

MORPHO-FUNCTIONAL, DECORATIVE AND PETROGRAPHIC STUDY OF ISLAMIC GLAZED/UNGLAZED CERAMICS FROM THE CITIES OF ÉVORA, MÉRTOLA AND SILVES

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Abstract:

Glazed and unglazed ceramic fragments, recovered in the cities of Évora, Mértola and Silves, were the subject of a morpho-functional study, considering the typological and decorative characteristics observed in *Gharb al-Andalus*. Possible local and non-local productions in each city were identified by petrography of the ceramic bodies, considering the mineralogical composition of the ceramic paste and the local geology. As a result, a chronology between the 10th and mid-13th centuries AD were proposed for the samples studied. Regarding provenance, excluding unglazed ceramics produced in the city of Évora, the majority of samples were compatible with the geological characteristics of either cities of Silves and Mértola.

Keywords: Typology, Chronology, *Gharb al-Andalus*, Provenance, Middle Ages

Resumo:

Fragmentos cerâmicos vidrados e não vidrados, recuperados nas cidades de Évora, Mértola e Silves foram objeto dum estudo morfo-funcional, considerando as características tipológicas e decorativas observadas no *Gharb al-Andalus*. As possíveis produções locais e não-locais em cada cidade foram identificadas por petrografia dos corpos cerâmicos, considerando a composição mineralógica da pasta cerâmica e a geologia local. Como resultado da abordagem proposta, é sugerido uma cronologia, entre os séculos X e os meados do século XIII, para as amostras estudadas. Relativamente à proveniência, excluindo as cerâmicas não vidradas produzidas na cidade de Évora, a maioria das amostras eram compatíveis com as características geológicas das cidades de Silves e Mértola.

Palavras-chave: Tipologia, Cronologia, *Gharb al-Andalus*, Proveniência, Idade Média

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1. INTRODUCTION

The current study presents an interdisciplinary approach to the study of Islamic Middle Ages ceramics recovered in the *Gharb al-Andalus* (actual Portugal). It includes a morphological, functional, and decorative evaluation of several Islamic ceramic sherds, in addition to the application of optical microscopy (OM) to determine ceramic provenance. By using this approach, therefore, it is possible to establish samples typology, the decorative characteristics, the relative chronology, to discriminate between local and non-local ceramic production, and suggesting possible trading contacts between different places. So, the com-

ination of these approaches can be extremely fruitful. The archaeological study of ceramics has associated costs, but it does not require the acquisition of expensive analytical instruments. On the contrary, the petrographic study of ceramics might be more complicated, but most universities and material sciences laboratories in Portugal have the capacity to produce thin sections. So, this application can be easily accessible to archaeologists at relatively low costs. Of course, a background in geology is required to identify minerals and rock fragments in thin sections. Therefore, collaboration between scientists with different backgrounds is

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needed to fully understand a ceramic assemblage. This paper presents an overview of this collaboration.

Regarding Islamic Middle Ages ceramics from the *Gharb al-Andalus*, the work of the CIGA group (*Grupo de Investigação sobre a Cerâmica Islâmica do Gharb al-Andalus*) has produced many research papers focused on the morphological, functional and decorative characterization of Islamic ceramics recovered in the *Gharb* (BUGALHÃO *et al.*, 2010; BUGALHÃO & FERNANDES, 2012; CATARINO *et al.*, 2012; CATARINO & GUIMARÃES, 2012; COELHO, 2012; GONÇALVES, 2012; PEREIRA, 2012; SIMÃO, 2012; CAVACO *et al.*, 2013; COVANEIRO *et al.*, 2013; FERNANDES *et al.*, 2015; GÓMEZ *et al.*, 2015; GONÇALVES *et al.*, 2015; INÁCIO *et al.*, 2015; GONÇALVES *et al.*, 2016; LIBERATO *et al.*, 2016; GONÇALVES *et al.*, 2017; GÓMEZ *et al.*, 2018; GÓMEZ *et al.*, 2019). These papers represent a “synthesis” of the state of the art in this field of study. So, a huge amount of data is already available regarding the morphological-functional and decorative evaluation of Islamic ceramics but, on the contrary, the archaeometric study of Islamic ceramics has not been developed at the same speed. Several research papers, master and PhD theses have been developed in the last decades in Portugal, but we are still far from a complete understanding of Islamic ceramic production and trading in the *Gharb* (GÓMEZ, 2003, 2004; BUGALHÃO *et al.*, 2004; BRIDGMAN, 2007; DIAS *et al.*, 2008; GONÇALVES, 2008; GALIZA, 2012; GÓMEZ, 2014; FILIPE, 2015; GONÇALVES, 2015; LOPES & SANTOS, 2015; SANTOS, 2015, 2016; GÓMEZ, 2018; BELTRAME *et al.*, 2019, 2020, 2021).

Overall, the main aim of the present study is

to contribute to the understanding of Islamic Middle Ages ceramics recovered in the *Gharb al-Andalus*. Specifically, unglazed and glazed (monochrome and bichrome) ceramic samples from the city of Évora were selected, and compared with those recovered in Mértola, and Silves (Figure 1). In these cities, different archaeological interventions with reliable excavation deposits were performed in the last 20-25 years (TEICHNER, 1998; GONÇALVES, 2008; GONÇALVES *et al.*, 2009; GÓMEZ *et al.*, 2012; GÓMEZ, 2014; MACIAS, 2014; SANTOS, 2015; LOPES & SANTOS, 2015; SANTOS, 2016; CORADESCHI *et al.*, 2017).

Taking into account the geological characteristics in each place, the selected cities depict an ideal case study from an archaeometric point of view. Besides, it can be possible to suggest a compatibility/not-compatibility of the analysed samples with the geological setting in each place based on the minerals and rock fragments eventually identified in the ceramic paste.

2. GEOLOGICAL BACKGROUND OF THE CITIES OF ÉVORA, MÉRTOLA, AND SILVES

The city of Évora is included in the Évora Massif, a geological unit outcropping within the Ossa-Morena Zone in the Iberian Variscan Orogen. In or close to the city, medium to high-grade metamorphic rocks (schists, migmatites and gneiss) and large mafic to felsic intrusions ranging from gabbro to granite, are mostly represented by tonalites and granodiorite (MOITA *et al.*, 2009).

The city of Mértola is included in the Southern Portuguese Zone (SPZ), the southernmost seg-



Fig. 1. Geographical locations of Évora, Mértola and Silves in the Iberian Peninsula.
Fig. 1. Localização geográfica de Évora, Mértola e Silves na Península Ibérica.

ment of the Iberian Variscan Massif, with characteristic rocks from the Iberian Pyrite Belt (IPB). The stratigraphic succession of the IPB is subdivided into three major Upper Palaeozoic sedimentary and igneous lithostratigraphic units: the Phyllite/Slate–Quartzite Group (PQ Group), the Volcano-Sedimentary Complex (VS Complex) and the Baixo Alentejo Flysch (BAF) (SCHERMERHORN, 1971; GÓMEZ, 2004; OLIVEIRA & SILVA, 2007).

The city of Silves is included in the Algarve sedimentary basin, bordering the Southern Portuguese Zone (SPZ) to the north, where the Baixo Alentejo Flysch (BAF) unit largely outcrops. The area of Silves is also characterized by the presence of Upper Triassic/Lower Jurassic Silves sandstones (Silves Group) along with outcrops of the Volcano-Sedimentary Complex (i.e. dolerites and basalts). Going south, carbonate formations of Jurassic and Cretaceous ages can be found, in which limestones, dolomites, and evaporites are common (FLETCHER, 2005; TRINDADE *et al.*, 2009, 2013, 2018).

3. ARCHAEOLOGICAL SITES CONSIDERED IN THIS STUDY

Évora

Colegio dos Meninos do Coro

The ceramic assemblage was recovered during the archaeological monitoring carried out in *Colegio dos Meninos do Coro da Sé de Évora* (Main Cathedral – Historical city centre). A limited number of sherds with different typology and decorative styles were unearthed from a dump pit. According to preliminary analyses of the ceramic assemblage and the related literature, a chronology spanning between the beginning of the 10th century AD and the end of the first half of the 11th century AD was suggested, corresponding to the Emiral/Caliphal/Taifa kingdoms periods. The ceramic collection consists of unglazed and glazed cookware and tableware (SANTOS, 2015, 2016).

Da Natatio das Termas Romanas

The Roman thermal bath (Évora town hall-Historical city centre) was initially excavated during the 1990s. Over a series of subsequent excavations in the archaeological site, important ceramic assemblages from the Middle Ages were retrieved in a particular deposit called *Natatio*, located in the western zone of the thermal complex. The study of the collected ceramics (SANTOS, 2015; LOPES & SANTOS, 2015) suggested a chronology of the ceramic assemblages comprised between the 10th century AD (Emiral and Caliphal periods) and the first half of the 12th century AD (Almohad period).

Pousada dos Loios

The archaeological interventions in 1987 were carried out inside the ancient *Alcáçova* of the Islamic period. During the excavation work, a reliable stratigraphic superimposition was depicted

by some Muslim houses laying out over an Islamic masonry wall. The retrieved ceramic material was clearly dated between the 10th and 11th centuries AD (SANTOS, 2015).

Roman temple

As part of broad research regarding Roman temples in the Iberian Peninsula, the German Archaeological Institute in Lisbon carried out a series of archaeological excavations around Diana's Temple at Évora (Historical city centre). Several materials from the Roman, Visigothic and Islamic periods, up to the Christian post-conquest, were retrieved. In 1992, an excavation area was opened at the southwest of Diana's temple where a reliable stratigraphic profile, belonging to the Islamic and subsequent Christian occupations, was recorded (TEICHNER, 1998; SANTOS, 2015).

Casa de Burgos

The archaeological excavations performed in the *Casa de Burgos* (DGPC building - Historical city centre) during 1989 identified three different occupation periods. Roman structures were associated with a Middle Ages household area. In this area, several materials from the Islamic period were retrieved. A preliminary typological analysis dated the recovered ceramic assemblage roughly between the Caliphal and Taifa kingdoms periods, that is, at the end of the 10th century AD and the first half of the 11th century AD (SANTOS, 2015).

Paço dos Lobo da Gama

In 2008 an archaeological intervention was performed over the area of the XVII-century manor house, named *Paço dos Lobo da Gama* (CORADESCHI *et al.*, 2017), inside the historical city centre of Évora. During the fieldwork, numerous Islamic ceramic sherds were recovered inside several pits, wells, and sewers. The recovering of a gold Dinar coin was able to establish a *terminus post quem* correlation, dating the evidence to the end of the 11th century AD (Taifa kingdoms period). The proposed chronology was also supported by the morphological characteristics of oil lamps unearthed during the excavation (SANTOS, 2015).

Mértola

Encosta do Castelo de Mértola

Archaeological excavations within an area called *Alcáçova do Castelo* have been carried out since 1978. In this place, an ancient suburb of the Islamic city was unearthed, dating between the 12th and 13th centuries AD (i.e. Almohad period), before of the Christian conquest of Mértola in 1238 AD. In the Almohad neighbourhood several Islamic houses and different materials (i.e. ceramics) were retrieved. Ceramics were mainly deposited inside pits, normally utilized to collect rubbish, and levelling fillings (GÓMEZ *et al.*, 2012; GÓMEZ, 2014; MACIAS, 2014).

Silves

Arrabalde Oriental Islâmico de Silves

Archaeological excavations along the south-east area of the *Alcáçova* were undertaken during the years 2001-2004. The fieldwork documented a continuous occupation that would be identified as a part of the suburb (*Arrabalde Oriental*) of the ancient Islamic city of Silves, dating between the 10th and 13th centuries AD. The studied material came from different archaeological deposits formed during the Almohad period (i.e. the second half of the 12th century AD) such as a rubbish pit and levelling fillings (DAVIS *et al.*, 2008; GONÇALVES, 2008; GONÇALVES *et al.*, 2009).

4. ARCHAEOLOGICAL AND ARCHAEO-METRIC STUDY METHODS

The interdisciplinary study of Islamic Middle Ages ceramics from Évora, Mértola, and Silves was initially addressed through the identification of recurrent physical attributes (i.e. typological characteristics) and the description of the decoration/finishing, when present (SHEPARD, 1980; RICE, 1987). Afterwards, ceramics were photographed (Figure 2), drawn (Figure 3) and fully described (BUGALHÃO *et al.*, 2010) to be, then, cross-compared with the existing typological data of Islamic ceramics across the *Gharb al-Andalus* (GONÇALVES, 2008; BUGALHÃO & FERNANDES, 2012; CATARINO *et al.*, 2012; CATARINO & GUIMARÃES, 2012; PEREIRA, 2012; SIMÃO, 2012; CAVACO *et al.*, 2013; GÓMEZ, 2014; GÓMEZ *et al.*, 2015; SANTOS, 2015; GÓMEZ, 2018). Furthermore, excavation reports and preliminary descriptions (TEICHNER, 1998; GONÇALVES, 2008; GÓMEZ, 2014; SANTOS, 2015; LOPES & SANTOS, 2015; SANTOS, 2016) were also considered and reviewed. In this way, a relative chronology (i.e. Emiral, Caliphal, *Taifa*, Almoravid, Almohad) was suggested for the ceramic assemblage.

The analysis of ceramic thin sections was performed using a Leica DM-2500-P transmitted light microscope equipped with an acquisition camera model Leica MC-170-HD. In every case,

the clay matrix, temper, and porosity were described following the guidelines proposed by P. S. QUINN (2013). Image analysis (i.e. using FIJI ImageJ 2 software) was utilized to evaluate temper grain size distribution using pictures collected at cross-polarised light and converted into binary images, as well as particles were subdivided considering the Wentworth scale (ADAMS *et al.* 1984). Finally, high-quality pictures of each pottery fabric were collected using a Hirox HR 5000E optical microscope at 140x magnifications.

5. ARCHAEOLOGICAL AND ARCHAEO-METRIC RESULT AND DISCUSSION

5.1. Archaeological study

5.1.1. Morpho-functional and decorative study

This section describes the morphological and decorative characterisation of the selected samples following the guidelines of BUGALHÃO *et al.*, (2010). The most important information on each piece is presented in Table 1, while the whole ceramic collection and technical drawings are presented in Figures 2 and 3, respectively.

The morpho-functional analysis categorized the ceramic assemblage into cookware, tableware, lighting, and artisanal objects (i.e. related to pottery production activities). Cookware mainly displayed coarse manufacture (cooking pots and casseroles) and, whether or not they were directly exposed to a heat source was also evident. Conversely, tableware was utilized for displaying and serving food such as different sizes of bowls, jugs, a tureen, and a small bottle. Most of them were coated either with monochrome or black-decorated bichrome glazes (honey and honey-black glazes). However, remnants of a superficial finishing (i.e. slip) were identified in some unglazed wares (EVR 7 and 8). Additionally, the ceramic assemblage included three oil lamps fully covered by a honey glaze, and a tripod stand partially covered by a transparent glaze (TEICHNER, 1998; GÓMEZ, 2004; GONÇALVES *et al.*, 2009; SANTOS, 2015; LOPES & SANTOS, 2015; SANTOS, 2016).

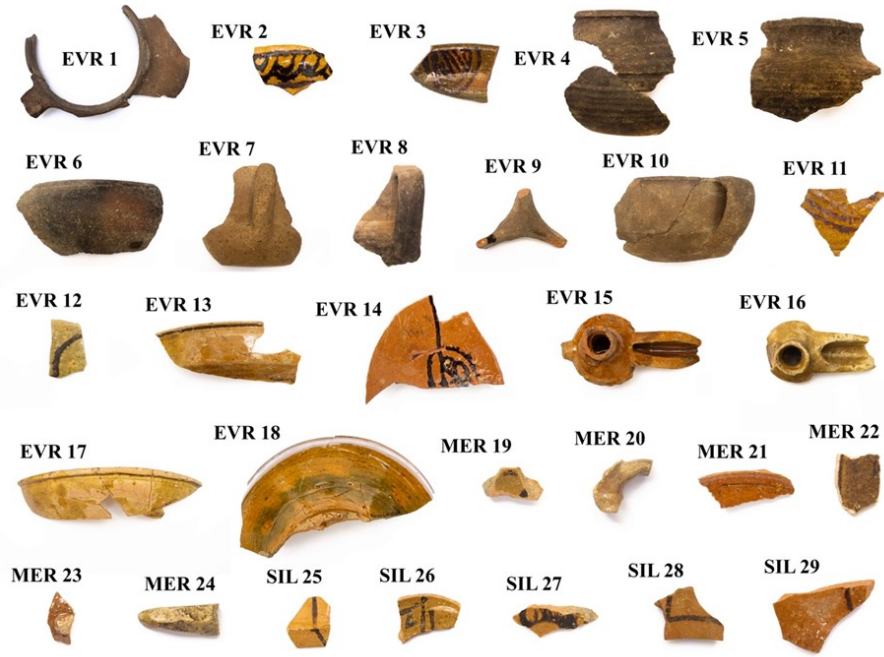


Fig. 2. Picture of the samples included in this study.
Fig. 2. Foto das amostras incluídas neste estudo.

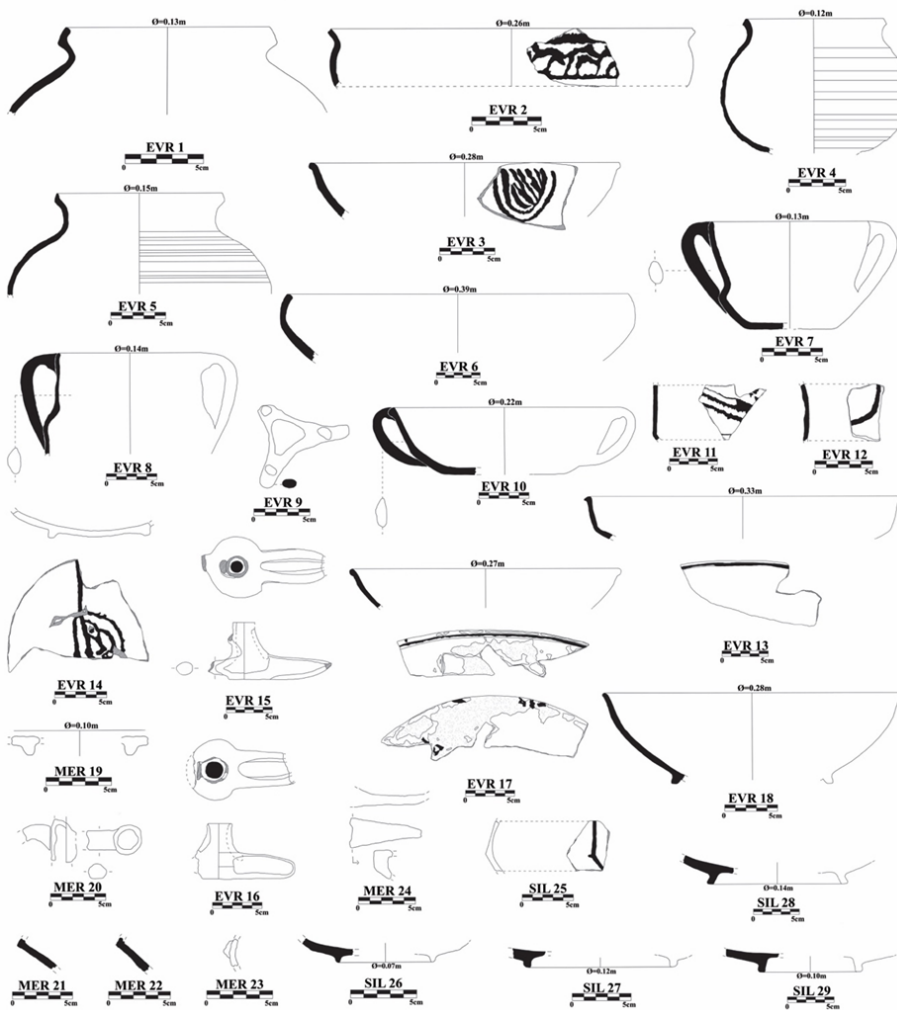


Fig. 3. Technical drawings of each ceramic sample included in this study.
Fig. 3. Desenhos técnicos de cada amostra de cerâmica incluída neste estudo.

Table 1. Ceramic sample list with the indication of the excavation reference, the glaze type, the function, the archaeological site name, the relative chronology, and the provenance.

Tabela 1. Lista de amostras cerâmicas com indicação da referência da escavação, tipo de vidrado, função, denominação do sítio arqueológico, cronologia relativa, e proveniência.

Sample	Reference	Typology	Decoration	Function	Archaeological Site	R. Chronology	Location
EVR-1	CMCS.48/53	Cooking pot	Unglazed	Cookware	Colégios dos Meninos do Coro	X - XI	Évora
EVR-2	EVR.LOIOS.23	Medium jug	Bichrome	Tableware	Pousada dos Loios	X - XI	Évora
EVR-3	EVR.LOG.243/XII/90	Bowl	Bichrome	Tableware	Da Natatio das Termas Romanas	XI - XII	Évora
EVR-4	CMCS.5/44	Cooking pot	Unglazed	Cookware	Colégios dos Meninos do Coro	X - XI	Évora
EVR-5	CMCS.25/6	Cooking pot	Unglazed	Cookware	Colégios dos Meninos do Coro	X - XI	Évora
EVR-6	CMCS.455	Casserole	Unglazed	Cookware	Colégios dos Meninos do Coro	X - XI	Évora
EVR-7	CMCS.830	Small jug	Unglazed	Tableware	Colégios dos Meninos do Coro	X - XI	Évora
EVR-8	CMCS.49	Small jug	Unglazed	Tableware	Colégios dos Meninos do Coro	X - XI	Évora
EVR-9	EVR-GOU.142	Tripod	Glaze drop	Artisanal	Casa de Burgos	X - XI	Évora
EVR-10	EVT-92-12	Casserole	Unglazed	Cookware	Roman Temple	XI - XII	Évora
EVR-11	PLG.S2.Si8[2] 1136	Bowl	Bichrome	Tableware	Paço dos Lobo da Gama	XI - XII	Évora
EVR-12	EVR.LOIOS.149	Small jug	Bichrome	Tableware	Pousada dos Loios	XI - XII	Évora
EVR-13	PLG.S2.Si8[2] 1119	Bowl	Mono-chrome	Tableware	Paço dos Lobo da Gama	XI - XII	Évora
EVR-14	EVR3-IV-F-1	Bowl	Bichrome	Tableware	Casa de Burgos	X - XI	Évora
EVR-15	PLG.S2.Si2[1] 785	Oil lamp	Mono-chrome	Lighting	Paço dos Lobo da Gama	XI - XII	Évora
EVR-16	SEM.REF.PLG	Oil lamp	Mono-chrome	Lighting	Paço dos Lobo da Gama	XI - XII	Évora
EVR-17	PLG.S2.Si8[2] 1129	Bowl	Bichrome	Tableware	Paço dos Lobo da Gama	XI - XII	Évora
EVR-18	PLG.S2.Si8[2] 1118	Bowl	Mono-chrome	Tableware	Paço dos Lobo da Gama	XI - XII	Évora
MER-19	M[20.110]24	Bowl	Bichrome	Tableware	Encosta do Castelo	mid-XII-mid-XIII	Mértola
MER-20	M [20.110]59	Small bottle	Mono-chrome	Tableware	Encosta do Castelo	mid-XII-mid-XIII	Mértola
MER-21	M[20.110]67	Bowl	Mono-chrome	Tableware	Encosta do Castelo	mid-XII-mid-XIII	Mértola
MER-22	M[20.110]68	Bowl	Mono-chrome	Tableware	Encosta do Castelo	mid-XII-mid-XIII	Mértola

Table 1. Ceramic sample list with the indication of the excavation reference, the glaze type, the function, the archaeological site name, the relative chronology, and provenance (Cont.).

Tabela 1. Lista de amostras cerâmicas com indicação da referência da escavação, tipo de vidrado, função, denominação do sítio arqueológico, cronologia relativa, e proveniência (Cont.).

Sample	Reference	Typology	Decoration	Function	Archaeological Site	R. Chronology	Location
MER-23	M[20.110]54	Small jug	Monochrome	Tableware	Encosta do Castelo	mid-XII-mid-XIII	Mértola
MER-24	M[20.110]43	Oil lamp	Monochrome	Lighting	Encosta do Castelo	mid-XII-mid-XIII	Mértola
SIL-25	BIB.03M7E101020	Tureen	Bichrome	Tableware	Arrabalde Islâmico	mid-XII-mid-XIII	Silves
SIL-26	BIB.03K7E6	Small bowl	Bichrome	Tableware	Arrabalde Islâmico	mid-XII-mid-XIII	Silves
SIL-27	BIB.02J2/E666	Small bowl	Bichrome	Tableware	Arrabalde Islâmico	mid-XII-mid-XIII	Silves
SIL-28	BIB.04J7E24A60	Small bowl	Bichrome	Tableware	Arrabalde Islâmico	mid-XII-mid-XIII	Silves
SIL-29	BIB.03Sap6Est2A	Small bowl	Bichrome	Tableware	Arrabalde Islâmico	mid-XII-mid-XIII	Silves

Évora

EVR 1 – cooking pot, panela, marmite

A closed ceramic vessel composed of a seemingly globular shape with a circular opening mouth. It displays a vertical everted rim with an outer triangular lip, and a reduced concave neck (*curved inverted bitronchoconic*). Also, the remnants of a wide, oval-shaped handle were observed emerging vertically from the rim. The ceramic body showed a coarse manufacture, with shallow grooves as simple decoration, and patchy, brown-coloured finishing. The remnants of soot were evidence of the vessel's function as a cooking pot.

EVR 2 – medium jug, jarra, jarra

Vessel with a seemingly closed, globular shape and a divergent small neck. The ceramic sherd was fully coated with a honey glaze and displayed a black decoration pattern on the outer surface. The evidence of formal features such as the body and neck shapes suggested the vessel's function as a medium-sized jug.

EVR 3 – bowl, tigela, ataifor

An open and seemingly spherical body with an everted rim (*extroverted*) and a semi-circular lip. Also, it was fully coated with a honey glaze displaying black-coloured designs on the inner surface. The body shape and the special treatment given to the vessel reflect its function as a bowl, in which the meal was served.

EVR 4 – cooking pot, panela, marmite

A closed ceramic vessel composed of a glob-

ular shape and a circular opening mouth, showing a vertical everted rim with an outer triangular lip, and a concave neck (*curved inverted bitronchoconic*). The ceramic body showed a coarse manufacture, displaying a finishing of shallow grooves over a dark brown surface. Moreover, it was partially covered by soot residue evidencing the vessel's function as a cooking pot.

EVR 5 – cooking pot, panela, marmite

A closed ceramic vessel with globular shape and a circular opening mouth, showing a vertical everted rim with an outer triangular lip, and a concave neck (*curved inverted bitronchoconic*). The ceramic body showed a coarse manufacture, displaying a finishing of shallow grooves over a brown coloured surface. In addition, the surface was partially covered by soot residue evidencing the vessel's function as a cooking pot.

EVR 6 – casserole, caçoila, cazuela

An open ceramic vessel with a semi-spherical body (*inverted tronchoconic*), a soft central carination, and an inverted rim with a flat lip. The ceramic body showed a coarse manufacture, the inner surface was carefully polished, and a simple outer design of a shallow line around the rim. Also, the body colour was given by a patchy dark brown slip scattered over both sides, coating the effects of a reduction firing. The remains of soot, as well, proved the vessel's function as a casserole.

EVR 7 – small jug, jarrinha, jarrita

A closed ceramic vessel made up of an evert-

ed curved cylindrical neck (*inverted tronchoconic*) with a slightly inverted rim, and a rounded lip. The body displayed a high-carinated globular shape and a flat base, with a vertical oval handle connecting the rim to the body. The ceramic object showed light, brown-coloured coarse manufacture, with a brownish slip remnant over both sides. Additionally, the small body size, with an evident body-neck separation, and the likely existence of an opposite handle suggested the vessel's function as a small jug.

EVR 8 – small jug, jarrinha, jarrita

A closed ceramic vessel made up of a vertical cylindrical neck (*straight cylindrical*) with a slightly inverted rim, and a rounded lip. The body displayed a globular shape and flat base, with a vertical oval handle connecting the rim to the body. The object showed a brown coloured ceramic paste and a coarse manufacture. Decoration patterns in the form of shallow grooves are evident on the surface in addition to white-paint remnants. Additionally, the seemingly small body size, with an evident body-neck break, and the likely presence of an opposite handle suggested the vessel's function as a small jug.

EVR 9 – tripod stand-stilt, trempe, tripode

A small ceramic piece made up of three equidistant helices with slightly pointed supports, and a shallow depression in the intersection. The ceramic body showed a brownish-coloured coarse manufacture with a rough surface. The function of such a ceramic object was implied by some glazed drops over the final ends of the piece, where the tool was in contact with the vessel during the firing process.

EVR 10 – casserole, caçoila, cazuela

An open ceramic vessel made up of an acute, central carination (*straight inverted tronchoconic*) with a seemingly oval opening mouth, displaying a straight everted rim and a triangular lip. Also, a vertical oval-shaped handle and a flat section of the base were preserved. The ceramic body showed a brown-coloured coarse manufactured ceramic paste, without any superficial treatment. The morphological features such as the body shape and the type of handle suggested the vessel's function as a casserole.

EVR 11 – bowl, tigela, ataifor

A ceramic sherd with a slightly convex-shaped body, a preserved short carination and inner, black-coloured decorations. The vessel's function as a bowl was determined.

EVR 12 – small jug, jarrinha, jarrita

A small ceramic sherd fully coated with a honey glaze and displaying black decorations on the outer surface. The fragment shape and the external finishing suggested the vessel's function as a small jug.

EVR 13 – bowl, tigela, ataifor

An open ceramic vessel made up of an acute, high carination (*inverted tronchoconic*), with a

straight rim and triangular-shaped lips, and a seemingly oval opening mouth. A honey glaze fully covered the vessel and its function as a bowl was determined by the body shape.

EVR 14 – bowl, tigela, ataifor

A wide ceramic sherd consisted of a convex bottom part, coated with a honey glaze and displaying a black decoration. Also, a low-annular foot on the outer surface was observed. The body shape and the type of base determined the vessel's function as a bowl.

EVR 15 – oil lamp, candil

A flat-base oil lamp composed of a closed repository and a spout. The former displayed an acute, central carination (*bitronchoconic*) with a broken handle emerged towards a relatively long-concave cylindrical neck with a circular opening mouth. The latter showed a three-faceted body stretching out from the repository. Additionally, the ceramic object was coated with a honey glaze over a reddish ceramic paste.

EVR 16 – oil lamp, candil

A flat-base oil lamp made up of a closed repository with an acute, central carination (*bitronchoconic*), and elongated four-faceted spout. Also, the former showed a concave cylindrical neck, opening to a circular mouth with an everted rim and rounded lips. The ceramic object was coated with a honey glaze over a buffy-coloured ceramic paste.

EVR 17 – bowl, tigela, ataifor

An open ceramic vessel composed of a spherical body (*spherical cap*) with an oval-shaped opening mouth and an everted, rounded rim. Also, the ceramic piece was coated with a honey glaze, with black decoration remnants. The body shape determined the vessel's function as a bowl.

EVR 18 – bowl, tigela, ataifor

A honey-glazed ceramic piece composed of a spherical body (*spherical cap*) with everted, rounded rim and oval-shaped opening mouth. Also, a section of a low diagonal foot was documented. The body shape determined the vessel's function as a bowl.

MER 19 – bowl, tigela, ataifor

The fragment showed an orange ceramic paste and comprised the bottom part of a vessel, with an inner flat surface, and an outer vertical low-annular foot. The piece, identified as a bowl, was entirely covered with a honey glaze, with internal, black-coloured decorations.

MER 20 – small bottle, bilha, redoma

A ceramic piece with a buff-coloured ceramic paste composed of a closed, cylindrical body with a partially circular handle entirely covered by a white glaze. The inner side of the body fragment was not covered by glaze. The sherd was sorted as a small bottle.

MER 21 – bowl, tigela, ataifor

A ceramic piece depicted by a small section of a strongly carinated body, entirely coated with a honey glaze over a reddish ceramic paste. The sherd was sorted as a bowl.

MER 22 – bowl, tigela, ataifor

A ceramic piece depicted by a small section of a strongly carinated body, entirely coated with a honey glaze over a brown-coloured ceramic paste. The sherd was sorted as a bowl.

MER 23 – small jug, jarrinha, jarrita

A ceramic piece depicted by a small section of a missing handle, entirely coated with a honey glaze over a buff-coloured ceramic paste. The sherd was sorted as a small bottle owing to the absence of glaze in the inner surface of the fragment.

MER 24 – oil lamp, candil

A point-shaped ceramic piece depicting half a section of an oil lamp spout. It was a three-faceted body, entirely coated with a honey glaze over a buff-coloured ceramic paste.

SIL 25 – tureen, terrina, sopera

A small central-carinated ceramic piece, entirely coated with a honey glaze over a reddish ceramic paste. In addition, black-coloured glazed decorations were registered in the inner side of the piece. The fragment was classified as a bowl used to serve meals.

SIL 26 – small bowl, taça, jofaina

A sherd with a red ceramic paste comprised a vessel's bottom part, with a relatively inner flat surface, and an outer diagonal low-annular foot. The ceramic object, identified as a small bowl, was entirely covered with a honey glaze with internal, black-coloured decorations.

SIL 27 – small bowl, taça, jofaina

A sherd with a buff-coloured ceramic paste comprised the bottom part of a vessel, with a relatively inner flat surface, and an outer diagonal low-annular foot. The ceramic piece was classified as a small bowl, it was entirely covered with a honey glaze with internal, black-coloured decorations.

SIL 28 – small bowl, taça, jofaina

A ceramic fragment with a red paste comprised a vessel's bottom part, with an inner flat surface, and an outer diagonal high-annular foot. The ceramic object, identified as a small bowl, was entirely covered with a honey glaze with internal, black-coloured decorations.

SIL 29 – small bowl, taça, jofaina

A ceramic fragment with a red paste comprised a vessel's bottom part, with a slightly inner spherical surface, and an outer diagonal low-annular foot. The ceramic object identified as a small bowl, was entirely covered with a honey glaze with internal, black-coloured decorations.

5.1.2 Relative Chronology

Thanks to the evaluation of the morpho-functional and decorative characteristics, of the archaeological contexts of recovery, and to the cross-comparison with the literature (BUGALHÃO *et al.*, 2010; CAVACO *et al.*, 2013; GÓMEZ *et al.*, 2015; INÁCIO *et al.*, 2015), it was possible to establish a relative time chronology for the ceramic samples included in this study (Table 1).

Évora

Évora sherds were recovered from different chronologically reliable archaeological contexts (TEICHNER, 1998; SANTOS, 2015; LOPEZ & SANTOS, 2015; SANTOS, 2016). The re-examination of sample characteristics suggests a chronology between the 10th and the early 12th century AD, documenting major morphological and decorative changes during the Caliphal and the end of *Taifa* periods.

Cooking pots (EVR 1, 4 and 5) still present the typical 'S' profile from the Emiral period, but with some additional changes such as the overall globular body, the relatively short, concave neck (*curved inverted bitronchoconic*) and a markedly triangular lip. These characteristics suggest that objects were probably produced between the second half of the 10th and the 11th century AD (GÓMEZ *et al.*, 2015; LOPEZ & SANTOS, 2015; SANTOS, 2016). Additionally, this relative chronology is supported by the common evidence of stretch marks on the surface, owing to the extensive usage of throwing wheels in shaping the ceramic vessels at that time (ACIÉN *et al.*, 1991; GÓMEZ, 2018). It is noteworthy that the mentioned formal attributes such as reduced necks, triangular-shaped lips, and shorter bodies, normally appear in great numbers around the 11th century AD (GÓMEZ *et al.*, 2012; LOPEZ & SANTOS, 2015).

A morphological development was seen in two casseroles. The first, EVR 6, is relatively dated to the 10th century AD (Caliphal period). It displays some traces from the Emiral period such as a soft carination, an inverted rim, and a semi-spherical body (GÓMEZ *et al.*, 2012; GONÇALVES *et al.*, 2015; GÓMEZ, 2018). The second, EVR 10, has a strong carination, an everted rim, and two potential handles. This is a formal change, and it is normally associated with ceramic production from the 11th and 12th centuries AD (*Taifa* to Almohad periods, respectively) (GONÇALVES *et al.*, 2015; LOPEZ & SANTOS, 2015; SANTOS, 2016).

The small unglazed jugs (EVR 7 and 8), display reduced bodies, usually documented from the 10th to 11th centuries AD. Other characteristics such as everted cylindrical necks, carinated shapes, slip coatings, and potential handles were also registered (LOPEZ & SANTOS, 2015; SANTOS, 2016; GÓMEZ, 2018; GÓMEZ *et al.*, 2019). At the same time, medium and small glazed jugs with black decorations (EVR 2 and 12, respectively) were roughly dated to the 11th century AD, when black decorations over monochrome glazes were more

widespread across the *Gharb* up to the 12th century AD (ACIÉN *et al.*, 1991; GÓMEZ *et al.*, 2012).

A group of ceramic sherds made up of monochrome and black-decorated bichrome glazed bowls were associated by similar morphological and decorative features. In this case, physical attributes such as characteristic strong carinated profiles, low-annular feet, everted rims, and thick walls, were clearly identified in some pieces (EVR 3, 11, 13, 14, 17 and 18). These formal and decorative characteristics were common from the 11th century AD onwards (ACIÉN *et al.*, 1991; GÓMEZ *et al.*, 2012; GONÇALVES *et al.*, 2015; LOPEZ & SANTOS, 2015; SANTOS, 2016; GÓMEZ, 2018).

In the case of oil lamps (EVR 15 and 16) the small repository and a long and faceted spout were key attributes, indicating a chronology ranging between the 10th to 11th centuries AD (GÓMEZ *et al.*, 2012; LOPEZ & SANTOS, 2015). To conclude, the presence of a tripod stand/stilt (EVR 9) in the ceramic collection from the city of Évora did not add any important temporal information. Besides, different kiln tools, including tripod stands, were widely reported since the beginning of the Islamic period in the Iberian Peninsula (SALINAS *et al.*, 2019).

Mértola

The ceramic assemblage from Mértola was retrieved from a reliable archaeological context, dating around the second half of the 12th century and the first half of the 13th century AD, during the Almohad occupation of the city. The suggested chronology was corroborated by common morphological and decorative features such as low-annular feet and strong carinated profiles in monochrome and black-decorated bichrome glazed bowls (MER 19, 21 and 22). Additionally, the appearance of a fragment covered by a white glaze (MER 20) and of a more faceted body in an oil lamp (MER 24), relatively assured the temporal pertaining. (GÓMEZ, 2004). The small size of the MER 23 sherd did not allow further morphological information, being dated according to its archaeological context.

Silves

Ceramic samples were unearthed from a secure deposit formed during the Almohad period, probably in the second half of the 12th and the first half of the 13th century AD. The collection consists of tableware covered by monochrome glazes with black decorations (SIL 25, 26, 27, 28 and 29). Additionally, the presence of thick walls and of a diagonal high-annular foot in small bowls (SIL 26, 27, 28 and 29) suggest that samples pertain to the last phase of the Almohad occupation of the city (GONÇALVES, 2008; GONÇALVES *et al.*, 2009; GONÇALVES *et al.*, 2015).

5.2. Petrographic Analysis

Analysed samples were sorted into 6 differ-

ent pottery fabrics (PF), and characteristics are reported in Table 4.

Pottery fabric 1

It includes cookware (EVR 1, 4, 5, 6 and 10), tableware (EVR 7 and 8) and a kiln tool (EVR 9) (Figure 2). In all cases, the ceramic paste is highly homogeneous and brown in colour. The only exception is sample EVR 9, which shows a moderately heterogeneous red/buffy ceramic paste. Porosity (4 to 11%) is mainly composed of meso-vughs and meso-elongated voids. Temper (11 to 17%) is very poorly sorted in all cases, with a high amount of equant crystals if compared to elongated ones. Roundness varies from very angular to sub-angular. Grain size distribution is mostly unimodal, except for EVR 1 and 9 (Bimodal). Mineralogically, fabric 1 is characterised by non-plastic inclusions such as amphibole (probably hornblende and/or cummingtonite), plagioclase, biotite, quartz, opaque minerals, potassium-rich feldspar (rare), and muscovite (rare). Pyroxenes were rarely observed in some samples (EVR 5, 6, 7, 8 and 9). Plutonic rock fragment inclusions (probably granite and tonalite) could also be identified as rock fragments (Figure 4A).

Pottery fabrics 2

It includes several tableware (EVR 3, 14, 18, MER 21, 22, 23, and SIL 27) and an oil lamp (EVR 15) (Figure 2). In all cases, the ceramic paste is heterogeneous and brown/red-buffy in colour. Lime nodules were very common, and clay pellets could also be rarely observed. Porosity (1 to 4%) is mainly composed of micro/macro sized vughs, vesicles and elongated voids. Temper (5 to 14%) is moderately sorted in most cases, except for SIL 27 (very poorly sorted), with a high amount of equant crystals if compared to elongated ones. Roundness varies from very angular to sub-rounded. Grain size distribution is unimodal. Mineralogically, it was characterised by the recurrent presence of quartz, potassium-rich feldspar, muscovite (rare) and plagioclase. Amphiboles were rarely observed in some samples (EVR 3, MER 21 and 23). Quartzite, sandstone and granite rock fragments could also be identified in each sample (Figure 4B).

Pottery fabrics 3

It includes several tableware (EVR 11, 13, 17, SIL 25 and 26) (Figure 2). In all cases, the ceramic paste is moderately homogeneous and red-buffy in colour. Additionally, unmixed clay pellets are very common, and lime nodules could also be rarely observed (EVR 13 and SIL 26). Porosity (1 to 2%) is mainly composed of meso/macro sized vughs, vesicles and elongated voids. Temper (5 to 10%) is moderately sorted, with a high amount of equant crystals if compared to elongated ones. Roundness varies from sub-angular to sub-rounded. Grain size distribution could be unimodal (EVR 11 and 13) or bimodal (EVR 17, SIL 25 and

¹The morphological characteristic of oil lamps with faceted sides began to appear from the late 11th century AD up to the middle of the 12th century AD (GÓMEZ 2004).

26). Mineralogically, it was characterised by the recurrent presence of quartz, potassium-rich feldspar, muscovite (rare) and plagioclase feldspars (rare). Amphiboles were rarely identified in some samples (EVR 17, SIL 25 and 26). Quartzite, sandstone and granitic rock fragments were common (Figure 4C) in addition to thermally altered limestones, bioclast and secondary calcite in SIL 25.

Pottery fabrics 4

It includes only one tableware (EVR 12) (Figure 2). The ceramic paste is highly homogeneous and buffy-coloured. Porosity (1%) is mainly composed of meso-vughs and meso-elongated voids. Temper (4%) is moderately sorted, with a high amount of equant crystals if compared to elongated ones. Roundness varies from angular to sub-angular. Grain size distribution is unimodal. Mineralogically, it was characterised by the presence of quartz, potassium-rich feldspar, muscovite (rare), plagioclase feldspars (rare) and biotite (Figure 4D). Thermally altered limestone and schist rock fragments could also be identified in addition to some bioclasts.

Pottery fabrics 5

It includes two oil lamps (EVR16 and MER 24) (Figure 2). In both cases, the ceramic paste is moderately homogeneous and buffy in colour. Porosity (2%) is mainly composed of meso/macro sized vughs and elongated voids. Temper (2 to 10%) is moderately sorted, with a high amount of equant crystals if compared to elongated ones. Roundness varies from angular to sub-angular. Grain size distribution is unimodal. Mineralogically, it was characterised by the presence of quartz, potassium-rich feldspar, muscovite, biotite (rare) and calcite (some thermally altered). Pyroxenes and amphiboles were very common in EVR 16. Thermally altered limestone and gneiss rock fragments could be also identified in addition to some fragments of quartzites and schists in EVR16 (Figure 4E). Secondary calcite was observed inside pores.

Pottery fabrics 6

It includes tableware (EVR 2, MER 19, 20, SIL 28 and 29) (Figure 2). In all cases, the ceramic paste is moderately homogeneous and red-buffy in colour. Porosity (2 to 4%) is mainly composed of meso/macro sized vughs and elongated voids. Temper (3 to 7%) is moderately sorted, with a high amount of equant crystals if compared to elongated ones. Roundness varies from very angular to sub-angular. Grain size distribution could be unimodal (EVR 2 and MER 20) or bimodal (MER 19, SIL 28 and 29). Mineralogically, it was characterised by the presence of muscovite (very abundant and mixed in the ceramic matrix), quartz, potassium-rich feldspar and plagioclase feldspar (rare). Amphiboles (brown) were also observed in some samples (EVR 2, MER 19 and 20). Quartzite, greywacke, and chert rock fragments could also be identified in each sample (Figure 4F).

Considering the ceramic technology applied, it is possible to notice a clear difference between

ceramic samples included in different pottery fabrics, functional classes and covered (or not) by glaze.

PF1 samples are unglazed, and it includes pieces with a different function (cookware, tableware, and an artisanal tool). In all cases, temper was abundant (i.e. max 17%). As for cookware ceramic samples, the technology applied evidenced the production of coarse-manufactured ceramic wares, and the employment of temper-rich materials was probably meant to improve the thermal shock resistance, and heating effectiveness of vessels exposed to fire (QUINN, 2013; MOLERA *et al.*, 1996). Similar consideration can be made for sample EVR 9 but, in this case, it was a kiln tool (i.e. tripod) utilized in pottery production activities. Tableware ceramics included in PF1 were not produced to be exposed to a heat source. Nevertheless, these samples showed very similar characteristics to cookware and the artisanal tool, indicating the utilization of the same technology.

On the contrary, most tableware and lighting objects (PF2 to 6) were produced following a different technological criterion. These ceramic samples were generally less porous and contained less temper if compared to unglazed ceramic samples. Moreover, compared to PF1 specimens, the raw material exploited in all cases was probably treated (partly purified) to modify the temper-to-clay ratio and eliminate the bigger inclusions. Temper could be added secondarily depending on the characteristics of the clay raw material employed.

Regarding provenance, ceramic samples included in PF1 were assigned to the city of Évora; PF2 and 3 were possibly assigned to the city of Silves. PF4 and 5 were considered imported artifacts from an unspecified location/s in the territory of the *Gharb al-Andalus*. Finally, PF6 was possibly assigned to the city of Mértola.

The mineralogy observed (plagioclase feldspars, amphiboles, opaque minerals, quartz, biotite, potassium-rich feldspars) and the rock fragments identified (i.e. plutonic acid/felsic rock such as tonalite and granite) in PF1 strongly indicate that it is compatible with the regional geology of Évora (i.e. Iberian Variscan Orogen) (MOITA *et al.*, 2009). Additionally, the inclusion in PF1 of a tripod stand (EVR 9), clearly associates all PF1 samples with a local coarse ware production.

In the case of PF2 and PF3, the identified mineralogy (quartz, plagioclase, feldspar, muscovite) in addition to the identification of quartzite, sandstone and granitic rock fragments in samples of ceramic pastes point to a compatibility with the geological setting in the surrounding of the city of Silves. The alteration products of the Silves Group were probably utilized for ceramic production.

The samples included in PF4 and PF5 do not show any compatibility with the local geology of Évora, Mértola, and Silves. So, at present, it is only possible to suggest that these samples were probably produced in an unspecified location in the southern the *al-Andalus* (southern Iberia) and imported into the *Gharb*. Besides, most of the main pottery workshops were located in the southern coast of the Iberian Peninsula.

In the case of PF6, the identification of quartzite, greywacke and chert rock fragments point to a compatibility with the regional geology of Mértola, and the alteration products of the Baixo Alentejo Flysch unit were probably utilized for ceramic production during the Islamic period (GÓMEZ, 2004; OLIVEIRA & SILVA, 2007).

To conclude, none of the glazed ceramics recovered in the city of Évora were produced in place, being just imported to the city from different

places during the Islamic period, including from the cities of Silves, Mértola and possibly from southern *al-Andalus*.

Petrography results also indicate/suggest that during the Almohad period monochrome and bi-chrome glazed ceramics could also be produced at Silves and Mértola. Moreover, ceramic samples eventually produced at Silves could be present at Mértola, and vice-versa.

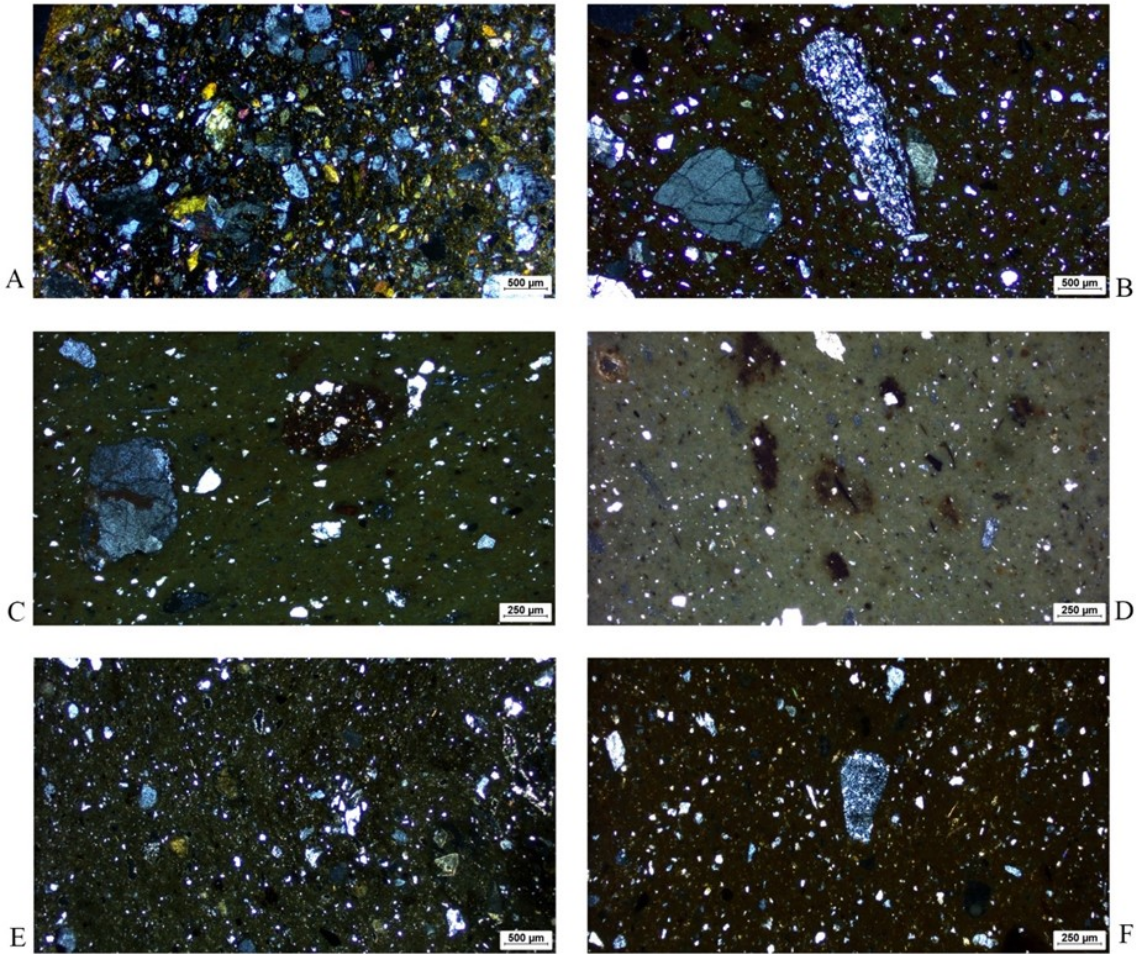


Fig. 4. Representative microphotographs obtained with cross polarized light (XPL). Representative picture of sample EVR6 included in PF1 (A). Fragments of sandstone identified in sample SIL27 included in PF2 (B). Clay pellet and a fragment of granitic rock identified in sample EVR11 included in PF3 (C). Biotite rich ceramic matrix in sample EVR12 included in PF4 (D). Thermally altered limestone fragments in the ceramic paste of sample EVR16 included in PF5 (E). Chert inclusion identified in the ceramic paste of sample EVR2 included in PF6 (F).

Fig. 4. Microfotografias representativas obtidas com nicóis cruzados (XPL). Imagem representativa da amostra EVR6 incluída em PF1 (A). Fragmentos de arenito identificados na amostra SIL27 incluída em PF2 (B). Nodulo de argila e um fragmento de rocha granítica identificado na amostra EVR11 incluída no PF3 (C). Matriz cerâmica rica em biotita na amostra EVR12 incluída em PF4 (D). Fragmentos de calcário termicamente alterados na pasta cerâmica da amostra EVR16 incluída em PF5 (E). Fragmento de cherte identificado na pasta cerâmica da amostra EVR2 incluída em PF6 (F).

Table 2. Sample characteristics observed during optical microscopy analysis with the indication of the pottery fabric (PF), of the mineral and rock fragments identified, and/as well as some specific observations.

Tabela 2. Características da amostra observadas durante a análise por microscopia ótica com a indicação do fabrico cerâmico (PF), dos minerais e dos fragmentos de rocha identificados, e algumas observações específicas.

Sample	PF	Mineralogy	Rock fragments	Observations
EVR1	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite	Fragments of acid and mafic plutonic rocks	
EVR2	PF6	Quartz, plagioclase feldspar (rare), muscovite, amphibole (brown), K-rich feldspar	Quartzite, greywacke, chert	Very rich in small crystals of muscovite mixed in the ceramic paste
EVR3	PF2	Quartz, plagioclase feldspar, muscovite (rare), amphibole (rare), K-rich feldspar	Fragments of granitic rock (felsic), quartzite, sandstone	Big lime nodules. Highly heterogenous ceramic matrix
EVR4	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite	Fragments of acid and mafic plutonic rocks	
EVR5	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite, pyroxene (rare), K-rich feldspar (rare)	Fragments of acid and mafic plutonic rocks	
EVR6	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite, pyroxene (rare), K-rich feldspar (rare)	Fragments of acid and mafic plutonic rocks	
EVR7	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite, pyroxene (rare), K-rich feldspar (rare)	Fragments of acid and mafic plutonic rocks	
EVR8	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite, pyroxene (rare), K-rich feldspar (rare)	Fragments of acid and mafic plutonic rocks	
EVR9	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite, pyroxene (rare), K-rich feldspar (rare)	Fragments of acid and mafic plutonic rocks	
EVR10	PF1	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite, pyroxene (rare), K-rich feldspar (rare)	Fragments of acid and mafic plutonic rocks	
EVR11	PF3	Quartz, plagioclase feldspar (rare), muscovite (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock	Clay pellets, lime nodules.
EVR12	PF4	Quartz, plagioclase feldspar, muscovite (rare), biotite, K-rich feldspar	Limestone, schist	Bioclast (bivalves)
EVR13	PF3	Quartz, plagioclase feldspar (rare), muscovite (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock	Clay pellets, lime nodules.
EVR14	PF2	Quartz, plagioclase feldspar (rare), muscovite, K-rich feldspar	Quartzite, frag. of sandstone and granitic rock (felsic)	Big lime inclusions. Highly heterogenous ceramic matrix
EVR15	PF2	Quartz, plagioclase feldspar, muscovite (rare), K-rich feldspar	Quartzite, sandstone	Highly heterogenous ceramic matrix
EVR16	PF5	Quartz, plagioclase feldspar (rare), muscovite (rare), amphibole (rare), biotite (rare), pyroxene (rare), K-rich feldspar, calcite (thermally altered)	Quartzite, micritic limestone (thermally altered), schist, gneiss	Secondary calcite in porosity
EVR17	PF3	Quartz, plagioclase feldspar (rare), muscovite (rare), amphibole	Quartzite, frag. of sandstone and granitic rock (felsic)	Clay pellets
EVR18	PF2	Quartz, plagioclase feldspar (rare), muscovite (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock (felsic)	Clay pellets, big lime inclusions

Table 2. Sample characteristics observed during optical microscopy analysis with the indication of the pottery fabric (PF), of the mineral and rock fragments identified, and/as well as some specific observations (Cont.).

Tabela 2. Características da amostra observadas durante a análise por microscopia óptica com a indicação do fabrico cerâmico (PF), dos minerais e dos fragmentos de rocha identificados, e algumas observações específicas (Cont.).

Sample	PF	Mineralogy	Rock fragments	Observations
MER19	PF6	Quartz, plagioclase feldspar (rare), muscovite, amphibole (brown), K-rich feldspar	Quartzite, greywacke, chert	Very rich in small crystals of muscovite mixed in the ceramic paste
MER20	PF6	Quartz, plagioclase feldspar (rare), muscovite (rare), amphibole (rare), K-rich feldspar	Quartzite	Big lime inclusions. Highly heterogenous ceramic matrix
MER21	PF2	Quartz, plagioclase feldspar, amphibole, opaque minerals, biotite	Fragments of acid and mafic plutonic rocks	
MER22	PF2	Quartz, plagioclase feldspar, muscovite (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock (felsic)	Highly heterogenous ceramic matrix
MER23	PF2	Quartz, plagioclase feldspar (rare), amphibole (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock (felsic)	Highly heterogenous ceramic matrix
MER24	PF5	Quartz, plagioclase feldspar (rare), muscovite, biotite (rare), feldspar, calcite (thermally altered)	Limestone (thermally altered), gneiss	Secondary calcite in porosity
SIL25	PF3	Quartz, plagioclase feldspar (rare), muscovite, amphibole (brown, rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock, thermally altered limestone	Secondary calcite in porosity, bioclast (bivalves), clay pellets
SIL26	PF3	Quartz, plagioclase feldspar (rare), muscovite, amphibole (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock	Clay pellets, lime nodules.
SIL27	PF2	Quartz, plagioclase feldspar (rare), muscovite (rare), K-rich feldspar	Quartzite, frag. of sandstone and granitic rock	Clay pellets, lime nodules. Highly heterogeneous ceramic matrix
SIL28	PF6	Quartz, plagioclase feldspar (rare), muscovite, K-rich feldspar	Greywacke, chert	Very rich in small crystals of muscovite mixed in the ceramic paste, vitreous inclusions
SIL29	PF6	Quartz, plagioclase feldspar (rare), muscovite, K-rich feldspar	Quartzite, greywacke, chert	Very rich in small crystals of muscovite mixed in the ceramic paste, vitreous inclusions

6. CONCLUSION

The present study evaluated the ceramic collection using a combined morpho-functional, decorative, and petrographic approach. As a result of the morpho-functional, decorative and chronological evaluation, the ceramic samples included in this study were mainly classified as cookware, tableware, lighting object, and artisanal tool. The collection is restricted but it represents specific ceramic wares normally employed in the cities of Évora, Mértola, and Silves in the Caliphal, *Taifa*, and Almohad periods, in a time framework ranging between the 10th and the mid-13th century AD. Archaeometric results indicate that unglazed and glazed ceramics were produced adopting different technological criteria, which remain unchanged in the considered timeframe. Six different pottery fabrics were also identified. Four of them were associated with the cities of Évora, Mértola and Silves, and the remaining two were considered as imported products towards an unspecified site/s probably located in southern *al-Andalus*.

In addition, some indication regarding trading contacts could also be obtained. The petrographic analysis corroborated the existence of local production centres of unglazed/common wares in the city of Évora which, in turn, was supported by the presence of a tripod stand (kiln tool) within the ceramic collection. In the case of Mértola and Silves, the existence of local production centres of glazed wares was assumed by the compatibility of the analysed ceramics with the local geology. Additionally, some glazed ceramics were also imported into the *Gharb al-Andalus*.

Thereby, short- and long-distance trading networks within the *al-Andalus* can be outlined starting from Évora. During the Caliphal and *Taifa* kingdom periods, the city was an internal supplier of coarse wares, but it was also an important local market for glazed ceramics eventually produced and distributed by Mértola and Silves (GÓMEZ, 2004; GONÇALVES, 2008; FILIPE, 2015; SANTOS, 2015, 2016).

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