TOWARD AN UNDERSTANDING OF NINETEENTH-CENTURY IMITATIONS OF MAMLUK ENAMELLED AND GILDED GLASS

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INTRODUCTION

This paper was prompted by our co-operative efforts in compiling a catalogue of Mamluk enamelled and gilded objects in the collection of the National Museum of Qatar (Carboni 2003). Among the objects we studied, three in particular were eventually excluded from the catalogue because they are most likely either late 19th or early 20th-century imitations or straightforward forgeries of original Mamluk objects. Part One of this joint paper deals with the art historical aspects and the known history of these three objects as well as of others that could belong to the same groups. Part Two focuses on the technology of Mamluk glass and on its chemical composition vis-à-vis 19th-century objects.

We would like to emphasize from the start that we are not inevitably condemning all the pieces we discuss in this paper as imitations or forgeries, but we simply intend to isolate them as priority subjects for an investigation in this field, the study of which is still in its infancy. The art historian has more doubts than certainties at this stage whereas the scientist's interpretation of 'objective' scientific data is more straightforward, but we both feel that it is important to make a common effort to separate grain from chaff in order to achieve a better understanding of a phenomenon that began as a worthy technical and artistic challenge in the latter part of the 19th century and later turned into an exploitation of the newly acquired knowledge for the purposes of profit. But even if forgery was never intended and these objects were fairly marketed as modern imitations when they were produced, poor records and the passage of time have unfortunately muddied the waters, so that the modern student is faced with the formidable challenge of differentiating between the medieval and the modern productions. In many instances the two productions are so similar under close visual scrutiny that even the best 'curator's eye' can be inadequate.

The known history of an object can be very helpful in determining its authenticity. Unless contradictory, groundbreaking information on 19th-century glass production comes to light, a safe post quem date can be placed around 1865, the time when Brocard and Salviati began to proudly present their technological and artistic achievements at the World Fairs. Thus, objects for which some scholars have raised eyebrows because they are atypical of the known Mamluk production are instead perfectly safe, as corroborated also by scientific investigation.

PART ONE

One of the three objects in Qatar under consideration is a large basin with a wide flaring rim, a shape often described as that of a spittoon (COLOUR PLATE 125). Unknown until recently, it appeared at auction in 2001 as having belonged to Emanuele Filiberto of the Italian royal family of the Savoia (d. 1931) and then to a European family (Sotheby's 2001, lot 97). Sold as Mamluk, it was hailed as a companion piece to the celebrated Cleveland Basin (inv. no. 1944.235; Hollis 1945; Carboni and Whitehouse 2001, 272–3) (COLOUR PLATE 126) to which it is virtually identical in shape, dimensions, decoration, and colours. However, scientific investigation surprisingly suggested that the Savoia Basin was modern.

The obvious question is, of course, whether the Cleveland object, which no one has questioned thus far, and which was recently included as an original Mamluk piece in the Glass of the Sultans exhibition, should be re-evaluated. In attempting to trace the history of the Cleveland basin it was impossible to document it prior to 1913. Pierpoint Morgan acquired the basin some time before his death in 1913; his son lent it to the Metropolitan Museum from 1925 to 1944 when Morgan's entire estate was put up at auction from where the Cleveland Museum acquired it (Parke-Bernet 1944, lot 120). A mystery, however, surfaced from the research and remains unsolved. In 1930 the Detroit Museum of Art included in an exhibition a basin described as having the same appearance and dimensions; the New York dealer Gabriel Demotte owned the object, or had it on commission, and lent it to the exhibition (Detroit 1930, 40). Since the Cleveland Basin was Morgan property and on view at the Met in 1930, and the Savoia Basin was supposedly in Europe all this time, it may be surmised that there exists (or existed) a trio, rather than a pair, of identical basins, one of which, perhaps, provided the original model.

The second enamelled and gilded vessel in Qatar is a tall footed bottle (c. 450mm in height; inv. no. GL.07.97) in brownish glass, with a large inscriptive band around the body (COLOUR PLATE 127). At first sight its enamels and surface condition are quite convincing in suggesting a Mamluk attribution but some doubts were raised during investigation regarding the quality of the calligraphy and the shape of the neck. The neck is larger and less elegant than on the majority of bottles, where the ring is usually placed near the mouth making the neck graciously flared above it. Scientific tests on the body and the enamels
confirmed our suspicions and we consequently removed the object from the catalogue.

To date, four more bottles seem to belong to this group of objects with a tall foot, bulging neck, a broad inscrptional band, coloured trefoil patterns, and narrow, sketchily decorated bands. The most convincing object, because of its more complex and accomplished inscription, is also in Cleveland and was acquired in 1944, the same year as the basin, after having belonged to the dealers Dikran Khan Kelekan and Hagop Kevorkian (inv. no. 44.488; Hollis 1945). It is as tall as the bottle in Qatar, but its decorative programme, including also a phoenix that encircles the neck, is more refined than the others in the group. For this reason, the Cleveland bottle is the best candidate to be the model for the group, if a model indeed existed.

Two almost identical bottles of smaller dimensions (height 280mm) with no ring around the neck but with a similarly bulging profile and general shape are in the Metropolitan Museum and in the Khalili Collection in London. The former entered the New York collections in 1925 as an anonymous gift and was catalogued as a 19th-century French forgery (inv. no. 25.126). No records exist as to the reason why the donor, a dealer himself, considered it a modern piece. Most likely he acquired it through a chain of ownership that could be traced back to the maker himself. That the bottle is suspicious was confirmed by Lisa Ploos in the Objects Conservation Department of the Metropolitan Museum, where it was pointed out that the absence of pontil mark and the density of the enamels at the bottom of a given area suggest that the firing occurred as a static process inside a kiln. As far as is known, Mamluk pieces were typically fired on the pontil by slowly spinning them at the glory hole.

The Khalili bottle (inv. no. GLS 172) was unrecorded before it was bought at auction in 1988 but it has been published as an original 14th-century piece without having been compared to the Met object (Christie’s 1988; Piotrovsky and Vrieze 1999, 203). As a matter of fact, not only do the two bottles have almost identical dimensions, proportions and decorative programmes, but they also share the absence of a pontil mark. A thorough investigation of the Khalili vessel would therefore be timely.

A third very similar bottle was acquired in 1953 by the Merseyside County Museums in England from a private donor (inv. no. 53.114.448; Merseyside 1979, 36). Catalogued as 14th-century Syrian, we have not investigated the object directly but it has similar dimensions and decoration as the Metropolitan Museum and the Khalili Collection bottles. An interesting detail described in a catalogue entry is that ‘the junction between body and foot is marked by a blue enamelled collar with a ruby glass insert in the interior’. Perhaps the catalogue regarded it as a modern repair on an otherwise medieval object, but this ring instead seems to provide further proof of the recent manufacture of this bottle and may also offer a clue as to its manufacturer.

The third object in Qatar from this group is a mosque lamp of typical shape inscribed with the name of the Mamluk sultan ‘Shar’ban II (r. 1363–76), which was found to have a modern glass composition (inv. no. GL.05.97; COLOUR PLATE 128). This was a surprising result, since a similarly decorated bowl-shaped lamp of the same greenish glass colour and texture, has instead a composition in accordance with modern parameters and was therefore included in the catalogue. Further research, however, confirmed that the Shar’ban lamp finds close parallels in a few late 19th and early 20th-century objects. The lamp in Qatar is almost identical to another in the Museum of Islamic Art in Cairo (inv. no. 267; Schmoranz 1898, fig. 48; Wit 1929, 7–8), which was removed in the late 19th century from the madrasa of Sultan Barquq (r. 1382–99); the building was finished in 1386— that the lamp was found in a building dedicated to a close predecessor of Shar’ban but of different lineage is an unusual, suspicious occurrence. Prince Yusuf Kamal commissioned for his palace in Cairo a third lamp, now in the Gazira Museum, at the beginning of the 20th century; most likely one of a series, it was reportedly made in France in the early 20th century (inv. no. H107; Carboni 2003, 53).

These three lamps can be better attributed by comparing them to another one in the Khalili Collection, which is dated by its Arabic inscription to 1910 and carries the name of the Egyptian khedive ‘Abbas Hilmi II (r. 1892–1914). Stephen Vernoit suggested that this lamp was one of a series made for the imposing mosque al-Rifa‘i, completed in 1912 and designed by the Austrian architect Max Herz Bey who was also the director of the Museum of Islamic Art in Cairo at the time (Vernoit 1997, 234–5). Vernoit pointed out its similarity to the lamp in the name of Shar’ban in Cairo and surmised that the latter might have provided an Austrian or Bohemian glassmaker the model for producing the khedive’s series. It is more likely, however, that the entire group, including the Cairo Museum lamp, was made in the same European centre over a number of years. Mosque lamps were the most commonly imitated enamelled and gilded Islamic glass vessels in modern Europe and it has become particularly urgent to make an effort to distinguish between the two productions.

**Part Two**

The manufacture of glass during the Mamluk period is thought to have involved the combination and melting of two primary ingredients— silica, in the form of ground-up quartz pebbles, and plant ash which would also introduce the calcium oxide component (Brill 2001; Henderson 2000, 84). The introduction of lead oxide to a translucent glass occurred in the 19th century and later.

Chemical analysis of the objects in the Doha collection was performed using electron-probe microanalysis (Henderson 2003, 29). Micro-samples of both the body of the vessels and of differently coloured enamels used to decorate the vessels were removed, mounted in an epoxy resin block and polished so as to remove any weathering (Henderson 1988). The results were quantified using geological and Corning glass standards (Goodhew et al. 2001, 200). Rather than provide the results of the individual vessels described in Part One, a global comparison of Mamluk and 19th-century glass vessels in the Doha collection will be presented here. In this case the three vessels discussed in Part One all fall into a definite technological tradition.
The first subject to be discussed is the chemical compositions of the bodies of the mosque lamps. A comparison of the chemical analyses of Mamluk and of 19th-century vessel bodies shows quite clearly that it is easy to distinguish between the two productions using the relative levels of magnesium and potassium oxides (Fig. 1). Mamluk and 19th-century glasses have different magnesium-potassium oxide ratios. One reason for this is that magnesia, as well as potassium oxide, are impurities found in the plant ash used to make the glass. On the other hand, the 19th-century mosque lamps contain either minimal levels of magnesia or high levels of potassium oxide. Nineteenth-century glassmakers apparently used a pure mineral source of soda with low impurities of magnesium and potassium oxide (Freestone 1998, 126). In addition, they appear to have used a second kind of flux, potassium oxide, probably in mineral form. This has also been found in ‘modern’ Venetian copies of Roman glass vessels (Page et al. 2001, 134, table 2). High levels of potassium oxide have never been detected in Mamluk glasses. So, as one might hope, it is clear that quite distinct kinds of raw materials were used to make the bodies of the Mamluk and the 19th-century vessels.

The vessel bodies of the basin, the bottle and the lamp described in Part One were made from a soda-lime-silica glass using rather pure raw materials which have introduced low impurity levels and therefore fall into the 19th-century group. All three vessels also contain a low impurity of arsenic, which is not found in ancient faintly tinted translucent glasses and is therefore another indication of a more recent production date (Table 1).

The relative levels of sodium and potassium oxides in the glasses and enamels decorating them is a reflection of the alkali types used. Firstly, the pale-green 19th-century bodies of the vessels contain lower potassium oxide than the Mamluk vessels. Secondly, the opaque red, blue, and white Mamluk enamels contain higher soda levels than their 19th-century equivalents. This compositional difference alone distinguishes between the medieval and 19th-century enamels. A fundamental reason why the basic compositions of the Mamluk and of the 19th-century enamels are different is that the Mamluk enamel makers added colorants to the same basic glasses as they used to make the vessel bodies, whereas 19th-century glassmakers added colorants to quite a different glass than that used to make their vessel bodies—a basic lead oxide-silica glass. The result is that the 19th-century lead-rich enamels contain negligible soda levels compared with Mamluk enamels.

The relative levels of two major ingredients—calcium and silicon oxides—indicate that Mamluk glasses mainly contain higher calcium oxide levels than in the 19th-century enamels and glasses. It is also worth noting that many of the 19th-century vessel bodies have higher silica levels than the Mamluk glasses, thus conferring a higher melting temperature on the glasses.

Yellow enamels, however, do not conform to the expected compositional pattern by their association with either Mamluk or 19th-century vessels. It is also apparent that there are some similarities between the compositions of Mamluk green and yellow enamels and that most red and blue enamels contain higher silica and calcium oxide levels than found in the green and yellow enamels. The reason for these characteristics is that the basic opacifier used in many Islamic enamels (in the form of tiny crystals) is tin oxide (Henderson and Allan 1990; Freestone 1998, 125; Henderson 2003, 30, fig. 1). By itself tin oxide produces opaque white enamel. When combined with lead it produces a complex crystal, lead-tin oxide, which is an opaque yellow colour. If copper (cupric oxide) is added to the yellow enamel, an opaque green enamel results. Thus, with the addition of lead oxide to the enamels one can see why opaque white, yellow and green enamels are related compositionally; they are united by the presence of tin oxide.

<table>
<thead>
<tr>
<th></th>
<th>Mamluk glass</th>
<th>C19th glass</th>
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<tbody>
<tr>
<td>Na₂O</td>
<td>11.69</td>
<td>3.8</td>
</tr>
<tr>
<td>MnO</td>
<td>0.8</td>
<td>3.84</td>
</tr>
<tr>
<td>SO₃</td>
<td>0.14</td>
<td>0.3</td>
</tr>
<tr>
<td>K₂O</td>
<td>4.13</td>
<td>13.2</td>
</tr>
<tr>
<td>MgO</td>
<td>4.86</td>
<td>1.97</td>
</tr>
<tr>
<td>FeO</td>
<td>0.33</td>
<td>0.16</td>
</tr>
<tr>
<td>SnO₂</td>
<td>nd</td>
<td>nd</td>
</tr>
<tr>
<td>Cl</td>
<td>0.7</td>
<td>0.13</td>
</tr>
<tr>
<td>As₂O₃</td>
<td>nd</td>
<td>0.27</td>
</tr>
<tr>
<td>CoO</td>
<td>nd</td>
<td>nd</td>
</tr>
<tr>
<td>CaO</td>
<td>7.85</td>
<td>6.43</td>
</tr>
<tr>
<td>PbO</td>
<td>nd</td>
<td>nd</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>1.24</td>
<td>0.87</td>
</tr>
<tr>
<td>NiO</td>
<td>nd</td>
<td>nd</td>
</tr>
<tr>
<td>Sb₂O₅</td>
<td>nd</td>
<td>nd</td>
</tr>
<tr>
<td>BaO</td>
<td>nd</td>
<td>0.06</td>
</tr>
<tr>
<td>SiO₂</td>
<td>65.4</td>
<td>66.76</td>
</tr>
<tr>
<td>CuO</td>
<td>nd</td>
<td>0.05</td>
</tr>
<tr>
<td>TiO₂</td>
<td>0.08</td>
<td>nd</td>
</tr>
<tr>
<td>Cr₂O₃</td>
<td>nd</td>
<td>0.06</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>0.27</td>
<td>0.2</td>
</tr>
<tr>
<td>ZnO</td>
<td>nd</td>
<td>0.14</td>
</tr>
</tbody>
</table>

Note: the principal alkali used in the 19th-century glass is potassium oxide (K₂O) and in the Mamluk glass is soda (Na₂O). The 19th-century glass is further characterized by the presence of arsenic oxide (As₂O₃).

nd = not detected
and elevated lead oxide levels. The 19th-century white enamels tested were found to be opacified with lead arsenate and traces of antimony in some, but no tin oxide was detected at all. Opaque green 19th-century enamels were opacified either by lead arsenate or by calcium antimonate. It is therefore clear that different raw materials were used to colour and opacify white and green enamels in the 12th–14th and 19th centuries.

Returning to the red and blue enamels, the compositional characteristic that unites Mamluk opaque red and blue enamels (when compared to white, green and yellow) is a lack of lead oxide. An iron-rich mineral was used to produce red enamel, for blue enamels, ground lapis lazuli was added to the base glasses in all cases (Freestone 1998, 123, fig. 27.1; Henderson 2003, fig. 2). The result is that there are elevated levels of silica and calcium oxide in almost all Mamluk red and blue enamels because no lead was present in the colorant compound used. In contrast to the Mamluk enamels, 19th-century blue enamels are coloured by an excessive amount of cobalt rather than lapis; the only 19th-century red enamel that was tested surprisingly was found to be opacified with cuprous oxide. It contained impurities of arsenic, barium and antimony oxides, impurities not normally found in Mamluk enamels.

A close investigation of the five yellow samples, all but one of which should be of a Mamluk date, shows some interesting features that provide us with clues as to their date of production. Firstly we have established that all Mamluk yellow enamels should be opacified with lead-tin oxide, whereas the 19th-century enamels all appear to be opacified with lead antimonate. Secondly, the yellow enamel with the highest lead and lowest calcium oxide has an arsenic impurity and is almost free of other impurities. However, two out of the three enamels containing between 0.5% and 3% calcium oxide from Mamluk lamps also contain 'modern' impurities of arsenic and zinc oxides. These two enamels with 'modern' impurities could therefore be more recent additions to the lamps; one of these two vessels had an enamelled base added in the 20th century, so this would have been an opportunity to touch up the original. So we seem to be able to provide an explanation for the unusual yellow enamel compositions that do not fit exactly the established distinction between Mamluk and 19th-century enamels.

Overall, these vessels show a clear distinction between the Mamluk and the 19th-century vessels. Even though the bodies of both sets of vessels have the same basic soda-lime recipes, the associated impurity levels reveal clearly that purer raw materials were used to make the 19th-century vessels. The compositions and colouration of the enamels are also quite different in the two periods of production. One reason why such clear distinctions are apparent is that Islamic glass and enamel makers generally used well-defined recipes to make both the translucent vessels and each enamel colour.

**CONCLUSION**

As remarked at the beginning, we are not stating that every object mentioned in this paper is modern, but that certain assumptions as to their identities should be questioned and thoroughly investigated by curators, conservators and scientists alike. It is true that collections may end up being poorer after such a focused study. What comes to my mind is an Italian proverb, *mai comune mezzo gaudio - a trouble shared is a trouble halved.*

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**REFERENCES**


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