



Micro-analytical study of two 17th century gilded miniature portraits on copper



Alfredina Veiga^{a,b}, Dora Martins Teixeira^{a,b}, António J. Candeias^{a,b}, José Mirão^{a,c}, Ana Manhita^a, Catarina Miguel^a, Paulo Rodrigues^{d,e}, Jorge Ginja Teixeira^{a,b,*}

^a HERCULES Lab., Universidade de Évora, Palácio do Vimioso, Largo Marquês de Marialva, 8, 7000-809 Évora, Portugal

^b Departamento de Química – Escola de Ciências e Tecnologia, Universidade de Évora, Colégio Luís António Verney, R. Romão Ramalho, 59, 7000-671 Évora, Portugal

^c Departamento de Geociências – Escola de Ciências e Tecnologia, Universidade de Évora, Colégio Luís António Verney, R. Romão Ramalho, 59, 7000-671 Évora, Portugal

^d Departamento de História – Escola de Ciências Sociais, Universidade de Évora, Colégio do Espírito Santo, Largo dos Colegiais 2, 7000-803 Évora, Portugal

^e Centro de História de Arte e Investigação Artística (CHAIA), Universidade de Évora, Palácio do Vimioso, Largo Marquês de Marialva, 8, 7000-809 Évora, Portugal

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ABSTRACT

Two gilded miniature portraits on copper support from the Evora Museum collection (Portugal) were examined and analysed by stereomicroscopy, μ -Raman spectroscopy, SEM-EDS, portable-XRF (pXRF), μ -FTIR spectroscopy and liquid chromatography coupled to diode array and mass spectrometry detection (LC-DAD-MS). Both portraits, one of a gentleman and the other of a lady, are notable paintings of comparable richness, which present several areas painted or covered with gold (namely, gold dust to compose and highlight different ornaments and gold leaf to cover the back of one of the portraits). The gold dust, the gold leaf and the materials used in the gilding technique were investigated non-invasively and non-destructively using stereomicroscopy, SEM-EDS, pXRF and μ -FTIR. The other materials of the paintings, like the inorganic pigments and extenders, were successfully identified by μ -Raman spectroscopy, while the organic red pigment *cochineal lake* was positively identified by LC-DAD-MS. Overall, the materials identified in these 17th century paintings are broadly consistent with those mentioned in the painting treatises of that time, or with those reported in a very limited number of material studies focused on artworks of the same kind and period.

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1. Introduction

Portrait miniature, as it is understood nowadays, is a special painting technique that was established during the Renaissance and strongly developed between the 17th and 18th centuries, until its decline after the first half of the 19th century [1–5]. Known as a small-scale portrait painting, with a typical size that does not exceed the palm of the hand, this evolved ultimately from some technical features specifically used in the illuminated manuscripts and in the portrait medal [4].

Admired and approved at its highest level, due to the particular beauty, intense realism, high portability, relative durability and a certain personal and intimate nature of miniature portrait, this artistic modality was introduced at the English and French courts at the beginning of the 16th century [1–3]. Many of the earliest miniaturists, natives or not of those Kingdoms (e.g., Dutch painters), were masters of both panel painting and/or of illuminated manuscripts, being that the portrayed individuals were almost exclusively members of royalty and high aristocracy. Gradually, this practice was spreading across the rest of Europe and extended to other continents, such as America [1,4,5].

Throughout time, the commissioning of miniatures began to be done also by other privileged and influential members of the Society, such as those from some religious orders and bourgeoisie. The reasons behind the creation of these small works of art and their commissioning could be various; the miniature portrait could be an object of loving, familiar, monarchical or religious devotions, or an object of socio-political or economical distinctiveness, or even a diplomatic document, or trading currency [1–5]. Sometimes, miniature portrait was made simply as copy of a larger painting.

Among the several techniques in miniature painting, that used different sorts of paints and support materials (e.g., watercolour or bodycolour/gouache applied on stretched vellum, paper, or mainly ivory, and also vitreous enamel painted on copper) the one that seems to have been used more discretely (at least judging by the number and size of the collections known) was the technique of oil based painting on copper support. Based on the common painting techniques and in particular, in the knowledge acquired on the painting techniques on copper support of larger dimensions, several European miniaturists and some American developed that practice, which required special and very meticulous procedures [4,6].

Despite the possibility to find relatively complete descriptions on oil painting on copper support in the literature [6–9] and of the advances

* Corresponding author. Fax: +351 266745303.
E-mail address: jmgt@uevora.pt (J.G. Teixeira).



Fig. 1. Gilded miniatures on copper plates of the 17th century from Museum of Évora (Évora – Portugal – UNESCO World Heritage Site): (1a) front side of miniature ME23 (134 × 104 × 0.67 mm), with a gentleman's portrait, and respective (1b) reverse side, with an allegory on death; (2a) front side of miniature ME639 (133 × 104 × 0.67 mm), with a lady's portrait, and respective (2b) reverse side, gold leaf gilded.

achieved recently on a few material science studies [10–12], the knowledge of scientific basis about this type of miniatures (in particular, their complete material identity and techniques applied) still remains insufficient. This shortcoming derives from the relative rarity of these objects and their actual availability, as well as of the need to use non-destructive (or at the limit, micro-destructive) powerful analytical approaches.

Surpassing the previous limitations and being aware that: (a) making extrapolations between studied and unstudied artworks, may lead to misleading conclusions, and (b) each original artwork is unique and can store new and important information (at least, relevant for a conservator–restorer, that needs to have enough information to take and carry out the most appropriate measures to restore and preserve the object), we present in this work a material science investigation centred on two 17th century copper miniatures painted and embellished with gold (Fig. 1). Both miniatures, which are a very small part of the collection of *Frei Manuel do Cenáculo* from the Évora Museum (which belonged mainly to the Portuguese royal family – Casa de Bragança) [10], were never studied through modern scientific approaches.

As a whole, the two miniatures exhibit two painted portraits on the front and a painting with an allegory of death on the back, all of them with large golden motifs. The back of one of the miniatures presents no painting, and the copper substrate is clearly gold-leafed. Art historians believe that the two portrayed individuals were a couple, with important links with the Portuguese Royal Family. As regards to the allegory of death, presented at the rear side of the nobleman's portrait, it is thought also that it was made after his death as an honour, and that its author signed with the name “*Dianna*”.

As can also be seen in Fig. 1, the three paintings are relatively well conserved. All of them highlight some failures in the pictorial layer, which do not undermine their beauty. The gold leaf on the rear side of miniature ME639 presents the same problem, being visible in several areas, the copper surface underneath it. The detachment of pictorial layer and of gold leaf must have been caused by some mechanical action during the long life of miniatures. As for the copper support, it is observed that this does not present much evident signs of corrosion, with the exception of natural patina formed by cuprite.

The fact that a miniature's face which is gold-leafed has induced until now the idea that the paintings in the other three faces have also

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