discovered. The context of these *lastre dipinte* which are also known from tombs, is interesting because it appears to confirm the close relationship between tomb paintings and terracotta manufacture.

The kiln and the associated structures excavated by Mengarelli, are difficult to date precisely for want of a detailed publication. Nevertheless, the layout of the main structures, kiln, water reservoir and drainage system, as well as the moulds indicate a late Archaic and 5th century BC date.255 This date is supported by the orientation of the structures uncovered during the recent excavations by Cristofani.257 The illustration in the box of Figure 33 shows that the orientation of the main features of the workshop is parallel to other Archaic walls on the plateau.

The large-scale workshop complex at *Caere* described above, is the only primary evidence for pottery production at the site. It can be related directly to the production of architectural terracottas. Terracottas represent merely one group of the ceramics produced in or near the town.258 In order to illustrate other groups of ceramics ascribed to potters who were working at *Caere*, I will discuss categories such as painted pottery, the red-ware terracotta tradition, *bucchero* and household vessels.259

Painted ceramics have been assigned to various craftsmen mainly on the basis of stylistic resemblances of the painted scenes. An attribution to a specific centre follows when the archaeological provenance of these vessels is known. Scholars have attributed to *Caere* a series of painters and workshops from the early 7th to the late 6th centuries BC.260 Caeretan painters and workshops include:
- the *Pittore delle Cru* dated to the early 7th century BC and subsequently;
- the *Pittore dell’Eptacardo*;
- the potter Aristhónothos;
- the workshop of the *urma calabresi* among whom the *Pittore della Nascita di Menerva* can be distinguished;
- a group of polychrome painters;

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255 Mengarelli 1936, 80-1, Tav. XXIX; Roncalli 1965, 55. *Lastre dipinte* are painted terracotta slabs about 100 to 136 cm high, 52 to 59 cm wide and 5 to 2.7 cm thick, which were employed for covering walls of tombs, sanctuaries and maybe civilian buildings. Roncalli has published a catalogue of 48 of these slabs and dates them from 560 to 440 BC: Roncalli 1965, 46-8. Most of the *lastre dipinte* were recovered at *Caere* while some were found at Veii and Falerii. Momentarily they are dispersed over major European and American musea. The fabric of the slabs is divided into two groups:
a. with reddish colour, occasionally a blackish core and abundant minerals of volcanic origin, augites and micas (thickness of slabs 5 to 3.8 cm),
b. with bright red colour at fracture, powdery surface, less minerals and homogenous composition (thickness of slabs 2.7 to 3 cm).

256 Damgaard Andersen states without presenting an argument that an Archaic date of the kiln is not probable: Damgaard Andersen 1993, 80-1.

257 Cristofani *et alii* 1988, 90.

258 In this thesis the production mode of ceramics is described while employing primary evidence like kilns, wasters, workshops remains etc. *Caere* is one of the major Etruscan towns which continued to exist into the Roman period. An examination of the pottery that was produced at this site can only partially be established on primary industrial evidence. A report of the secondary data that incorporate various stylistic workshop attributions which are based on a visual examination of the ceramics, is essential for illustrating the wide range of ceramics that were produced at the site. A presentation of the development of the pottery production at a major Etruscan town like *Caere*, had to be included for introducing fine wares as well as a more advanced stage of craft specialisation. I consider the high level of specialisation at *Caere* to be characteristic for the evolution at other primary sites in central Italy.

259 I restrict this presentation to distinct wares from *Caere*. It is impossible to present all the fabrics that were recovered at *Caere*. The catalogues that were edited by Cristofani, give a detailed report of the various fabrics from the 7th to the early 5th centuries BC that were found at the site: Cristofani 1992; 1993.

260 Many painters or workshops which have been indentified on stylistic grounds, cannot be attributed to a specific centre because the archaeological provenance of the artefacts is unknown.
- the group of the anforoni squamati, and
- the Gruppo della Tolfa which are associated with the Caeretan hydriae during the later part of the 6th century BC.\textsuperscript{261}

This sequence suggests a continuous presence of pottery workshops at Caere producing ceramics which are directly or indirectly related to immigrant potters, imported ceramic vessels or to a local ceramic tradition. Martelli specifies a ceramic school that became established at Caere in the early 7th century BC and among whose associates were the Pittori delle Cru e dell'Eptocard. The Aristhónothos potter was probably a prominent member working in the tradition of this school.\textsuperscript{262} The red ware production at Caere covers the entire 7th century BC and chiefly concerns the larger ceramic shapes such as amphorae, pithoi, large pyxides, house urns and sarcophagi. The painted decoration is stylistically not consistent and thus reflects the hands of various painters. This feature of the painted decorations makes it probable that during the 7th century BC it is not yet possible to reconstruct a workshop in which specialisation had advanced into separate potters and painters. It is likely that the potter also painted the ceramics as has been suggested for the Aristhónothos potter.\textsuperscript{263}

\textsuperscript{261} These attributions to Caere are presented in: Martelli 1987. Rizzo points for the Geometric pottery to the role of Euboean potters from Euboea itself or from the colonies at Pithekoussai and Cumae in transmitting the technology and decoration schemes to central Italy. She introduces some late Geometric red-on-white vessels from Caere which are dated to the late 8th, early 7th centuries BC: Rizzo 1989. The impact of a Greek oriented pottery production on an established, advanced impasto tradition, is illustrated by the ceramic content of tomb 2006, tomb 78 del Vecchio Recinto, tumulo XXIV sull'Altipiano and the Tumulo della Speranza which are discussed in her article. I refer to Hemelrijk for the correlation between the Tolfa vases and the Caeretan hydriae: Hemelrijk 1984, 190-1.

\textsuperscript{262} Martelli 1987, 264.

\textsuperscript{263} The Aristhónothos crater is considered to be either the product of an immigrant potter who worked at Caere or an import. Martelli presents the various views on the Aristhónothos potter: Martelli 1987, 264. The opinion that it was an import is expressed by Orlandini who considers the crater to be an import from Sicily or Cumae: Gli Etruschi e Cerveteri 1980, 60.
Fig. 35. Caere, manufacture of terracotta sarcophagi during the 7th and 6th centuries BC; their production is related to the local ceramic industry that made architectural terracottas and other wares.

A specific Caeretan group of jars, storage jars and basins which are decorated with stamps or cylinder stamps, is isolated by its decoration. This production may have descended from the red-ware tradition. The vessels were made in impasto rosso or a paler red-orange impasto during the late 7th to late 6th centuries BC. In addition to the stamps, the pottery is frequently decorated with motives applied in relief such as bugne, concentric circles, zig-zag lines and palmettes. This group of vessels is distributed in the region around Caere.264

For Acquarossa and Satricum the close relationship between the production of rooftiles and larger ceramic vessels is substantiated.265 To my knowledge no rooftiles of the painted red ware variety were found at Caere. It is, however, probable that the workshop involved in the red-ware production also made building materials such as

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265 For Acquarossa see: Wikander, C., 1988, 132; Wikander, Ö. 1993 a, 101; section 2.6.5. The combustion chamber of kiln B at Satricum contained both late Archaic tiles, large vessels and other impasto pottery: section 2.6.1.
tiles. The demand at Caere for building material must have been considerable which is implied by the distribution of architectural terracottas on the plateau (Fig. 34). The production of these terracottas enhanced the craft specialisation from the 7th century BC. The increase in specialisation is reflected by the manufacture of specific products such as sarcophagi and other distinctive ceramics (Fig. 35).

Early evidence for an emerging coroplast tradition at Caere are the statues from the Tomba delle cinque Sedie dated to the second half of the 7th century BC. These statues were modelled by hand, about 50 cm high and probably represented the male and female deceased. The production of terracotta sarcophagi continues during the 6th century BC and includes outstanding examples such as the sarcophagus dei Leoni and the sarcophagi degli Esposi. Briguet considers the manufacture of these sarcophagi to be the outcome of a long tradition in terracotta production at Caere which lasted for more than two centuries. It is suggested that besides the sarcophagi, the workshops also made large ceramic vessels, lastre dipinte and architectural terracottas. Around 500 BC the terracotta production changed both stylistically as well as technically. The new production method continued during the 5th century BC and included the terracottas from temple B at Pyrgi and the terracottas from Caere exhibited in Copenhagen.

In addition to the painted vessels associated with the terracotta production, it is suggested that Italo-Geometric pottery was made at Caere from the late 8th century BC onwards. These vessels were made on a potters' wheel and imitated Greek painted pottery. This implies workshop conditions at Caere for certain types of ceramics from the late 8th century BC. The imitation of Greek pottery is a recurrent theme in the ceramic industry of central Italy. It is reflected by the production of Etruscan-Corinthian vessels and by the well-known Caeretan hydriae. Of these hydriae about 40 have survived which form a closely related group of vessels with colourful figured scenes. They were produced over a period of 20 to 30 years during the late 6th century BC. Hemelrijk judges that the workshop producing these hydriae, was probably also involved in the production of other ceramics such as household vessels. He also implies that the specialisation in the workshop had not yet broken down into potters and painters but that the master was both painter and potter. This master was presumably of east Greek origin because on one hydria the names of Odios, Ajax and Nestor were written in the Ionic alphabet. An east-Greek homeland for some of the craftsmen in Etruria can be connected to the Ionicising influence on Etruscan art. The potters of the Gruppo

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266 Compare for example the white-on-red storage jar that is assigned to the Bottega dell'Urna Calabresi with the painted jars and tiles from Acquarossa: Rizzo 1989, 36; Wikander, C. 1988, 75-96, 131-2, figs. 27 and 48. Cianferoni published two storage jars from Caere that are decorated in the red-ware tradition and dated to the late 7th century BC: Cianferoni 1991, 106-7.

267 Prayon 1975 b.

268 Sarcophagus dei Leoni, first half 6th century BC, l. 192 cm: sarcophagi degli esposi, 530-520 BC, Villa Giulia l. 199, h. 144, w. 70 cm; Louvre l. 194, h. 111, w. 69.5 cm.

269 Briguet 1989, 102-4, 213-8. The analysis of the reddish-brown fabric of the sarcophagus at the Louvre, corresponds with geological data from Caere.


271 Rizzo 1989. I presume on account of the stylistic similarities of the painted decorations on the Italo-Geometric pottery as well as on the white-on-red ware production, that it is undetermined whether these ceramics were produced at Caere during the 7th century BC in separate workshops.

272 Etrusco-Corinthian vessels were produced at Caere from about 625 to 550 BC: Cristofani 1992, 115. I refer to Hemelrijk for the Caeretan hydriae: Hemelrijk 1984.

273 Hemelrijk writes that he cannot certify the other vessels which were produced at the workshop but amphorae, alabastra and simple household wares are suggested: Hemelrijk 1984, 63, 167.


della Tolfa were probably directly inspired by the workshop that was making the Caeretan hydriae. These potters may have trained in this workshop as apprentices. The production in Etruria of Black Figure pottery continues into the 5th century BC.276 Early Red Figure vessels of the second half of the 5th century cannot be definitely ascribed to Caere.277

Painted Etruscan pottery with figurative scenes imitating Greek vessels is outnumbered at the site by bucchero and, therefore, an examination of the bucchero production is more suitable for an account of workshop conditions in Etruria.278 Bucchero production starts in the early 7th century BC at Caere after which its manufacture spread to other centres in central Italy.279 Rasmussen suggests that only a single workshop may have been involved during the early years of the bucchero production.280 The bucchero vessels from Caere are characterised by particular motifs and specific vessel forms though some of these characteristics are also encountered at other production centres in southern Etruria.281 A complication is that the fabric of the bucchero from Caere is not homogeneous in terms of its chemical composition.282 Recently, bucchero from Caere was subjected to petrographic and geochemical analyses.283 About 30 bucchero vessels chiefly dating to the 6th century BC, were analysed by various archeometric techniques. Microscopic examination revealed a division into two groups.284

1. Black, sandy sherds with an average thickness of about 4.2 mm, a compact dark matrix which contained angular quartz, plagioclase, sanidine, microcline, pyroxenes, small orange tuff fragments and some carbonates;
2. Dark-greyish sherds, slightly thicker with an average thickness of 5.6 mm, a yellowish calcite-rich matrix which colours black towards the edges. Group 2 contained less inclusions than group 1. The following inclusions are recognised: microfossils, shell fragments, less than 5% quartz and feldspars, orange fragments of tuff and black limonite concretions.

The XRF analyses confirmed the subdivision in two groups. Group 1 was made of an illite clay of sedimentary origin285 which contained a large amount of inclusions, many of volcanic origin. Some of the samples seem to be

276 Ginge 1987, 16. She mentions that Black-Figure pottery was produced in Etruria from about 540 to 475 BC. It can however, not be excluded that the manufacture of this variety continued into the second quarter of the 5th century BC.

277 Pianu 1980, 3.

278 This statement covers the whole period 700 to 400 BC and is mainly based on the fact that bucchero became increasingly an households ware during the 6th century BC. Cristofani states that the quantity of bucchero that is dated from 550 to 475 BC and that derives from an urban context at Caere, is substantial and is only succeeded by the quantity of common wares: Cristofani 1992, 174-7.

279 Gran-Aymerich differentiates six chronological phases the earliest of which he dates from 680 to 630 BC: Gran-Aymerich 1993, 21. He locates the production of early vessels in Caere as does Rasmussen: Rasmussen 1979, 3-5. The manufacture of bucchero at other sites in central Italy is seldom dated before 650 BC.

280 Rasmussen 1979, 159.

281 Particular motives for the Caeretan production are rows of fans with dotted lines and zones of incisions or ribbing, animal and floral frizes, relief decoration, incisions or stamps on flat handles. Specific vessel shapes are the development of the globular amphorae with flat handles to the Nicosthenic shape, chalices on four supports with stamped decoration and the whole range of kantharoi. These characteristics of bucchero from Caere are reported by Gran-Aymerich and less definite by Rasmussen which is probably more realistic considering the diffusion of the production technique: Gran-Aymerich 1993, 24; Rasmussen 1979, 128-42.

282 Gran-Aymerich et alii 1985. The application of advanced research techniques for provenance studies can result in a discrimination which is occasionally difficult to relate to archaeological meaning. More simple techniques like refiring programmes and thin-sectioning on a significant number of bucchero vessels might be able to distinguish the various fabrics into more obvious categories: cf. Burkhardt 1992.


284 The analyses of the thin-sections are more detailed than the thin-sections of bucchero from Caere that are described by: Mannoni 1993, 223. The results of both analyses are, however, not incompatible.

mixed with marine clays containing carbonate. Group 2 was made of a plastic, marine clay containing few inclusions of which the microfossils and foraminiferae are characteristic. The orange tuff fragments in both groups can be related to the orange tuff from the plateau of Caere. One of the clay samples dug around Caere could be related positively to group 2 but none of the samples corresponded with group 1. Burkhardt made a distinction between the firing process of both groups. Group 1 was fired in a strongly reducing atmosphere which probably caused some absorption of carbon while the dark colour of group 2 is mainly caused by a reduced atmosphere and the subsequent reduction of the iron-oxides in the clay. It is likely that the shift towards group 2 during the second half of the 6th century BC, can be associated with the use of a different clay deposit. This demonstrates that during the second half of the 6th century BC the resources for pottery production changed significantly. Besides the shift from red to pale architectural terracottas, Burkhardt presents evidence for an analogous change of clay for the bucchero manufacture.

The early 7th century BC bucchero vessels have a limited range of vessel shapes such as amphorae, jugs and kotylai. They were carefully made of fine clay and turned on the wheel. The vessels have thin walls and do not yet have standardised, stamped motifs of palmettes and animal friezes. This early bucchero is found in the same strata as the fine brown impasto vessels which were made on a wheel and highly polished. The potters from Caere exported some of their bucchero vessels to other emerging towns in the region during the 7th century BC. There was also a demand for bucchero overseas. Moulding contributed to the transformation in the quality of the bucchero vessels which became more standardised during the late 7th and 6th centuries BC. This reflects the efficiency that is associated with workshop conditions. Bucchero remained a ware group for domestic vessels such as bowls and plates during the fifth century BC.

The modelling and surface treatment of bucchero differs to such an extent from the manufacture of painted Etruscan pottery with figurative scenes, that it is probable that they were made in separate workshops. The early bucchero from Caere was labour intensive, the artefacts were carefully made and their production does not reflect the mass production of workshops. The standardisation of the bucchero repertoire which emerged in the second half of the 7th century BC, reflects a successful transformation of the production method which had to compete with the workshop mode of production of ceramics imitating Greek pottery.

The development of the fine ware pottery at Caere during the 6th century BC can be divided into two categories:
1. A continuation of the production of painted pottery modelled on a potters' wheel. This production is reflected by artefacts attributed to the group of polychrome painters, the group of the anforoni squamati and the gruppo della Tolfa;
2. A change in the bucchero production which became more and more standardised.

The transformation of the bucchero production is also reflected by the production of other common table wares. The typology of these Archaic wares is directly related the late bucchero production and incorporates groups such as:

a. The brocchette ceretane which are made from a levigated clay with small mica and augite inclusions and coated with a pale firing slip, dated to the first half of the 6th century BC;
b. The ceramica acroma arcaica which incorporates attingtoi, brocchette, calice and kantharoi. They are made from a depurated, slightly powdery clay, and

286 These impasto vessels were also made on a wheel and subsequently burnished and polished: cf. Cristofani 1993, 253.
289 Cristofani 1992, 118-28. He reports besides brocchetti also lids, bowls, plates and pisside.
290 Cristofani 1992, 129-33. This ware group is dated to the last quarter of the 6th and early 5th centuries BC.
c. The Etruscan black glazed pottery which became produced at Caere from the late 6th, early 5th centuries BC.\(^\text{291}\)

A quantification of *impasto* household vessels compared with fine table wares demonstrates that the common *impasto* wares comprise the principal group at Caere. This group includes specific products such as the red-orange *impasto* jars on a high foot dated to the late 8th and first half of the 7th centuries BC as well as the undecorated *impasto rosso* ceramics the production of which ceases around the middle of the 6th century BC.\(^\text{292}\) During recent excavations on the plateau of Caere, more than 5,000 fragments of Archaic and late Archaic *impasto* were found which could be divided in cooking jars and other household vessels.\(^\text{293}\) Common *impasto* wares are in quantity the main ceramic group. It is therefore unfortunate that a presentation of the manufacture of these common wares has to be general for lack of detailed information. Cristofani emphasises that the absence of fabric analysis and of primary evidence for workshops making these vessels, hampers the evaluation.\(^\text{294}\) A general account is not available because scholars have focussed on specific wares or distinct groups of artefacts. Nevertheless, during the 6th century BC the typology of these vessels becomes standardised in the territory of Caere while the paste composition varies. This implies that various production centres employing different raw materials may have existed in the region. Within each production unit the fabrics became increasingly homogenous as has been noticed at other sites in central Italy. Due to the absence of primary evidence, it is difficult to relate the production of common household vessels to either household industry or to the workshop mode of production. The increase in standardisation during the 6th century BC indicates an intensification in the production which would have advanced household industries and, therefore, may reflect workshop conditions. Thus it is deduced that the common household vessels in *impasto*, started to be mass produced during the 6th century BC which is reflected in the typology and the increasingly homogenous fabric. This development would have supported latent workshop conditions.

As mentioned above there were, during the 6th century BC, visible changes in paste compositions employed in the pottery production at Caere. *Bucchero* started to be made with another clay while the resources used by the coroplasts, were also replaced. These craftsmen changed the red-brown fabric for a pale firing clay. Moreover, the *impasto rosso* tradition was replaced by a paler red-orange *impasto* as can be seen from the pottery decorated with stamps or cylinder stamps. This evidence for the transformations in resource management cannot be related to an overall change in the organisation of the workshops. The only primary evidence from Caere is the large-scale workshop in the urban centre that produced architectural terracottas. The relationship of these products to the surrounding clay resources is neither substantiated except for the *bucchero*.

This account of the ceramic industry at Caere establishes that several workshops existed simultaneously but a nucleation as was encountered at Laurentina-Acqua Acetosa, cannot be proven. At Marzabotto the workshops are dispersed over the urban area and this may have occurred at Caere.\(^\text{295}\) Inspite of the lack of primary evidence on nucleation of workshops at Caere, the various urban workshops which are deduced from the secondary findings, must have co-operated.\(^\text{296}\) The production of specific types of pottery at the *emporium* of Caere that may be related to immigrant potters, can be expected but is so far not recorded.\(^\text{297}\) The common *impasto* household vessels may even


\(^{293}\) Cristofani 1993, 273.

\(^{294}\) Cristofani 1993, 312-3.

\(^{295}\) See section 2.6.7.

\(^{296}\) I refer to Peacock for a discussion on nucleation and co-operation: Peacock 1982, 39-43.

\(^{297}\) Hemelrijk for example, considers that the workshop that produced the *Caeretan hydriae* could be located either in Caere or in Pyrgi: Hemelrijk 1984, 193.
have been made at several production sites in the territory of Caere but these rural workshops have not been recorded either. Therefore a reconstruction of the organisation of pottery production at Caere and its territory remains speculative for lack of primary evidence. Some of the options mentioned such as rural workshops, urban nucleation and production at emporia, may have co-existed because the demand for ceramics was substantial.

The report on the pottery production at Caere from the 8th to the 5th centuries BC indicates that during the 7th century BC several pottery workshops existed for the production of:
1. red-ware ceramics;
2. bucchero, and
3. painted pottery made on a potters' wheel.

Caere itself prospered from the late 8th and early 7th centuries BC onwards and it has been suggested that its development was slightly later than its neighbouring towns, Veii, Tarquinia and Vulci.298 During the 8th century BC much of the common impasto wares for preparing, storing and serving food were probably still made within the household either as household production or as household industries. It is likely that this mode of production continued for the common impasto wares during the 7th century BC. Therefore during this century the pottery that was produced by the workshops was partially augmented by the common wares that were made within the household. The role of household production declined, however, with the impulse of the demand for architectural terracottas during the 7th century BC. The manufacture of ceramic building materials in workshops gradually absorbed the impasto production. For example, some of the larger household vessels started to be manufactured in the red-ware tradition as were the tiles. In addition, the export of fine wares from Caere to its hinterland and other regions from the second half of the 7th century BC stimulated specialisation of the potters' craft.299 A fraction of the bucchero production was even distributed along the coasts of the western Mediterranean and at Carthage. The increase in the output during this period indicates an expansion of the production facilities which may reflect larger workshops or a growth in the number of workshops. A major stimulus for specialisation was the building activity both in the urban area as well as in the necropoleis. Gradually the huts on the plateau were replaced by buildings covered with terracottas.300 This process continued during the 6th century BC. The remains of a large scale workshop for the manufacture of terracottas at Caere dates from the late 6th century BC and covers an area of more than 400 m² merely for the kiln, drainage system and settling tanks. This demonstrates the substantial size workshops could obtain during this period. In the vicinity of this workshop, Cristofani discovered additional industrial waste products and inscriptions. The debris indicates that various materials such as bone, metals, textiles and pottery were manufactured here. He suggests that during the 6th century BC, this area of the plateau was inhabited by artisans who were partly literate and who belonged to a middle class.301

Pottery production at Caere during the late 6th and 5th centuries BC developed into a production mode which was chiefly directed by internal demand. The export of pottery to other regions waned. The table wares became ordinary and this signals the undistinguished efficiency of their manufacture which was already dormant in the 6th century BC. The lack of distinction will not have advanced the value of the vessels nor the status of the potter. The demand for ceramics at Caere would, however, still be sufficient to sustain several pottery workshops. The terracotta moulds found at the workshop on the plateau, indicate that production continued here during the 5th century BC.302 Furthermore, the manufacture of common impasto household vessels and of table wares made on a potters' wheel, continued including the manufacture of black glazed pottery.

298 Bietti Sestieri 1992 b, 43-4; Bartoloni 1989, 109, 211.
300 cf. Cristofani et alii 1988, 85-8; Nardi 1989. Nardi reports tiles, imbrices and terracottas on the plateau of Caere from the 7th century BC.
301 Cristofani 1993, 504-5.
302 Mengarelli 1936, 76-7, 81, Tav. XXVII, 1-3.
The economic development of Caere during the second half of the 5th and 4th century BC has been described as one of decline. The interest of the Caeretan elite became less directed towards external activities and increasingly focussed on domestic affairs. This process was possibly forced by circumstances like military defeats, for example the failure to win the battle at Cumae in 474 BC. Nevertheless, the riches plundered at Pyrgi in 384/383 BC records the accumulation of wealth at sanctuaries, an accumulation which was also established during the 5th century BC. Therefore I prefer not to use the term decline. Apparently the resources of Caere and its territory were still affluent during the 5th century BC. The failure to direct these resources towards expansion became eventually fatal especially in relation to the increasing influence of Rome that continued to expand its territory and standing.

2.6.5 Acquarossa

The late Iron Age and Etruscan site of Acquarossa is located north of Viterbo, about 70 km NNW of Rome. It is situated on a tuff plateau and the urban area covers about 25 hectares. Excavations have revealed huts dated from the late 8th, early 7th centuries BC but the site is best known for its buildings and the associated architectural terracottas. The huts were replaced by buildings with stone foundations and tiled roofs from about 640/620 BC. Construction works proceeded and the town grew in a relatively short period to approximately 1,200 buildings at the time of its destruction around 550/525 BC. The site is included in this study because of the existence of detailed reports on the impasto ceramics and the possibilities for quantification of the output. It is noteworthy that the evidence from Acquarossa demonstrates once more that the building activities were essential for increasing specialisation in the ceramic industry.

In spite of the fairly extensive excavations, only a fraction of the urban area was uncovered. The excavators have so far not found any kilns nor workshops and imply that these may have been located outside the town on the assumption that workshops are generally not located in urban centres in antiquity. The evidence for the workshops discussed in this study makes this statement relative. Many workshops appear to be located within centres during this period. For example, the workshops at Laurentina-Acqua Acetosa are located just outside the old habitation centre but within an urban layout while at Marzabotto the pottery workshops are located in various quarters of the town. Nevertheless the evidence implies a tendency from the 6th century BC to establish workshops on the edge of urban centres.

The detailed publications of the ceramics found at Acquarossa involve mostly impasto fabrics. The majority of the monographs on the excavations discuss single groups of architectural terracottas such as plain tiles, antefixes, simas, painted revetments and akroteria. The presentation of these ceramics in separate volumes makes it difficult to assemble information on the terracottas which belong to one construction phase of a building. Recently, Ö. Wikander catalogued 49 roofs combining the available information on the architectural ceramics from Acquarossa. Stylistic examination of the ceramics from this site is correlated to fabric and technical analysis. The early production at Acquarossa is characterised by a dark, reddish-brown fabric while the terracottas modelled by

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304 For historical dates see: Prayon, 1981. See also: Cristofani 1984.
305 Östenberg 1983.
306 The figure of 1,200 buildings is obtained by extrapolation since less than 4% of the urban area was excavated: Wikander, Ö., 1993 a, 137-9.
308 Wikander, Ö., 1993 a, 87-99.
using a mould and dated from 580/560 BC, are classified as a light buff ware. Fabrics as well as samples from clay deposits around the site were investigated by various archeometric techniques. Analysis of trace elements by X-ray Fluorescence (XRF) revealed several clusters. From these analyses it is deduced that the composition of the paste used for the modelling of cooking stands is very close to the pastes of the wall plaster or daub. The composition of the pottery and tiles is not related to this group. Trace element analyses of impasto household wares and terracottas indicate a close relation in raw materials. Scheffer has isolated the cooking stands and associates them with household manufacture on account of variations in size, shape and decorations. This evaluation coincides with the paste composition. Nevertheless, professional potters were involved in the production of the architectural terracottas. Chemical analysis of terracottas and one sample of a storage jar demonstrate that they are identical in composition. This implies that workshops made household ceramics as well as terracottas. Stylistically this is confirmed by the direct correlation between painted pottery and painted architectural terracottas from Acquarossa.

Thin-section analysis of the tiles reflects that the clays were deliberately tempered because chamotte or grog is present in all samples. Furthermore, the temper included quartz, feldspar, augite, ore, basalt and slag. The wares vary distinctly and five ware groups could be identified. This implies changing or different workshop characteristics. The analysis of the roof terracottas and clay samples indicates the exploitation of several claybeds around Acquarossa. This may suggest that more than one workshop was involved in the manufacture of tiles, architectural terracottas and household ceramics.

The existence of several workshops is also indicated by a quantification of the output. This quantification can be criticised but for this research the calculations made by Wikander need to be examined. As mentioned above, it was estimated that at the time of its destruction, Acquarossa numbered 1,200 buildings. This figure is based on the fact that almost 4% of the urban area was excavated and that more than 40 houses were uncovered while it was possible to identify 49 roofs. The whole urban area could contain about 1,200 buildings. The percentage of the excavated area can be considered representative for the whole urban area because the various excavation zones are located all over the plateau. Wikander assumes that 1,700 buildings were erected over a period of 100 years because half of the buildings were constructed on top of previous buildings. On average the houses at Acquarossa covered about 60 square metres which would have required approximately 300 standard pan-tiles, 270 standard cover tiles and 12 to 21 ridge tiles. This accounts for about 1,100,000 ceramic artefacts for 1,700 buildings including 10% for repairs. Moreover, a percentage of the houses was decorated with terracotta antefixes, raking simas, revetment plaques and some additional ceramic artefacts. Thus, Wikanders’ estimation for the output of the terracotta workshops at Acquarossa suggests that per annum an average of about 11,500 artefacts were produced over a period of approximately 100 years. However his analysis rests heavily on the reconstruction of the total number of houses.

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309 Wikander, C., 1988, 131.
312 Wikander, C., 1988, 75-118, 130.
313 These tempering materials are locally available: Judson 1983.
314 Wikander, Ö., 1993 a, 167. The firing temperatures vary from 500/600°C to 800-1,000°C.
315 Wikander, Ö., 1993 a, 138-9. The massive data on architectural terracottas that were recovered at Acquarossa, and the extensive excavations of the urban area makes this site suitable for quantification. Criticism would evolve around the number of buildings erected or the density of buildings per hectare. Wikander also evaluates the estimations of the number of inhabitants in Acquarossa which alternate from 1,250 to 4,000/7,000. According to his analysis 4,000 to 7,000 inhabitants is a reasonable assessment.
316 Wikander, Ö., 1993 a, Fig.28. Moreover, preliminary investigation trenches denote that the whole urban area was inhabited: Wendt et alii 1994.
houses erected at the site and this number appears to be debatable. On the other hand, the estimated figure does not represent storage jars and other household vessels which were probably also produced in these workshops. The output of 11,500 ceramic artefacts per year has to be related to the output of tileries recorded in antiquity. The output of these tileries varies enormously from about 1,000 tiles a year by a team of 7 workmen in the Isthmia experiment to 220 tiles a day by one craftsmen as recorded by some Roman graffiti. A rate of 220 tiles a day refers to the modelling and does not include other activities such as the transport of the clay or firing. The figure of the Isthmia experiment includes the whole process from the extraction of the clay to the distribution of the fired product. The substantial size of the architectural terracottas from Acquarossa would affect the production time and makes a figure of 220 tiles a day unlikely.

Considering the upsurge in building activities at Acquarossa which is reflected in the estimated output, it is probable that several small workshops existed simultaneously. This corresponds with the distinctive ware groups for the tiles and the exploitation of various claybeds in the vicinity of Acquarossa. Simultaneously, a continuation of the household production is suggested at least for the cooking-stands. It is likely that the workshops modelling the ceramic building materials increasingly absorbed the manufacture of other impasto wares. In time the household production will have declined.

2.6.6 Poggio Civitate

Poggio Civitate is located near the modern village of Murlo in the region of Siena, about 70 km south of Florence. The site is situated on an isolated hill overlooking the surrounding countryside and lies between the Sienese clay district and the Colline Metallifere. It is located between the interior Etruscan towns of Chiusi and Arezzo and the coastal centres Roselle, Vetulonia and Populonia. Poggio Civitate and the neighbouring site of Montalcino control the river crossing of the Ombrone which is the natural route between the Tyrhenean coast and central Etruria. The site is included in this report because of the considerable evidence for manufacture.

Among the architectural ceramics found at the site, there are quite a few which belong to the earliest examples in central Italy. These ceramics can be related to advanced construction techniques. The life-sized, human ceramic figures which decorated the ridge of the monumental early Archaic roof and the substantial terracotta drainage pipes exemplify the outstanding competence of the artisans who erected these complexes. The social-economic level of the site is advanced which is documented by the excavations and shown in the structures and artefacts. Poggio Civitate is somewhat an anomaly in the archaeological record and, therefore, its interpretation has become enigmatic.

Interpretations of the site include so far, palatial complex, seat for a Northern League, meeting hall, religious centre and political sanctuary. Whatever the explanation the analysis has to include the fact that it was a production centre as well.

317 Wikander, Ö., 1993 a, 137-9; Person 1994.
318 Rostoker and Gebhard 1981. The Roman graffiti are recorded by for example, Peacock and Tomlin: Peacock 1982, 143; Tomlin 1979, 233, 236.
319 Unfortunately the excavations await final publication. For a general report on the site see: Phillips 1993. The extensive annotated bibliography in this publication illustrates the interest Poggio Civitate has aroused. The drainage pipes are published in: Case e palazzi d’Etruria 1985, 127-8. Twelve tubes were recovered which had been inserted into each other. Two tubes were published measuring a length of 76 to 84 cm and a diameter from 44 to 51 and from 38 to 56 cm. The Etruscan character of the site is not just reflected by the pottery but also by an inscription on a small ivory lion’s head. The inscription is dated to 630-600 BC and is translated into I am from Avile: Cristofani 1975, 9. Rathje implies that the Near Eastern influence is notable at the site: cf. Rathje 1988.
320 Though it is an anomaly, the architectural complex at Poggio Civitate should not be considered a curiosity. One can expect similar, early structures elsewhere in central Italy: Torelli 1983, 482; Rathje 1988, 87-8.
Since 1966, excavations have revealed several early monumental buildings which are dated from around 650 to 530 BC (Fig. 36). Two major building phases are reported. The first phase dates to the seventh century BC and consists at least of a large rectangular building and the southeast building or stoa-workshop. The rectangular building of about 37 by 8 m, had one floor and is dated around 650 BC. The ground floor contained rows of storage jars set into the earthen floor. This building was destroyed by fire during the late 7th century BC. Considerable amounts of carbon were found in and around the storage jars and probably derive from the burnt wooden beams that had supported the first floor. Another indication for the first floor is the scatter of household ceramics in and around the dolia as if fallen from above when the building collapsed during the fire. The roof of the building was covered with terracotta tiles and decorated with acroteria and antefixes. The affluent character of the site is recorded by the artefacts preserved in situ. The artefacts associated with this building include local bucchero, imported Greek and

321 A concentration of carbonized beans and seeds is associated with the 7th century BC building: Nielsen 1991, 250.
Etruscan pottery, common impasto household vessels, metal objects, jewellery and much carved ivory and bone. It was claimed that the bucchero vessels belong to an elaborate banqueting service.322

Fig. 37. Poggio Civitate, plan of the southeast building or stoa workshop and the ceramic mould and cast of a canopic head.

The southeast building or stoa-workshop is an elongated structure of about 48.5 by 6 m with a triple row of columns (Fig. 37). It appears to be an early form of an open stoa since no stone wall foundations were discovered. It was a spacious, roofed area, open on all sides for adequate light and ventilation. The complex is dated by Nielsen to around 630 BC mainly on account of the architectural terracottas which decorated the structure.323 It was erected with the Italic/Oscan foot as measuring unit and this is the earliest example in central Italy of the employment of a historically known linear unit for construction works.324 Between the column bases, 67 covertiles were found, lying directly on the hard packed floor. They had not yet been fired but had been neatly laid out to dry in several rows. The general appearance of the area is that of a workshop. This is supported by the mould of a canopic head found

324 Nielsen 1987, 91-2. I refer to Wikander for a comparison of units of length in central Italy based on architectural ceramics: Wikander, Ö., 1993 b. His sceptical judgement on the early use of measures is not supported by the evidence that is presented in chapter IV of this study.
against one of the column bases (Fig. 37). Moreover, industrial waste of the processing of other materials such as ivory, bone and metals were found in and around this structure. Therefore one of the functions of the building was to serve as manufacturing area. A kiln is not reported yet but can be expected in the vicinity. At one stage the building was destroyed by fire.

The southeast building represents the oldest architectural, workshop structure in central Italy. The labour involved in its construction and decoration does not suggest a semi-permanent building that was erected to serve the craftsmen who built the other monumental buildings at Poggio Civitate. Within this context one can quote Nielsen who wrote: 'That so large a structure was devoted to the practical needs of a workshop must raise some questions on the general interpretation of the site. Furthermore, that so utilitarian and unceremonial a building was decorated in such an elaborate fashion will necessitate a reconsideration of the identification of buildings and their functions solely on the basis of their architectural members'.

After the fire that demolished the 7th century BC rectangular building of about 37 by 8 m, this building was replaced around 600 BC by an edifice of imposing proportions with a large colonnaded central courtyard. The complex has an almost square layout, each side measuring about 60 m. The walls were of mudbrick and pisé, that is rammed earth and the building was elaborately decorated with architectural terracottas. A series of life-sized human figures, both seated and standing, and some animal statues were positioned along the ridgepole. Other moulded or hand modelled terracottas for the protection of the wood and the decoration of the roof, included Gorgon and feline representations, daedalic heads and frieze plaques with horse races, banquet and procession scenes. This building was deliberately dismantled around 550/530 BC.

The pottery production at Poggio Civitate includes architectural terracottas and household ceramics. A stylistic, close relationship between the local bucchero and the terracottas was observed especially for the mould-made sections. For example, the canopic heads which decorated the stoa-workshop are related to the potnia theron handles in local bucchero. Cristofani identified other common features of the pottery decoration and the architectural terracottas. This homogenous style in both the terracottas and the pottery at Poggio Civitate reflects an organisation of the ceramic production which involved both potters and coroplasts. Elemental analyses of the ceramic fabrics of Poggio Civitate confirm the compositional similarity of wares. Two main clusters were identified. One group of wares included the architectural ceramics, coarsewares and impasto. The other main group incorporated bucchero, orange wares and some fine orange wares. The differences are attributed to the preparation of the clays and the firing technology rather than to different clay deposits. The archaeometric information supports the impression that the majority of the ceramics at the site are of local manufacture.

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325 Besides this mould, a fragment of a mould for a lateral sima was found near the well, south of the Archaic building complex: Nielsen 1991, 245.

326 See section 3.6.8.

327 During the fire the unfired tiles turned into ceramics. The footprints on some of the tiles are related to the confusion during the fire. ‘Several persons ran over the soft clay tiles, flattening them and leaving behind clear sets of footprints’: Nielsen 1987, 92.

328 Nielsen 1987, 119. Nielsen concentrates on an interpretation as workshop though it could be that this buildings served other functions as well. Damgaard Andersen presents some Archaic workshops in central Italy which are decorated with architectural ornamental terracottas: Damgaard Andersen 1993, 71-2, 79-81.


330 Cristofani 1975, 11-2. He suggests that the coroplast who worked at Poggio Civitate, was used to model pottery and that this would account for the unsophisticated appearance of the terracottas. Thus, it is feasible that this potter who probably worked in a small team, produced terracotta statues, building materials like tiles and drainage pipes, as well as pottery.

331 Tobey et alii 1986. The authors differentiate between coarse wares and impasto. Impasto pottery is more depurated and the vessels have thinner walls than coarse wares. This distinction is usually not followed by other scholars.
During its existence, the workshop which decorated the various monumental buildings did not alter the paste for the terracottas which indicates continuity. The Orientalising and Archaic terracottas are modelled with the characteristic Murlo fabric.\(^\text{332}\) Progress in efficiency is recorded by the rooftiles because the early pan and cover tiles are not as standardised as those of the Archaic building.\(^\text{333}\) The moulds used by the potters must have been numerous. The twenty-five terracotta heads from the stoa-workshop derived from five different moulds.\(^\text{334}\) In addition to moulding, hand modelling continued. Both human and animal statues as well as the feline spouts of the lateral simas were modelled by hand.\(^\text{335}\) The combination of modelling techniques for terracottas by hand and mould at Poggio Civitate, demonstrates the close relationship between the production of architectural ceramics and the coroplast tradition.

Local pottery production is attested by the significant number of household vessels.\(^\text{336}\) The common impasto household wares were described by Bouloumié and Bouloumié-Marique.\(^\text{337}\) The coarse wares include ovens, braziers, baking-covers or cooking-bells and cooking-stands some of which are made from the same paste as the terracottas.\(^\text{338}\) As well as the red-brown impasto, other locally employed fabrics include impasto buccheroïde, grey bucchero and a fine yellowish fabric with a red-brown engobe. These pastes were used for the manufacture of plates, bowls, cups, mugs, ribbed jars and lids. A total of 400 to 500 shallow plates were excavated which shows regular production.\(^\text{339}\) Bucchero drinking cups are also frequently encountered. The potters at Poggio Civitate imitated the bucchero repertoire in various fabrics and Bouloumié-Marique implies a simultaneous production of bucchero and impasto wares especially of those forms which are identical but modelled from various pastes.\(^\text{340}\) This reflects the situation as encountered at S. Pietro a Sieve where among the wasters from a pottery workshop various fabrics are recorded including bucchero and impasto.\(^\text{341}\) Thus the pottery workshop at Poggio Civitate made common table wares as well as elaborately constructed bucchero cups with moulded handles. The cups may have been made on commission. The employment of various fabrics in the same workshop could be a feature which is characteristic of pottery workshops in the smaller, secondary centres of central Italy.

The three monumental structures from Poggio Civitate illustrated in Figure 36, are incorporated in a settlement area because defence structures and tombs were discovered. The limited area so far excavated, does not permit a reconstruction but the site obviously required protection due to the defence system. Remains of this system included a fossa and two parallel walls separated by a passageway. The inner wall was preserved to a height of 185 cm. while the outer wall was lower. In one corner of the passageway, a concentration of sling stones was found which was probably intended as munition.\(^\text{342}\) Tombs were located on the Poggio Aguzzo, a small adhering hill to Poggio


\(^{333}\) Phillips 1993, 56.

\(^{334}\) Nielsen 1987, 102.

\(^{335}\) Phillips 1993, 20. The statues were constructed in segments and are hollow. The segments were attached to each other in order to fire the clay figure as one artefact. Openings in the statues ensured ventilation which kept the interior dry.

\(^{336}\) Cristofani 1975, 11.


\(^{338}\) Bouloumié 1978.

\(^{339}\) Phillips 1993, 61.


\(^{341}\) De Marinis 1991. A ribbed jar similar to the jars from Poggio Civitate is illustrated by De Marinis in Fig. 17. See for some additional information on this site section 2.1.

Civitate. Among the finds associated with the tombs, are copper alloy buckles with iron inlay, a copper alloy helmet, an iron spear point and a few fibulae. The finds date to the early Archaic period. Both the defense system and the tombs indicate that the buildings were incorporated in a settlement. Moreover, loom weights, spools and spindle-whorls are common and demonstrate that textiles were produced at the site. This indicates that the settlement was permanently inhabited.

The suggestions concerning the local production made by Phillips, are twofold. He implies that skilled craftsmen thrived on the demand generated by the inhabitants of the site itself but also that the local industry could have been a major source of income for the inhabitants of Poggio Civitate. If the monumental structures at the site had a public function than visitors were given or might have acquired commodities that were made locally. The analysis of Cristofani who considers Poggio Civitate to be a rural centre with a residential complex of a dominant family, could account for the additional settlement traces such as the defence system. This interpretation can accommodate as well the evidence on craft specialisation. Thus, the craftsmen who worked at the site, are related to the demand generated by the leading family as well as by the centre itself. These artisans were involved besides the manufacture of prestige items, in the production of more ordinary wares.

2.6.7 Marzabotto

Marzabotto is the most northern, ancient town presented in this study. It is located about 30 km SW of Bologna and is included because the site illustrates a different model of workshop nucleation. At Marzabotto several pottery workshops were excavated during campaigns which started in the last century (Fig. 38). All in all, four workshops dated to the late 6th or 5th centuries BC, could be identified by means of kilns, wasters and other primary evidence related to the manufacture of ceramics. These four workshop contexts will be presented individually.

The workshop in Regio IV, Insula 4 was excavated in 1885 (Fig. 39). Brizio reports six kilns for firing pottery, five of which were situated in a long building of 10 by 7 m. The sixth kiln was in the south-west corner of the next room in which a well was also excavated. The kilns are of type I with an average size of about 110 by 100 cm. The soil around the kilns was black and contained much carbon. Household ceramics, such as storage vessels, cups and oinochoai, were found inside the kilns. Some of the kilns contained long bricks which probably supported other large bricks with which the internal floor of the firing chamber were constructed. The illustrated brick in Figure 39 has some ventilation holes and two notches which, according to Brizio, makes it likely that several of these bricks constituted the internal floor of the kiln. The oinochoai and other vessels found in the kilns as well as in the nearby well, date this complex to the 5th century BC.

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344 Case e Palazzi d'Etruria 1985, 149.
345 Phillips 1993, 72, 81. In addition, he suggests that some of the rooms of the Archaic building might have been shops: Phillips 1993, 10. This is one of the remarks that denote that the speculations on the site are abundant.
346 Cristofani 1975.
347 Principal members of this family might have combined in their position both political and religious power: Adembru 1992. Thus, they could generate additional demand for goods because both positions required ornamentation as well as artefacts for redistribution.
348 Brizio 1889, 281-3. The bricks for the internal floor were made of refractory clay and measured 42 by 27 by 11 cm.
During excavations in 1964 the workshop in Regio II, Insula 1 was discovered. A detailed report on the features of this workshop was provided by Saronio. Because the workshop is exceptionally well preserved, it demands a full description (Fig. 40).

It was situated along the main road A near the northern border of the city and the area excavated measures 36 by 17 m. The workshop was already in use during the late 6th century BC as shown by some remains that could be dated to the period prior to the rectangular, regular layout of Marzabotto. The building of the kilns for example, can be subdivided in an earlier and a later phase as can the construction of the basins or tanks which are situated near the water supply. During the first stage the basin was a circular pit lined with pebbles after which it was filled with wasters from the kiln in order to form a platform for the rectangular tank. This tank was directly linked to the water supply.

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Fig. 38. Marzabotto, general map with location of workshops.

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349 Saronio 1965.
supply in order to collect the water which derived from more elevated quarters of the town.\textsuperscript{350} The rectangular tank was constructed with tiles and must have provided the workshop with water since a well was not found. A second rectangular container of 120 by 150 cm was filled with yellow clay. This container was probably already in use during the first phase of the workshop as a reservoir for preparing clay.\textsuperscript{351} In one room an area of 5 by 5 m. (no. 6 in Fig. 40) was covered with a substantial quantity of \textit{tegulae} and \textit{imbrices} which had been regularly disposed. The tiles measured 65 by 45 cm which is the usual size at Marzabotto and some of the cover-tiles had plain antefixes. Further details are missing but since the excavator mentions a large quantity of tiles which had been arranged, I suggest to interpret this room as a store for fired artefacts.

![Fig. 39. Marzabotto, pottery kilns and building remains in Regio IV, Insula 4 combined with drawings of a kiln and its structural features.](image)

The kiln has a north-south orientation, is rectangular in shape and measures 510 by 240 cm. The floor of the combustion chamber was constructed of fired earth while the walls were made of porous \textit{impasto} bricks. The opening of the kiln is to the north where the earth was mixed with ash and carbon. To the north-east of this kiln, a smaller kiln was discovered which measured 95 by 105 cm. This smaller kiln was probably used during the first phase of the workshop. Near the kiln some rings of refractory clay were found which are likely to have separated the individual vessels in the firing chamber. To the south of the kiln, there was a room partly paved with tiles near which a large terracotta basin and a storage jar was placed together with some bowls and a pitcher (no. 7 in Fig. 40).\textsuperscript{352} This area was probably used for storing water and for washing. Remains of a wooden floor were found underneath the

\textsuperscript{350} Sassatelli 1994, 57.

\textsuperscript{351} Saronio 1965, 396.

\textsuperscript{352} The basin had a diameter of 105 cm and a height of 21 cm. The storage jar had a height of 45 cm and a width of 42 cm.
basin. Along the streetside of the interior of the house, the excavators detected a row of post holes which were interpreted as an open roofed area where the unfired artefacts could dry (no. 8 in Fig. 40).

Several terracotta antefixes were found near the workshop and could have decorated the building or might have been produced here. The wasters confirm that the workshop produced building materials such as tiles and bricks. Sassatelli reports the production of domestic wares and even mentions some fragments of moulds, one of which represents a male head which could have been used for making appliques for the decoration of large ceramic artefacts.

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353 Saronio 1965, 407-12.
354 Sassatelli 1994, 57.
356 Saronio 1965, 416.
357 Sassatelli 1994, 57.
Saronio doubts whether potters actually lived in this building and considers it to be merely a production unit. However no function has been attributed to some of the southern rooms and these could well have been used for dwelling. Moreover, the west side of the building is only fragmentarily preserved. These considerations, the washing facilities as well as the size of the complex make it, in my opinion, probable that some space was designated for habitation.

The workshop in Regio III, Insula 4 was excavated around 1970. It is poorly preserved but identified as a workshop because of the presence of a small kiln of type I (Fig. 41). The kiln was oriented north-south with the opening towards the south and was situated against the east wall of a building. It measures 115 by 70 cm and was probably domed. The kiln had a combustion and firing chamber and was bisected by an interior wall which supported the raised oven floor. Much carbon was found on one side of this wall. Traces of foundation walls were identified near the kiln but could not be reconstructed in detail as workshop remains. A well was situated near the building. Four post holes were preserved along the wall which resembles the situation in the workshop in Regio II, Insula 1. The post-holes are in line but not spaced regularly. It is suggested that they are the remains of a shelter or drying shed for unfired pottery. In my opinion, the post-holes are too close to the wall and kiln. This makes it difficult to assume a separate structure contemporary with the other features. Further details are missing due to poor preservation.358

358 De Maria et alii 1978, 68-9. The description by De Maria reveals that the workshop was located in Insula 4b on the opposite side of the alleyway when compared to its location as indicated by: Mansuelli 1979 a, Fig. 1. To the north of Regio III, Insula 2, two kilns for firing laterizi were recovered. These kilns are dated to the late Republican or early Imperial period: De Maria et alii 1978, 81-91.
The fourth workshop was excavated recently in Regio IV, Insula 2 and measures 20 by 35 m over the full width of the Insula.359 Figure 42 presents the preliminary plan of this workshop. A functional interpretation of the various rooms is made difficult first by past agricultural activities which have severely disturbed the habitation levels of the building, and secondly, by the preliminary character of the reports so far available. Several kilns were recorded which had not been in use simultaneously. It appears that from the beginning one of the functions of this area was related to the manufacture of both pottery and building materials. Within room E the remains of a kiln were excavated which had been used to fire architectural terracottas. The kiln was dismantled and became filled with ceramics, carbon, some fragments of the internal floor of the kiln and wasters of tiles and cover-tiles.360 Other traces of workshop activities were found underneath some walls and thus predate the building. Two basins are reported which could hold water for wetting clay361 as well as a large rectangular substructure which was probably used as a cistern.362 In room N two rectangular kilns of different size were excavated (Fig. 42). The large kiln measures 2 by 1.2 m and the small kiln 90 by 80 cm. On account of the size of both kilns, it is suggested that the large kiln was employed for firing tiles besides other vessels while the smaller kiln was only used to fire pottery. Near the north wall of room O other traces of workshop activities were found. It is reported that remains of at least three kilns were found. These kilns had been partly reused to construct in a later period other kilns with a different size, shape and orientation. At least two kilns have a circular plan while the other is rectangular. There is also some evidence which suggests that metals were worked near this building because a small copper alloy ingot, many slags and some moulds for casting copper alloys were found. This workshop revealed various inscriptions one of which was probably a complete alphabet. This could imply that at least some of the artisans were literate.

The evidence from Marzabotto demonstrates that several pottery workshops existed simultaneously. The features of the remains of workshops excavated differ. The workshop in Regio II, Insula 1 had a functional layout of several compartments which can be attributed to aspects of the manufacturing process while the workshop in Regio IV, Insula 4 consists mainly of a collection of kilns. Two workshops have preserved a stratigraphy which illustrates that they were intended from the beginning to be pottery workshops.365 During the 5th century BC, these workshops became incorporated in the orthogonal layout of the town. They are situated within the urban grid and not transferred to the outskirts. Urban nucleation with a relocation of the workshops to the outskirts is recorded at Laurentina-Acqua Acetosa while the evidence from Marzabotto exemplifies another model in which their position is a continuation of their original location within the settlement. The pottery workshops in Regio II, Insula 1 and in Regio IV, Insula 2 are characterised as large, spacious complexes which probably included living quarters. The washing facility and rooms with wooden floors of the workshop in Regio II, Insula 1 implies that the workshop was used partly for habitation. Some craftsmen and traders had, therefore, living quarters along the main roads of the town.366 The size of the workshops does not indicate that artisan families were of subordinate status. Mansuelli suggested that an aspect of Etruscan town-planning was egalitarianism. This hypothesis is based on the proportions of the houses at Marzabotto, the domestic objects found in these houses and a comparison between the situation at

359 For reports on this workshop see: Sassatelli and Brizzolara 1991, 1995; Sassatelli 1994, 91-2. Since these are preliminary reports some details have not been presented yet.

360 Sassatelli and Brizzolare 1991, 389.

361 From the reports it is deduced that these tanks are like those of the workshop in Regio II, Insula 1.

362 This substructure measured 4.3 by 2.8 m with a depth of 2 m. It had perfect straight walls and was filled with ceramics and building materials. As such it resembles the cistern and basin documented at Caere: see section 2.6.4.

363 Mansuelli 1979 a, 38-40. He states that the settlement from the beginning was inhabited by artisans and that a 6th century BC metal workshop was subsequently incorporated into the regular grid which is dated to the beginning of the 5th century BC.

364 Mansuelli 1979 b, 358.
Marzabotto with the *Crocifisso del Tufo* cemetery at Orvieto.\textsuperscript{365} Though the social stratification was not egalitarian, the evidence from Marzabotto implies that stratification might not always have been expressed in the size of the building plots for private houses because many late Archaic houses and even workshops are considerable in size.\textsuperscript{366}

![Marzabotto, pottery workshop in Regio IV, Insula 2 combined with an illustration of two kilns in room N.](image)

The wasters in or near the pottery workshops substantiate the argument that they were mainly involved in the production of building materials and domestic ceramics. The potters predominantly produced subsistence goods for local demand. As yet, no evidence was found which supports the idea that the potters at Marzabotto were involved in the production of luxury vessels or terracotta statues though the mould for terracotta appliques from the workshop in *Regio II, Insula 1* establishes that this workshop produced decorated large vessels as well as architectural terracottas. The evidence from Marzabotto illustrates once more the close relationship between the production of building materials and large ceramic vessels. The demand for earthenware was encouraged by the rapid expansion of the town at the beginning of the 5th century BC. This expansion required substantial amounts of building

\textsuperscript{365} Mansuelli 1979 b, 358, 360.

\textsuperscript{366} It is suggested that the buildings at Marzabotto merely had a ground floor: Mansuelli 1979 a, 42. Thus, the workshops with living quarters in *Regio II, Insula 1* and in *Regio IV, Insula 2* measure about 700 m\textsuperscript{2}. In comparison with other workshops, the workshops at Marzabotto are the most spacious in central Italy. The houses which were excavated by Carandini since the mid-1980s on the northern slopes of the Palatine and which are dated to the late 6th century BC have a ground floor which is slightly larger than the workshops at Marzabotto. The buildings in Rome are however, reconstructed with a first floor: *Grande Roma* 1990, 97-9. According to the director of the excavations these houses were private residences which were inhabited by the Roman aristocracy. It is suggested that these Roman houses remained the ancestral homes of the leading families for many centuries to come: Cornell 1995, 96-7.
materials such as tiles, bricks and other architectural terracottas. Tiles and cover-tiles were used at Marzabotto not only for roofs but also for pavements, basins and covering drains and water supplies.

An impression of the quantity of the domestic vessels derives from a typological study of local ceramics by Bouloumié.367 His study is based on pottery that was excavated from an area of approximately 3 by 3 m of house III in Regio 4, Insula 1 (Fig. 62). In these 9 square metres about 340 kg of ceramics were found. The wares which are dated from the late 6th to the late 5th centuries BC, varied in fabric from fine, semi-fine to coarse and the colours that were obtained during firing are greyish-black (bucchero), brown, red, yellowish or pale. This implies that the potters at Marzabotto used various clay deposits simultaneously from which they made several fabrics according to the type of vessel being produced. Some of the ceramics were coated with a slip which indicates levigation of the clays. The vessels incorporate the whole range of ceramic types known from other sites. They include amphorae, oinochoe, olpai, skyphoi, kylikes, jars, small jars, cups, lids, bowls, goblets, plates and basins. Bouloumié reports that 40% of the examined batch consisted of bowls, 25% of goblets or cups, 25% of jars while the remaining 10% consisted of the other types. He mentions that the bowls were made on a semi-industrial scale368 but it appears from the evidence presented in this section, that a workshop could produce the whole range of vessels types.

When compared with Felsina which is just 30 km distant from Marzabotto, the cultural features at Marzabotto seem distinct.369 It is, therefore, probable that Marzabotto had its own social-economic territory. This implies an economy based on an internal flow of commodities with an urban centre which functioned as a market place for its territory. this accounts for the relatively large number of workshops at Marzabotto. Mansuelli characterised Marzabotto as a 'concentration of production in relation to lines of communication'.370 An agora or forum has not been discovered yet. Available information suggests that the transfer of the commodities produced locally, is closely related to the individual workshops.

The rapid development of Marzabotto can be associated with the reorganisation of the pianura padana during the second half of the 6th century BC. From 540-530 BC, old centres such as Felsina were revitalised and urban centres for example Spina, Mantova and Marzabotto were founded ex novo.371 The foundation of these new centres was supported by the original inhabitants and was the result of the increasing economic importance of the region. This stimulated denser communication routes and the development of commerce.372 The invasion of Etruria by Gallic tribes at the beginning of the 4th century BC induced radical changes in the Po Valley and to the south of the Appenines. Marzabotto lost its urban characteristics. Consequently, it existed chiefly as a town during the 5th century BC when several artisan families were among its inhabitants.

2.7 Ancient literary texts

Except for some inscriptions that can be related to potters such as Aristhónothos or Kusnailise, there is no literary

367 Bouloumié 1976.
368 Bouloumié 1976, 114.
369 Mansuelli 1979 a, 40, 44.
370 Mansuelli 1979 b, 366.
371 Sassatelli 1990 a, 60-2.
372 Sassatelli 1990 a, 68-9. He concludes on account of inscriptions from Bologna and Marzabotto, that mainly indigenous families were involved in the reorganization of the area but that Etruscans cannot be excluded. A different view was expressed by Mansuelli who suggests that the developments in the Reno valley cannot be explained predominantly in terms of a local development: Mansuelli 1979 a, 36-7.
evidence for craft specialisation in central Italy between 800 and 400 BC. Most of the later texts known, describe specialisation as a process which crystallised during the Formazione della Città. These texts date to Imperial Rome but are based on earlier writings. For example, Plutarch mentions in his description of the life of Numa, ‘... that of all his measures, the one most admired was the distribution of the people into groups according to their trades or arts. He distributed them into musicians, goldsmiths, carpenters, dyers, leatherworkers, curriers, braziers and potters’, Plutarch Numa, 17.

Pliny, who lived from about 23 to 79 AD, records two of the seven collegia of craftsmen established by Numa Pomphilus. These are the copper/bronze workers (NH 34, 1) and the potters. Pliny's text on the potters is quoted at the beginning of this chapter.

According to Florus, who lived in the 2nd century AD, it was not Numa Pomphilus but Servius Tullius who ‘... entered the people on a census-roll and arranged them into classes, being distributed into divisions and corporations. The state was so organised that all distinctions of inheritance, dignity, age, employment and office were committed to registers and thus a great state was ruled with the exactitude of a small household’, Florus I,6.

The seven collegia recorded for Rome by the ancient authors belong to the oldest guilds and already Waltzing alludes to the specialisation involved. He indicates that the artefacts produced by these guilds do not belong to what is normally made within a household. The specialisations mentioned by Plutarch are usually considered to be among the oldest since they are the same as those recorded in the Homeric poems. Other evidence of an early date for the establishment of collegia is to be found in the XII tabulae. These tables record the early legislation of Rome and refer to collegia. They are securely dated to the first half of the 5th century BC but could relate to customs that had been established in the previous century.

There appears to be a discrepancy in the literary texts for the period in which the collegia emerged. Some texts mention Numa Pomphilus as the instigator while others consider Servius Tullius as the author of the collegia. It is noteworthy that quite a few, new manufacturing techniques which required the establishment of workshops, were introduced to central Italy during the second half of the 6th century BC, the period that is traditionally ascribed to King Numa. The actual institution of collegia must have been later and could date to the 6th century BC, the period ascribed to Servius Tullius because my study records several towns with industrial quarters from the late Archaic period. The nucleation of workshops is recorded in these quarters. The urban development of Rome and the subsequent building activities would have established a demand for ceramics which makes nucleation of pottery workshops feasible for the 6th century BC. Pliny mentions that the collegium figulorum was established as the last collegium. He alludes to the potters' wheel and thus describes the workshop mode of production; Pliny, NH 35, 159. He also explicitly refers to bulk products such as amphorae, tiles and bricks. Terracotta rooftiles, amphorae and mud-bricks are recorded in central Italy from the 7th century BC but in this respect one should not take his text verbatim. For example, amphorae production during the 7th century BC has not been assigned to Rome but to some major Etruscan towns such as Vulci. Pliny also mentions earthenware drainage pipes. Some early terracotta drainage

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375 Plutarch lived from the second half of the 1st to the beginning of the 2nd century AD. Numa's reign is traditionally dated from 715 to 673 BC. He is the mythical successor of Romulus.

376 I refer to the bibliography for references to the translations used in this study.

377 The reign of Servius Tullius is traditionally dated from 578 to 535 BC.


pipes dated to the early 6th century BC, were found at Poggio Civitate.\textsuperscript{380} Pipes from this period are, however, exceptional and their bulk production is probably from a later date. Pliny may actually refer to his own lifetime since the large scale production of fired bricks in Rome started after the great Neronian fire.\textsuperscript{381}

In time, the \textit{impasto} pottery started to be made by specialised craftsmen who may initially have been involved in the manufacture of ceramic building materials. The workshops producing the architectural terracottas gradually absorbed the \textit{impasto} production. This could account for the continuing \textit{impasto} tradition in central Italy. This transition must have been gradual and can be dated to the period second half of the 7th and early 6th centuries BC. It can be illustrated by fabric analyses and requires a distinction between levels of standardisation. The local production of non-standardised, coarse household wares is recorded at several proto-urban and urban sites side by side with more standardised and technologically advanced pottery. The manufacture of these coarse wares is usually reconstructed as a domestic activity which appears to continue into the 6th century BC. For example, Scheffer has isolated the locally made cooking stands of Acquarossa which are associated with the Archaic houses. The production of these stands is not correlated with craft specialisation but with household manufacture on the basis of variations in size, shape and decorations.\textsuperscript{382} A similar development can be noticed at Satricum where coarse, non-standardised fabrics appear to dominate the repertoire until the Archaic period. During the same period one can detect the upsurge in workshop conditions as is reflected in the manufacture of \textit{bucchero}. In this chapter it is suggested that these workshops could also produce a range of other fabrics during the 7th and 6th centuries BC, especially in the secondary centres such as Poggio Civitate, Satricum and probably the settlement at S. Pietro a Sieve. The manufacture of these wares reflects increasing craft specialisation leading to workshop conditions.

The ancient authors refer specifically to the situation in Rome and not to other major towns in central Italy. The existence of a \textit{collegium figulorum} presupposes urban workshop nucleation as has been demonstrated for Laurentina-Acqua Acetosa and Marzabotto. The archaeological evidence from Caere suggests the simultaneous existence of several workshops from the 7th century BC. Rome was, by the 6th century BC, a substantial town and urban nucleated pottery workshops are likely to have existed from then on.\textsuperscript{383} These workshops must have cooperated but it remains uncertain whether this cooperation became institutionalised into a \textit{collegium figulorum}. Therefore the archaeological information and the ancient literary texts coincide to some extent. There are many reasons for accepting an early date for the introduction of labour division according to the specialisations recorded by the ancient authors.

The mere presence of workshops in Rome during the 6th century BC demonstrates that the craftsmen are sedentary. They satisfied the increasing demand for ceramics by a growing urban population. There are, however, other literary sources which in my opinion, have overshadowed a discussion on established workshops in central Italy. This is primarily due to the reconstruction of travelling artisans based on texts related to famous coroplasts such as Diopus, Eugrammos, Eucheir and Vulca. Pliny reports:

\textit{... that when Demaratus, who in Etruria became the father of Tarquin king of the Roman people, was banished from the same city (Corinth) he was accompanied by the modellers Euchir, Diopus and Eugrammus, and that they introduced modelling to Italy}; Pliny, \textit{NH} 35, 152.\textsuperscript{384}

Livy discloses that Tarquinius Superbus asked for craftsmen from Etruria to build the temple of Jupiter in Rome; Livy I, 56. In addition Pliny mentions Vulca who:

\begin{flushright}
\textit{... that when Demaratus, who in Etruria became the father of Tarquin king of the Roman people, was banished from the same city (Corinth) he was accompanied by the modellers Euchir, Diopus and Eugrammus, and that they introduced modelling to Italy}; Pliny, \textit{NH} 35, 152.\textsuperscript{384}
\end{flushright}

\footnotesize
\textsuperscript{380} Case e Palazzi 1985, 127-8.
\textsuperscript{381} Peacock 1982, 133.
\textsuperscript{382} Scheffer 1981/1982, 23-5.
\textsuperscript{383} Cornell 1995, 173-210; Smith 1996, 129-232. Both authors describe the urban development of Rome during the 6th century BC. They do not present any data on the \textit{collegia} or on craft specialisation.

\footnotesize
\textsuperscript{384} cf. Torelli 1983, 472-7. Tarquinius Priscus's or Tarquin's reign is traditionally dated from 616 to 578 BC.
... was summoned from Veii to receive the contract from Tarquinius Priscus for a statue of Jupiter to be consecrated in the Capitol, and that this Jupiter was made of clay and consequently was regularly painted with cinnabar; and that the four-horse chariots about which we spoke above on the pediment of the temple were modelled in clay; and that the figure of Hercules, which even today retains in the city the name of the material it was made of (Hercules Fictiles), was the work of the same artist. For these were the most splendid images of Gods at that time; and we are not ashamed of these ancestors of ours for worshipping them in that material; Pliny, NH 35, 157.

Related to the craft of the coroplasts is the art of painting. According to Pliny, the Greeks Damophilos and his associate Gorgasos were most highly praised as modellers and painters and in 493 BC they decorated the Shrine of Ceres in the Circus Maximus at Rome with both kinds of their art, and there is an inscription on the building in Greek verse in which they indicated that the decorations on the right hand side were the work of Damophilus and those on the left were by Gorgasus; Pliny, NH 35, 154.385

These texts refer to the activities of coroplast workshops which were established during the 6th century BC. The evidence from Poggio Civitate and Acquarossa demonstrates that these workshops already existed during the second half of the 7th century BC. The amount of work executed by these workshops and the infrastructure necessary, for example pozzi, canals, kilns and buildings, do not imply temporary facilities and travelling workshops. These coroplasts masters established workshops that were semi-permanent. With increasing urbanisation these workshops may even have become permanent. Considering the construction works and architectural terracottas required in central Italy during the 6th century BC, it appears likely that at many sites only the coroplast masters, possibly accompanied by some assistants, would travel and were requested for specific assignments, but not the whole work force. Damgaard Andersen for example, mentions that by the late 6th century BC, the building of temples can almost be considered an industry.386 Regarding the immigration of craftsmen such as Eucheir, Diopos and Eugrammos, some valuable remarks were made by Ridgway in his contribution Demaratus and his predecessors.387 He underlines that these craftsmen were definitely not the first to arrive in central Italy and that the Demaratos story should be read in terms of interaction between equals. This interaction arose both between the Etruscan nobility and Demaratos as well as between the indigenous craftsmen and their immigrant counterparts.

2.8 Conclusion

A cross-cultural analysis of 185 societies by Murdock and Provost to examine the division of labour by sex, supports the argument that pottery production is an activity which becomes assigned to males when:
- simpler production techniques are replaced by more complicated procedures,
- residences become more settled,
- agriculture intensifies,
- complex civilisations are developing which results eventually in the assignment to male specialists of even the most female tasks such as cooking and making bread.

These four features are attested for central Italy during the period 800 to 400 BC. The general principle is that 'greater technological complexity is associated with a shift in sexual allocation of the more complex tasks from females to males'.388 The production of ceramics in central Italy changed significantly during the centuries reviewed.

385 See: Torelli 1983. Other references to the ceramic industry are found in Pliny NH, VII, 205; XXXV, 15-17, 151-155.
386 Damgaard Andersen 1993, 85.
387 Ridgway 1992 b.
The transformation is based on the adoption of fundamentally different production mechanisms on a local level. Around 800 BC the majority of the pottery was produced within the household by women who were either completely or partially independent in their ceramic requirements. Towards 400 BC the bulk of the ceramics was made by men within a workshop mode of production be it full-time or part-time occupation. Women may have assisted in these workshops but apparently men could claim control over the primary subsistence activities of their family. From ethnographic findings it was established that the production of pottery made by hand in slabs or by using an elementary mould or turntable and subsequently fired in a simple kiln without separation of combustion and ceramics, is mainly the activity of females who make pottery during household tasks, pregnancy and nursing. Thus, pottery making is accomplished within the household by using simple technology due to which the production chain can be interrupted when other household tasks need to be tended to first. Usually, women are allocated those sequences of activities which entail low risk tasks close at home.

The production of fine table wares using more elaborate and efficient technology such as a potters' wheel and an updraught kiln, involves artisans and reflects a men's craft. With increasing specialisation the pottery started to be made predominantly by men. However the production of ceramics could involve all members of a household in conditions that reflect a family workshop. Another option is the master workshop where labour depends mainly on assistants.

The technological and social-economical transformation of the ceramic industry is mirrored in the pottery itself. It is a facet of the process of specialisation which is related to the early urbanisation of the region. As mentioned above pottery technology became more complex during the period 800 to 400 BC while male craftsmen took over its manufacture. This transformation occurred gradually and involved various processes since a more complex mode of production does not exclude a simple one. The evolution of the potters' craft depended on factors such as the quality of the agricultural land and the extent of the local and regional market. The distinction between household and workshop industry may have faded slowly in the developing urban centres while in the smaller centres it probably did not disappear at all. In many smaller centres, pottery production remained a part-time activity and probably was organised around a family unit. The production of ceramics progressively evolved towards craft-specialisation. Until the 6th century BC, the local hand-made pottery used for preparing and firing food, may have been made within a household tradition. Simultaneously, ceramics are encountered which were made by craftsmen who utilised levigated clays and a fast wheel. These artefacts are known as fine-wares and were mainly used for eating and drinking. During the Orientalising Period the demand for these vessels is related to new consumption patterns and to a cultural change. Luxury ceramics started to be used during rituals such as the symposia. The ceramic vessels employed during these rites can be described as highly valued artefacts and luxury wares. Besides changing consumption patterns, demand is also affected by increase in population size and the number of households. According to Arnold, a household replaces three to six vessels a year and a population of about 1,000 would result in sufficient demand for utilitarian wares to induce specialisation. Thus any process which increases the number of households such as settlement nucleation and urbanisation, would eventually lead to full-time craft specialisation. A significant feature for central Italy is that the production of the plain wares became assigned to workshops during the 7th and 6th centuries BC. I suggest that this reallocation is closely associated with the manufacture of ceramic building materials. These ceramics started to be produced in bulk from the second half of the 7th century BC as is demonstrated by the developments at Acquarossa, Caere and other settlements. The

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389 The role of slaves within workshops is discussed at a later stage. It is probable that at this date slaves were mainly employed in domestic service and not in craft- or agricultural production: cf. Cornell 1995, 280. See also: Colonna 1975.

390 Arnold 1989, 100-8.

391 Scheibler 1984.


393 Arnold 1989, 156-7.
relationship between building materials and household ceramics is also recorded for the workshops at Satricum, Laurentina-Acqua Acetosa and Marzabotto dated to the late 6th and 5th centuries BC. The manufacture of architectural terracottas and household vessels together in one workshop is probably the main cause for the continuing *impausto* tradition in central Italy.

The emergence of workshops which produced utilitarian ceramics is, therefore, primarily related to an increasing demand due to the rise in the number of households during the 8th to 6th centuries BC. During the 5th century BC this development may have altered into population pressure and an associated marginalisation of the agricultural base of households which can be observed in changing settlement patterns. Marginalisation would also affect the conditions and organisation of workshops and the social position of potters. Increasing social-economic pressure is reflected by the disappearance around 500 BC of various centres such as Acquarossa, Poggio Civitate and Laurentina-Acqua Acetosa. It is also indicated by the pottery itself. For example, the development of the *bucchero* production has been described as ‘*pièces de prestige* (au VIIe s), *pièces de demi-luxe* perpétuant une tradition aristocratique (fin du VIIe et VIe s) et *pièces utilitaires communes* (fin du VIe au IVe s).’ This transformation of the *bucchero* production characterises the changes of the whole ceramic industry. From the 7th to the 5th centuries BC workshops gradually became involved in the production of subsistence goods for a local market. The nature of the ceramic product that was made in a workshop progressively altered from luxury to subsistence goods. The lasting evolution of the ceramic industry from a household activity to a workshop enterprise is correlated to this change in the character of the product. Workshops conditions were initially fostered by the elite who required luxury vessels while these enterprises became gradually also involved in the manufacture of subsistence goods. Moreover, one can detect from the evidence presented in this chapter a shift from small scale arrangements to large scale installations. The excavated workshop remains at Poggio Civitate, *Caere*, Laurentina-Acqua Acetosa and Marzabotto demonstrate the substantial size these enterprises could obtain.

The general development of the ceramic craft is presented above and is characterised by:
- the evolution from a household activity to a workshop industry and the related sexual reallocation of tasks,
- the role of the elite and the increase in the number of households,
- the close relationship between ceramic building materials and household wares,
- the transformation from luxury to subsistence goods,
- the increase in the size of the enterprises and
- emerging marginalisation of the craft during the 5th century BC.

In order to support this outline, I would like to continue the account in chronological order.

During the 8th century BC the pottery production was primarily organised as a household activity or industry. The early kiln structures at Lavinium, Rome and Cures Sabini are simple. It is not certain whether in these

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394 Torelli suggest an increase in craft specialisation around 500 BC. He implies that the manufacture of ceramic building materials became distinct and separated from the pottery production: Torelli 1983. His hypothesis is not supported by the primary data that is presented in this chapter.

395 See for example, Arnold for a discussion of the principle of marginalisation of the pottery production: Arnold 1989, 199.

396 Gran-Aymerich 1993, 35.

397 The 8th and 7th centuries BC workshop remains indicate simple, small scale structures which were mainly located in settlements that still consisted of huts. The lay-out of the workshop at *Caere* has not been excavated completely but the kiln, levigation tanks and waterworks cover an area of about 350 square meters while the workshops with living quarters at Marzabotto in *Regio II, Insula 1* and *Regio IV, Insula 2* are about 700 square meters.

398 Negroni Catacchio 1995, 280-3; Carafa 1995, 255. This chapter presents some early kiln structures at Lavinium and *Satricum*. Barbaranelli interprets an early Iron Age feature that he excavated at Torre Chiarucchia which is located along the coast, 7 km to the north of *Pyrgi*, as a pottery kiln: Barbaranelli 1956. This interpretation is ambiguous. For example, the feature does not have a combustion hole. He
structures the fire is separated from the pottery but an increase in the ability to control the firing circumstances is demonstrated by the pottery itself. This reflects conditions for household industries. Elementary household production must have continued though simultaneously workshops conditions were introduced for a restricted production of Italo-Geometric wares.

The ceramics from the 7th century BC exhibit an increase in specialisation along several lines. Workshop conditions are reflected by the continuing production of Italo-Geometric wares. A response of the indigenous potters is the bucchero production and elaborate fine impasto vessels. The demand for these luxury table wares was instigated by the elite and their changed consumption patterns. Examples of highly intricate drinking vessels from Ficana and Poggio Civitate are mentioned in this study but one can equally recall the production of the rudimentary workshops at Satricum, Vetulonia and Roselle. These workshops did not exclusively produce fine impasto vessels but also coarser fabrics. Thus, they manufactured a range of pottery wares some of which are highly elaborate. This reflects increasing craft specialisation leading to workshop conditions and, therefore, I have described these arrangements as rudimentary workshops. Authentic pottery workshops are characterised by efficiency and mass production which is not the characteristic feature of these early workshops. It is tempting to apply in this context the concept of energy expenditure which implies that in pre-state societies, pottery can be elaborately made while in state societies pottery becomes standard. This concept can only be employed for the 7th century BC if one incorporates Voutsaki’s comments that

1. labour in pre-capitalist societies is not a commodity, and
2. value is not crystallised at the moment of production, but can be redefined during exchange.

In chapter IV, I will demonstrate that market mechanisms were introduced in central Italy at least from the second half of the 7th century BC but that these mechanisms were adopted reluctantly. The confrontation between the market mechanisms of the Levantine and Greek societies versus the essentially, non market mechanisms of Italian communities appears to be contained in the quality of the attractive early bucchero and fine impasto table wares. This indigenous tradition can be contrasted to the production mode of the standardised wheel-turned pottery imitating the imported ceramics and that was characterised by a necessary increase in efficiency and full-time occupation. The labour intensive production of the fine impasto and early bucchero wares was probably not directly translated into value because their exchange was not regulated by a market. Therefore it seems that an immediate response of the indigenous potter to the efficiency of the workshop mode of production was an elaboration of the previously established impasto tradition. This idea is supported by the meticulous burnishing of these vessels which is a technique basically alien to wheel-throwing. The local potter adopted the majority of the shapes of the imported ceramics but did not embrace the associated technology and related market mechanisms. Nevertheless, the efficiency of their manufacturing techniques increased rapidly and the production of the bucchero and impasto table wares became more standardised during the second half of the 7th century BC. From the middle of this century the manufacture of ceramics intensified at various sites. Late Italo-Geometric and Etrusco-Corinthian wares were

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399 See section 2.5. It implies that during this period updraught kilns became commonly adopted and that vertical moulds were used for vessels with an elaborate plastic decoration: cf. Bietti Sestieri 1992 b, 94.


401 cf. Rice 1991, 259-60, 272. See also: Moorey 1994, 141, 157. Mooreys’ chapter 4 on the Ceramic and Glassworking Crafts, presents an illuminating analogy when compared with chapter II of this study because several disputes coincide.


403 The sealing of wheel-thrown pottery is characterised by the application of slips and paints or is effected by the chemical composition of the clay.
produced *en masse* in Etruria. At the expense of labour investment per artefact, fine *impasto* and *bucchero* pottery started to be made in series. This successful transformation may also account for the long-term changes in the *bucchero* production which were characterised as developing from prestige ceramics to semi-luxury vessels. Eventually *bucchero* became one of the fabrics for common table wares.404

A major impetus for the ceramic industry was the replacement of huts by houses with stone foundations. These houses were roofed and faced with architectural terracottas. At settlements such as Poggio Civitate and Acquarossa, the manufacture of these ceramic bulk wares started about 650-640 BC. It is probable that this process occurred also at other settlements in central Italy.405 The building activities in central Italy from about 650 BC had a far more enduring impact on the ceramic industry than the altered manufacture of luxury table wares. The manufacture of ceramic building materials created a massive demand and assimilated the production of coarse household wares within the workshop mode of production. The considerable demand for the architectural terracottas is reflected in the calculations from Acquarossa where the construction of an average house required about 600 tiles. This quantity at first outnumbered the ceramic household wares required by the family-unit living in the house. The workshops producing the ceramic building materials, absorbed the manufacture of household wares of similar *impasto* fabric. A workshop would produce architectural terracottas as well as ceramic vessels such as storage jars, jars, bowls and basins. At Poggio Civitate for example, it has been established that the tiles, the ceramic statues and the *impasto* household wares were made from the same clay deposit.406 This implies that these wares were modelled in the same workshop that made the tiles and other ceramic building materials. In particular, the local red ware production at various sites in central Italy can be related to the manufacture of tiles. This was substantiated in this chapter by a description of the red ware production at Caere which could be related to the local coroplast tradition. It was an *impasto* production employing slab building and for the vessels, turning on a slow wheel. In quantity this *impasto* production far outnumbered the production of the fine wares made on a fast wheel. This indicates that specialisation of the pottery craft in central Italy depended chiefly on the production of bulk wares, that is the *impasto* tradition. This hypothesis is recently substantiated in a study by Docter who could distinguish the manufacture of transport amphorae in central Italy from other regions in the Mediterranean. In central Italy these amphorae were modelled by hand and finished on a turntable while in most other regions they were made on a wheel.407

The increased demand for ceramics during the 7th century BC probably established early nucleation of workshops at primary centres such as Tarquinia, Vulci, Vetulonia and Caere. In this chapter this hypothesis is supported by an examination of the secondary evidence of the pottery production at Caere. At smaller sites the process of specialisation in the ceramic craft occurred as well but nucleation was not feasible. In these settlements, rudimentary workshops had to produce a range of wares. This is implied by the evidence presented from Satricum, S. Pietro a Sieve and Poggio Civitate. Other options for the progress of craft specialisation in these smaller settlements during the 7th century BC are:
- that craftsmen besides pottery manufacture may have been involved, in other activities such as agriculture or
- that within a single workshop several materials may have been processed. For example, a combination of carving and pottery manufacture is possible and is suggested by the stoa workshop at Poggio Civitate.408

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404 Gran Aymerich 1993, 22-3.
406 Tobey *et alii* 1986. See also section 2.6.6.
407 Docter 1997, 89-90, 155-6, 191, 192-215, 244-7. The transport amphorae from central Italy that could be examined by Docter, Annis and Jacobs were made with various modelling techniques such as moulding the base, coiling the walls and finishing by rotation on a turntable or slow wheel. Eventually a slab was applied: Docter 1997, 215. Phoenician and Attic transport amphorae were made in a workshop employing a fast wheel. Corinthian transport amphorae were, however, modelled by hand employing coiling techniques and rotation on a slow wheel: Docter 1997, 245-6.
408 See sections 2.6.6 and 3.6.8.
relationship between the early bucchero production and the metal craft is reflected not merely in the decorative techniques but also in firing conditions. This implies that these materials were probably processed in an industrial compound of a settlement where various materials were handled.

The export of Etruscan pottery overseas from the second half of the 7th century BC, demonstrates the effective evolution of the local organisation of the ceramic industry. The bucchero production expanded in line with a widening market and was able to compete on foreign markets during the late 7th and first half of the 6th centuries BC.\textsuperscript{409} The export of bulk commodities is recorded by the Etruscan transport amphorae. These vessels are distributed along the west-Mediterranean coasts from about the last quarter of the 7th to the late 6th centuries BC. The transport amphorae are recorded in substantial quantities at sites in southern France which reflects directional trade between Etruria and the Mediterranean coastal settlements of France.\textsuperscript{410} An account of the organisation of the manufacture of the Etruscan amphorae would be interesting because it represents administered economic structures. Unfortunately this aspect is barely understood due to lack of inscriptions, homogenous fabrics and standard measurements. The early amphorae types are especially miscellaneous. Bound, for example, noticed that the Etruscan amphorae from the Giglio shipwreck and dated around 600 BC, lack standardisation in dimensions and fine detail.\textsuperscript{411} They are labelled Etruscan amphorae because their production cannot be attributed to specific sites in central Italy though Vulci is frequently implicated as the major production centre.\textsuperscript{412} Type Py 5 which is attested during the 6th century BC and which is found in Etruscan merchant vessels, appears to have more uniform dimensions.\textsuperscript{413} The amphorae excavated at Caere in a settlement context include 112 fragments of Etruscan origin which is less than the imported amphorae. The fragments of the imported transport amphorae derive from various places around the Mediterranean. Besides some Punic and Graeco-Italian amphorae the provenance of the amphorae is ascribed to Attica, Chios, Samos, Corinth and Marseille.\textsuperscript{414}

The report on the export of Etruscan ceramics takes this chronological account into the 6th century BC. The primary evidence presented in this chapter demonstrates that the association of ceramic building materials and the household wares is still valid for the Archaic period and the pale Archaic wares. This is indicated by the kiln complex B at Satricum, the workshops at Laurentina-Acqua Acetosa and at Marzabotta which demonstrates that this relationship continued into the 5th century BC.

The evidence of the Archaic period provided the first example of nucleation of workshops. The industrial quarter at Laurentina-Acqua Acetosa is probably the result of a reallocation of settlement functions. The workshops were located next to each other in a new urban development just outside the centre. This demonstrates the high level of planning that is obtained at specific sites in central Italy. The nucleation of workshops in industrial quarters must have induced cooperation and communal organisation of tasks. Whether this led to the institution of a collegium figulorum remains open to debate but the hypothesis that some kind of corporation was established during the Archaic period is supported by the evidence for nucleation.

A different kind of workshop nucleation when compared to the situation at Laurentina-Acqua Acetosa, is

\textsuperscript{409} Gran-Aymerich 1993, 19.

\textsuperscript{410} Bouloumié 1982, 58.

\textsuperscript{411} Bound, 1991, 203-8. He emphasises that the profile of every rim fragment is different.

\textsuperscript{412} Rizzo 1990, 27-8; Bouloumié 1982, 52.

\textsuperscript{413} In her catalogue Rizzo published four Py 5 amphorae which have corresponding measurements: Rizzo 1990, 122, 141, 146. Bouloumié who examined the content of the Etruscan merchant vessel that was recovered at Antibes and dated to 540-530 BC, suggests that some of the 180 Etruscan amphorae contained 21 liters while others contained 7 liters: Bouloumié 1982, 3-10.

\textsuperscript{414} Cristofani 1993, 319-49.
attested at Marzabotto where the workshops are not located next to each other but dispersed over the urban centre. This pattern is the result of a continuation of previous arrangements because some of the 5th century BC workshops at Marzabotto are preceded by late 6th century BC establishments. A similar continuation is attested for complex A at Lavinium and the pottery workshop on the plateau of Caere. This pattern is counterbalanced by the location of other workshops in central Italy such as workshop C at Satricum, complex B at Lavinium and the workshops at Laurentina-Acqua Acetosa which began to be located on the outskirts of urban centres. This shift of location towards the periphery is not recorded before the 6th century BC. The evidence suggests that originally the production facilities were concentrated in the emerging urban centres. None of the archaeological examples of pottery workshops that could be examined for this chapter illustrates a rural or semi-permanent workshop. The examples of pottery workshops in Latium Vetus and Etruria that are presented, are all located within settlement nuclei, emerging towns and towns. They are situated in settlement centres which consist of at least several buildings. In addition, the primary evidence demonstrates that these workshops produced a range of artefacts. Their location in settlement centres and towns indicates an additional demand for ceramics stimulated by the increasing number of households. The workshops producing the ceramic bulk materials for the building activities would not have been located far from the construction works. The absence of evidence for rural or semi-permanent workshops does not in my opinion indicate that they did not exist but rather that their role was limited in relation to the workshops that could be presented in this chapter. To me it seems probable that the emergence of rural workshops is basically of later date and is related to the marginalisation of the crafts. These workshops as well as estate production probably developed during the Republican period. The devaluation of the pottery production is displayed by the gradual degeneration of the quality of the ceramics from the 5th century BC. It is reflected by the output of workshop C at Satricum. Colonna suggests a similar decline in the local ceramic production at Pyrgi which can be compared with the pottery found in votive deposit II at Satricum.415 It is also demonstrated by the quality of the coroplast tradition and is apparent if the 6th century BC statues are compared with terracotta statues from Caere and Lavinium dated to the 5th and 4th centuries BC.416 The established pottery workshops produced progressively for a local demand within an economy that created less opportunities for growth. This affected the characteristics of the ceramic products as well as the social position of the potters.


416 See sections 2.4, 2.6.4 and 2.6.2. See also: Groppo Moretti 1990.