

Article

Mopa Mopa and Barniz de Pasto at the Victoria and Albert Museum: Recent Developments [†]

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Abstract: This paper summarises the research carried out so far on *barniz de Pasto* objects from the Victoria and Albert Museum (V&A) and outlines future areas of development for our collection of Indigenous lacquer from Latin America. The V&A was the first UK public institution to identify objects decorated with *barniz de Pasto* within its collection. Two of these were acquired in 2015 and 2018; others had entered the collection between 1855 and 1902 but were recognised as *barniz de Pasto* only after 2018. The acquisition in 2015 of a cabinet marked the start of a research campaign to understand the materiality and context of all the museum's *barniz de Pasto* objects. The analytical techniques used included X-radiography, polarised light microscopy and digital microscopy, Raman microscopy, X-ray fluorescence (point and scanning), chromatography (py-GC-MS and LC-DAD-MS), Fourier transform infrared spectroscopy, X-ray diffraction, and X-ray micro-computed tomography. Unexpected discoveries were made along the way, including the characterisation and documentation of mercury white (mercury(I) chloride, or calomel) used as a white pigment, a world first. Gel-based cleaning methods were used to remove a non-original, discoloured, natural varnish covering nearly the entire surface of one of the objects, and the recent overpaint on its lid, revealing original surfaces which had been repaired and drastically repainted in the second half of the twentieth century.

Keywords: *mopa mopa*; *barniz de Pasto*; *barniz brillante*; mercury white; calomel; gourd; lacquer; Indigenous American lacquer; gel cleaning; silver



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1. Introduction

1.1. Historical Background

Barniz de Pasto (literally, 'varnish from Pasto') is the term widely used for the surface decoration of wooden artefacts of the colonial period and later, using resin derived from a tree (*Elaeagia pastoensis* L.E. Mora). The tree grows in the high, tropical and relatively inaccessible areas of what is now southwest Colombia, where the resin has been, and continues to be known as *mopa mopa*. A growing array of archaeological evidence demonstrates that, long before 1492, the resin was used by Indigenous groups for various types of ceremonial artefacts including beads, nose rings and wood cups (*qero*, spelled *quero* in Spanish) [1–3] and [4] (pp. 3–37). However, within decades of the arrival of the Spanish, precipitating both conflict and collaboration, the resin was being used, variously coloured and in very thin sheet form, to decorate European product types, made of wood or using gourds, often with carefully wrought metal fittings. While small caskets were produced (or at least have survived) in significant numbers, a wide variety of other wooden items, dateable to the colonial period, have been published in recent years, including writing boxes, dishes, trays and bowls, book stands, bottles, and picture frames [1,4–7].

Barniz de Pasto or *mopa mopa* work continued to be produced in the Pasto region during the republican period and indeed continues to thrive. Although production came to be centred in San Juan de Pasto—in 1801 Alexander von Humboldt (1769–1859) noted that 80 *barnizadores* (craftspeople specialising in the production of *barniz de Pasto* objects) worked there [8]—over this extended timespan, several centres were involved. Therefore, it is not surprising that various styles of decoration can be traced, even if mapping and dating these are at a relatively early stage. They tend to share hybrid characteristics, mixing European, local and Indigenous motifs along with others derived from Asian luxury goods, particularly textiles and lacquer that were intended for European markets, and shipped through South America via Manila [9,10]. Jorge F. Rivas has described early *barniz de Pasto* artefacts which reflect the mixing of pre-Colombian American, Asian and European cultures, as “some of the first works of a globalized world” [11] (p. 479). However, there remain many complex questions around ‘the extent to which they reflect colonial strategies of exploitation, cultural collision or miscegenation, or local, creative responses to the new political, religious and economic order developed under Spanish rule’ [12]. European accounts of *barniz de Pasto* from as early as 1652 evince keen interest in how the resin was obtained and processed, how the decoration was applied, and in the works themselves [13]. These were admired—and sent to Europe—as rarities, notable for their unusual and intricate beauty and their bright colours. Their lustre and durability also led to comparisons with prestigious Asian lacquer goods. In the eighteenth century, as scientific enquiry was applied to the thriving production of *barniz*, interest in what colourants were used was also addressed by Mario Cicala (1741–1743) and von Humboldt (1801) while visiting Pasto [13].

Establishing the core techniques of *barniz de Pasto* relies on both historic accounts and craft traditions as they are still practised. Lumps of resin are softened in boiling water to make it more elastic and workable by hand, and to facilitate the removal of plant matter such as twigs. During the colonial period, the working of the resin, and the addition of colourants, involved chewing, the purpose and cultural meanings of which action deserve further study [13]. Once sufficiently malleable for use, whether coloured or left in its natural, greenish state, the *mopa mopa* can be stretched into extremely thin sheets without tearing, typically accomplished by two *barnizadores* using their hands and teeth. Polychrome designs of almost incredible delicacy and fine detail are created by applying film in different colours, still warm and usually in layers. The film is cut to shape with a blade and pressed onto the surface of wood or gourd (sometimes a small piece may be applied and cut in situ). Other effects involve twisting *mopa mopa* threads in two colours, or by cross-hatching the film to create shading. No adhesive is used as the resin sheet bonds to the surface (or to itself) as it cools, producing a surface that is not only colourful and detailed but also, like Asian lacquer, durable when being handled, waterproof and impervious to most organic solvents. A variant to this opaque (*opaco*) method of using the resin, but not necessarily later in development, is now generally known as *barniz brillante* (‘bright’ or ‘shiny’ *barniz*), described in detail by Álvarez-White et al. [6].¹ It usually involves the use of metal leaf (generally silver) between translucent layers of *mopa mopa*, producing glittering metallic effects not unlike certain types of Japanese lacquer [9,10].

1.2. *Mopa Mopa* at the V&A

In 2015 a V&A multidisciplinary team formed by curators, conservators and scientists set out to investigate a newly acquired object, a small cabinet (V&A: W.5-2015, see Figure 1a), at that time the first example of *barniz de Pasto* to have been identified in a UK museum [14].²



Figure 1. (a) Cabinet W.5-2015; (b) tray 1262–1855; (c) casket W.7-2018; (d) gourd 28–1866; (e) gourd 268–1879; (f) gourd 1577–1902. Objects not shown to scale.

The cabinet is decorated, inside and out, with a closely worked design of plants and various creatures which surround a series of Latin emblems. While it was greatly admired by its most recent former owner, little was known about it beyond the likelihood that it was purchased in England, very probably after 1945. This uncertainty over provenance for *barniz de Pasto* artefacts now being recognised in the UK and other parts of Europe is not unusual, and further research into their, probably, complicated routes from the Americas would undoubtedly be interesting and potentially illuminating. In 1988, an art valuation suggested that it was ‘probably seventeenth-century Indo-Portuguese’. Even in 2014, no examples of *barniz de Pasto* were recorded in any European museum outside Spain. Within ten years, *barniz de Pasto* and its products are quickly emerging as a complex and deeply fascinating strand of early modern, global design history [5,15,16].³

During early research, no Indo-Portuguese analogies were identified but strikingly similar motifs appeared on ‘an extraordinarily well-preserved box possibly from Pasto’ illustrated in the 2011 catalogue of a Spanish dealer [17]. With the potential identification of *mopa mopa* now under consideration, the scientific analysis of a tiny sample from the surface of the object, as described below, was sufficient—alongside the visual evidence—to present the mysterious cabinet as the first identified example of *barniz de Pasto* in a UK museum [12,18,19].

Although it was not realised at the time, this investigation formed part of a much longer, but hesitant, engagement with *barniz de Pasto* artefacts on the part of the museum, which has been marked by phases of expansive curiosity and benign neglect, as well as scientific process and international collaboration. In fact, as far back as 1855 during the earliest days of the South Kensington Museum (as the V&A was then named), the very first acquisition of Hispanic woodwork was an octagonal dish or tray, now known to be decorated in the *barniz brillante* technique (V&A: 1262–1855, Figure 1b).⁴ At the time of its purchase from an unnamed source, it was described as ‘lacquered work, elliptic. Ancient Persian? 16th or 17th cent^y.’ and until recently it remained with other eastern Mediterranean and Indian varnished and lacquered wares, displayed during the 1980s but otherwise mostly in storage.

The story of its correct identification and relation to other examples of *barniz de Pasto* in the museum was told in an episode of the BBC television series, *Secrets of the Museum* (series 3, episode 4), first broadcast in 2022 in the UK. No written evidence survives to confirm where it was purchased or why, but the most likely source was probably a London antiques dealer, and it must have been acquired to contribute to the museum's fast-growing repertoire of non-British (and therefore less familiar) decorative styles and woodwork techniques, chosen for the educational benefit of designers, practitioners and students.

The piece is remarkably similar to a *bandeja* (tray) in the Museo de America, Madrid (inv. 12243), also carved from solid wood [20,21]. It displays a decorative idiom in *barniz brillante* found relatively widely, which is characterised by yellow, blue and black against a ground of the natural wood (at the borders) or an off-white colour, employing floral motifs (including large peony-like blooms), magpie-like birds, black animals, and sometimes human figures, a distinctive basket or palm tree. Other pieces with broadly comparable decoration in this extensive group include lobed barber's bowls, cups, table cabinets, a large box, and domed caskets, one of which is inscribed 'facto in Quito en 1709', endorsing the hypothesis that this style of work was produced in Quito during the eighteenth century, and presumably earlier.⁵

Most recently, further work on the V&A collection has identified a lobed dish with decoration of a similar character, which was acquired in 1876 (V&A: 238–1876, Figure 2).⁶ This is almost certainly decorated in *barniz de Pasto* but that cannot be verified while the piece is inaccessible during the museum's exceptional transfer of its vast London store. The dish seems to have formed part of an English collection of decorative arts formed in the first half of the nineteenth century. At the time of acquisition, it was regarded as 'Turkish or Persian'.



Figure 2. A recently rediscovered lobed dish (V&A: 238–1876).

Between the years 1866 and 1902, the museum purchased three small gourds—perhaps for scent or snuff—each about 10 cm high, decorated with matt *barniz de Pasto* and fitted with silver collars and sprinkler stoppers (Figure 1d–f). Although extremely similar, they were

obtained separately and described at the time, variously, as ‘Portuguese(?), 17th century’ purchased in Spain in 1866, probably by Henry Cole on one of his buying trips; ‘Hispano-Indian or Mexican, 17th century’ by John Charles Robinson who in 1879 sold to the museum another which he had bought in Spain; and ‘Spanish-American, 18th century’, for the example bought from Messrs. Rollin and Feuarden (London) in 1902.⁷ The three are so similar in design that they must share a common origin: on a black ground the decoration depicts flowers, fruits, birds and animals in off-white, blue, green and red (one also uses pink and orange), with contrasting neck and foot bands characterised by off-white, undulating lines on a deep red ground. Two of the three include areas of distinctive hatching to represent animal fur. One, whose silver stopper is engraved SANCHEZ, includes two hands (or gloves, of the kind that were customarily perfumed) fingering a heart motif, indicating that the gourd may have been a love or betrothal gift; very similar hand/heart combinations appear on a *barniz brillante* casket in the Hispanic Society Museum and Library, New York that has been dated c.1650.⁸ The gourds’ rounded bases mean that they do not stand unsupported, suggesting that they might have been carried for personal use, perhaps olfactory as suggested above. This occasional or intimate role may also help explain their generally good condition: although one has at the foot a sizeable loss that shows the fairly thick layer of decoration, there is less of the colour fading common on other surviving pieces. As such a clear object type, purchased from three different sources, it is reasonable to assume that others must have been produced. Although another, larger, gourd with *barniz* decoration has been recently published [22,23], hitherto no closely comparable small gourds of the V&A type have been identified.

When, in 1909, the museum created separate departments organised by material, the flasks were assigned, on account of their silver fittings, to the Metalwork Collection, where they remained ‘sleeping’ unobtrusively until recognised as *barniz de Pasto* in 2018. At this time they were transferred to the Furniture Collection, alongside other examples of *barniz*.

The exciting findings made in relation to the cabinet and three gourds were followed by the acquisition in 2018 of a small *barniz brillante* casket with a twentieth-century provenance to a European, private collection (Figure 1c).⁹ The dense scheme of birds, insects, flowers and leaves is worked with great delicacy on an almost miniature scale, with each motif outlined. The colour scheme uses red, yellow and green against a black ground, which, along with borders featuring the *shippo* motif used in Nanban lacquer, seems to indicate clearly the influence of Asian lacquer [9,10]. Around ten caskets of comparable form and decoration have been published to date, ranging in size from 21 to 29 cm wide, some with a pronounced crimson colour theme, others apparently with their original silver mounts. These constitute one of the larger groups of surviving 17th-century *barniz de Pasto* artefacts, and are thus particularly promising in terms of charting the technical characteristics of specific workshops over time.¹⁰

1.3. Research Aims

When the V&A started looking into *mopa mopa*, there was very scant published scientific and conservation literature available, most of which focussed on pre-Columbian artefacts, which are made using a slightly different type of resin (*Elaeagia utilis*) [3]. Our primary aim was to learn more about the materials and techniques of the V&A objects, to inform their preservation, and to make this knowledge available widely, engaging in national and international dialogue and exchange of information and expertise.

In particular, this paper summarises the main scientific discoveries made in relation to the V&A *mopa mopa* objects and outlines future avenues of research. We intend to draw the readers’ attention to the commonalities and differences between the V&A objects and highlight novel aspects that were revealed during our journey of discovery, including the presence of mercury white on a large number of *mopa mopa* objects and the behaviour of the surfaces during conservation.

2. Experimental

The experimental setups used between 2015 and 2019 have already been published (see below) and include the following:

- Optical microscopy (at the V&A) [18,19];
- Fourier transform infrared analysis (at the V&A) [18,19];
- Micro- X-ray fluorescence analysis (at the V&A) [18,19];
- Raman microscopy (at the V&A) [18,19];
- X-radiography (at the V&A) [18,19];
- Micro-X-ray diffraction (at the Natural History Museum, London) [18];
- Micro-computed X-ray tomography (at the Natural History Museum, London) [18,19];
- Macro X-ray fluorescence scanning (at the National Gallery, London) [18]
- Pyrolysis gas chromatography with mass spectroscopy-py-GC-MS (Museum of Fine Arts, Boston) [1];
- Liquid chromatography with diode array detection and mass spectrometry—LC-DAD-MS (Museum of Fine Arts, Boston) [1].

The new analytical campaigns of 2022 and 2023 involved the following, in addition to the V&A equipment already listed above:

High-resolution digital microscopy. Digital microscopy was done with a benchtop Hirox HRX-01 digital microscope with a H-1020E attachment. The images were acquired with $\times 10$, $\times 30$ or $\times 90$ magnification, polarised ring LED light and multi-focus mode. Raking light was also used. Images were processed with the HRX-01 software version 2.24 and Adobe Photoshop 24.7.0.

Scanning X-ray fluorescence (XRF). The XRF scans were carried out using a Bruker M6 Jetstream spectrometer equipped with a Rh-target microfocus X-ray tube, and two 60 mm² XFlash silicon drift detectors (SDD). The X-ray tube was operated at 50 kV and 600 μ A. The elemental distribution maps were collected with a 100 μ m spot size, a 180 μ m step size and a dwell time of 55–75 ms/pixel. The X-ray fluorescence spectra were calibrated, fitted and processed using the Bruker M6 Jetstream software, version 1.6.758.0.

Stereo microscope examination. The microscopic surface examination was carried out in the Furniture Conservation studio using a Meiji EMZ-TR Zoom Stereo Microscope on Stand, $\times 7$ – $\times 45$ magnification with a Meiji Fibre Optic Lite Source, High-Intensity Illuminator FL-150.

3. Results

This section summarises both the published and unpublished scientific investigations conducted so far on each of the six identified objects, and the relevant conservation comments and details. This work focuses primarily on the newest results, including additional discoveries which shed light on the V&A collection, in particular, and *mopa mopa* craftsmanship in general. Table 1 provides a synopsis of the previously published results, which are cited, to support and integrate the newest developments. The results are described in the order they were obtained and tell the story of our findings in relation to materials and techniques.

As the publications by Newman et al. [1,2] describe in detail, *Elaeagia* resin (of the two relevant species studied to date) can be distinguished from other natural resins by FTIR spectroscopy; py-GC/MS also plays a crucial role in the characterization of the materials.

Table 1. Synopsis of previously published results. * Marks this work.

	W.5-2015	1262–1855	W.7-2018	28–1866	268–1879	1577–1902
Mopa mopa ID	[18,19]	*		[19]		
Molecular pigment/dye ID	[18,19]			[19]	[19]	[19]
Elemental pigment ID	[18] *	*	[19] *	[19] *	[19] *	[19] *
Structural investigation (X-ray-based)	[12,18,19]			[19]	[19]	[19]
Conservation assessment/treatment	[18,19] *	*	[19] *	[19] *	[19] *	[19] *
Historical background	[12,14] *	[12]	[12]	[12]	[12]	[12]

3.1. Cabinet (W.5-2015)

The V&A's cabinet (Figure 1a) has a fall-front and lid, both hinged, revealing upper compartments with three drawers below, decorated on almost all show surfaces with opaque *mopa mopa*. The layered *mopa mopa* decorative surface is even and smooth, with a wide colour palette. Various examples of this basic, small cabinet form (usually termed *escritorio* or *escritorillo* in Spanish because they often held writing materials) have been published, including two rare, dateable examples (c.1643 and c.1684) in the collection of the Hispanic Society Museum and Library.¹¹ In terms of its decoration, the cabinet corresponds closely to a number of published pieces, decorated in opaque *barniz* on a black ground with repeating polychrome borders: the Madrid and c.1643 cabinets mentioned above; a tabletop in Hispanic Society Museum and Library, also dateable c.1643; one comparatively large and two small caskets. Of these last two, one features a very similar selection of emblems but is worked in *barniz brillante*, and an attribution to the Central Andes in the early seventeenth century has been tentatively suggested [10].¹² These various pieces share a distinctive dense composition of small leaves, fruits, birds, and creatures; two include human figures, and like the V&A's cabinet include prominent emblematic or religious imagery with inscriptions, features that do not seem to endure beyond the 17th century. Of this small group, the V&A cabinet displays the most extensive and elaborate iconographic scheme, religious and moral in character, although it is yet to be fully revealed, as explained below.

The structural analysis of the cabinet revealed dovetail joinery of the carcass and drawers in South American cedar (*Cedrela* sp., in the family Meliaceae).¹³ Among structural repairs the most significant was on the lid where an internal spline holds two halves of the lid together. Examination under the microscope made it clear that the surface decoration had not been painted with brushes, as might have been assumed at first glance; it revealed thin layers of resin in a variety of colours, and strands of twisted 'cord' that had been pressed into the underlying film [18,19]. However, areas of loss had been overpainted in at least two different campaigns, one of which was later dated to the second half of the twentieth century [19]. Over this complex surface, a plant resin varnish (wholly unlike *mopa mopa*), had been extensively applied (by brush), which had become dull and yellowed; a layer of wax was also present. The removal of the non-original varnish was particularly challenging because we needed to make sure we did not disturb the *mopa mopa*. We did not know how the latter would react to different cleaning methods and materials as this was a subject not addressed in the technical literature then available in English. Identifying a solution, as described below, became possible thanks to the very generous and timely support of Jorge Welsh Works of Art, London and Lisbon.

This cabinet was thus the first V&A *barniz* object to be analysed in depth. Representing our first encounter with *barniz de Pasto*, the cabinet was examined in detail, using the protocol normally adopted for any high-profile or unusual object entering the collections. Routine X-radiography (to identify methods of construction and other structural details) and optical microscopy of micro-samples obtained from pre-existing areas of loss (to investigate the layer structure and any history of repaint and repair) were undertaken.

These were followed by investigations using Raman microscopy, FTIR microscopy and micro-XRF analysis; additional micro-computed tomography, X-ray fluorescence mapping, and py-GC-MS and LC-DAD-MS were undertaken in collaboration with colleagues at the Natural History Museum, London, the National Gallery, London, and the Museum of Fine Arts, Boston. These initial efforts produced a series of surprises, which have already been published elsewhere [12,18,19] and included the following:

- *Elaeagia pastoensis* Mora was identified by FTIR and py-GC/MS;
- A decorative scheme including a skeleton was present on the inner surface of the lid, which had been covered with a much later, probably professionally painted scheme, a pastiche of other *barniz* areas in the cabinet;
- ‘Mercury white’ (a white pigment made of calomel, mercury(I) chloride) was extensively used on all original surfaces, either alone or mixed with natural organic dyes;
- An oil-based restoration was visible in many damaged areas, with lead white used to replace losses to mercury white.
- Later repairs and restorations were present, made of acrylic paint-containing pigments that were invented from the early 1920s until 1958. This evidence confirmed that the latest restoration was very recent.

Additional XRF mapping was undertaken at the V&A in 2022 and 2023 to address questions that had arisen more recently. This resulted in a number of discoveries. Firstly, a small number of the *mopa mopa* sheets used as the base for the overall decoration appear to contain a significant amount of iron (Figure 3). These sheets are not visibly different from the others that do not contain iron, and it is possible that the different composition is related to something that was chewed with the resin at the time of manufacture.

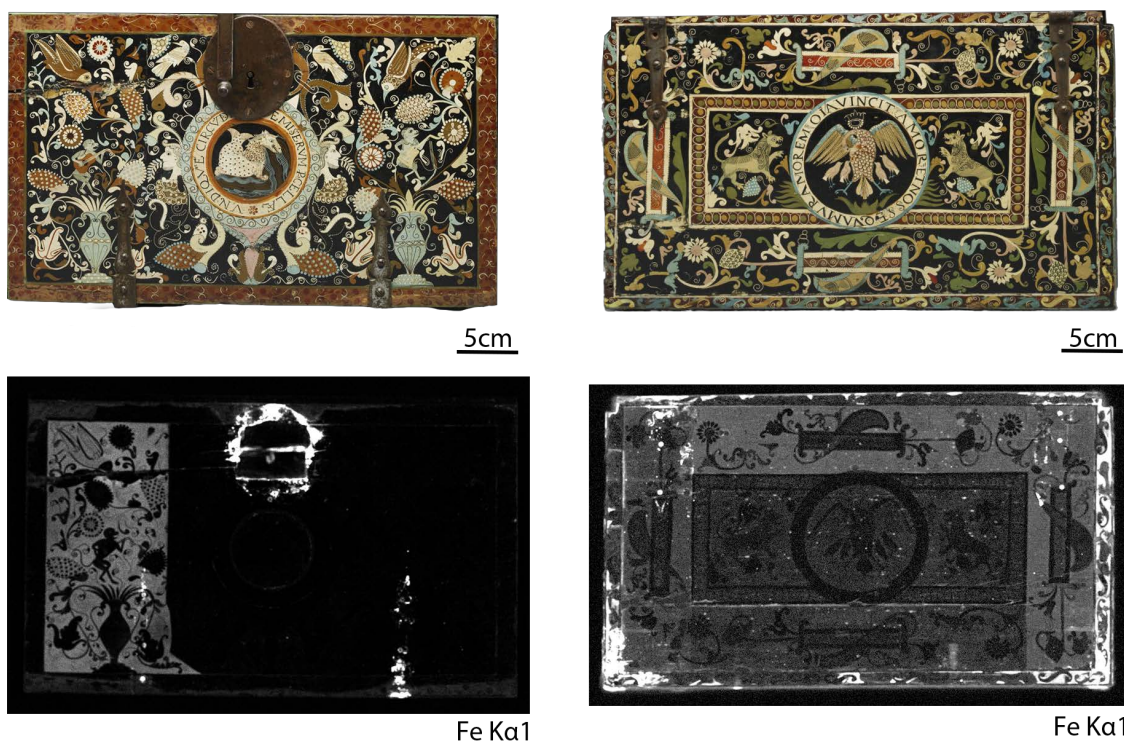


Figure 3. Iron maps of the inside surface of the hinged fall-front (on the **left**), where an iron-rich *mopa mopa* sheet is visible on the left-hand side; and the back of the cabinet (on the **right**), where two iron-rich *mopa mopa* strips can be seen at the top and the right-hand side of the panel.

Another significant discovery concerns the presence of a lead-containing pigment in the original *mopa mopa* decorative scheme on two of the cabinet’s surfaces, the back of the cabinet (Figure 4) and the outer side of the fall-front (Figure 5). While mercury white is still the opaque pigment of choice almost everywhere on the cabinet and is used either alone or

mixed with organic colourants, lead-containing materials were found in a small number of areas, usually beige but occasionally brick red (Figure 6). No molecular analysis could be attempted from these areas because no samples could be taken from such pristine surfaces. The hypothesis is that lead white is present, mixed with organic colourants.

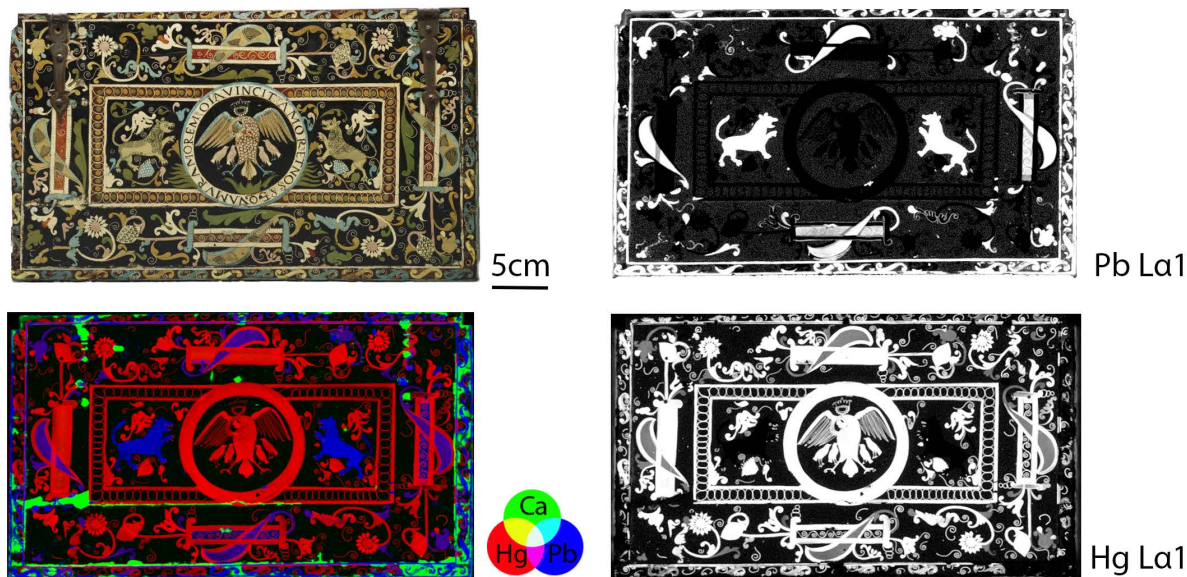


Figure 4. These images confirm the simultaneous presence of lead- and mercury-containing materials. **Top left:** visible image of the back of the cabinet; **top right:** XRF map of the $L\alpha 1$ line of lead, showing where lead pigments are present; **bottom right:** XRF map of the $L\alpha 1$ line of mercury, showing where mercury white is present; **bottom left:** combined elemental map of mercury, lead and calcium—calcium is present only in repaired or retouched areas. Note: the visible image includes the hinges which were not scanned by scanning XRF.

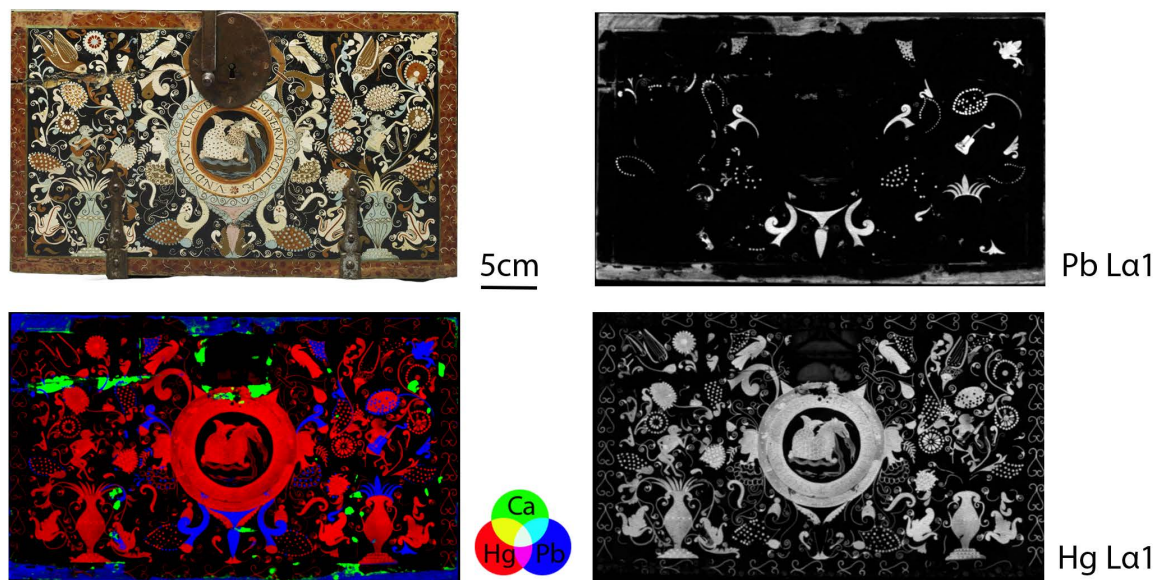


Figure 5. These images confirm the simultaneous presence of lead- and mercury-containing materials. **Top left:** visible image of the outer surface of the fall-front; **top right:** XRF map of the $L\alpha 1$ line of lead, showing where lead pigments are present; **bottom right:** XRF map of the $L\alpha 1$ line of mercury, showing where mercury white is present; **bottom left:** combined elemental map of mercury, lead and calcium—calcium is present only in repaired or retouched areas. Note: the visible image includes the hinges and lock which were not analysed by scanning XRF.

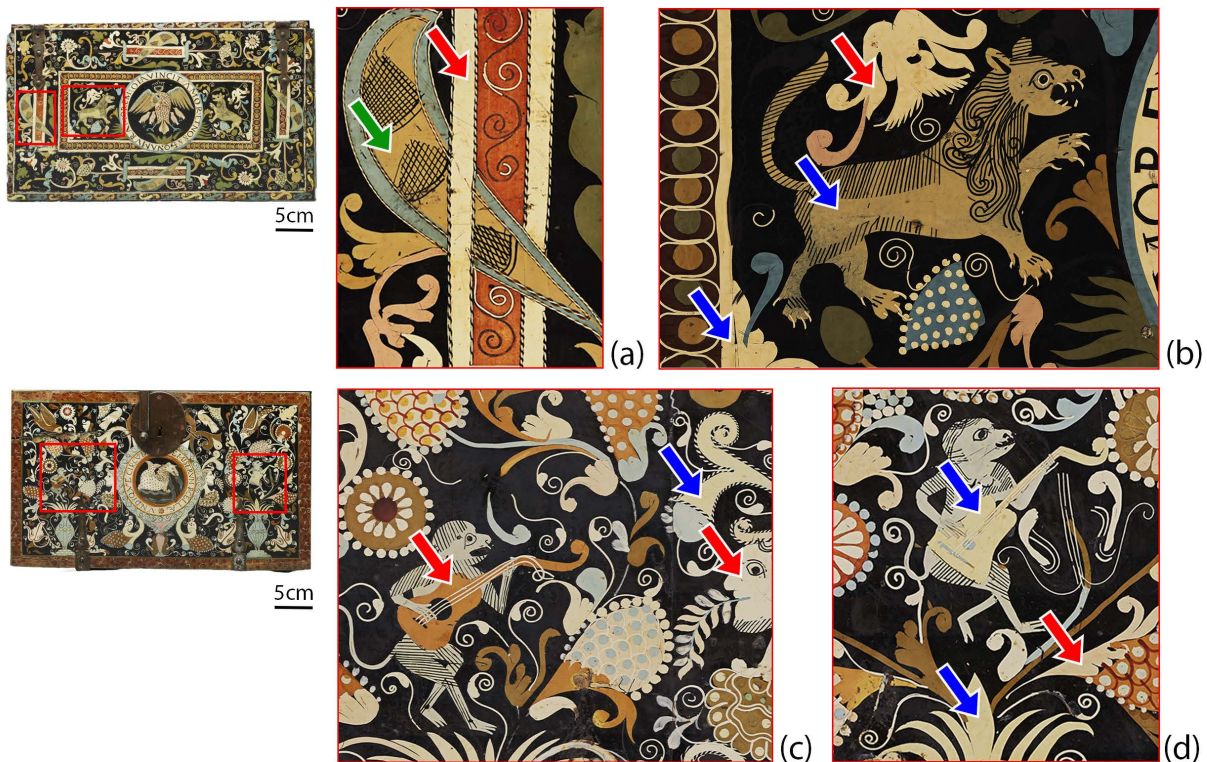


Figure 6. Surfaces from the back (a,b) and from the outer surface of the fall front (c,d): examples of white and off-white areas decorated with mercury white (red arrows) and of beige and brick-red areas decorated with lead-containing materials (blue arrows). The green arrow marks the only area where lead and mercury are present in the same location.

An overview of the colours seen on the cabinet and a selection of high-resolution images and XRF maps are in Supplementary Material S2, including evidence that some of the *mopa mopa* sheets may have been enriched in iron during the manufacturing process.

The new scanning XRF sessions also revealed the extent of the different restoration and intervention campaigns, suggesting a likely timeline for them. The results from the drawers on the left-hand side of Figure 7 show mostly earlier interventions, suggesting the presence of lead white, chrome yellow and ochre. The maps of the inner surface of the lid (right-hand side of Figure 7) show both the earlier interventions (calcium and lead maps indicating filler and lead white, respectively) and the late twentieth-century overpaint (titanium and iron indicating anatase and an iron oxide, respectively). As described by Burgio et al. [18] and Melchar et al. [19], the morphology and size of the particles of anatase and iron oxide (materials that do exist in nature and may be present in historical paint) could be clearly associated with modern industrial production. They were also found within the same pictorial layers as many twentieth-century synthetic pigments, such as phthalocyanine blue, pigment orange 5 and pigment yellow 83, clearly demonstrating they are part of a very recent intervention.

Once the fully late twentieth-century dating of the overpaint on the lid was clear, it was possible to consider removing it entirely. Such a drastic intervention is rare with museum objects where modifications are not unusual, may well have been added to conceal extensive damage and constitute an important part of the object's history. In this case, the overpainted pastiche could be dated very late in the cabinet's timeline, to a period when the cabinet was probably in England and perhaps in the hands of a dealer. Unusually, it was evident that an earlier, probably original, scheme, survived underneath. While the underlying design appeared to be essentially complete, it was probable that XRF scanning (which cannot detect organic pigments) would not reveal all of it, meaning that this large, central element of the cabinet's full iconographic scheme could be understood only by the actual removal of the overpaint. As the overpaint scheme could be fully documented before its removal, it was,

therefore, decided that the extraordinary opportunity to reveal the full extent of the original, highly complex, *barniz de Pasto* scheme justified the removal of the post-1958 pastiche. The original scheme is characterised by vibrant colours (Figure 8), including purples, mauves and pinks, which have faded everywhere else on the cabinet, except on the inner surface of the fall front (which however has lost some of the pigmentation's brilliance). Our suspicions that text (hitherto invisible) might be present were borne out: the central portion of the design consists of a rebus, with yellow lettering which was not picked up by the XRF analysis and is, therefore, likely to be made solely of organic materials.

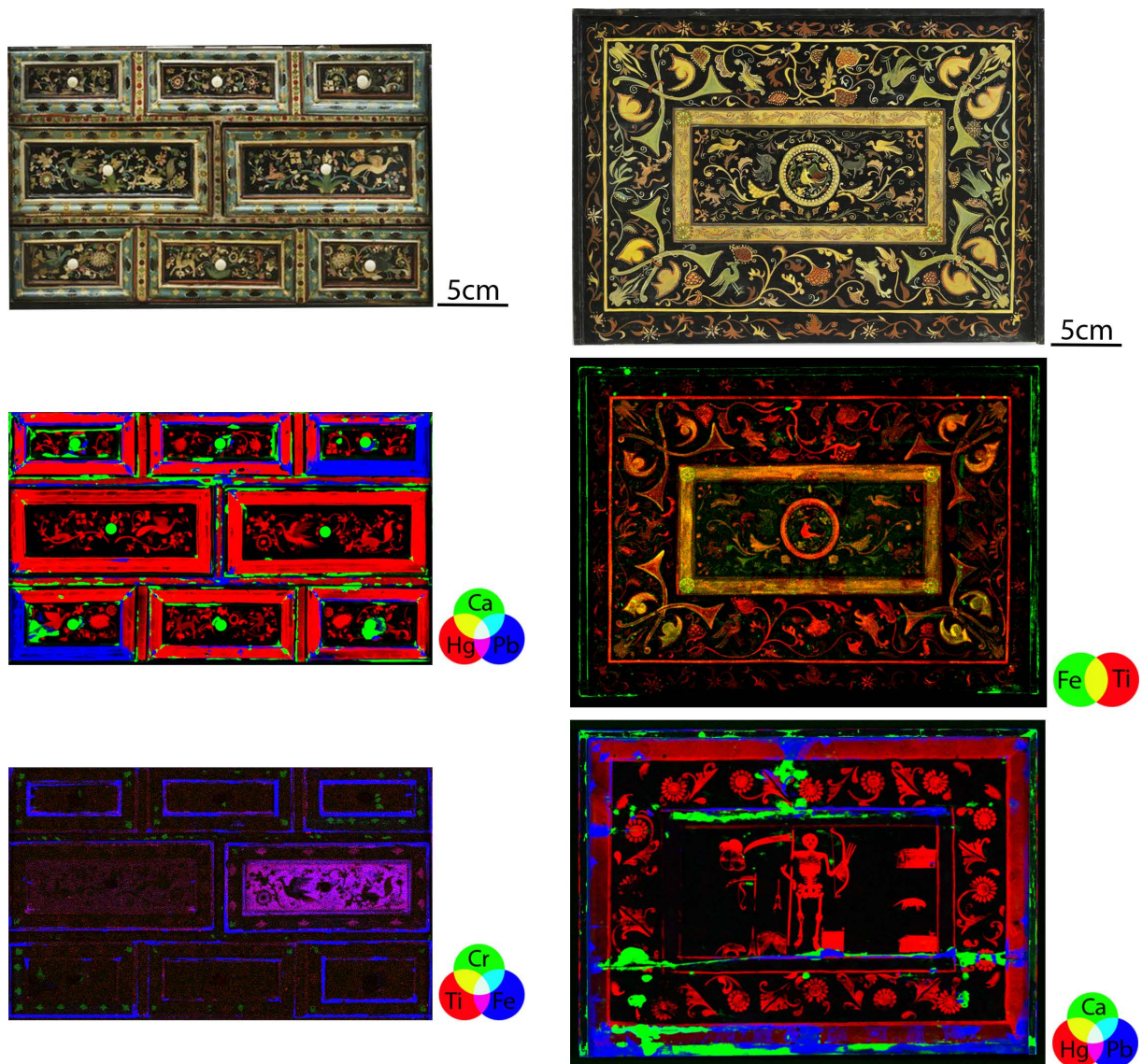


Figure 7. Drawers (left) and the inner surface of the lid (right): in the drawers, the elemental maps of lead, mercury, calcium, chromium, titanium and iron outline early repairs and restoration; on the inner surface of the lid, titanium and iron outline the late 20th century overpaint, while calcium and lead are ascribed to earlier interventions.



Figure 8. The newly uncovered original scheme on the inner surface of the lid. The image shows an intermediate conservation stage where an excess of calcium-containing filler, affecting the legibility of the original *mopa mopa* decoration, is still visible.

3.2. Casket (W.7-2018)

This small dome-lidded casket (Figure 1c) has a smooth outer surface of layered *mopa mopa*; the interior is completely covered with a transparent reddish-coloured *mopa mopa*. It was subjected to limited scientific investigations to avoid sampling from what is now an unbroken surface; prior to acquisition, the casket had an extensive treatment (not using *mopa mopa*) to fill areas of loss and damage. Initial tests by FTIR microscopy were carried out before its accession into the V&A collection and were aimed at confirming the presence of *mopa mopa*. During preliminary scientific analysis, complementing the curatorial and conservation assessments which suggested that the object was decorated with the *barniz brillante* technique, we confirmed that silver leaf was extensively present on the casket, and ascertained that mercury white was also present, confined to the thin outlines of some of the figures. This was later visualised fully using scanning XRF (Figure 9), which also revealed the extent of the restoration that the casket had undergone before entering the V&A.

The appearance of the casket is particularly dark, most notably on the lid. The darkness, due to the tarnishing of the silver below the topmost layer of *mopa mopa*, obscures much of the ornate surface decoration. Whether the final *mopa mopa* layer used on the top was thinner than that in other areas, or it has been worn thin due to handling, is unclear. Close examination of the decoration reveals what appears to be two different uses of silver, one where the leaf is sandwiched between layers of *mopa mopa* and another where silver particles are used in the background to create an Aventurine or *nashji*-style effect [4,6,7]. This has not yet been confirmed analytically but seems likely because of the distinct dark grey appearance of the design motifs (that appear to utilise leaf) on top of a particulate-looking silver background (Figure 10).

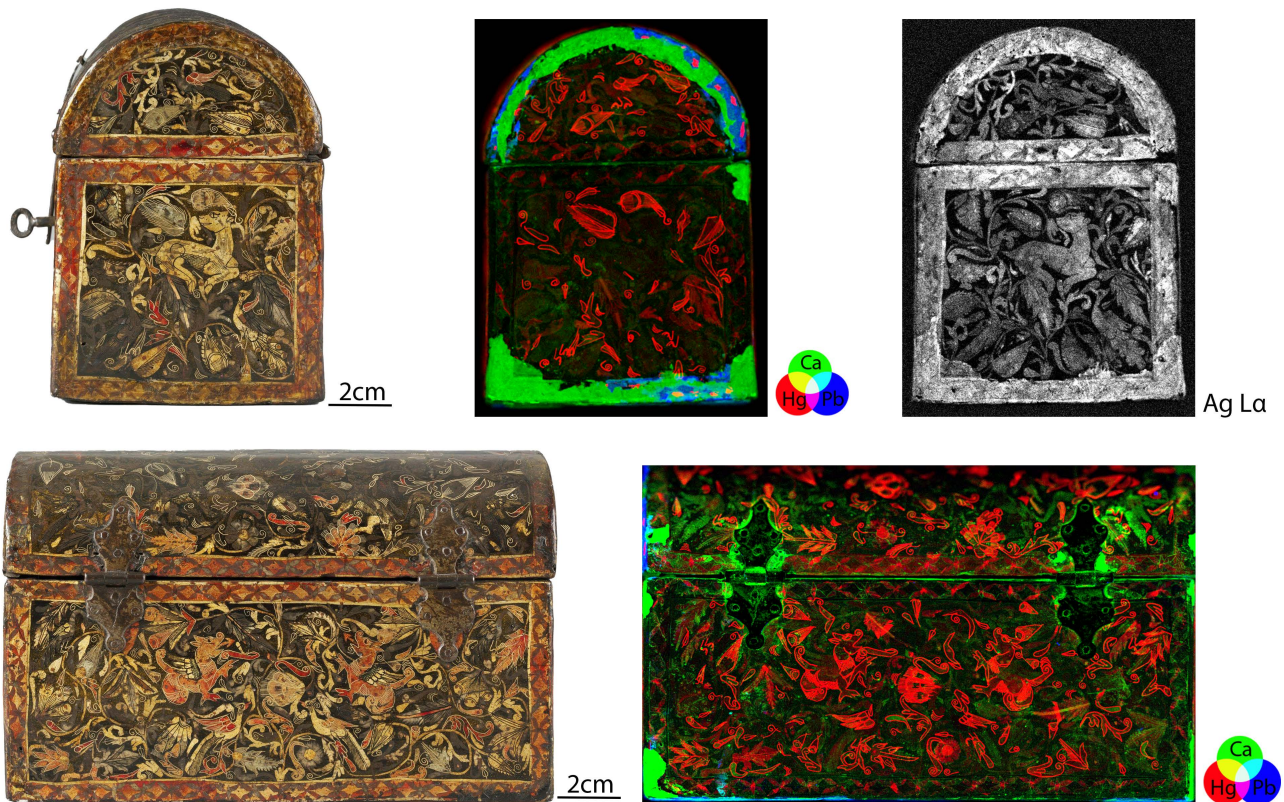


Figure 9. Proper left side (**top**) and back (**bottom**) of the casket: the XRF maps show in red the location of the original mercury white decoration and in white the distribution of silver; calcium and lead are shown in green and blue, respectively, and indicate areas of recent intervention.

3.3. Tray (1262–1855)

The *barniz brillante* tray (Figure 1b), which has slightly raised decoration on the visible wooden substrate, has been subjected to limited scientific investigations to date. A small specimen was removed from a damaged edge to confirm the presence of *mopa mopa* using FTIR microscopy.

Multiple spots were analysed by point-XRF to characterise the various materials, pigments and dyes present. Among the questions we sought to answer at the time was the presence or absence of mercury white, but also of gold and silver leaf (as hinted by the presence of both golden and silvery metallic tones). In 2023, a portion of the centre was also investigated using scanning XRF (Figure 11). These analyses revealed the following:

- No mercury white was present anywhere on the tray;
- Silver leaf was present in all the areas with a metallic shimmer;
- No gold was detected;
- The coloured materials were mostly organic.

The juxtaposition of gold and silver effects was later noted on another object which came to the V&A to be investigated non-invasively and which has recently been published [24]: a *barniz brillante* casket, which once belonged to Rudyard and Caroline Kipling, and which now forms part of the National Trust (NT) collection at Bateman's, Sussex (National Trust inv. 761758). As with the V&A tray, areas displaying a golden effect were achieved by using tinted *mopa mopa*, not actual gold leaf.



1cm



1cm

Figure 10. Details of the *barniz brillante* decoration of the casket, taken with the polarised light filter to reduce the glare of the metal leaf.

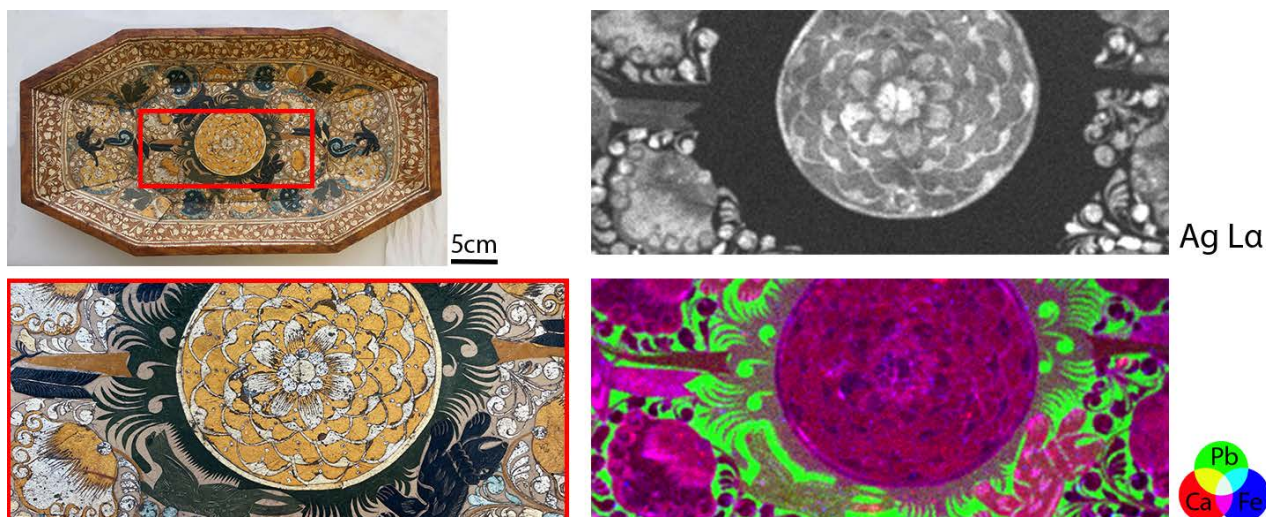


Figure 11. The V&A tray (1262–1855) and XRF maps of the centre of the tray show the distribution of silver, as well as the combination of lead, calcium, and iron.

The tray has other similarities with the NT casket. These include a slightly raised surface decoration; a blistering effect observable on some of the *mopa mopa*, which raised the question of whether any lead soaps may be present [25–29] (further investigation was beyond the scope of the current research); incision lines visible on the *mopa mopa* surface corresponding to the decorative motifs being cut in situ; incision lines visible on the wooden substrate.

3.4. Gourds (28–1866, 268–1879, 1577–1902)

The three gourds are decorated with a smooth surfaced, opaque *mopa mopa*. The range of colours and detailing are similar in palette and execution to the cabinet (W.5-2015) (Figure 12).

Other than the minor loss of small decorative elements, two of the gourds (1577–1902 and 268–1879) are in essentially pristine condition, while one gourd (28–1866) has a small but significant loss at the bottom. As described in the article by Melchar et al. [19] and the references therein, the damaged gourd was sampled, with one portion of the sample mounted as a cross-section, and the other analysed by chromatography. At the same time, selected spots on the gourds were also analysed by point-XRF to confirm the presence of mercury white. Much later, when scanning XRF became available at the V&A, the gourds were also fully mapped (Figure 12). These were the main findings from the investigation:

- Mercury white is present, both in the outlines of some of the decorative elements and as the main pigment in others;
- Lead-containing pigments are visible in some of the beige areas;
- The background which appears black is actually pigmented with indigo (a blue pigment).

At the time of the first investigations, the gourds underwent micro-computed tomography, which showed how they had been constructed and decorated [19]. This analysis also revealed the presence of air bubbles and fine cracks in the foundation layer of *mopa mopa* on one of the gourds (28–1866). The resulting imperfect adhesion of the decorative layers to the substrate may explain why this is the only gourd to have suffered the loss of some of the *barniz de Pasto* layers.

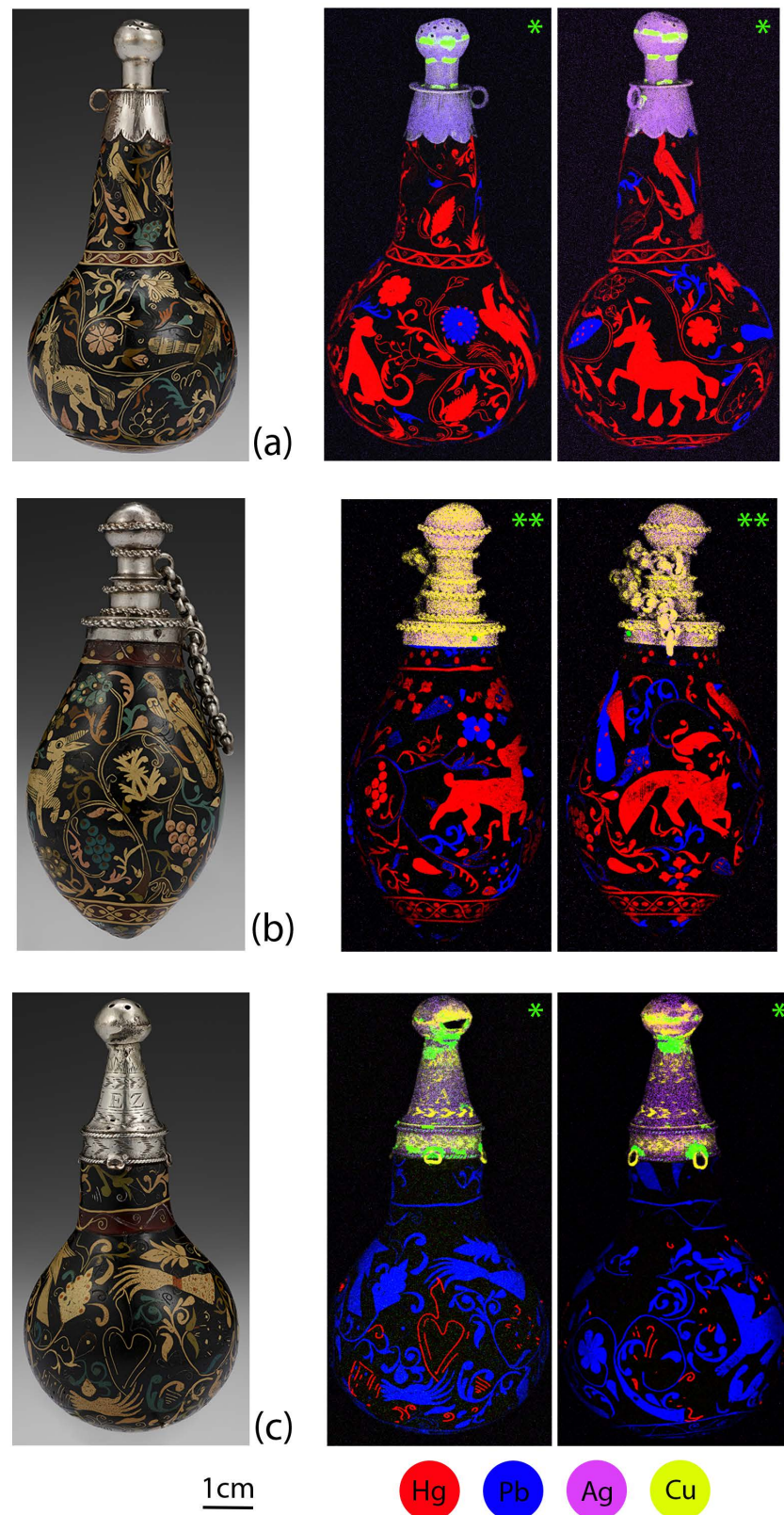


Figure 12. The three V&A gourds (from top to bottom: 28–1866 (a), 268–1879 (b) and 1577–1902 (c)), with XRF maps showing the distribution of mercury (Hg), lead (Pb), silver (Ag) and copper (Cu). The bright green colour represents zinc in maps with a single asterisk (*) and iron in maps with a double asterisk (**).

Although the three gourds are similar in many ways, including band-like designs at the transition between the body and neck, the lengths of the necks and attachment of the silver hardware differ, suggesting that one, possibly two of the gourds may have been altered in the past. While one gourd (28–1866) has a long neck, the neck of 1577–1902 has been cut down, interrupting decorative motifs. The third, more ovoid gourd (268–1879) has no neck above the decorative band, possibly as a result of its natural shape. The CT scan showed that this gourd has an internal wooden ring to help support the metal hardware, perhaps an indication that the mount needed additional support if the neck, once shortened, provided less substrate to secure the silver mount.

4. New Conservation Activities

The *mopa mopa* objects in the V&A's collection have been well looked-after and are in good, stable condition. Interventive conservation was necessary for only two of the objects, due to the presence of minor surface accretions or the need to remove degraded or visually obtrusive non-original coatings. The materials and techniques considered for the removal of the coatings were influenced by work done primarily within the painting conservation discipline [19,30,31], but were adapted to the specific needs of Indigenous American surfaces.

4.1. Cabinet (W.5-2015)

Treatments on the cabinet have occurred in several stages, all underpinned by the scientific analysis described here and in previous publications. The initial treatment included the removal of a non-original recent varnish and partial cleaning of the metal mounts [19]. The current conservation treatment, in preparation for the display of the cabinet at V&A East Museum, includes the following:

- Removal of the acrylic overpaint on the lid underside;
- Filling and toning areas of loss;
- Removal of the non-original sled feet and replacing them with a non-invasive mount that incorporates a more appropriate style of turned feet;
- Removal of corrosion and discolouration on metal hardware.

The second treatment stage was the most dramatic as it focussed largely on the removal of acrylic paint on the lid underside to uncover the skeleton design that had become evident during X-radiography and XRF scanning analysis. A Carbopol xylene gel was used to gently remove the acrylic overpaint. Once the original *mopa mopa* surface was revealed, it became apparent that the lid underside was the most damaged surface on the cabinet, having suffered areas of loss and scratches across its surface. The scratches, in multiple directions, suggest that the surface has been systematically scraped and was flattened in the past, perhaps when repairing the lid split that needed an internal spline support. The rebus design, visible once the paint was removed, is more challenging to interpret as a result of the surface scraping. Usually, when looking at areas where *mopa mopa* decoration has been lost, depressions in the shapes of the missing design are visible. In this case, close examination has not helped interpret the lost decoration because of the extent of the mechanical damage (Figure 13).

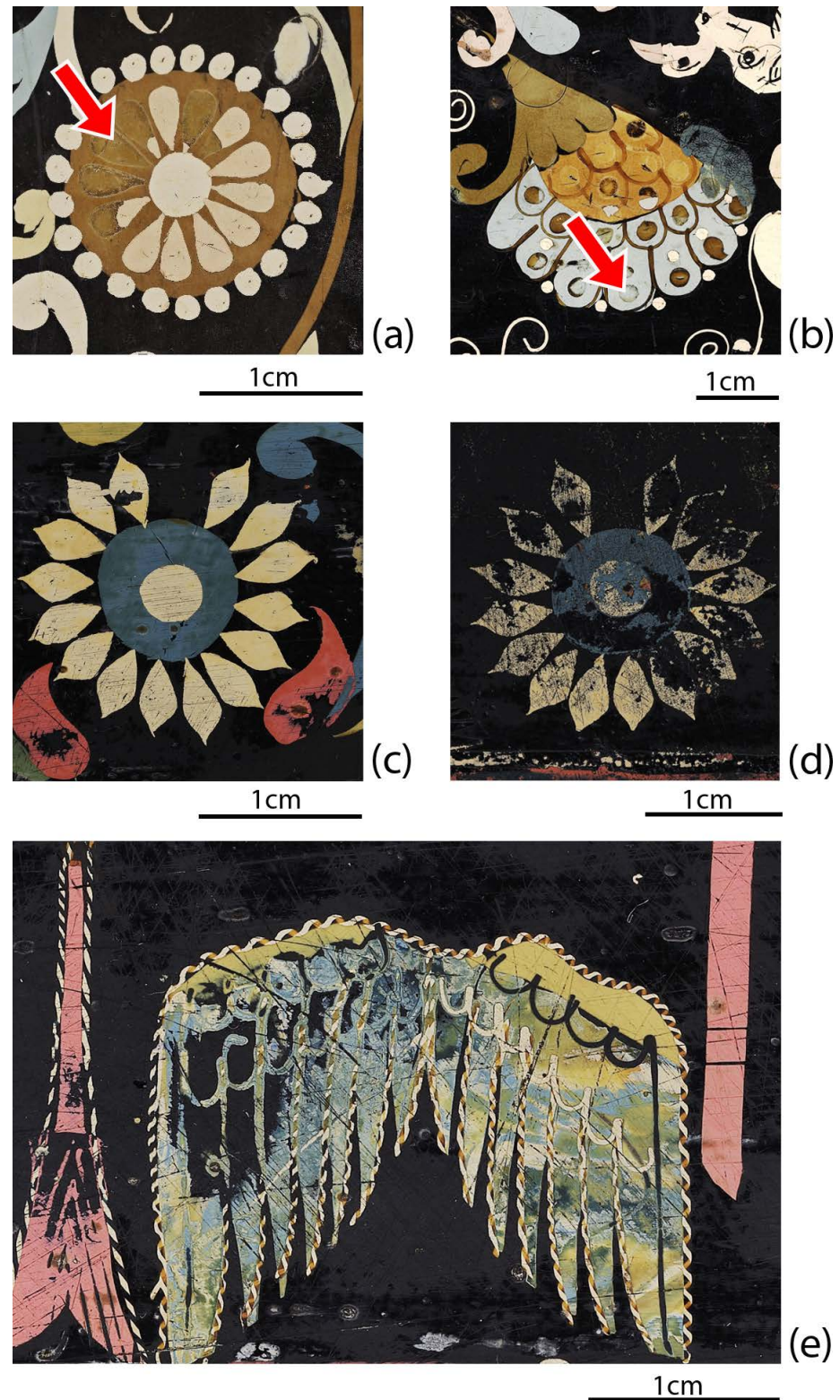


Figure 13. Details of the inside surface of the hinged fall-front (a) and the outside surface of the lid (b) showing areas where the missing decoration is highlighted by the area of depression (red arrows); details from the inside surface of the lid (c–e) showing that the depression is not visible in the areas of missing decoration because the surface has been levelled by scraping.

Despite this damage, the surface retains an amazing colour palette including lavender, yellow and bright pink hues. Additionally, glue and gesso that had been applied over original *mopa mopa* were removed, this time using laponite, a synthetic clay-based aqueous gel [32].

A multi-layered treatment is being carried out in 2024 to achieve a cohesive overall appearance that emphasises the original craftsmanship and design.

4.2. Tray (1262–1855)

The tray, carved from a single piece of as-yet unidentified wood, has a coating of *mopa mopa* on all surfaces. The faceted back and edges are coated with a transparent *mopa mopa* while the inside of the dish has additional, slightly raised decoration combining both opaque and *barniz brillante* techniques. Unlike the other objects in this group, fingerprint depressions are visible in many areas. There are also two types of knife marks on the tray, one type in the *mopa mopa* corresponding to the surface designs, suggesting designs may have been cut in situ, and another type on the wooden substrate, some apparently random in nature and others that appear as scribe marks, seemingly marking the edges and angles needed by the craftsman in the layout and making of the tray. The underside also has several lobbed, cloud-like, incised designs under the *mopa mopa*.

Prior to treatment, ingrained surface dirt was visible, especially where the inside bottom meets the sides. In all areas there are small losses, lifting areas of *mopa mopa* and dark grey discoloration, likely due to tarnishing of the silver leaf. Close examination of the surface also reveals a pattern of blister-like bubbles in areas of lead-containing pigments (Figure 14), which may be due to the presence of metal soaps. Minor damage consistent with furniture beetle (*Anobium punctatum*), including small holes and distortion along the grain, under the surface coating, is visible in some areas.



Figure 14. Detail of the tray showing vibrant red colour revealed during cleaning (red arrow), blistering on dark green *mopa mopa* (green arrow), and combination of matte and *brillante* techniques.

During aqueous cleaning of the surface, bright red areas were revealed by the removal of the thick surface dirt where the bottom meets the sides. The original colour scheme may have been much more vibrant than it now appears; it currently includes opaque dark green, opaque dark blue, opaque dark yellow, metallic light yellow, metallic dark yellow, metallic orange-yellow, metallic white, metallic light blue and metallic dark blue.

5. Discussion

The investigation of the six *mopa mopa* objects discussed in this paper has revealed many unexpected points of contact among the items. Based on the materials used on them, the objects can be divided into two sub-groups of two and four, respectively: the casket and the tray (and possibly the recently rediscovered lobed dish V&A: 238–1876) exemplify two different styles of *barniz brillante*, while the cabinet and the three gourds employ opaque *barniz de Pasto*. Each has at least one analogous item in another collection, and work continues comparing observations and findings with other institutions.

All objects save one (the tray) contain mercury white (mercury(I) chloride) in the decorative layers. At first, this was surprising, because this material (historically also known as calomel) was not recognised as a traditional artists' pigment, although there is an obscure reference to a mercury-containing white material that may have been used by women painters in Tudor England [33]. The first official identification of mercury(I) chloride used as a conventional pigment was made at the V&A [4] (p. 78) and [18]; its occurrence has since been recorded on other types of European works of art, if only rarely [34,35]. To find it in five out of six objects, independently accessioned by the V&A over the course of over 150 years, is highly significant because it suggests that by the seventeenth century, the material was routinely employed by *barnizadores*, and was the go-to white pigment used not only in white areas but also in coloured ones, where it was usually mixed with organic dyes. According to the evidence gathered so far, the *mopa mopa* resin pigmented with mercury white is used in two slightly different ways: it is either applied as a thin outline enclosing areas pigmented with other materials (as in the casket W.7-2018 and the gourd 1577–1902), or it is used as a filler pigment in its own right. Occasionally the two uses coexist, for example on the cabinet W.5-2015 and the gourds 268–1879 and 28–1866.

Both *barniz brillante* objects analysed so far contain silver as the metallic source of the shimmering effect and present mostly translucent, organic dyes.

One of the trends that emerged only when we compared the analyses from all the V&A objects is that lead-containing pigments had been used more frequently than originally realised. Early considerations revealed that lead is usually present in beige-coloured or off-white areas (except for a few brick-red decorative elements on the cabinet). The occurrence of lead-containing pigments in *mopa mopa* objects worldwide is not yet extensively mapped out. Even within the V&A collections, it has only recently become apparent, thanks to the extensive use of scanning XRF, that a lead-containing decoration was present on just two of the surfaces of cabinet W.5-2015, where its use had originally been excluded.

While we can say that a lead-containing material was used on the beige-coloured elements seen on the three gourds, and on some of the beige-coloured and brick-red elements on the cabinet, no lead was detected on the original decoration of one of the two *barniz brillante* objects (the casket W.7-2018). The presence of lead on the tray (V&A: 1262–1855) is comparable with what we found on the Bateman's casket from the National Trust collection, where most of the surfaces' background contains lead (probably in the form of lead white) [24]. This however is not overly surprising, as the decorative style of the V&A *brillante* casket is very different from that of the V&A tray and the National Trust casket. When the newly rediscovered lobed dish (V&A: 238–1876) becomes accessible, we plan to confirm whether lead-containing pigments are present. The appearance of this object, very similar in design and style to the V&A tray and the National Trust casket, strongly suggests that lead was used in the decoration.

The evidence gathered from the examination of the V&A objects strongly confirms that *mopa mopa* in itself is a very sturdy and resilient material. However, the organic colourants mixed with it can be highly susceptible to light-induced fading. For example, the V&A tray shows that hidden areas still show traces of a vibrant red colourant that has disappeared elsewhere. This light sensitivity was also indirectly confirmed by the comparison of the external surfaces of the cabinet and the gourds with the inner surfaces of the cabinet. The latter show an array of vibrant colours that have become very much subdued or have faded altogether elsewhere. There are no bright pink, yellow and mauve colours except on the

newly revealed inner lid, and the same hues are still present, less vibrantly on the inner surface of the fall front. Moreover, a close examination of the outer surfaces of the cabinet shows a faintly mottled appearance. This matches the craquelure of the later varnish which was removed during the conservation of the object: where the later varnish was thinner, the colour of the *mopa mopa* decoration is now more faded. The evidence strongly suggests that many of the colourants used with *mopa mopa* objects are highly light sensitive, meaning that *barniz de Pasto* should be stored and displayed in suitable conditions.

6. Acquisition of Contemporary Objects/*Mopa Mopa* at the V&A: Future Perspectives

Contemporary design continues to form an important part of the V&A's mission, as it has since the museum's earliest days. *Barniz de Pasto* has been practised continually since it emerged in the sixteenth century and, in 2020, it was included in the UNESCO List of Intangible Cultural Heritage in Need of Urgent Safeguarding (Colombia); it is also now one of the traditional crafts promoted by the organisation Artesanías de Colombia.¹⁴ Despite the small numbers involved in production—according to Artesanías de Colombia about ten harvesters of the *mopa mopa* resin, and thirty-six *barnizadores*—the technique continues to thrive and develop. The work of two leading masters in the technique, Gilberto Granja and Eduardo Muñoz Lora was exhibited in April 2023 during the V&A conference *Lacquer in the Americas*, and both shared their expertise and knowledge through filmed demonstrations.¹⁵ At the time of writing (2024) examples of their work are in the process of being acquired by the museum. Alongside traditional craft product types and decorative formats, varied new approaches led by artists and designers have emerged in recent years.

Tatiana Apráez is a jewellery designer, maker and teacher based in Bogotá, Colombia [36]. Her family background and upbringing in San Juan de Pasto led to an early decision to incorporate *barniz de Pasto* into her own work, and for many years she has worked with *barniz* master Germán Obando to develop ways to apply *mopa mopa* resin to metal, which resulted in her commercial range of *barniz de Pasto* silver jewellery. While *barniz* has not traditionally been used for jewellery, *mopa mopa* resin was used before the Spanish arrival to create beads and nose rings for adornment [4], a tradition to which Apráez responds in a deeply personal way. Although an unconventional application of the technique, the intimate scale and precious character of jewellery worn on the body might be regarded as a very appropriate match for the exceptional rarity of the resource (whose sustainability cannot be taken for granted), the memorably tactile handling of the technique and the delicate intricacy of effect that *barniz de Pasto* can achieve.

In 2023, the V&A acquired a pendant and two brooches from Apráez's Urcunina Series, named after the local name for Galeras, an active volcano near San Juan de Pasto which dominates the geography of the region; her aim with the pieces is to evoke 'the volcano's inner force and its quiet beauty'.¹⁶ Each was lathe-turned in local hardwood by Apráez (some also incorporate 3D printed elements). In a striking departure from the traditional *barniz* aesthetic of floral motifs, an abstract-geometric check or tile pattern covers all the surfaces, accentuating the organic, curvilinear forms. The shimmering effect is reminiscent of *guilloché* as applied to metalwork in Western traditions of jewellery and clock-making, but Apráez also draws inspiration from pre-Hispanic archaeological finds, specifically the spinning discs of Nariño made using copper/gold alloy using the technique of hammered tumbaga with depletion gilding.¹⁷ Like these extraordinary works, Apráez's circular pieces also respond to the play of light when worn on the body and in motion. On the Urcunina Series, the *barniz de Pasto*, which is applied conventionally in cut leaf form, uses *mopa mopa* resin pigmented with non-toxic dyes (as used in handicrafts and food packaging) along with metallic powder, sometimes contrasting with the polished wood ground, in what might be considered a hybrid technique between opaque *barniz* and *barniz brillante*.

Apráez's work will be exhibited alongside historic examples of *barniz de Pasto* in a wide-ranging display 'The Power of Tradition' at V&A East Museum (opening in 2025). As *barniz de Pasto* is such a rich subject, historically, culturally and technically, with recent

research, analysis and treatments proving so fruitful, this opportunity to present the V&A's collection accented by contemporary practice is particularly timely.

7. Conclusions

The research carried out at the V&A over the past eight years on objects made of Indigenous American lacquer in general, and objects decorated with *mopa mopa* in particular, has been an eye-opener on multiple levels. The collaboration between V&A conservators, curators and scientists has shed light on the materiality of a relatively little-known group of objects and has revealed new, surprising details about their composition and manufacture. The dissemination of our work has also been facilitating the rediscovery of *mopa mopa* pieces in other collections. Our own developing knowledge is making it possible to look at our collection with fresh eyes and rediscover previously misidentified items which we now know were made using *mopa mopa*.

Although our technical examination and scientific analysis of Indigenous American lacquer objects has been constrained by our decision to adopt a non-invasive approach wherever possible—meaning that we have not sampled from pristine surfaces, even when sampling could have provided valuable information—heritage science is developing at such a fast rate that we are confident we will be able to address these questions non-invasively very soon.

The discoveries made along the way, such as the identification of mercury white on a large proportion of the V&A *mopa mopa* objects investigated over the past few years, have also informed the work of other institutions and have facilitated the improved understanding of objects in other collections.

The interventive treatments carried out on the cabinet, to remove non-original surface coatings, have demonstrated how resilient the original surfaces are to a range of solvents and water-based materials. At the same time, our observations have revealed how sensitive some of the colourants may be to light exposure: what we see now, although colourful and vibrant, is muted in comparison to what would have been the original appearance. Hidden defects and lack of full adhesion of the *mopa mopa* to the substrate, discovered during micro-CT scanning experiments, suggest that a less-than-perfect manufacturing process may eventually cause detachment of the decoration. This shows how involving specialists from other institutions, complementing equipment and specialisms available in-house, can enrich our knowledge and produce more well-rounded research outcomes.

What makes our research on *mopa mopa* even more exciting is the realisation that there is still much to be discovered, more connections to be made, and more knowledge to bring to light.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/heritage7090216/s1>, Supplementary Material S1: Spanish translation of this paper; Supplementary Material S2: Additional XRF maps and digital microscopy images.

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Conflicts of Interest: The authors declare no conflict of interest.

Notes

- ¹ The sheen and glitter of *barniz brillante* is not easy to capture by photography, especially when images need to be taken with a polarised or diffused light filter to reduce any interfering glare—see also Figure 7 in Humphrey et al. [12].
- ² The cabinet was donated by Dr Robert MacLeod Coupe and Heather Coupe in memory of their brother, Philip MacLeod Coupe.
- ³ On *barniz de Pasto* see for example, *The Arts in Latin America, 1492–1820* exhibition organized by Joseph J. Rishel with Suzanne Stratton-Pruitt, Philadelphia (2006) pp. 106–109.
- ⁴ The collection record for this object can be viewed online: <https://collections.vam.ac.uk/item/O11275/tray/> (last accessed 1 April 2024).
- ⁵ See Chapter 7, *El esplendor del brillo* (pp. 164–257) in Álvarez-White, M.C., *El barniz de Pasto: secretos y revelaciones*. 2023: Universidad de los Andes [4].
- ⁶ The collection entry can be found online: <https://collections.vam.ac.uk/item/O112126/dish-unknown/> (last accessed 15 April 2024).
- ⁷ The collection entries can be found online: V&A: 28-1866; bought £1 in Leon, <https://collections.vam.ac.uk/item/O378670/flask/> (last accessed 1 April 2024); V&A: 268–1879; bought £3 by J.C. Robinson in Spain, <https://collections.vam.ac.uk/item/O378668/flask/> (last accessed 1 April 2024); V&A: 1577–1902: the silver neck mount engraved SANCHEZ; bought London £4 from Mr F.E. Whelan, <https://collections.vam.ac.uk/item/O373700/flask-and-stopper/> (last accessed 1 April 2024).
- ⁸ HSML inv. no. L2067.
- ⁹ The collection entry can be found online: <https://collections.vam.ac.uk/item/O1438719/casket/> (last accessed 1 April 2024).
- ¹⁰ Caskets from the group in public collections include HSML inv. Nos. L2067 and 32941; LACMA inv. No. M.2008.34; Museo Catedralicio y Diocesano, Pamplona on loan from the parish of San Pedro Apostol, Mondigerria.
- ¹¹ HSML inv. Nos. LS2446 and LS2000.
- ¹² Tabletop HSML inv. No. LS2447; casket with Zebregs & Röell (November 2021 catalogue, no. 13); the large casket sold c2014 by Amir Mohtashemi, London.
- ¹³ Microscopic wood identification was carried out by Peter Gasson, Royal Botanic Gardens, Kew.
- ¹⁴ ‘Traditional knowledge and techniques associated with Pasto Varnish mopa-mopa of Putumayo and Nariño’ <https://ich.unesco.org/en/USL/traditional-knowledge-and-techniques-associated-with-pasto-varnish-mopa-mopa-of-putumayo-and-nario-01599> (accessed on 16 April 2024).
- ¹⁵ See the conference webpage <https://www.vam.ac.uk/event/9Zml1R5NvMK/lacquer-in-the-americas-april-2023> (last accessed 16 April 2024) and the bilingual conference recordings that can be reached through the blog post <https://www.vam.ac.uk/blog/museum-life/lacquer-in-the-americas> (last accessed 16 April 2024).
- ¹⁶ Tatiana Apráez, personal communication with Nick Humphrey, 2023.
- ¹⁷ Museo del Oro, Bogotá; accession number: O21220. Published online by Google Arts and Culture, at <https://artsandculture.google.com/asset/rotating-disk-nari%C3%B1o-plateau-late-period/YgGVXTCRbnmF1A?hl=en> (last accessed 14 April 2024).

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