

Architectures of Fire

Processes, Space and Agency
in Pyrotechnologies

edited by

Dragoş Gheorghiu



Access Archaeology



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Italian Pottery Kilns and Production Areas from the Bronze Age to the Archaic Period (2200-500 BC). A Typological Approach

Agostino Sotgia

Abstract

This paper proposes a typological approach to study the structural evidence related to pottery kilns and craft areas. Starting from a systematic survey of pottery kilns attested in the Italian peninsula from the Bronze Age (2200-950 BC) to the Orientalizing and Archaic periods (725-500 BC), this research provides a reconstruction of different kiln types by putting particular emphasis on craft areas, with the main goal of identifying common features, similarities and dissimilarities among different sites. Moreover, ethno-archaeological data have been taken into account in order to provide a more complete overview of extant evidence.

Keywords: kilns; production areas; craftsmanship; proto-history; Italy; typology.

Introduction

Despite of traditional studies focused on final products, in this paper, I propose an alternative approach, aiming at reconstructing ancient pottery manufacturing models focusing in particular on the analysis of structural evidence and related craft areas.

Indeed, starting from the study of the morphology and consequent function of kilns, and how they change during the time, we can better understand the technological choices – on the basis of pottery production - occurred in the Italian Peninsula from the Bronze Age (2200-950 BC) until Archaic periods (725-500 BC). Also, the areas chosen to host this production show specific characteristics helpful to describe in a clear way the production itself.

Thanks to a typological approach, able to underline the principal characteristics of both structures and areas, we can follow the development of organization of pottery production. The chronological and technological classification of the kiln types here presented allows to draw a scheme that is not limited to a 'straight evolutionary logic', but to the understanding of the craft activity, with its peculiar forms of specialization (Sotgia *in press*).

Also the discovery of a series of common traits for production area, not related to chronology and location, allows outlining more clearly the pottery workshops organization and consequently the steps of production.

State of research

Current knowledge of pottery kilns and production areas in Italy is still unsatisfactory¹, even though studies on this topic have increased over the last decades especially for the pre-Roman period. Few partial-works can be mentioned as a starting point.

¹ This gap is not only due to the lack of clear archaeological contexts for earlier phases, but also to the specific state of preservation of the kilns that do not always allow a correct understanding of these structures.

A kiln, in fact, is most of the times a temporary installation made of a poor quality mixture of mud and straw or other insulating materials mostly raw. Moreover, even in well-organized production areas, after a few firings, a kiln was frequently replaced by a new one. In fact, the high temperatures during the firing process and the exposure to weather conditions caused very easily cracks and crevices in kiln walls. Artisans were therefore forced to frequently repair and partially reconstruct the structures, and consequently entirely rebuilding the structures after a relatively short time was more convenient.

Table 1: Comparative table, showing different typological schemes for Italian protohistoric.

Current proposal	Iaia (2009)	Levi (2010)	Jones et al. (2014)
Type 1	Open Firing	Open Firing	Open Firing
Type 2	Single-chamber kiln	Single-chamber kiln	Single-chamber kiln
Type 3.1	Two-Pit Kilns without perforated floor	Two-Pit Kilns	Updraft kilns with a separation between firing and fuel chambers
Type 3.2	Two-Pit Kilns with perforated floor	Updraft Kiln	
Type 4.1			
Type 4.2			
Type 5			

The first classification for the Italian pottery kilns was proposed by N. Cuomo di Caprio (1971). As I will explain later in this paper, this work is compromised by the so-called sceptical approach.

The first study on specifically protohistoric kilns (alongside to a classification of ovens) is provided by N. Negroni Catacchio (1995). However, the low amount of samples analysed makes this work not exhaustive.

A higher number of data were analysed by C. Iaia and A. Moroni Lanfredini (2009) and S. Levi (2010). However the current proposal differs from these previous classifications for the use of more detailed examples that not only allow to better define known types but also to add new types (Table 1).

Focusing on the Italian Prehistory, the lack of clear evidence and the peculiarity of these structures, allowed many scholars to follow the so called ‘sceptical’ and ‘problematic’ approaches, as defined by Cristiano Iaia (Iaia and Moroni Lanfredini 2009: 57-59).

The main exponent of ‘the sceptical approach’ is N. Cuomo di Caprio (2007: 502-503), who described the most ancient evidence, dated to the Bronze Age-Early Iron Age, as simple methods of firing techniques. Cuomo di Caprio writes that these kilns are limited to mere holes in the ground filled with ash and coal.²

In regard of the ‘problematic approach’, it is proposed by, among others, M. Vidale (2007: 42), who raised doubts about both the excavation methods applied on the kilns contexts and the published works on such structures.³

Despite the fact that Vidale’s observations on issues concerning excavation methodology are valid, especially in regard of past fieldworks, the problem with the ‘sceptical-problematic’ approach is that its conclusions led to avoiding alternative research strategy on this topic.

Following the arguments by Cuomo di Caprio, it seems that in pre- and proto-historic periods the form of craftsmanship was very basic (see footnote 2). Therefore, she thought that, regarding the Protohistory,

² ‘Structures dating to proto-historic periods [...] consist of pits or holes, filled with ashes, charcoal and pottery fragments, often not easy to interpret. These primitive structures continue to be used throughout the Iron Age and even later. If one wishes to use the term ‘Kiln’ one might highlight the non-fixed nature of the structure by using the expression ‘temporary kiln pit’’. (Cuomo di Caprio 2007: 502-503) [The translation of the quote from Italian is mine]

³ ‘The furnaces in the classic or historic period have been studied significantly better than the prehistoric and proto-historic ones [...]. Moreover the textbooks, as is common in other fields, tend to copy or ‘imitate’ each other, passing on only a few images or reconstructions that have become canonical, although approximate or unnecessary’. (Vidale 2007: 42) [The translation of the quote from Italian is mine]

the investigation of ancient production rather than the study of kilns and production areas would be more interesting.

The starting point of this research, on the contrary, is the awareness that various morphologies of kilns are linked to production requirements and to the introduction of new types through time. This suggests a certain degree of craft specialization and work planning.

Moreover, by integrating the detailed analysis of each kiln's evidence within their context (production area), it is possible to gain a better understanding on scale and modes of pottery production across space and time.

My chrono-typological classification, indeed, not only reflects technical developments, namely the shift from simple kilns during earlier periods (Type 1 and 2) to more complex structures (Type 3 and 4) in later times, but it is also related to the organization aspects of production.

The simplest and oldest types were never wholly abandoned, and they are documented alongside the more recent types (even within the same sites), probably as a response to the need for producing different wares.

Consequently, the research question concerns the possibility to investigate the pottery production following the technological development of pottery kilns.

In this sense, the work of C. Iaia (Iaia and Moroni Lanfredini 2009) is fundamental. He proposed to examine the structural evidence of pottery workshops putting emphasis on the cultural choices behind every production process. With this perspective, it is possible to overcome the simplistic evolutionary model of the 'sceptical approach' in order to suggest a linear path from simple kilns during earlier periods to more complex structures in later times.

Pottery kilns

Building a typology

The classification proposed here starts from and expands on the typological studies by C. Iaia (Iaia and Moroni Lanfredini 2009) and S. T. Levi (2010). Essential are also the works on firing methods written by O. S. Rye (1981) and P. M. Rice (1987; 1994). On the one hand, these works are integrated with ethno-archaeological studies (see the references in the text), on the other hand they refer to experiments conducted by Balansky *et al.* (1997) in the Oaxaca Valley, the Italian experiences developed inside of the Parco Archeologico della Terramara di Montale in 1997 (Cardarelli and Levi 2004) and at the park of Broglio di Trebisacce in 2006 (Vanzetti *et al.* 2014).

In regard of the Parco Archeologico di Broglio di Trebisacce I had the possibility to work during the 2014 summer and the 2015 winter with G. Pulitani at the restoration of an experimental kiln (Figure 1). On that occasion, I had the unique opportunity to take part into the process of building and using a kiln as well as to directly experience a production area.

In order to isolate peculiar attributes, the hierarchical scheme of classification takes into account:

1. the presence/absence of building structures;
2. the position of pots and fuel inside of the kiln;
3. the kiln morphology.



Figure 1: The author during the restoration of the kiln at the Parco Archeologico di Broglio di Trebisacce. Summer 2014 (photo by G. Pulitani)

This first distinction is therefore between *non-kiln firing* (Type 1; i.e., firing without building structures) and *kiln firing* (i.e., firing made in fixed, or semi-fixed structures). However, such distinction is not always clear. In the case of (semi-)fixed structures, another distinction can be made between kilns in which the fuel is placed in direct contact with the artefacts during the firing process (Type 2) and those in which there is a division between the firing chamber and the area where the fuel was burnt (combustion chamber). Finally, depending on the shape formed by the arrangement of the two chambers, it is possible to define the remaining types (Types 3-5).

This typology is a part of my research work (Sotgia 2013) on the Final Bronze Age kiln, discovered in the site of Monte Cimino (VT). In order to study this proto-historic evidence, I made comparisons among Bronze Age evidence. However, after a first survey of the kiln dated to this broad period, I realized that the small amount of available evidence (12 Sites - 35%), did not allow a significant sample. As a consequence, I choose to make the sample more significant by adding up also the evidence dated to the Iron Age (14 Sites - 40%) and to Archaic period (9 Sites - 25%). I chose to fix the chronological boundary at the 6th century BC because after that moment the pottery production turns definitely in a huge 'industrial' production - with new type of kilns and workshops organization.⁴

The resulting sample (Table 2) is composed by 118 kilns - discovered in 35 sites - spanning all over the Italian peninsula (Figure 2).

⁴ See the examples of Satricum, Lavinium, Laurentina-Acqua Acetosa and Caere in Nijboer 1998.

Table 2: Comparative table, showing different typological schemes for Italian protohistoric.

Sites	Kilns	Chronology	Types
Basilicanova - Montechiarugolo (PR)	1	XII-XIII cent. B.C.	3.1
Bellinzona - Castel Grande - Canton Ticino	1	XV-XIV cent. B.C.	3.1
Bologna - Quartiere Fieristico (BO)	1	IX-VIII cent. B.C.	3.1
Bologna - San Vitale (BO)	14	IX-VIII cent. B.C.	4.2
Casteldebole - Borgo Panicale (BO)	4	IX-VIII cent. B.C.	3.1
Cures Sabini - Fara Sabina (RI)	1	VII-VI cent B.C.	4.1
Fidene - Roma (RM)	1	IX-VIII cent. B.C.	3.1
Lavinium - Anzio (RM)	3	VII-VI cent B.C.	2 - 4.2
Le Chiarine, Puntone Nuovo - Scarlino (GR)	2	XI-X cent B.C.	3.1 - 3.2 - 5
Matelica - IPSIA (MC)	3	IX-VIII cent. B.C.	3.1
Matelica - Palazzo Chirichetti (MC)	5	IX-VIII cent. B.C.	3.2
Matelica - Via Pergolesi (MC)	2	IX-VIII cent. B.C.	3.1
Montagnana - Borgo S. Zeno (PD)	5	IX-VIII cent. B.C.	1
Monte Cimino - Soriano nel Cimino (VT)	1	XI-X cent B.C.	4.2
Monteriggioni - Campassini (SI)	5	VII-VI cent. B.C.	1 - 3.2 - 4.2
Montedoro - Senigallia (AN)	1	VII-VI cent. B.C.	3.2
Montericcio di Imola (BO)	1	IX-VIII cent. B.C.	4.2
Padova - Piazza Castello (PD)	1	VII-VI cent. B.C.	4.2
Porto Perone (TR)	1	XV-XIV cent. B.C.	2
Posta Rivolta (FG)	13	XIX-XVI cent. B.C.	4.1
Punta La Terrare - Brindisi (BR)	1	XV-XIV cent. B.C.	2
Roma - Foro di Cesare (RM)	1	IX-VIII cent. B.C.	3.1
Roma - Palatino SW (RM)	1	IX-VIII cent. B.C.	3.2
Salapia - Trinitapoli (BT)	1	XI-X cent B.C.	3.2
San Nicola - Amendolara (CS)	3	VII-VI cent. B.C.	3.1
Santa Maria di Ripalta - Cerignola (FG)	1	XV-XIV cent. B.C.	2
Santa Rosa a Poviglio - Poviglio (RE)	1	XII-XIII cent. B.C.	2
Satricum (LT)	2	VII-VI cent. B.C.	2
Savignano sul Rubicone (FC)	12	VII-VI cent. B.C.	3.2
Scalo di Furno - Porto Cesareo (LE)	1	XV-XIV cent. B.C.	2
Torre Chiaruccia - S. Marinella (RM)	1	IX-VIII cent. B.C.	1
Torre Galli, Drapia (VV)	1	IX-VIII cent. B.C.	3.1
Trebbio - San Sepolcro (AR)	3	VII-VI cent. B.C.	3.1
Tufarriello (SA)	19	XIX-XVI cent. B.C.	1
Veio - Formello (RM)	4	IX-VIII cent. B.C.	2 - 3.1 - 3.2



Figure 2: Overview of the structural evidence analyzed in this work

Classification

The classification is organised as follows: for each type is provided a detailed description and a list of all the evidence and for each context is further specified the site's name, its relevant municipality, chronology and bibliographic references.

Some kilns have been listed as *variants* due to the presence of specific features that cannot be assigned to a specific known type; other kilns have been interpreted as *uncertain attributions* as the extant literature does not precise exact types.

Type 1 - Open Firing (Figure 3)

This type of 'kiln' consists of a small area in the ground, where dried pots are stacked in piles and covered with wood; dung and straws are usually employed as fuel and as thermal insulating material. This technology is the oldest and the simplest one. The fuel (dead branches, reeds, weeds, dung and other materials easily available on-site) is placed at the bottom of the pit, underneath the and between the artefacts, and, in cases of 'stacks', it is also added to the top and all over the heap (Sillar 2000).

The fire is directly lit on the heap; flames rise suddenly as well as the temperature all at once, thus determining an irregular atmosphere between the vases in the heap.

The pots are fired for a short time and, at the end of the process, the 'stacks' are demolished to retrieve the pots. In this firing process several pots may be deformed because of the weight of the covering material, or may result not evenly fired.

Type 1, as opposed to the other, produces a higher amount of damaged pottery and requires higher fuel consumption. The archaeological evidence is hard to discern; a reddening/blackening of the soil is often the only visible sign.

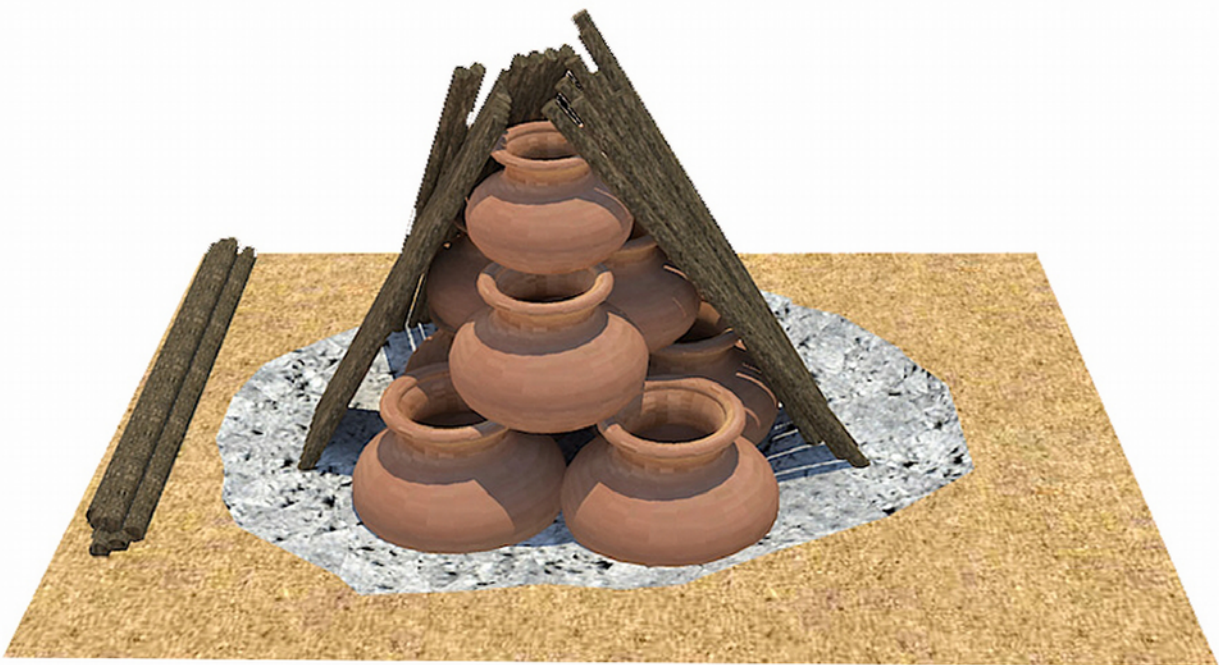


Figure 3: 3D reconstruction of the Type 1: Open Firing and archaeological example from Montagnana Borgo S. Zeno (after Bianchin Citton 1998)

Several ethno-archaeological studies provide support to the understanding of the archaeological evidence (Arnold 1985; Arthur 2014; Beaudry and Kenoyer 1987; Colton 1951; Diop 2000; Kristiansen 1981; Lauer 1974; Nicklin 1981; Okpoko 1987; Rye and Evans 1976; Saraswati and Behura 1966; Shepard 1956; Sirika 2008; Skibo 1992: 61-62; Tobert 1984).

Documented Sites:

Tufariello Buccino (SA) [Early Bronze Age/Middle Bronze Age] (Holloway 1975); Montagnana Borgo S. Zeno (PD) [Final Bronze Age/ Early Iron Age – 11–8th century BC] (Bianchin Citton 1998; Paiola 1998); Torre Chiaruccia, Santa Marinella (RM) [uncertain attribution: the floor was heavily reddened by fire and many carbons are present, indicating that a direct contact between the fuel and the vases occurred; however, the discovery of three stones, put close to each other, might suggest their use as spacers or as stands for pots] [Early Iron Age] (Barbaranelli 1956); Monteriggioni-Campassini (Pit E) [Archaic Period – 7th century BC (Ciacci 2004)

Type 2 - Pit Firing (Figure 4)

Type 2 consists of a pit dug into the ground, filled with dried pots and fuel and sealed with mud (or other insulating material such as stone, dung or straw). In the most complex form of pit-firing structures the floor is paved with a thick layer of potsherd for additional thermal insulation.

This kind of technology is generally interpreted as an improvement of the ‘Open Firing’ kiln, as it allows more firings to be performed before demolition (only the temporary dome was broken in order to retrieve the pots). Moreover, it makes easier to control the temperature, thanks to the several openings in the dome.

An idea of the use of this type of kiln is provided both by experimental *replica* of Balanksy *et al.* (1997) and by the ethno-archaeological research of Rye and Evans (1976) in Pakistan.

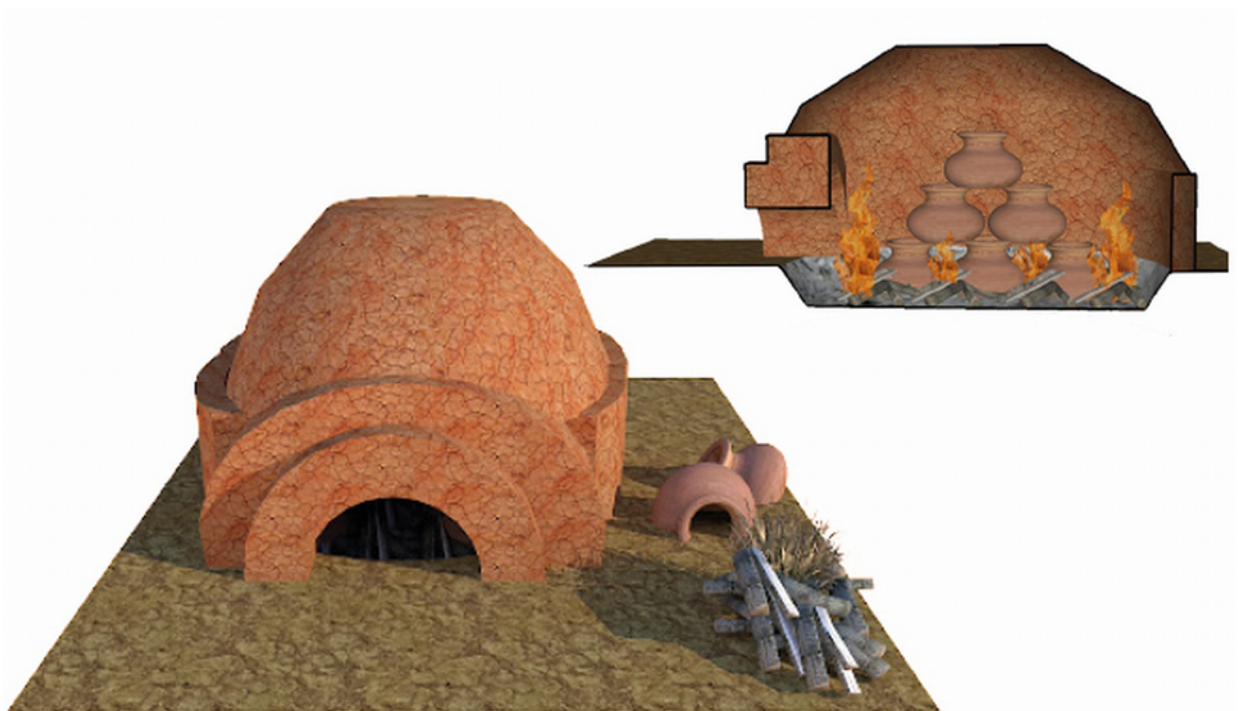


Figure 4: 3D reconstruction of the Type 2: Pit Firing and archaeological example from Santa Maria di Ripalta (after Nava and Pennacchioni 1981)

Documented Sites:

Santa Maria di Ripalta, Cerignola (FG) [Middle Bronze Age – 15-14th century BC] (Nava and Pennacchioni 1981); Punta La Terrare, Brindisi (BR) [uncertain attribution: De Juliis mistakenly defines this kiln as an ‘open firing’ one, but the structure, the floor insulated with refractory mud and the coverage (even if hypothetical) clearly show that it was a more complex structure] [Middle Bronze Age] (De Juliis 1981); Porto T [Middle Bronze Age] (Pacciarelli 1992; Peroni 1996; Radina and Battisti 1987); Satricum – Kiln A [7th century BC] (Nijboer 1998); Scalo di Furno, Porto Cesareo (LE) [Middle Bronze Age] (Lo Porto 1986); Santa Rosa a Poviglio, Poviglio, (RE) [Recent Bronze Age – 13th century BC] (Bernabò Brea and Cremaschi 1987); Veii, Formello (RM) [Early Iron Age – 9th century BC] (Boitani *et al.* 2009); Lavinium, Anzio (RM) (a kiln, uncertain attribution) [Early Iron Age – 8th century BC] (Fenelli 1984).

Type 3 - Two-Pits Kiln

This kiln consists of two parallel pits in the typical ‘figure-eight’ shape, which kept the fuel separated from the pots. One chamber acts as firebox where the fuel is burned, while the other contains the pots to be fired.

The ‘firing chamber’ (and sometimes also the firebox) is covered with a mud layer, which, at the end of the firing process, is broken in order to retrieve the pots.

This type of kiln allows to add more fuel during the process and to reach higher temperatures, on the average above 700°C. The gasses produced are channelled through a chimney located on the top of the temporary dome.

There are two variants known for this type, depending on the arrangement of the chambers: horizontal (Figure 5) or vertical (Figure 6). In the latter, pots are placed on a perforated floor above the second pit that creates a further separation between fuel and vessels.

A reconstruction of this type of kiln was made in 1997 inside the Museo Archeologico Etnologico of Modena and a video⁵ of this experiment shows both the steps for the construction of this structure and the firing methods.

Variant 3.1 - Documented Sites:

Bellinzona-Castel Grande, Canton Ticino [Middle Bronze Age] (Donati 1986); Basilicanova, Montechiarugolo (PR) [Recent Bronze Age – 13-12th century BC] (Cattani 1997); Le Chiarine, Puntone Nuovo, Scarlino (GR) (Kiln A) [Final Bronze Age – 12-10th century BC] (Aranguren 2008; 2009); Fidene, Roma (RM) [Early Iron Age – 9th century BC] (di Gennaro and Iaia 2004); Bologna (BO) – Quartiere Fieristico [Early Iron Age – 9-8th century BC] (Tovoli 1997); Casteldebole, Borgo Panicale, Bologna (BO) [Early Iron Age – 8th century BC] (Bellucci *et al.* 1994); Matelica (MC) - Via Pergolesi [Early Iron Age – 8th century BC] (Silvestrini and Sabbatini 2008); Matelica (MC) - IPSIA [Early Iron Age – 8th century BC] (Silvestrini and Sabbatini 2008); Torre Galli, Drapia (VV) [Early Iron Age] (Orsi 1926); Veii, Formello (RM) [Early Iron Age - 9th century BC] (Boitani *et al.* 2009); Veii, Formello (RM) [Early Iron Age – 8th century BC] (Boitani *et al.* 2009); Rome (RM) – Foro di Cesare [Early Iron Age] (De Santis *et al.* 2010); Trebbio, San Sepolcro (AR) [Archaic Period – 7-6th century BC] (Acconcia *et al.* 2009; Ciacci *et al.* 2009; Iaia and Moroni Lanfredini 2009); San Nicola, Amendolara (CS) [Variant of this type: this kiln would be pertinent to Variant 3.1 but it differs from the latter because of the firing method. Indeed the kiln from Amendolara shows a covered corridor instead of the second pit]. [Archaic Period – 6th century BC] (De la Genière and Nickels 1975).

⁵ 3500 anni fa nella grande Pianura - 2009 - directed by F. Vannini; Produced by Comune di Modena.

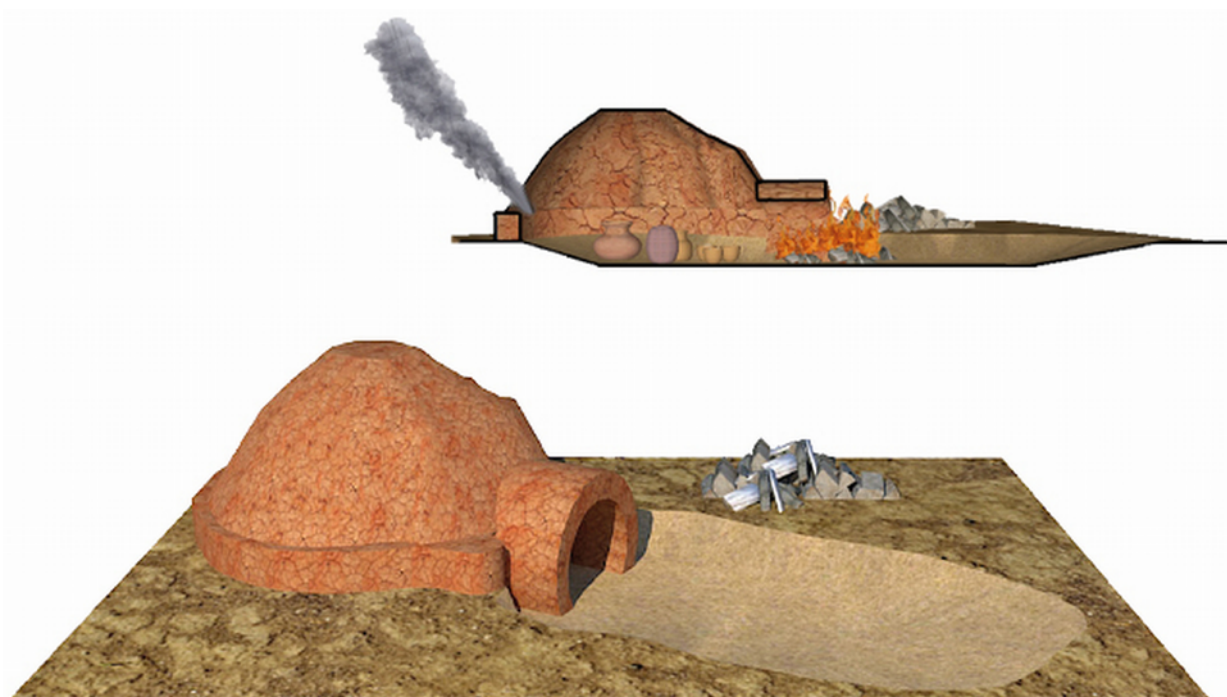


Figure 5: 3D reconstruction of the Type 3.1: Two-pits Kiln with horizontal arrangement and archaeological example from Bellinzona-Castel Grande (after Donati 1986)

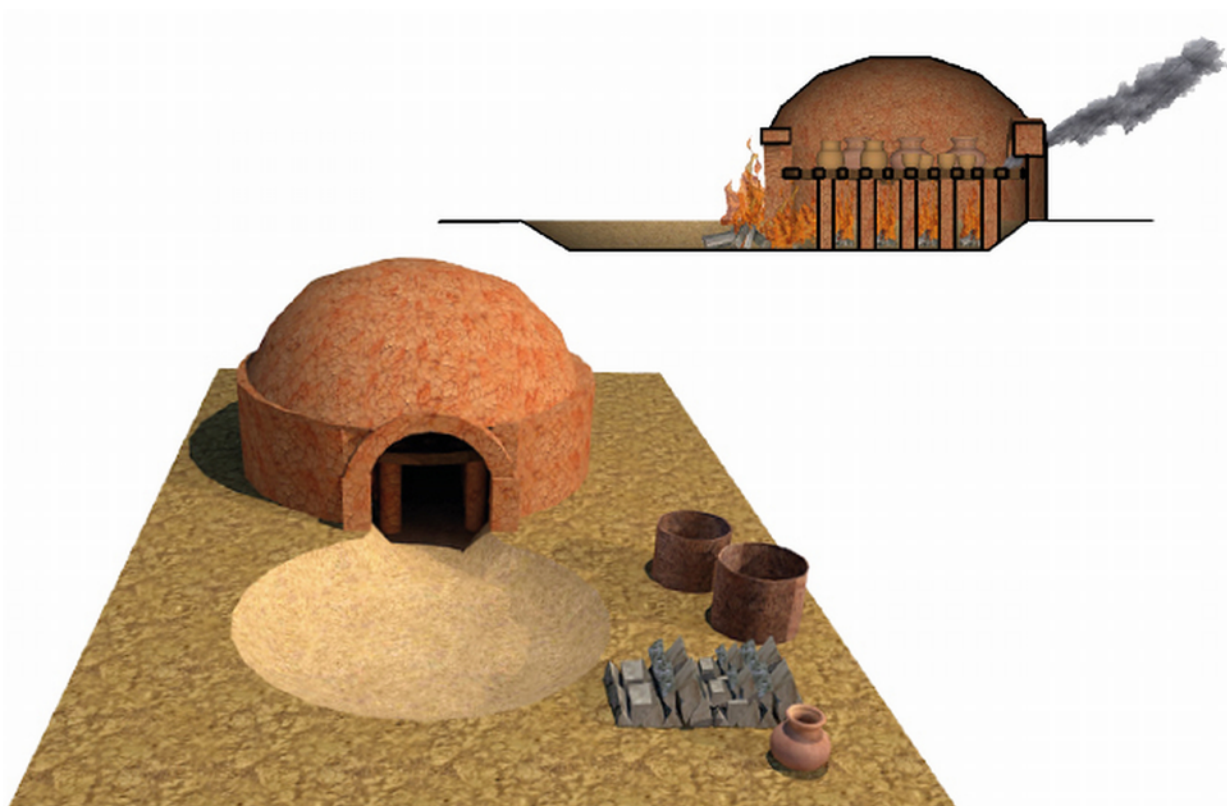


Figure 6: 3D reconstruction of the Type 3.2: Two-pits Kiln with vertical arrangement and archaeological example from Savignano sul Rubicone (after Miari 2003)

Variant 3.2 - Documented Sites:

Salapia, Trinitapoli (BT) [Final Bronze Age – 11-10th century BC] (Alberti *et al.* 1981); Le Chiarine, Puntone Nuovo, Scarlino (GR) (Kiln C) [Final Bronze Age – 12-10th century BC] (Aranguren 2008; 2009); Matelica (MC) – Palazzo Chirichetti [Early Iron Age – 8th century BC] (Silvestrini and Sabbatini 2008); Rome - Palatino SW [Early Iron Age] (Brocato 1995); Monteriggioni-Campassini (SI) (Pits L, G, D) [Archaic Period – 7th century BC] (Ciacci 2004); Savignano sul Rubicone (FC) [Archaic Period – 7-6th century BC] (Miari 2003); Montedoro, Senigallia (AN) [Archaic Period – 7-6th century BC] (Gobbi 2002); Veii (9th century BC) (Boitani *et al.* 2009).

Type 4 - Single Deep Pit with Vertical Structure

This kiln consists of a deep pit with two superimposed chambers. The fuel is burnt at the bottom of the pit, and pots are placed in the other chamber. As in the case of two-pits kilns, the gasses found their way out through a chimney or other openings present on the temporary dome.

There are two known variants within this type, depending on the absence (Figure 7) or presence (Figure 8) of a perforated floor.

The first variant does not feature the perforated floor above the firebox, and pots are placed on a ‘carved shelf’ dug out in the pit.

In the second version, above the fire there is a perforated floor embedded in the pit or supported by columns.

Variant 4.1 - Documented Sites:

Posta Rivota (FG) (Pits L, H, D, R) [uncertain attribution: Tunzi Sisto offers only a partial description of seventeen structures and pictures do not allow for accurate evaluation. The kiln presented here should be considered as an uncertain attribution, until more extensive reports are published.] [Early Bronze Age / Middle Bronze Age] (Tunzi Sisto 2012); Cures Sabini, Fara Sabina, (RI) [Early Iron Age/Orientalizing Period – 8-6th century BC] (Guidi *et al.* 1985; Guidi *et al.* 1988).

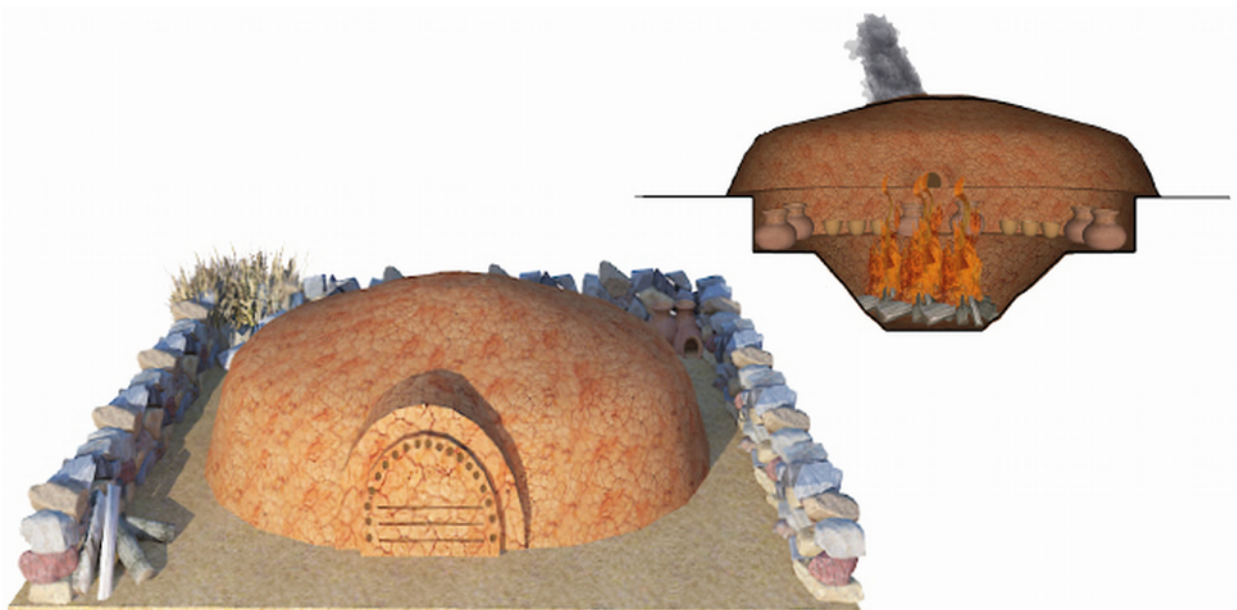


Figure 7: 3D reconstruction of the Type 4.1: Single Deep Pit without perforated floor and archaeological example from Posta Rivota (after Tunzi Sisto 2012)

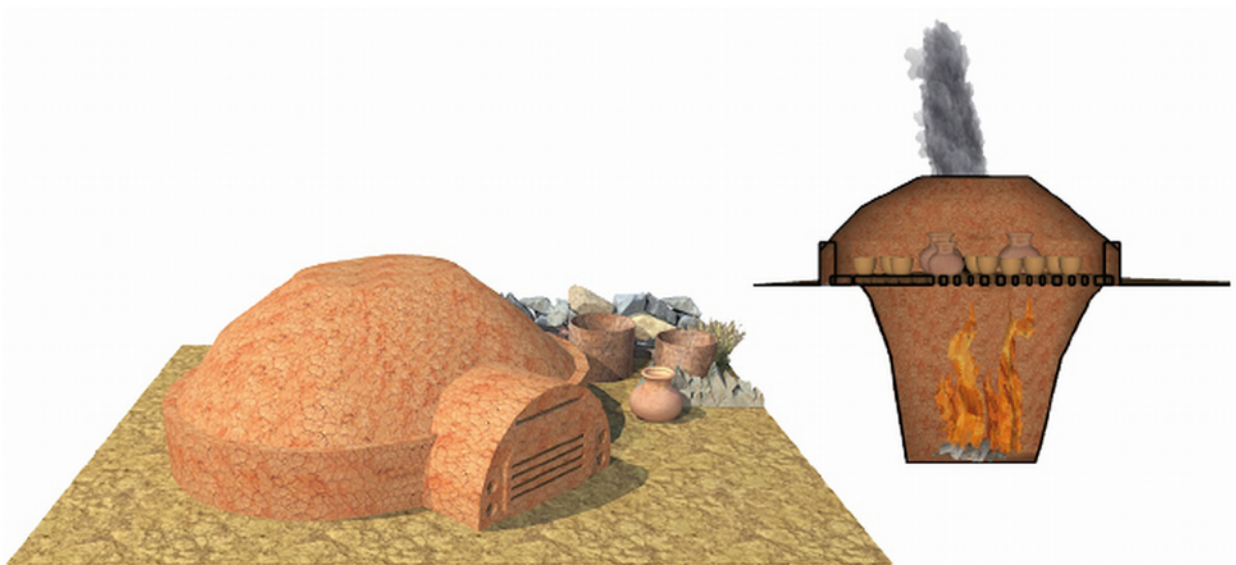


Figure 8: 3D reconstruction of the Type 4.2: Single Deep Pit with perforated floor

Variant 4.2 - Documented Sites:

Monte Cimino, Soriano nel Cimino (VT) [Final Bronze Age – 10th century BC] (unpublished); Bologna (BO) - S. Vitale [Early Iron Age – 8th century BC] (Taglioni 1997); Padova (PD) [Archaic Period – 6th century BC] (De Min *et al.* 2005); Lavinium, Anzio (RM) (Kilns B,C) [Archaic Period – 6-5th century BC] (Fenelli 1984); Monteriggioni-Campassini (SI) [Archaic Period – 6th century BC] (Acconcia and Aiello 1999); Montericchio Imola (BO) [Variant: This structure, for its peculiarity of being built partially with mud bricks, represents a variant of the type with a pit featuring a vertical structure and a perforated floor.] [Archaic Period – 6-5th century BC] (von Eles 1985).

Type 5 - Stonework Kiln

This kiln is the only permanent type, while all other types are usually demolished after a few runs. It is totally or partially built in stone. Much like in the ‘Two-pits Kiln’, the firing process takes place into a firebox while the pots are placed in a second chamber, above or alongside the fire. In Italy, this type has been found only in the site of Le Chiarine, Puntone Nuovo, Scarlino (GR) (Kiln B – Figure 9) [Final Bronze Age – 12-10th century BC] (Aranguren 2008; 2009). However, a comparison can be made with a similar structure found in the nearby site of Golfo di Baratti (Populonia), although interpreted by the excavators as a kiln for salt production (Baratti 2010). Lastly, this structure found a parallel with the evidence coming from the Aegean site of Kommos (Crete) [Late Mycenaean Iron Age] (Shaw *et al.* 2001) that is also the base-model used in the 2006 Broglio Experiment (Vanzetti *et al.* 2014).

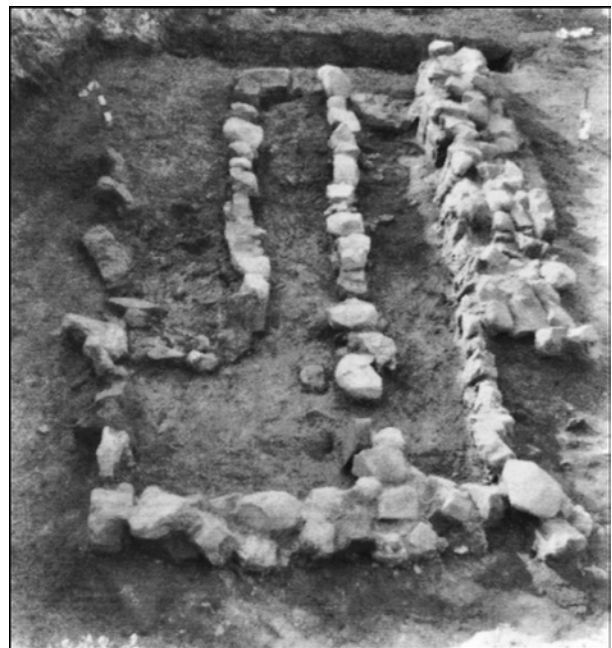


Figure 9: Archaeological example of Stonework Kiln from Le Chiarine, Puntone Nuovo (after Aranguren 2008)

Production area

Also for the production areas, it is possible to identify some common attributes shared by all the sites analysed. In this case, a strict classification like the one proposed for the kilns appears not functional, whereas a discussion of these attributes based on the comparison with ethnographical and experimental material is useful to better understand both the archaeological evidence and the cultural choices made by potters.

Starting from the analysis of archaeological evidence for the period under investigation, clear production areas are attested at Veii Piano di Comunità (8th century BC - Bartoloni *et al.* 2013), Savignano- Via Montigallo (7-6th century BC - Miari 2003) and Padova - Piazza Castello (6th century BC - De Min *et al.* 2005).

The first of these sites, Veii, is characterised by the presence of three kilns, several pits for the settling of clays and a big cistern for water supply (Figure 10).

At Savignano (Figure 11), 12 kilns have been identified, pits for processing or settling the clay are also attested alongside several worktops for the forming of vases. Moreover, some of these workspaces featured a roofing system, as the potholes found on the ground near the kilns may indicate.

Lastly, the production area of Padova presents the same characteristics of Veii and Savignano, i.e., a series of basins for settling of the clay or silos and partly underground vases for the creation of 'pottery recipe'. In addition, also the location chosen for the production area provides some interesting information. Indeed, the



Figure 10: Veii (after Bartoloni *et al.* 2013)

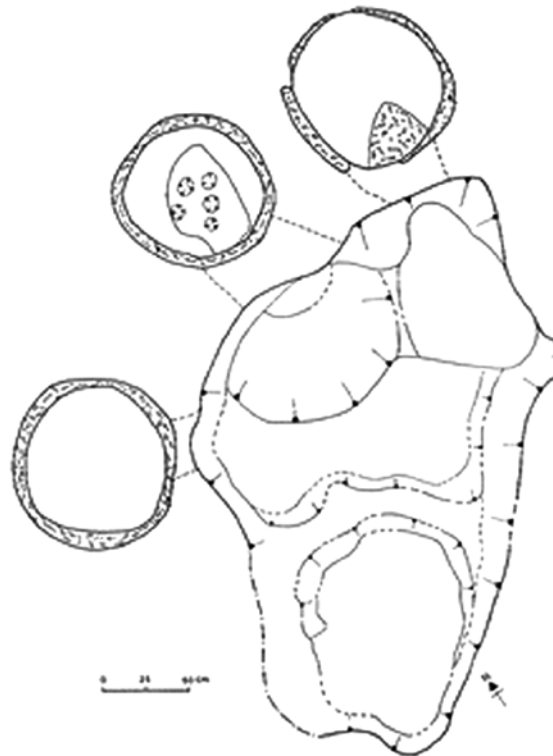


Figure 11: Savignano sul Rubicone (after Miari 2003)

area is located at the margin of the settlement close to the river, in all probability functioning as water supply for the workshop.

It appears clear that the shared attributes distinctive of the production area are the presence of more than one kiln as well as the presence of additional structures connected with the manufacturing process, like water reservoirs or pits for the settling of the clay.

These particular characteristics are documented in other archaeological contexts that can be interpreted as production areas, even if in these cases the scale is smaller than in the previous examples, or if they share only some of this attributes.

Vats and cisterns are attested in the context of Cures Sabini (8-6th centuries BC - (Guidi *et al.* 1985; 1988) and Monteriggioni (7th century BC - Ciacci 2004). In the latter site roof structures are also attested as well as at the site of Matelica - Via Pergolesi (8th century BC - Silvestrini and Sabbatini 2008). The installation of such structures in marginal areas of the settlement can be proved also at Monte Cimino (10th century BC - (Barbaro *et al.* 2013) or Roma - Foro di Cesare (Early Iron Age - De Santis *et al.* 2010) and for the areas of Bologna - S. Vitale (8th century BC - Taglioni 1997) and Torre Galli (Early Iron Age - Orsi 1926). The latter areas were so peripheral that have been subsequently turned to burial grounds.

Comparing archaeological, ethnographic and experimental evidence

The main attributes of pottery production areas retrieved in the archaeological record have been then compared with one relevant ethnographic example and with an experimental evidence. Inside the

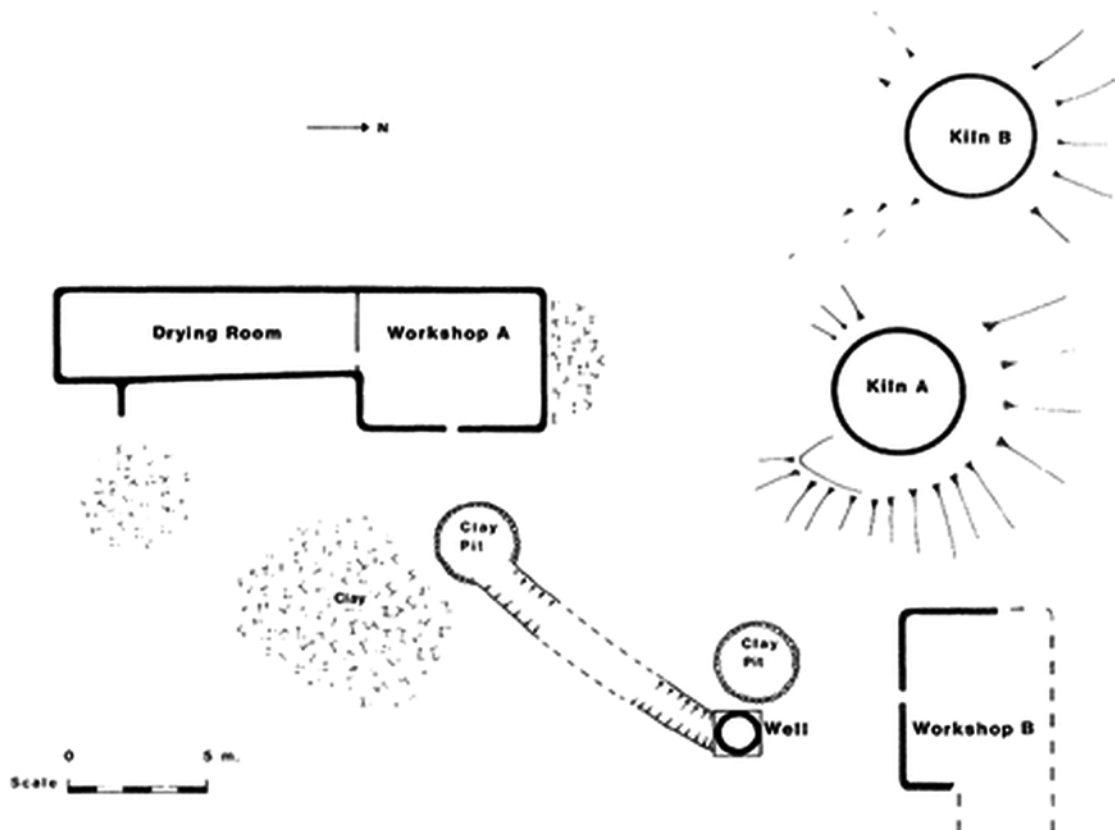


Figure 12: Deir el-Gharbi (after Nicholson and Patterson 1985)



Figure 13: Parco Archeologico di Broglio di Trebisacce (Photo by the author)

numerous research on this topics I chose as case study the work of Nicholson and Patterson (1985) at Deir el-Gharbi (Egypt) because is one of the most complete researches on pottery workshops. For the experimental evidence, indeed, I gave priority at my (personal) experience matured at the *Parco Archeologico di Broglio*, so I chose to compare the archaeological evidence, among the others, with this research. Both the proposed examples do show the same attributes of the archaeological contexts.

At Deir el-Gharbi, in Upper Egypt, local pottery workshops cluster in groups of three to five around their respective clay puddling, trenches and wells, with the kilns lying off to one side. As the archaeological evidence shows, some of the attributes designated as typical for the production areas are clearly identifiable: a water supply (well), pits and worktops (trenches and clay puddling) and more than one kiln (Figure 12).

During the restoration of pottery kilns at the Parco Archeologico di Broglio, the yard organised by G. Pulitani features some of the typical production areas attributes mentioned above (Figure 13): not only that one of the first operations was the setting up of roofing structures to protect the kilns from bad weather, but we also created pits and specific areas for the storage and processing of clay. Many empty water casks, moreover, were placed near the roof to collect the rainwater.

Actually, even if this production area is a modern one, the choices at the base of the spatial organization are most likely the same that were made in antiquity.

Everything needs to be at hand, from raw materials to water or kilns, to substantially reduce the time invested between one production step to the other.

Concluding remarks and further research

This paper is a contribution to a better definition of both the structures for firing pottery and the production areas.

In regard of pottery kilns, the value of their typological classification lies in explaining:

1. technological developments concerning the shift from simple kilns during earlier periods (Type 1 and 2) to more complex structures (Type 3 and 4) in later times, and
2. the relationship between kiln's types and production strategies. Indeed, as argued above, the simplest and oldest types were never wholly abandoned, and they are documented alongside the more recent types, probably depending both on the production and on demand of different wares.

The typology to which I referred as a starting point, is the one proposed by Cristiano Iaia in 2009 (Iaia and Moroni Lanfredini 2009). My new typology partly agrees with but mostly expands Iaia's scheme. Especially, new and more detailed examples are now provided, and Iaia's hypotheses have been elaborated.

I am well aware of the fact that my classification proposal requires further confirmation, either by expanding the sample, or by providing analytic and experimental tests.

The production areas have been analysed assessing contexts, archaeological evidence, ethno-archaeological research and experimental reconstructions. They clearly show a series of common traits irrespective of their chronology and location. These traits are:

- the presence of more than one kiln in the areas;
- the choice of placing these areas mainly in marginal areas of the inhabited space;
- the proximity to water sources, or in the absence of these, the creation of tanks or reservoirs to collect water;
- the presence of trenches for clay settling and workspaces;
- the creation of roof structures to protect the furnaces ensuring a longer use.

In this light, the area investigated must have looked like the reconstruction proposed below (Figure 14).

On the basis of these observations, this model sheds light on the organization of craft contexts from the Bronze Age to the Archaic period. Certainly, more archaeological samples are necessary to confirm the model.

One of the goals of this research is to promote an integrated methodological framework for the study of ancient pottery workshops in order to move beyond the 'sceptical-problematic' approach that in some ways prevented to deepen our knowledge on the matter. In conclusion, I wish to have demonstrated the potentiality of pursuing a new path of research aimed at a better understanding of the fragmented knowledge of production systems. Moreover, by challenging traditional evolutionary explanatory models, I hope to have provided a valid platform for discussion and a stimulus to implement this research topic.



Figure 14: Hypothetical reconstruction of a production area (drawing by the author)

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