

Study of a finding of 16th century azulejo panels at the Cathedral of Setúbal in Portugal

Alexandre Pais, João Manuel Mimoso, Pe. Rui Rosmaninho, Maria de Lurdes Esteves, Sílvia R. M. Pereira, Maria Augusta Antunes, Ana Margarida Cardoso, José Mirão

ABSTRACT

A series of disperse renaissance azulejos with designs outlined in blue against a yellow background, secluded by the basal wall of the altar of the *Igreja de Santa Maria da Graça*, Cathedral of Setúbal, near Lisbon, were recently unveiled. The azulejos were probably once part of a chapel lining that was removed, and some were re-applied here at an unknown date. They were spread without any concern whatsoever about continuity because they were not intended for visibility.

In this paper we attempt a partial digital reconstruction of the painting, showing that it includes the representation of two feminine winged figures, together with flowers and fruits. One of the figures is a young lady with butterfly wings, and the other an elderly woman with bird wings. Both have crowns, although of different sorts.

We also report the results of a first analytical study of the azulejos and discuss their technological and chronological placement in relation to other 16th century panels from the workshops of Lisbon.

RESUMO

Foi descoberto recentemente na Igreja de Santa Maria da Graça, Sé de Setúbal, um vasto conjunto de azulejos renascentistas com imagens delineadas a azul contra um fundo amarelo, que forram interiormente um murete frontal à base do altar, e que se encontram dispostos sem qualquer preocupação de continuidade. Os azulejos podem ter sido parte do revestimento de uma capela da própria igreja, de onde foram removidos numa data desconhecida e, posteriormente, reaplicados no local onde hoje se encontram, sem a preocupação de reconstituir, mesmo que parcialmente, a sequência da decoração.

Neste artigo, tentamos uma reconstituição fragmentária da pintura mostrando que ela inclui a representação de duas figuras femininas aladas, juntamente com flores e frutos. Uma das figuras é de uma mulher jovem, com asas de borboleta, e a outra de uma mulher idosa com asas de ave. Ambas ostentam coroas, embora de tipos diferentes.

Apresentamos também os resultados do estudo instrumental dos azulejos e discutimos a sua inserção tecnológica e cronológica na sua relação com outros painéis do século XVI atribuídos às oficinas de Lisboa.

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KEYWORDS: Renaissance majolica / Setúbal Cathedral / Portuguese azulejos / João de Góis

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1. INTRODUCTION

The *Igreja de Santa Maria da Graça* is the cathedral of the old town of Setúbal (ca. 55 km SE of Lisbon). Recently, the local parish priest, Father Rui Rosmaninho, contacted the *Museu Nacional do Azulejo* because of some azulejos extant there. He also mentioned a curious application of odd azulejos lining a hidden wall of which he eventually sent a picture. This led to a major finding of rare 16th-century renaissance azulejos in Portugal: there, secluded by the altar, was a jigsaw puzzle of majolica tiles with images outlined in blue over a yellow background (Figure 1). Probably the azulejos were once part of the lining of a chapel, possibly at this very church, that was removed and 330 tiles and fragments were re-applied here at an unknown date. Their original emplacement remains obscure.

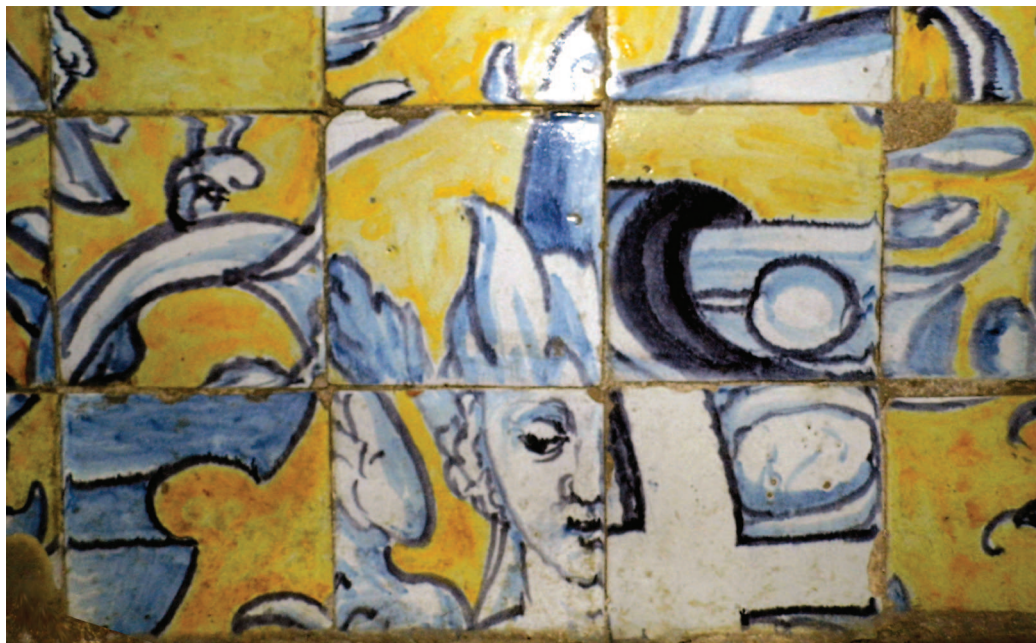


Figure 1. An aspect of the jigsaw puzzle as it was found at the Cathedral of Setúbal

In this paper, we report a partial reconstruction of some of the main motives of the dispersed azulejos, detail the information obtained from an analytical study of samples collected from the tiles and discuss their possible chronology and significance for the history of the early production of faience azulejos in Lisbon.

2. MACROSCOPIC STUDY OF THE AZULEJOS

A visual observation reveals immediately a number of technical issues that characterize these azulejos. The first, and maybe the most striking, is the seemingly poor filling power of the yellow background colour. While at *Capela de São Roque* in Lisbon [1] (also a 16th century production dated “1584” with motives painted in blue against a yellow background) the yellow areas are very homogeneous (right side of figure 4), here the painter did not obtain an acceptable degree of homogeneity (Figure 1). However, a closer look reveals that the problem actually stems more from the sparing use of the paint than

indeed from the maladroitness of the painter. While in *São Roque* the yellow was applied as a full colour, here it seems that the paint was too thin and there are conspicuous stroke markings, while locally there is a superimposition of two or more brush strokes that darken the colour (e.g. in areas of the tiles seen on the left side of figure 1).

Another noticeable issue resides in the frequent running of the blue outlines of the motives (recognizable in several of the azulejos depicted in figure 1). A similar issue was seen in the panel of the dog on the Gospel side of the *Capela de São Roque* lining [1] but in that case, the problem was not as striking as here.

The running of the dense outline paint shows clearly that the tiles were fired in a vertical position and the direction of the dribble indicates the side on which each azulejo so affected stood upright. Indeed, when that side is examined there can sometimes be seen remainders of two small clay rolls on which the tile stood, over firing (Figure 2). It is interesting to notice that the supporting rolls were of a clay that fired to a red colour, while the clay used for the biscuits fired to a lighter buff colour. The presence of the rolls remains discernible in the azulejos, and particularly the unevenness they caused to the side of the tile, leaving unsightly blemishes on the glaze that was never seen in other 16th century productions by the workshops of Lisbon.

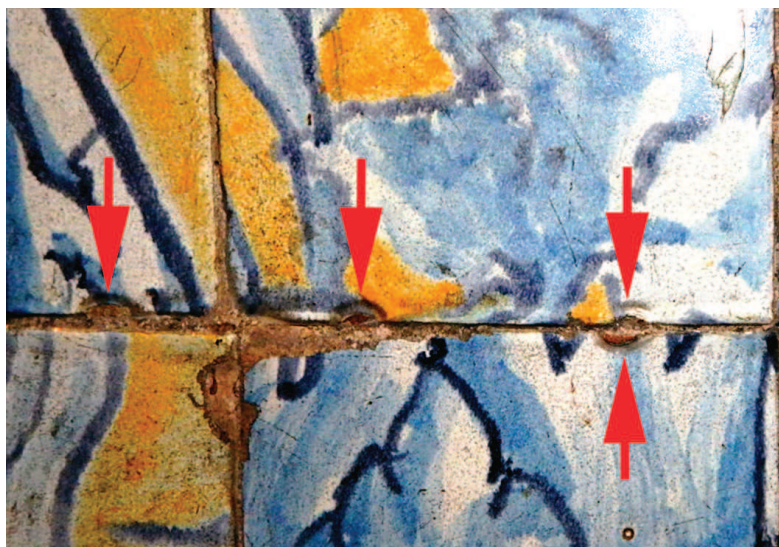


Figure 2. Remains of the clay rolls, under the lower edge, on which the tile rested over firing

3. HISTORICAL CONTEXT AND DIGITAL RESTITUTION OF THE PANELS

The church dedicated to *Santa Maria da Graça* seems to have been founded in 1248 [2]. Through the information obtained by a series of enquiries (called *visitações*) conducted during the 16th and 17th centuries, a possible chronology for the presence of the azulejos may be tentatively established. In 1533, an enquiry noted the bad conditions following an earthquake two years earlier [2]. The same enquiry mentions the widespread use of azulejos in the church, albeit at that time they could only be of the Hispano-Moresque

type, probably imported from Seville. In 1550-52 the church was demolished (*deribada*) and a new building started to be erected following an architectural program conceived by António Rodrigues [2]. The works were still proceeding in 1564/65 but the cathedral was almost finished, according to an enquiry from that period. An important information from this documentation refers that “The Church is finished and the floor will be paved with stone and the walls plastered” (*Ja ser acabada a Igreja mandar se haa lagear e acafeiar*) [3]. This means that there could be no azulejo panels before 1565. Most works were concluded by 1570, except the retables and parts of the towers [2].

We did not find any information pertaining to the lining with azulejos around this time but should they have been applied one possible location would be the *Capela do Santíssimo* (Chapel of the Holy Sacrament), located on the Gospel side of the transept and from 1586 under the tutelage of Diogo Salema, being the burial site for those of this family. Following an enquiry in 1611 by the *Ordem de Santiago* (the military Order of St. James) the church was described as “a large construction all in stone masonry, (faced) part in stonework, and part in azulejos.” (*É uma casa grande, toda de pedra e cal, a parte de alvenaria, e a parte de cantaria, de azulejos*) [2]. The same description states “the *Capela do Santíssimo* has a sacristy, provided for by the Confraternity (of the Holy Sacrament) and the Salema family, well decorated in gold and blue, with its railing on the outside, a door on the west, and glass windows” (*a capela do Santíssimo Sacramento, sacristia, com provimento dos mordomos da confraria e dos Salemas, bem ornada, de ouro e azul, com suas grades por fora, com porta para o poente, com vidraças*) [2]. Putting together these two descriptions one can see that this very rich chapel could be a likely placement for the azulejos, with their painting in blue over a yellow background simulating gold.

The church was much damaged by the 1755 earthquake “being ruined in most parts, especially in the main chapel and the towers” (*ficando arruinada por muitas partes, principalmente na capella mor, e nas torres*) [2]. And this reference leads to another possible original location for the panels. In the enquiry of 1564/65, there is a reference to a burial of human remains in the altar apse [2], a privilege reserved to kings and very few others to whom such privilege (called *provisão régia*) was given. In this case the burial was related to the Cabedo family. Miguel de Cabedo had this exclusive privilege granted in 1565 by king D. Sebastião (1554-1578), because he proved that his mother was already buried in the main chapel of the former church that had been demolished and was under the patronage of his family. The royal privilege not only granted Miguel de Cabedo authorization to be buried in this most holy place in the church but also that his descendants could have a tomb in the main chapel provided he donated a silk garment the church needed. He died in 1577 and because there was a new provision by the king that no grave should be opened in the main chapel for burial purposes his widow had to ask royal permission for her husband to be buried there, arguing no new grave would be opened because his remains would be deposited in one that was already there. And so, in 1578 the king authorized his burial and that of his descendants [2].

For a coming argument it is important to understand who Miguel de Cabedo (1525-1577), also known as Miguel Cabedo de Vasconcellos, was (the following was sourced from [4]). His father was Jorge de Cabedo, ambassador in Paris, and one of his brothers, João Pinheiro, was present as a representative theologian of king D. Sebastião in the Council of Trent. Miguel de Cabedo studied in Bordeaux and then at the University of Toulouse where he developed his knowledge of jurisprudence. Subsequently his studies led him to the Universities of Orleans and Paris, and it was while he studied there (1547) that he made a translation from Old Greek to Latin of Aristophanes’ (ca.446 BC - ca.386 BC)

comedy *Plutus*. He was called to the Portuguese royal court and had several important assignments among them the economical administration of Lisbon. He was so successful at this difficult task that when he died even the townspeople lamented his demise as Father of the People and outspoken defender of its liberty (*como Pay commum e acerrimo defensor da sua Liberdade*) [4, pp. 467]. Besides being a noted jurist, Miguel de Cabedo was also renowned for his classical culture and he was considered a remarkable Latinist poet. Among his celebrated works, the translation of Aristophanes' *Plutus* was maybe considered the most important. This play is a political satire and reflects that richness is bestowed randomly and not only to the virtuous and pious. Amid the characters of the play is the blind deity of richness, *Plutus*, and the she-deity of poverty, *Penia*.

The placement of the azulejos as we can see them today, secluded by a wall under the main altar, could be due to the rebuilding after the cataclysmic 1755 earthquake or else they could have been removed from the walls earlier and replaced by a different adornment. The question that is still without an answer is: what was their original placement? Believing they are from this church and noting they were expensive at the time [5], besides the already mentioned *Capela do Santíssimo*, they could also have been applied in the most important place in the church: its main chapel.

Can the motives that we perceive in these azulejos give us some suggestion of their purpose? We tried a digital reconstitution from what is left and assembled compositions with flowers and fruits (Figure 3) as well as two cornucopias of which the most complete is illustrated on the left side of figure 4 where it may be compared with one of the cornucopias at the *Capela de São Roque*, in Lisbon. Albeit less perfect, this cornucopia is not very different from *São Roque's*. If the purpose of the panels in *São Roque* was to create an illusory metal railing that simulates a protection for the chapel and where the symbols of the saint can be seen (the dog with a loaf in its mouth, on one side, and a pilgrim's staff, on the other) what could have been the motif for those in Setúbal? We cannot ascertain at the moment the number of original panels, but the presence of two feminine figures (Figure 5) and of also two cornucopias seems to indicate that the panels may have been two, either facing each other, or on both sides of some other feature. The cornucopia is a rather common decorative element in itself, but is also a symbol of the element Earth and of Prosperity, usually associated with deities that grant fortune, such as *Plutus*.

If what we have here is indeed the remains of two azulejo panels, they would be somewhat narrow and probably the key to understand them lies in the images of the two women, one young and the other old. One might see here an allegory related to time and the frailty of life (butterfly wings) and its briefness (bird wings), a subject that could easily be related with a mortuary chapel. If this interpretation is correct, and we must emphasize it is only a first hypothesis that only the rearrangement of the azulejos based on their backside markings may confirm, then both the main chapel and that of the *Santíssimo* would be appropriate locations. Although there are other chapels in the church that were meant for burials, only these two were made in the period that matches the aesthetics of the azulejos, the main chapel in 1578 and that of the *Santíssimo* in 1586. Another aspect that could support the idea of a more religious background for these panels is the fact that we have two seraphs or winged heads in this set, as well as a butterfly (Figure 6). Their presence seems to reinforce the idea that they could represent a kind of allegory to the frailty and swiftness of the human existence and to the thereafter of the soul.

But if we develop the idea that these panels could be used as decoration of the main chapel, then a relation with Miguel de Cabedo would be likely and the two women in figure 5 could represent *Euthenia* or Prosperity (the Young Lady) and *Penia* or Poverty

(the Old Lady), both aspects necessary to the balance of society according to the play *Plutus* that he translated. If this was the case, the representations were suitable for a renowned Latinist, as Miguel de Cabedo is known to have been, and if so a pattern in the commission of the first majolica azulejo panels in Lisbon could emerge: when we start to acknowledge the places with these specific azulejos, an important number of them can be associated to men with a solid classical background. Among them stands Brás de Albuquerque (1501-1581), responsible for the azulejos of *Quinta da Bacalhoa* (in Azeitão) and possibly for the azulejos in *Igreja da Graça* (in Lisbon), and Diogo d’Eça (1530-?) associated with *Quinta das Torres* (in Azeitão). Both estates are not far from Setúbal and are considered two of the most important renaissance sites in Portugal, also renowned for their azulejos from the same period.



Figure 3. Partial reconstruction of two bundles of fruit



Figure 4. Partial reconstitution of a cornucopia from the tiles found at *Igreja Nossa Senhora da Graça* (left side) and comparison with a similar design at *Capela de São Roque*, in Lisbon (right side)



Figure 5. The two feminine figures (Young and Old Ladies) partially reconstructed from the disperse azulejos



Figure 6. Partial reconstruction of the two seraphs or winged heads, still faceless but the wings and the hair can be seen, and part of a butterfly in the azulejos found in Setúbal

If we consider the hypothesis of these azulejos having lined the *Capela do Santíssimo* - grounded in the fact that in 1611 there were azulejos in the church and this chapel was decorated in gold and blue, exactly the colours of the tiles - we must examine a possible connection with Diogo Salema who instituted the chapel as a burial place for him and his family about which he left precise testamentary instructions in 1586 [6, pp. 162]. The Salema family is connected with the nearby town of Alcácer do Sal and actually both towns were domains of the military *Ordem de Santiago*. There is also an azulejo panel in Alcácer do Sal dated 1592 and their chronology should not be too distant [7]. The purpose and original location of the Alcácer do Sal panel is also as yet unexplained but may be related to the Salema family [7], offering a second possible pattern for the occurrence of azulejo panels in both towns and a tempting research line to be tentatively explored in the future.

4. EXPERIMENTAL

4.1. Samples

The azulejos from the Cathedral of Setúbal were given the reference Az199. The full lining was photographed and the tiles were given individual reference codes. Fourteen samples (Az199/01 to Az199/14) were collected by removing small fractions, preferably of the glaze with biscuit attached, from areas previously damaged. The sampled areas were recorded but the images are not included here because the present amalgamation does not justify them. Table 1 collects information on the samples that were analysed.

Table 1. Samples from the renaissance azulejos of the Cathedral of Setúbal used in this study

Sample reference	Glaze colour
Az199/01	yellow
Az199/03	white
Az199/04	medium blue
Az199/07	white
Az199/08	yellow
Az199/10	white
Az199/11	yellow
Az199/12	medium blue
Az199/13	yellow
Az199/CH	mostly biscuit, with white and blue glaze attached

4.2. Analytical methodology

The azulejo samples were stabilized in resin, lapped and polished to obtain a cross-section for observation and analysis by scanning-electron microscopy coupled with an X-ray energy-dispersive spectrometer (SEM-EDS).

The optical acquisition of images of the sections was obtained with a Leica DFC295 digital camera coupled to a M205C stereomicroscope of the same brand.

SEM-EDS observations and analyses were made at the HERCULES Laboratory in Évora using a Hitachi S3700N SEM with a coupled Bruker XFlash 5010 EDS. The specimens were uncoated and the observations were made in backscattered electrons mode (BSE) in variable pressure mode at 40 Pa and at an accelerating voltage of 20.0 kV. The acquisition of X-ray spectra was done with the detector at ca. 10 mm working distance.

The selection of areas for EDS analysis avoided inclusions in the glaze or biscuit representing more than ca. 5% of the full area analysed. Whenever possible area sizes of ca. 200 x 200 µm for glazes and 500 x 500 µm for biscuits, or larger, were used but acceptable repeatability was verified in areas four times smaller. For comparison purposes, only the elements usually representing the major components were considered, excluding tin (Sn) in the glazes and lead (Pb) in the biscuits due to their variability with the area chosen (in the case of Sn in the glaze because of crystal aggregations and in the case of Pb in the biscuit because the content increases with proximity to the interface). The results of the EDS analyses were given in weight % of each element considered. The amount of oxygen was calculated through the remaining elements stoichiometry of their most commonly considered oxides and the results were normalized to 100%.

Principal Component Analysis (PCA) of EDS results was made using the SPSS© software platform by IBM Analytics.

4.3. Results

4.3.1. Morphological characteristics

Figure 7 illustrates microscopic images of two of the sample sections prepared. The colour of the biscuits varies from yellow-cream to buff. No coperta (a transparent glaze layer sprinkled on top of the painted glaze) was used over the painting.

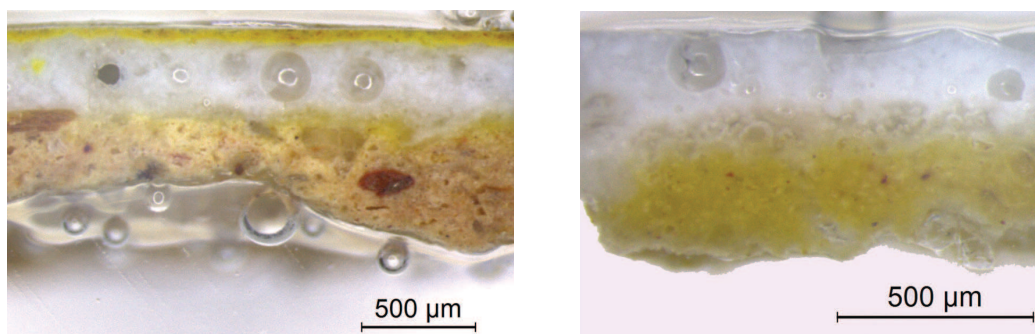


Figure 7. Prepared sections in optical microscopy - Az199/01 (left) and Az199/03 (right)

Figure 8 illustrates SEM images of samples Az199/01, Az199/10 and Az199/CH that exemplify the main micro-morphologic characteristics generally associated with the glazes of these azulejos: relatively few inclusions (grains of sand), occasionally none at all, and an interface glaze-biscuit with many crystals of neo-formation.

All the sections bearing both glaze and biscuit are morphologically similar.

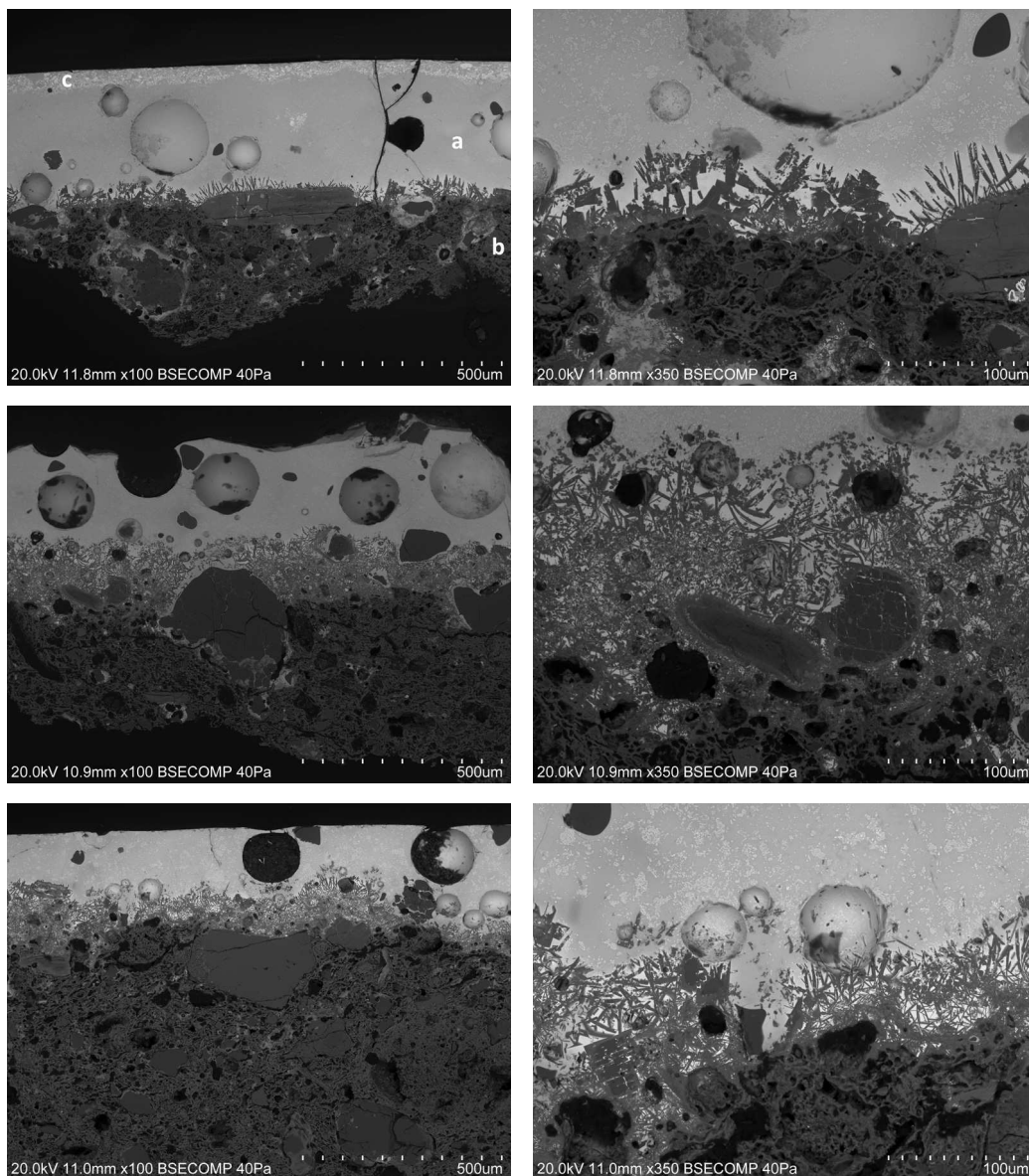


Figure 8. SEM images of samples Az199/01 (top), Az199/10 (middle) and Az199/CH (bottom) exemplifying the main micro-morphologic characteristics generally associated with the glazes of this panel (a – glaze; b – biscuit; c – yellow pigment)

4.3.2. Yellow pigment

A grain of yellow pigment from sample Az199/01 (left side of Figure 9) was analysed and the pigment found to be, not Naples yellow, but rather a tin-antimony-lead yellow as shown by the semi-quantification by EDS (Table 2) and spectral counterpart (right side of Figure 9). Besides the elements present in the matrix, the simultaneous high contents in Sn, Sb and Pb confirm the use of a tin yellow pigment (approximate proportions Sn:Sb are 1:2).

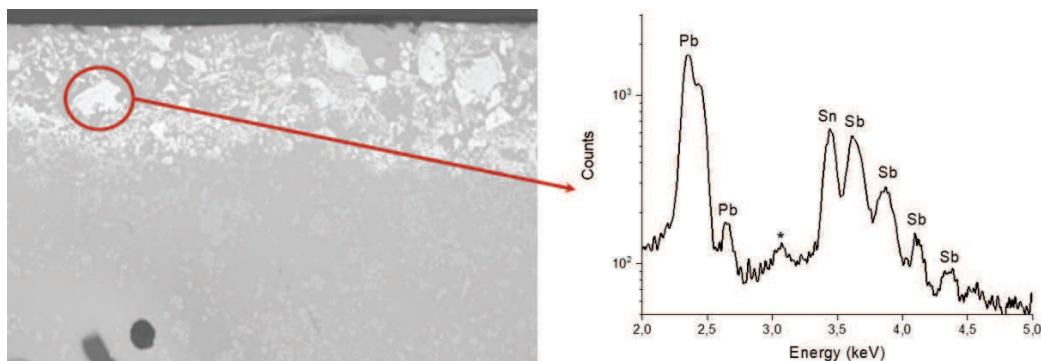


Figure 9. Selection of a grain of yellow pigment in Az199/01 (left side) and relevant part of the EDS spectrum of the yellow pigment in logarithmic scale confirming the presence of tin in the colour (the peak marked “*” is an artefact resulting from the analytic technology used)

Table 2. Semi-quantitative composition of a grain of yellow pigment in Az199/01 (wt.% of the elements normalized to 100%)

Az199/01	Al	Si	Fe	Sn	Sb	Pb	O
Yellow	0.34	2.23	0.69	9.11	18.14	53.78	15.71

4.3.3. Glaze composition

Table 3 includes the semi-quantitative results of analyses of the glazes by EDS in weight %. Sn was excluded for the reasons pointed out in section 4.2. The ratio between Si and Pb (the main components of the glaze) was determined and is also included in the table.

Table 3. Semi-quantitative composition of the glazes determined by SEM-EDS (weight of oxygen and main elements, excluding Sn, for comparative purposes normalized to 100%)

Samples	Na	Mg	Al	Si	K	Fe	Pb	O	Si/Pb
Az199/01	1.69	0.68	2.84	18.78	2.30	0.63	44.00	29.09	0.43
Az199/03	2.50	0.78	3.86	21.39	2.95	0.73	34.99	32.80	0.61
Az199/04	1.60	0.60	2.32	20.38	1.80	0.78	42.33	30.20	0.48
Az199/07	1.73	0.69	3.07	18.88	2.30	0.72	43.21	29.41	0.44
Az199/08	1.41	0.66	3.33	18.37	1.77	0.84	44.64	28.98	0.41
Az199/10	1.93	0.93	3.26	18.98	2.34	0.91	41.74	29.90	0.45
Az199/11	1.82	0.61	2.99	18.66	2.07	0.56	44.25	29.03	0.42
Az199/12	1.97	0.84	3.24	19.46	1.86	0.78	41.64	30.22	0.47
Az199/13	1.77	0.71	3.87	18.84	2.16	0.82	41.81	30.02	0.45
Az199/CH	0.78	0.72	3.46	21.51	2.23	0.97	38.17	32.15	0.56

4.3.4. Biscuit composition

Table 4 includes the semi-quantitative results of SEM-EDS analyses of the biscuits of which there was a sufficient area. The results refer to oxygen and eight other elements of higher content and particular interest for comparison purposes. Pb was detected in all cases but excluded for the reasons pointed in 4.2. The results are given in weight % and the table also includes the ratios between the main components of the biscuit - Ca and Si.

Table 4. Semi-quantitative composition of the biscuits determined by SEM-EDS (weight of the main elements corrected to 100%)

Samples	Na	Mg	Al	Si	K	Ca	Ti	Fe	O	Ca/Si
Az199/01	1.29	1.96	7.36	18.90	1.76	22.87	0.57	3.91	41.37	1.21
Az199/07	1.22	2.12	7.84	17.93	1.62	23.50	0.56	4.12	41.08	1.31
Az199/08	1.16	1.72	7.79	20.19	1.73	20.95	0.62	3.66	42.17	1.04
Az199/10	1.35	2.17	7.51	17.03	1.44	25.77	0.67	3.54	40.53	1.51
Az199/12	1.64	1.69	8.02	20.78	2.14	19.06	0.56	3.63	42.48	0.92
Az199/13	1.34	1.72	7.58	20.00	1.55	20.87	0.54	4.39	42.02	1.04
Az199/CH	1.39	1.46	8.68	20.92	2.27	18.17	0.61	3.75	42.74	0.87

4.4. Principal Component Analysis

4.4.1. Glazes

Figure 10 shows the results of a log-based PCA of the glazes considering the analytical results in Table 3, together with samples from known works used here for comparative purposes: *Igreja da Graça* (Graça I and Graça II corresponding to its two phases), the panel *Nossa Senhora da Vida*; *Capela de São Roque* [8] and the already mentioned panel from Alcácer do Sal [7], through a plot in the plane of the two first principal components (PC1 and PC2). PC1 explains 46% of the variation and is controlled in the positive sense mostly by the contents in Al, Si and K (possibly derived from the integration of quartz and potassium feldspars) and in the opposite sense by the content in Pb. PC2 explains 24% of the variation and is controlled in the positive sense mostly by the contents in Na and Mg and in the opposite sense mostly by the content in Fe (as seen in the loadings plot of Figure 11).

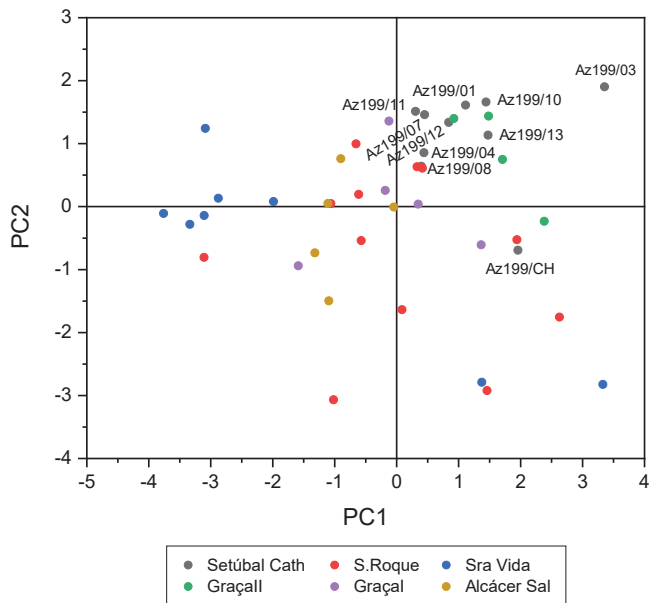


Figure 10. Score plot of the PCA of the glazes of Setúbal Cathedral (Az199) with other 16th century panels

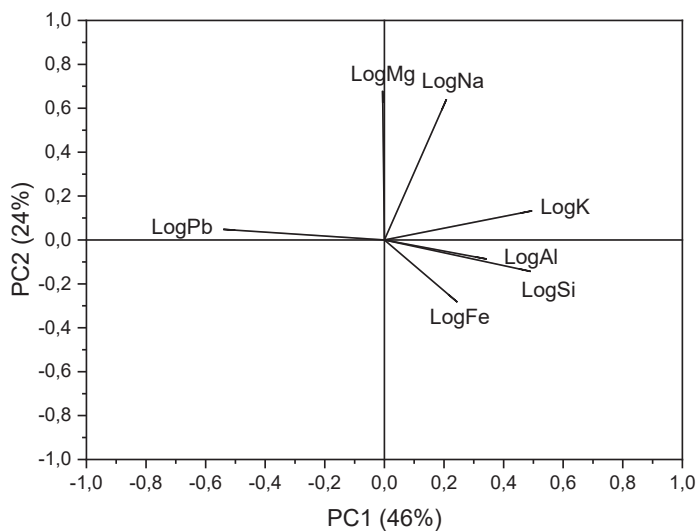


Figure 11. Loadings plot of the PCA of the glazes

4.4.2. Biscuits

Figure 12 shows the results of a log-based PCA of the biscuits of all samples, considering the analytical results in Table 4 together with the samples mentioned above, through a plot in the plane of PC1 and PC2. PC1 explains 42% of the variation and is controlled in

the positive sense by the contents in Al, Si and K and in the opposite sense mostly by the contents in Mg and Ca. Through PC1, the panels from Setubal, Graça II and Alcácer do Sal are separated from the remaining, meaning that they were probably produced from marls with higher contents in Mg and Ca. PC2 explains 26% of the variation and is controlled in the positive sense by the contents in Na, Mg, Al, Ti and Fe and in the opposite sense by the content in Si (Figure 13).

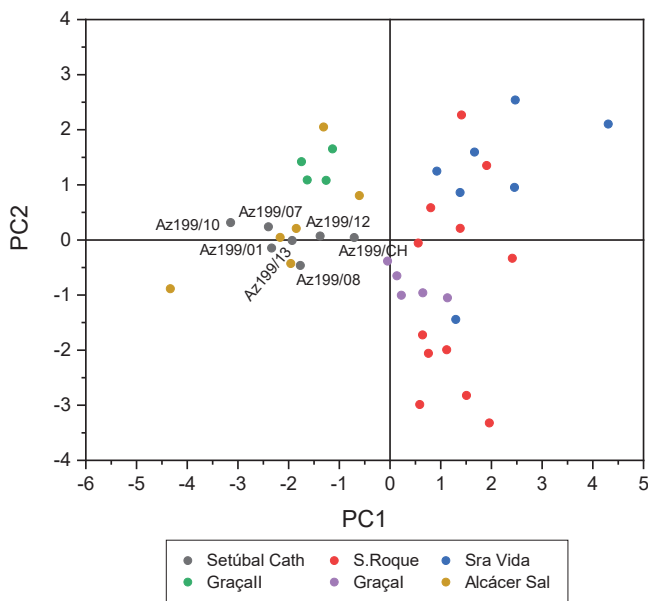


Figure 12. Score plot of the PCA of the biscuits of Setúbal Cathedral (Az199) with other 16th century panels

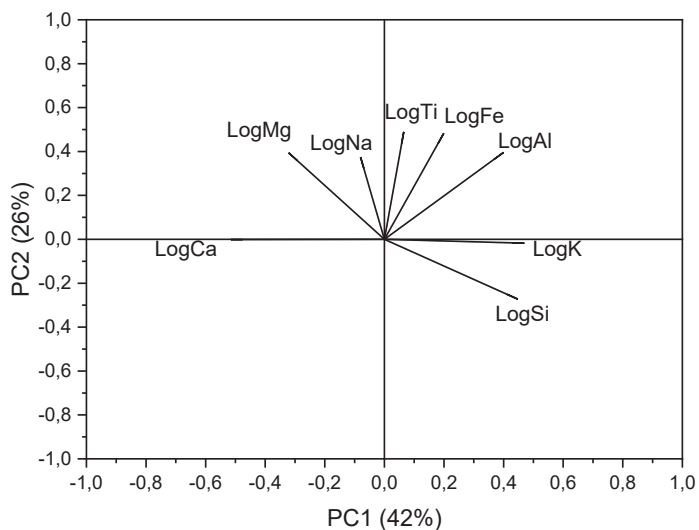


Figure 13. Loadings plot of the PCA of the biscuits

5. DISCUSSION

5.1. Technology

The SEM images of the glaze sections and their interfaces with the biscuits (Figure 8) can be compared with corresponding images of samples obtained from panels attributed to João de Góis or his circle [8]. The comparison strongly suggests a similar preparation of the components and a comparable firing practice, resulting in a few untransformed grains of sand often remaining in the glaze and a very noticeable growth of neo-formed feldspar crystals in the glaze-biscuit interface [9].

The use of the unusual Sn+Sb+Pb yellow pigment corresponds to what was already found in other panels stemming from the circle of João de Góis [8, pp. 129-130]. The same pigment was also found in the Alcácer do Sal panel [7].

Yet, and surprisingly given the aforementioned, a visual observation immediately reveals a general lack of quality in the azulejos under discussion, both as pertains to the manufacturing technique and the painting of the yellow background colour. The reason for this apparent contradiction cannot be presently affirmed but only hypothesized.

5.2. Clustering

The PCA of the glaze compositions (Figure 10) does not allow a clear separation of the Setúbal panel from other productions of the João de Góis circle, even though it points to a particular closeness to Graça II, the presumed second phase of the panels at *Igreja da Graça*, resulting from marginally higher contents in Na and K. However, the results presently available are not sufficient to affirm a clear individualization and, until more panels are studied and taken into account in the comparison, the glazes must all be considered similar regarding their composition.

The results of the PCA of the biscuits (Figure 12) is different and may help shed light on the chronology of Setúbal because it clearly separates it from panels presumed on firm grounds to have manufactured before 1585 (the first phase of *Igreja da Graça* – Graça I, the panel *Nossa Senhora da Vida* and the *Capela de São Roque* lining) [1; 8; 10] and groups it with the still undated second phase of *Igreja da Graça* (Graça II) and very closely with the Alcácer do Sal panel dated “1592”.

6. CONCLUSION

The panels of the Cathedral of Setúbal are quite unique for their seemingly rather ordinary quality, particularly when compared with such technical and artistic achievements as the *Capela de São Roque* lining and the panel *Nossa Senhora da Vida* [1; 10]. It is tempting to allocate them to a still obscure time around 1560 and before the lining of *Igreja da Graça*, when João de Góis was learning and perfecting his trade. But are there firm grounds for such a proposition? There is a limit beyond which instrumental methods cannot, by themselves, be affirmative and a fair degree of assurance depends of the work of the historian, without which there is no solution in sight. The historical fact that the Cathedral of Setúbal was reconstructed and the work was not concluded before 1565

suggests that, if the azulejos were originally lining some part of the church, as they likely were, they should not pre-date the fine panels of *Igreja da Graça* and therefore cannot be an early work by João de Góis.

The recovery of the main motives (Figures 3-6) shows that the design now reconstructed was by no means ordinary. As mentioned before, the inhomogeneity of the yellow background painting that, more than anything else, imparts an impression of lesser quality, stems probably from the sparingly use of the paint, either because the pigment was very expensive, or because its stock was low. Therefore, it too may be unrelated to the quality of the output of the workshop. Finally, we come to the running of the blue colour and the vestigial presence of some clay rolls that supported the tiles during firing. These are, indeed, detrimental attributes but if the panel was not fired in the workshop itself, but rather at a kiln where faience from several producers was fired together, as it possibly was, then maybe the problems stem mostly from the work of those operating the kiln, not the potter's workshop. Still, we could expect a quality workshop to substitute by better replicas those tiles most affected by the running of the blue colour and particularly the single tile with the face of the Young Lady (see figure 5) in which the problem is very conspicuous.

Whatever the economic or technical limitations that resulted in the rather incongruous aspect of the panels of which the dispersed tiles found in Setúbal are just a part, and although the morphological and compositional similarities found in the glaze point to the technical circle of João de Góis, the shortcomings that were never seen in his known productions point to the early, unsure, steps of a different workshop, possibly started by one of his apprentices, rather than to a late production of his own. However, even if unlikely, it is within the realm of possibilities that the as yet undetermined departure or death of its master [11] may have left the workshop of João de Góis deprived of its full technological skill and artistry.

Can these azulejos represent a preliminary to the similar lining of *Capela de São Roque* dated "1584"? Analytics can dismiss such a hypothesis: the biscuits of *São Roque*, as those of *Graça I* and *Nossa Senhora da Vida*, are characterised by low Ca/Si ratios, typically under 0.50 [8, pp. 126] while here the ratio is typically over 0.90 (Table 4) and similar, namely, to the Alcácer do Sal panel dated "1592" [7]. Finally, we come to a likelier hypothesis: that the dispersed azulejos at the Cathedral of Setúbal are an attempt inspired by the lining of *Capela de São Roque*, tentatively copying its intricate floral designs, maybe heralding the beginnings of a workshop at some time after 1584.

Then, the Setúbal panel or panels should be datable to the late 1580s or to the 1590s. An attribution to this period may one day be confirmed by the finding of azulejo remains in their original emplacement or by documental evidence, but such a chronology would fit better a connection with Diogo Salema who was alive in 1586 [6, pp. 162] and the *Capela do Santíssimo*, than with Miguel de Cabedo, who died in 1577. And because Salema's exacting testamentary instructions drawn in 1586 [6, pp. 162] do not refer azulejo panels, the decision to order them would presumably have been made after that date, maybe after having seen the lining of *Capela de São Roque* in Lisbon.

The likelihood that a new workshop may have been established around this time, of which this panel or panels represents an early effort, to compete with that of João de Góis and/or of Francisco de Matos [1] is enticing and opens new prospects for the study of the production of faience azulejos in Lisbon as the 16th century was coming to a close.

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