POTTERY KILNS IN MOURARIA (LISBON, PORTUGAL): ARCHAEOLOGICAL EVIDENCES OF A 16th AND 17th CENTURIES WORKSHOP

André TEIXEIRA,
Associate professor at FCSH-NOVA; researcher at CHAM-FCSH/NOVA-UAç

Anabela CASTRO,
Archaeologist; master student at ISCSP/UL

Joana Bento TORRES,
Researcher at CHAM-FCSH/NOVA-UAç

Tiago CURADO,
Researcher at CHAM-FCSH/NOVA-UAç

Nuno Amaral de PAULA,
Master student at FCSH-NOVA

Abstract

During a preventive archaeology work in Largo das Olarias, in Lisbon's late-medieval Moorish neighbourhood (Mouraria), four pottery kilns from the 16th and 17th centuries were discovered. A large number of objects was found inside of them, such as kiln furniture and ceramic wastes of faience, unglazed redware and also some lead-glazed earthenware. All the kilns were small, oval shaped and had their combustion and firing chambers separated by a grid floor supported by arches; they were made of brick, clay and ceramic fragments. This paper aims to bring new information on Lisbon's pottery production in the Early Modern period, and an evaluation on the technology used in its pottery kilns, through the study of those finds from Largo das Olarias.

Introduction

Working with clay has a long tradition in Lisbon, as in most of Portugal. The pottery activity in the Portuguese capital during the Islamic period is well known. The ceramic production was located outside the walled urban area, which descended from the kasbah to the river (**Fig. 1**). Like other polluting manufactures, pottery workshops were placed in peripheral neighbourhoods, in the east, as Alfama, and in the west, as Baixa/Downtown. The clay was collected both in the area of Santos and Bairro Alto, in the west, and Mouraria and Anjos, to the east (Bugalhão 2009; Bugalhão et al. 2009).

After the Christian conquest of Lisbon in 1147, a part of the Islamic community remained in the city, concentrated in a neighbourhood outside the walls, the Mouraria. Here they benefited from the protection of Portuguese kings, having their own administration and maintaining their places of worship and daily practices, although paying taxes and being forbidden to leave that area at night, among other impositions. The majority of the population maintained their professions, almost a third of which was devoted to pottery. The vitality of the ceramic production attracted Christian potters to the area, generating a "multi-religious conviviality" (Barros 1998: 90-92). The archaeological record has been showing how this area largely supplied the city from the 14th to 16th centuries. For that matter, we highlight the findings of ceramic production in the context of rescue archaeology actions in Rua da Amendoeira and in Quarteirão dos Lagares (**Fig. 1**) (Nunes, Filipe 2012).

In 1496, within the framework of a policy of religious standardization, the Islamic community was forced to convert to Christianity; otherwise, it would be forced to leave Portugal. It is difficult to assess the volume of individuals who remained or left to other places, but the neighbourhood of Mouraria did not lost its vocation in ceramic production throughout the early modern period, remaining until this day the use of the toponym *Olarias* [pottery workshops] (Farinha 1932). It was this moment of Lisbon's history that the archaeological intervention in Largo das Olarias came to document (**Fig. 1**), as part of the rehabilitation project of the buildings located in the area.

The pottery workshop

During archaeological work at Largo das Olarias four kilns were recognized (**Fig. 2**). Despite the fact we are still developing our study, namely the revision of all the wasters used to fill the fire chambers, we can broadly access that these kilns were working between the 16th and 17th centuries. Here, we are focusing on the analysis of the kilns' structures, which were only excavated to the elevation needed for the construction work. Only one kiln (no 2) was completely excavated.

The four kilns discovered in Largo das Olarias shared with each other very similar technical and morphological characteristics. They had an oval shape, with kiln 1 being the smallest (1.3 m diameter), kiln 2 with a medium size (2 x 1.6 m) and 3 and 4 of larger dimensions (2.6 x 2.3 m). They were all built with clay, brick and unglazed red earthenware, to which were added, in the case of kilns 2, 3 and 4, some fragments of saggars. The use of these resistant materials was intended to ensure the

Fig. 1 Lisbon main neighbourhoods and emplacement of Largo das Olarias' kilns (adapted from the plan of João Nunes Tinoco, 1650).

Fig. 2 Final plan of Largo das Olarias site.

strength of the structures, as well as their waterproofing and heat conservation characteristics. Kilns 1 and 2 had the narrowest walls (0.2 m), in contrast with kiln 4, which had the thickest ones (0.3 m), with kiln 3 being in the middle of these (0.26 m). Their inner surfaces were dark red, gradually evolving to pink towards the outer surfaces.

All the kilns were composed by two chambers (**Fig. 3**): a lower fire chamber and an upper firing chamber. Dividing them was a grid, from 0.3 m to 0.55 m thick, composed by arches that were embedded in the very walls of the kiln (**Fig. 4**). To allow the passage of heat from the fire chamber to the firing chamber, the grid had holes. In kiln 3, there were 14 circular holes, 6 in the centre with a diameter of 0.1 m and 0.8 m in the peripheries with 0.2 m of diameter. In kiln 4 there were 13 holes: some were circular (of 0.2 m of diameter), others quadrangular (with 0.2 m side) and also rectangular (with 0.1 per 0.26 m). Some of these had bricks placed diagonally, allowing to control the heat in the firing chamber.

Only in the case of kiln 2 it was possible to know the maximum height of the fire chamber, 1.7 m, which was excavated in the geological substrate,

Fig. 3 Fire chamber of kiln 2 and firing chamber and grid of kiln 3.

surely to give stability to the structure. Naturally, in all cases the fire chamber had heavily burned walls. Despite that, in kiln 2, a layer of clay mixed with glazed ceramic fragments covered the original walls of the fire chamber. Due to the colour of its surface, we can conclude that this last renovation was not subjected to fire, leading us to determine that this refurbishing would have failed and the kiln would have been permanently abandoned.

The firing chambers were poorly preserved, being only recognized a small part of their height, essentially in kiln 3 (**Fig. 3**). Nevertheless, they would have been domed shaped, and the walls were entirely covered with clay in a 0.1 m thick layer.

The access to the fire chamber was made through a corridor. In kilns 2 and 3 these were facing east, while in kiln 4 it was to the west. In kiln 2 the corridor was supported by two arches made of bricks and clay, with 1.1 m and 1.3 m wide (**Fig. 2**). Kiln 4 had a 1.5 m wide corridor, and was also built

Fig. 4 Grid's arch of kiln 4.

from bricks, clay and unglazed ceramics, presenting its interior walls plastered with lime mortar and perceiving its domed roof. The accesses to the firing chambers were not well preserved. In the case of kiln 3, some of these remains are identifiable but difficult to characterize, since it was destroyed by a contemporary building.

Apart from kiln 1, almost completely destroyed by this contemporary building and by the access corridor to kiln 2, in the other three kilns it was possible to identify their surrounding supporting walls, which were intended to give them solidity in the face of continuous heating and cooling operations (**Fig. 2**). In the case of kilns 2 and 3 they are reusing a previous structure, since the walls were plastered on their inner side. In the case of kiln 4, we observe the purposeful construction of a wall, as well as its overlaying to the former support wall of kiln 3.

We must add that a well was documented about 1 m west of kiln 4, made of stones and mortar (**Fig. 2**). Although it was not possible to point to a chronology of construction, it is probable that it had been used by this pottery workshop, since this type of structures was needed in these places to prepare the clay.

As for the chronology of the kilns, it is difficult for the moment to point to a specific date of its construction and use. Nevertheless, kiln 1 is the oldest, having been destroyed by the construction of kiln 2, namely its access corridor. Kilns 2 and 3 may have worked simultaneously, sharing the same reinforcement wall. By analysing its dimensions, the first one is smaller than the second, and it is possible that the first one was used for the first firing and the second one for firing the glaze. This solution of two kilns per workshop, "morphologically equal but of different sizes", seems to have been widespread in Portugal after the 16th century (Sebastian 2010: 278). Kiln 4 is probably the most recent of the whole, since its implantation implied the affection of the wall that supported kiln 3, making incompatible their coexistence. However, it cannot be ruled out that kilns 2 and 4 have not worked simultaneously, or at least that such association was not tested or attempted, possibly justifying the unsuccessful remodelling of kiln 2. In any case, this diachrony did not involve major changes in the design and construction of furnaces in this pottery space.

The sequence of kilns in Largo das Olarias is common to other pottery workshops, such as the extensive pottery neighbourhood in early modern Mérida, where "successive superposition" of kilns was attested, with several remodelling actions being applied in each structure previously to its final and complete substitution (Alba 2008: 153). These structures had a limited duration, aiming at an average life span of 50 years, although this depended on a number of variants (Sebastian 2010: 300).

Due to regional or local differences, this type of double-chambered structures with a grid are the most common in the Mediterranean since Late Antiquity. During the Islamic domain they are also present in the Iberian Peninsula, continuing in the following centuries. In parallel, the circular shape of Mouraria kilns is predominant among the Iberian findings in the Islamic period, when compared to the quadrangular ones. The support of the grid by arches is also the most used solution in Antiquity and in the Middle Ages (Coll, García 2010: 33-34). In Lisbon, during Islamic occupation, in addition to kilns that used clay bars, there were also identified double-chambered structures with a circular shape, more modest than these now revealed, and with the grids set on pillars (Bugalhão et al. 2009).

The ceramic kiln excavated in Mata da Machada (Barreiro), which worked undoubtedly during the first half of the 16th century, also had a double chamber and a grid supported by brick arches, although it had a square shape and bigger dimensions, towards a large-scale production. Its products were either honey or green coloured glazed ceramics for domestic use, or unglazed red earthenware for domestic use, but also to supply the sugar production (Torres 1990: 132-133; Coelho, Teixeira 2018). Another 16th century kiln was also identified on the left bank of the Tagus estuary in Alcochete, apparently for the production of tiles, bricks and unglazed household objects. Although it had closer dimensions to those of Mouraria, along with a double chambered and grid set on brick arches composition, it had a sub-rectangular shape, in addition to a rougher construction, which included a central pillar to reinforce the grid structure (Correia 2005: 70-71). The closest Spanish parallel seems to be the San Agustin kiln, in Murcia, from the 17th century (Blanco, Séiquer 1992: 149).

The kilns now uncovered in Mouraria seem to be different from the information usually conveyed in written sources concerning the Portuguese or European structures used to produce faience, which typically have a square or rectangular design (Sebastian 2010: 284, 287). In a hypothetical evolutionary logic for the Portuguese case, based on the kilns discovered in Porta da Alagoa (Évora), from the 13th to the 16th centuries, the oldest would be oval shaped and the most recent would have a square profile (Almeida et al. 2008). With that in mind, it is possible that the Mouraria kilns would have an archaic feature. However, this is no longer true if we look into the grids' support, where they use full arches to support the grid, instead of a central span directly sustained in the kiln walls. Thus, in the context of faience production, we can maybe facing a technological transition on these findings, halfway between small circular medieval structures and modern quadrangular and larger kilns. This characteristic might be related to the ancestry of this type of manufacture in Mouraria (Sebastian 2010: 285-287, 292).

The ceramics

The four kilns were filled with pottery wastes, including the kiln's own fallen walls, the rejected samples of pottery production (such as deformed pieces) and household debris, which included broken vessels, food wastes and others disposals. This means the archaeological reality excludes the hypothesis that we are, in any of the cases, before the last ceramic load of these kilns. The materials recovered inside each kiln are being know studied in detail, in an effort to point us to a more precise chronology of the working stages and deactivation of this pottery workshop. For the moment, we are only able to present the generic traces of the production found in the four kilns.

Two ceramic types were definitely manufactured in this area: unglazed red earthenware and faience, since the evidences of wasters are abundant. The firing of these ceramics was oxidizing, although some examples of unglazed red earthenware appear sometimes darker, suggesting a less homogeneous firing process, with a deprivation of air at some point in the cooking process.

The unglazed red earthenware was composed of orange to red coloured pastes, occasionally covered by an orange to red slip, yet with an identical tone to that of the paste. Some fragments had hand modelling decoration and had their inner and/or outer surfaces burnished, sometimes creating decorative patterns. From a technological point of view, our samples are very similar to productions recovered in other archaeological sites in Mouraria, from the 14th to the 16th centuries (Marques et al. 2012; Nunes, Filipe 2012), and even during the final phase of Lisbon's Islamic rule in the 12th century (Bugalhão et al. 2009). Moreover, the origin of the clay seems to remain unaltered, being collected from the Mouraria and Anjos neighbourhoods.

The forms now documented in Largo das Olarias are, however, somewhat different from ancient ones, being recognized a panoply of domestic use objects (**Fig. 5**). Concerning cooking vessels, we register two main utensils: the pans with two triangular handles and the pots with two vertical or horizontal handles. The pans appear sometimes with their inner surface burnished in an attempt to reduce its permeability. Also, we find the respective lids, generally larger in the first case, and smaller in the second. There are two mainly different shapes of lids, one simpler and smaller, and another one with a foot ring and a burnished upper surface.

In association to the table we identify: bowls, cups, jugs, small oilers, and jars. The bowls are divided into two types: a simpler one, with a hemispherical form and flat base, designed to contain liquid foods, such as soups, stews or broths. The other one should be functionally associated with cups, since it was used for drinking spring water, distilled waters or even wine. The cups are primarily associated with the ingestion of liquids, although there are some bigger and more robust forms, which could also be used on cooking. Jugs and small oilers have a similar shape, despite the first being bigger than the latter, they have a tight neck and usually a trilobated mouth; the jugs would be used preferably for water and the oilers to contain olive oil and/or vinegar. The jars are distinguishable by their round form, narrow collar and small pouring spout, used essentially for transporting and reserving water.

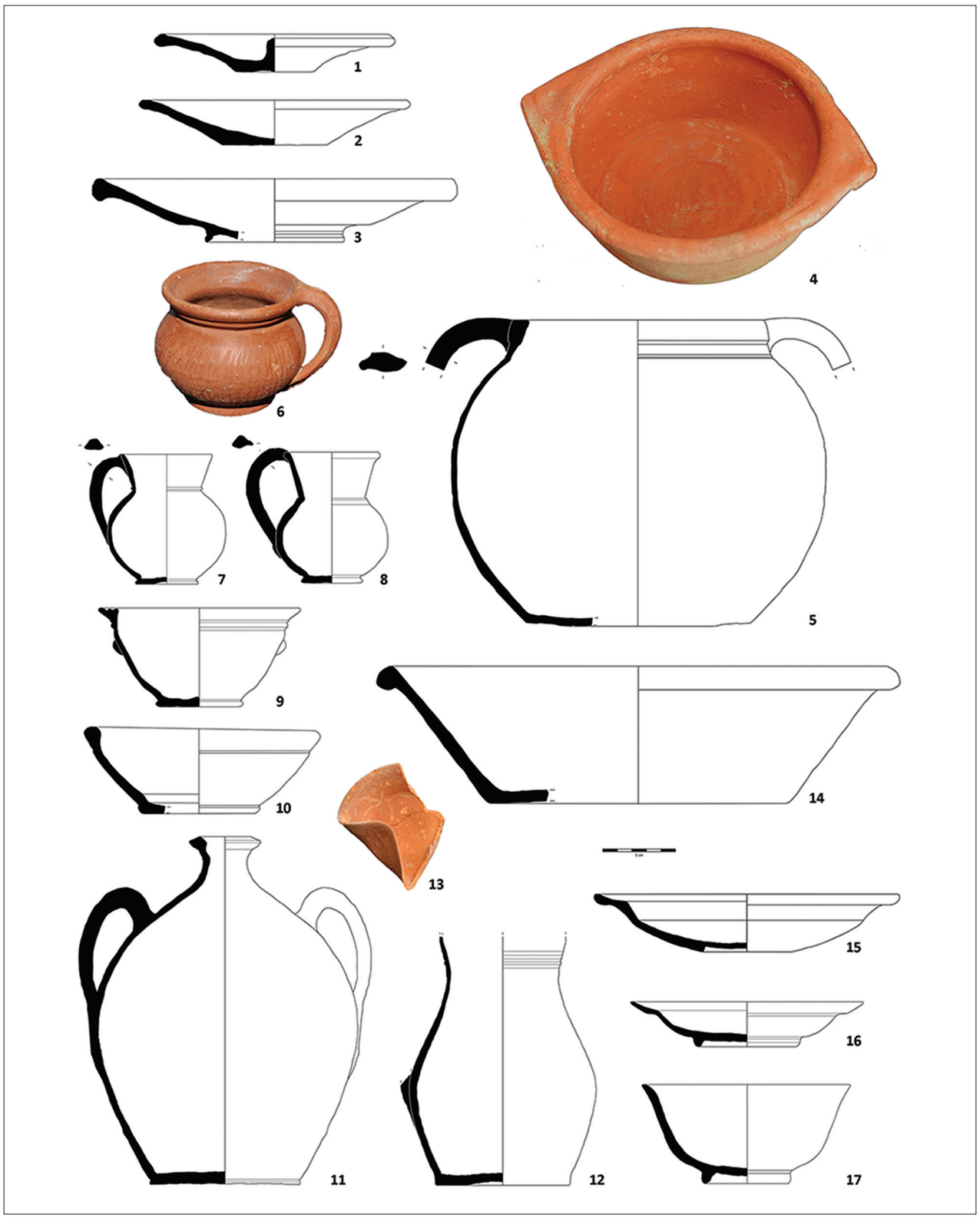

Fig. 5 Unglazed red earthenware: 1-3-lids; 4-pan; 5-pot; 6-8-cups; 9-10-bowls; 11-jar; 12-jug; 13-lamp; 14-basin. Faience: 15-16-plates; 17-bowl.

Related to hygiene practices and the preparation of food, the basins had an enormous functional versatility, allowing to wash clothes or dishes, but also to prepare meat or fish, or even bread or cake dough. Also, we must note the existence of storage and transport containers, such as smaller pots, to conserve dry foods, the bottles and big jars, used to conserve water. Finally, we must mention the production of lamps, supplied with oil and a wick, one of the simplest and most common ways to light throughout time.

These household objects are very similar to others identified in other production archaeological sites in Mouraria, dated from the beginnings of the early modern era and extending to the 17th century (Marques et al. 2012: 126-129).

The faience was made with pale pastes between the beige, the light yellow and light pink, above which the white enamel was applied, some of which were decorated in blue. The main forms detected were plates and bowls, with different variants and sizes (**Fig. 5**). The dishes have two essential subtypes and the bowls present at least four very different shapes, which can be associated with the consumption of diverse types of food. With less representativeness, we find other faience objects, such as: oval platters, sometimes with lids; small oilers possibly associated with small circular shaped lids; and salt-cellars to provide salt, parsley, mustard or other spices to the table.

We will not address in detail the decorative patterns and motifs recognizable, although we must note the oriental influence marked by the arrival of greater quantities of Chinese porcelain from the first years of the 16th century onwards. It is even noticeable the mimicking of decorative and formal changes that occurred in the Chinese porcelain during the last quarter of the 16th century, at the dawn of the Wanli kingdom. For now, and comparing the analysis of the ceramics with those found in other archaeological sites, the chronology of this production may be framed between de last quarter of the 16th century and the first decades of the 17th century (Castro et al. 2017: 1737-1739).

In another perspective, the faience findings are particularly fascinating because they testify the various phases of its production (**Fig. 6**). It also enables us to document archaeologically the reasons for why some of the first and second firings went wrong. Therefore, biscuit ware was recovered, as the result of its first firing and which, perhaps due to a deficient drying process, eventually fissured. Biscuit fragments dipped in glaze and, in some cases, even painted, were also collected, making us wonder the reason for them not proceeding to the second firing. Finally, we find deformed materials, probably due to the lack of control of the kiln's temperature during the second firing; this led to a melting process between the pieces and sometimes the saggars in which they were concealed in the kiln.

Indeed, we also collected various items of kiln furniture, used to distribute the weight and pressure on the pieces inside the kiln, like shelves, stilts, rollers and chocks, as well as saggars, pegs and trivets. The saggars were directly associated with enamelled objects used to protect them during the vitrification process from fumes and ashes. Mainly with a cylindrical form, two types of boxes were distinguished: the saggars with no holes, with capacity for a single object, being used essentially for bowls and large plates; and the peg saggars, opened in the base, with several triangular holes for the fitting of these pyramidal pieces, which supported several stacked dishes by their rim.

Final remarks

Our present work is a first approach on the morphology and production of a Mouraria pottery workshop. The continuation of this study will allow us to contribute to broad our knowledge on the characteristics of early modern kilns in Lisbon. In addition, it may help us to better understand the chronology and phases of Lisbon's unglazed red earthenware and faience manufacture.

At the same time, despite the fact that we did not deepen the theme on the shapes and decorations of these ceramics, it will definitely be a priority to do so in future publications. The studies on Lisbon's unglazed red earthenware are increasing significantly, but they are still not very precise when addressing chronology. Our contribution to the study of Lisbon's faience will also be a step on assessing chronology of production versus

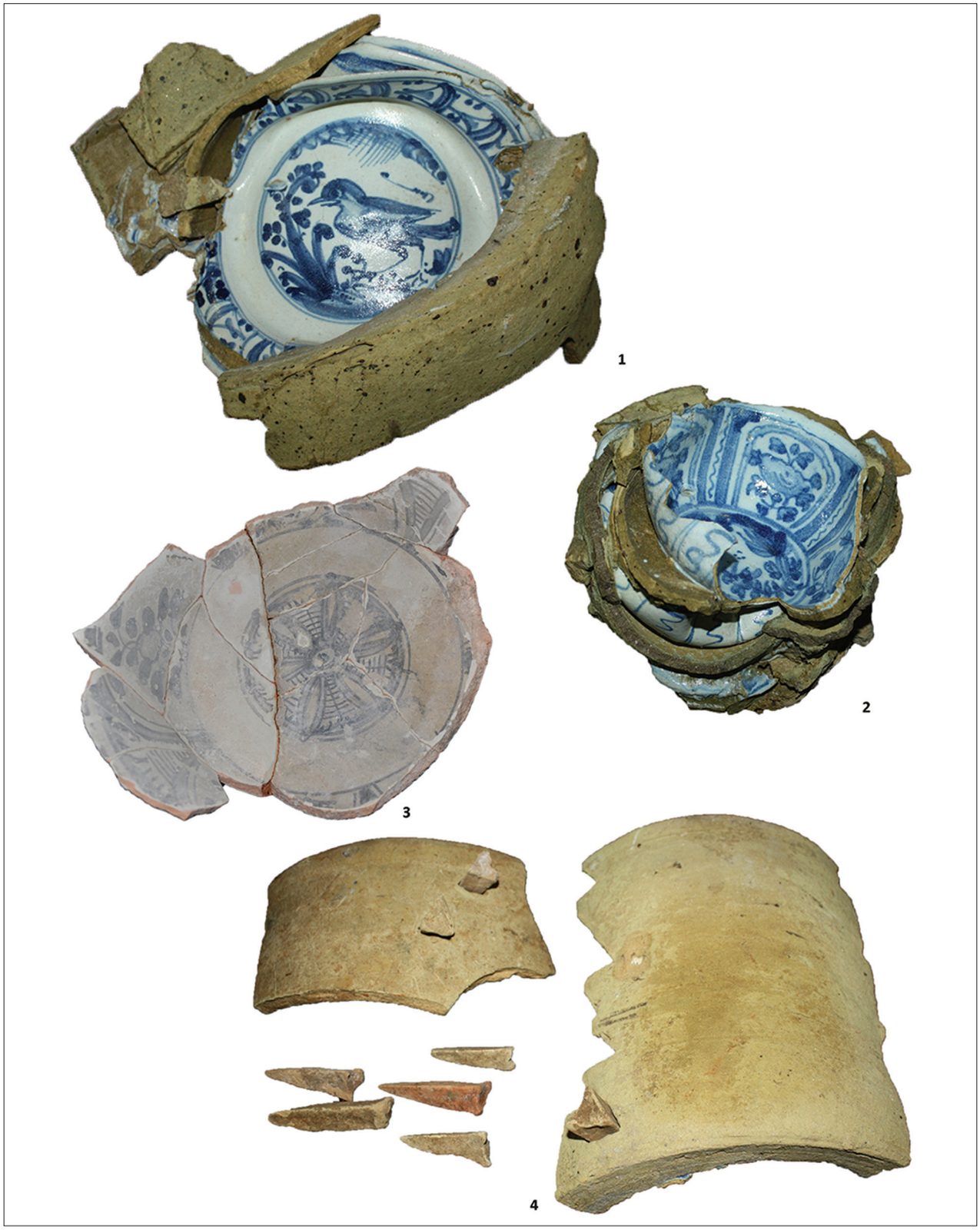

Fig. 6 1-2: deformed faiences inside saggars; 3: biscuit fragment dipped in glaze and painted before the second firing; 4: saggars and pegs.

chronology of consumption/discard. In this effort, it will be interesting to evaluate the stylistic changes operating on Lisbon's faience, what influenced it, how and when it integrated new patterns, but also how fast did it assimilate and recreate decorative motifs into its own "language". Lastly, there is a will to characterize in archaeometric terms Lisbon's ceramics, allying it to a careful description of shapes, decorative motifs and archaeological context, in an effort to contribute to more easily distinguish the productions of this Portuguese city, in comparison to those of other locations.

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