Pottery to the people. The production, distribution and consumption of decorated pottery in the Greek world in the Archaic period (650-480 BC)

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IV Archaeological remains of Greek pottery production: excavated workshops and kilns
IV.1 Introduction: a short survey of the workshop sites

Until far into the 20th century, the number of excavated Greek kilns was negligible (Appendix I, cat. nos. G36; G69; G75; G79). Moreover, they were all poorly preserved, and other workshop remains were entirely unknown. Ancient descriptions were also lacking, and depictions on pots and plaques (chapter V) provided only general impressions. Therefore scholars had to rely on Roman kilns and workshops as a source of information on the earlier Greek situation, although they realised that they could be technologically more advanced. Contemporary potting according to traditional methods also offered some insights.

Excavations in the Athenian Kerameikos (Appendix I, G7; G49-G50; Pl. 3a) and the Corinthian Potters’ Quarter (G23-G24; Pl. 6-7a) in the 1930s supplied little new information. The finds in the Kerameikos, mainly partial kilns and some basins, were scanty and remain only very summarily published. The excavations of the Potters’ Quarter, apart from the pottery finds, were relatively quickly and extensively published, although they yielded no kiln and only scattered bits of workshop installations. For the most part, in fact, the site is a huge dump alongside relatively few and unclear architectural remains. A better preserved workshop in Corinth, the so-called Tile Factory (G22; Pl. 5b), excavated in 1939-1940, still awaits final publication.

Since about 1950, the number of known Archaic and Classical pottery production sites in the Greek world has rapidly grown. For the period 650-400, a few recent lists and some readily available publications note 38 definite or probable kiln or workshop sites from Greece itself; an additional 56 from Greek Italy (including Sicily), one from France, and 12 from the East Greek world, i.e. the Ionian mainland and the Black Sea coast. As can be seen in Appendix I (column ‘what kind of finds?’), most of these sites, however, are little more than kilns or waster dumps

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105 See also Seifert 1993, 100, nos. 22-23 (Mycenaean), the late Hellenistic kiln at the Dipylon Gate (Hussong 1928, 31; Gebauer and Johannes 1937, 185; the references in Seifert 1993, 104, no. 128, confuse this with G49) and the Roman kiln built in the Pompeion (Gebauer and Johannes 1937, 185-186; Seifert 1993, 103, no. 91). The often cited Early Classical kiln on the South Slope of the Akropolis (Kavvadias and Kawerau 1906, 120; Seifert 1993, 101, no. 46, dated too early; see Appendix I) can hardly be a pottery kiln. Its position, its unique typology with two supporting piers, the absence of wasters and the presence of a thick layer of lime on the floors of the substructure all suggest that it was a lime kiln (see also Monaco 2000, 155-163, 248-249).

106 See Rayet and Collignon 1888, XIV; Thédenat 1896, 1255-1256; Walters 1905, II 443-454; Rhomaios 1908, 181-183; Mau 1910, 1; Hussong 1928, 26; Robinson 1938, 11-12.

107 See Rhomaios 1908, 178-180.

108 See Stillwell 1931; 1948 (esp. 13, 21, 31-32); and also Stillwell 1952 (small finds); Stillwell and Benson 1984 (pottery) and recent discussions of the site in Williams 1982, 17-18; Salmon 1984, 101-103; Jones 1986, 175-189; Arafat and Morgan 1989, 315, 324-325, Fig. 1; Lawrence 1996, 104-107.

109 See Appendix I, which also lists 41 4th-century sites in Greece, 34 in Greek Italy, and 6 in ‘East Greece’, plus respectively 22, 9 and 1 undated sites which could be of Archaic or Classical date. My lists for Greece are mainly based on the rather unreliable catalogue in Seifert 1993, with additions from the recent volumes of Archaeologikon Deltion (ArchDelt), the Archaeological Reports (AR) and Ergon. I have also consulted the lists and references in Marwitz 1960, 235-238; Cook 1961; Belshe, Cook and Cook 1963; Thompson and Wycherley 1972, 186; Davaras 1973, 79-80; 1980, 120-124; Despini 1982, 62, n. 1; 64, nn. 2-3; 74, n. 1; 80-81, nn. 2-10; Papadopoulos 1989, 43-44; 1992, 218; 1996, 118, 120; Rizza, Palermo and Tomasello 1992, 45-49. For Greek Italy see Cuomo di Caprio 1971-1972, 452-461; 1992b, 71-78; Papadopoulos 1994, 152-153. See also Blondé and Perreault 1992; Baziotopoulou-Valavani 1994, and the site references in Appendix I.
found during rescue excavations. Very few include further remains of a workshop, and fewer still offer a substantial part of one, not to mention a complete production site.

Moreover, the degree of publication of these sites varies markedly. Only three have received detailed treatment in full-scale final publications: Mandra di Gipari, just outside the city of Prinias, Crete (G35; Pl. 8-10), the above-mentioned Corinthian Potters’ Quarter (G23-G24; Pl. 6-7a), and four workshops of the Centocamere area of Lokroi Epizephyrioi, now Locri in southern Italy (I35-I38; Pl. 12a-b; 21-22). Ten more workshops, including some kiln-only sites, have been presented in relatively extensive preliminary publications which offer reasonably complete general impressions of the sites (G8; G20; G38; I18; S12; G70: G74; I39; I44; S29; in addition, for G22 extensive excavation diaries are available for study; Pl. 3c-5; 11a; 12a-b; 13; 16b; 17b; 19c-21a; 22d; 25a). At the other extreme, the vast majority of the sites are only mentioned in passing in preliminary excavation reports, sometimes without any illustration. For nearly 20 workshops and 28 kilns, the state of preservation or the publication provides plans and concise descriptions and measurements without offering additional information.

The situation is relatively worst in regard to the main production centres. Lakonia offers nothing useful (see G36), and three small kilns in Miletos (T3-T5) and one in Klazomenai (T2) are all that is known about the installations for the thriving production of fine ware in the Eastern Aegean in the 7th and 6th centuries. Corinth seems comparatively well off with the Potters’ Quarter (G23-G24; Pl. 6-7a), the unpublished Tile Factory (G22; Pl. 5b), a kiln underneath the Roman forum (G25), and one or two dumps of wasters (G21 and perhaps the Vrysoula deposit). The remains of all substantial structures, however, date from well after the heyday of Corinthian pottery exports in the 7th and early 6th centuries, which, it seems, has left few production traces.

Matters are slightly better at Athens, where about a dozen probable or certain production sites from the 7th to the 5th centuries (G3-G15; Pl. 2b-4) and 25 4th-century or undated locations (G41-G59; G78-G81; G99-100; Pl. 3a; 27a) are known, some represented merely by waster dumps. Nearly all of them came to light in the wider area of the Kerameikos, the potters’ quarter mentioned by ancient authors, in the northwest of the ancient city. The finds include the probable workshops of some of the painters known to us by stylistic attributions, including the late Archaic Brygos Painter and some of his associates (G9), the late Classical Painter of the Athens Dinos (G15) and the early 4th-century Jena Painter (G47). Unfortunately, it seems that only pottery dumps survive, as traces of installations are not recorded. Elsewhere in Athens, however, remains of workshop structures have turned up, as well as test pieces, supports for use inside the kiln, and

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111 Barra Bagnasco 1989a; 1989b.

112 G12; S6; S7; S15; P1; P5; G40; G45; G49; G50; G53; I53; P8; P9; P10; G101, and the later sites G98; P12-P13 (Pl. 18b-c: 24c; 26; 27c-e).

113 G1; G5; G25; G27; G28; G29; G30; G31; I14; I23; I28; I31; S3; S8; S10-S11; T2; T3-T4; P4; P6; G62; G69; I40-I41; I42; T8; G76 (Pl. 2b; 7b; 7d; 12; 14; 15b-17a; 19a; 23a-b).

114 Baziotopoulou-Valavani 1994 briefly describes most known workshops in Athens, with references and a map. Monaco 2000 is more extensive, but adds little to the primary publications she refers to. On Athenian workshops, see also Thompson 1984, 7-8; Knigge 1988, esp. 164-165, Abb. 165, and the site map; Arafat and Morgan 1989, 321-323, 342, n. 2, Fig. 4; Oakley 1992; Scheibler 1995, 107-109; Papadopoulos 1996, 115-124; and the individual references in Appendix I.

remnants of unused clay, some of which was in situ. Only one of these workshops, lying at the crossroads of Lenormant and Konstantinoupoli Streets (G8; Pl. 3c-4), has been published in some detail; it was poorly preserved.

Less prominent production centres offer a slightly fuller picture. In Greece itself, in addition to the workshop at Mandra di Gipari (G35; Pl. 8-10) mentioned above, large complexes have been excavated at Phari on Thasos (G38; Pl. 11a), Figaret in Corfu town (G20; Pl. 5a), and Sindos, Macedonia (G70; Pl. 19c-d, 4th-century however, and only kilns). In Italy we encounter rather summarily published scatters of kilns in and around Taras (I53-I61; Pl. 24c; 27d, now Taranto) and Sicilian Naxos (S10-S17; Pl. 16b; 17), a workshop area at Metapontion (I18-I19; I44-I46; Pl. 13; 24), and extensive potters’ quarters at Siris/Herakleia (I23-I27; I49-I52; Pl. 14-15a, now Policoro) and Lokro (I7-I14; I35-I41; Pl. 12; 21-23), the last two places yielding mainly finds from the late 4th and 3rd centuries. The Black Sea area adds little, with some kilns at Histria (P4-P6; P8-P10; Pl. 26) and the well-preserved workshops of Chersonesos (P12-P13; Pl. 27d-e) which, however, fall outside the chronological range of this study. In addition to all these, many solitary kilns supply limited, though useful, data on specific topics like the sizes and locations of potteries.

IV.2 Location of pottery workshops: the human factor

One of the most striking features emerging from the synoptic overview of Archaic and Classical Greek pottery workshops in Appendix I is that their locations show some very consistent patterns (Tables IV.1-3). First of all, production sites are usually connected to towns (Table IV.1). Solitary workshops in the countryside are rare, mainly limited to specialised amphora producers or to installations at large farms (I20; S28; and some undated sites in Italy), all of which probably catered for the agricultural needs of the surroundings, although not necessarily in the immediate vicinity. The sole notable exception is Phari (G38), which is the only known workshop in the countryside older than the late 5th century, about which more below.

Secondly, nearly every workshop associated with a town is located in the periphery of the inhabited area, often just inside or outside the walls, or along outgoing roads (Table IV.3). In larger towns with several workshops, these tend to form one or sometimes more clusters or even a specialised potters’ quarter, kerameikos, where ceramic production dominated a larger built-up area. Although especially metal workshops are sometimes found in the same general area as

116 One could add the later workshop at Tholakia, Paros (G98).

117 See Empereur and Picon 1986a, 498; Muller 1999, 280.

118 G26; G37; I21; G39; G60; G64; G71; G72; G73; G74; T7; G92; G95; G96; G97; T9; T10; T11; T12. See Empereur and Picon 1986a; 1986b; 1986c; Garlan 1986.


120 G2-G24; G34-G35; I7-I14; I18-I19; I23-I34; S1-S5; S9-S20; F1; T1-T6; P1; P3-P6; G41-G59; G63; G68; I35-I47; I49-I53; S21-S24; S26-S27; S32-S34; T8; P8-P10; G76; G78-G79; G81-G84; G90; I55-I58; S36-S37; T12; P12. See Coja 1979, 40-42; D’Andria 1980, 42; Rizza, Palermo and Tomasello 1992, 42; Baziotopoulou-Valavani 1994, 51; Muller 1999, 280-281.

121 G5-G6; G13; G41-G45; G54; G78 (Athens, Agora/Areipagos/Thissio); G8; G10-G12; G14; G46 (Athens, Academy/Kephisos valley); G48; G51-G53; G55-G59 (Athens, Petralona); G3; G7; G9; G15; G47;
potteries or on apparently very similar locations, mixed clusters of workshops are rare; moreover, the few reports of potteries attached to other kinds of workshops seem questionable (G60; G61).

A third recurrent pattern is that many pottery workshops and potters’ quarters lie within areas that earlier or later served as cemeteries or even close to contemporaneous burial plots, the Athenian Kerameikos being the best known example, though the list is much longer (Table IV.3). The apparent linkage of burial grounds and potteries may have been intended to bring the producers close to the purchasers who furnished their deceased relatives’ graves. However, this is not likely to be the main explanation, as the phenomenon most often involves ‘linkages’ of divergent dates. More probably, the determining factor was that both cemeteries and kilns cause pollution: in the first case, stench, smoke from cremations and risk of contamination; in the second, smoke, heat, perhaps mud, and sherd and ash dumps, not to mention the fire hazard. By confining workshops and cemeteries to outside of town or to the fringe of the built-up area, one can avoid most of these inconveniences. In some towns, natural environmental conditions may also have played a role. Rock is hard to dig into and does not contain potter’s clays, whereas well-watered, muddy areas may be fit for ceramic production but unpleasant to live in.

Whatever the exact reason for the typically peripheral placement of pottery workshops, accessibility, however essential, was probably a secondary issue in the choice of location. The living surely needed more pots than the dead, and they had to find their way to the workshop to fill daily needs. Once again, we see that the requirements of potteries are quite similar to those of cemeteries, so that overlap is inevitable: just as graves are often situated within easy reach of town, in clearly visible places along the main outgoing roads, potters’ establishments would tend

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G49-G50; G79 (Athens, Kerameikos; there is no clear boundary with the Kephisos valley); I7-I13; I35-I41 (Lokroi Centocamere); I18-I19; I44-I46 (Metapontion); I23-I27; I49-I52 (Siris/Heracleia); S127; S14-S17 (Naxos, Sicily); P4-P5; P10 (Histria, area G) P6; P8-P9 (Histria, area Z2); S32-S34 (Syracuse); and perhaps S18-S20 (Selinus); T3-T5 (Miletos); I43 (Laos); see also Fourmont 1992, 68; Rizza, Palermo and Tomasello 1992, 29.


123 See I5; I6; I7; I25; T2; G41-G45; G50; G60?; G61?; G67; G68; I40-I41?; I49; and possibly at Argos, Gounari Street. See also, for Athens, Gebauer 1938, 610-611; for Selinus, Fourment 1992, 68. Courbin 1960, 99-100 offers an example of the Early Iron Age, at Argos.

124 G3; G47; G5-G12; G14-G17; G23-G24; G32-G33; G35; I26-I27; S2-S3; S9; S12-S16; P4-P5; G44-G59; G70; I53; S23; S32-S34; P10; G79; I54-I58. See Coja 1979, 40, 42; Karagiorga-Stathakopoulou 1988, 95; Baziotopoulou-Valavanis 1994, 47, 52; Scheibler 1995, 108; Papadopoulos 1996, 121-122. The pattern is quite old: the earliest production remains on the Athenian Agora, which is full of cemetery plots, go back to the Proto-Geometric period (see Thompson and Wycherley 1972, 186). Courbin 1960, 71-74 and Papadopoulos 1989 offer other examples from the Early Iron Age, at Argos and Triora respectively (see also Papadopoulos 1996, 121-122).

125 See Zachariadou, Kyriakou and Baziotopoulou 1985, 44; Baziotopoulou-Valavanis 1994, 47, 52.

126 Some pottery workshops have contemporary graves in their direct surroundings, though: see G8; S9; S14; G49 and probably I26; I27.

to cluster at the routes connecting towns with their surroundings (Table IV.3). Apart from being close at hand for those who knew what they wanted, the location along main roads possibly also offered the best chances of attracting less directed customers. For the potter, it may have facilitated the flow of supplies and probably helped to keep the walking time of non-resident staff to a minimum. One may conclude that the disadvantages of a peripheral location were compensated for by a strategic position in the communication network.

The importance of a well-connected location is especially clear in coastal towns. In quite a few of them, pottery workshops are placed on roads leading to the port or beach; some are actually built on the beach or in the direct surroundings of the harbour. In many cases, overseas export – not necessarily over long distances – is very likely to have played a role in the choice of location. The Figareto workshop in Corfu town (G20), which appears to have been in an area of workshops between the town proper and the sea, offers an excellent example. Although the fine pottery and statuettes made by this workshop found only a limited overseas market, its amphorai played their part in the widespread international trade in Corfiote agricultural products and perhaps fish, presumably shipped from the nearby port. The situation in the kerameikos of Lokroi Centocamere (I7-I14; I35-I41; see PL 12a-b) is comparable, though less straightforward. These potteries lie in a densely built urban quarter full of workshops and merchants’ shops at some distance from the city centre, which is higher up, while being conveniently close to the sea along both sides of the important coastal road crossing the lower city. Apparently, habitation was of only minor importance in this mainly ‘commercial’ area.

In inland towns it is often more difficult to distinguish potters’ quarters in intensively used, though geographically peripheral urban or sub-urban areas, from the residential quarters and to link them to a favourable position in the communication network. The problems are clearly


129 See Thompson and Wycherley 1972, 186; Thompson 1984, 8, who stresses the proximity of Athenian pottery workshops to the Agora; Baziotopoulou-Valavanis 1994, 52.

130 See Coja 1979, 40; Empereur and Picon 1986b, 651-652; Barra Bagnasco 1989b, 27; Rizza, Palermo and Tomasello 1992, 42.

131 G13; G16; G17; G20; G22; S10; G54; G78; G84, perhaps also S18-S20; G48; G51-G53; G55-G59.

132 G19; I7-I14; I21; S7?; S11; S12; F1; T1; P1; I35-I41; S27; S37; G82; G83; G88? See Empereur and Picon 1986c, 122-123; Baziotopoulou-Valavanis 1994, 52; Papadopoulos 1996, 112, 126; Kourkoumelis and Démesticha 1997, 553.


135 See Barra Bagnasco 1980, 93; 1989a, 63; 1989b, 27, who, however, overemphasises that only one of the excavated parts of blocks (I3) was entirely occupied by pottery workshops. The adjacent block I2 indeed has only one pottery workshop amidst shops and, probably, houses, but I4, on the other hand, has two workshops covering the entire excavated area; of the next block, I5, nothing but the outer walls survive. Of the five blocks on the other side of the main road (H1-H5), H1 is so full of kilns that it must have contained potteries only. The others have no kilns, and probably housed a combination of shops, workshops and houses. The report, and possibly also the excavation results as a whole, do not allow any further specification (see Lissi 1961).
illustrated by the so-called Inner Kerameikos of Archaic Athens, the area of the Classical Agora. Widely scattered over the area, alongside clusters of Bronze Age and Early Iron Age graves, several dumps of Protogeometric, Geometric and probably Early Archaic potters’ debris have come to light, mostly in well fills (see G6). More substantial remains from the early 7th century, including a kiln, have been found underneath the Early Classical Tholos (G5; Pl. 2b). Yet, until recently, this area was generally regarded as part of the – domestic – city itself, mainly because of the scattered wells. The potters’ debris, so far as known, was thus seen as traces of workshops in an urban habitation area. Recently, however, Papadopoulos has convincingly argued that the Inner Kerameikos must primarily have been a burial ground until at least the end of the Late Geometric Period. In this scenario, the area would conform to the general pattern of potteries associated with cemeteries, exemplified by the adjacent ‘real’ Kerameikos (G7; G49; G50; Pl. 3a). Yet, from the early 7th century onwards graves no longer accompany the potters’ debris, suggesting that much of the area closest to the city was already being built over, at least partly with potteries. Its conversion into a more formal Agora just before or after the Persian destruction might then simply be a continuation of the role of this well-connected peripheral area in providing services to the city, which was perhaps made easier by the absence of dense housing.

Information on the archaeological contexts of pottery workshops in small towns and the countryside is often very limited, as such sites are usually less well documented than larger towns. At first glance, it is tempting to assume that outside the major cities a strategic position in the transportation network was of secondary importance. Within small places distances are, of course, negligible, and production, moreover, is often locally oriented. Yet a remarkable number of non-urban workshops seem to take account of the opportunities offered by a regional or even interregional communication network. The most spectacular instance is certainly the anonymous village at Scornavacche, near Ragusa in inland Sicily, precisely on the main land route between Gela and Syracuse (S30-S31; Pl. 25b). It appears to have been a more or less specialised potters’ town, with kilns in several houses, which manufactured amounts of domestic pottery and votive statuettes that exceeded local needs. As there is not any large habitation centre in the immediate vicinity, the advantageous location of the village on a main thoroughfare must account for its flourishing, presumably in combination with essential natural resources, i.e. clay beds.

136 See also the unnumbered sites at the Agora in Appendix I and Thompson and Wycherley 1972, 186; Thompson 1984, 7-8; Papadopoulos 1996, 116-121; Monaco 2000, 175-195.

137 E.g., most recently, Thompson 1984, 8; Shear 1994, 225-230; see also Papadopoulos 1996, 123-124.


139 One of the earliest signs of this process is the construction of the intriguing large buildings C, D and F in the area of the later Tholos in the early and mid 6th century. Although this complex has been seen as a public building with practical functions, including storage and perhaps workshops (Börner 1996, 36-45), its monumental architecture is more in keeping with the current interpretations of the buildings as a tyrant’s palace or a civic building for government functions (See Shear 1994, 229-231; Kiderlen 1995, 203, both with references to the extensive previous literature). Whatever the identification, the building is not a construction one expects to find in an ordinary habitation quarter. Moreover, precisely the strategic location at the crossroads to Eleusis, Piraeus, the Akropolis, the city centre and the South periphery which may have attracted nearby pottery workshops and the later Agora (see Thompson and Wycherley 1972, 186) might also be suitable for buildings aimed at attracting or impressing the public.

140 For different views of this impression of the ‘public’ Agora, see Vanderpool 1974; Thompson 1984, 7-8, 14; Shear 1994; Papadopoulos 1996, 112-114, 125-126.
Similar considerations are likely to have played a role in the placement of many of the solitary Thasian amphora workshops as well (G37-G38; G71-G74; G95-G97). Clay resources seem to be a determining factor, a point to which I shall return in the following section. On the other hand, these establishments depended on the demand for containers in the fertile countryside. Not all of them, however, appear to be situated very near the farms where their amphorai were needed, and some lie close to the sea (G38; G73; G74; G96; and to some extent G72; see Pl. 20b).\textsuperscript{141} Besides amphorai, moreover, also household pots were usually produced, possibly not always strictly for local markets. Surveys along the coasts of Naxos (G63-G64), Paros (G67), Antiparos (G39; Pl. 18a shows all three islands) and Rhodos\textsuperscript{142} (with the adjacent mainland, T9-T11) and around Sinope on the Black Sea shore (T12) as well as some isolated sites elsewhere (G26; T7?) indicate that the pattern displayed by the Thasian rural potteries is not unique, but more information will be needed before this impression can be substantiated and the picture filled in more precisely.\textsuperscript{143}

A last point regarding all these rural sites, including Scornavacche (S30-S31), is that they mostly start appearing during the 4th century, with a few going back to the late 5th century (G37; G26 is undated, but Classical). Apparently, they represent a new development, perhaps made possible by steadily improving communications and an increasing scale of trade in the late Classical and early Hellenistic periods or caused by shifts in land utilisation and habitation patterns. The exceptional 6th-century solitary workshop of Phari on Thasos (G38) may presage the later pattern or reflect comparable conditions. Interestingly, precisely this site again underscores the importance of the opportunities for distributing goods in the selection of a location. Although partly determined by the existence of a clay bed, the placement of the workshop seems to be especially dependent on passers-by, here seafaring traders.\textsuperscript{144} In addition, the simply decorated pots produced at Phari belong to categories that are met all along the North Aegean and Black Sea coasts, suggesting that this solitary workshop was much less locally orientated than its later counterparts.\textsuperscript{145}

Finally, one category of pottery workshop falls outside the general pattern of well-connected but peripheral sites: the kilns – usually without a clear workshop context – found in the direct surroundings of sanctuaries (G28?; G29-G31; I14; S7?; S8; S10; P1; G65; G66; G75?; I47; S21; S22; S29; see also dumps G13 and S1; Pl. 12c; 25a).\textsuperscript{146} Although sometimes the link between sanctuary and workshop could be fortuitous (G28?; I14?; S7?; S8; G75; S21; S22), a meaningful

\textsuperscript{141} Garlan 1986, 273-275.

\textsuperscript{142} Empereur and Picon 1986c, 115.

\textsuperscript{143} See Empereur and Picon 1986a, 496-498; 1986b, 652; 1986c, 112-115.

\textsuperscript{144} Blondé, Perreault and Péristéri 1992, 39.

\textsuperscript{145} See Perreault 1999a, 256-258; 1999b, 298-300.

\textsuperscript{146} See also Coja 1979, 58; Muller 1999, 281. In addition, the workshops of Selinus (S18-S20) are part of an urban quarter directly outside the area of temples on the akropolis (Fourmont 1992, 68). Further, a few dumps without a clear sanctuary context may be either workshop refuse or votive deposits, or perhaps a mixture: G2; G43; Pemberton 1970 (the Vrysoula deposit in Corinth; see also Appendix I and Appendix III, Table XVI.10). It is, moreover, quite common to find smaller quantities of moulds, misfired pots and other production discards amidst votive and non-votive deposits in sanctuaries: see Dunbabin 1962, 529-530 (Perachora, near Corinth, with references to other sites); Barra Bagnasco and Russo Tagliente 1996, 184, 187; Mugione 1996, 222 (both Hellenised Lucania, Italy). Dupont 1983, 27, mentions production traces at the Heraion of Samos and workshop remains nearby (G7 after G35; G92); see for pottery production at the Samian Heraion also Kron 1984, esp. 297; 1988, esp. 145.
relation can be assumed in most cases, even if few publications include the pertinent information. Some of these sanctuary kilns must have been temporary installations, producing architectural decoration needed in constructing or restoring temples and other buildings (I147; G65; G66; S10; I47). Others are thought to have made votive statuettes, plaques and pots (G28; I22; S8; S10; P1; G75; see also dumps G13 and S1); but if wasters from these categories are absent, such a conclusion may be dangerous in regard to a place which would obviously be full of votives not necessarily produced on the spot. In any event, it can be concluded that the erection of kilns at sanctuaries was another means of bringing the producer and consumer as close together as possible. Environmental concerns were apparently found less urgent at sanctuaries, possibly because firing was rather infrequent – even temporary in the case of ‘architectural’ kilns – and/or because the sacred buildings were not continuously used or inhabited. Smoking altars and smelly offerings surely also helped to camouflage the effects of the kilns.

Summarising, one may conclude that the locations of Greek pottery workshops were primarily determined by social, practical and economic matters. At the most general level, the relative difficulty, costs and risks of transport, combined with the availability of manpower and consumers, explain the general association of pottery workshops with towns. In some areas and periods the insecurity of the countryside may also have been a factor. Within towns, the consistent location of potteries along outgoing routes at the fringes of the built-up area seems to be related to the accessibility of sites, the urge to limit environmental inconvenience and perhaps the exposure to buyers. These considerations would be part of more or less unconscious planning traditions, with the general dislike of crafts and ‘dirty’ work among the elites possibly strengthening the tendency to keep potteries out of town.

Lastly, many of the factors that affected the locations of workshops in cities and villages must have been so self-evident or inevitable that they also affected the location of potteries in the countryside, where pottery production started to spread on a limited scale in the late Classical period.

IV.3 Location of pottery workshops: the role of natural resources

A perhaps surprising implication of the discussion in the preceding section is that natural resources played at most a secondary part in the selection of sites for Greek potteries. It is indeed very difficult to find workshops where natural resources may rival the commercial, logistical and social considerations. The rural Thasian (G37-G38; G71; G73-G74; G95-G97)148, Naxian (G63-G64) and Parian (G67) workshops come closest, as most of them are placed directly above or close to clay beds (see Pl. 18a).149 As mentioned, however, their locations usually offer other advantages as well. Moreover, these islands seem to have a relatively limited amount of clay, spread over small pockets, whereas in many other areas of the Greek world good clay beds,


148 G72 apparently does not have a ‘natural’ location.

149 See also G26; G39; G92; T9; T10; T11.

being more abundant, were probably less of a determining factor in the choice of a location,\textsuperscript{151} which might also explain why there is not a second Phari for over a century. As to the more usual suburban workshops, the situation is unclear. One can surmise that potters chose the side of town which offered the best natural resources, but it is again difficult to find evidence for such ‘natural determinism’.

A fundamental problem here is that little study has been done on the availability and use of potters’ clays in the various areas of the Greek world, so that it is difficult to assess the role of even this most elementary raw material in regard to the choice of locations.\textsuperscript{152} Many suburban workshops, for example at Sicilian Naxos (S12) and Mandra di Gipari (G35), are assumed by their excavators to be build directly over their clay beds, but unfortunately the reports very rarely include either arguments or scientific data in support of the claims.\textsuperscript{153} And even when they do, as in the case of the Corinthian Potters’ Quarter (G23-G24), the situation is not necessarily clear.\textsuperscript{154} Agnes Stillwell, the site’s excavator, maintained that the clays used here came from the slopes of the ravine directly below.\textsuperscript{155} Subsequent chemical research, however, showed that these clays are unsuitable for making pottery,\textsuperscript{156} although a recent geological survey of the Corinthia suggests there may well be layers of good potters’ clay in the vicinity of the Potters’ Quarter. In fact, Corinth is surrounded not only by a scatter of clay beds, but also by the remains of pottery workshops of all periods (of which G21-G25 are only a few).\textsuperscript{157} Although it is obvious that resources and workshops would often be close to each other, the general availability of clay suggests that it was usually not the most decisive asset of a location.\textsuperscript{158} Therefore, only workshops that made products requiring special clays may have been bound to specific areas.

In Athens the situation is even less distinct than in Corinth, partly because the spread of the modern city severely hampers the obtainment of archaeological and geological data about ancient clay pits. Moreover, the potters’ clays recovered in several excavations have been neither analysed nor compared to samples of fired pots. Additional evidence is confusing: in recent times

\begin{itemize}
\item \textsuperscript{151} See Ziomecki 1964, 3; Matson 1972, 200; Empereur and Picon 1986c, 124; Picon and Garlan 1986, 294; Morgan 1995, 319-321; Blondé and Picon 1999, 240.
\item \textsuperscript{152} See, however, Empereur and Picon 1986c, 122-125; Picon and Garlan 1986; Papadopoulos 1989.
\item \textsuperscript{153} See Pelagatti 1972, 213 (Naxos) and Rizza, Palermo and Tomasello 1992, 29, 42, 156 (Mandra di Gipari). Comparable situations exist at the Lernormant/Konstantinoupoloemos workshop in Athens (G8; Karagiorga-Stathakopoulou 1988, 95; Zachariadou, Kyriakou and Baziotopoulou 1992, 56; see also Arafat and Morgan 1989, 322); the Corinthian Tile factory (G22; Walter 1942, 143; see, however, Arafat and Morgan 1989, 315); Selinus (S18-S20; Fourmont 1992, 60). The only site where pottery workshops can be connected to clay pits with some certainty is Chersonesos, on the Crimea: see Ziomecki 1964, 4.
\item \textsuperscript{154} See also the tragic case of Lokroi (Palmieri 1976), where origin research has failed because the sampling of both pottery and clay beds was much too limited, and no one seems to have taken into consideration the need of adequate reference material.
\item \textsuperscript{155} Stillwell 1931, 7; 1948, 3.
\item \textsuperscript{156} See Arafat and Morgan 1989, 314-316; Morgan 1995, 321; 1999b, 223. The Anaploga Well (G21), which is not far from the Potters’ Quarter, does seem to have clay nearby, however (Arafat and Morgan 1989, 315).
\item \textsuperscript{157} Personal communication, Guy Sanders, July 1999. See also Morgan 1995, 319-321; 1999b, 223-224.
\item \textsuperscript{158} See, for a different opinion, Arafat and Morgan 1989, 314, 325. Morgan 1995, 321 is less one-sided.
\end{itemize}
potters have mainly depended on the huge clay pits at Amarousi, 10 km to the northeast of the city, \(^{159}\) but also some clay sources to the northwest, along the Kephisos, much closer to the Kerameikos and the Academy area, have been cited in this respect, \(^{160}\) while ancient, post-classical written sources praise the clay from Cape Kolias, on the coast at modern Agios Kosmas, about 10 km south of central Athens. \(^{161}\) Despite the absence of evidence, it is reasonable to suppose that clay from the Kephisos valley was used in nearby workshops. Apparently, only a clay from Cape Kolias has been matched by chemical analysis with pots, interestingly a small group of finds from the 7th-century workshop in the southeast part of the Agora (G6). \(^{162}\) It is intriguing that precisely this early pottery seems to come from such distant clay beds. \(^{163}\)

Though exceptional, the use of clay brought from some distance would not be unique. According to its excavator, the workshop of Figareto (G20) drew on clay found at a distance of 1-4 km, \(^{164}\) and Ninina Cuomo di Caprio argued that the local clays at Taranto are so unsuitable for potting that more distant sources in the area must have been relied on. \(^{165}\) Regrettably, Cuomo di Caprio offers no evidence, and illustrates her article with Tarentine pots which seem to reflect precisely the bad qualities of the local clay she rejects. Even more doubtful are the recurrent hypotheses, based on stylistic analysis, that workshops or itinerant potters transported clay over even greater distances. \(^{166}\) Not surprisingly, these untestable suggestions are highly controversial. \(^{167}\) In sum, the rather small distances evidently covered by some Athenian potters or their clay suppliers may well have reached the limits of feasibility.

The role played by the availability of water, a second crucial natural resource, in the location of a pottery workshop appears to be quite comparable to that of the clay supply. Many production

\(^{159}\) Noble 1966, 173; 1988, 16-19; see also Richter 1923, 40 (who names Chalandri and Koukouvaones, close to Amarousi); Jones 1986, 150-151 (who also names Koukouvaones, in addition to Amarousi). I wish to thank Wendy van Duivenvoorde for letting me read her work in progress on Athenian clays (Van Duivenvoorde 2000).

\(^{160}\) Thompson 1984, 8; Baziotopoulou-Valavani 1994, 52; see also Thompson and Wycherley 1972, 186; Jones 1986, 151. Scheibler 1995, 108 suggests that there may have been small pockets of clay at the Kerameikos itself, in the northwest periphery of Athens. The Lernormant/Konstantinoupoleos workshop (G8), part of a cluster of potteries still more to the northwest of the city (G10-G12; G14; G46), has also been linked to (hypothetical) local clay sources: see Karagiorga-Statathakopoulou 1988, 95; Arafat and Morgan 1989, 322; Zachariadou, Kyriakou and Baziotopoulou 1992, 56. Early 20th-century clay winning in the same area (along the Hiera Odos) is reported by Jones 1986, 151.

\(^{161}\) Suda, *Lexicon*, s.v. Kolias; Athenaios XI.482b; see Richter 1923, 97, 102; Zionecki 1964, 3; Thompson 1984, 8; Jones 1986, 103, 151, 156; Arafat and Morgan 1989, 316; Sparkes 1991, 9-10.

\(^{162}\) Fillieres, Harbottle and Sayre 1983; see Jones 1986, 151-159, esp. 156.

\(^{163}\) See Morgan 1995, 321.

\(^{164}\) Preka-Alexandri 1992, 50.

\(^{165}\) Cuomo di Caprio 1992a, 73-74; see also, for other cases, Palmieri 1976, 610; Empereur and Picon 1986b, 651-652; Arafat and Morgan 1989, 315-316.

\(^{166}\) See e.g. Boardman 1980, 123; Morris 1984, 20-21; Stibbe 1984, 137-138; Benson 1985, 19-20; Möller 2000, 43, 139-140.

\(^{167}\) Arafat and Morgan 1989, 314-315; 1994, 109, 133-134, n.1; see also Jones 1984, 26.
sites, like the Athenian Kerameikos (G7; G49; G50), the Corinthian Potters’ Quarter (G23-G24) and Mandra di Gipari (G35), are near springs or streams (see Pl. 3a; 8b). Just as in the case of clay, it seems only logical that potteries would cluster as closely as possible to their necessary resources. Again, however, the situation is not as simple as it might appear at first sight. No pottery workshop can be directly related to an important public spring, like Peirene in Corinth or the Enneakrounos in Athens. At the same time, many production sites, including some close to natural water sources, like the Potters’ Quarter and the Kerameikos, have wells or cisterns, some of which are fed by elaborate hydraulic systems (see e.g. Pl. 3a; 6; 7a).

This is not as surprising as it seems: although the Potters’ Quarter lies next to a natural spring and two streams, it is a steep climb to get to them and back, so that a steady supply from uphill made sense, even when some construction work was involved. As to Athens, it is doubtful whether the streams there can be considered a reliable and clean water supply, especially during the summer. That the role of ‘rivers’ should not be overestimated is confirmed by Sicilian Naxos where the Santa Venera torrent, which passes the city a short distance away (Pl. 16b), hardly seems to have influenced the location of the eight or nine peripheral or suburban potteries or clusters of workshops (S10-S17), probably because like the streams at Athens it was dry for much of the year, as it is nowadays. Finally, the kerameikos of Siris/Herakleia (I23-I27; I49-I52) is situated on the top of the low hill forming the akropolis rather than in one of the nearby river valleys or close to the site’s main springs (see esp. Pl. 14a).

In view of all these exceptions to the expected, one may wonder whether the water supply of potteries should not be simply regarded as a self-evident feature of their general geographical

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168 See Thompson 1984, 8; Arafat and Morgan 1989, 321; Scheibler 1995, 108; Papadopoulos 1996, 121. See also, for the Academy area (G8), Karagiorga-Stathakopoulou 1988, 95; Zachariadou, Kyriakou and Baziotopoulou 1992, 56; Baziotopoulou-Valavani 1994, 52, who, however, seem to overstress the nearness and thus importance of the Kephisos stream, which actually is not that close, considering the amount of water to be transported.

169 See Stillwell 1948, 3; see also, for the Tile Factory (G22), Walter 1942, 143.

170 See Rizza, Palermo and Tomasello 1992, 29, 42, 156.

171 See also G9?; G17; G33; G36; G38 (Blondé, Perreault and Péristéri 1992, 39); I1-14; I18-I19; I22; I29; I30; I31-I32?; S7; G70; G71; G74; I44-I47; S26; T11 (Love 1978, 1120); T12.

172 See Stillwell 1948, 12, 29-30, 32, 44-45 (wells at the Potters’ Quarter, G23-G24); 11, 16-18, 20, 26-27, 37 (hydraulic installations); G49 and G50 (hydraulic installations at the ‘real’ Kerameikos) and Papadopoulos 1996, 124 (wells at the Inner Kerameikos, i.e. the later Agora, G6; see also G42). Other workshops with wells or water collecting systems are G10; G20 (see Preka-Alexandri 1992, 45; Kourkouméli and Dénesticha 1997, 555); G22; I7; I11; I17; I18; I20; G41; G43; G45?; G48; G70?; I35; I36; I38; I39; I53: S32; S33; G78; G91 (Pl. 5a; 21-22; 24c); see also Fournmont 1992, 68 (Punic Selinus, block FF1).

173 See Stillwell 1931, 7; 1948, 3.

174 Dirty water may have had undesirable effects on clay and clay-paint.

175 Comparable situations may be offered by Lokroi and Siris/Herakleia, which lie close to ‘rivers’, but have no known workshops on the river banks. Metapontion and possibly Sybaris, which are similarly situated, have potteries at the river, though.

176 But three of the Archaic suburban workshops of (then still) Siris (I28-I30) are located near wells or natural springs.
context: just as human dwellings tend to concentrate in places with a relatively good water supply, potters would avoid places where water was not readily available. Moreover, the outgoing roads which attracted so many potteries often followed water courses or led along springs, as these water resources were also used by the general public. Similarly, low-lying plains and beaches suitable for mooring ships usually also have fresh water nearby and sometimes alluvial clay deposits as well. One may therefore conclude that water, like clay, was a vital necessity which was not so hard to come by as to dictate a choice of location.

The supply of wood or any other fuel for the kiln raises yet more of the same considerations. Some excavators of pottery workshops explicitly note the existence of forests in the surroundings, but probably many kinds of fuel other than logs and branches were also used, from brushwood, cuttings and prunings of olive groves, vineyards and orchards to various harvest refuse like straw, pressed olive pulp and nutshell. In Antiquity, although good building wood was often hard to come by and expensive, a fuel shortage seems not to have existed.

IV.4 Location of pottery workshops: social and organisational implications

All in all, the way potteries are situated in both the social and the natural landscape strongly suggests that the choice of a site depended more on the specific requirements of producers and consumers than on the presence of natural resources. Roughly speaking, one may further conclude that water, fuel and, especially, sufficient suitable clay were available at most sites where they were needed, either directly on the spot or so near that it was not thought worthwhile to move out of the town’s vicinity for the sake of being as close as possible to the raw materials. Besides the comfort and safety of town life, the presence of manpower and especially consumers must have been deciding factors. Yet town life had its limitations, since potters’ workshops were usually not accepted in the central areas of habitation, commerce and government.

Above, I relate the exclusive location of pottery making in places outside the urban centre to practical matters, i.e. pollution and communication. An alternative view is put forward by Arafat and Morgan, who argue that the location of the Corinthian Potters’ Quarter (G23-G24) and two presumed workshop dumps not far away in the western part of the city (G21; the Vrysoula deposit) is due not only to the proximity of clay and fuel, but also to that of farmland where potters could work the fields outside the potting season. This suggestion is related to Arafat and Morgan’s assumption that pottery-making in Archaic or Classical Greece was a part-time
occupation, practised during the low periods in the agricultural cycle.\textsuperscript{181} Since this assumption is not as self-evident as Arafat and Morgan seem to maintain – the farming season and the potting season largely coincide – it is risky to advance it as an argument in a discussion about the qualities of locations.

In fact, the suggestion that potters farmed walking to the fields founders as soon as one considers the situation at Corinth in the wider context. Most, if not all, Greek towns, including cities like Corinth, probably had plenty of full-time farmers who daily walked out to the lands. If the proximity of the fields had been an important consideration, one would expect that Greek urban peripheries were desirable areas for habitation and not the often disorderly combination of workshops, old graveyards and various public and religious buildings of secondary importance which are usually found there. It would seem credulous to regard the presence of potteries in such an environment as a sign of self-chosen country life. Moreover, as seen in the previous sections, the same peripheral arrangement of workshops repeats itself all over the Greek world, from major urban centres like Athens and Syracuse (S32-S34) to smaller rural towns like Sicilian Naxos (S10-S17; Pl. 16b), Herakleia (I23-I30; I49-I52; Pl. 14a) or Argos (G2)\textsuperscript{182} where farmland is always nearby. Besides all this, it is very uncertain that potters lived in their workshops, as will be shown in the following section.

The literally marginal location of potters’ workshops in most towns divides them from the places where respected people, i.e. landowners (but also many tenants), lived. Furthermore, working amid the dead, as many potters seem to have done, could not be highly regarded, and may well be another indication of the lowly status of the craft. If potters worked the land, it was almost doubtless not their own. Yet, pottery establishments are not usually situated marginally in a functional sense, because their locations, no matter how lowly esteemed in relation to the town centres, provided high visibility and easy accessibility. They usually lay close to roads and, if relevant, harbour areas, that is, places which attract people. Even at many outlying workshops, like Phari (G38), the high potential for customers passing by must have been a necessary condition for the business’ foundation. The often prominent placement of potteries in relation to local, regional and ‘international’ communication networks is a significant asset which would compensate for the possibly negative effect of the immediate surroundings. This must have been especially the case in places like Archaic Corinth where relatively much pottery was sold to exporters. Together with the potters’ tendency to cluster their workshops, even in smaller towns, their apparently general orientation towards the wider world, suggests a degree of organisation and professionalism which is easier to reconcile with a full-time rather than a part-time occupation.

IV.5 Layout of pottery workshops

The physical and functional layouts of ancient potteries cannot easily be reconstructed from the scanty remains of the few sites which have yielded nothing more than kilns or rather the fire chambers of kilns. Although all the other constituent parts of workshops – like clay storage and preparation areas and floors, levigation basins, rooms for turning and possibly painting, and dumps - have been unearthed, no Archaic, Classical or even Hellenistic workshop site has been discovered in its entirety, over its full area and with all its installations. Some essential features

\textsuperscript{181} Arafat and Morgan 1989, 326.

\textsuperscript{182} One could add Chios (G16-G19); Lokozi (I7-I14; I35-I41; Pl. 12a-b); Metapontion (I18-I19; I44-I47); Taranto (I53-I58); Histria (P4-6; P8-P10).
seem to be lacking even in the relatively well published and apparently ‘complete’ workshops of Figareto (G20; Pl. 5a), Mandra di Gipari (G35; Pl. 8-10), Phari (G38; Pl. 11a), the kerameikoi of Naxos (S12; Pl. 16b; 17b) and Lokroi (I35-I39; Pl. 21-22): either they were located in an adjacent unexplored area or at some distance from the excavated installation, or they have not left any recognisable traces. Awaiting the discovery of a truly complete example, we have sufficient bits and pieces to get a general impression of the overall arrangement, all the more so since the archaeological data are surprisingly consistent. Despite some variation in the size and layout of the premises and in the types of kilns, the excavated constructions and installations are very much alike.

A first general pattern is that pottery workshops are usually independently functioning units, housing all the facilities for the entire production process from the preparation of clay to the finished pottery and perhaps merchandising as well. It is of course conceivable that in some instances parts of the process were carried out elsewhere. This would apply especially to the preparation of clay at its place of origin or near a water source and, with respect to workshops which are situated in a kerameikos, to firing in a shared kiln. However, evidence for such practices is minimal: the apparent lack of working space in Mandra di Gipari (G35; Pl. 8c-d; 9a) might have been offset by a construction directly outside the excavated area. In a few workshop areas, like the potters’ quarter of Sicilian Naxos (S12; Pl. 17b, which in my opinion represents two establishments), Metapontion (I44; Pl. 13a) and possibly Figareto (G20; Pl. 5a) and Lokroi I (I39; Pl. 22d), the boundaries of the individual units in relation to the available kilns are unclear. Kiln sharing may be a possibility here, if the unclear boundaries are not simply a result of the state of preservation of these sites. In absence of other evidence, one may conclude that the execution of processes outside the workshop itself, if done at all, had little impact on the layout.

The only and puzzling exception to the usual type of more or less complete establishment is presented by a group of ‘workshop’ sites which apparently consist of little more than a kiln and some working spaces in an open courtyard between houses which reveal no further traces of pottery manufacture. The clearest instances are the solitary kilns at Sybaris (I31; Pl. 15b; 16a) and in early Archaic Sicilian Naxos (S11; Pl. 17a). Although one could suppose that the installations

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183 Figareto has no storage spaces, rather limited installations for clay preparation and few clear working areas or rooms. At Mandra di Gipari an area for clay storage and installations for clay preparation are entirely missing, while the built spaces seem too small to accommodate all the potters’ tasks, leaving hardly any room for the finished products either (see Rizza, Palermo and Tomasello 1992, 39, 155-156). Phari offers a reasonably well preserved kiln and basins for clay preparation, but only traces of buildings. These and the size of the plot suggest that it was a fully equipped workshop, but elaboration is not possible. At Naxos, on the other hand, the workshop buildings and the kilns are neatly preserved, whereas the installations for clay preparation have left no traces. Only Lokroi has some more or less complete establishments, with hydraulic installations, working rooms, enough space for storage and kilns, but most of these components and the workshops themselves are in a rather fragmentary state, and the boundaries of spaces and plots are not always clear, so that detailed reconstructions are not possible.

184 For these possibilities, see Rizza, Palermo and Tomasello 1992, 39, 155-156; Scheibler 1995, 110.

185 Although the very summary excavation reports (Griffo 1964-1965, 145; Pelagatti 1968-1969, 351; 1972, 213-214) are silent on this point, the layout suggests a pair of workshops lying back to back. The position of the kilns is somewhat awkward, but that problem remains even if the built spaces belong together.

186 It is likely that some workshop sites consisting of a single kiln without any context should belong to this group as well. Especially the odd situation at Amendolara (I2-I4; Pl. 11b), with three kilns amidst neatly planned, but apparently unrelated, houses, comes to mind here, but some of the kilns at Siris/Herakleia (I23-I24; I26; Pl. 14b; 15a) may also qualify. G5, below the Tholos at Athens (Pl. 2b), is another possible candidate.
belong to domestic workshops which have vanished, it is also possible to consider them seasonal or semi-professional production facilities which were used (and possibly shared) by people living in the surroundings who perhaps worked at home. If materials and tools were brought in only when needed and extensive clay processing could be carried out elsewhere, such domestic production might leave few traces.

In this respect, the kilns at sanctuaries, none of which (except perhaps S29; Pl. 25a) has a recognisable structural context (see especially I14; S8; S10; P1; G65; G75; I47; Pl. 12c), are also relevant. As remarked (section IV.2), some of them were probably temporarily built by itinerant architectural decorators, whereas others would have filled the on-site demand for votives, perhaps only on special occasions. In this case too, the craftsmen may have come from the surroundings. One wonders whether the unfired products were brought there or, as would seem religiously more appropriate, fashioned on the spot. In the former hypothesis, the distance between the place of fashioning and the kiln is problematic, but on the other hand, the absence of installations for preparing clay seems to argue against the fashioning of products at the sanctuary itself. However, the necessary facilities may simply have disappeared without a trace, perhaps because it was considered more desirable than in domestic contexts to remove them when the installation went out of use. The same might apply to the working spaces, if these were actually built in the vicinity of the kilns, in the sacred area.

The scantiness of the remains is not a characteristic limited to the kiln-only sites: in fact, it can be regarded as a second general pattern which is also particularly relevant to fully equipped establishments. Viewed as positive evidence, the poor state of conservation of potters’ workshops suggests that their buildings were rather ephemerally constructed. This impression is corroborated by the construction techniques and layout of most of the excavated examples. Often, the kiln is the best or the only preserved feature, probably, among other things, because kilns were usually dug partly into the ground. Even so, the relatively solid construction of many kilns contrasts sharply with the crude, ramshackle walls that usually stood around them. The workshop of Mandra di Gipari (G35), in a region with abundant stone for building, is exceptional in its solidity (see Pl. 12c). Especially in places with less plentiful supplies of usable stone and a continuing tradition of pottery production, like Metapontion (I44) and Lokroi (I35-I39), the buildings’ walls and floors were often partly constructed of debris found on the spot itself, including sherds of coarse ware and lumps of baked clay from demolished kilns.

Thirdly, in most pottery establishments unroofed walled spaces and half-open roofed areas (partly) supported by posts appear to outnumber the truly closed rooms, as clearly illustrated by the drawn reconstruction of the Mandra di Gipari workshop (G35; Pl. 9a); Phari (G38; Pl. 11a), Figareto (G20; Pl. 5a), Metapontion (I44; Pl. 13a), Sicilian Naxos (S12; Pl. 17b) and Lokroi (I35-I41; Pl. 21-23, esp. 21c) may be cited as well. Where the function can to some extent be determined, the building often seems to consist of a single small room, probably simply the space needed for turning (Table IV.4). Besides shaping, other delicate tasks like the final stages of

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189 One could probably add the less well preserved workshops G8; G22; S6; G40?; G74; P8-P10? and the later sites G98 and P12-P13 (Pl. 3c-4; 18b; 20a-b; 26; 27c-d).

190 It is notable that some of these rooms (G20, room A; B; S12, rooms 1 and 5; I35, room D5; I36, room G1) have a short protruding wall perpendicular to one of the outer walls. Could this be related to the placement of the wheel?
clay preparation and painting were probably done in the same small room, but there rarely seems to be additional interior space for other processes like drying clay or pots. These were most probably carried out mainly in a half-open shed or outside under a lean-to roof. Pithoi and other large pots may also have been fashioned in such areas, where more space would be available.

Table IV.4 Workshop sizes and spaces

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Plot size</th>
<th>Turning space</th>
<th>Other closed spaces</th>
<th>Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>G8 Lernormant/Constantinoupolos</td>
<td>ca. 200 m²</td>
<td>15 m²?</td>
<td>27; sizes?</td>
<td>3c-4</td>
</tr>
<tr>
<td>G20 Figareto</td>
<td>675 m²</td>
<td>17 m² (AB)</td>
<td>10 m² (ΔΓ); 10 m² (N-side)</td>
<td>5a</td>
</tr>
<tr>
<td>G24 Corinth, Terracotta Factory</td>
<td>195 m²</td>
<td>10.5 m²⁹¹</td>
<td>7.5 m²; 25 m²; 20 m²; 8 m²</td>
<td>7a</td>
</tr>
<tr>
<td>G35 Mandra di Gipari</td>
<td>160 m²⁹³</td>
<td>?</td>
<td>12 m² (A); 9 m² (B)?</td>
<td>8c-d</td>
</tr>
<tr>
<td>G38 Pharí</td>
<td>1,400 m²</td>
<td>&lt;30? m²</td>
<td>?</td>
<td>11a</td>
</tr>
<tr>
<td>S6 Himera, isolato III</td>
<td>500 m²</td>
<td>?</td>
<td>16 m² (2); 7 m² (1)</td>
<td></td>
</tr>
<tr>
<td>S12 Naxos, Quartiere dei Vasai</td>
<td>77 m²</td>
<td>6 m² (1)</td>
<td>7.5 m² (2)</td>
<td>17b</td>
</tr>
<tr>
<td>(two workshops?)</td>
<td>240 m²</td>
<td>9 m² (5)</td>
<td>? (67)</td>
<td>17b</td>
</tr>
<tr>
<td>G74 Thasos, Vamouri Ammoudia</td>
<td>&gt;128 m²</td>
<td>no</td>
<td>27 m²</td>
<td>20a</td>
</tr>
<tr>
<td>I35 Lokroí, nucleo D</td>
<td>&gt;250 m²</td>
<td>35? m² (D5)</td>
<td>24 m² (D6); 10 m² (D4)?</td>
<td>21b</td>
</tr>
<tr>
<td>I36 Lokroí, nucleo G</td>
<td>179 + &gt;165? m²</td>
<td>21 m² (G1)</td>
<td>22 m² (G2); 11.5 m² (G3)</td>
<td>22a</td>
</tr>
<tr>
<td>I37 Lokroí, nucleo H</td>
<td>182 m² (+ more)</td>
<td>no</td>
<td>no</td>
<td>22c</td>
</tr>
<tr>
<td>I38 Lokroí, nucleo L</td>
<td>&gt;150 m²</td>
<td>?</td>
<td>43.5 m² (L1)?; 20.4 m² (L2)</td>
<td>22b</td>
</tr>
<tr>
<td>I39 Lokroí, isolato I₄</td>
<td>480 m²</td>
<td>?</td>
<td>?</td>
<td>22d</td>
</tr>
<tr>
<td>(if two workshops)</td>
<td>260 and 220 m²</td>
<td>?</td>
<td>?</td>
<td>22d</td>
</tr>
<tr>
<td>I50 Herakleia, block III West</td>
<td>&gt;216 m²</td>
<td>?</td>
<td>5 m²; 26 m²; 15 m²; &gt;10 m²</td>
<td>14b</td>
</tr>
<tr>
<td>S29 Megara Hyblaia 41, 6</td>
<td>110 m²</td>
<td>?</td>
<td>(which rooms, if any?)</td>
<td>25a</td>
</tr>
<tr>
<td>S31 Scornavacche, house in SW part of excavated area</td>
<td>ca. 350 m²</td>
<td>no</td>
<td>20 m²; 11 m²; 22 m²; 6 m²;</td>
<td>25b</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>28 m²; 10 m² (incl. house?)</td>
<td></td>
</tr>
<tr>
<td>P12 Chersonisos, workshop A/I</td>
<td>80 + 50? m²</td>
<td>no</td>
<td>no?</td>
<td>27d</td>
</tr>
<tr>
<td>P13 Chersonisos, workshop B/II</td>
<td>52 m²</td>
<td>no</td>
<td>12 m² (includes kiln)</td>
<td>27d</td>
</tr>
</tbody>
</table>

A fourth general pattern concerns the apparently large size of the plots of land on which potters' workshops stand, often measuring several hundred square metres (Table IV.4), i.e. about equal to the area of a comfortable house in an ancient Greek town. The size of such plots sharply contrasts with the numbers and quality of the structures. In addition to the relatively small roofed buildings and sheds, pottery production clearly required much open space for the storage of fresh clay and fuel, the preparation of raw materials and, once again, probably the drying of clay and pots. Few of these activities can be expected to leave a trace in the archaeological record. Quite a number of

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¹⁹¹ Stillwell 1948, 34 gives 280 m², probably because she includes all spaces attached to what seem regular outer walls of the building.

¹⁹² I take the so called Altar Room (Stillwell 1948, 41-42) as the turning space. There appears to be no conclusive evidence for taking this room as a shrine, as Stillwell does: the pottery is similar to the finds in the rest of the building and the so-called stelai or altars are simply upright stone slabs, which might have had a practical function, perhaps in relation to the placement of the wheel. The room, moreover, has an outgoing drain.

¹⁹³ The 270 m² (or 15 x 18 m) given by Rizza, Palermo and Tomasello 1992, 38 is based on the maximum dimensions of the building, disregarding its irregular shape.
excavations have uncovered solidly paved areas which could serve, for example, as treading floors or drying areas.\textsuperscript{194} Equally solid is the construction of decantation and levigation basins; and some workshops seem to have been equipped with rather refined water supply and distribution systems.\textsuperscript{195} Although the archaeological data are too limited for complete functional reconstructions, the equipment and its layout seems to have generally resembled that of traditional establishments in more recent times.\textsuperscript{196}

The open layout of many workshops is at odds with the general opinion that potters and their families and/or assistants lived on the premises.\textsuperscript{197} As seen at Figareto (G20; Pl. 5a), Mandra di Gipari (G35; Pl. 8c-d), Sicilian Naxos (S12; Pl. 17b), Lokroi (I35; I36; Pl. 21b; 22a), Metapontion (I44; 13a-b),\textsuperscript{198} Chersonesos B (P13; Pl. 27d) and probably at Athens (G8; Pl. 4), Phari (G38; Pl. 11a) and Vamvouri Ammoudia (G74; Pl. 20a), the rooms are typically small: ca. 10-30 m\textsuperscript{2} or even less. Although inhabitable as such, almost all the space would be filled by the wheel, a few storage shelves and possibly some drying vessels, paint-pots and freshly prepared clay; further, the dampness made the living conditions uncomfortable. Workshop spaces with built-in kilns, as at Mandra di Gipari (G35; Pl. 8c-d), Metapontion (I44; Pl. 13a-b), Herakleia (I50; Pl. 14b) and Scornavacche (S31; Pl. 25b), must have been even less inhabitable.\textsuperscript{199} A few workshops, including the Corinthian Tile Factory (G22), Lokroi, nucleo H (I37; Pl. 22c), and Chersonesos A (P12; Pl. 27d), seem to lack any potential as living spaces. Although this impression may result from the sites’ limited preservation or excavation, the above-mentioned solitary kilns erected between houses (12-14?; 123-124?; 126?; I31; S11; Pl. 11b; 14b-15; 17a) and at sanctuaries (I14; S8; S10; P1; G65; G75?; I47; S29; Pl. 12c-d; 25a) doubtless indicate that open-air pottery operations existed.

Perhaps a Greek worker could get by without a real home and lived and slept outdoors for much of the year – the summer is, after all, the potting season. However that may be, it seems most probable that many potters lived away from their workshops, even if the locations of their homes must remain speculative. Some may have had a house adjacent to their workshops, but the many potters with enterprises on suburban sites may well have had homes in town, like the many peasants who worked the nearby fields. In any case, there are not any dwellings in the

\textsuperscript{194} G4; G20; G22; G23; G24; G25; G35; I18; S7; G45; G53; G74; I36; I37; I50; S30; P10?; G98.
\textsuperscript{195} Basins (either for clay preparation or cisterns) can be found at G4; G5; G12; G20; G22; G23; G25; G38; G41?; G43?; G45; G48; G49; G50; G68; I36; I37; I38; I39; S32?; hydraulic installations (including elaborate drains) at G10?; G23; G24; G38; I20; S7; G45; G48; G49; G50; G53; G54; G68; I35; I36; I38?; I39; I50; P9?; G76?; G78?; G91?; G93?; G98.
\textsuperscript{196} See Sparkes 1991, 10-12. In addition to the mentioned installations, I36 and I37 apparently have working benches, and at G12; G22; S7; G70 and I36 probable clay or slip containers have been found.
\textsuperscript{197} See Thompson and Wycherley 1972, 187; Thompson 1984, 8; Barra Bagnasco 1989a, 63; Rizza, Palermo and Tomasello 1992, 42-43. The assumption is often implicit, as in Arafat and Morgan 1989 (but see 324-325); 1994; Morgan 1995. Scheibler 1995, 110 is the only one who expresses doubt, and sees no evidence for in-house production.
\textsuperscript{198} As it is not clear whether the scanty remains belong to one or, as is more likely, several workshops, and there is no way to establish plot sizes, I have not included I44 (Pl. 13a-b) in Table IV.4. The closed spaces measure 6 m\textsuperscript{2} and 18 m\textsuperscript{2} (between walls abcd, against city wall); 22 m\textsuperscript{2} and 12 m\textsuperscript{2} (vano D); 18 m\textsuperscript{2} (vano E). It seems probable that both pairs and the single space belong each to a different workshop or to a different phase of the same one.
\textsuperscript{199} See Rizza, Palermo and Tomasello 1992, 42-43.
surroundings of the extramural workshops at Lenormant and Konstantinoupolieos Streets in Athens (G8; Pl. 3c), Mandra di Gipari (G35; Pl. 8a-b) and Sicilian Naxos (S12; Pl. 17b). The same probably holds for other workshops in cemetery areas, like those in the western periphery of Athens, including the Kerameikos (G3-G4; G7; G10-G12; G14; G46; G48-G54; Pl. 3a).

With regard to intra-urban peripheral workshops, the situation is less straightforward. Although we have seen that simple spaces for manufacturing pottery exist in otherwise residential areas (G5?; I2-I4; S11; I23-I24; I26; I31; Pl. 2b; 11b; 14b-15; 17a), there is no definite evidence that they are directly linked to the adjacent houses. The more elaborately built workshops of Figareto (G20; Pl. 5a), Metapontion (I44; Pl. 13a) and Lokroi (I35-I41; Pl. 12b; 21a; 23a) all seem to stand apart, without directly connected houses or many domestic structures in the surroundings, although it should be noted that these excavations barely extend beyond the workshops themselves. The Archaic remains of the Corinthian Potters’ Quarter (G23; Pl. 6b) are too unclear to draw a conclusion, despite the attempts by Arafat and Morgan and others to see the area as having at least a partially residential character. For the time being, therefore, nothing contradicts the evidence, admittedly meagre, suggesting that many or even most potters lived away from their workshops.

Having said that, I do not totally deny the existence of inhabited workshops. However difficult to prove, the domestic function of workshop rooms, without a division between working and living areas, seems possible at some sites, for instance the Corinthian Terracotta Factory (G24; Pl. 7a) and at least one (I50; Pl. 14b, perhaps also I29) of the Herakleia workshops which have rooms large enough to allow for habitation. Moreover, kilns at large farms (I20; S28) are obviously connected to dwellings. The workshop in the city of Himera (S6) is simply a house with a small kiln (if this is not an oven or a forge, as seems possible). A similar kind of domestic operation should probably be envisaged at Scornavacche (S30-S31; Pl. 25b), about which no specific information is available, however. The layout of some of the large Lokrian workshops (I35-I41; Pl. 21-23a) is less clear, but at least I36 (pl, 22a) may have had some domestic space. And at least one workshop in the Agora area in Athens (G6, possibly also G5; Pl. 2b) is regarded as a domestic operation, even though the scant remains fail to support such a conclusion.

It should be noted that all but a few (S6; I29?) of the likely urban workshops in houses date from the 4th century, and that most of them – Lokroi may include exceptions – are small-scale installations with hardly any constructed facilities, producing statuettes and simple pottery. Larger or earlier workshops, on the other hand, all have the appearance of specialised, well-equipped, though somewhat shoddy, artisanal establishments. Moreover, their remarkably uniform layout

200 Coja 1979, 40-42 argues that some of the Histrian workshops had houses in the vicinity, but offers no evidence.

201 See Arafat and Morgan 1989, 324-325; Morgan 1995, 323; 1999b, 230, n.84; and also Williams 1982, 17-18; Crielaard 1999, 55 (basing his conclusions about the Early Iron Age on Archaic evidence). The architecture is limited to more or less loose walls, which can have belonged to any kind of building. The pottery was not published in full, but generally seems to come from messy secondary deposits. Although it is probable that not all the fragments are workshop refuse, I cannot explain such an assemblage.

202 See also, for sites in Greek Italy, Rizza, Palermo and Tomasello 1992, 42-43, who, however, seem too generous in viewing workshops as partly domestic buildings.

203 Brann 1961b, 375; 1962, 110; Thompson and Wycherley 1972, 187. Thompson and Wycherley also include some dumps regarded as workshop remains in their argument (see the unnumbered entries after G6 in Appendix I). Even if these finds can be related to pottery production, which is doubtful, they offer no information on workshop layout.
and equipment suggest they represent the typical organisational and spatial unit of pottery production centres all over the Greek Mediterranean from at least the Archaic period to Early Hellenistic times and probably beyond.\textsuperscript{204}

However, the relation of workshops in major centres like Athens and Corinth, which manufactured on a comparatively large scale for the ‘international’ market, cannot readily be correlated with the above-sketched patterns of function and layout because the archaeological evidence from precisely these cities is of limited value and has led to contrasting interpretations. Regarding Corinth, Stillwell, who excavated and published the Potters’ Quarter (G23-G24; Pl. 6), argued that many of the remains, especially the so called North and South Long Buildings and perhaps some water channels, reflect large-scale enterprises, possibly an association of potters sharing kilns, water supply and other facilities, like shops.\textsuperscript{205} Although Stillwell has found support,\textsuperscript{206} the most recent interpretations are more cautious, rightly stressing that the excavated data are rather scanty and ambiguous. The Long Buildings, which show considerable variation in construction techniques, are in all likelihood simply the western parts of two ordinary city blocks, each filled with several private buildings. Therefore the Potters’ Quarter may well be another typical kerameikos with densely clustered, but separate, workshops with all the necessary installations between them.\textsuperscript{207} As seen, the presence of dwellings in the area is possible, though uncertain; but the combination of workshop and dwelling seems highly unlikely in view of its general rarity. The Tile and Terracotta Factories (G22; G24; Pl. 7a), finally, undoubtedly fall within the common patterns sketched above, but these locally oriented workshops had nothing to do with the earlier heyday of Corinthian fine ware.

For Athens, signatures suggest larger-scale operations than in other centres, possibly even Corinth (chapter VII); the scanty archaeological data, however, furnish no confirmation. Although the large area of basins and kilns excavated in the Kerameikos in the 1930s (G49; G50; see also G7; G79) may theoretically be part of a big establishment, the summary preliminary publication and vague dating of the finds preclude further speculation. Other finds in Athens seem to confirm the pattern of small, independent units which we have met in ‘provincial’ places (G3-G6; G8-G15; G41-G48; G51-G59; G78-G81). Indeed, the one relatively well-published workshop site at Lenormant and Konstantinoupoleos Streets (G8; Pl. 3c-4) would be a good example of that standard type, although it was possibly somewhat larger than usual.

\textsuperscript{204} Later Greek workshops, like those at Tholakia on Paros (G98) and Chersonesos (P12-P13), do not diverge from the earlier pattern. Indeed, the kerameikoi of Lokroi (I7-I13; I35-I41) and Herakleia (I23-I27; I49-I52) continue during the 3\textsuperscript{rd} century without notable changes, and that of Syracuse (S32-S34), which only starts in the 4\textsuperscript{th} century, follows the old patterns until well into the Roman period. See the lists of workshops of the Hellenistic and later periods in Cuomo di Caprio 1992b, 74-76; Seifert 1993, 102-105. Workshops of the ‘indigenous’ but Hellenised world in Magna Graecia also conform to the Greek pattern from the Archaic period onwards, again without a clear break at the Roman conquest. See for this the (selected) unnumbered sites in Appendix I and the catalogues in Cuomo di Caprio 1971-1972, 443-461; 1992b, 71-78. The non-Greek workshops of Etruria and Punic Sicily also listed in these catalogues show more variations, with for example a large-scale in-house workshop on Motya (Cuomo di Caprio 1992b, 72-73, no. 16a, with references; more workshops have been found in the same area since). The usual layouts, however, appear to be much like the Greek ones.

\textsuperscript{205} Stillwell 1948, 15-21.

\textsuperscript{206} Roebuck 1972, 121-122; Salmon 1984, 101-102.

All in all, the limited evidence from Athens and Corinth gives no reason to exclude their workshops from the general pattern of pottery operations, even if their exact relations to the pattern cannot be determined. One may therefore conclude that the spatial and socio-economic context of workshops (with the exception of solitary and sanctuary kilns) and the character of production had little impact on the basic layout, size and organisation of potteries: in other words, the universal type seems to be an all-round establishment which adapted to differing circumstances by the varied application of the same kinds of installations.

IV.6 Kiln sizes, shapes and types in relation to their production

The most impressive feature of many ancient workshops is the kiln or, perhaps more frequently, set of kilns. It is quite common to find kilns in pairs, but larger sets also occur, as many as six at the relatively early workshop of Mandra di Gipari (G35; Pl. 8-10) and even ten at Figareto (G20; Pl. 5a). As noted, it is not always clear whether sets of kilns belong to one or more workshops, but this results in few problems of interpretation. In contrast, a greater difficulty is that the available preliminary publications are generally vague about the relative dating of the kilns at one workshop, so that it often remains unclear how many of them are actually contemporaneous. The large site of Figareto, which apparently contains kilns of different dates, is a good example of such uncertainty. It is nevertheless likely that, as a rule, at least a few of Figareto’s ten kilns were operational at the same time. Many smaller sets also give the impression that, generally, the simultaneous employment of more than one kiln was common practice. In the workshop at Mandra di Gipari, for which good stratigraphical evidence is available, four kilns were probably in use during its latest phase.

A second puzzling aspect of Greek kilns is that whereas their general typology is quite uniform and simple, they differ considerably in size and details. Most conspicuous is the often marked variation in size within pairs and larger sets, as at Mandra di Gipari (G35; Pl. 9-10). Sometimes, differences in size occur in combination with typological variation, for example round and rectangular kilns beside each other (G30; S10; S12; G40; G49?; I35; P13; Pl. 7c; 17b; 18b-c; 21b-208

208 See Rhomaios 1908, 183; Cuomo di Caprio 1971-1972, 418.

209 G33; S10; S15; P1; P5?; P6; G40; G53; I35; I40?; I42; I47; S28; G88 (Pl. 18b-c; 21b-d; 23a). G22 and G38 contain non-contemporaneous pairs. See also Barra Bagnasco 1989a, 63.

210 Other sets: three kilns: G8 (plus one earlier); G28; I21 (plus at least one earlier, if one workshop); S12? (if not two workshops); G49? (if contemporaneous); G62; G74; I36; I37; I41 (plus two earlier?); I44; P9; P10; P13; G101 (plus two later) (Pl. 4a; 7b; 13a; 17b; 19a; 20a; 22a; 23a-b; 24a-b; 26; 27d); four kilns: G70 (plus one later); I39; I50; P8 (Pl. 14b; 19c-d; 22d); five kilns: G50; I57; 6 kilns: G30 (contemporaneous?); P12? (possibly five); G98 (Pl. 7c; 27c-e). The three kilns of G7 (pl. 3b) are superimposed over each other.


214 See also G20; G22; G28; G30; S10; S12; S15; G40; G49?; G62; G70; G74; I35; I36; I37; I39; I41; I44?; I50?; P10; G98; P12; P13 (Pl. 5; 7b; 13a; 14b; 17b; 18b-c; 19a; 19c-20a; 21b-23b; 24a; 26; 27c-e).
Most variation, however, is limited to refinements in the size or shape of the stoking channel, the support of the kiln floor, and the placement or the form and size of the ventilation openings in this floor. Such slight constructional or functional differences are remarkably common, even among sets of kilns of apparently similar size and type.\textsuperscript{215} Despite the opinions of several scholars, it seems quite unlikely that the differences between kilns at various sites or within workshops reflect chronological developments.\textsuperscript{216} All the basic techniques and kiln types seem to have been available from at least the 7\textsuperscript{th} century\textsuperscript{217} and in many cases the late Bronze Age;\textsuperscript{218} and little of the documented variety fits into chronological trends or geographical patterns.\textsuperscript{219} The growing popularity of rectangular kilns is the only clear typological trend over the years,\textsuperscript{220} and regional groupings of kiln types cannot be made. Moreover, kilns which were simultaneously used in the same workshop, such as Mandra di Gipari (G35; Pl. 9-10) and probably, partly, Figareto (G20; Pl. 5a), and opposing pairs of kilns which share a common stoking pit (I35; I50; Pl. 21b-d; 14b) show no less variation than sets of kilns which are less surely contemporaneous. Therefore the most plausible explanation for the random spread of minor variations in typology and construction is that they reflect the personal preferences of the builders, presumably based on a continuous process of trial and error regarding different firing techniques. However, none of the small improvements, whether real or imaginary, had enough impact to trigger lasting evolutionary developments in kiln technology.\textsuperscript{221}

On the other hand, much of the more conspicuous variation in size and type is probably due to functional differences, i.e. characteristics of kiln loads, like their weights, required firing methods or manners of loading.\textsuperscript{222} But since reliable evidence for kiln contents is very limited, the subject is tricky. Few excavation reports explicitly refer to wasters inside kilns,\textsuperscript{223} and other kiln’s contents

\textsuperscript{215} See G20; G28; G35; S12; P6; G62; G70; I36; I37; I39; I41; I44; I50; P10; G98; P12 (Pl. 5a; 7b; 9b-10; 14b; 17b; 18b-c; 19a; 19c-d; 22a; 22c-d; 24a; 26; 27c-e).

\textsuperscript{216} Gebauer and Johannes 1937, 185-186; Mingazzini 1954, 33; D’Andria 1975, 364; see Despini 1982, 84; Seifert 1993, 95.

\textsuperscript{217} G1 (Pl. 2a) seems to be the oldest preserved rectangular kiln in the Greek world; it is also one of the largest.


\textsuperscript{219} See Coja 1979, 35; Despini 1982, 83-84; Rizza, Palermo and Tomasello 1992, 45.

\textsuperscript{220} See Gebauer and Johannes 1937, 185-186; Despini 1982, 83-84. The catalogue in Appendix I contains 31 sites with rectangular kilns. G1(Pl. 2a) is from the 7\textsuperscript{th} century; S10 is probably Archaic; the small kiln of G22 is from the 6\textsuperscript{th} or the early 5\textsuperscript{th} century; G8, I14 and S12 plus the large kiln of G22 date to the 5\textsuperscript{th} century (pl. 5b; 12d; 17b); G25 and P5 belong to the late 5\textsuperscript{th} or the early 4\textsuperscript{th} century, five more are assigned to the 5\textsuperscript{th}-4\textsuperscript{th} centuries (G7; I16) or the Classical period in general (G30; G31; G32). The 4\textsuperscript{th} century provides twelve sites with rectangular kilns (G40; G49; G54; G65; G66; G68; G70; G75; I5; I47; S26; G101; Pl. 18b; 19b; 19d; 21b-d), the 3\textsuperscript{rd} century adds P12 and P13 (pl. 27d). Finally, there are five undated sites (G78; G86; G88; I55; I58; Pl. 27a-b) most of which are probably 4\textsuperscript{th}-century or later.

\textsuperscript{221} See Rizza, Palermo and Tomasello 1992, 45.

\textsuperscript{222} See Garlan 1986, 213; Barra Bagnasco 1989b, 30; Rizza, Palermo and Tomasello 1992, 39-40, 48-49.

\textsuperscript{223} Borisova 1958, 147 (amphorai in round kiln, P12); Ducrey and Picard 1969, 803 (pithos in small kiln [perhaps kiln top?, VS], G28); Barra Bagnasco 1989b, 30 (fragments in several kilns, I35-I38); Preka-
– unless including complete pots which have misfired – are not necessarily reliable evidence, since ceramic fragments were commonly used in the construction of kilns. The only obvious functional category comprises very small kilns with diameters of one metre or less, which are big enough for small pots or statuettes only. Although it has been supposed that black gloss pottery could not easily be fired in very small kilns, the black gloss finds at a few workshops which possessed only one kiln, which measured less than a metre in diameter (G27; I18; I23; Pl. 13b-c; 14b), unequivocally demonstrate that no such limitation existed.

Looking at the other end of the kilns’ range, many scholars suppose or argue that rectangular kilns, which are usually large, were especially used to fire large and plain ceramics, i.e. tiles, bricks, terracottas, architectural decoration and/or large containers. The hypothesis is not unfounded. A rectangular kiln often has a strongly constructed floor, fit for heavy loads, and the size and shape make it especially suited to big rectangular objects. The atmospheric conditions inside such a voluminous kiln, moreover, would have been relatively difficult to regulate and control, partly because the firing temperature probably varies more inside a rectangular kiln than inside a round one. As result, it might have been difficult or even impossible to fire fine and decorated pottery of acceptable quality in large rectangular kilns.

In practice, however, the categories of pottery associated with round and rectangular kilns are not always so clear-cut. There is some evidence for both the firing of pots, though not very delicate ones, in rectangular kilns, and the production of tiles and bricks in round kilns. In addition, the main kilns in workshops producing a high proportion of large vessels like amphorai or pithoi range in floor size from less than 1 m$^2$ to over 7 m$^2$, but these are apparently always

Alexandri 1992, 50-51 (fragments in round kiln, G20); see also Papadopoulos 1989, 18. Despini 1982, 71, 79 wisely refrains from relating fragments found inside stoking channels to possible loads in the kiln above (G70).

224 G117; G27; G28; G30; G35; I18; I23; I31; P6?; G74; I42; I50; P8; P9; G95; P12-P13; and perhaps the tiny rectangular kilns (?) at G78 and P12 (Pl. 7b-c; 10; 13b-c; 14b; 16a; 20a; 27a; 27d).

225 See Borisova 1958, 152; Despini 1982, 84. It has been suggested (Ducrey and Picard 1969, 803; Rizza, Palermo and Tomasello 1992, 41) that the small kilns at Lato (G28; Pl. 7b) and Mandra di Gipari (G35; Pl. 10) were used for firing single pithoi, but this seems rather awkward.

226 Cuomo di Caprio 1984, 81.

227 Rectangular kilns of more than 4 m$^2$: G1; G7; G22; G25; G32; I14; S10; S12; G40; G65; G66; G70; I35; I47; G68; I55; G101 (pl. 2a; 3b; 5b; 12d; 17b; 18b-c; 19b; 19d; 21b-d); between 1 m$^2$ and 4 m$^2$: G30; G54; I58; P13 (Pl. 27b; 27d); smaller than 1 m$^2$: G78; P12? (both not certainly kilns; Pl. 27a; 27d).

228 Ziomecki 1964, 26-27; Ducrey and Picard 1969, 800; Coja 1979, 35, 61; Seifert 1993, 96; see also Cuomo di Caprio 1971-1972, 435-438; 1974, 57; 1984, 81-82; Despini 1982, 84.


230 Davaras 1980, 125; Cuomo di Caprio 1984, 81-82.

231 G7; G11; G40; G70; G75; I35; see Despini 1982, 71, 79, 84; Papadopoulos 1992, 218.

232 G8; G20; S15; P1; I37; S27; P7?. See Rhomaios 1908, 181; Cuomo di Caprio 1974, 57, n.31; Despini 1982, 81-82, 84; Seifert 1993, 96, 98, n.41. Coja 1979, 61 seems to have overlooked this possibility.

233 G20; G35; G38?; S12; G62; G74; T8; P9; T11; G98: P12-P13 (Pl. 5a; 9-11a; 17b; 19a; 20a; 27c-e).
round and usually much smaller than the average rectangular kiln. It is clear that much of the technical logic eludes us, not to mention the local traditions of potters and the limitations posed by building methods, which may have been more decisive than purely functional considerations.234

The most popular kinds of kilns are the medium-sized round or oval ones, say 1-2 m in diameter,235 and larger round ones,236 which are less rare than sometimes suggested.237 Direct evidence for the function of such kilns is limited and inconclusive, mainly because excavation reports omit the necessary data, but also because it is not possible to distinguish the output of single kilns at multiple-kiln sites. Even when more background information is available, however, the resulting picture can be confusing, as illustrated by the very few kilns directly associated with a high proportion of decorated workshop debris. More than half of them are small kilns measuring up to 1.30 m in diameter (G27; S8; T3; I44, A-B; G76; Pl. 24a), whereas the others are large, with diameters of 2.0 m or more (G8, G; S3; G40?; I53; Pl. 4b; 18b-c; 24c).238 Additional evidence from large round kilns (G8, A-B; G20?; G38; G62?; G70; Pl. 4c; 5a; 11a; 19a; 19c-d) also suggests that size posed fewer limitations on the products' quality than has sometimes been advanced.239 Coarser ceramics possibly protected the more vulnerable objects in the kiln load during firing and filled the space unsuitable for decorated wares, like the spots closest to the fire chamber, the chimney and other openings.240

In sum, although some workshops had 'specialised' rectangular or very small kilns, most of them probably relied on medium-large round kilns which, suiting various kinds of products, could be flexibly employed. This practice fits well the conclusions on the general layout of potters' workshops at the end of the preceding section, which also points at varied use of rather standard installations. At the same time, however, the marked variation in the finds associated with different round kilns (e.g. fine ware only, mainly amphorai or mixed household wares) suggests that these all-round installations could serve very specific, even specialised, purposes. A closer look at the evidence and an attempt to achieve a more refined interpretation of the employment of these apparently rather specialised installations would therefore be worthwhile.

234 Despini 1982, 84.

235 G5; G20; G28; G29; G33; G35; G38; I2-I4; I28; S8; S12; T3; P1; P5; P6; G49; G53; G60; G69; G70; I39; I44; I50; I51; I52; S29; S31; P9; P10; G76; G91; G94; P13; G98; G101 (Pl. 2b; 5a; 7b; 10b; 11; 14b-15a; 17b; 19c; 22d; 24a-b; 25a-b; 26b; 27c-d).

236 G7; G20; G35; S3; S10; S13; S15; T4; G40; G74; I35; I36; I37; I38; I39; I40; I41; I53; S27; S28; T8; P7; P10; T11; P12; G98; G99; G101 (Pl. 5a; 10b-c; 20a; 21-23; 24c; 26c-d; 27c-e). In addition, G8, G20; S11; G62; P12 (Pl. 4-5a; 19a; 27d-e) have one or more kilns of around 2 m in diameter.


238 See Despini 1982, 84; Seifert 1993, 96. It needs to be noted that these figures include only one kiln from Athens (G8) and none from Corinth; they should not be considered representative.

239 Ducrey and Picard 1969, 800; Cuomo di Caprio 1984, 79, 81.

240 See Cuomo di Caprio 1984, 81-82. The occurrence of mixed kiln loads is also stressed by Rhomaios 1908, 180-181; Seifert 1993, 96.
IV.7 Kilns and production capacity

A basic issue concerning the relation between the utilisation of kilns of common type and individual workshop contexts is production capacity, which is linked not only to the sizes of the kilns, but also to production rhythms. Reliable calculations of kiln capacities, however rough, are out of the question, even if we could take account of the varying sizes of the artefacts, since excavation data on the original heights and therefore volumes of kilns are lacking. Recent kilns show considerable variations in proportions, although a general rule seems to be that the height (excluding the fire chamber) at least equals the diameter.²⁴¹ Pictures of kilns on Archaic Corinthian plaques, discussed in sections V.2.f and V.5, suggest that this rule of thumb goes back to Antiquity, but the depicted kilns are, of course, not necessarily typical.

Borisova's drawn reconstruction of a kiln (Pl. 27e), based on exceptionally well-preserved remains at Chersonesos (P12-P13; Pl. 27d),²⁴² shows a very low, narrow-domed space less than 1.5 m in height and 2.0 m in diameter. Although the kiln looks quite like a modern bread oven, the shape is without parallel either in the ethnographic record of pottery production or on the Corinthian plaques. But since it would be very impractical to load and use and since the factual basis of the reconstruction itself seems debatable,²⁴³ the proposed kiln model can better be disregarded. Most of Francesco Tomasello's hypothetical reconstructions of the kilns at Mandra di Gipari (G35; Pl. 9-10) also seem to underestimate the original heights, although, of course, the remains supply no clues in this respect. Marcella Barra Bagnasco's calculations of the capacity of eight kilns at Lokroi (I35-I37, kilns Y1-Y8; see Pl. 21-22) are no more than guesses, which lose any value they might have by the fact that very divergent volumes are assigned to kilns of similar (floor) size.²⁴⁴ Adam Winter's old reconstructions (see Pl. 1a), which mainly derive from his study of relatively recent installations, probably still offer the most useful impression of the set-up and proportions of ancient kilns.²⁴⁵

Taking Winter's reconstructions, the ethnographic record and ancient depictions as our reference points, we can suppose that round kilns were at least as high as they were wide, but as a rule no higher than twice the width and, in the case of relatively large kilns, probably markedly less so. The supposition results in the following volumes:

²⁴¹ See e.g. the illustrations and descriptions in Hampe and Winter 1965, esp. 35, 79, 80, 86, 90, 96, 101; Matson 1972, 217.

²⁴² Borisova 1958, 147, 152 and Rys. 9.

²⁴³ Borisova probably places too much emphasis on the inclination of the preserved walls, which may well have been displaced by the pressure of the surrounding earth. Another problem is her reconstruction of the covering of the kiln from loose fragments. If these indeed belong to some kind of domed ceiling, which is not certain, it may have begun rather high up.

²⁴⁴ Barra Bagnasco 1989b, 31; compare the sizes given in Appendix I.

²⁴⁵ Winter 1978, 27-34.
Table IV.5 Hypothetical kiln sizes for given diameters

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Volume: height = diameter</th>
<th>Volume: height = 2x diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 m</td>
<td>0.3 m³</td>
<td>0.5 m³</td>
</tr>
<tr>
<td>1.0 m</td>
<td>0.8 m³</td>
<td>1.6 m³</td>
</tr>
<tr>
<td>1.5 m</td>
<td>2.7 m³</td>
<td>5.3 m³</td>
</tr>
<tr>
<td>2.0 m</td>
<td>6.3 m³</td>
<td>12.6 m³</td>
</tr>
<tr>
<td>2.5 m</td>
<td>12.3 m³</td>
<td>24.5 m³</td>
</tr>
<tr>
<td>3.0 m</td>
<td>21.2 m³</td>
<td>42.4 m³</td>
</tr>
<tr>
<td>4.0 m</td>
<td>50.3 m³</td>
<td>100.5 m³</td>
</tr>
</tbody>
</table>

The figures for rectangular kilns would be comparable, when it is accepted that the height lies somewhere between the length and the width; for example, a kiln of 2.0 x 4.0 x 3.0 m had a volume of 24.0 m³. As to the numerical capacity, the ethnographical record and Winter's reconstructions present a wide range of possibilities, obviously depending on the shapes and sizes of the items. An average of, say, 50 to 200 pots per m³ can be considered reasonable.

Yet whatever the value of these figures, they fail to address one crucial matter: we know nothing about the efficiency and the frequency of the employment of kilns in the ancient Greek world. Basic circumstances like the time needed for loading, firing, cooling and unloading can only be guessed at, partly because ethnographic information is equivocal on these points, but also because many varying factors are involved, like the sizes and shapes of kilns, types of products fired, loading methods, fuels used and manners of regulating combustion, etc. Uncertainty begins at the very core of the problem: estimates for ancient firing times range from a few hours to an entire week. The cooling down of the kiln would have taken about as long as the firing, but we are still faced with the impossibility of reliably estimating the amount of time involved.

The difficulties are well illustrated by the elaborate reconstructions of the working cycles at Lokroi advanced by Cuomo di Caprio and Barra Bagnasco. Cuomo di Caprio's starting point is a kiln (uncatalogued, kiln 1 in I? between I41 and I42; Pl. 23c) with a diameter of 3.9 m, for which she calculates a capacity of 30.0 m³. Assuming a firing time of 30 hours, she arrives at a cycle of two firings a month, each consisting of 10-12 days of preparation, including shaping and

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246 Figures calculated from data found in Hampe and Winter 1965, 35, 79, 80, 86, 90, 96, 101 and Winter 1978, 28, 32, 34, 38 range from 67 to 176 pots of unspecified sizes and shapes per m³. One may also compare the typical volume of ca. 35-40 liter (25 to a m³) of the Panathenaic amphora, a large shape.

247 Compare Scheibler's estimate of a capacity of 200-250 pots for the average ancient fine-ware kiln (1984, 131; 1995, 206, n. 89) and kiln capacities in recent Greece (500-1000 medium sized pots, Matson 1972, 218-219) and Djerba (160 large oil containers, Peacock 1982, 42).


249 See Richter 1923, 35 (12 hours); Hussong 1928, 35 (12 hours or more); Cuomo di Caprio 1971-1972, 404 (10 hours for a kiln of 1/3 m³; 30 hours for one of 30 m³); Matson 1972, 219, 223 (7-10 hours in recent Greece); Winter 1978, 27-34 (3-5 hours for 1 m³, 5-8 hours for 3 m³); Barra Bagnasco 1989b, 30 (7-8 days); Sparkes 1991, 25 (ca. 1 day, including cooling).

250 Cuomo di Caprio 1974, 61-64; see also 1971-1972, 404, 442.

251 Barra Bagnasco 1989b, 30-33.
painting, and 6-7 days of work at the kiln. The required staff would comprise ten people, divided into six workers, three potters and a decorator.

Barra Bagnasco, on the other hand, takes eight kilns into consideration, a rectangular one of ca. 8.0-8.5 m² (I35, Y1; Pl. 21b-d) and seven round ones measuring 2.20-3.0 m in diameter (I35-I38, Y2-Y7; Pl. 21-22), to which she assigns volumes of 3.0-21.0 m³ – certainly very conservative estimates.\(^{252}\) By means of detailed calculations, she arrives at a firing cycle of once a month, during which 17-21 days alone, including 7-8 days of firing, were spent at the kiln. This would require a staff of 63 people for 8 kilns, including 3 stokers per kiln, assuming that they worked 13 hours a day for 25 days a month.

Clearly, such calculations lead us nowhere. Even if we ignore the rather low estimates of kiln volumes and Barra Bagnasco’s surely exaggerated firing time, the considerable variations in the estimates of the organisation of the work and the number of required hours only underscore our ignorance in the matter. These results are no less fanciful than Toby Schreiber’s bold and apparently unfounded assumption that Attic workshops performed several firings a week. Indeed, if we accept that Athenian kilns for fine wares were somewhat smaller than Lokrian kilns for tiles and coarse ware, and that a firing time of 12 hours was sufficient, which seems plausible, Schreiber’s estimate may not be wide off the mark.\(^{253}\)

Lastly, there is the amount of time between firings, about which one can only speculate. If the same people were involved in both shaping and firing, as likely happened in many workshops, kilns probably stood idle for much of the time and the firing cycle would have depended on the shaping capacity of the workshop. On the other hand, the employment of more or less specialised teams of stokers would have allowed for firing as the potters continued to shape, thus intensifying the use of the kiln. And variations in demand and perhaps also seasonal fluctuations in the potters’ working cycles surely further influenced the periods of the kiln’s use. All this only makes calculations like those presented above look even more doubtful.

Fortunately, despite the impossibility of extrapolating reliable quantitative reconstructions or estimates of productivity from the sizes of kilns, excavated remains give information on workshop scale and organisation. If treated with some caution, excavation data permit rough but reasonable guesswork about production capacity in a relative sense, the result of which can, in turn, be elaborated into hypotheses on the division of labour. They even provide a margin of play for a general characterisation of workshops in regard to their output and organisation.

To start, larger kilns are more efficient than smaller ones, as they require comparatively less fuel and obviously can hold more pottery at a time.\(^{254}\) As a result, it might be more desirable to operate a larger kiln below its full capacity than to make intensive utilisation of a smaller one. But a few basic conditions must be fulfilled. The higher investment (in every sense, like monetary and material) must be bearable, as must also the risk of greater loss if anything goes wrong. The larger kiln must be devoid of any technological drawback which, for instance, might place limitations on the kinds of pottery which can be fired. The fuel supply, stock management and sales policies have to be able to cope with the alternation of high production peaks and long periods without

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\(^{252}\) Kiln Y1, measuring at least 8 m², is estimated at only 10 m³; Y2, diameter at least 3 m, at 6 m³; Y3, probable diameter around 2.4 m, at 6 m³; Y4, diameter at least 2.2 m, at 10 m³; Y5, probable diameter more than 2 m, at 3 m³; Y8, probable diameter ca. 3 m, at 5 m³. Only the estimates for Y6 (d. 2.8 m, 17 m³) and Y7 (d. ca. 3 m, 21 m³) are reasonable.

\(^{253}\) Schreiber 1999, 37. Matson 1972, 219 offers a recent example of such a rhythm. Cuomo di Caprio 1974, 64, n. 39 suggests a weekly cycle for small kilns.

\(^{254}\) See Winter 1978, 29-31.
fresh merchandise. And, perhaps most importantly in practice, the potter and his staff need to be able to maintain such a production rhythm.\textsuperscript{255}

The last condition may have proved especially problematical in relatively large Greek workshops: although pots need to dry before firing, the drying time must not last too long. Traces of various kinds of shelters in workshops – if that is indeed what many of their simple structures were – indicate that measures were taken to control drying and storage before firing, which could have had the effect of considerably extending the amount of time between shaping and firing. The effectiveness of such measures cannot, of course, be determined.\textsuperscript{256} Yet even if freshly shaped pots could safely be kept for weeks before firing, the filling of a large kiln would have required a considerable production capacity over a period of time. According to Barra Bagnasco's estimates, which are probably too high,\textsuperscript{257} a kiln of, say, 20 m\textsuperscript{3} would contain 7,800 kilo of fresh pots, the result of a production rate of 557 kilo a day over a two-week cycle. In other words, large kilns seem to be related to high production figures.

The same principle would then seem to apply in the opposite sense: small kilns imply a low production rate. But there is an essential difference. Whereas working slowly to fill a large kiln may result in pots drying out too much, the very intensive utilisation of a small kiln, although perhaps inefficient, is free of the technical and organisational problems attached to large kilns.\textsuperscript{258} If sufficient manpower and fuel were available, a small kiln may have been considered the easiest and safest solution, even for big workshops. Moreover, in the case of fine pottery, which perhaps – we do not know for sure – could not be left to dry for more than a few days before being fired, it may not have been possible to wait long enough to produce the quantity required to fill a large kiln. This circumstance possibly accounts for the use of small kilns by the producers of fine painted wares (see G27; S8; T3; I44, A-B; G76; Pl. 13a; 24a).

Workshops with two or more kilns further complicate the attempts to relate kiln size to production capacity,\textsuperscript{259} especially if the kilns are of similar type and size, as happens commonly.\textsuperscript{260} If the pair or set of kilns at a single workshop is in fact contemporaneous, the most obvious explanation is that the increase in the number of kilns was a means of increasing output in a

\textsuperscript{255} Of course, these conditions should be considered relative factors: what counts are not objective scientific data, but the potter’s subjective impressions and ideas of them when he decides to build a new kiln. Therefore the weight of tradition should perhaps be added as another condition.

\textsuperscript{256} See Schreiber 1999, 33.

\textsuperscript{257} Barra Bagnasco 1989b, 30-31. She assumes a filling rate (pottery to total kiln space) of 15-20 per cent of the kiln volume for coarse wares and 25 per cent for fine wares, with clay weighing 1,550 kg/m\textsuperscript{3}. A comparison of these 232.5-387.5 kg of fresh pots per m\textsuperscript{3} of kiln with the 50-200 average pots/m\textsuperscript{3} derived from recent data given above shows that the proposed filling rates are improbably high for at least medium-large closed fine ware vessels (oinochoai, amphorai) and open high footed vessels (cups), which weigh at most a few kilos. It can also be noted that Barra Bagnasco (1989b, 32) calculates 920 hours of work per m\textsuperscript{3} of clay, i.e. about 36 minutes a kilo. 557 kilos of production a day would then require 330 working hours, i.e. at least 30 people – a figure far beyond those usually given for ancient potteries and, even if woodcutters, clay diggers etc. are excluded, difficult to correlate with excavated workshop plots unless almost everyone worked in the open air or the firing season was very short. The figures and calculations therefore seem unreliable.

\textsuperscript{258} Of course, the danger of drying periods being too short could be avoided by maintaining a stock.

\textsuperscript{259} See Cuomo di Caprio 1971-1972, 418.

\textsuperscript{260} See G7; G8; G20; G28; G35; S12; P1; P6; G53; G62; G70; I36; I37; I39; I41; I42; I44; I50; P8; P9; P10; G98; P12 (Pl. 3b; 4c-5a; 7b; 8c-10; 13a; 17b; 19a; 19c; 22a; 22e-23b; 24a-b; 26; 27c-e).
situation where a single bigger kiln was unattainable owing presumably to the technical and practical difficulties mentioned above. This may also apply especially to some fine-ware producers like those at Metapontion (I44; Pl. 13a; 24a-b) and, perhaps, Lenormant and Konstantinoupolis Streets in Athens (G8; Pl. 4).

Several scenarios can be envisaged. The most straightforward, as mentioned, is that the additional kiln(s) enabled a larger and more continuous output. During the firing of one kiln, another one could be filled, etc.261 In its most extreme form, this could, theoretically at least, make it possible to fire continuously which, in turn, would imply that men specialised in firing the kilns were separate from those who fashioned the pottery. It must be pointed out, however, that this organisational model is without parallel in the ethnographic record and contradicts all current assumptions about Greek pottery production. Yet even in a less demanding situation, it is hard to imagine that two or more kilns could be operated by someone who also spent much of his time shaping pots. Clearly, some specialisation and/or division of labour occurred, unless the multiple kilns were fired simultaneously. The latter procedure may appear odd at first sight, but the pairs of kilns with linked stoking pits (I35; I50; Pl. 14b; Pl. 21b-d; see also I44, kilns A-B; Pl. 24a) strongly suggest that it was indeed followed, evidently with the effect of saving labour and perhaps fuel (as compared to running two separate kilns).262 The second kiln would make even more sense if it operated only occasionally when demand peaked, the other kiln was being repaired or a single large kiln was found undesirable for technical and practical reasons. In each instance, the additional kiln acted simply as a means of increasing output without altering the work rhythm.263

Another interpretation exists, however, stemming from the hypothesis that extra kilns were not intended to increase production, but aimed at diversification.264 This is especially likely at workshops which possessed kilns of different shape, although, as discussed above, even sets of similar kilns may have produced various kinds of ceramic objects. A good case in point is the Mandra di Gipari workshop (G35; Pl. 8-10), which has two large kilns and two or three small ones.265 A technical explanation for the tiny size of these smaller kilns is not at hand, as larger kilns were already in use elsewhere for the firing of fine pots. If low volume in the fine-ware market was the reason for the choice of a small kiln, it seems illogical that there would be more than one of them, and occasional peaks in demand would not have been decisive on such a small scale. The answer may be that the multiple small kilns enabled the potter simultaneously to make different categories of pots in limited numbers, in order to serve a small market calling for a wide

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261 See Rhomaios 1908, 183; Barra Bagnasco 1989a, 63; 1989b, 32.

262 See Cuomo di Caprio 1974, 418; Barra Bagnasco 1989a, 63; 1989b, 30-32.

263 See Barra Bagnasco 1989b, 30-32.

264 See Barra Bagnasco 1989a, 63; 1989b, 29.

265 Compare also the Hellenistic workshops at Chersonesos (P12; Pl. 27d-e, with two large and four small kilns, see Borisova 1958, 144-150) and Tholakia, Paros (G98; Pl. 27c, again two large and four small kilns), and the earlier amphora workshop at Vamvouri Ammoudia, Thasos (G74; Pl. 20a-b, with one large and two small kilns; see esp. Garlan 1986, 213).
range of products. In turn, the two large kilns would then have allowed for some diversification in the manufacture of coarse wares.

The Figareto workshop (G20; Pl. 5a) offers another example of diversification, though in a different context. The enormous amount of discards found all-over and surrounding the site testifies to a varied production of mainly transport amphorae and terracotta statues and reliefs, but also red figure, black gloss and plain pots, loomweights and lamps. Yet the ten round kilns of this workshop, several of which – we do not know how many – must have operated simultaneously, were all of approximately the same type and, in contrast to Mandra di Gipari (G35; Pl. 9-10), varied little in size. As maintained above, the standard round kiln was highly flexible, however, and could accommodate all kinds of ceramic products. Many kiln loads at Figareto possibly had a mixed character, but it is equally conceivable that different products were fired in separate kiln loads under special conditions. Precisely in a large workshop like this it would not have been difficult to prepare a complete kilnful of special products for one firing. Therefore the extensive kiln set at Figareto implies not only a large production capacity in general, but also the simultaneous manufacture of various objects requiring different firing conditions.

On a smaller scale the same (hypothetical) principle of production flexibility by the use of all-round kilns may also be applicable to the amphora workshops of Thasos with single large kilns (G74; Pl. 20a-b, which however also has additional small kilns, and presumably G71-G73) and probably Naxos (G64) and Paros (G67). Some of them apparently produced household ware as well, in all likelihood outside the amphora season or to fill the kiln to capacity when amphorae were being fired. In either instance, the diversification may be regarded as an attempt to get the most advantage of working on a large scale.

A similar explanation may fit the Phari workshop (G38; Pl. 11a) too, where, once more, the apparently diversified production is not paralleled by the use of different kilns: instead, there is one relatively large kiln. This may indicate that Phari met with high (peaks of) demand for some of its products, but either did not experience equally continuous demand over its entire range or, if so, formed stocks which would later satisfy such demand. In view of this hypothesis, which can be considered a small-scale variety of that just sketched for Figareto (G20), the combination of

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266 A totally different and purely speculative alternative would be that the Mandra di Gipari workshop was not one small independent unit, but accommodated a larger group of people who made pottery on a relatively small scale, perhaps at home, who wanted to share some installations but not all their kiln loads. See Rizza, Palermo and Tomasello 1992, 110-111, where a similar suggestion is advanced and refuted. For the local character of the production, see Rizza, Palermo and Tomasello 1992, 112.

267 See also Rizza, Palermo and Tomasello 1992, 39-40, 48, where Palermo argues on technical grounds that one of the large kilns was used to fire heavy pithoi and the other to fire more usual pottery, which he supposes to be lighter in weight. Although the idea is attractive, the argument is not convincing because the floor construction, which would reflect such a different function, has not been preserved in either kiln. I also doubt whether a kiln load of pithoi was really heavier than one of stacked pots.

268 See Preka-Alexandri 1992, 50; Kourkoumélis and Démesticha 1997, 555. The amount and variety of the finds is much greater than these publications might suggest (personal observation during a short visit to the Corfu storerooms, for which I thank Dr. Giorgos Riginos and Dr. Katerina Kanta).

269 See Barra Bagnasco 1989a, 63.

270 See Empereur and Picon 1986a, esp. 510; 1986b.

271 See Empereur and Picon 1986c, 125.
large scale firing and flexibility seems more important than fine-tuning production, which appears to be the chief consideration at Mandra di Gipari (G35). A possible explanation for this difference is that demand at Phari was not only higher, but also more stable and predictable.

One final comparison of sites. Whereas the workshops with a single large kiln in Thasos, Naxos and Paros might be compared to the large, multiple-kiln operation at Figareto, the small multiple-kiln workshop of Mandra di Gipari might be more comparable to the many small, one-kiln sites. The traditional, standard small kiln is, as remarked, highly flexible and can fire almost any kind of pottery of suitable size. It thus corresponds with the ideal production unit when demand is low, or perhaps just slightly erratic, and not too varied, possibly even uniform. Typical examples may be the small Archaic kilns of Knossos (G27) and Megara Hyblaia (S8), which seem to have exclusively fired fine wares of various shapes and decoration.

Summarising, we have met four hypothetical types of kiln facilities in workshops (Table IV.6): (1) several medium-large round kilns and a large, highly diversified turn-out; (2) a single medium-large round kiln and (a) medium, highly varied production or (b) larger but somewhat more uniform production; (3) a combination of large and small round kilns and a small, slightly diversified output; and (4) one small, round kiln permitting little diversification and only a low production level. (5) One might also add the few, usually rectangular kilns catering for specialised and perhaps temporary or seasonal needs at sanctuary sites.

Table IV.6 Workshop types according to kiln set and output

<table>
<thead>
<tr>
<th>type</th>
<th>kiln set</th>
<th>output</th>
<th>remarks on location and output</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 or more</td>
<td>round L/XL</td>
<td>++</td>
</tr>
<tr>
<td>2(a)</td>
<td>1</td>
<td>round M/L</td>
<td>++</td>
</tr>
<tr>
<td>2(b)</td>
<td></td>
<td></td>
<td>-/+</td>
</tr>
<tr>
<td>3</td>
<td>2 or more</td>
<td>round S and L</td>
<td>+</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>round S/M</td>
<td>+/-</td>
</tr>
<tr>
<td>5</td>
<td>1 or 2</td>
<td>rectangular M/L</td>
<td>-/--</td>
</tr>
<tr>
<td>6(a)</td>
<td>1</td>
<td>rectangular L/XL</td>
<td>-/+</td>
</tr>
<tr>
<td>6(b)</td>
<td></td>
<td></td>
<td>+</td>
</tr>
<tr>
<td>7</td>
<td>2 or more</td>
<td>1 rect., others round L/XL and M/L</td>
<td>+/-</td>
</tr>
</tbody>
</table>

The rectangular kilns found outside sanctuaries remain to be examined. They can be placed in two categories. (6) Workshops with solitary large kilns might either be classified as a special variety of type 4 above, catering for building materials, or, if production was more varied, as apparently happened at the Corinthian Tile Factory (G22), as a subcategory of type 2b. Obviously, most sanctuary kilns simply belong to a type 6 workshop, although in the special sanctuary context. (7) Secondly, one may distinguish a category marked by sets of kilns: one large and rectangular kiln in combination with one or more round kilns. Such a workshop's relation to the foregoing types can easily be determined. We have seen that rectangular kilns were usually utilised to fire architectural decoration, statuettes and large coarse vessels, whereas round kilns are associated with various kinds of pots, often including fine wares. Therefore differentiation in the types and sizes of the kilns must be intended to cater for a varied output. Workshops of this category most closely resemble Mandra di Gipari (G35; Pl. 8c-d), that is, type 3; but having fewer and larger

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272 See Rizza, Palermo and Tomasello 1992, 41.
kilns, they are also quite close to type 2. By implication, the output of a type 7 workshop could either be relatively uniform, as type 2b (also types 4-6), or more diverse and flexible, as types 1, 2a and 3. Type 7 mainly diverges from type 3 in that the output would be relatively greater, thanks to the larger kilns, in combination with a somewhat reduced capacity to fine-tune production, caused by the absence of small kilns and of the limited versatility of large rectangular kilns. In contrast to type 1, the different kilns probably allowed for a wider range of products, without posing too many limitations on flexibility and production capacity. As to type 2: it may be regarded as a small-scale version of type 7, offering less capacity, less variety, but more flexibility. One might finally conclude that a type 7 workshop would have had the ideal kiln facilities to keep pace with a quite sizeable and stable, but diverse, market.

IV.8 From kiln sets to workshop characteristics

The rough classification of workshops according to the characteristics of their kiln sets as discussed in the previous section is interesting not only in itself, as an indicator of a variety barely revealed otherwise or as a means of translating excavation data into social and economic interpretations, but also because it is possible to relate the diverse workshop types to the wider spatial and economic contexts of workshops. As suggested in passing, the workshop types listed above can easily be matched with specific situations, like the amphora workshops in the countryside (type 2) or the all-round small-town workshop (type 3). When looking more closely and systematically at the situation and classification of workshops, we indeed see some general patterns emerging which suggest that the location of potteries, the sizes and types of their kilns, and the scale and width of the distribution of their output are roughly interrelated (Table IV.7).

Table IV.7 Workshop categories according to location and output

<table>
<thead>
<tr>
<th>category</th>
<th>location</th>
<th>situation</th>
<th>output</th>
<th>market range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>small towns</td>
<td>mostly solitary</td>
<td>3/4 coarse to simply decorated</td>
<td>local and surroundings</td>
</tr>
<tr>
<td></td>
<td>solitary</td>
<td></td>
<td>5/6 coarse to simply decorated</td>
<td>local</td>
</tr>
<tr>
<td></td>
<td>medium/large towns</td>
<td>mostly nucleated</td>
<td>3/4 coarse to simply decorated</td>
<td>local</td>
</tr>
<tr>
<td></td>
<td>mostly solitary</td>
<td></td>
<td>5/6 coarse to simply decorated</td>
<td>local</td>
</tr>
<tr>
<td>B</td>
<td>medium/large towns</td>
<td>mostly nucleated</td>
<td>1/7 coarse to second rate figured</td>
<td>local and regional</td>
</tr>
<tr>
<td>C</td>
<td>countryside</td>
<td>solitary</td>
<td>2a coarse/plain/black</td>
<td>local; some regional</td>
</tr>
<tr>
<td></td>
<td>solitary</td>
<td></td>
<td>2b coarse to simply decorated</td>
<td>regional; some international</td>
</tr>
<tr>
<td>D</td>
<td>medium/large towns</td>
<td>nucleated</td>
<td>4/4+ coarse to first rate figured</td>
<td>regional-international</td>
</tr>
<tr>
<td></td>
<td>large towns</td>
<td>nucleated</td>
<td>1 plain to first rate figured</td>
<td>international</td>
</tr>
</tbody>
</table>

A first category of workshops (A) consists of those connected to small towns or supplying local markets in larger cities. This category comprises types 3-6. In fact, the small or medium-sized type 3 workshops offering a wide range of products - Mandra di Gipari (G35; Pl. 8c-d) being the typical example - seem ideally geared to the overall basic ceramic needs of the average Greek town.²⁷³ Some workshops falling under type 4 may have played a comparable role on a smaller scale, supplying small towns with their basic pottery. Other workshops, including those at larger sites, probably offered just a narrow range of fine wares or special items like statuettes. One might also assign some small and apparently specialised sites without preserved kilns to this category.

like the Corinthian Terracotta Factory (G22) and the 4th-century remains in the Athenian Agora/Areopagos area (G41-G45). As said, the type 6 workshops closely resemble those of type 4, but had a different output; some may have manufactured basic building materials only, others also plain wares and statuettes. Apart from the two latter categories, the range of products of the type 6 workshops was presumably more or less comparable to that of the smaller type 4 establishments operating in the same area. The workshops at sanctuaries, type 5, form a special variant of types 4 and 6; they are characterised by the on-the-spot distribution of the limited range of ceramic products in demand there.

A second category (B) seems to consist of workshops in medium and large towns, aiming at both local buyers and a wider regional market. It includes most workshops of types 1 and 7. Although the distribution of their output is not always clear, the often large, multiple-kiln potteries of the kerameikoi of Athens (G7-G8; G49-G50; G53; see Pl. 3-4), Sicilian Naxos (S12; Pl. 17b), Metapontion (I44; Pl. 13a; 24a-b), Lokroi (I35-I37; I39-I41; Pl. 21-23) and possibly Atalanti (G40; Pl. 18b-c) probably fall in this category. The groups of small kilns at Histria (P8-P9) and the apparently isolated kilns at Knossos (G62; Pl. 19a) and Sindos (G70; Pl. 19c-d) can be noted as well. These workshops, it seems, usually turned out a variety of coarse, black gloss and simply decorated pots of average types and quality. The workshop at Metapontion (I44), which produced only black gloss and red figure pots, is an exception; perhaps not coincidentally, the small size of its kilns places it on the fringe of type 1. It appears that special products like decorated wares and perhaps cooking pots were usually either supplied by local type 4 workshops or imported from ‘international’ centres like Athens and Corinth. The workshops of types 1 and 7 simply manufactured the bulk of ordinary ceramics, the distinction between the types possibly indicating little more than slight differences of emphasis in output.

Thirdly, a clear-cut category (C) comprises the solitary ‘amphora producers’ along the coasts and in the countryside, the comparable, but unique, site of Phari (G38; Pl. 11a), and the kilns at farms. So far as can be ascertained, all these workshops are of type 2. In all likelihood, most of them mainly furnished pots for local agricultural use, but there are signs that some may have aimed at a larger market which had a more continuous demand. The distribution of Thasian amphora stamps on the island itself suggests that empty containers could be acquired from relatively distant producers. In addition, the production of household wares at ‘amphora workshops’ could easily have exceeded the needs of the direct surroundings. Probably, especially solitary workshops in coastal locations could distribute their products through the traffic generated by food transport from the countryside to towns. Such dependence on passers-by seems total at the Phari workshop and the potters’ village of Scornavacche (S30-S31; Pl. 25b), where there is no trace of a substantial local farming clientele. Neither the ‘amphora workshops’ nor Phari and Scornavacche, however, had anything special to offer townsfolk who could buy the same products, and probably even more, from their local craftsmen. The existence of these outlets clearly depended not on the quality of their products, but on the convenience of their locations to people travelling to places of trade or on their way home.

Of course, not all workshops fall within such neat categories. Apart from the many sites where the limitations of the archaeological data exclude secure classification, some quite problematical cases remain. Generally speaking, however, the difficulties seem mainly to concern exceptional cases or details of classification, without effecting the basic patterns. A few type 2 workshops, for example, are not located in the countryside, but probably belong to suburban kerameikoi. Similarly, the one clearly defined workshop in the extensive potters’ quarter of Herakleia (I50; Pl. 14b) belongs to type 3, not to type 1 or 7 as might be expected in such a context. Clearly,

274 See Empereur and Picon 1986a, esp. 510; 1986b; Garlan 1986, 273-275; see also Empereur and Picon 1986c, 122-125.
moreover, the distinction between a large type 3 workshop and a small one of type 1 or even type 7 is somewhat arbitrary, especially if there is not distinct circumstantial evidence (products, spatial context); and a few workshops with two small round kilns, which, strictly speaking, fall outside my typology, muddle up the picture of medium-sized workshops even more. Additional uncertainties concern some large type 6 workshops, like the Corinthian Tile Factory (G22), which very possibly aimed at customers outside the local market and which may therefore be classified in category B instead of A. Some specialised fine-ware producers, such as type 4 workshops, might present similar cases, although the lack of studies on the distribution of ‘local’ pottery types makes it difficult to draw conclusions about the matter.

In some instances, the exceptions can quite easily be accounted for. The Figareto workshop (G20; Pl. 5a), with a type 1 kiln set, but a remarkably varied output, looks like an exceptionally versatile example of the typical regionally oriented workshop of category B. By producing statuettes and decorated pots, it incorporates the function of specialised type 4 workshops, while its amphorai, although traded, of course, locally or regionally, became distributed internationally as containers, like the amphorai of the category C workshops. The marked variety of the production of the type 1 workshop at Figareto seems to depend on the large, wide-ranging demand of a big harbour town which not only attracted many local buyers, but also offered the possibility to enter regional and international distribution networks of pottery and goods shipped in containers. It is likely that better data from similar centres, like Chios (see G16-G19?), Samos or Rhodos, would reveal that the Figareto workshop is not the exception it now appears to be.

More problematical are the clusters of poorly preserved Archaic remains in Miletos (T3-T5) and Gela (S3, perhaps S2, S5). They all appear to be solitary kilns, but that is perhaps due to limitations of excavation and publication. Although they may simply belong to locally or regionally oriented workshops of type 4, it is tempting to regard these Archaic kilns as the precursors of the later and generally larger type 1 workshops, thereby making it possible to assign them to category B. Two of the kilns under discussion (S3, T4) are large enough in themselves to be designated type 2, and it might not be coincidental that where information on products is available (S2; S3; T3) decorated fine wares predominate, nor that precisely Miletos, an important pottery exporting town in the Archaic period, is involved. Here again, new finds (like T2 at Klaizomenai, an Archaic single-kiln workshop producing plain and decorated pottery) and more extensive publication of the available data may clear up matters.

Besides all these rather marginal uncertainties and ambiguities, a disturbing enigma remains to be solved: a major category of pottery manufacturer – the large specialised workshop producing fine wares mainly, or to a large extent, for export – is not represented in my classification system (Tables IV.6-7), simply because no trace of it seems yet to have been discovered in the archaeological record. Several phenomena are relevant. First, the largest excavated workshops (Figareto, G20; Sicilian Naxos, S12; Lokroi, I35-I38; Pl. 5a; 17b; 21-22) all seem to belong to category B, supplying a local or regional market with mainly coarse and simple ceramics and relatively little (Figareto) or no (Naxos, Lokroi) figured ware. Secondly, the few excavated workshops producing figured pottery form a mixed group, comprising both type 4 and type 1 sites of various sizes and operating in very different contexts. The only thing most of them have in common is that they also made simply decorated, black and banded fine wares. Thirdly, Archaic Corinth and Athens barely figure in the available evidence, and Classical Athens and especially Corinth only slightly more. Most of this information, however, concerns workshops which were not producers of figured wares.

Although it is hardly viable to attempt a serious assessment of the organisation of such a workshop from these diverse elements, some main points look clear. First of all, nothing indicates

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275 See Kourkoumélis and Démesticha 1997, 555.
either an unusually high level of production or an exceptional degree of workshop organisation. The Athenian and Corinthian workshops catalogued in Appendix I do not stand out in any way and, in fact, fit easily into the classification system presented above. For example, the best-preserved Athenian workshop, at Lenormant and Konstantinoupoloos Streets (G8; Pl. 4c), had two or three medium-sized kilns during its late 5th-century phase when it produced simple black gloss pottery. This establishment seems to have been smaller than those at Figareto (G20; Pl. 5a) or Sicilian Naxos (S12; Pl. 17b), which, however, show comparable, open layouts. The plan of the earlier phase of the Lenormant/Konstantinoupoloos workshop (Pl. 4b), when figured pottery was produced, is unclear, although the plot could not have been much bigger and there are no traces of denser building. The only other well-documented workshop making figured pottery, I44 at Metapontion (pl. 13a), is much smaller. Even if its two or possibly three kilns were operated intensively and in combination, their output capacity must have been less than that of the many ordinary workshops of types 2, 3 and 7.

Regarding Corinth and Athens, another general point is that most workshop remains and dumps yielding decorated pottery seem to reconfirm the usual pattern of rather mixed production. The finds at the Potters’ Quarter (G23-G24) include different kinds of decorated and plain fine pottery, lamps and statuettes. Athenian black and red figure workshops almost invariably yield also black gloss and banded fine wares, the Lenormant/Konstantinoupoloos workshop (G8) being a clear example. None of them, however, seems to have also made statuettes. Neither the Potters’ Quarter nor the Athenian fine ware producers apparently bothered much about coarse pottery, that is, if the reports can be trusted for not being overly selective.

The average size and layout of at least Athenian workshops and the exclusively fine, but otherwise mixed, output of the Potters’ Quarter viewed in combination with the Athenian black and red figure production suggest that the manufacture of pottery in the major exporting centres was carried out, at most, in expanded versions of type 4 workshops or in relatively specialised, but not exceedingly large, establishments of type 1. If further exploration of the Potters’ Quarter, the Kerameikos or the Academy area uncovers more workshops, they would doubtless have sets of several similar, medium-sized round kilns which were used to fire a wide range of fine wares. One can only speculate about Lakonia, Miletos, Rhodos and other ‘minor’ exporters of figured pottery, but the finds at Metapontion (I44) and perhaps those at Miletos (T3-T5) make clear that workshops of this category might usually have been small one kiln establishments.

Two interconnected points regarding the production of figured pottery follow. First, it was apparently restricted to urban workshops, especially those of types 1 and 4 located in kerameikoi (Athens, Corinth, Metapontion, perhaps Miletos, but possibly not Figareto). Obviously, isolated

276 Unfortunately, the only reasonably well preserved workshop with kilns at Corinth, the Tile Factory (G22), dates after the heyday of Corinthian pottery export and produced no figured ware. As said, it is a large, but otherwise typical, type 6 workshop.

277 Stillwell 1931, 86; Stillwell 1952, 3-4. Salmon 1984, 97, 103 remarks that much simpler pottery was aimed at the local markets.

278 See Baziotopoulou-Valavani 1994, 52.

279 See Kourkoumélis and Démesticha 1997, 555. The small Archaic kilns/workshops at Knossos (G27) and Megara Hyblaea (S8) also produced decorated fine wares, but it is unclear whether these wares should be classified with the figured pots. Both workshops are urban, although they appear to be solitary. On the absence of decorated fine wares at Mandra di Gipari (G35), see Rizza, Palermo and Tomasello 1992, 111. It may also be relevant to note here that many minor figured wares with a limited regional distribution which are known from stylistic attributions only, like Thasian black figure, pseudo-Corinthian Corfiote and Tarentine as well as
establishments operating in urban peripheries, small towns or the countryside could not survive on the trade in mainly figured wares. The implication seems to be that the manufacture of figured wares depended on the existence of a strong, regionally oriented cluster of workshops or on perhaps some other focal point (like the harbour at Corfu?) which attracted enough potential customers who demanded higher quality goods. If this hypothesis is correct, figured pottery should be considered an additional product in the literal sense, more difficult to market than the common wares, but probably potentially more lucrative – in other words, a kind of modest luxury.

Secondly, the evident link between figured pottery and kerameikoi may also furnish the clue which explains the puzzling presence of small workshops in the major exporting centres. The large-scale character which is missing in these rather primitive-looking individual establishments is instead achieved by the collectivity: the group of workshops gathered in a kerameikos. If even small towns that are not at all renowned for their pottery production, like Sicilian Naxos or Lokroi, or thought to be of regional importance only, like Metapontion, Herakleia or Histria, have striking clusters of workshops (Pl. 12a-b; 13a; 14; 16b; 17b), what should we expect at Corinth or Athens? Seen from such a perspective, especially the situation at Athens becomes more understandable. Although the remains of individual workshops are scant, an extraordinary amount of potters’ debris is spread over a large area of the city. As argued above, the Kerameikos may have extended into the area of the later Agora until the Archaic period. Remains of 5th- and 4th-century ceramic production have turned up everywhere in the city’s west periphery, from the Academy in the northwest through the Pireaus Gate area (now Thisio) directly south of the Kerameikos to Petralona in the southwest. The extent of the finds becomes even more impressive when one considers that the workshops of over 99% of the more than 1,000 black and red figure producers known from stylistic studies are waiting to be discovered.

On the other hand, the scattered archaeological data cannot mean that the whole western periphery of Athens was a solid area of potteries during the entire Archaic and Classical periods. Despite a few concentrations of production sites, the potteries were doubtless surrounded by empty spaces, cemeteries, other kinds of workshops and individual, more or less public buildings, like sanctuaries and the Academy. Moreover, the rather rough dating of many sites probably results in an exaggerated impression of the extent of the total area occupied by pottery workshops at any given time. In fact, it is tempting to see a general shift in the location of potteries, first away from the Agora through the Kerameikos to the northwest, then, from the late

probably Euboean, Chalkidian and part of Boiotian black figure, all come from relatively large centres which also had a considerable production of simpler wares (and in some cases terracottas).


281 For Lokroi see Cuomo di Caprio 1974, 60-61, and Barra Bagnasca 1989a, 63, each offering different figures for the total scale of production at Centocamere.


284 See Baziotopoulou-Valavani 1994, 52-53. Of course, not each identified painter worked in his own workshop: the workshops of the Brygos Painter (G9), Painter of the Athens Dinos (G15) and Jena Painter (G47) each yielded debris including fragments of pots by stylistically related painters.

5th century, back to the Kerameikos and, finally, in the second half of the 4th century, away to the southwest, but also further back towards the 'Industrial Quarter' on the slopes of the Areiopagos, close to the Agora.

However, even if we allow for much open space and some shifts over time, the spread of evidence would indicate that a sizeable kerameikos stood in the western periphery of Athens from at least the 6th century onwards. The picture sketched by Arafat and Morgan, of sporadic domestic workshops supplying nearby villages and their cemeteries, is surely misguided, not only because there are too many workshops too close together over a much larger area than they suggest, but also because the immense, obviously urban cemeteries and the workshop sites lying between them leave little room for villages. In any case, there are no clear traces of concentrated habitation in these areas in the direct surroundings of the city.

In comparison with the Athenian workshop areas and even the kerameikoi of Southern Italy and Sicily, the famous Corinthian Potters' Quarter (G23-G24; Pl. 6) is suspiciously small. It cannot be more than a small part of the entire district, which must have extended further towards the city centre, where perhaps the kilns, now so conspicuously missing, may have been located. The Tile Factory (G22) and the kiln in the Forum area (G25) suggest that other clusters of workshops operated elsewhere in the city. However, the deposits from the Anaploga well, some 15 minutes walking distance to the southeast, but still within the western part of the city, and possibly the Vrysoula dump, a few hundred metres north of the Potters' Quarter, may indicate that pottery production was concentrated in Corinth's western periphery.

One could even speculate that these sites and the Potters' Quarter are the remains of a continuous area of workshops. Although this may seem a farfetched proposal according to the

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286 One might speculatively relate these shifts to the general expansion and contraction of Athens, following the ups and downs of its political and socio-economic history. If indeed the case, the link would confirm the 'social' background of the peripheral location of pottery workshops.

287 Arafat and Morgan 1989, 322-323; 1994, 114. Typical of their method is that they regard 'votives' found at Poulopoulou Street (G13) and products of workshops in the Academy area as comparable kinds of locally oriented pottery. Besides overlooking that Poulopoulou Street lies within the Classical city walls, they fail to mention that the supposed votives are thought in the excavation report to have been part of a workshop dump underneath a later sanctuary and they describe the two sites as 'nearby' although they lie at a considerable distance from each other on opposite sides of the Kerameikos.

288 As anyone taking a walk in the area can observe, it is not only within easy walking distance of the ancient city centre, but even now continues to offer good views of the Akropolis between the high-rise buildings.

289 Stillwell 1948, 3-4. The excavated area measures around 340 by 10-15 m.

290 Lawrence 1996, 107; see also Arafat and Morgan 1989, 325.

291 See Amyx and Lawrence 1975, esp. 83.

292 See Pemberton 1970, who regards it as a workshop dump because of the presence of some wasters. However, Robinson 1965 prefers a votive deposit. As I argue in section XVI.2, the assemblage as a whole suggests that Robinson is right (see also Table XVI.10). The wasters could be intrusions, craftsmen's votives or remains of on-site production in the sanctuary. In either case, one can assume that some pottery was produced in the area.
present state of evidence and in view of current ideas on Corinthian pottery production, Athens demonstrates that such a large kerameikos is not inconceivable. As in other kerameikoi, much of the Corinth district may have been occupied by open space, graveyards and scattered buildings of various kinds, while the actual number of workshops remained fairly small. In fact, although the evidence is indicative of intensive activity in the Potters' Quarter, the density of building (including installations) was evidently quite low, as commonly occurs at pottery production sites, including Athens. Finally, the absence of work by many major exporting painters among the finds from the Potters' Quarter and the Anaploga Well which, however, yielded considerable numbers of attributable pieces – by 105 painters over the 200 odd years from EPC to LC III and 7 or 8 painters, respectively – is yet another indication that we can reasonably postulate the existence of a much grander kerameikos, offering facilities to dozens or even hundreds more of their fellow artisans. It goes without saying that not all of them had their own workshops, while it must also be kept in mind that besides figured pottery Corinth was an important manufacturer of plain wares, statuettes, architectural decoration and the well-known Corinthian tiles. Precisely as in Athens, the clusters of so many workshops must have formed a formidable production network, only faint traces of which are revealed by the archaeological evidence and recent calculations and reconstructions of the scale of pottery production.

IV.9 Excavated workshops and kilns: conclusions on scale and organisation

Reviewed in its entirety, the archaeological evidence for ancient pottery workshops presents a two-sided image of uniform simplicity and differentiated complexity. At first glance simplicity prevails. All over the Greek world many elements of workshops look similar. Layout and construction are generally confined to essentials, with much open space for working and storage, and few, often rather ephemeral buildings. Only kilns and other installations tend to be more solidly built and to be more elaborate, despite their low technological level. As a rule, the output seems to have had an all-round character, with each workshop manufacturing a wide range of products, mostly targeting local or regional markets. Significantly, large and specialised factory-like establishments have not been discovered; instead, the typical workshop is rather small, even if the kilns may be relatively large.

However, some aspects of the uniform pattern seem at odds with the overall impression of primitive, small-scale artisanal operations. Most conspicuously, potteries are typically located in

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293 Most recently and thoroughly put forward in Arafat and Morgan 1989, 324-325; see also, less minimalist, Lawrence 1996, 107.

294 Stillwell 1948, esp. 11.

295 The dense building proposed in Williams 1982, 18 and Arafat and Morgan 1989, 328, 341 finds little support in the excavation plans.

296 Stillwell and Benson 1984, esp. 10-12; see also Stillwell 1952; Benson 1984, 99; 1985, 17-18. It should be noted that only a fraction of the material from the Potters' Quarter and Anaploga has been published; see for Anaploga Amyx and Lawrence 1975, 83, where a total of 185 baskets of pottery is reported.

297 Amyx and Lawrence 1975, 69, 83.

298 See Amyx and Lawrence 1975, 69, 83; Salmon 1984, 97, 103; Benson 1985, 18; Lawrence 1996, 104-107; and also Arafat and Morgan 1989, 324.
peripherical but well-connected locations within easy reach of suppliers and customers. The absence of habitation space at workshops is intriguing and may be an additional sign of sophistication. A closer examination of the basic layout of the typical workshop reveals that the general similarity embraces much small-scale variation, especially concerning the sizes, shapes and combinations of kilns. Similarly, the common location characteristics actually occur in very different geographical and functional contexts, from large suburban kerameikoi to solitary rural workshops with one kiln. Some of these kerameikoi, moreover, seem to have been surprisingly large. Especially in Athens, but perhaps also in Corinth, the large scale of these clusters of pottery establishments may have overshadowed the small scale of the individual production units.

A last point. The standard picture of ‘mixed’ production comprising the whole range of ceramic products from fine pottery to coarse wares and even statuettes and building materials, may require some modification. Although strong specialisation in particular pot-forms or kind of decoration cannot readily be determined by excavations – as opposed to some workshops specialising in terracottas and tiles – differences in emphasis can clearly be discerned. Besides all-round establishments, which, however, usually were not producers of figured pottery, workshops can be identified which made amphorai and some plain wares, or storage jars and plain and black table wares, or black and decorated fine wares only. In some instances the layout is clearly dependent on the particular nature of the output, whereas in other instances similarly-looking sites seem to have made very different kinds of pottery. The generally uniform simplicity of the physical remains hides a complex reality of differences in internal organisation, kiln use and marketing.

The obvious conclusion to be drawn from this two-sided image would be that the standard assumptions, so easily deduced from excavation reports and ground plans, need to be adjusted in the light of the local specifics and the individual contexts. Once that is done, as I have tried in regard to the kiln sets and the workshop categories in the previous sections, a more differentiated picture emerges: many kinds of workshops adapt to many sets of circumstances, patterns of specialisation mark production and complimentary combinations of groups of workshops operate on individual sites and between them.


300 See also Muller 1999, 284-285, arriving at similar conclusions from different evidence.