Harriet Lewars & Jonida Mecani

Conserving a pietre dure table

Abstract

This joint paper will present the ongoing conservation of an eighteenth century Italian pietre dure table. The table top and base are being treated separately by the two authors. The object, privately owned, is one of two matching rectangular pier tables which had deteriorated after thirty years of being kept in a household conservatory. Unfortunately the unstable environment had actuated some difficult conservation problems; for the base this included structural splits, instability and surface losses, whilst for the table top, a total cohesive failure between individual decorative stones and ground layers, further complicated by extensive losses, fracturing and previous restorations. We will share our research into the object's provenance, with reference to the analysis of the materials and the manufacturing techniques employed. We also hope to have reached a conclusion as to whether the pair of table tops previously existed as a single square that was cut in half for an owner's convenience – the theory rests on their equal dimensions and symmetrical design. With this in mind we will describe our conservation strategies and experiments comprising consolidation, loss replacement, re-carving, retouching and coating.

Keywords

pietra dure, Italian furniture, structure, losses, marble, stone, jesmonite, Paraloid B67, gesso, Lascaux 360

Fig. 1. The tabletop before treatment.

Introduction

This paper describes the conservation of a pietre dure tabletop and its gilt-wood base, which were separate undergraduate projects completed at City & Guilds of London Art School by Harriet Lewars and Jonida Mecani. The text covers the condition of each object before treatment and the conservation work carried out. Information regarding the tabletop was produced by Harriet, and that about the base by Jonida.

The table belongs to an estate owner and had been on display in a domestic conservatory for three decades. Previous impact damage, failing repairs and the fluctuating conditions in this environment had caused extensive damage to both elements and made the table unuseable.

1. The Tabletop

The tabletop comprised a variety of individual stone veneers glued on top of a rectangular sandstone slab with tree resin. The veneers formed a design depicting two vases pouring water, bordered with geometric patterns (fig. 1).

An 18th century, southern Italian origin was proposed, based on the style and features it had in common with examples of known origin such as mother of pearl inlay and the use of composite materials in detailed areas. One of a pair (the partner table was scheduled for treatment at later date), the symmetry of design between the two suggested that the tops may previously have existed as a single square that was later halved to produce two smaller rectangular tables (fig. 2).

Fig. 2. The tabletops together in storage.

2. Conservation problems

The table had clearly suffered serious impact damage but also displayed evidence of at least two previous restoration campaigns, for which no treatment records existed. About a third of the sandstone base slab (proper right hand side) had broken off, undoubtedly with the veneers above it, but had been later re-adhered and reinforced with a patch of stone that was screwed in from below (fig. 3).

Fig. 3. The patch repair on the underside of the table.

The Portoro Marble edge mouldings that once bordered the perimeter of the table had broken into several pieces. Some lengths remained loosely fixed to the table, others were delivered in a box of broken sections and shattered veneers, but a significant portion was missing altogether (fig. 4).

Fig. 4. Broken legths of the Portoro Marble edge mouldings.

The losses to the mouldings provided a cross-section view of the tabletop which included the materials between the veneers and the base slab. The veneers varied in thickness, a construction method that was not uncommon for pietre dure surfaces; the depth of each veneer could be determined by the value and availability of different stone types (for example, it would reduce production costs if lapis lazuli veneers could be thinner than those of locally sourced white marble). To maintain a consistent height, thin veneers were backed with sheets of slate cut to the same shape; this would have provided support for fragile stones and also allowed for final adjustments; it is much easier to grind down slate to the correct height than hard stones [1] Elsewhere, roughly cut or shattered slate fragments were pushed in to further correct the height (fig. 5).

Probably due to the conditions of the conservatory, the natural tree resin gluing the veneers, slate layers and sandstone together had shrunken into hard crystallised crumbs and lost its adhesive properties. Colophony mixed with wax was a traditional glue for pietre dure veneers [1],[2]. In this case, FTIR analysis confirmed the presence of natural tree resin, but not which type, although there were three different colours (orange, black and yellow), all exhibiting the same deterioration problems. A wax component was identified in samples taken of the yellow resin only. As a result of this deterioration, there was a lack of support underneath many of the veneers and the majority of them were only loosely attached (fig. 6).

1. Greenaway, T. 2019. Email correspondence

2. Chastang, Y. 2012. The conservation of two pietre dure and giltbronze-mounted cabinets made by Domenico Cucci for Louis XIV. Studies in Conservation. 57 (1), S.pp.73-S79

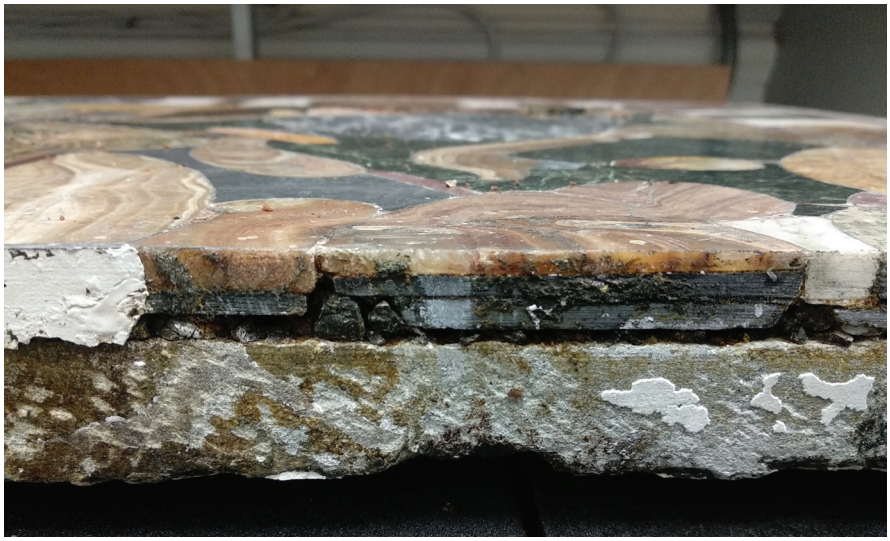

Fig. 5. Layer structure of the tabletop showing layers of slate between the veneers and the sandstone slab.

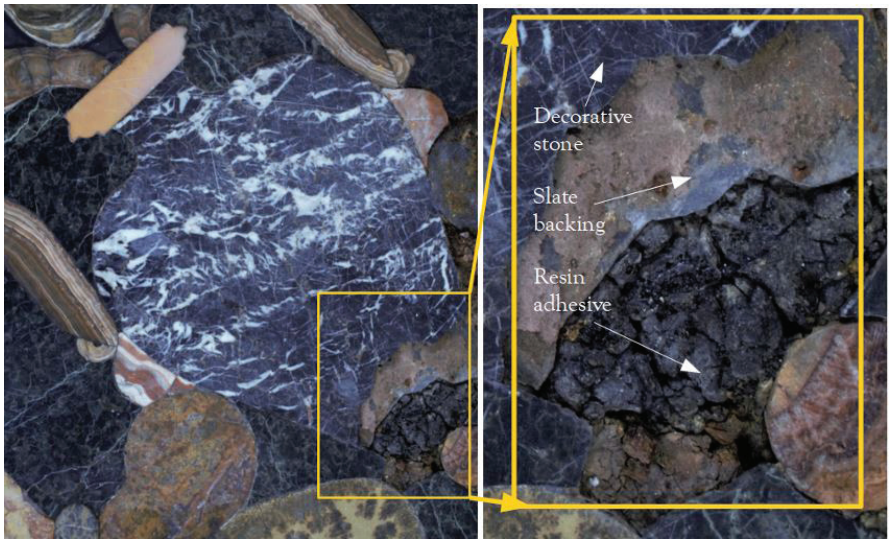

Fig. 6. Deteriorated natural resin below the veneers

Fig. 7. Plaster repairs under the veneers at the proper right hand side.

During treatment (see section 4.1), it was discovered that the surface veneers on the proper right hand side above the sandstone repair been re-set by an earlier restorer with Plaster of Paris. The repair to the sandstone slab was stable, but the plaster used to reset the veneers was detaching from the substrate (fig. 7).

A mixture of original and non-original stone replacement materials were present on the surface. A red composite material containing red iron oxide and tree resin (analysed using polarised light microscopy (PLM) and Fourier Transform Infrared Spectroscopy (FTIR)), was thought to be original (fig. 8). Less successful fillers, such as rough lumps of stone or plaster, were thought to be more recent repairs (fig. 9).

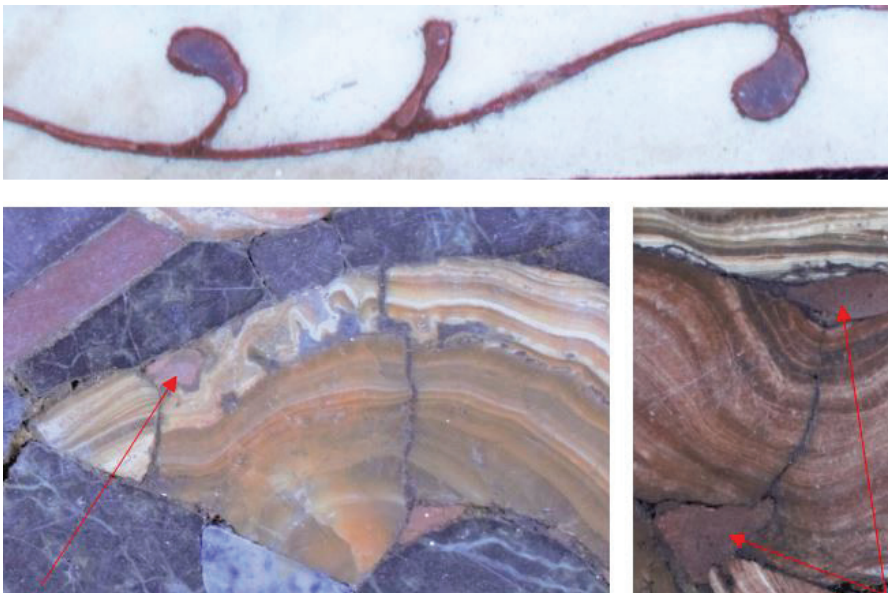

Fig. 8. Red fill material composed of iron oxide particles and tree resin.

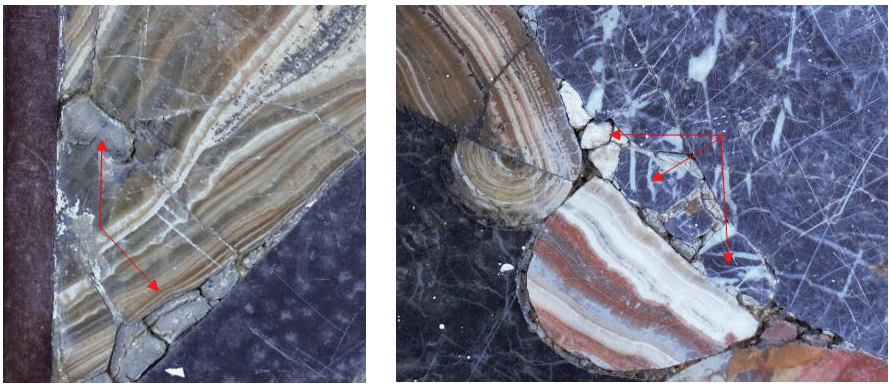

Fig. 9. Small unpolished stones and plaster used to fill losses

3. Treatment aims

The client's brief included the following points:

- Address the deteriorated glues and adhesives and secure loose and lifting veneers
- Re-set detached veneers.
- Re-apply mouldings and replace missing sections with stone or an alternative material.
- Clean the surface and polish out serious scratches where appropriate.
- Research, select and apply a wax coating, for which there is a precedent on the partner table.

The table would be returned to a private house as a display table after conservation, so the treatment was designed to impart long-term stability and an appearance suited to the surroundings of a well furnished home.

4. Treatment

4.1 Disassembly

The condition of each decorative veneer was recorded carefully on annotated maps. Then, the attached moulding fragments and many of the veneers from the table were removed in order to access the ground layers for consolidation (fig. 10).

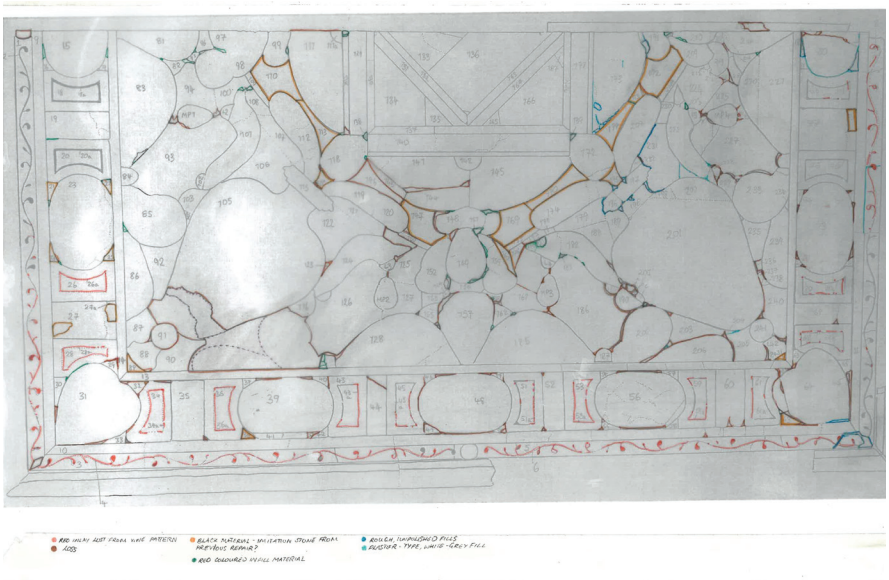

Fig. 10. Maps detailed losses, repairs, and areas in need of consolidation.

The moulding fragments were removed mechanically. It seemed that they were originally dowelled into place (a few dowels remained but all had caused significant wear and fracturing to the sandstone, so those still in place were loose), but that two different materials had subsequently been employed to re-adhere broken lengths; Plaster of Paris and silicone rubber were identified using FTIR analysis. This suggested two different restorations had been attempted in the same area (fig. 11).

Fig. 11. Removing misaligned mouldings

The veneers were removed by picking out the old resin crystals underneath them, so they came away either whole or in pieces along old fracture lines. Fractured veneers were faced with Primal WS24 and Japanese tissue before removal and were subsequently cleared of resin with acetone on cotton swabs. Lumps of Plaster of Paris were stuck to the veneers near the repaired area; this was softened with an aqueous Laponite gel before being loosened with a scalpel. (fig. 12, a portion of the white marble border before and after cleaning). ,Broken veneers were repaired using Primal WS24, upside down on a sheet of glass to keep the surfaces flat, and backed with Japanese tissue paper for additional support. These pieces were stored on a scale drawing of the tabletop during the treatment of the lower layers (fig. 13).

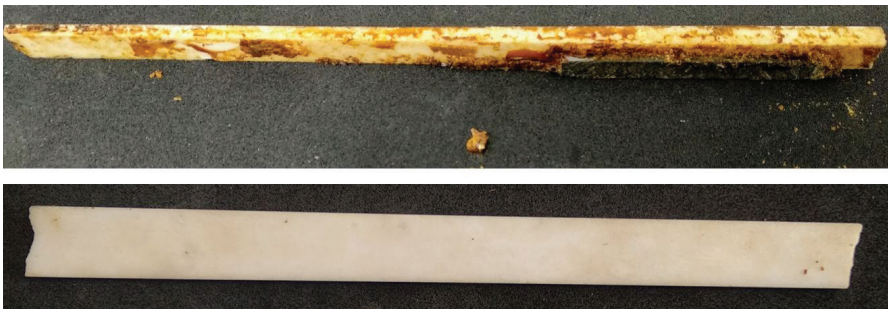

Fig. 12. A portion of the white marble border before and after cleaning.

Fig. 13. Repairing veneers upside down on sheets of glass.

The ground layers resembled assorted rubble; broken sheets of slate, earthenware fragments with various glazes, broken ceramics, chunks of terracotta and small pieces of lead. These 'packing out' may have been original because they were set in resin rather than plaster or silicone. A lower quality of craftsmanship has been associated both with 18th century work made for export[3] and poorer workshops in southern Italy, so these discoveries helped to support the tabletop's claim to these origins (fig. 14A and 14b).

3. Guisti, A.M., 1991. Pietre Dure: Hardstone in Furniture and Decorations. London. Philip Wilson Publishers.

4.2 Consolidation

Unsuccessful attempts were made to regenerate the natural resin, using heat, solvents and solvent/consolidant mixtures. Samples of the resin were extracted and exposed to acetone, IMS and Xylene, with and without Paraloid B72 at 20% concentration. Acrylic based consolidants including Primal WS24, Primal Rhoplex B60A, Lascaux 4176 and Plextol B500 were also trialled but curiously caused the resin to leach colour and significantly retarded their drying times. It was subsequently agreed with the client that preserving the original adhesive was less important than establishing structural stability by using a replacement material.

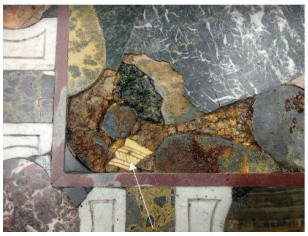

Fig. 14a and 14b, rubble below the surface.

Approximately one third of the surface veneers and the ground layers below them were removed from the outer edges of the tabletop. The client found the degree of unevenness in the surface of the central area acceptable so no more stones were removed but, thanks to improved access, the ground layers could be consolidated (fig. 15).

Paraloid B67 was selected as a consolidant because it could be dissolved in white spirit, which did not react with the tree resin, whereas alcohols and ketones caused it to dissolve. Over two weeks, solutions were injected at concentrations increasing from 2% to 15% and finally bulked with microballoons, until the individual veneers seemed secure. Near the centre, new ground layers were built up using the bulked B67 and where possible, using the excavated fragments of slate and pottery, out of respect for the original scheme.

4.3 Resetting the central veneers

Resetting the lifted veneers was challenging and involved compromise: the veneers that had not been removed still presented an uneven surface that sloped down towards the proper front right corner of the table and dipped in the centre, whilst individual pieces were not level with one another. The priority was to make each stone as level as possible with those adjacent, in order to protect the fragile edges; a process comparable to filling potholes in an old road, using Paraloid B67 in white spirit, bulked with microballoons below the veneers.

Fig. 15. Showing the portion of stones removed before consolidation was possible.

A dry version of this mixture was built up until the relevant veneer could be placed on top of it and sit at the same height as the adjacent stones. The veneer was then removed and the bulked mixture allowed to cure, then a flowing solution of B67 was used to adhere the veneer in place. The adhesive was slow drying, which allowed for adjustments to be made for up to two days. Because most stones were worn at the edges, there were small gaps between them, which allowed for a useful technique; to keep the stones level, two crossed threads could be adhered to the reverse faces with Primal WS24 and Japanese paper, so the ends of the threads could be tweaked from all sides (fig. 16). It was more complicated to reset veneers that had previously broken into many pieces and this tended to take several hours of minor adjustments, using flat glass slides to push pieces to the correct height.

Fig. 16. Re-setting veneers.

4.4 Resetting the border veneers

In addition, new slate sheets were used to help build up the height around the edges of the table in place of the deteriorated old material to increase stability and make resetting easier (fig. 17).

Fig. 17. New slate added to increase the height of the ground layers.

4.5 Mouldings

Initially the plan was to make casts of the existing mouldings to replace the missing lengths. Several materials including epoxy and polyester resins and Jesmonite AC100 were tested and Jesmonite was selected as the best candidate. Jesmonite is an acrylic composite that is very strong, lightweight, water resistant, non-toxic and easy to colour match. It is prepared by mixing a dry powder and a liquid component which sets after approximately 10-12minutes, and pigments can be added to the mixture. The remaining fragment of the missing length was also cast, and that cast was inserted into the end of the mould so that the replacement section would have a corresponding break surface (fig. 18). However, just as the casts were finished a stone carving student at the university, Daniel Burbidge, offered to produce replacement lengths using real Portoro Marble, which was much preferred by the client, so the missing lengths were made again from stone and gaps were filled with pigmented Jesmonite. Nonetheless, Jesmonite was found to be an extremely useful alternative to stone and would be recommended for similar projects. Both existing and new moulding lengths were adhered to the sandstone using Paraloid B44 (30%) in acetone.

Fig. 18. Jesmonite cast before retouching, fitted to the orginal break surface.

4.6 Filling surface losses

Losses to, and gaps between the veneers (previously filled with deteriorated resin) were filled with pigmented Jesmonite. Jesmonite is not traditionally used as a filler, but by preparing it in very small quantities it was found to be excellent for the purpose. Unlike most fillers, it expands slightly as it sets (by 0.15%, according to the manufacurer), rather than shrinking, which helped to lock the veneers in place. The fills could then be cut with tools, sanded, polished and reshaped or removed using acetone, without staining the stones (fig. 19). Minor retouching was subsequently carried out using Gamblin conservation colours.

Fig. 19. Jesmonite fills

Much of the red fill material in the vine border was missing or crumbling away. Remaining passages were consolidated with sodium carboxy methyl cellulose at 2% in deionised water, which improved cohesion and caused no colour or gloss change. Areas of loss were coated with a barrier layer of Paraloid B67 (at 10% in white spirit) then filled with a bulked paint consisting of Aquazol 500 (2% in deionised water), kaolin powder, fine marble dust, dry pigments (red iron oxide, prussian blue and vine black). The pattern was first over-filled, then cut flat and level with the marble using a small, rounded cabinet scraper and polished with 4000x Micromesh. The result successfully matched the colour, fragmented appearance and condition of the original, whilst improving the legibility of the design (fig. 20).

Fig. 20. Before and after, border fills.

4.7 Polishing

Overall polishing was not attempted because many of the veneers were undercut (a traditional construction method which reduced the hours it would take to fit the veneer jigsaw together perfectly). Polishing, or setting a precedent for it, could have lead to expanding gaps between the veneers. Furthermore, many of the thinnest veneers were extremely fragile. The naturally occurring colours and patterns were still appreciable in most stones so polishing was not necessary, but selective polishing was carried on the vase veneers where the scratches was visually distracting. Using deionised water as a lubricant, the surface was abraded with increasingly fine grades of sandpaper on a sanding block up to 2500 grit, then polished with Micromesh up to 6000 grit.

4.8 Waxing

A wax paste made from a mixture of Renaissance wax (33%), carnauba wax (17%) and white spirit (50%) was applied as a protective coating against liquid spillages, dirt, stains and further scratching, to saturate the colours of the stones and to establish a shine similar to that on the partner table, which had also been waxed. The paste was prepared by melting the waxes in a bain marie, adding the solvent off the heat and allowing to cool. It was applied with a soft bristle brush and buffed the following day with a soft cloth.

Fig. 21. Tabletop after treatment.

5. Table Base

The conservation aims for the giltwood base included understanding the stability of the structure and decorative surface, but also how the decorative schemes related to the construction as a whole (fig. 22).

It was interesting to compare the giltwood base with that of the partner table; they presented the same decorative scheme but were constructed differently. For instance, our table had ornaments carved into the timber while on the partner table the ornaments were carved separately and affixed to the leg (fig. 23).

Fig. 22. The front and back of the giltwood base before treatment.

Fig. 23. Left: the base with ornaments carved into the leg; right: applied ornaments on the partner table.

The upper part of the base was assembled by dovetail joinery, mechanically stabilising the structure, whilst inside corner blocks worked to the same end from the inside, amongst which was an historic repair (fig. 24, 24a, 24b).

Fig. 24. Dovetail joinery in the exterior timber.

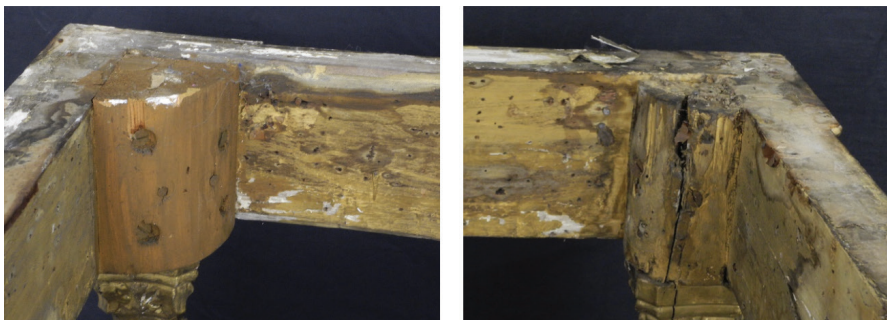

Fig. 24a. Original internal structural support.

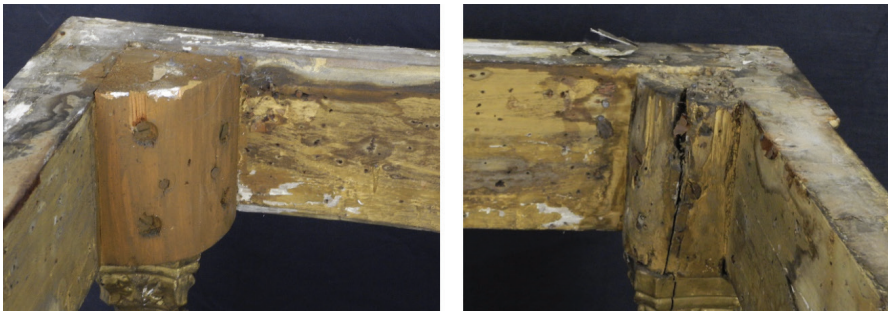

Fig. 24b. Later replacement of the internal structural support.

6. Conservation problems

There were major splits on the back of each leg. It was first thought that these were caused by the weight of the tabletop but later examination showed that legs were made from single pieces of timber and that the cracks were naturally occurring radial splits. The splits did not compromise the table's stability but it was interesting to note that legs were deliberately positioned with the splits at the back to hide the defects. No other signs of stress-related cracking were present (fig. 25).

Fig. 25. An example of splits in the legs at the back of the table.

Again, due to the fluctuating environmental conditions in the conservatory the decoration was badly damaged. There were losses to the carved ornament and some parts were detached. There were also losses to the gilding, which exhibited craquelure and lifting gold flakes and evidence of overpaint in some areas – possibly bronze paint.

7. Analysis

The wood was identified as Poplar Populous Italia, which helped point to an Italian provenance. (fig. 26)

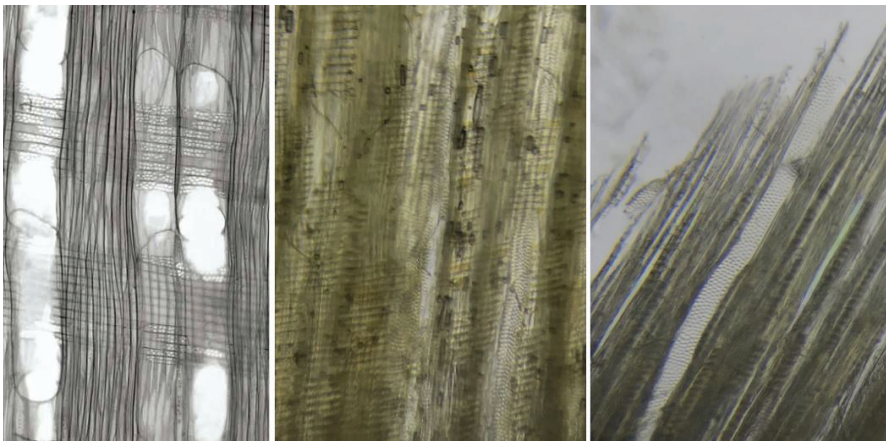

Fig. 26. Thin section samples taken to identify the wood.

Cross section analysis was conducted to ascertain the stratigraphy of the decoration. The samples revealed three different schemes on different components.

Three applications of bole were identified on the legs, the first red, the second a paler red and the third grey. (Fig. 27a, sample from the front leg, 200x magnification. 1 - gesso, 2 - red bole, 3 - gold leaf, 4 - pale red bole, 5 - gold leaf, 6 - grey bole, 7 - gold leaf, fig. 27b).

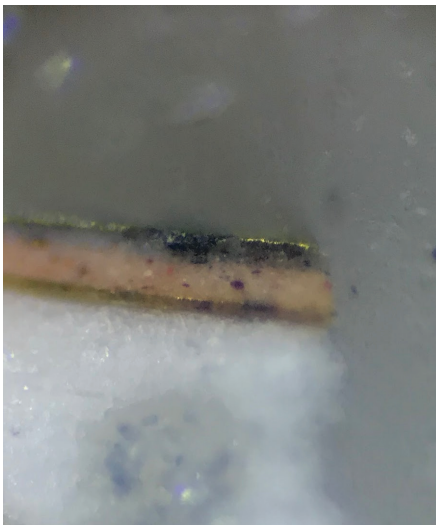

Fig. 27a. Sample from the front leg, 200x magnification. 1-gesso, 2-red bole, 3-gold leaf, 4-pale red bole, 5-gold leaf, 6-grey bole, 7-gold leaf.

Fig. 27b. Sample location on the leg

On the frieze, there were only two applications of bole (first pale red, then grey) and on the applied ornament only a single layer of red bole was visible. The colour of the red bole further supported a possible Italian provenance. (fig. 28a, sample from the frieze, 200x magnification - layers from ground to surface - 1- gesso, 2, pale red bole, 3, gold leaf, 4, grey bole, 5, gold leaf, fig. 28b).

Fig. 28a. Sample from the frieze, 200x magnification-layers from the ground to surface. 1-gesso, 2- pale red bole, 3-gold leaf, 4-grey bole, 5-gold leaf.

Fig. 28b. Sample location on the frieze.

FTIR analysis showed that the materials used in the ground layers of the legs included Plaster of Paris (calcium sulfate), which differed from the upper part of the table where calcium carbonate was identified in the ground layers. This suggested that the legs were attached later and possibly that the table's components were assembled from other pieces of furniture to accommodate the pietre dure tabletop. Plaster of Paris was widely used in gilding preparation layers in Italy, whereas in England, whiting (chalk) was more commonly used. These findings suggested that the legs were made in Italy but were attached to the top part of the table and re-gilded at a later date, possibly in England. Fig. 29, top spectrum shows the ground layer on the legs, matching with a reference sample of Plaster of Paris (calcium sulfate) Fig. 30, top spectrum shows the ground layer on the frieze matching a reference sample for calcium carbonate. (whiting)

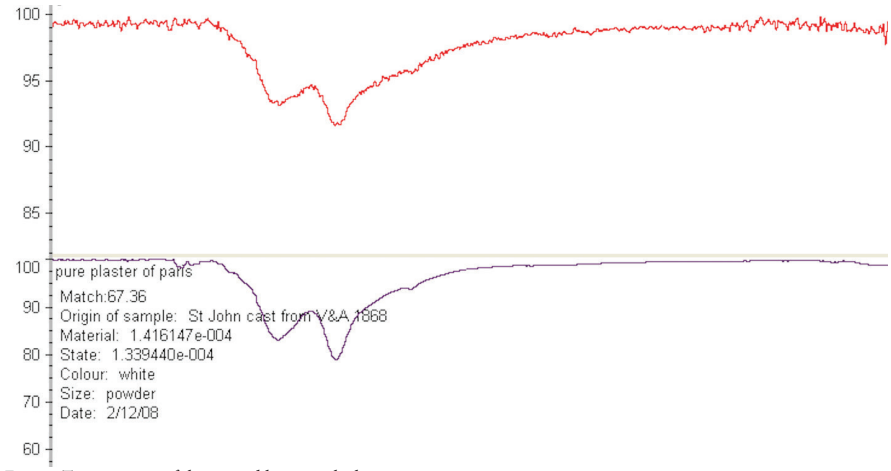

Fig. 29. Top spectrum of the ground layer on the legs.

8. Treatment

Consolidation and cleaning were carried out using traditional methods. The flaking gold was consolidated first, as it was particularly unstable, using rabbit skin glue in deionised water (1:12), to which the surface responded very well (fig. 31). Subsequently the surface was cleaned using a minimal amount of water with a very low concentration of rabbit skin glue, and saliva in areas of stubborn dirt. The overpaint was removed with benzyl alcohol, applied by brush and rinsed with a swab after 3-4 minutes.

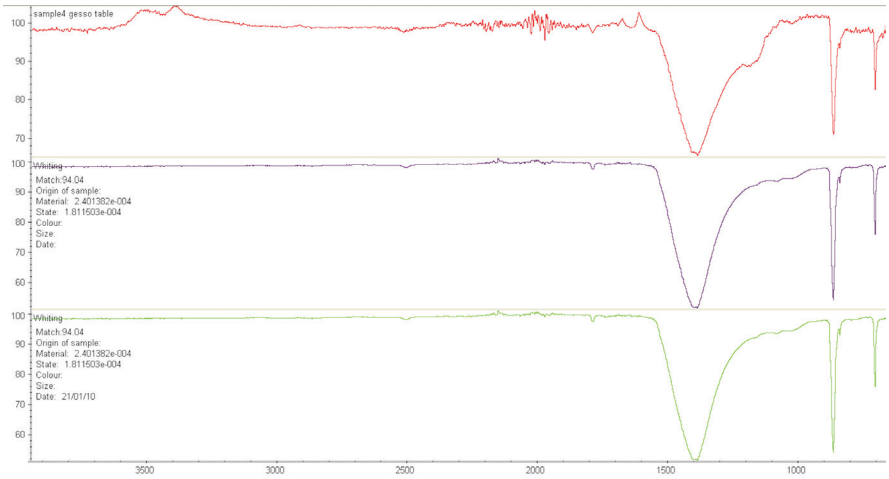

Fig. 30. Top spectrum of the ground layer on the frieze.

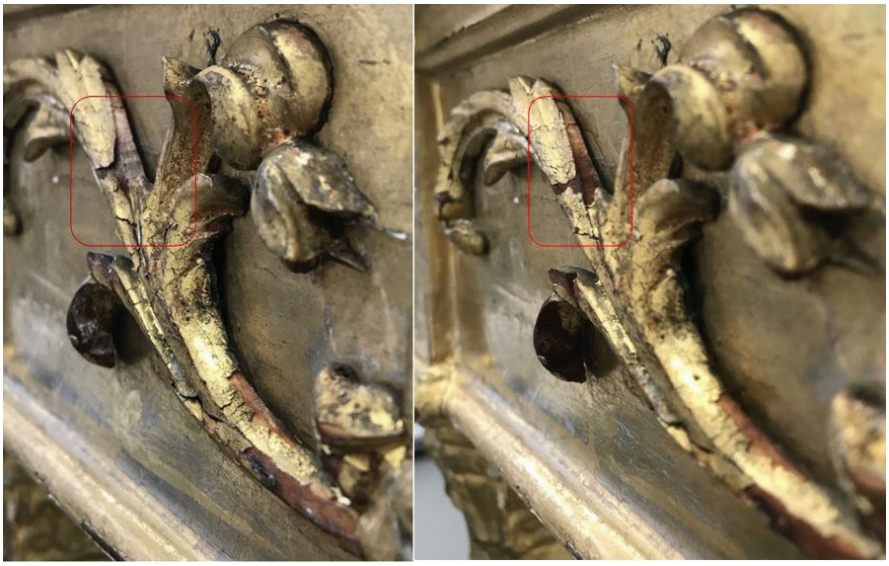

Fig. 31. Before and after consolidation of the gilding.

The detached ornaments were re-glued with hide glue in deionised water (1:3), in keeping with the original assembly methods (fig. 32). The missing sections were carved out of new lime wood, using the existing ornaments as a reference, and were also glued with hide glue (fig. 33).

Fig. 32. Re-gluing the original ornament with hide glue.

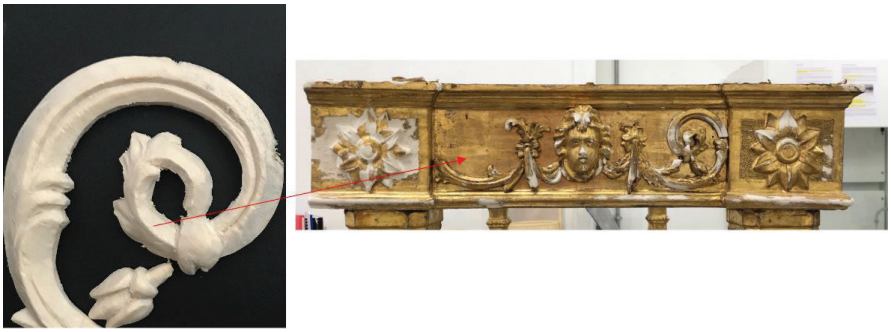

Fig. 33. Re-carving missing ornament.

Surface losses were filled with whiting and rabbit skin glue (gesso putty) in order to stabilise the surrounding areas and to improve the overall appearance (fig. 34). Larger areas of loss were painted with bole and water gilded, but smaller areas were retouched using the Italian technique known as 'tratteggio' , meaning 'hatching'. Tratteggio entails applying very thin, closely spaced parallel lines to an area of loss using only pure primary colours (yellow, red and green); the effect is not noticeable from a distance but can be readily distinguished from the original on close inspection. Evidence of earlier tratteggio retouching was identified on the table legs (fig. 35 and fig. 36 a/b).

Fig. 34. Surface losses being filled with gesso putty.

Different combinations of adhesives and bulking materials were investigated for filling the splits on the back of the legs. The purpose of filling the splits was to improve the aesthetic appearance and prevent further deposition of dirt. It was necessary to find a material that would not restrict future movement in the timber. The material combinations listed in Table 1 were aged in the oven provided by City & Guilds of London Art School to get an indication of how they would behave over time.

Table 1: Filling materials tested

No.	Bulking material	Adhesive	Assessment
1	Glass bubbles powder	Butvar B98 5%	Unsuitable: very soft and crumbly
2	Glass bubbles powder	Butvar B98 10%	Unsuitable: very hard and inflexible
3	Onyx powder : glass bubbles powder (1:1)	Butvar B98 5%	Good. Some flexibility preserved and no noticeable shrinkage
4	Fumed silica : Onyx powder (1:1)	Butvar B98 5%	Unsuitable: shrinkage and cracking
5	Fumed silica : Onyx powder (1:1)	Primal B60 10%	Unsuitable: shrinkage and cracking
6	Glass bubbles powder	Primal B60 15%	Good: no shrinkage noted but too little elasticity
7	Microballoons : Onyx powder (1:1)	Lascaux 360 20%	Good: no shrinkage noted and the material retained sufficient elasticity

Table. 1.

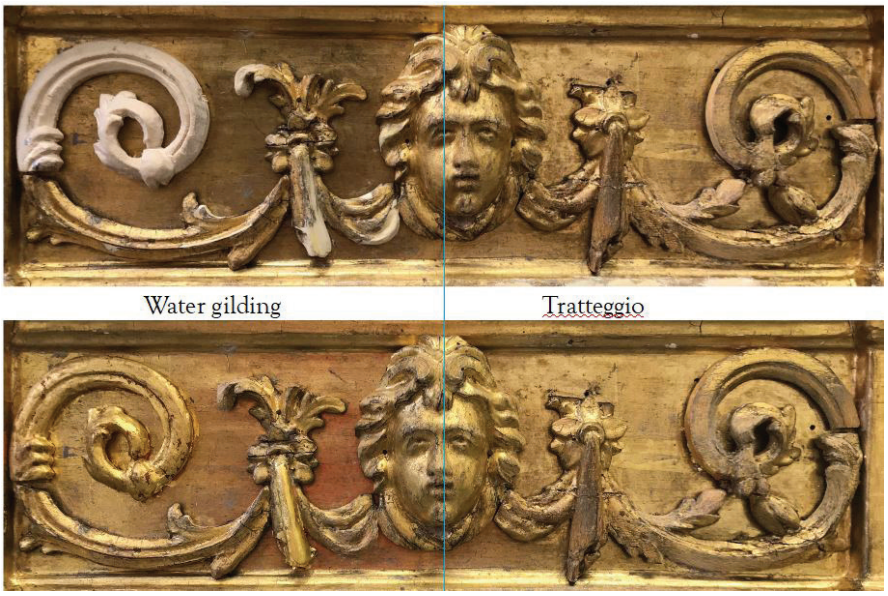

Fig. 35. Water gilding and tratteggio.

Fig. 36. a) new tratteggio b) earlier retouching using the same technique on the legs.

Following testing, it was concluded that Lascaux 360 (20% concentration) with microballoons and onyx powder was the most suitable for the purpose because it maintained some elasticity after ageing; this suggested that it would not limit natural expansion or shrinkage in the timber. This filling mixture was applied over a barrier layer of Japanese tissue paper, (fig. 37 and fig. 38).

Fig. 37. Fill samples after ageing.

Fig. 38. Applying Japanese tissue barrier layer and fill material into splits on the legs.

Fig. 39. The table base after treatment.

9. Summary

The pietre dure table had been damaged as a result of the long-term display conditions and unsuitable restoration materials used in previous treatments. Observations and research suggested that the partner tables were produced by splitting a single square table into halves and that some of the apparent damage could be attributed to this operation. Following analysis it also seemed plausible that the current table bases incorporated recycled original components alongside others of different origins, which were assembled to suit this scheme.

The aims – to stabilise the tabletop and base sufficiently for domestic use, to re-set all detached elements, replace missing parts and to obtain an appearance comparable to that of the partner table – were successfully achieved on time. The repairs carried out were often visually discernible but discreet, so the object could serve its function as a display piece in a domestic environment.

The objects were returned to their owner with documents recording the treatment in detail and giving care recommendations for display, storage and maintenance (fig. 40).

Fig. 40. The tabletop and base reunited after treatment.

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Bibliography

Chastang, Y.. The conservation of two pietre dure and giltbronze-mounted cabinets made by Domenico
Cucci for Louis XIV. Studies in Conservation, 2012 57 (1), S.pp.73-S79.

Derrick, M. R., Stulik, D., Landry, J. Infrared Spectroscopy in Conservation Science: Scientific Tools for Conservation. The Getty Conservation Institute, 1999.

Griswold, J., & Uricheck, S. Loss Compensation Methods for Stone. JAIC 37(1), 1998, pp.326-357.

Guisti, A.M., Pietre Dure: Hardstone in Furniture and Decorations. Philip Wilson Publishers, 1991

La Duc. When in Rome, do as the Romans do? The conservation of an Italian marble and micro-mosaic
tabletop. The American Institute for Conservation of Historic & Artistic Works: Objects Speciality Group
2016, Postprints, 23

Marques, S., Twelve Panels by Luca della Robbia: Conservation Issues. V&A Conservation Journal. 54.

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