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MUGHAL GLASS:
Indian Glass from the Late Modern and Early Colonial Period

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ABSTRACT

This thesis will concentrate on a number of splendidly decorated blown objects, seeking to establish where they were made, and what they reveal about glass blowing in India during the eighteenth and nineteenth century. The specific objects included within this thesis were selectively organised into three primary chapters based on object type. These were case bottles, *huqqa* bases, and dining ware objects. Within each chapter smaller groupings of objects were formed based on similarities of shape, colour of glass, or decorative technique. These groupings represented case studies, which were each subsequently discussed within three separate categories: form and function, the chemical analysis of the glass, and surface decoration. This methodological structure was devised in order to better answer where these objects were made, and furthermore, what defines Indian glass as Indian. By examining the origins of the shapes, the chemical analysis of the glass, and the decorative techniques and patterns, this thesis attempts to present a more authoritative discussion and clearer understanding of eighteenth and nineteenth century Indian glass.

The thesis is organised into five chapters: literature review; the chemical analysis and trade of glass; case bottles; *huqqa* bases; and dining ware objects. The literature review examines how Indian glass from the Mughal period has been discussed, the gaps in the literature, and the challenges facing the field. The chemical analysis and trade of glass examines the characterisation of the glass as interpreted through both EDS and XRF testing of selected objects, followed by a discussion and interpretation of where these types of glass were manufactured, comparative analyses of other glassware, records of European traded glass into India, and an examination of the Indian glass industry during the nineteenth and twentieth century. The three case studies examine selected objects through the tripartite methodological approach, comparing them to other media or decorative techniques when relevant.

Contents

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Chapter 1: INTRODUCTION

Abstract

While recognising the long tradition of glass production in the area, especially in terms of opaque glass beads and bangles, this thesis will rather concentrate on a number of splendidly decorated blown objects, seeking to establish where they were made, and what they reveal about glass blowing in India during the eighteenth and nineteenth century. The specific objects included within this work were selectively organized into three primary chapters based on object type. These were case bottles, *huqqa* bases, and dining ware objects. Within each chapter smaller groupings of objects were formed based on similarities of shape, colour of glass, or decorative technique. These groupings represented case studies, which were each subsequently discussed within three separate categories: form and function, the chemical analysis of the glass, and surface decoration. This methodological structure of examining each object within three separate parts was devised in order to better answer where these objects were made, and furthermore, what defines Indian glass as Indian. By examining the origins of the shapes, the chemical analysis of the glass, and the decorative techniques and patterns, this thesis attempts to present a more authoritative discussion and clearer understanding of eighteenth and nineteenth century Indian glass.

Structure

The thesis is organized into five chapters: literature review; the chemical analysis and trade of glass; case bottles; *huqqa* bases; and dining ware objects. The literature review examines how Indian glass from the Mughal period has been discussed, the gaps in the literature, and the challenges facing the field. Given the fragmented nature of this literature, much research involved looking at parallel or tangential fields; very little exists on the specific subject of Indian blown glass prior to the early nineteenth century. The chemical analysis and trade of glass is organized into three sections. The first examines the characterisation of the glass as interpreted through both Energy Dispersive Spectrometry and X-ray Florescence testing of selected objects, followed by a discussion and interpretation of where these types of glass were manufactured, the historical evidence attesting to glass compositions, comparative analyses of other glass, and lastly records of European traded glass and cullet into India. This chapter ends with an examination of the Indian glass industry during the nineteenth and twentieth century. The three case studies examine the objects through the tripartite methodological approach outlined below, inserting comparative discussion with other objects or types of glass when relevant.

Methodological Approach: Form, Function & Chemical Analysis of Glass

The Indian vessels examined within this thesis represent approximately a dozen varied shapes and forms. Examining whether these forms are indigenous to South Asia or derived from external influences will provide a clearer understanding as to why these objects were produced in glass, and the implications this has on their function. The two largest categories of glass objects produced and decorated are rectangular case bottles and *huqqa* bases. The former reflects a shape commonly produced in Europe starting from the seventeenth century, while the *huqqa* – in particular the earlier globular form – is believed to have developed from the traditional Indian *lota* (water carrier). A supplementary way of understanding possible social contexts and shifts in shapes is through glass's depiction within Indian paintings. Glass objects such as bottles and cups begin to appear in Indian paintings of the late sixteenth century, decorating niches and accompanying social and courtly settings.[1] By the eighteenth century, a wider array of glass objects is illustrated in paintings, including *huqqa* bases and smaller decorated bottles, yet in the vast majority of paintings, the visual culture reflects one of a luxury or courtly context.

Examination into the chemical composition of glass has greatly advanced the current understanding of this material. Prior to this thesis, chemical analysis had only been conducted on a few specimens, so that enormous gaps remained in our general understanding of where these objects were manufactured. Whether these blown vessels were European (and decorated in India), produced from imported European glass ingots, a combination of recycled European glass ('cullet') and local glass, or were of an entirely and uniquely Indian composition could only be understood through chemical analysis. Energy dispersive x-ray spectrometry (EDS) had previously been conducted on two *huqqa* bases; however, an additional nineteen objects have been specifically analysed for this study through non-invasive x-ray florescence (XRF). The qualitative results from XRF tests have helped categorise and define types of glass used;

[1] The glass vessels decorating the distant niches within paintings could have been painted, as was the tradition in several palace complexes at the time. See, for example, the inner chamber of the mausoleum of Itimad-ud-Daula in Agra, built between 1622-28. The niches around the cenotaphs are painted with polychrome bottles, presumably meant to imitate glass. See: Ebba Koch, *The Complete Taj Mahal* (London: Thames & Hudson, 2006), fig. 63, p. 53.

these are discussed within a scientific and historical context in the chapter three, with a more detailed discussion relating to specific objects within the following case studies.

Surface Decoration & Pattern Books

The glass objects of this thesis are decorated in an undeniably Indian style, presenting a combination of floral, figural, and geometric patterns. The term Mughal and, moreover, 'Mughal repertoire' is used throughout the thesis to describe a pattern style that appears across the corpus of objects presented within the Catalogue. Rather than employing the term Mughal to designate a particular reign, Empire, or geographical region - as a way of classifying or confining the objects to a period of production, court, or region - the term is used to describe a decorative floral pattern that emerged during the early Mughal period and continued across regions and upon various media throughout the proceeding centuries.

Much discussion and literature surrounds the origins and evolution of the Mughal flower motif, and will therefore not be discussed here at great length;[2] however, more recent scholarship now views Robert Skelton's initial opinion attributing the emergence of the singular floral spray to Mansur's 1620 flower studies in Kashmir as out-dated,[3] and neither the earliest nor the sole source of influence for the development of this floral repertoire.[4] Indeed, European engraved herbals had already arrived into the Mughal courts by the late sixteenth and early seventeenth century,[5] and prior to this, evidence of singularly arranged floral sprays appears on Mughal Emperor Akbar's marble cenotaph (Sikandra, circa 1611-13), as well as in architectural ornamentation, such as the stele made for Mughal Emperor Jahangir in his twelfth regnal year in 1618.[6]

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[2] For a detailed description of the Mughal flower style, see: Daniel Walker. *Flowers Underfoot: Indian Carpets of the Mughal Era* (New York: The Metropolitan Museum of Art, 1998), pp. 86-95.

[3] See: Robert Skelton, "A Decorative Motif in Mughal Art", in *Aspects of Indian Art.* Pratapaditya Pal (ed.), (Leiden, 1972), pp. 147-52.

[4] Emperor Jahangir's spring visit to Kashmir in 1620 inspired his court artist, Ustad Mansur, to record the flowers there, detailing more than one hundred studies. Jahangir's passion for the landscape is expressed in the following: "Kashmir is a garden of eternal spring, or an iron fort to a palace of kings – a delightful flower-bed, and a heart-expanding heritage for dervishes. Its pleasant meads and enchanting cascades are beyond all description…. The red rose, the violet, and the narcissus grow of themselves; in the fields there are all kinds of flowers and all sorts of sweet-scented herbs more than can be calculated." See: Jahangir, *Tuzuk-i Jahangiri* or *Memoirs of Jahangir*, Alexandre Rogers (trans.) and Henry Beveridge (ed.), Vol. II, 1909, pp. 143-5.

[5] For a discussion of this, see: Ebba Koch, *Mughal Art and Imperial Ideology: Collected Essays* (Oxford: Oxford University Press, 2001), in particular, "The Baluster Column: A European Motif in Mughal Architecture and Its Meaning".

[6] Susan Stronge, "The Minto Album and its Decoration, c. 1612-1640" in *Muraqqa': Imperial Mughal Albums from the Chester Beatty Library, Dublin*. Elaine Wright (ed.) (Virginia: Art Services International, 2008), p. 101.

Irrespective of the date or exact influence of this flower, its roots can be traced back to Imperial Mughal designs as demonstrated in architectural ornamentation, arts of the book, or jade objects dated prior to 1620. Yet the importance of the floral spray lies not in its date, but rather, its permeation across a variety of media and its crystallisation - already by the early seventeenth century - as a Mughal motif. This isolated and repeating floral spray, often depicted in delicate detail against a plain background, continues in its delineated and subtle representation across various regions, schools, and ateliers in South Asia for centuries.[7]

The decoration appearing across the majority of glass specimens discussed within the proceeding chapters is characterised as Mughal, or representing a Mughal repertoire. Within this context, however, differences in depiction and representation of flowers exist upon the glass objects, suggesting that, despite the motif having long crystallised, subtle differences in sprays and floral arrangements serve to differentiate styles of patterning. While the overall similarity of floral patterns appearing across glass objects of differing shape, size and colour might reflect the continual popularity of the Mughal motif, as a pattern deeply embedded within decorative traditions, slight differences with regards to stylisation, arrangement, and composition of patterns and sprays reflect regional or artisanal experimentations in design. How these patterns evolved, and the manner in which they were subsequently transferred onto various media, is best explained through the use of pattern books. The floral, animal, and human forms that appear in both consistent and repeated occurrence upon the glass objects most likely drew inspiration from stock patterns that were compiled within books or albums.

The notion of a pattern book does not appear to exist during the early Mughal period of the sixteenth and seventeenth century; or if it did, no known examples have been confidently attributed to this period. Traditionally, artisans and painters who were employed in the *karkhana* of the Mughal capital would prepare new patterns for certain crafts that would be presented to the emperor, and whose approval would be obtained by the *daroga* (supervisor) of the Imperial workshop. The patterns or sketches for

[7] Stephen Markel argues that a visible and “increasingly stylized and at times degenerative character” appears a characteristic of later floral motifs, which he attributes to the dissemination of Mughal artists to the regional courts created, in part, from the wider political instability of Mughal Emperor Aurangzeb (r. 1658-1707). See: Stephen Markel, “The Use of Flora and Fauna Imagery in Mughal Decorative Arts,” *Flora and Fauna in Mughal Art*, Som Prakesh Verma (ed.) (Mumbai: Marg Publications, 1999), p. 27.

objects were normally done by painters, and then transferred to fellow craftsmen, some of which could be executed in the court *karkhana*, while others had to be sent to workshops scattered in various parts of the country.[8] Even within provincial courts, *karkhanas* and artists prepared new designs for objects, which were initially drawn on paper and then transferred to a media of choice; however, it remains unknown as to whether such drawings or patterns were, at the time, ever intentionally compiled into an album, as to date only examples of eighteenth century pattern books exist. Nonetheless, the tradition of preliminary sketches or drawings made by one artist for the intentional transfer onto another media (textile, jewellery, metal, or even glass) has a long history within artisanal and craft production in South Asia; however, the function of these patterns or books evolved to suit changes in the development of industrial crafts in the nineteenth century.

All pattern books intended to showcase artist's innovations and experimentations in design, and often emerged from the desires of a particular Emperor or court, the traditions of a family workshop, or later, the demands of a manufacturer. Not only were drawings intended to showcase innovations or to fulfil commissions, but they also served a crucial role in educating craftsmen to produce repeatable patterns, thereby providing them with a degree of mastery over the principles of design, which could then be easily transferred or applied to other media.[9] Such was the presumed intention behind the earliest known pattern book dated to the late eighteenth and nineteenth century (Victoria & Albert Museum, 4779-1854), which contains ninety-five folios of floral motifs, many done by a different hand (figs. 1 and 2). When this book was first published in *Indian Heritage* (1982, cat. 171, p. 68), Robert Skelton believed that the diaper and border patterns illustrated upon several folios would have been suitable for use by textile designers, but that they could have also been applied to a variety of media.[10] New patterns were thus created as innovative examples of design in their own right, with their transferability to media being second in importance. The densely decorated pages of this particular pattern book illustrate a mix of both innovative and traditional designs, and while the individual motifs might have been executed by

[8] Jagdish Mittal, "Indian Painters as designers of decorative art objects in the Mughal period," in *Facets of Indian Art* (London: Victoria & Albert Museum, 1982), p. 248.
[9] Vidya Dehejia, "A Cache Uncovered: Workshop Drawings of Oomersee Mawjee & Sons of Kutch" in *Delight in Design: Indian Silver for the Raj* (Singapore: Mapin Publishing, 2008), p. 38.
[10] Robert Skelton (ed.). *The Indian Heritage: Court Life & Arts under Mughal Rule* (London: Victoria & Albert Museum Press, 1982), cat. 17, p. 68.

different hands, the overall similarity in the pages' borders, the size of the patterns upon the pages, the colour of the pigments, and the type of paper all indicate that the pages were completed during the same period, and by the same atelier or workshop.

Figs. 1 and 2: *Book of Floral Designs*, Mughal or Deccan, 18th century, gouache and gold on paper (V&A, 4779-1854)

Moreover, the intentional assemblage of these ninety-five pages implies that the book served as an important source for artisans, who may have drawn upon patterns for the production of their crafts (textile, for example) or to showcase designs for future commissions. In addition, these patterns (and this book) could have functioned as a way of differentiating, or rather associating, a particular style of production with a specific family or workshop. In this instance, pattern books would have not travelled between ateliers or across regions; rather, this meticulously drawn and painted book remained within the possession of select group of artists, and would have been shown to a specific patron who requested a certain commission.[11]

[11] For another example of a pattern book, see Khalili Collection of Islamic Art, London Acc. No. SS 1051 published in Pedro Moura Carvalho, *Gems and Jewels of Mughal India from the Nasser D. Khalili Collection of Islamic Art* (London: Khalili Collections, 2007), p. 290. Like the V&A's book, this example does not attribute artists' names, places, or dates to the patterns or pages; however, it does present a variety of designs intended for a range of craftsmen, including jewellery, furniture, textiles, metal ware, and possibly even glass. Many of the drawings in this book present more traditional floral patterns commonly characterized as Mughal, although some also reflect distinctly European tastes; it has been suggested that a European atelier in India could have commissioned this pattern book.

Other types of sketches or preliminary drawings, some compiled into books and others remaining as loose folios, were intended to circulate between manufactures or artisans of particular crafts, as was the case with late nineteenth century silver production. A collection of pencilled drawings detailing ideas, innovations, and clients or patrons' specifications from the well-known silver manufacture Oomersee Mawjee & Sons in Kutch demonstrate this, as these drawings were often transformed into printed material, serving as catalogues from which customers could place orders (figs. 3 and 4).[12]

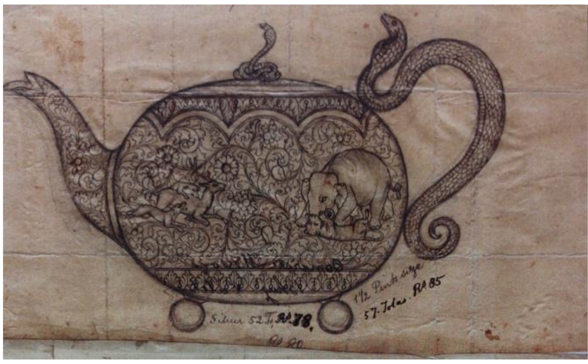

Fig. 3: Workshop drawing of a tea pot from Oomersee Mawjee & Sons of Kutch, circa 1860 (After Dehejia 2008, figure 2)

Fig. 4: Teapot with Coriander Flower Pattern, Lucknow, ca. 1880, silver (After Dehejia 2008, cat. 80)

Increasingly in the nineteenth century, with the development of industrialized crafts and the demand for tradition-based designs – the latter largely motivated by the foundation of art schools intended to promote art industries (in Bombay, Madras, Lucknow, and Calcutta for example) - pattern books played an instrumental role of instruction that helped stimulate craft industries. Pattern books also served as a valuable marketing tool, to secure and coordinate orders. This was especially the case with the Ahmedabad Wood Carving Company, Lockwood de Forest (artist, designer, and the company's American director), and his local partner Mugganbhaii Hutheesingh, who collected woodwork drawings from Jaipur and other places and compiled them into pattern books.[13] Another instance of pattern books stimulating production in the late nineteenth century is with the inmates of the Yerawada jail in Poona, who were given paper drawings of two hundred and fifty year old Deccani carpet designs to replicate for

[12] Dipti Khera, "'Designs to Suit Every Taste' P. Orr & Sons and Swami Silverware" " in *Delight in Design: Indian Silver for the Raj* (Singapore: Mapin Publishing, 2008), pp. 20-37.

[13] Abigal McGowan, "All that is Rare, Characteristic or Beautiful-Design and the Defense of Tradition in Colonial India 1851-1903," *Journal of Material Culture* 10, no. 3 (2005); chapter 3.

carpet-weaving.[14] These inmates used the pattern books to inform, replicate, and produce carpets; the same patterns were later distributed to other carpet manufactures.

The patterns appearing across the glass objects of this thesis - representing a mix of floral, figurative, and geometric patterns - drew inspiration from motifs that were initially experimented through preliminary sketches and drawings, and later executed in other media. As pattern books were made for wood, textile, or silver production, it seems plausible that books dedicated to glass drawings were also produced. Whether glass decorators used floral patterns that were already established as canonical Mughal motifs (fig. 1); drew directly from motifs and drawings made for other media (such as for silver; figs. 3, 4 and 5); or created new patterns unique to glass objects depends on the specific atelier or manufacturer. It seems likely, however, that a combination of all three existed.


Fig. 5: Workshop drawing of animal and bird studies from Oomersee Mawjee & Sons of Kutch, circa 1860 (After Dehejia 2008, figure 13, p. 45)
Fig. 6: Cat 22

The glass objects reveal popularised patterns and motifs in existence upon other media, and were thus familiar to artists. Although the decorative motifs are, for the most part, not unique to glass as a particular medium, their technical application, treatment, and arrangement of designs is unique. Furthermore, the decorative

[14] Ibid, pp. 263-287.

techniques appearing on the glass objects draw from both ancient Indian and Islamic traditions, some abandoned and recently revitalised, and others continuously employed on other media such as gems and jade. A single glass object in this thesis will often demonstrate a combination of techniques and surface patterns, which include the following identified techniques: wheel-cut, appliqué, gilded, enamelled, and cold painted. This combination of decorative techniques, coupled with a variety of Indian patterns, does make the decoration upon these glass vessels unique and different to other mediums.

Corpus of Material Examined

The objects included in this thesis reflect a variety of mould or free blown specimens made of transparent or colour glass, and decorated in a variety of techniques and patterns. The repeated mention of a 'corpus of material' refers to the glass objects assembled, personally examined, and discussed in the case studies and included within the attached Catalogue; they have been accumulated for the specific purpose of this thesis. The Catalogue does not attempt to represent a completed collection of Indian glass objects from the eighteenth and nineteenth century, but rather, a cohesive study of diverse objects that reflect a breadth of shapes and styles. The glassware was gathered from collections dispersed throughout the world, and has been organised by object type (case bottles, *huqqa* bases, dinner services). The objects selected for the case studies were done so based on whether they were chemically analysed through XRF analysis; the chemical analysis served as the foundation upon which further discussion (object form and surface decoration) was then applied. The second criterion for the objects' inclusion within the case studies was whether they represented an exemplary example of artistic craftsmanship, possessing a unique glass colour or demonstrating splendid surface decoration. These selected objects attempted to highlight the diversity of Indian glass objects from the late Mughal period currently within museum collections in the United States of America, Europe, India, and Kuwait.

Note on Transliterations

All non-English words or texts have been translated from their original language into the Latin alphabet, and while variations of translations exist (as is the case of Persian and Hindu words), this thesis has remained consistent to one translated form. All diacritic marks or accents have been purposely omitted from these translations in an attempt to simplify reading.

Chapter 2: LITERATURE REVIEW

Introduction

No cohesive or comprehensive body of literature in English exists on Indian glass produced during the late Mughal period of the eighteenth and nineteenth century. This thesis aims to construct a coherent corpus of literature. Due to the fragmentary nature of the study of Indian glass from this period, research into other fields (both parallel and tangential) was necessary. The literature includes primary and secondary sources, dated from the late sixteenth century; the primary Indian and non-English European travellers' accounts have all been consulted in their translated English editions.

The corpus of literature is organised chronologically and includes: sixteenth and seventeenth century primary accounts of both Indian and European travellers; seventeenth and eighteenth century India Office Records from the East India Company; nineteenth and twentieth century accounts of English surveys on archaeological, geological, mineral, and artistic production throughout South Asia; and late twentieth century to present day sources on Italian, Chinese, Iranian, English, Dutch and Indian glass; museum catalogues and exhibitions on Indian art, Mughal Art and Islamic glass; comparative decorative analysis of metal ware, carved jade, textiles; and Indian paintings from the late sixteenth to twentieth century.

Much of the secondary literature mentioning glass from the Mughal period remains speculative, working on the assumption that techniques have remained virtually unchanged throughout the centuries. Most theories of glass production have been taken from contemporary accounts and applied to the past; no actual archival evidence from the Mughal period discusses techniques or practices of glass blowing. Furthermore, no surviving tools exist (such as moulds, blow pipes, and furnaces), or drawings that support the existence of glass production from the sixteenth to eighteenth century. The absence of primary evidence – archaeological and historical – makes it challenging to understand the extent of an Indian glass industry manufacturing blown glass vessels prior to the earliest recorded European account dated to 1807. However, the absence of evidence does not mean evidence is absent; research is still in progress.

The literature pertaining to the chemical analysis of glass represents a scarce yet vital corpus of material required to better understand the objects discussed within this thesis. A large portion of this literature deals specifically with the chemical analysis of

Indian beads and fragmentary remains dated from the 5th century BCE – 1st century AD. While different in dating, these chemical analyses nonetheless provide a strong corpus of comparative material needed to contextualise later studies of eighteenth and nineteenth century Indian glass. To date, only two Indian objects from the late Mughal period have been analysed by an energy dispersive x-ray spectrometer (EDS), yet several late seventeenth and eighteenth century Italian, Dutch and English glass objects have been studied, providing a strong comparative analysis in which the tested Indian glass included in this thesis can be contextualised and better understood.

The secondary sources on Mughal glass are equally scarce and require a certain amount of scrutiny based on their re-use of previous data; little new evidence or interpretation has come from these secondary sources. Conversely, an inexhaustible amount of literature exists on the subject of Indian and Mughal art. Much of the discussion of glass exists within the context of museum catalogues, often placed in juxtaposition to other decorative arts that demonstrate similar stylistic features; this comparative stylistic analysis represents the most common method of dating and provenance. While the vast majority of Mughal glass appears within museum exhibition catalogues, which serve as important visual resources for identifying objects within collections, these objects have been systematically catalogued in a generic 'Mughal, eighteenth century' manner, thus neither advancing nor contributing significantly to the understanding of these objects. Much of the literature from the 1960s – 1980s, furthermore, attributed the origins of Indian glass (both decorative and technical) to foreign influences (primarily Iranian or European), consequently viewing Indian glass as a 'response to' and not 'creation of' independent or indigenous traditions practiced within India. The subjugated manner in which this influence has framed, tainted, and arguably hindered the understanding and advancement of academic literature relating to this field has only recently shifted its view, looking instead at Indian glass as developing independent from external influences or traditions.

Another context in which Mughal glass appears is within museum or private collections that publish either a general catalogue or focus on the glass collection. Like the abovementioned catalogues, these publications serve as strong visual sources in identifying Indian objects, but vary in descriptions and contextual depth. This category is extensive in scope, as many museums have historically published collections at varying moments, often re-editing or releasing publications based on thematic exhibitions or recent acquisitions. A similar literary source appears in auction or private dealers' catalogues, both of which publish examples of Mughal glass; unfortunately, many of these suffer from the same 'Mughal, eighteenth century' catalogue descriptions as mentioned above.

Given the scarcity of material relating directly to Mughal glass, and the general manner in which it has been systematically catalogued, the widest body of literature examined draws from tangential fields. This literature covers subjects such as English, Dutch, Italian, Iranian and Chinese glass; trade of European and Eastern glassware; techniques of glass engraving and decoration; history of furnaces; and glassmaking techniques across parallel regions. While Mughal glass is not specifically referenced in this expansive corpus of literature spanning over a century, the literature does allow for parallels to be drawn and applied to the discussion of glass within this thesis.

Lastly, Indian paintings from the sixteenth to twentieth century represent a vital supplementary body of documentation that trace glass's form and function within a visual culture. Examining when and how glass objects appear in paintings provides an invaluable insight into understanding the cultural context of glass in Mughal India, as well as a complementary way of dating the objects examined within this thesis.

The following literature is organized chronologically. It does not attempt to provide an extensive list of all the materials consulted, but rather identify and explain documents that have shaped or influenced the understanding of this subject.

Sixteenth Century Mughal Accounts

The Great Mughals, those considered from the creation of the Mughal Empire with Babur to the death of Aurangzeb (1526-1707) were renowned documenters, who provided detailed accounts of their daily lives (such as Jahangir in his *Tuzuk-i-Jahangiri*, or *Memoirs of Jahangir*, *from the First to the Nineteenth year of his Reign*) or had them recorded by a royal advisor, such as Abu-l Fazl for the Emperor Akbar. These Mughal texts, which were later translated into English, continue to serve as extraordinary insights into the policies and practices of Mughal rule; although, inherent issues of translation certainly apply to the manner in which these texts have been interpreted, and subsequently incorporated into proceeding publications.

Despite the rich body of Mughal primary sources, very little direct reference to glass exists. A commonly cited reference – and to date the earliest known royal reference to glass – appears in Akbar's *Ain-i Akbari* (The Constitution of Akbar) written by Abu-l Fazl in the late sixteenth century. Within this text, the place of production, glass cutters, and the price of glass appear in various sections (called '*Ain's*), as demonstrated by two such references: "Glass is used for windows; price 1 R. for 1 ¼ s., or one pane for 4 d ('*Ain* 86, *The Prices of Building Material, Etc.);* or "Glass-cutters, 100 d. per gaz" ('*Ain* 87, *On the Wages of Labourers*)."[15] The *Ain-i Akbari* makes further mention of glass within the discussion of royal *subahs* (provinces), particular in the provinces of Bihar, Awadh, Agra (the Royal Residence), and Berar. In the *subah* of Bihar, gilded glass is manufactured[16]; in Awadh, glass is described in exchange of trade carried back from the northern mountains; in Alwar (Ulwar) glass and woollen carpets are produced; and in Berar, the reservoir contains "the essential materials for the manufacture of glass".[17] With the exception of the *Ain-i Akbari*, no further mention of glass production has been found in any of the Great Mughal Emperors' chronicles.

Seventeenth Century European Accounts

The compendium of accounts compiled by the East India Company in the India Office Records (IOR) provides detailed listings of trade between the Company and both the East and Far East. The 'General Ledgers' of the IOR present detailed accounts that include the names of suppliers of goods to the East India Company, the ships on which they were transported, the prime cost, quantities, and the names of purchasers. Each record is subsequently organised according to creditors and debitors, with total calculations given to each inventoried list. Within these lists, glass appears as drinking vessels, glassware, glass beads and flint glass; the earliest recording of imported glass dated to the early seventeenth century, with specific mention to flint (lead) glass only appears in 1684. These lists, however, do not give any indication whether the glass was for personal consumption or trade. Many of these East India Company Factory records appear within Sir William Foster's thirteen volume text entitled *The English Factories in*

[15] Abu-l Fazl' Allami, *The Āʾīni Akbarī* ; translated from the original Persian by H. Blochmann, 3rd ed., Vol. 1 (New Delhi : Oriental Books Reprint Corp. 1977), p. 235 and 236, respectively.

[16] Ahsan Jan Qaisar speculates that "the initial reference to the manufacture of *shisha-i zar afshan* (gilt glass?) in Bihar is so vague that one cannot infer anything; other Persian sources do not mention or describe this reference, nor is it noticed by any foreign traveller. One wonders whether Abu-l Fazl did not refer to mica in Bihar whose qualities faithfully respond to his term, that is, *shisha-i zar afshan*?" See: Ahsan Jan Qaisar. *The Indian Response to European Technology and Culture, AD 1498-1707* (Oxford: Oxford University Press, 1982), p. 71.

[17] Abu-l Fazl' Allami, *The A'ini Akbari*, translated by H.S. Jarrett, Vol. 3, 2nd rev., Jadu-Nath Sarkar (ed.) (New Delhi: Oriental Books Reprint Corp. 1977), pp. 163-4, 183, 192, and 239, respectively.

India, 1618-1669: a calendar of documents in the India Office, British Museum and Public Record Office (1906).[18]

European travellers' accounts also appear in the compendium of publications by The Hakluyt Society, a late nineteenth century society that published an insurmountable wealth of primary records of European voyages and travels in Iran, India and Asia from the sixteenth to eighteenth century, including Sir Thomas Roe's (the English ambassador to India under James I) double volume travel journal in India from 1615-19.[19] Roe's letters document the exchange of gifts given and suitable for the Emperor Jahangir, of which glass is mentioned; the majority of these accounts describe looking glass, spectacles, and window glass.[20] Despite the abundance of Europeans traveling to India during the first half of the seventeenth century, mention of glass only appears within the context of cultural customs of Hindu women wearing glass bangles.[21] Conversely, French traveller Jean Chardin gives an elaborate description of glass production in Shiraz and Isfahan, providing a contemporaneous glass industry upon which to compare Indian glass production of the seventeenth century.[22]

Eighteenth Century Records

The eighteenth century India Office Records (IOR) referenced glass imported from England to India within the private papers of Company officers. Unfortunately, most of the accounting ledgers for private trade were destroyed in the mid-nineteenth century; documented information pertaining to traded glass has only been found in private records dated from the first half of the eighteenth century.[23] The records of imported broken flint (lead) glass, lump glass, and ingots from England into Madras and the Bay of Bengal provide evidence of such trade. These records, dated from 1716,

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[18] William Foster (ed.). *English Factories in India, 1618-69: a calendar of documents in the India Office, British Museum and Public Record Office*, 13 Vols. (Oxford: Clarendon Press, 1911).

[19] William Foster (ed.). *The Embassy of Sir Thomas Roe to the Court of the Great Mogul, 1615-1619 as narrated in his journal and correspondence*, Vol. II (London: The Hakluyt Society, 1899).

[20] Two other journals discussing travels in India (also published by The Hakluyt Society) are Thomas Browrey, *Geographical Account of the countries round the Bay of Bengal, 1669-1679* (Cambridge: Haklukt Society, 1905), and Fray Sebastien Manrique, *Travels of Fray Sebastien Manrique 1629-1643*, C.K. Eckford Luard (ed.) (Oxford: The Hakluyt Society, 1927), Vol. 2.

[21] Other European travellers accounts in India include the diaries of John Mildenhall (1603-5), Ralph Finch (1583-89), William Hawkins (1603-13), William Finch (1608-11), Nicolas Withington (1612-16) and Thomas Coryat (1614-1617). These were all compiled in, William Foster (ed.). *Early Travels in India, 1583-1619* (London: Oxford University Press, 1921).

[22] Chevalier Chardin. *Voyages du Chevalier Chardin en Perse, et autres lieux de l'Orient*, L. Langles (ed.), Vol. 1-10 (Paris: Le Normant, 1811).

[23] This information was provided in an email correspondence between the author and Margaret Makepeace, India Office Records, British Library, London, Mar 9th 2015.

represent the earliest known evidence supporting a trade of English glass into India. No mention of glass production appears within any Company Factory records.

In addition to the IOR, European traveller's accounts and letters make mention of glass trade and consumption in India, particularly in Awadh, during the second half of the eighteenth century. The translated letters of Antoine-Louis Henri Pollier and Claude Martin, both of whom represented European residents of India who traded, amongst other profitable commodities, glass;[24] while the account of Asafu'd Daulah, Nawab Wazir of Awadh, provides an Indian description of glass decorations in Lucknow.[25]

Nineteenth & Twentieth Century Accounts

The earliest nineteenth century European account of glass production in India comes from Francis Buchanan in 1807; in his three-volume survey *Journey from Madras through the countries of Mysore, Canara, and Malabar*, he describes and illustrates glass production in Chinapatam, providing details of types of objects produced, furnace structure, manufacture of alkali, and sourcing of raw materials.[26] The descriptions do not specify whether glass blowing was used to create the small vessels, but his reference to recycled broken vessels mixed with locally sourced materials represents the earliest European account of glass manufacture in India. More important than Buchanan's early account of glass production is Martin Montgomery's *The History, Antiquities, Topography, and Statistics of Eastern India* (recorded in 1807 and published in 1838) in which he mentions the use of recycled European glass for the manufacture of blown glass objects in Patna City, Bihar.[27] Shortly thereafter, another important account, again given by Buchanan, is recorded in 1811-12 on the districts of Bihar and Patna (published in 1935).[28] This description provides more detailed accounts about glass workers (*churisaz*), organized work structures, manufacturing, and trade in his section on the

[24] Muzaffar Alam and Seema Alavi. *A European Experience of the Mughal Orient: The I'jaz-I Arsalani (Persian Letters, 1773-1779) of Antoine-Louis Henri Pollier* (New Delhi: Oxford University Press, 2001).

[25] Abu Talib ibn Muhammad, *History of Asafu'd Daulah, Nawab Wazir of Oudh, Being a Translation of "Tafzihu'l Ghafilin"*, translated from the original Persian by William Hoey (Lucknow: Pustak Kendra, 1885).

[26] Buchanan was a surgeon and botanist (1762-1829) and in 1800 Lord Wellesley, the British Governor General of India, appointed him to conduct an extensive survey of the Kingdom of Mysore in the south of the subcontinent, which had recently been annexed by the East India Company. See: Francis Buchanan. *Journey from Madras through the countries of Mysore, Canara, and Malabar, Vol. I, II, II* (London: Bulmer and Co., 1807).

[27] Martin Montgomery (ed.). *The History, Antiquities, Topography, and Statistics of Eastern India; comprising the districts of Behar, Shahabad, Bhagulpoor, Goruckpoor, Dinajepoor, Puraniya, Rungpoor and Assam*, Vol. I, II, III (London: H. Allen and Co., 1838).

[28] Francis Buchanan. *An Account of the Districts of Bihar and Patna in 1811-1812* (Patna: The Bihar and Orissa Research Society, 1935), Vol. II, book V, pp. 618-706 and Appendix p. 766.

state of the arts and commerce. While both Buchanan and Montgomery's accounts were recorded in the early nineteenth century, their descriptions could reflect techniques already employed in the late eighteenth century, if not earlier.

A chronological gap appears between Buchanan and Montgomery's primary accounts and the first artistic survey that examined glass production in the Punjab region of northwest India, published by B.H. Baden-Powell in 1872 called the "Handbook of the Manufactures and Arts of the Punjab".[29] Shortly following this publication, the seventeen-volume journal on *The Journal of Indian Art* was published from 1886-97, created in response to an 1883 resolution of the Government of India to address the concern felt for the general decline in the decorative arts.[30] The surveys discussing glass industries in India were conducted by various contributors, each of whom detailed the objects produced and the methods of manufacture employed in each region. Three articles discussing glass within this Journal are: C.J. Hallifax's "Pottery and Glass Industries of the Punjab, III: Glass" published in Volume 5 (1894);[31] T.N. Mukharji's (from the Indian Museum, Calcutta) "Pottery and Glassware of Bengal, II: Glassware" from volume 6 (1896);[32] and H.R.C. Dobb's "The Pottery and Glass Industries of the North-West Provinces and Oudh" (1897).[33] *The Journal of Indian Arts*, and in particular the above mentioned articles, represents the most significant literary contribution to the understanding of nineteenth century Indian glass; its importance is demonstrated by its continual referencing within subsequent publications.

Overlapping slightly with *The Journal Of Indian Arts* – which is cited within his section pertaining to glass – is Watt's 1889 three-volume dictionary of Indian economic products.[34] This publication – started in response to a demand by the Agricultural Department of the Northwestern Provinces in 1877 - presents an extraordinarily detailed description of raw materials and economic products within India, discussing the history, uses and trade of each category. Sadly, the section on glass comprises only

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[29] Henry Baden-Powell. *Handbook of the Manufactures and Arts of the Punjab* (Lahore: Punjab Printing Company, 1872), pp. 235-9.
[30] Susan Stronge. *The Decorative Art of India* (London: Studio Editions, 1990), p. 709.
[31] C.J. Hallifax, "Pottery and Glass Industries of the Punjab, III: Glass" *The Journal of Indian Art*, Vol. 5 (1894), pp. 47-49
[32] T.N. Mukharji, "Pottery and Glassware of Bengal, II: Glassware" *The Journal of Indian Art*, Vol. 6 (1896), pp. 99-102.
[33] H.R.C. Dobbs, "The Pottery and Glass Industries of the North-West Provinces and Oudh" *The Journal of Indian Arts*, Vol. 7 (1897), pp. 1-6.
[34] Sir George Watt (ed.). *A Dictionary of the Economic Products of India, Vol. 1-3* (Calcutta: Department of Revenue and Agriculture, 1889), Vol. 3, pp. 503-6.

three pages, and largely cites from *The Journal of Indian Arts*; however, earlier sections on the raw materials of limestone and cobalt ore discuss both location and pricing that indirectly relate to materials used in glass production. Watt also draws heavily from past references such as V. Ball's *Economic Geology* (1881).

Several geological surveys conducted by the *Geological Survey of India,* the first of which was compiled by H. M. Medlicott (1829-1905) and W. T. Blanford (1832-1905), published in 1879, provide insight into the raw glass making materials available throughout the Indian subcontinent. Within these manuals, other subject specific surveys are conducted, such as F. R Mallet's section on 'Mineralogy'.[35] These surveys look at the geological history of the subcontinent while also analysing the mineral wealth (regions found, compositional analyses, and mining costs). Another similar text published in 1917 discusses the *reh* sands and deposits on Usar lands (in Awadh), published by the *Journal of the Society of Chemical Industry, London*, which provides insights into the quality of locally sourced sands used as silica within primary glass production.[36] While this type of literature does not explicitly discuss glass, it provides sources of raw materials used within the primary glass production, allowing one to deduce the levels, qualities, and costs required for such manufacture.

A slight chronological gap exists again between the late nineteenth and the early twentieth century, with no surveys or publications done on glass manufacture until 1922, and later again in 1937. The motivation behind these twentieth century articles moves away from an artistic interest in indigenous crafts to one focused on industrial production, looking at the wider industry and its relation to imported glass within an international, post WWI context. These articles problematise the challenges surrounding increased foreign glass imports by analysing how India can further develop its indigenous glass production to combat growing global competition. Both articles from 1922 and 1937 provide detailed analyses of places and methods of production, again testing raw materials and comparing cost effective modes of manufacture; however, by this point the glass industry already reflected modern practices of production comparable to those in the West, and elsewhere. C.S. Fox's 1922 article

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[35] Mallet, F.R., *A Manual of the Geology of India, part IV: Mineralogy* (Calcutta: Geological Survey of India, 1887).

[36] Silver, A.H., "A note on the possibility of utilising reh or sajji mitti (efflorescent deposits on Usar lands) for the manufacture of commercial alkalis," *Journal of the Society of Chemical Industry, Great Britain* (1917).

"Notes on Glass Manufacture" focuses on this transition within the global production of glass, analysing various factories within India and providing detailed charts, statistics, and percentages of imported versus exported glassware.[37] Edward Dixon later published two articles on *A Survey of Indian Glass Industry* (1936)[38] and *The Industrial Outlook: Indian Glass Industry* (1937), the latter divided into two parts, which similarly looks at the various glass industries throughout India, analysing the raw materials and costs of production against a competitive global market.[39]

Late Twentieth Century to Present

Thereafter virtually no literature concerning glass techniques or manufacture in India exists until 1969, when Dr. Moreshwar G. Dikshit published his *History of Indian Glass*, organized into eight chapters: early Indian glass, influences of glass in India, glass of the dark period, Mughal glass, documentary evidence on glass, the last phase, analyses of ancient Indian glass, and glass in Indian literature.[40] Dikshit created the first exhaustive and detailed survey on the subject of Indian glass, yet today his research and interpretations are largely out-dated. His analysis on earlier archaeological glass was taken mostly from Earle R. Caley's book on *Analyses of Ancient Glasses, 1790-1957* published in 1962 by Corning. While Dikshit's archaeological interpretations were based on stratigraphic and typological dating, as opposed to chemical analyses, as an economist by study and archaeologist by training his writings on later Mughal glass (where no testing of specimens had been conducted) lacked both the visual and the historical depth required to support his speculations on dating and provenance; he does not substantiate or contextualise his assumptions with historical evidence, trade documents, scientific analysis, or stylistic comparisons to other mediums.

While Dikshit does make brief mention of tools, furnaces, and methods of production (providing hand drawn illustrations accompanied by local terminology), the one reference to a furnace and production is cited directly from Francis Buchanan's 1807 account of Chinapatam in Mysore; however, sadly Dikshit inverses the dating of

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[37] C. S. Fox, "Notes on Glass Manufacture," *Bulletins of Indian Industries & Labour*, No. 29 (Calcutta: Superintendent of Government Printing, 1922), pp. 1-73.

[38] Edward Dixon. *A Survey of the Indian Glass Industry*, no. 2, Bulletins of Indian Industrial Research (Manager of Publications, Delhi, 1936), pp. 1-39.

[39] Edward Dixon, "The Industrial outlook: Indian glass industry (part 1 & 2)," *Current Science*, no. 3 & 4 (1937), pp. 127-30; 181-7.

[40] Moreshwar Dikshit. *History of Indian Glass* (Bombay: University of Bombay, 1969), p. 7.

Buchanan's survey, dating it instead to 1870.[41] In his last chapter entitled, 'The Last Phase', he draws largely from *The Journal of Indian Arts* (Dobbs, Hallifax, Mukherjee), yet provides the greatest discussion to glass production in Kapadwanj in Gujarat. Dikshit's overall greatest contribution to this study is his catalogue of illustrated glass examples, most gathered from museum collections and some never before published. It remains, to date, the largest publication of Mughal glass. Much of the Indian literature published on India glass from 1969 to the present directly references Dikshit's data and interpretations; his text has been canonised within the greater Indian discourse, integrating his analyses into both common and popular understanding.

The *Journal of Glass Studies* represents the largest, continuous journal dedicated to the study of glass since its inception in 1958. The breadth of articles sourced from this journal provides the majority of complementary or comparative glass research consulted thus far, and in particular, three articles related to the form and production of glass bottles: "The Glass Wine Bottle in Colonial Virginia" (1961)[42] and "Common Beverage Bottles: Their Production, Use and Forms in Seventeenth and Eighteenth Century Netherlands" (1971);[43] and "Glass Bottle Push-Ups and Pontil Marks" (1971).[44]

In 1973, collector and historian Simon Digby published "A Corpus of Mughal Glass," which reviewed Dikshit's survey before confirming the popularly accepted belief that the most direct influences on Indian glass came from external influences (France, the Tyrol, Bohemia, Iran in the sixteenth century, and England after 1700).[45] Digby does, however, acknowledge that an independent Indian glass history exclusive of external influences existed on the subcontinent prior to the sixteenth century, and shifted to the production of 'luxury' glass after this date. Digby discusses the inherent challenge of dating Mughal glass objects, as not a single piece is inscribed with a date, stating that "nowadays, particularly fine examples tend to be assigned to the 16th, 17th, and 18th centuries by the exercise of aesthetic judgment aided only by random comparison with the details or ornament of Mughal and other Indian paintings and manuscript

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[41] Dikshit (1969), pp. 127-9.
[42] Ivor Noel Hume, "The Glass Wine Bottle in Colonial Virginia," *Journal of Glass Studies* 3 (1963), pp. 91-113.
[43] Robert H. McNulty, "Common Beverage Bottles: Their Production, use and Forms in Seventeenth and Eighteenth Century Netherlands, Part I," *Journal of Glass Studies* 13 (1971), pp. 91-117.
[44] Oliver Jones, "Glass Bottle Push-Ups and Pontil Marks," *Historical Archaeology*, (1971), pp. 62-73.
[45] Simon Digby, "A Corpus of Mughal Glass," *Bulletin of the School of Oriental and African Studies* 36 (1973), pp. 80-96.

decorations, or with the surface decoration of Mughal architecture."[46] Digby's observation directly deals with the challenge of dating and provenance, and although no other scholar has before or since made such an accurate assessment, he represents the first to beg the question of balancing the necessity of stylistic comparisons with the inherent challenge of craftsmanship. Furthermore, Digby is the first to discuss the real influence of imported English potash-lead glass upon Indian manufactured glass during the eighteenth century, a question that has consequently remained at the crux of all Indian glass manufacture. Whether the glass was merely transported to India in raw form (ingots) and subsequently sculpted and decorated, or sent as a finished product for local consumption remains unanswered in his article; however, this exact question continues to challenge all scholars in the field.

R.J. Charleston's 1974 article provided insightful parallels into the seventeenth century Iranian glass industry, of which the primary production of glass vessels and its trade into India were discussed.[47] Similarly, articles published during this period on Venetian trade, developments within Venetian glass, or Venetian trends in Bohemian glassmaking during the sixteenth and seventeenth century all provided insights into parallel glass industries that helped further the understanding of Indian glass.[48] Phelps Warren's article "Later Chinese Glass: 1650-1900" (1974) discussed the Imperial production of Chinese glass blowing, which started around 1690, having been first introduced into China by Italian missionaries.[49]

The 1970s witnessed several thematic exhibitions organized by museums that included examples of Mughal glass, each catalogued with a discussion of varying depths. These include: *Europäisches und Aussereuropäisches: Glas* (Frankfurt am Main: Museum fur Kunsthandwerk, 1973); Brigitte Klesse and Gisela Reineking-von Bock, eds. *Kunstgewerbemuseumder Stadt Koln: Glas* (Koln, 1973); *Neuerwerbungen 1956-74* (Frankfurt am Main: Museum fur Kunsthandwerk, 1974); Christoph W. Clairmont. *Benaki Museum: Catalogue of Ancient and Islamic Glass* (Athens, 1977); *Glass at the Fitzwilliam Museum* (Cambridge: Cambridge University Press, 1978); and slightly later, *The Indian*

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[46] Ibid, p. 81.
[47] Robert Jesse Charleston, "Glass in Persia in the Safavid Period and Later," *Art and Archeology Research Papers* (1974), pp. 12-27.
[48] Karel Hettes, "Venetian Trends in Bohemian Glassmaking in the Sixteenth and Seventeenth Centuries," *Journal of Glass Studies* (1963), pp. 39-53; Timothy H. Clarke, "Lattimo – A Group of Venetian Glass Enameled on an Opaque-White Ground," *Journal of Glass Studies* 16 (1974), pp. 22-52.
[49] Phelps Warren, "Later Chinese Glass: 1650-1900," *Journal of Glass Studies* 19 (1977), pp. 84-126.

Heritage: Court Life & Arts under Mughal Rule (Victoria & Albert Museum, 1982), which published some of the collection's fine Indian glass examples amongst its decorative arts along with a short contextual history of Indian glass, written by Susan Stronge.

In 1986 and 1987 the *International Congress on Glass* held proceedings on the archaeometry of glass, a series of papers and conferences held in Calcutta and then New Delhi, which looked at the technological and chemical analysis of early Indian glass. While S. Deo,[50] B.B. Lal,[51] and H.C Bhardwaj[52] all contributed papers on studies of early Indian glass, it was Robert Brill's 1986 paper on "Chemical Analyses of Some Early Indian Glasses" that postulated that a unique Indian glass composition existed.[53] This study represents an important piece of scholarly work, not only in its succinct articulation of scientific data gathered by EDS analysis (the first of its kind to analyse ancient glass specimens by this method), but its bold postulation that a unique Indian family of glass compositions exists. Not only does this 1986 article provide a foundation upon which to understand ancient Indian glass within a larger context of glass produced during the time, but more importantly, it allows for a 'control group' of data upon which future testing of Indian samples (even from later dates) can be compared.[54]

The strongest of the most recent publications discussing glass from the Mughal period comes from the Los Angeles County Museum of Art (LACMA) curator, Stephen Markel. Three of his articles published in 1991 and 1993 discuss the challenge surrounding Indian or English glass manufacture during the seventeenth and eighteenth century, as initially posed by Digby in 1973. In Markel's first publication, "India and 'Indianate' Vessels in the Los Angeles County Museum of Art" he attempts to differentiate between objects of different styles and possible places of production by providing a new term, 'Indianate', as referring to "The European export glassware

[50] S. B. Deo, "Early Indian Glass: Antiquity and Archaeology" in *Archaeometry of Glass, Proceedings of the Archaeometry Session of the XIV International Congress on Glass*, New Delhi, March 2-6, 1986, H. C. Bhardwaj (ed.), (Calcutta: Indian Ceramic Society, 1987), pp. 76-79.

[51] B. B. Lal, "Glass Technology in Early India," *Archaeometry of Glass, Proceedings of the Archaeometry Session of the XIV International Congress on Glass*, New Delhi, March 2-6, 1986, H. C. Bhardwaj (ed.), (Calcutta: Indian Ceramic Society, 1987), pp. 44-56.

[52] H.C. Bhardwaj, "A Review of Archaeometric Studies of Indian Glasses," *Archaeometry of Glass. Proceedings of the Archaeometry Session of the XIV International Congress on Glass* (Calcutta: Indian Ceramic Society, 1986), pp. 64-74.

[53] Robert H. Brill, "Chemical Analyses of Some Early Indian Glasses," *Archaeometry of Glass. Proceedings of the Archaeometry Session of the XIV International Congress on Glass* (Calcutta: Indian Ceramic Society, 1986), pp. 1-25.

[54] See also: Robert H. Brill, "A Note on the Scientist's Definition of Glass," *Journal of Glass Studies*, Vol. 4 (1962), pp. 127-138, for scientific language used to define, distinguish and understand glass as a material.

manufactured for the Indian market from the late 17th through 19th centuries. The surface of the vessel was appropriately enlivened with Mughal Indian floral motifs, either by European craftsmen working from stock designs or by indigenous Indian artists employed to decorate the vessels after their importation into India".[55] Like Digby, Markel distinguishes between a tradition of glass manufacture in India with that of transparent, luxury glass vessels, which both Digby and Markel claim started with the advent of Europeans arriving at the royal Mughal courts in the early seventeenth century. Unlike previous publications, Markel looks at glass manufacture in Kapawandj in Gujarat – citing from Dikshit's 1968 article - historically linking the region to its strong European trade posts, and thus directly influencing local glass production.[56]

Markel's second publication discussed glass within the context of "Luxury Arts of Lucknow" (1993), again taken from examples within LACMA's collection, in which glass *huqqa* bases demonstrated the unique artistic production of Lucknow during the second half of the eighteenth century.[57] The same year (1993) Markel published "Western Imports and the Nature of Later Indian Glassware" that looks at European glassware imported into India and its later effects on the local Indian glass industries of the nineteenth century.[58] Markel provides rich and detailed evidence of primary European accounts (English, Italian and Dutch) that support glass imports into the subcontinent, looking specifically at the representation of *huqqa* bases as examples of a European import made to suit Indian tastes. The article presents a strong link between the historical developments of English glass during the seventeenth century and the primary accounts of both English trade records and letters.

In 1991 British Museum curator Hugh Tait published the first edition of the Museum's glass collection, entitled *5000 Years of Glass*, with a later revised edition released in 2012. This encyclopaedic publication of the museum's collection focuses primarily on Western glass, with a brief discussion highlighting Mughal glass examples from the late Islamic period.

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[55] Stephen Markel, "India and 'Indianate' Vessels in the Los Angeles County Museum of Art," *Journal of Glass Studies* 33 (1991), p. 82.

[56] Moreshwar Dikshit, "A Brief Study of the Glass Industry at Kapadwanj," *Bulletin: Museum and Picture Gallery, Baroda, India,* No. 20, 1968, pp. 1-9.

[57] Stephen Markel, "Luxury Arts of Lucknow," *Arts of Asia* 23 (1993), pp. 108-20.

[58] Stephen Markel, "Western Imports and the Nature of Later Indian Glassware," *Asian Art* (1993), pp. 35-59.

One of the most significant studies contributing to the understanding of eighteenth century Indian glass is the 1995 study by Ian Freestone and Mark Redknap on salvaged glass ingots from the 1765 Albion ship wreckage.[59] The Albion, en route to China via Madras, had glass ingots on board that were chemically tested by the British Museum and compared to waste glass from south Yorkshire, proving their origin as English. This study provided late eighteenth century evidence for the trade in English potash-lead ingots intended for melting into reworked glass.

Six years after the published discovery of the Albion, Joseph Dye III published his canonical catalogue of *The Arts of India: Virginia Museum of Fine Arts* (2001), in which Freestone and Redknap's results was corroborated by the EDS testing (energy dispersive x-ray spectrometry) of two Indian glass *huqqa* bases from the Museum's collection, proving that both glass compositions were almost identical.[60] These studies represent crucial scientific discoveries that further advanced the understanding of eighteenth Indian glass compositions.

Two publications discuss glass techniques through contemporary glass practices currently used in India. Torden and Kock's 2001 publication on "Traditional Raw Glass Production in Northern India: The Final Stage of an Ancient Technology" focuses on the site of Jalesar (located northeast of Agra) where both primary and secondary glass production continues today.[61] The article examines the process in detail, looking at the sourcing of raw materials, treatment of materials, furnace construction, and the quality of glass produced, providing illustrations and photographs to demonstrate each step. The following year in 2002 the same authors published "Medieval Glass Mirrors in Southern Scandinavia and their Technique, as Still Practiced in India," which traces the history of lead backed mirrors and their evolution to mercury lined blown globes in Kapadwanj, Gujarat.[62] The authors take current examples of glass production practiced in India (Jalesar and Kapadwanj) to demonstrate traditional glass making techniques.

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[59] Mark Redknap and Ian Freestone, "Eighteenth-Century Glass Ingots from England: Further Light on the Post-Medieval Glass Trade," in *Trade and Discovery: The Scientific Study of Artefacts from Post-Medieval Europe and Beyond,* Duncan Hook (ed.) (The British Museum: London, 1995), pp. 145-158.
[60] Joseph M. Dye III. *The Arts of India: Virginia Museum of Fine Arts* (Richmond: University of Virginia Press, 2001), Appendix 2, p. 528, and pp. 533-4.
[61] Sode Torben and Jan Kock, "Traditional Raw Glass Production in Northern India: the Final Stage of an Ancient Technology," *Journal of Glass Studies* 43 (2001), pp. 155-169.
[62] Sode Torben and Jan Kock, "Medieval Glass Mirrors in Southern Scandanavia and their Technique, as Still Practiced in India," *Journal of Glass Studies* 44 (2002), pp. 79-94.

Stefano Carboni and David Whitehouse's exhibition catalogue, *Glass of the Sultans* (2001) includes Mughal glass in the section on "Glass in the Age of the Empires". Three splendid Mughal glass examples are catalogued from various museum collections, with brief historical descriptions. The cataloguing for each example represents the clearest and most detailed format used thus far, and is the subsequent model upon which the Catalogue in this thesis is based. The following year, Stefano Carboni discusses Mughal glass within the context of late Islamic glass in the catalogue *Glass from Islamic Lands* (2001) of the al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait. The chapter entitled, "The Revival of Glass in the Islamic World: The European Connection 17th- 19th Century" draws upon a selection of glassware (*huqqa* bases, case bottles and flacons) to explore the European influence upon Indian glass production during this later period of Islamic glass.[63] His discussion uses a variety of diverse sources and comparative mediums (metalwork and Indian paintings) to illustrate the evolution of forms, in particular, the *huqqa* base as cited in Mark Zebrowski's 1997 publication.[64]

While many sources were consulted on English glass manufacture, those discussing the creation of English lead glass were the most relevant, in particular D. Dungworth and C. Brain's 2005 investigation of late seventeenth century English crystal glass.[65] This study provided a chemical comparison upon which to understand the XRF analysis of the tested specimens included within this thesis. Similarly, comparative studies on both Dutch and Central European glass of the eighteenth century provided immeasurable insight into glass composition and production, such as Katharina Muller's 2009 article, "Material Analysis of Colourless Lead Glasses from a Late 17th Century Glasshouse Site in Groningen (the Netherlands)".[66]

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[63] Stefano Carboni, "The Revival of Glass in the Islamic World: The European Connection 17th- 19th Century" in *Glass from the Islamic Lands, in association with The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait National Museum* (London: Thames & Hudson, 2001), pp. 371-396.

[64] Marc Zebrowski. *Gold, Silver and Bronze from Mughal India* (London: Alexandria Press, 1997).

[65] David Dungworth and Colin Brain, "Investigation of Late 17th century Crystal Glass," *Center for Archaeological Report* 21 (English Heritage: 2005).

[66] Katharina Muller, "Material Analysis of Colourless Lead Glasses from a Late 17th Century Glasshouse Site in Groningen (the Netherlands), *Annales du 17e Congres de l'Association Internationale pour l'Histoire du Verre Antwerp, Belgium: AIHV* (2009), pp. 401-7; and Jerzy J. Kunicki-Goldfinger, Joachim Kierzek, Aleksandra J. Kasprzak, and Bozena Malozewska-Bucko, "Analyses of 18th century Central European Colourless Glass Vessels," *AIHV Annales du 15e Congres* (2001), pp. 258-61.

In 2009, Robert Brill co-wrote with A. Kanungo an article on "Kopia, India's first Glassmaking Site: Dating and Chemical Analysis".[67] This publication radiometrically analysed samples from this site (located between Lucknow and Patna), concluding that Kopia was a centre for the primary production and manufacture of glass from around 200 BCE onwards. These findings prove that primary glass production existed in the Indian subcontinent, a belief that, while already assumed, had not been scientifically proven until then.

The next five years witnessed the publication of several thematic exhibitions on both Indian art and glass, including: *Maharaja: The Splendor of India's Royal Courts* (Victoria & Albert Museum, 2009); *India's Fabled City: The Art of Courtly Lucknow* (Los Angeles County Museum of Art, 2010); *Made for Mughal Emperors: Royal Treasures from Hindustan* (2010); *Vorsicht Glas! Zerbrechliche Kunst 700-2010* (2010); and *Les arts de l'Islam au Musée du Louvre* (2012). While these catalogues identify glass examples within various museum collections, they have not furthered the discussion of Indian glass from the Mughal period, instead, often providing the simplified classification of 'Mughal, eighteenth century'. No attempt to specify date, region or reign of production, technique, glass type, or decorative influences has, for the majority of previously published catalogues, been made.

In 2014 M. Gill and Ian Freestone published an article that chemically tested tile glazes sampled from seven buildings in the Delhi region, dated from the sixteenth and seventeenth century.[68] The analysis of these glass glazes revealed similar glass compositions to those discovered in Brill's 1986 publication, providing more scientific support for a unique (and unchanged) Indian family of glass composition. This article, moreover, fills a necessary gap in research on Indian glass, and represents one of the few scientific studies on glass dated from the Mughal period.

Concluding Remarks

The study of glass from the Mughal period would be greatly enriched by discovering more definitive archival and historical evidence that attests to a glass blowing industry in South Asia prior to 1807. In addition, more chemical analysis through EDS testing could also further the understanding of glass compositions, which

[67] Robert H. Brill and Alok K. Kanungo, "Kopia, India's First Glassmaking Site: Dating and Chemical Analysis," *Journal of Glass Studies* 51 (2009), p. 11-23.
[68] Maninder Thilo Rehren Gill and Ian Freestone, "Tradition and Indigeneity in Mughal architectural glazed tiles," *Journal of Archaeological Science* 49 (2014), pp. 546-555.

would provide securer indications to where the glass originated. The main areas of literature that need further development are both archival and scientific.

Chapter 3: CHEMICAL ANALYSIS & TRADE OF GLASS

Introduction

Approximately three hundred blown glass objects comprise the corpus of material; these are dated to the eighteenth and nineteenth century and include case bottles, *huqqa* bases, spittoons, salvers, covered bowls and jars, cups, and ewers. In total, twenty-one glass objects currently within international institutions outside India were tested; nineteen of these objects were tested using an x-ray fluorescence spectrometer (XRF) while two used an energy dispersive x-ray spectrometer (EDS). Both analyses have been included in this discussion despite differences in testing methods. The institutions that conducted the XRF analyses were: Corning Museum of Glass, New York; Victoria and Albert Museum, London; and the British Museum, London. The Virginia Museum of Fine Arts, Richmond, included their EDS tests in a 2001 catalogue.[69] Considering that the majority of the objects were analysed by XRF, the focus of the discussion will surround these results, with a minor discussion incorporating the two EDS results. The author recognizes the inherent challenges surrounding the different testing approaches, and for this, no comparative evaluation between the two testing methods has been attempted; instead, each chemically analysed object has been discussed and interpreted within its subsequent method of analysis and not comparatively (EDS versus XRF). The author further recognises that no conclusive opinions can be formulated from the differences in methods of testing and data collected.

Methods of Testing

Testing can assign a particular glass composition to a specific region or period; however, testing methods and interpretations cannot always be reliable. Unfortunately, no perfect technique for understanding all of the components present in a glass sample exists. Two primary methods for testing this glassware were used: one that presented a rapid and non-invasive form of testing via x-ray florescence analysis (XRF), versus an invasive form that involved removing a sample from the tested specimen and examining it through energy dispersive x-ray spectrometry (EDS). XRF analysis provided qualitative (or semi qualitative) results that indicated the larger components present within the glass, but could not categorically provide exact percentages or detailed information of

[69] Joseph M. Dye III. *The Arts of India: Virginia Museum of Fine Arts* (Richmond: University of Virginia Press, 2001), Appendix 2, pp. 528, 533-4.

these elements; it represents a rapid, 'safe' and cost efficient method for determining the basic components within the glass.[70]

Through the removal of a small glass sample, EDS creates a chemical characterisation of the glass by 'exciting' the atomic structure of each element. The number of energy x-rays emitted from the charged or excited particles of the small tested sample is then calculated through an energy-dispersive spectrometer. While EDS has the advantage of close observation, each sample taken may vary in composition, leading to both accurate yet different determinations; multiple single samples from the same glass specimen may thus present different results. In particular, for samples where weathering, aging, or deterioration of the glass occurs (commonly referred to as 'crizzling'),[71] these can cause chemical alterations in the composition of the glass, and alter the interpretation of data depending on how deep within the glass the analysis is taken.[72] Another challenge to consider with EDS analysis is the presence of external particles, materials, or components into the raw batch, which at any point could alter the 'purity' of the intended batch composition.

Because XRF testing only allows for the larger compositional elements within the glass's composition to be detected, the percentages of tested elements cannot be accurately or confidently analysed. Rather, the tested levels can only be comparably understood in relation to other chemical elements. Furthermore, smaller trace elements may be present in quantities that cannot be detected by this testing method, but may be present in undetectable quantities. The objects tested by XRF were each analysed in an area presenting the least amount of surface decoration. The spot area differed on each object and was recorded by a detailed image by both the British Museum and Victoria and Albert Museum; no detailed spot analyses accompany any of the Corning Museum of Glass objects. The following results are classified by institution.

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[70] Stephen Koob. *Conservation and Care of Glass Objects* (Archetype Publications: Corning New York, 2006), pp. 11-13.

[71] Crizzling, a term commonly used by 1676 to describe glass made by the English manufacture George Ravenscroft, which were "being subject to that unpardonable fault called *crizzling"* appeared in many compositions within Europe, America, and East Asia between the sixteenth and nineteenth centuries, a period marked by considerable glass experimentation and compositional changes. See: Robert Plot, *The Natural History of Oxford-shire*, Oxford: printed at the theatre, 1677, cited in Robert J. Charleston, *English Glass and the Glass Used in England, circa 400-1940* (London: George Allen and Unwin, 1984), p. 112. For more research on crizzling see: Robert H. Brill, "Incipient Crizzling in Some Early Glasses, Summary," Bulletin of the American Group – *The International Institute for Conservation of Historic and Artistic works* 12 (1972), pp. 46-47.

[72] Ibid, p. 117.

The Victoria & Albert Museum, London analyses were conducted by Lucia Burgio (Senior Scientist) in February 2015 using a Bruker ArtTAX x-ray fluorescence spectrometer with the following experimental parameters: 50 kV X-ray tube voltage, 600 mA current, and 100 seconds live time. Three objects were analysed by this method: *huqqa* base (I.M.15-1930); cup (C.140-1936); and case bottle (15-1867).

The British Museum, London conducted their analyses using a Bruker ArTAX x-ray fluorescence spectrometer with the following operating conditions: 50 kV X-ray tube voltage, 0-50 keV spectral range, 0.5 mA current, 0.65 mm diameter collimator and 200 seconds live time. Andrew Meek (Conservation and Scientific Researcher) tested the following objects in January 2015: *huqqa* base (1961.10-16.1); covered jar (1878,1230.324); covered bowl (S.342); ewer (SLMisc.343); two spittoons (1887.126.18 and 1887.126.19); cup and saucer (1878,0301.36a,b); cup and saucer (1878,1230.323); and case bottle (SLMisc.341).

The Corning Museum of Glass, New York conducted analyses using a Bruker TRACer III-V Portable x-ray fluorescence spectrometer. The Low-Z measurements were done under a vacuum with a Ti filter, with the following operating conditions: 15 kV X-ray tube voltage, 14.5 µamps, and 300 seconds live time. Corning conducted two separate sets of testing, the first done by Astrid van Giffen (Associate Conservator) in July 2013, and the second by Stephen Koob (Chief Conservator) in June 2015. The objects tested include four *huqqa* bases (69.6.5; 74.6.1; 65.2.14; 71.6.1); one plate (74.6.2); and two case bottles (62.1.6 and 59.1.583).

The following two *huqqa* bases were tested by M. T. Wypyski for the Virginia Museum of Fine Arts, Richmond (cat. Nos. 207 and 208; Acc. Nos. 68.8.137 and 68.8.138, respectively) using an energy dispersive x-ray spectrometer attached to a scanning electron microscope. For each object, a sample was taken from the pontil mark at the base. According to Wypyski:

> *The samples were prepared for analysis by embedding them in epoxy resin and grinding with silicon-carbide paper to expose the sample interiors. The cross sections were thin polished with cerium oxide, and given a high-vacuum carbon coating for conductivity before analysis. The prepared samples were analysed using a Kevex model Delta IV energy dispersive X-ray spectrometer attached to a modified Amray model 1100(1600T) scanning*

electron microscope (SEM). This model EDS does not detect elements below the atomic weight of sodium.[73]

Results

The major component appearing within all tested glass was lead. Overall, the lead (Pb) content of the findings represented the predominant element within the glass compositions, with strong traces of potassium (K), and traces of either iron (Fe), copper (Cu), manganese (Mn), and calcium (Ca) detected in varying amounts, with minor traces of both titanium (Ti) and Zinc (Zn) detected in a few examples. As the tested examples cannot be divided into more precise compositional groupings based on chemical elements present within the glass, the results will be organised according to the institution that conducted the analysis.

The Victoria and Albert Museum conducted a spot analysis on the bottom rim of the cobalt blue cup (C.140-1936), as this area proved reasonably free from gold or other decorative elements (fig. 7). Lead (Pb) was the predominant element, but potassium (K), calcium (Ca) and trace amounts of iron (Fe) and copper (Cu) were also detected (figs. 8 and 9).

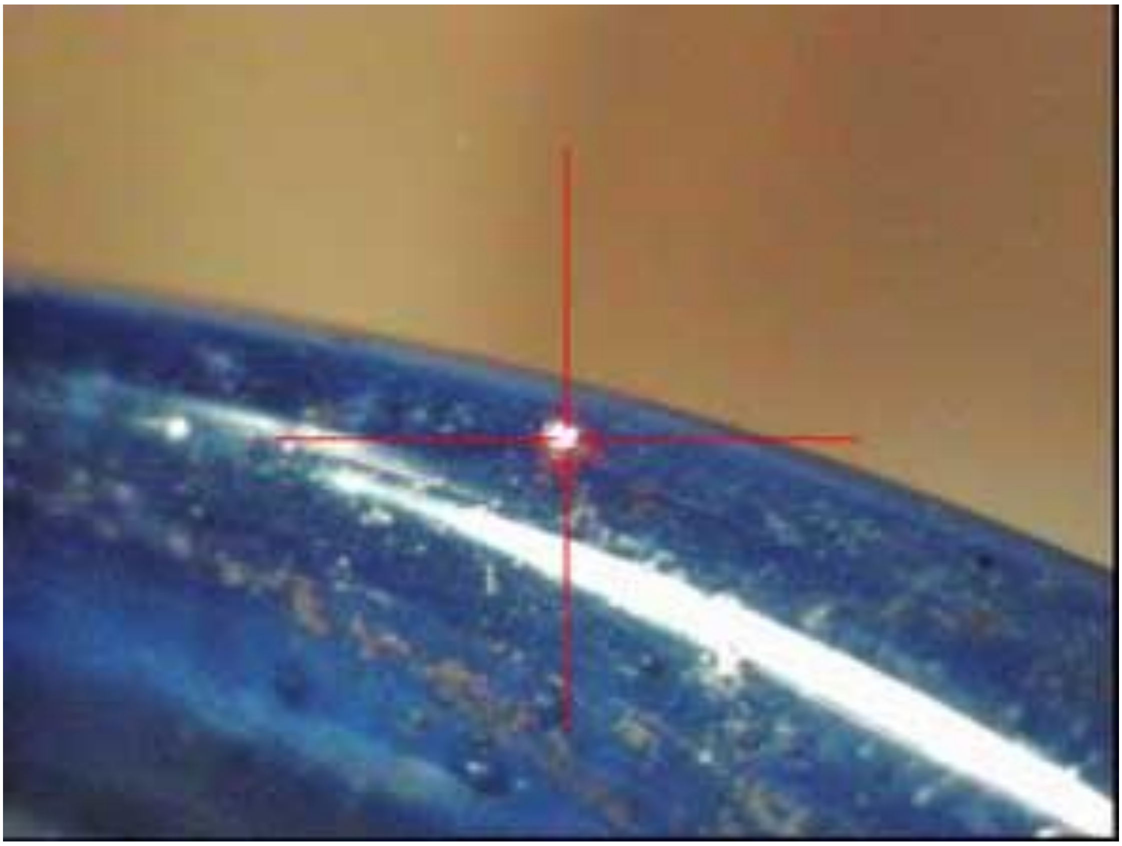

Fig. 7: Spot analysis of cup (V&A C140-1936a)

[73] Joseph M. Dye III. *The Arts of India: Virginia Museum of Fine Arts* (Richmond: University of Virginia Press, 2001), p. 532.

The cobalt blue case bottle (15-1867) was tested behind the standing lady decorating one of the bottle's four sides; this spot analysis also attempted to analyse an area not covered with surface decoration (polychrome paint or gilt) (fig. 10). Lead (Pb) was the predominant element, but potassium (K) and traces of iron (Fe) and manganese (Mn) were also detected (figs. 11 and 12).

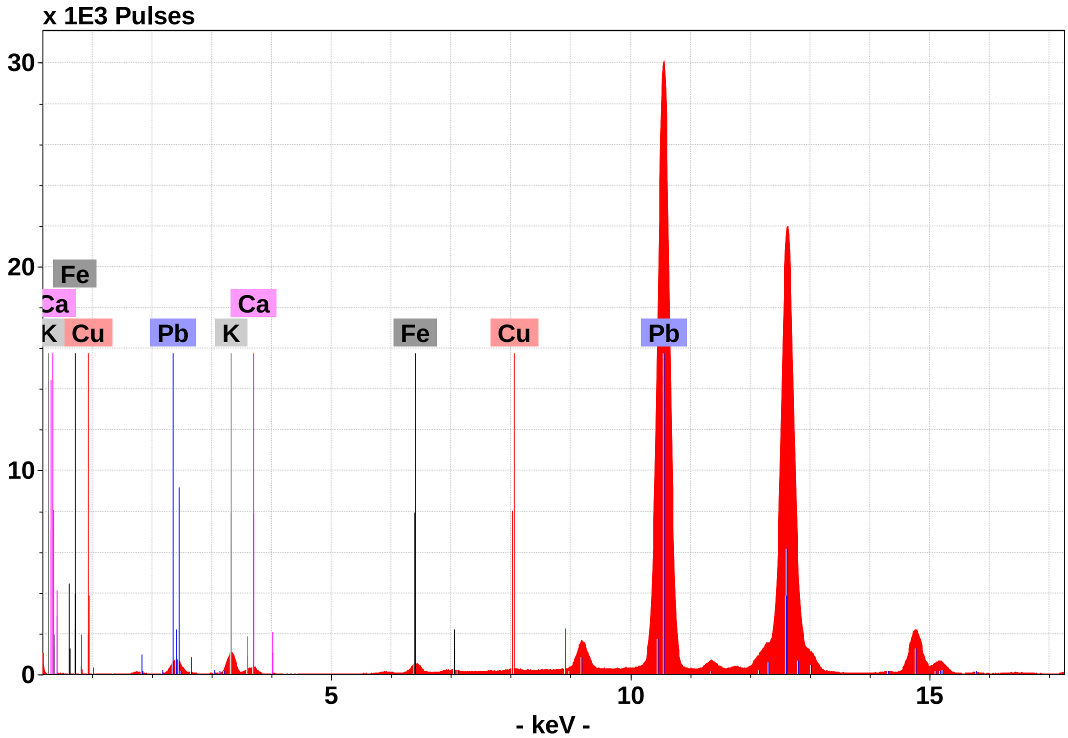

Fig. 8: XRF spectrum from the cup (V&A C140-1936a)

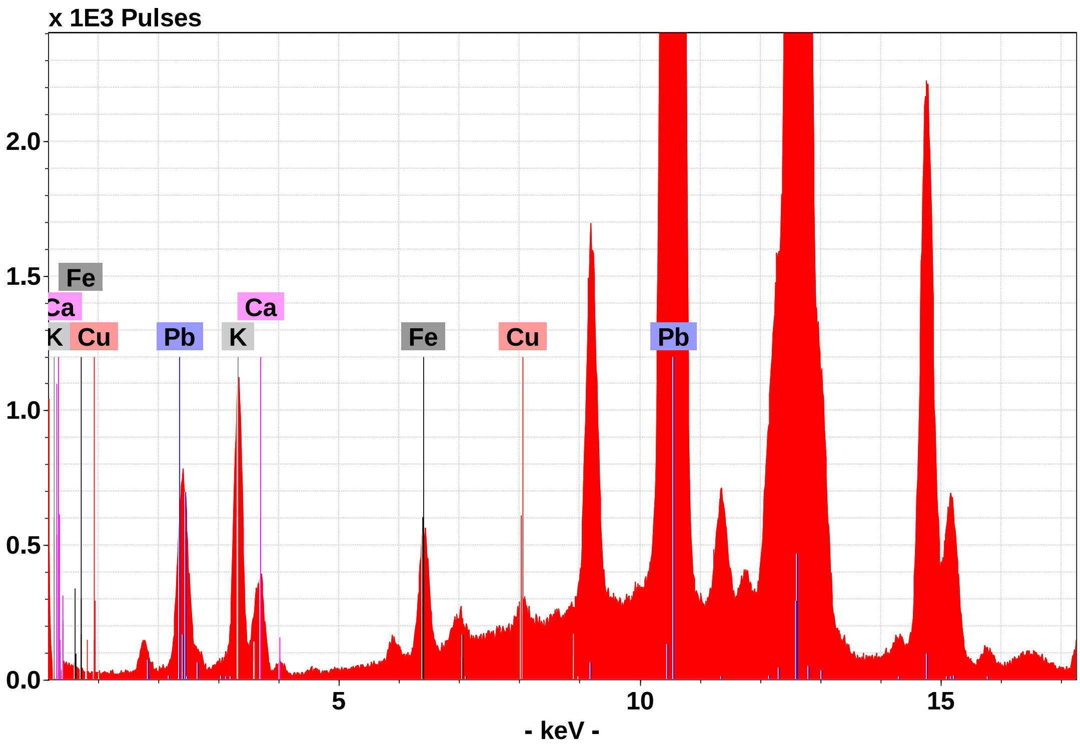

Fig. 9: Detail of XRF spectrum from the cup (V&A C140-1936a)

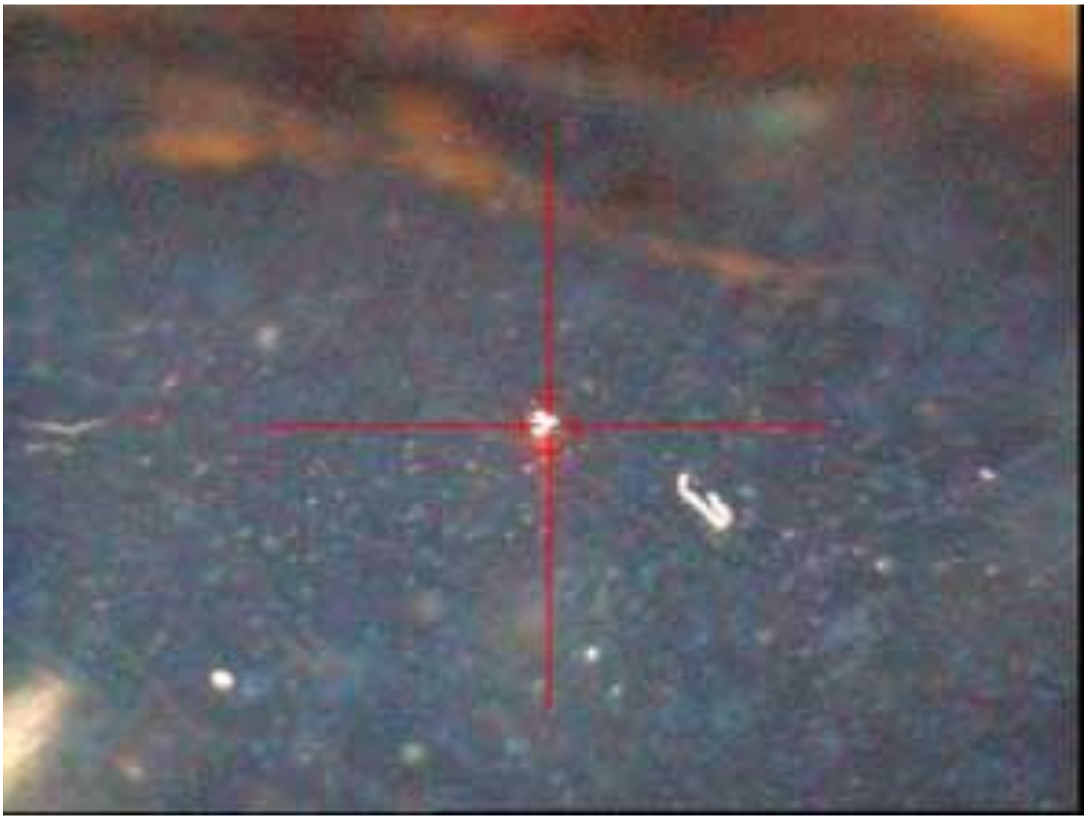

Fig. 10: Spot analysis of bottle (V&A 15-1867)

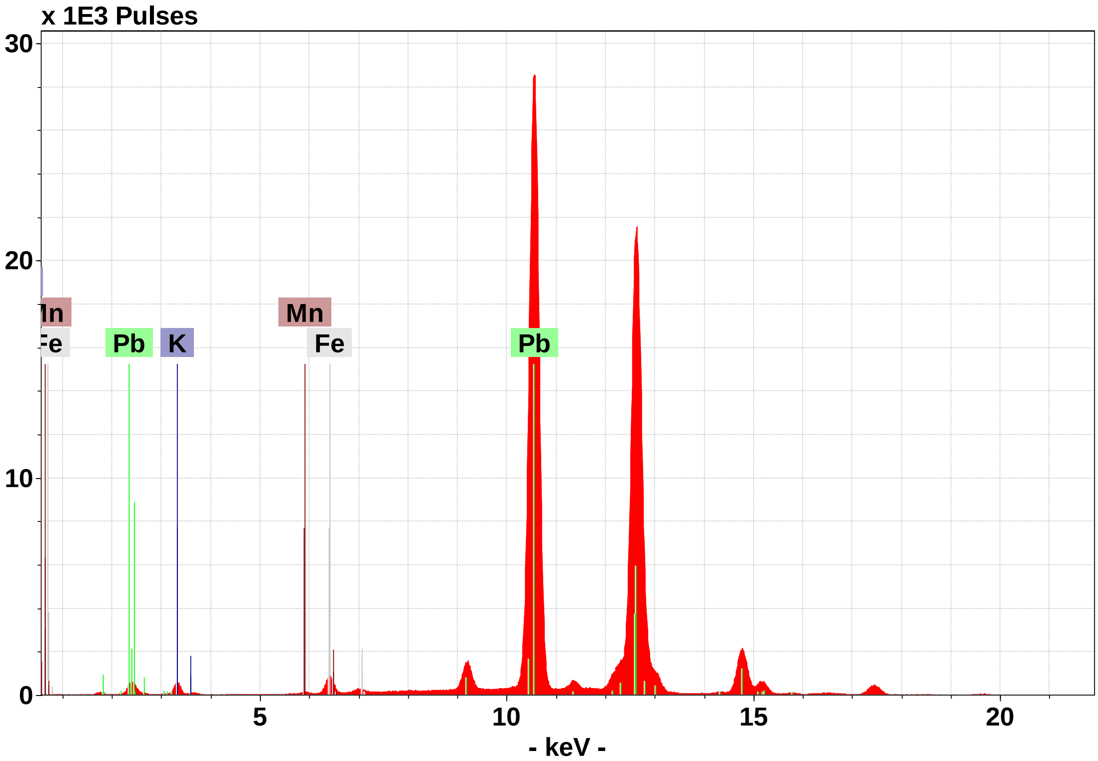

Fig. 11: XRF spectrum of bottle (V&A 15-1867)

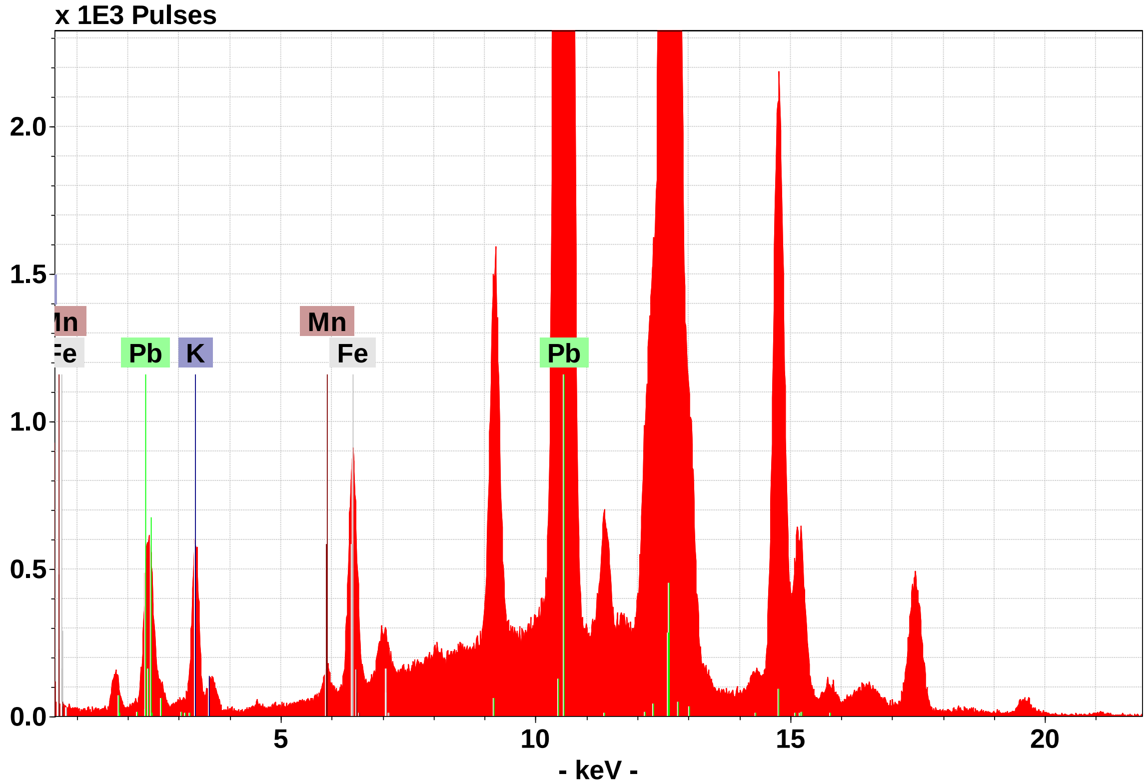

Fig. 12: Detail of XRF spectrum of bottle (V&A 15-1867)

The green globular *huqqa* base (IM.15-1930) is entirely decorated in the reverse-gilt technique, with additional detailing of the leaves done in light green paint. The spot analysis was therefore done in one of the clear leaves where neither paint nor gilding was present (fig. 13). Lead (Pb), iron (Fe) and copper (Cu) were the main elements, but potassium (K), calcium (Ca), and traces of manganese (Mn) were also detected (figs. 14 and 15).

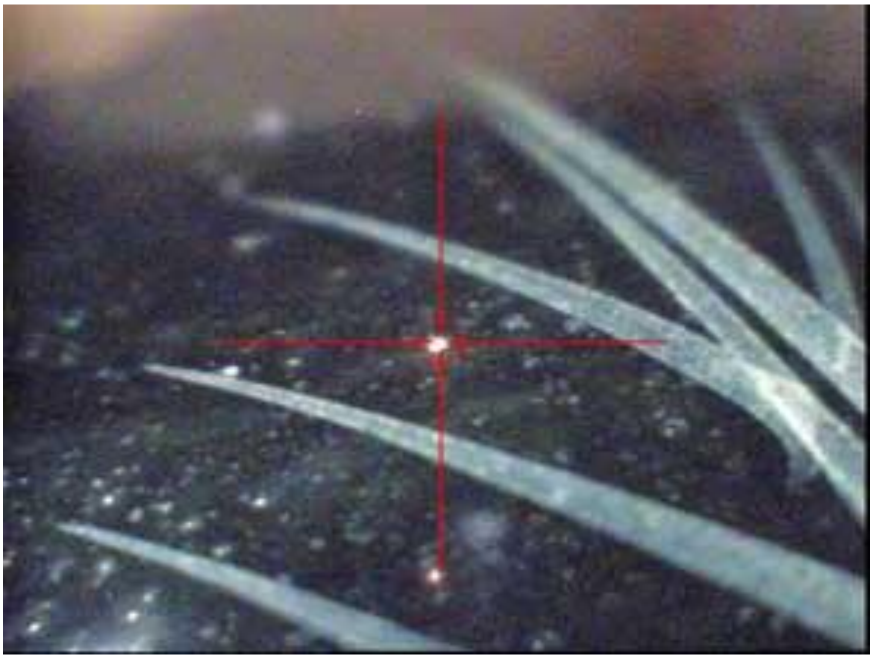

Fig. 13: Spot analysis of *huqqa* base (V&A IM.15-1930)

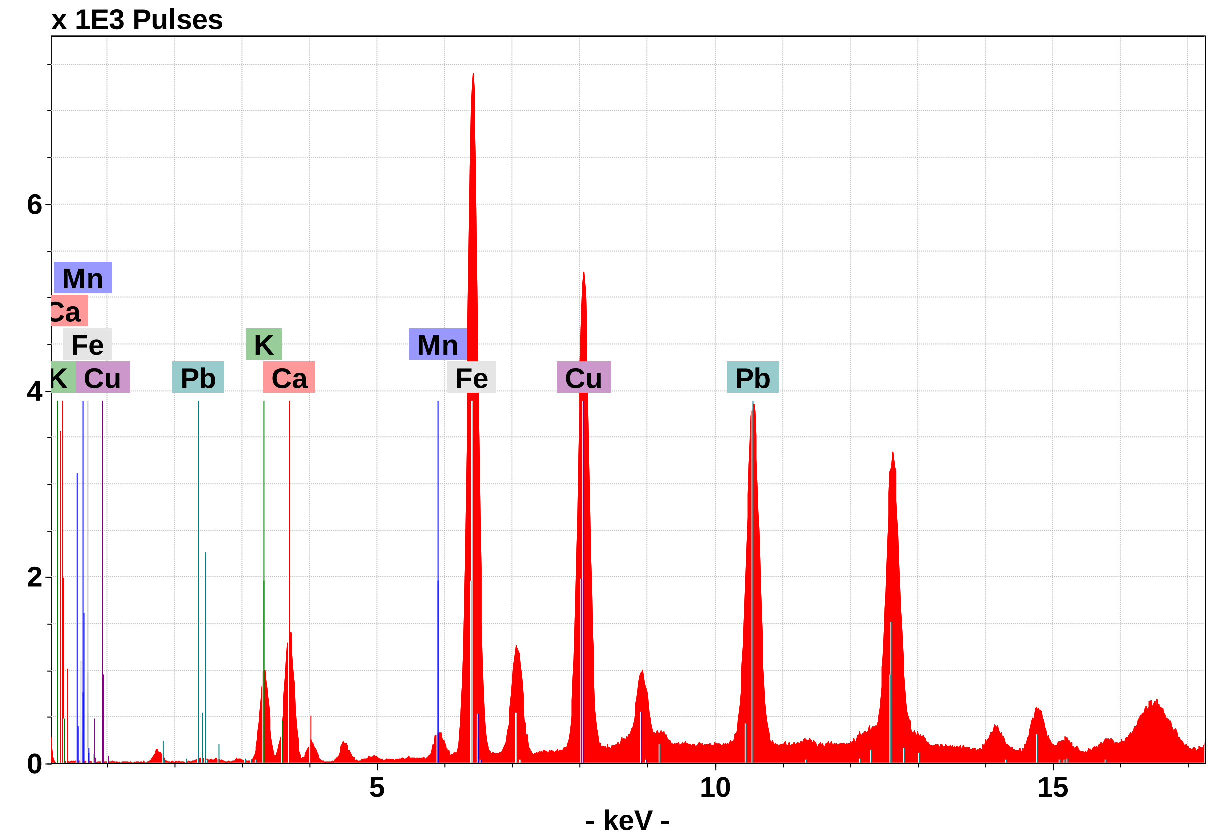

Fig. 14: XRF spectrum of *huqqa* base (V&A IM.15-1930)

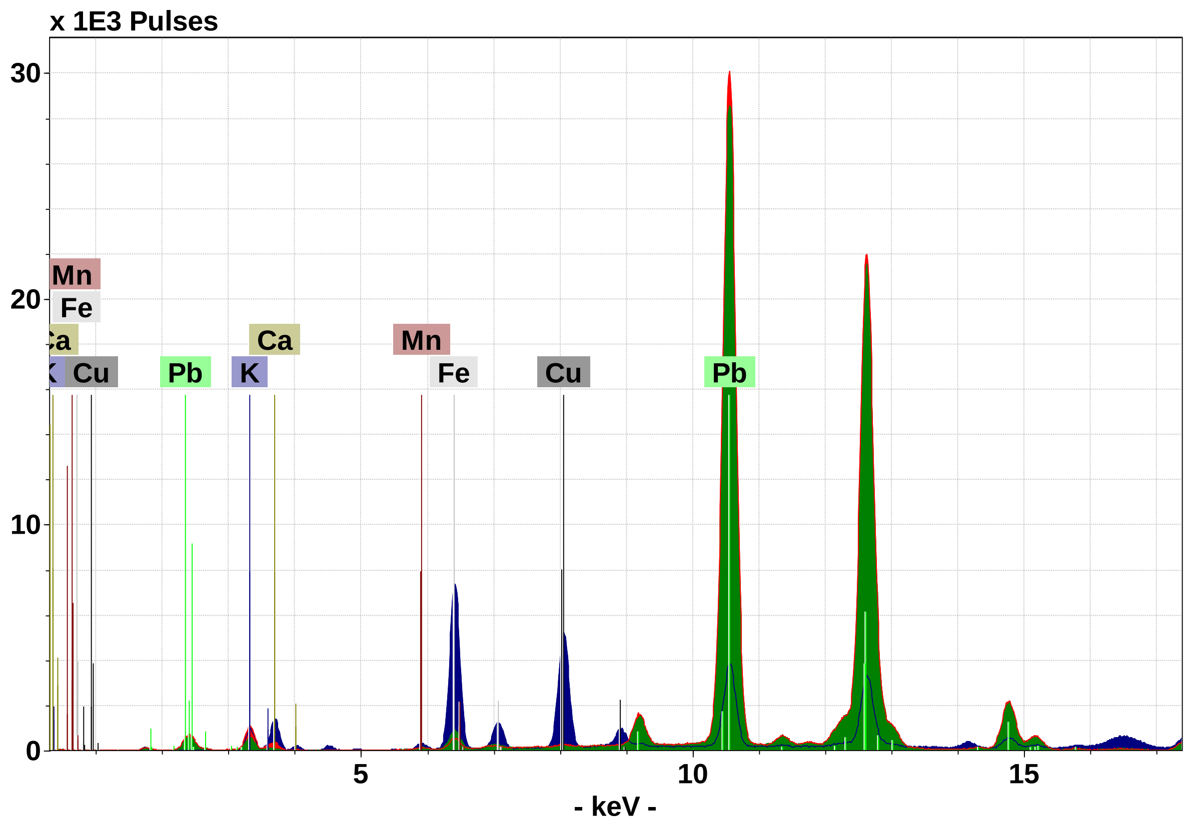

Fig. 15: Detail of XRF spectrum of *huqqa* base (V&A IM.15-1930)

The British Museum analyses were spot tested at points void of surface decoration, and while these exact points of analysis were not specified, detailed images were captured. The tests yielded results comparable to the Victoria and Albert Museum, with all glass characterised as potash-lead, with the exception of the green globular *huqqa* base (1961.10-16.1) that presented elevated peaks of both copper (Cu) and iron (Fe) (figs. 16 and 17).

Another slight difference appeared in case bottle (SLMisc.341), which yielded detectable levels of iron (Fe) that were slightly higher than the other objects (figs. 18 and 19). The other examples all yielded results that were almost identical in compositional peaks, with no other minor trace elements detected with this method of testing. The spot checks and analyses of the objects discussed within the proceeding case studies are included below (figs. 20 –27).

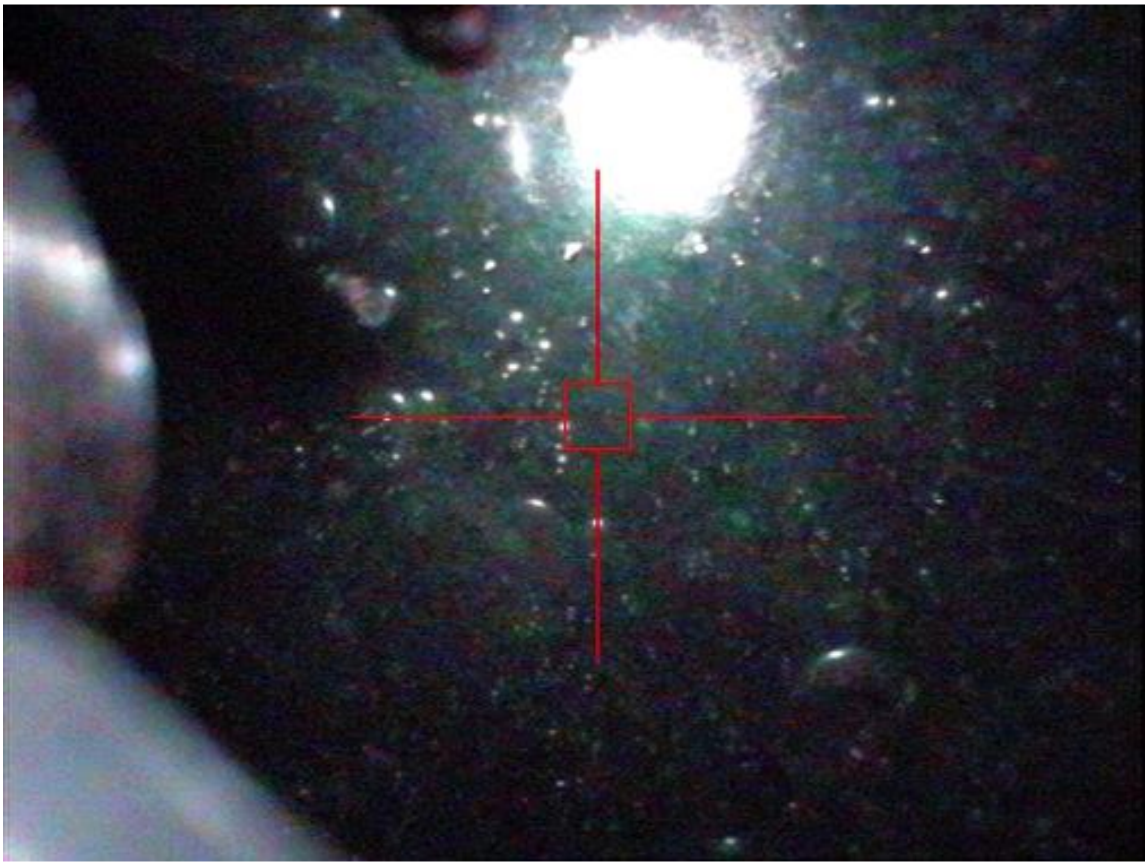

Fig. 16: Spot analysis of *huqqa* base (BM 1961.10-16.1)

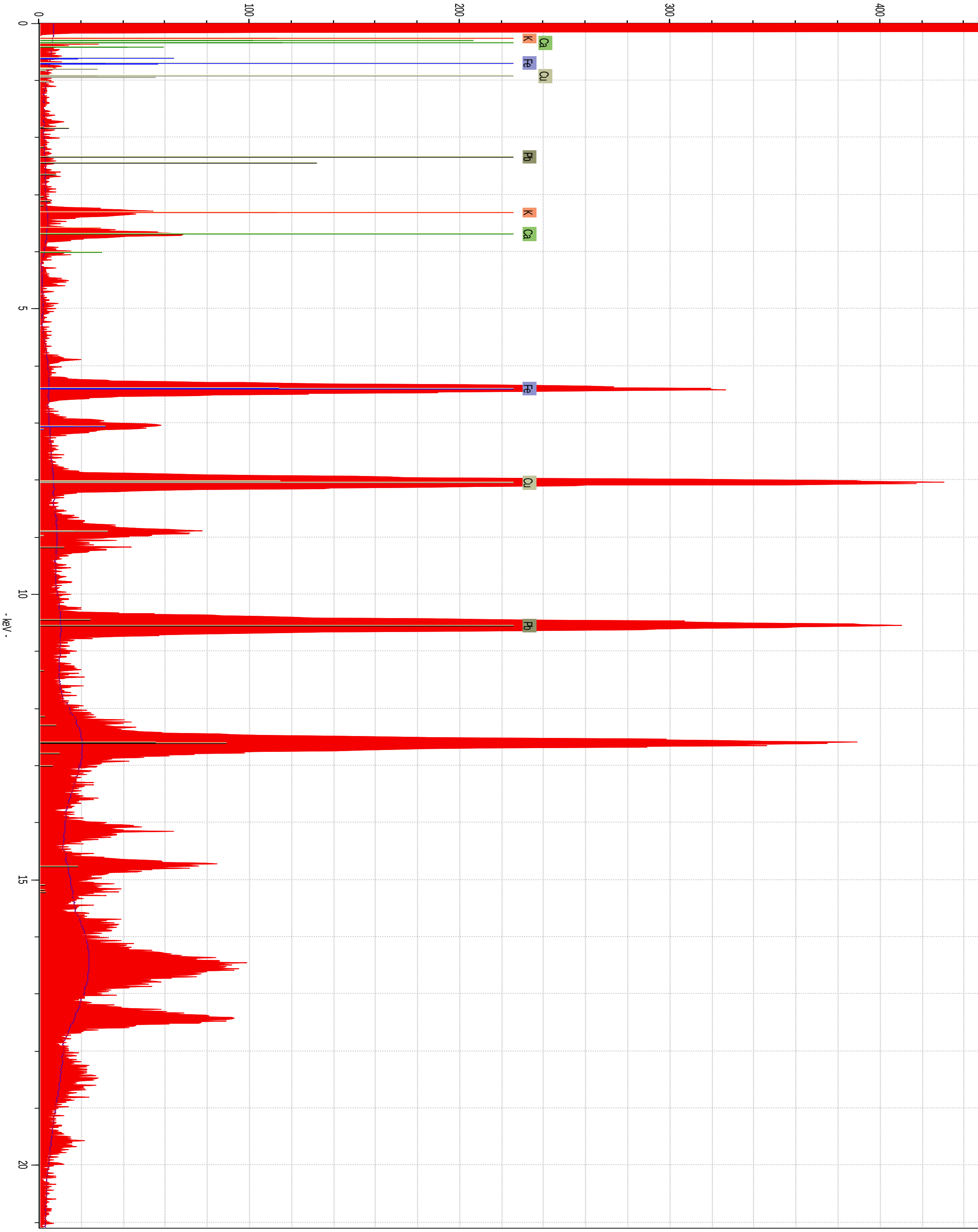

Fig. 17: XRF spectrum of *huqqa* base (BM 1961.10-16.1)

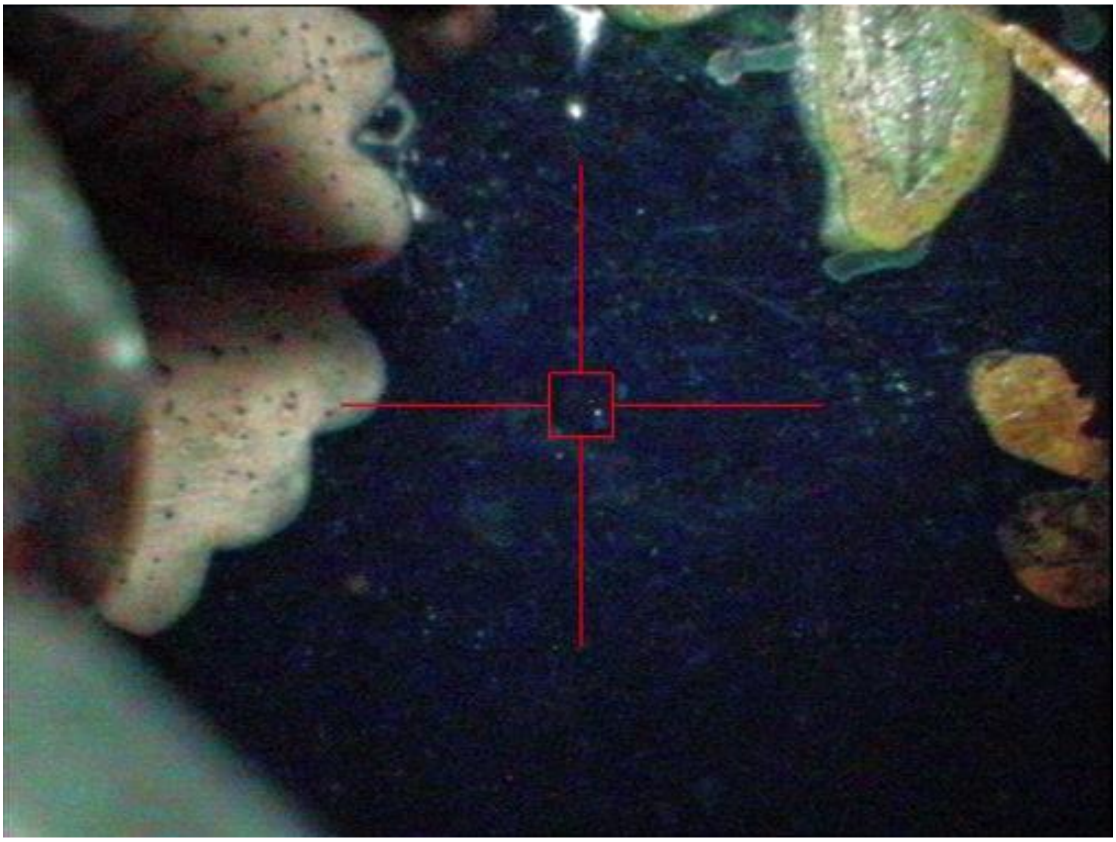

Fig. 18: Spot analysis on case bottle (BM SLMisc.341)

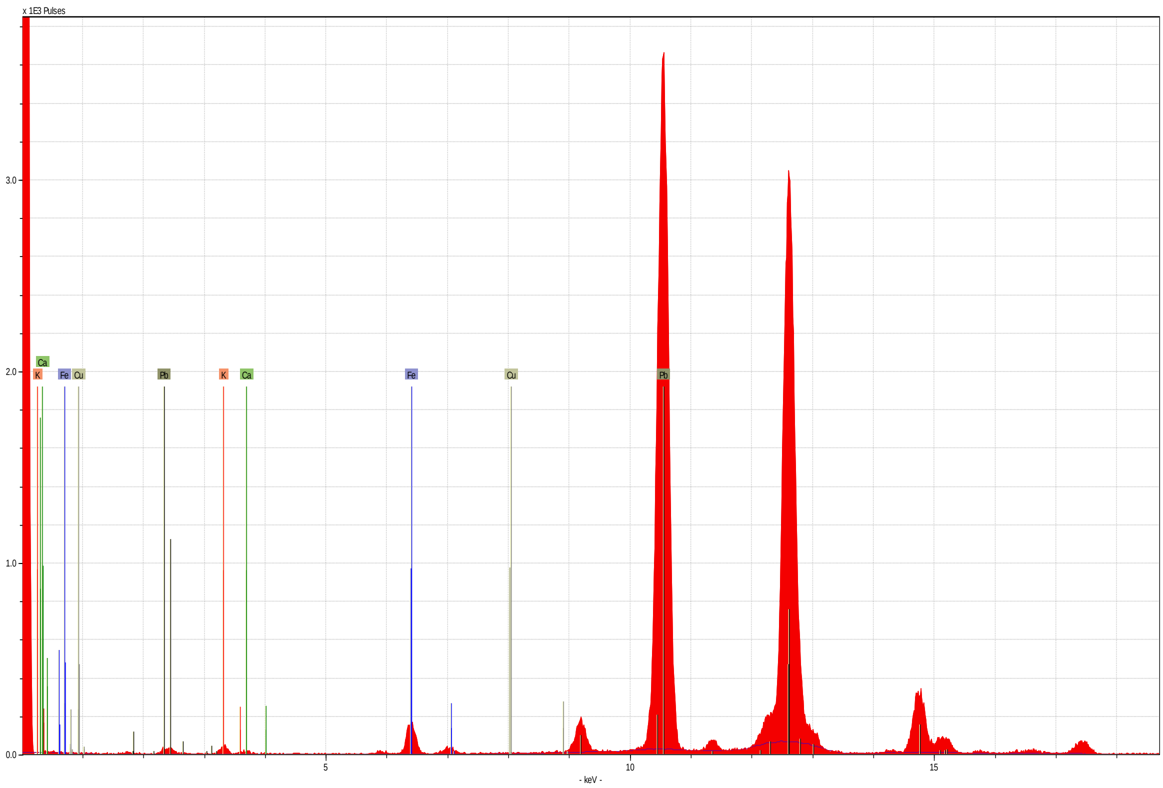

Fig. 19: XRF spectrum of case bottle (BM SLMisc.341)

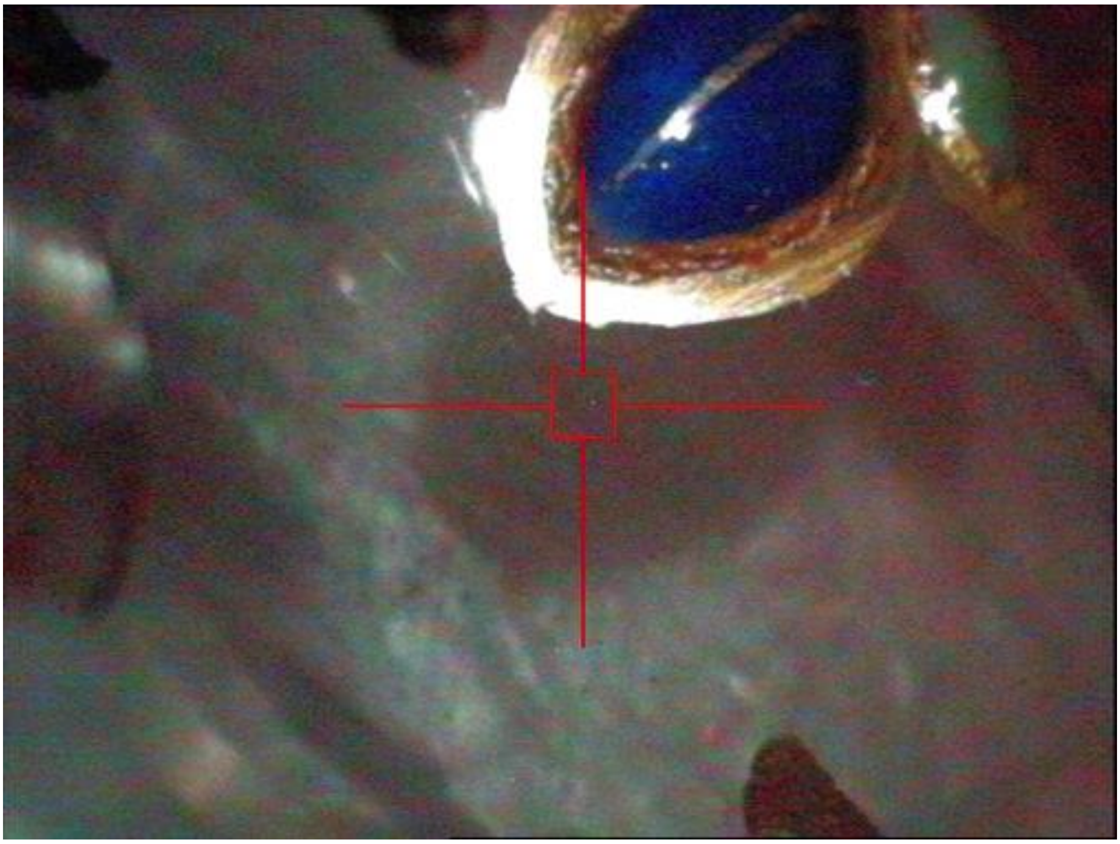

Fig. 20: Spot analysis of covered bowl (BM S.342)

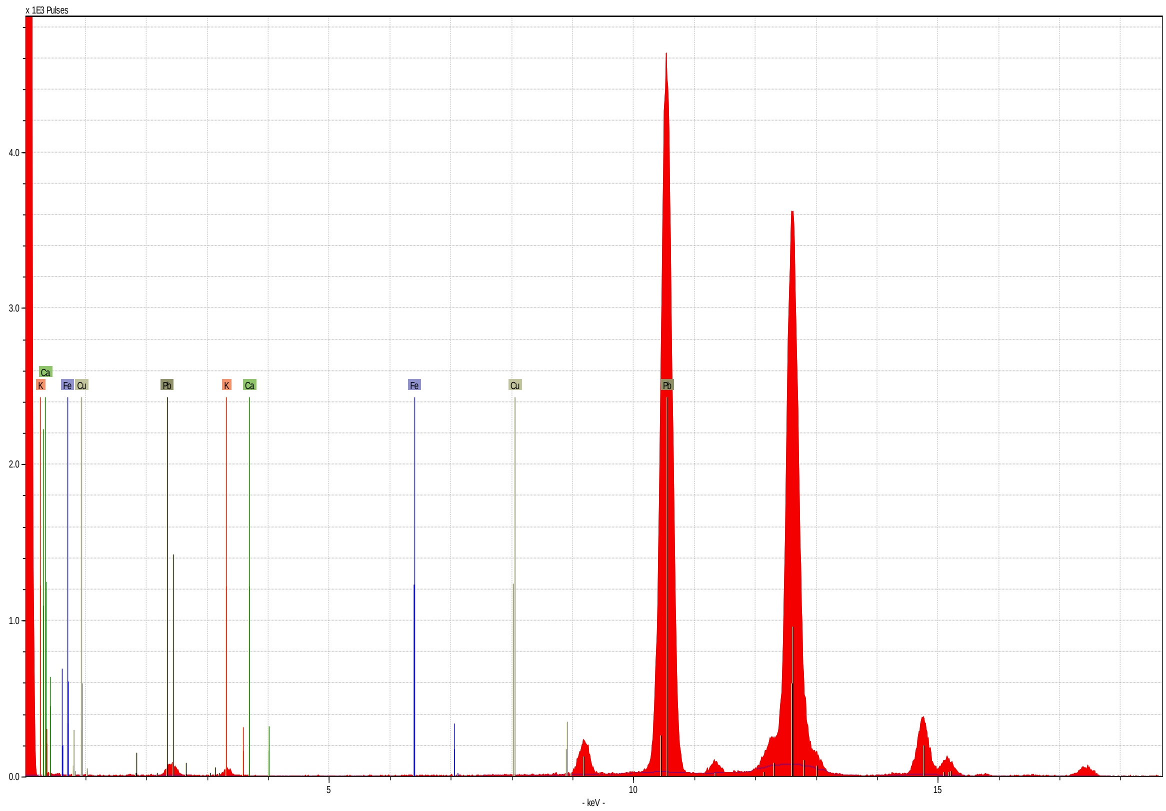

Fig. 21: XRF spectrum of covered bowl (BM S.342)

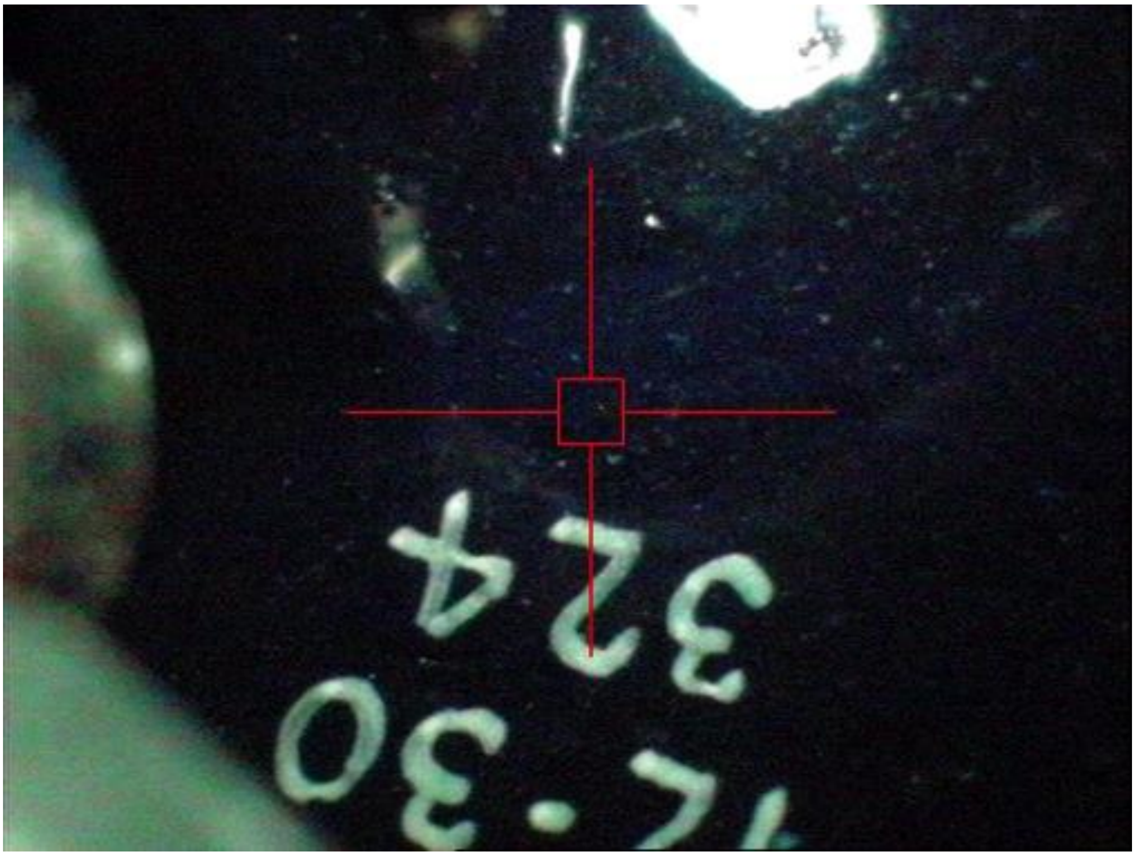

Fig. 22: Spot analysis covered jar (BM 1878,1230.324)

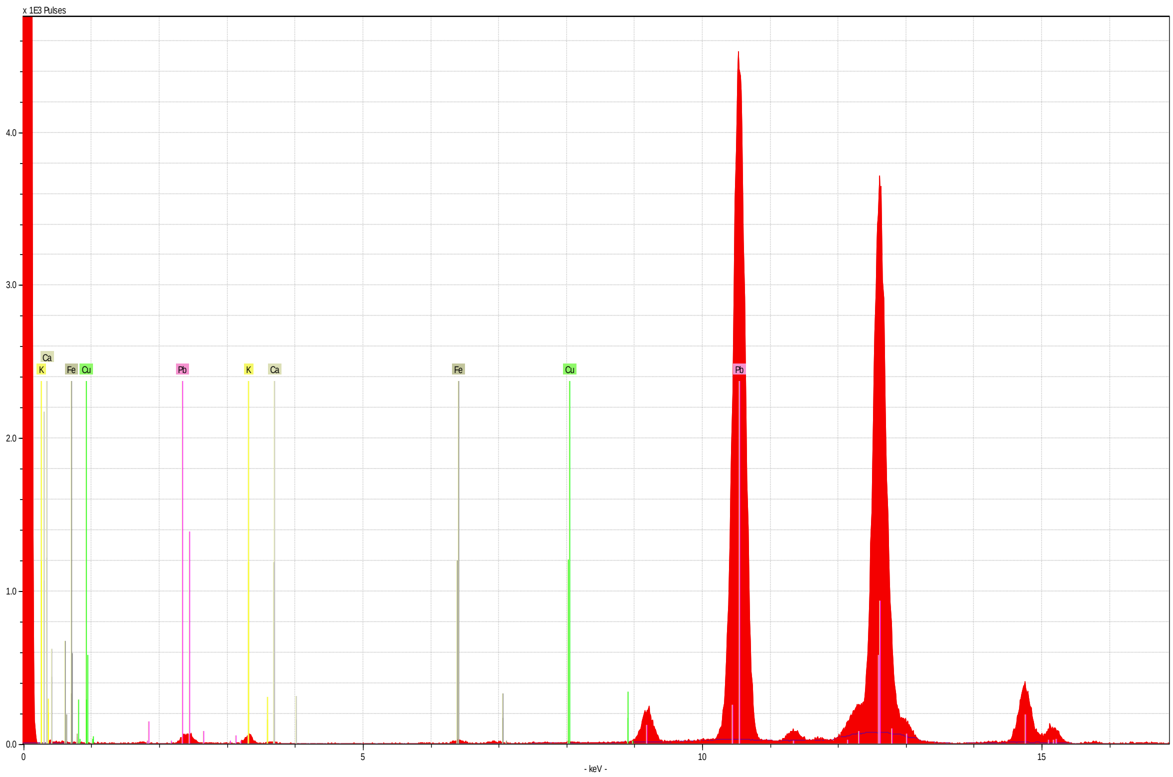

Fig. 23: XRF spectrum of covered jar (BM 1878,1230.324)

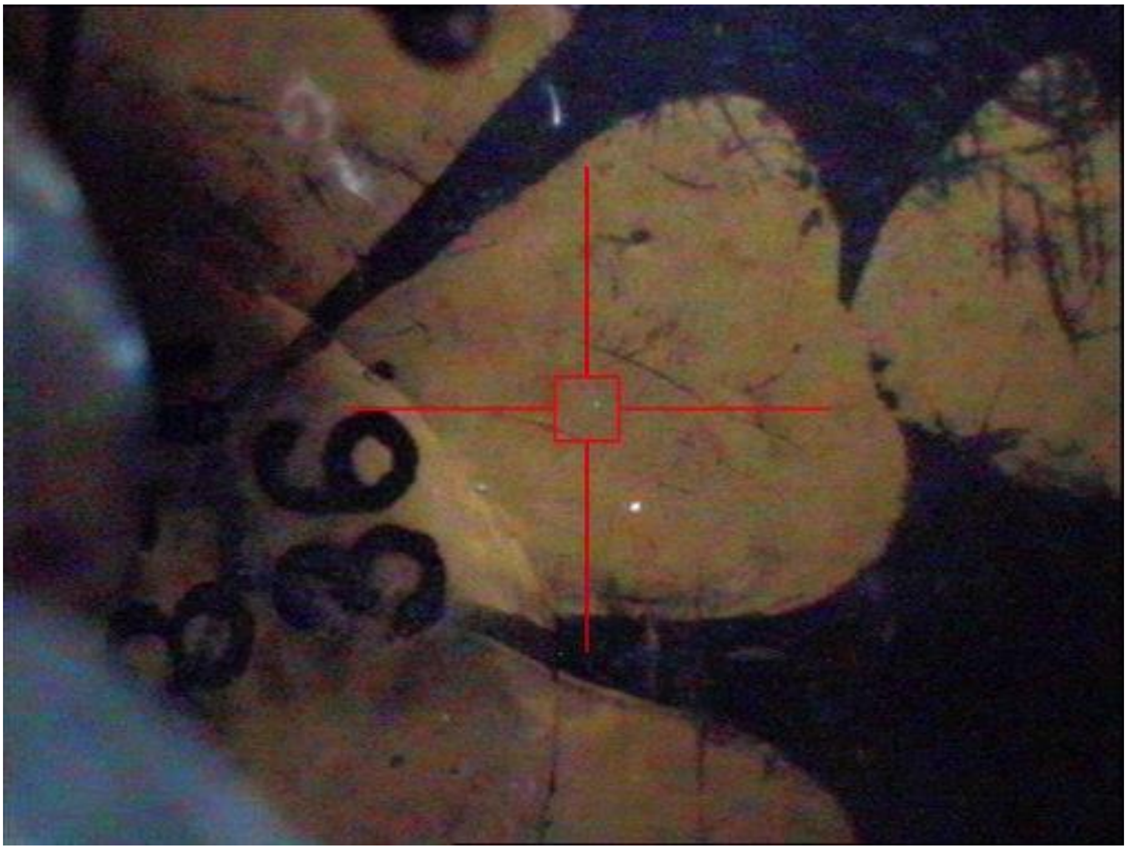

Fig. 24: Spot analysis of cup and saucer (BM 1878,0301.36a,b)

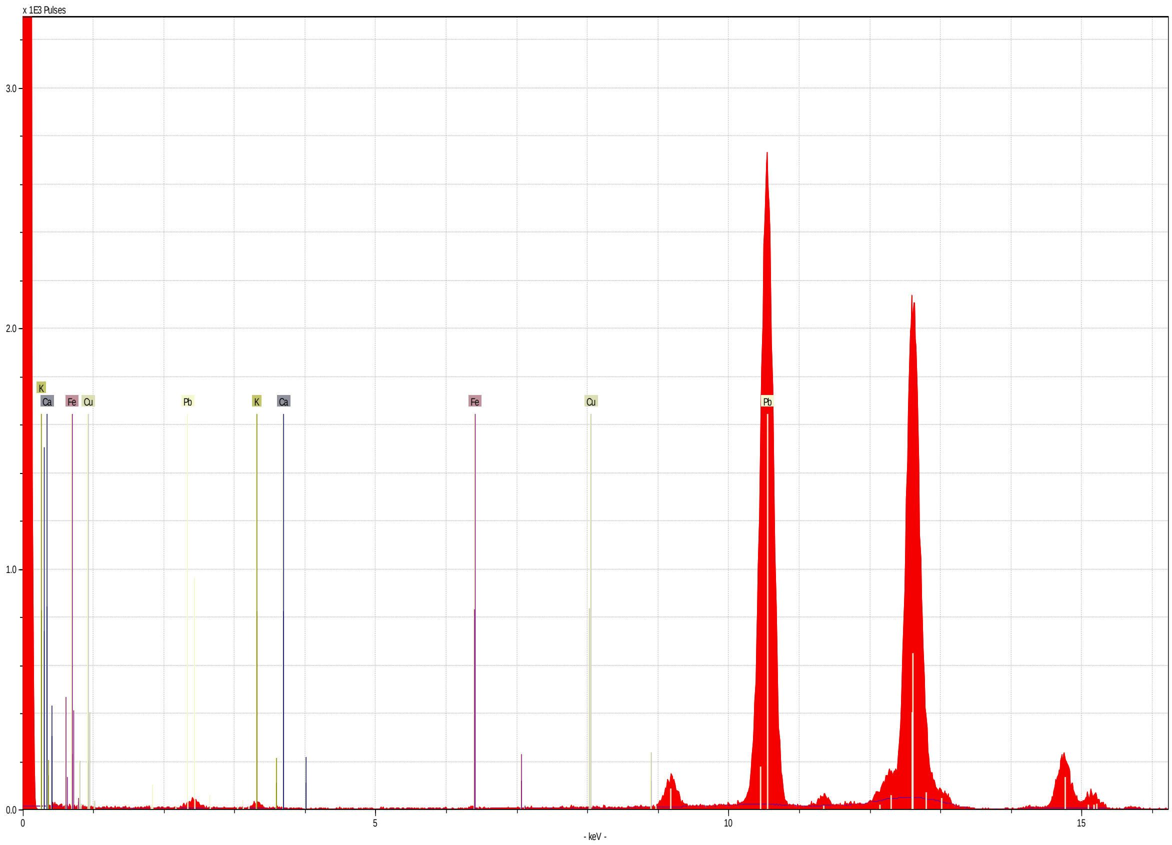

Fig. 25: XRF spectrum of cup and saucer (BM 1878,0301.36a,b)

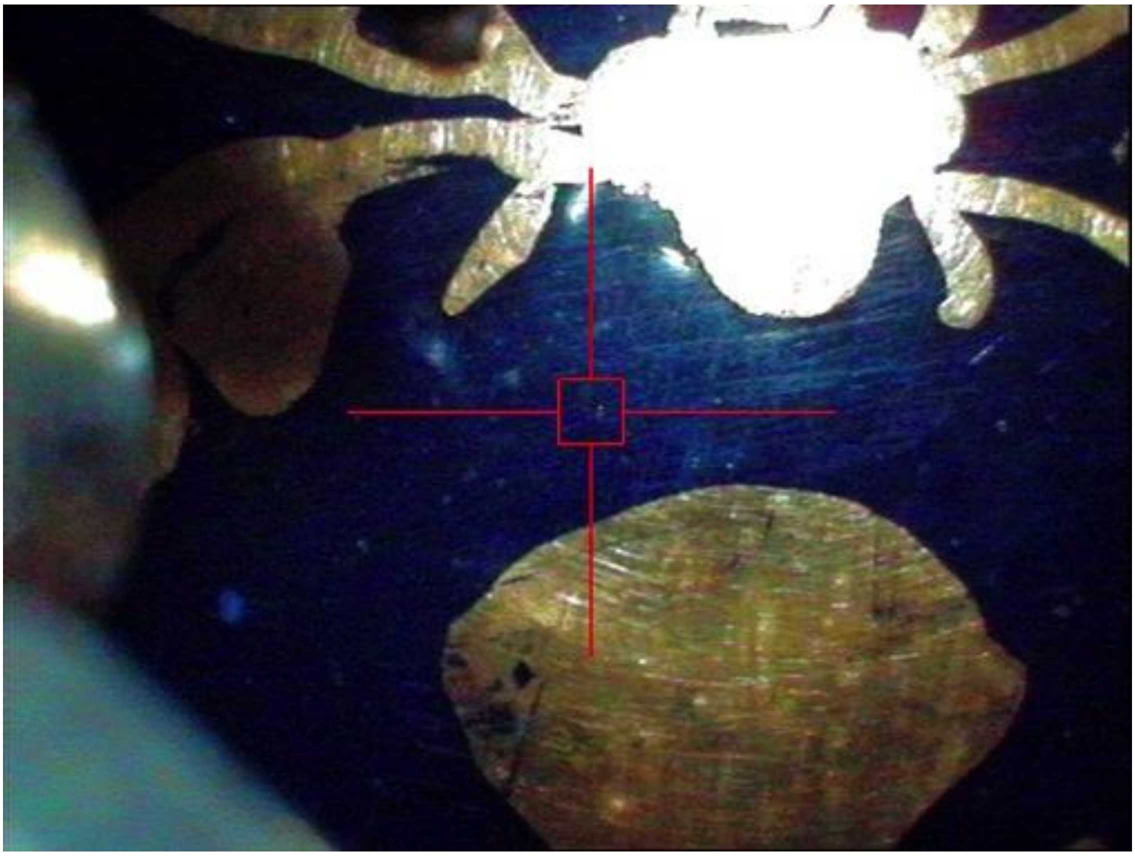

Fig. 26: Spot analysis of ewer (BM SLMisc.343)

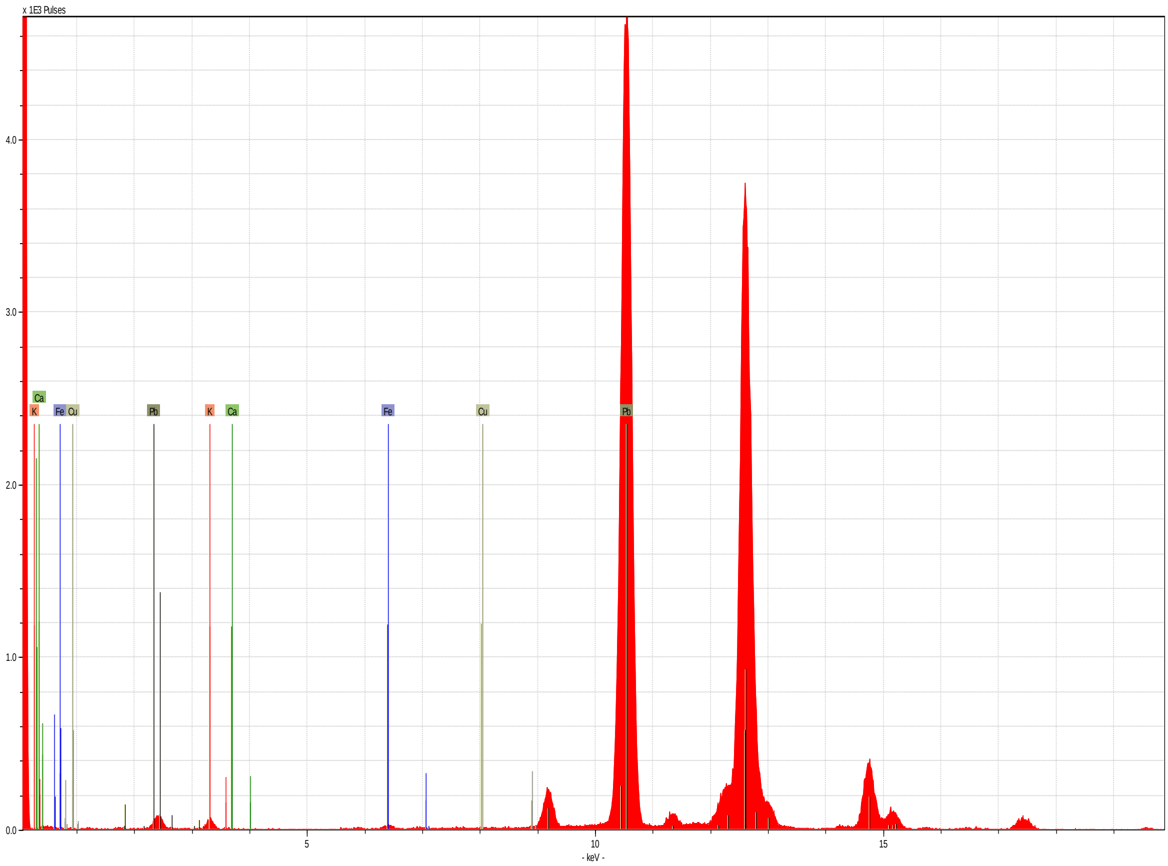

Fig. 27: XRF spectrum of ewer (BM SLMisc.343)

The Corning Museum of Glass analyses yielded results comparable to both the Victoria and Albert and British Museum in that lead comprised the predominant element in all but one tested example. The overall characterisation of the glass can be considered of a lead-potash type. The four *huqqa* bases yielded almost identical results, displaying elevated peaks in lead, with comparable levels of both potassium and calcium, with similar traces of iron, manganese, tin, and zinc (figs. 28-30), with the purple bell-shaped *huqqa* presenting slightly elevated levels of manganese (fig. 31).

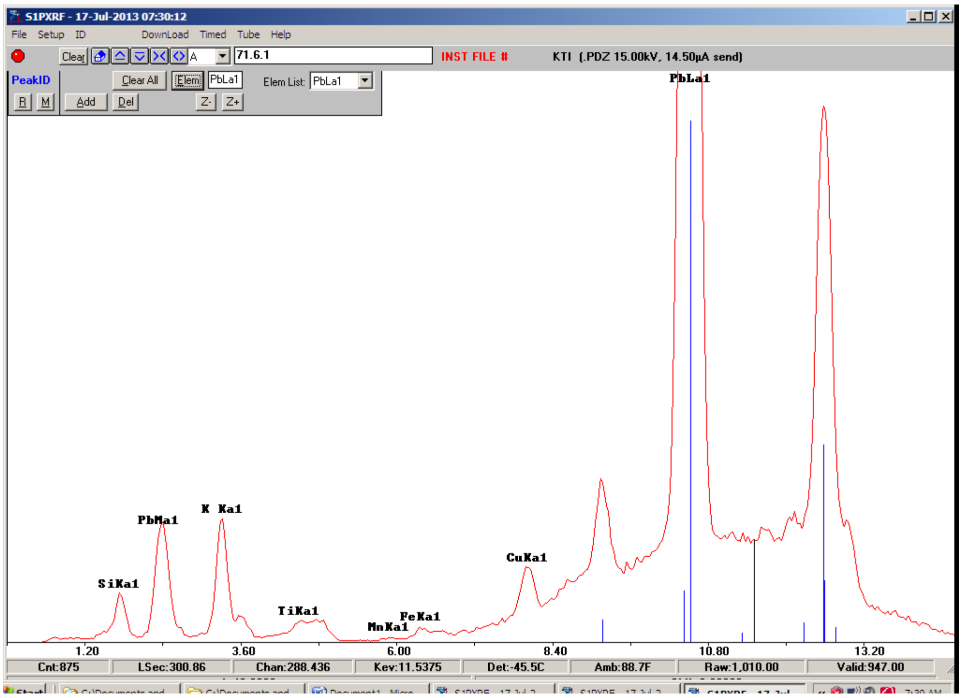

Fig. 28: XRF spectrum of *huqqa* base (Corning Museum of Glass 71.6.1)

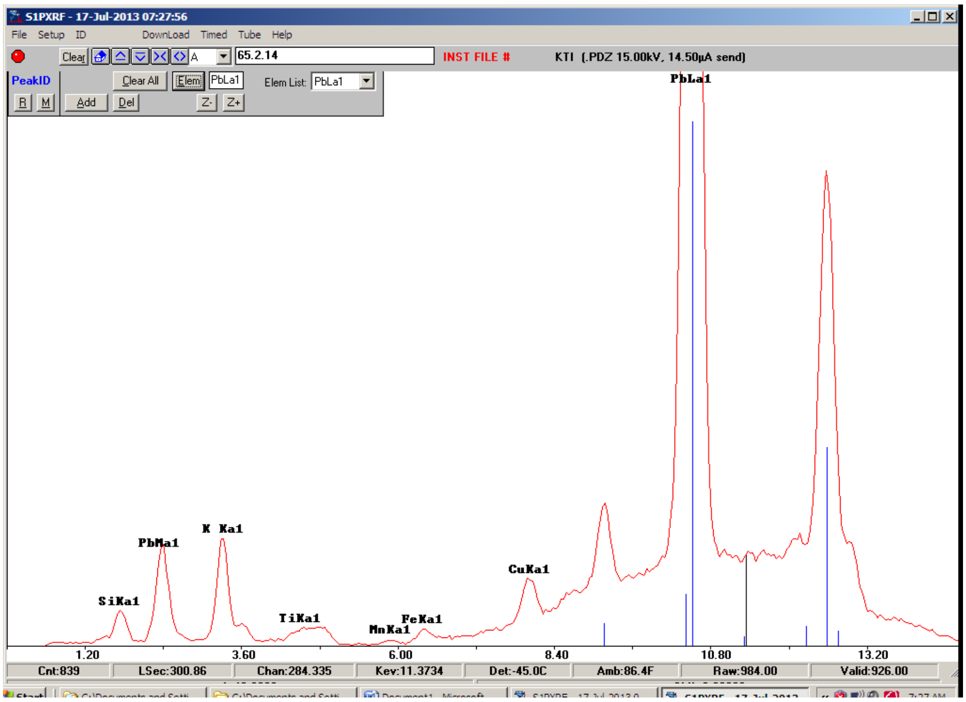

Fig. 29: XRF spectrum of *huqqa* base (Corning Museum of Glass 65.2.14)

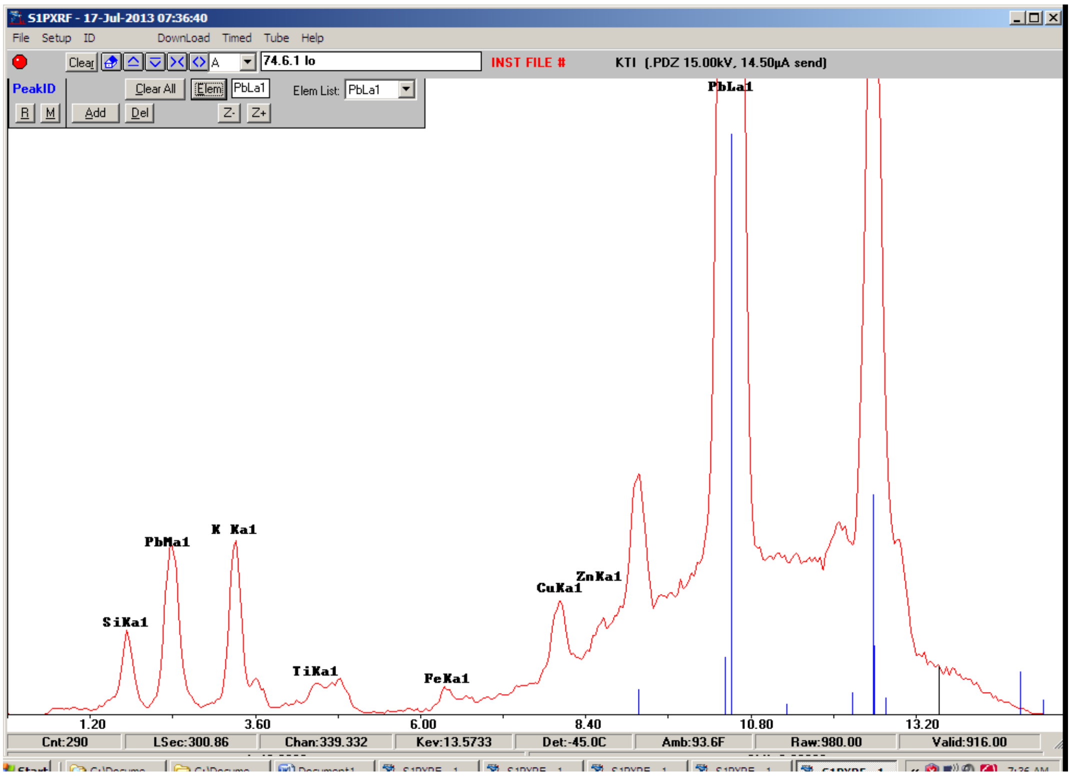

Fig. 30: XRF spectrum of *huqqa* base (Corning Museum of Glass 74.6.1)

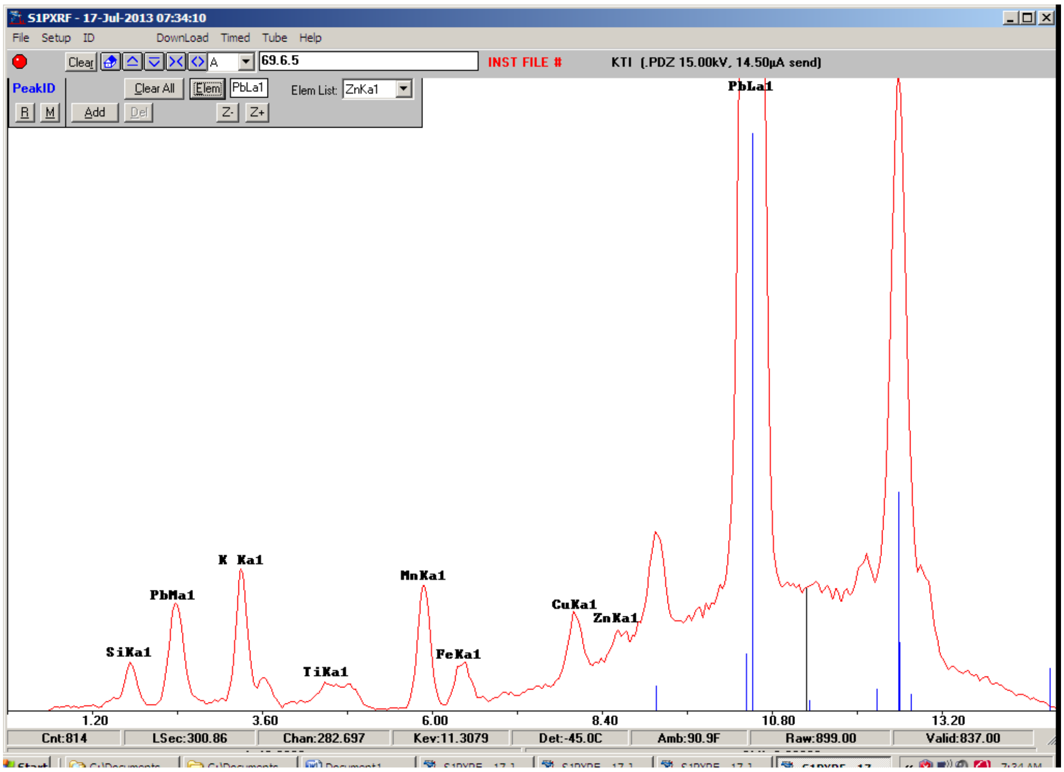

Fig. 31: XRF spectrum *huqqa* base (Corning Museum of Glass 69.6.5)

The two case bottles, one of a translucent cobalt blue glass (fig. 32) and the other of translucent greyish colourless (fig. 33), yielded very similar results, with the blue bottle demonstrating slight iron and copper traces; the comparative levels of potassium to iron were identical. The opalescent pale green plate represents the only variant composition different to the tested examples, remaining on the periphery of this 'potash-lead' characterization of glass (fig. 34). This plate has lower lead traces, but elevated iron and potassium levels with traces of manganese and calcium detected.

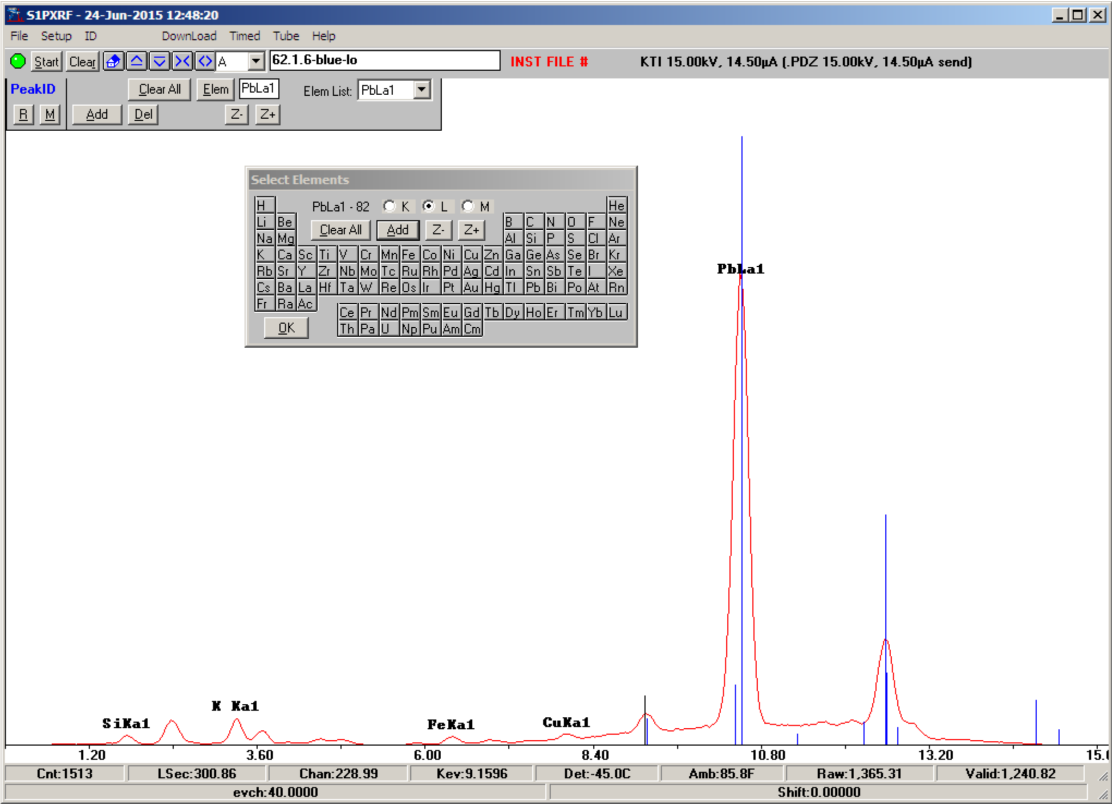

Fig. 32: XRF spectrum of cobalt blue case bottle (Corning Museum of Glass 62.1.6)

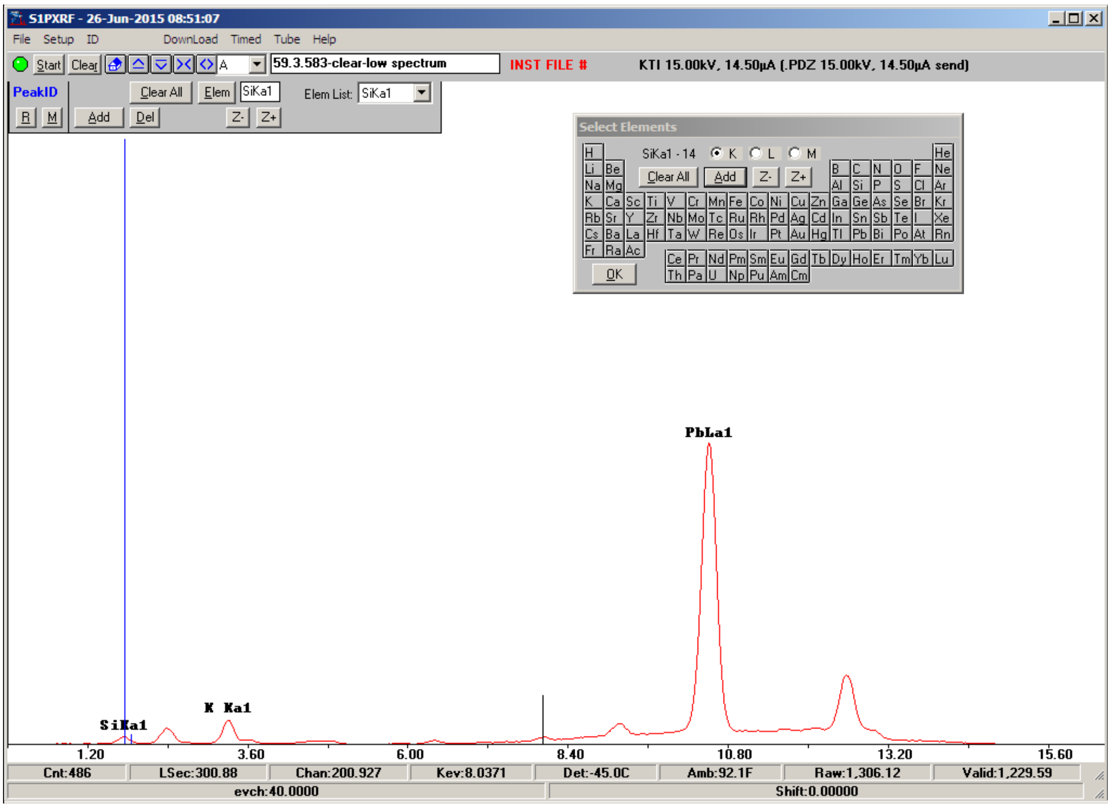

Fig. 33: XRF spectrum of colourless bottle (Corning Museum of Glass 59.1.583)

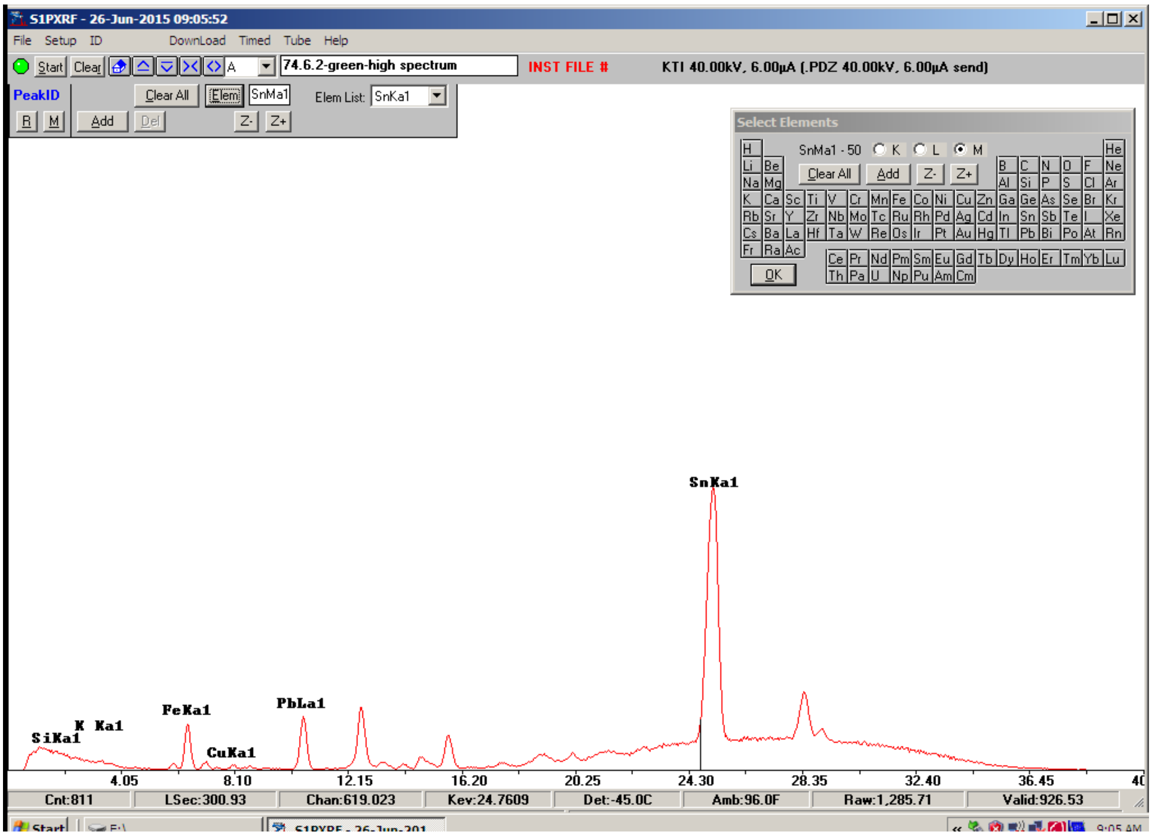

Fig. 34: XRF spectrum of opalescent green plate (Corning Museum of Glass 74.6.2)

The EDS results for the two bell-shaped *huqqa* bases yielded the following compositions, expressed as relative oxide weight percentages.[74] *Huqqa* 68.8.137: lead (Pb) 35.5%; potassium (K) 9.0%; silica (SiO_2) 55%; calcium (Ca) 0.1%; iron (Fe) 0.1%; and alumina oxide (Al_2O_3) 0.2%, and *huqqa* 68.8.138: lead (Pb) 38.8%; potassium (K) 9.2%; silica (SiO_2) 52%; calcium (Ca) 0.2%; iron (Fe) 0.1%; and alumina oxide (Al_2O_3) 0.4%. While the results yield very similar compositional percentages, the glass was not identical. The glass consisted nearly entirely of lead, potassium, and silicon oxides, with traces of alumina, calcium, and iron detected. The results categorise the glass of these two objects as being of a lead-potash-silica variety.

Discussion and Interpretations

A detailed interpretive analysis of the smaller trace elements within each tested object is discussed within the case studies; these smaller elements have not been classified into a compositional grouping for present discussion. Rather, discussion will surround only the primary elements found within the majority of the tested glassware (thus excluding Corning plate 74.6.2). As the glass can be categorically characterised as a potash-lead type, only lead and potassium will be analysed and discussed within a

[74] Joseph M. Dye III. *The Arts of India: Virginia Museum of Fine Arts* (Richmond: University of Virginia Press, 2001), Table 2, Appendix 2, p. 533.

broader understanding of when these elements were introduced into glass making, where they were used, and how this relates to the tested specimens. The two EDS analysed *huqqa* bases will be discussed separately and in relation to comparable methods of chemical analysis.

As very little chemical analysis has been conducted on Indian glass, only a few studies can help compare or contextualise the above results. The qualitative data will be compared to the chemical analyses thus far done on Indian beads and tile glazes. Despite differences in dating and types of objects, these studies, nonetheless, provide a small corpus of scientific material on Indian glass with which to compare these results.

In 1986 Robert Brill tested (via EDS analysis) various specimens previously gathered from archaeological sites in India, ranging from the fifth century BCE to the first century AD.[75] Brill compared this data to analyses of other glass making traditions outside of India, suggesting that a different, two-part glass composition existed, one that consistently yielded high alumina (greater than 5.0%) with conversely low lime (less than 4.0%) ratios.[76] Brill argued that the unusually high yet distinctive levels of alumina resulted from the silica-containing ingredient used, which he speculated could have been pulverised obsidian as opposed to the more traditional crystalline source of silica (quartz sand or pebbles).[77] Brill suggested that the low lime levels within Indian glass could have come from a two-part composition as opposed to the more common three; the lime traces could have already been present within either the alkali (plant ash) or silica (in this specific case, pulverized obsidian), providing a high enough trace to stabilise the batch. While Brill's low-lime, high-alumina composition supports an Indian 'family' of glass gathered from the 5th century BCE to the 1st century AD, this distinctive composition of glass appears in later analyses of sixteenth and seventeenth century tile glazes from the Delhi region.[78]

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[75] Brill comments on the nature of his testing that, "through the cooperation of several Indian archaeologists and physical scientists, we have assembled and analyzed a group of 38 glasses excavated in India. Most of the glasses came from known sites, but, unfortunately, none are closely dated. They included various types of objects, colors, extents of weathering, etc."; Robert H. Brill, "Chemical Analyses of Some Early Indian Glasses," *Archaeometry of Glass. Proceedings of the Archaeometry Session of the XIV International Congress on Glass* (New Delhi: Indian Ceramic Society, 1986), pp. 2-3.
[76] Comparatively, both Islamic and Mediterranean glass have alumina contents of less than 3%; Ibid, p. 2.
[77] Ibid (1986), p. 3.
[78] Maninder Thilo Rehren Gill and Ian Freestone, "Tradition and Ingenuity in Mughal architectural glazed tiles," *Journal of Archaeological Science* 49 (2014), pp. 546-555.

Thirty samples of tile glazes were gathered from seven different sites around the Delhi region, with each analysed through EPMA-WDS and SEM-EDS analyses (fig. 35).[79] The results showed that the glazes were all of a soda-lime silica variety, with slight variation of alumina and lime levels amongst samples; yet the majority of glazes were characteristically typical of Brill's earlier results, yielding high alumina percentages (between 4.84-8.35%) with conversely low lime levels (between 1.20-2.62%).[80]

Fig. 35: A mosaic composition of glazed tiles on the wall of Nila Gumbad Delhi, circa 1625 (Photo: courtesy of Maninder Gill 2014)

The authors speculated that, "Indeed, the analyses of glass specimens from numerous sites all over the country dating from the early centuries of the first millennium BCE to the modern times, reveal similar compositional profiles, signifying a long unchanged tradition and technology, not least on account of the nature of locally available raw materials".[81] The composition of these few tested specimens, despite differences in dating and type of objects analysed, nonetheless suggests that a soda-

[79] Thirty samples were from these Mughal sites around Delhi: Bu Halima Gate (sixteenth century); Arab-ki Sarai Gate (1560-1); Khairul Manzil Masjid (1561-2); Atgah Khan's Tomb (1566-7); Sabz Burj (sixteenth century); Nila Gumbad (circa 1625); Quli Khan's Tomb (seventeenth century); Ibid, p. 546.

[80] Ibid, table 2, p. 551.

[81] Ibid; the following references further cited: Brill, 1987; Dussubieux et al., 2010; Kanungo and Brill, 2009; Sode and Kock, 2001.

lime-silica variety – one that is both high in alumina and low in lime – could be a defining characteristic of these Indian glass compositions.

While the soda-lime-silica variety of glassware analysed from the fifth century BCE to first century AD, and again from the sixteenth and seventeenth century, is both distinctive and different from the potash-lead glassware within this thesis, the varying percentages of lead oxide within the glass can further characterise them as different. The analysed glass of this thesis consist nearly entirely of lead, potassium, and silicon oxides, with only traces of alumina and calcium detected. Conversely, lead oxide only appears as a colourant for yellow and green tile glazes, as detected in certain Delhi samples ranging in weight percentages of 9 to 16%.[82] The presence of lead within glazes (traditionally also mixed with tin) has a particularly long history of use as a colourant in the manufacture of yellow and green glass and ceramic glazes; its use in India dates to the first century AD.[83] While lead exists within Indian glass, its lower percentages differ considerably from that of the potash-lead glass discussed within this thesis. This coupled with differing alumina and calcium (lime) levels detected between the glassware, suggests a different characterization of glass, and possibly even origin of manufacture. By examining the dominant elements of both lead and potassium detected within the analysed objects of this thesis, one can more accurately categorise the glass variety and establish its place of manufacture.

Lead oxide represents the predominant compositional element within the majority of the tested glassware, yet its high percentage within glass was only introduced into English glassmaking from the late seventeenth century.[84] The introduction of lead into commercially manufactured glass, to a degree defining it as lead or crystal glass, has been popularly attributed to the London glassmaker George Ravenscroft, whose efforts to produce fine, crystal-like glassware similar to the highly regarded Venetian *cristallo* soda glass was patented in 1674.[85] While both Venetian and English glassmakers were already manufacturing translucent *cristallo* glass in England from the late sixteenth century, Ravenscroft's desire to create crystalline glass

[82] Gill and Freestone (2014), table 2, p. 551.
[83] Ibid, p. 552; Robert H. Brill. *Chemical Analyses of Early Glasses,* Vols. 1 and 2. (New York: Corning, 1999); M. Tite, T. Pradell and A. Shortland, "Discovery, production and use of tin-based opacifiers in glasses, enamels, and glazes from the late Iron Age onwards: a reassessment," *Archaeometry* 50 (2008), pp. 67-84.
[84] Stephen Markel, "Western Imports and the Nature of Later Indian Glassware," *Asian Art* (1993), p. 51.
[85] John P. Smith and David Whitehouse, "A Basin Attributed to George Ravenscroft," *Journal of Glass Studies* 55 (2013), p. 102.

resembling rock crystal resulted in new experimentations in glassmaking. In May 1674 he was awarded a seven year royal patent for a glass "not formerly exercised or used in this our Kingdome, and by his greate disbursements having soe improved the same as thereby to bee able to supply both inland and outland markets."[86]

While the English were influenced by the elegant forms and transparent quality of Italian *cristallo* glass, the introduction of lead at the elevated levels associated with late seventeenth century Ravenscroft glass does not correspond with contemporaneous Italian glass; *cristallo*, *Vitrum Blanchum*, and 'other' classifications of sixteenth to eighteenth century Italian glassware yielded no traces of lead, with potassium levels just below 3%.[87] Chemical analyses seem to infer that the lead present within Ravenscroft's glass represented a uniquely English experimentation in glass intended to create transparent *cristallo* glass that was hard enough to sustain both engraving and use.

By the time of Ravenscroft's death in 1681, the use of lead within glass mixtures seems to have been widely known and practiced in England, with his followers continuing to produce glass well into the eighteenth century.[88] Further analyses of late seventeenth century English crystal glassware reveal elevated lead compositions that correspond to the levels present within the thesis's tested glassware. Dungworth and Brain have both undertaken extensive analysis of English lead glassware of the late seventeenth century; their recent 2005 results of fifty-two analysed samples indicated lead glassware that were composed almost entirely of the oxides of lead, silicon and potassium.[89] With corresponding lead percentages arranged into four groups, the results indicated that the dating of vessels could be chemically traced by the corresponding levels of potassium and lead; over time less potash and more lead oxide appeared in the glass.[90] Group one was dated from 1674-85 and yielded lead oxide (PbO) of between 16.4%+/-2.4 with potassium oxide (K2O) at 16.6%+/-0.8; group two

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[86] Patent quoted in J. Paul Hudson, "George Ravenscroft and His Contribution to English Glassmaking," *Antiques* 6 (1967), p. 822.

[87] Marco Verita and S. Zecchin, "Thousand Years of Venetian Glass: the evolution of chemical composition from the origins to the 18th century,*" Annales du 17e Congres de l'Association Internationale pour l'Histoire du Verre Antwerp, Belgium: AIHV* (2009), pp. 602-613; and Augusta Lima Teresa Medici, Antonio Pires de Matos and Marco Verita, "Chemical analysis of 17th century Millefiori glasses excavate in the Monastary of Sta. Clara-a-Velha, Portugal: comparison with Venetian and *facon* de Venice production," *Journal of Archaeological Science* 3 (2012), table 4, p. 1244.

[88] Robert Jesse Charleston, "George Ravenscroft: New Light on the Development of his 'Christalline Glasses,'" *Journal of Glass Studies* 10 (1968), p. 161.

[89] David Dungworth and Colin Brain, "Investigation of Late 17th century Crystal Glass," *Center for Archaeological Report,* 21 (English Heritage: 2005), p. 25.

[90] Ibid, p. 25.

dated from 1674-1692 with lead oxide of 27.2%+/-1.2 and potassium oxide of 12.3%+/-0.3; group three dated from 1680-1689 with lead oxide of 34.5%+/-0.7 and potassium oxide of 9.3%+/-0.8; and group four dated from 1685-1720 with lead oxide of 39.9%+/-0.6 with potassium oxide of 9.3%+/-0.2.[91] While the EDS weight percentages given for these four groups cannot be corroborated by the XRF tests conducted on the majority of the thesis's tested glassware, they can be compared to the two VMFA *huqqa* bases, which yielded lead and potassium oxide percentages of 35.5% and 38.8%, and 9.0% and 9.2%, respectively, which, according to Dungworth and Brain's results, dates these two glass compositions to between 1680 and 1720 (assuming they are of an English origin).

Lead glass mixtures did not remain unique to England, and quickly spread to the Continent by 1680 if not earlier.[92] By the late seventeenth century both the Netherlands and Central Europe were producing variations of crystal lead glass, yet none of these tested mixtures yielded the same levels of elevated lead oxide. During the eighteenth century, colourless glass manufactured in Central Europe were of a potassium-calcium-silica composition, with lead percentages varying from about 10% to 20%.[93] In particular, glass tested from eighteenth century glasshouses in Dresden (Germany) yielded between 6% - 9% lead oxide, whereas both the Brandenburg (German) and Naliboki (Polish) factories yielded lead oxide results lower than 6%.[94]

The Dutch glasshouses of the late seventeenth century seem to have been directly influenced by English glassmaking techniques.[95] Many glass specimens from the Low Countries have proven to contain modest levels of lead, often making the distinction between English and Dutch glassware from this period difficult. Despite this, several differences in minor trace elements exist between the two. A study of a late seventeenth century glasshouse site in Groningen (northern Netherlands), active

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[91] Ibid, Table 14, p. 39.

[92] Charleston (1968), p. 161.

[93] Jerzy J. Kunicki-Goldfinger, Joachim Kierzek, Aleksandra J. Kasprzak, and Bozena Malozewska-Bucko, "Analyses of 18th century Central European Colourless Glass Vessels," *Annales du 15e Congres de l'Association Internationale pour l'Histoire du Verre* (2001), p. 224.

[94] Ibid, p. 260.

[95] According to a letter written by the Venetian secretary in England, Girolamo Alberti, to the Doge and Senate on June 15th, 1674, "one Vincenzo, surname unknown, has come to London and intents to work there in a furnace of the Englishman Ravenscroft, the one who resided at Venice for many years when he traded and brought home a considerable capital"; see Allen B. Hinds (ed.), *Calendar of State Papers and MSS. Relating to English Affairs existing in the Archives and Collections of Venice*, XXXVIII (London, 1940). This same Vincenzo later left Ravenscroft's glasshouse for Antwerp in 1677, where he obtained a patent for the erection of a furnace for the manufacture of crystal glass; see: R. Chambon, "Les Origines de la Fabrication du Cristal Anglais en Belgique," *Etudes d'Histoire et d'Archeologie Namuroises dediees a Ferdinand Courtoy* (Gembloux, 1952), p. 795.

between 1687 and 1698, yielded results indicating that lead oxide ranging from 2-33% was present within the forty-one specimens.[96] The samples were consequently grouped according to their lead percentages; the last group (number four) contained nine specimens that yielded lead oxide levels averaging around 29.4%. Similar to Dungworth and Brain's results, this highest lead group also yielded the lowest potassium levels. The direct correlation between elevated lead levels and lower potassium appeared in both glassware, yet Groningen's potassium levels were still higher than the English lead glass, measuring at 13.1% versus 9.3%; this increase most likely stemming from the type of alkali (or fluxing agent) used within the raw batch.[97] The type of fluxing agent used could have also attributed to other differences detected between English and Dutch glass, such as differing levels in calcium oxide and minor trace elements or accessory minerals (such as magnesium, alumina, and iron).

The main distinguishing difference characterising late seventeenth century English from Dutch glass (Dungworth and Brain versus Groningen) is the difference between calcium oxide levels. Results revealed that the Groningen glass with levels of lead oxide up to 20% contained higher amounts of calcium oxide (greater than 4%), in comparison to English lead crystal glass with comparable lead levels yielding calcium oxide levels no greater than 1%. This difference in calcium oxide can be visibly detected in some XRF tested specimens included within this thesis, yet is more accurately measured in the two EDS analyses of the VMFA *huqqa* bases, which measure at 0.1% and 0.2%.[98]

The calcium oxide levels of less than 1% detected within late seventeenth and eighteenth century English glass stems from the type of alkali, or flux, used within the raw glass batch. During the third quarter of the seventeenth century, English glassmakers introduced the use of saltpetre - potassium nitrate (KNO3) – as the fluxing agent, which protected the covered furnace pots from destruction by metallic lead as well as eliminated any discolouration created from contamination of un-burnt soot

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[96] Katharina Muller, "Material Analysis of Colourless Lead Glasses from a Late 17th Century Glasshouse Site in Groningen (the Netherlands), *Annales du 17e Congres de l'Association Internationale pour l'Histoire du Verre Antwerp (Belgium: AIHV*, 2009), pp. 401.
[97] Ibid, Table 1, p. 402.
[98] The XRF analyses that reveal slightly elevated levels of calcium oxide (greater than 1%) and therefore comparable to Dutch glass, these traces could have resulted from a variety of other unknown factors, such as environmental contamination created during the primary or secondary glass manufacturing process in India. This theory has not yet been proven, but is argued in the following chapters when specific objects presenting elevated calcium oxide levels are discussed in detail.

caused by coal-fired furnaces.[99] Saltpetre functioned as a natural cleaning agent, eliminating other minor trace elements in order to create a cleaner and clearer glass. Records of its use in glassmaking can be traced to a 1666 account of George Duke of Buckingham, owner of a glasshouse in Lambeth, describing, “Warrant to the Commissioners of Ordnance to deliver to George Duke of Buckingham 50 bags of saltpetre to prevent interruption and cost in the glassworks lately set up at his expense”.[100] Prior to the third quarter of the seventeenth century, saltpetre was only used for ordnance in defence of the realm; the King of England exercised a monopoly over its sale.[101]

Fig. 36: *The Manufacture of Saltpetre at Patna, 1786,* by Arthur William Devis
Collection Charles Greig, London

Throughout the late seventeenth and eighteenth century, all saltpetre imported into England came from India, and specifically Patna, Bihar (fig. 36).[102] Cargo lists, sale notices, and letters of India Office Records dated between 1685-1738 make frequent

[99] David Charles Watts, “Why George Ravenscroft introduced lead oxide into crystal glass,” *Glass Technology* 31 (1990), p. 208.
[100] Robert Edwards. *Glass Circle News* 35 (1986), p. 6
[101] Dungworth and Colin (2005), p. 8; and Watts (1990), p. 208.
[102] Saltpetre was imported in large quantities from India as both cargo and ballast for the sailing of vessels travelling from India to Europe; Ibid, p. 8; and Watts (1990), p. 208.

mention of the English exporting saltpetre from India.[103] A letter dated to April 7th 1731 describes, "The Court of Directors of the United East India Company…entreat your interest with the Board of Ordnance that two hundred tons of Salt Peter purchased for use of His Majesty…may be restored to them to be buy them exposed to publick sale for the use and benefit of the Glass and powder manufacturers".[104]

While the English continued to use Indian saltpetre in the manufacture of English potash-lead glass, it remains unknown whether the Dutch used saltpetre in their glass manufacture during the late seventeenth century. Given that the tested glass from Groningen yielded elevated potassium and calcium oxide levels, the Dutch most likely used another alkali source, such as potash or calcined tartar as opposed to saltpetre.[105] While a few eighteenth century records mention saltpetre in connection to the Dutch in India, these accounts mostly describe their difficulty in mining saltpetre or disputes between the Dutch and English in arranging its trade; no mention of its use appears in relation to the manufacture of Dutch glass.[106]

Concluding remarks

While the qualitative data provided by the XRF analysis cannot give more accurate insights into the percentages of glass compositions, the objects can nonetheless be characterised as a potash-lead variety with elevated lead and potassium levels more similar to those demonstrated in late seventeenth and eighteenth century English glass. The low levels of calcium oxide, more authoritatively demonstrated in the two EDS analyses of the VMFA *huqqa* bases, correspond more closely to eighteenth century English potash-lead glass. This theory is not only based on qualitative chemical

[103] India Office Record [IOR/H/97, ORB 30/587].
[104] India Office Record [IOR/E/1/203, folio 57; 7th April 1731].
[105] Muller (2009), p. 404.
[106] One of the many references of disputes and difficulty expressed by the Dutch of the English, "The English had obtained in 1758 from the new Nabob the exclusive Privilege of purchasing the Saltpetre, but debarring the Dutch there from. The English answer was that the Dutch had desired it and they would without any scruple have excluded the English therefrom"; IOR/I/2/8, Letter 64. Jean-Baptiste Tavernier made specific mention of the Dutch trading in saltpetre during his travels in Patna in 1676, "Saltpetre comes in abundance from Agra and from Patna, and that which is refined costs three times as much as that which is not. The Dutch have established a depot at Chapra, which is 14 leagues above Patna; and the saltpetre being refined there, they sent it by river to Hugly. They imported boilers from Holland, and employed refiners to refine the saltpetre for themselves; but have not succeeded, because the people of the country, seeing the Dutch wished to deprive them of the profits of refining, would not supply them any longer with whey, without the aid of which the saltpetre cannot be bleached, for it is worth nothing at all if it is not very white and very transparent", V. Ball, trans., *Jean-Baptiste Tavernier, Baron of Aubonne, Travels in India, 1676*, Vols. 1 and II (London: Macmillan and Co., 1889), Vol. 2, p. 13.

analysis, but also further corroborated by historical trade records attesting to the import of English lead glass into India.

Trade in English Flint Glass

Since the early seventeenth century the English imported glass into India, yet prior to the introduction of lead into glass mixtures, this glassware was of a soda-lime-silica variety similar to Venetian *cristallo* glass. Sir Thomas Roe, who led an embassy from James I to the Mughal Emperor Jahangir (r.1605-1627), recorded in his journal under the year 1616 a gift of 'six glasses guilt'.[107] While mirror (i.e. looking glass) and glazing glass were not in demand in India, fine quality drinking vessels in the *facon de Venice* style were throughout the seventeenth century (figs. 37 and 38).

Fig. 37: *Goblet*, Verzelini Glasshouse, London, ca. 1581 (Victoria & Albert C.523-1936)
Fig. 38: *Detail* of figure 39

William Hawkins, an English merchant who resided at the Mughal court from 1609 to 1611 recorded that there were two hundred "rich glasses" in the Imperial treasury in Delhi; while in 1622 Joannes de Laet commented that more than two million and a half rupees worth of the "most elegant vessels of every kind in porcelain and coloured glass" existed in Emperor Akbar's (r.1556-1605) royal treasury in Agra.[108]

European glass imports continued to arrive into India during the reigns of Mughal emperors Jahangir, Shah Jahan (r.1628-1658), and Aurangzeb (r.1658-1707), with

[107] William Foster (ed.) *The Embassy of Sir Roe to India 1615-19, as narrated in his Journal and Correspondences* (Oxford University Press, H. Milford: London, 1926), pp. 122, 356, 459.
[108] De Laet and Manrique in 'The Treasure of Akbar,' cited in Vincent A. Smith, *Akbar the Great Mogul, 1542-1605*, 2nd ed. (Oxford: Clarendon Press, 1926), p. 242.

regular mention in the English India Office Records of glass imported from 1664-1709 (figs. 39 and 40); however; the specific reference to imported flint glass (i.e. lead glass) only starts to appear from 1684.[109] The glass mentioned in these accounts all represented vessels intended for personal use by Company members, as traded items, or gifts given, and not recycled glassware.

Fig. 39: ***A Garden Gathering with a Prince in a Green Jama*****, by Bichitr, India, Mughal, circa 1615-20 (Chester Beatty Library, Dublin In. 07A.7)**
Fig. 40: ***A Garden Gathering with Two Princes and a Sleeping Cat*****, by Govardhan, India, Mughal, circa 1630-35 (Chester Beatty Library, Dublin In.07A.8)**

It is only from the second quarter of the eighteenth century that India Office Records document the private trade of broken flint glass, lump glass, and ingots into India.[110] These mentions appear in private papers as a privileged trade, and not as Company merchandise. The earliest recorded reference to imported broken flint glass comes from Captain James Osborne, who on September 19th, 1716 requested permission to carry four tons of "broken flint glass worth 100 Pounds".[111] When

[109] IOR/L/AG/1/1/9, f. 268.
[110] Most of the accounting ledgers for English private trade were destroyed in the mid-nineteenth century; any documented information pertaining to traded glass has only been found in private records dated from the first half of the eighteenth century. This information was provided in an email correspondence between the author and Margaret Makepeace, India Office Records, British Library, London, Mar 9th 2015.
[111] IOR/E/7 f.251.

corroborated with Charles Hardy's *A Registry of Ships*, Captain James Osborne sailed upon the Hanover ship, which made two voyages in 1715 and 1716 from England to Bengal.[112] The following year, Alvaro d'Fonseca requested permission to send out 1,200 Pounds worth of rough coral and "lump glass English Manufactory" to Bombay for investing in diamonds.[113] On September 11th, 1717, records to the Court provided information of "six tons and pieces of flint glass made in the forme of a Brick" travelling upon Captain Joseph Tolson's ship, the Heathcote, again to Bengal.[114] Several more references to the sale of lump glass exist in private papers recorded from 1716 and 1719, all accompanying voyages to either the Bay of Bengal or Madras.

The mention of broken flint glass, lump glass, and glass in the shape of a brick refer to types of cullet intended for re-melting in a secondary glass production. The brick specifically refers to glass ingots, which were included in the cargo of English ships traveling from England to India and China, yet the earliest known reference to such trade dates to the 1765 Albion wreckage discovered in 1985.[115]

Fig. 41: Glass ingot, Albion wreckage, ca. 1765, 16.5 (L) x 9.2 (W) x 2.5 cm (H)
Collection of Ian Freestone, London (Photo by author)

[112] Charles Hardy. *A register of ships, employed in the service of the Hon. the East India Company, from the union of the two companies, in 1707, to the year 1760: specifying the number of voyages, tonnage, commanders, and stations* (London: printed for Charles Hardy, 1799), p. 3.
[113] IOR/E/1/8 ff. 82-82v and IOR/E/1/9 ff. 465-466v
[114] IOR/E/1/8 ff. 263-264v.
[115] Redknap and Freestone (1995), p. 145.

Court minutes indicated that the Albion previously travelled to China in 1761-2; however, several recorded officers on board the sunken 1765 ship were appointed to Fort St George in Madras, suggesting India as one of its destinations.[116] In 1995 energy dispersive x-ray analyses (EDS) was conducted on eleven glass ingots, shaped in both plano-convex and flattened rectangular bricks, and of transparent pink, purple, green, and blue colour glass (fig. 41). The results indicated that the glass ingots were of a characteristically English potash-lead-silica variety - 8-13% K2O (potassium oxide), 33-40% PbO (lead oxide), and 50-55% SiO2 (silica oxide) - and furthermore, chemically compared to waste glass from south Yorkshire to confirm their English origin.[117] Minor trace elements were also detected in the ingots; the presence of alumina, lime and iron all measured at levels below 0.4%, suggesting the use of very pure sources of potash and silica in their manufacture.[118]

As there was no mention of glass in the Albion's cargo, and no glass appeared within any Court recordings of private papers of its Captain or crew members, it remains uncertain whether the ingots were intended for private sale in India or China.[119] According to Redknap and Freestone, "by the time the Albion sailed, lead crystal production was still confined to a relatively limited number of continental glasshouses".[120] The economic advantages of exporting this relatively guarded material could have incentivized East Indian Company individuals to sell or trade ingots, especially in markets where glassmaking techniques were not as developed, or where stronger lead glass was desired.

To date, the only evidence that strongly supports the use of English lead glass in the manufacture of Indian objects is the comparative EDS analysis conducted between the Albion's ingots and two eighteenth century Indian glass *huqqa* bases currently in the Virginia Museum of Fine Arts, Richmond (VMFA); these results revealed that the glass

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[116] IOR: B/80; December 12th, 1764.
[117] Redknap and Freestone (1995), 147.
[118] Ibid, p, 148.
[119] Emily Byrne Curtis suggests that coloured glass ingots imported from Europe into China during the 18th century could have been used in cloisonné metalwork, or as the basis for paints applied to porcelain or enamels on glass itself, but does not add further references to the explicit trade of glass from England to China. See: Emily Byrne Curtis, "Carrying Treasures to China: The Albion" in *Glass Exchange between Europe and China, 1550-1800: Diplomatic, Mercantile and Technological Interactions* (Ashgate Publishing Ltd, Surrey: 2009): pp. 125-135
[120] Redknap and Freestone (1995), p. 148.

was of an almost identical chemical composition.[121] Despite the similarity between the Albion ingots and *huqqa* bases confirming the use of a distinctive English potash-lead type of glass, it remains uncertain whether the *huqqas* were manufactured in England (and sent to India for subsequent decoration) or blown in India. According to Marc Wypyski, who conducted the EDS analysis on the VMFA huqqa bases, "It has been previously assumed that little if any relatively expensive English lead crystal glass had been imported to India for use in local glassmaking. The compositions of these two *huqqa* bases, however, indicate that at least some English lead glass may have been, although the possibility also exists that these items were produced elsewhere, and the finished products simply exported to India".[122]

Despite Wypyski's belief that the *huqqa* bases could have been manufactured in England and imported into India, based on chemical analysis, historical trade records, and technical details of the glass' manufacture, the *huqqas* and following objects included in the case studies were most likely manufactured in India using imported English potash-lead glass. The various differences in minor elements appearing within their varied XRF analyses arguably reflect contamination from either the re-melting or manufacturing of the glass objects themselves, and not regional differences reflected in the origins of the glass cullet.

Moreover, the visual traits detected within the glass objects of this thesis include uncountable seeds, bubbles, and dark inclusions, qualities often produced during the secondary melting of waste glass, cullet, or ingots. While the seeds could have already existed within the imported ingots, the small bubbles were most likely created during the re-melting of crushed cullet, scrap, cut offs or waste glass, especially if not heated at high enough temperatures required to sufficiently melt the glass.[123] The arguments presented in the following sections of this chapter, and in the proceeding case studies, further reinforce the Indian origin of these blown vessels; however, before embarking on that discussion, a brief comparative study of another glass production in South Asia needs to be addressed. This example draws upon India Office Records, Mughal royal references, and surviving examples in situ, and moreover, sheds new light upon the

[121] Dye (2001), Appendix 2, p. 534.
[122] Ibid, p. 534
[123] The argument that re-melted glass can produce more bubbles based on the melting process has been carefully articulated and confirmed in writing by glass expert Peter Drobny, who worked at the Corning Museum of Glass from 1999 - 2004, and at the Steuben Division of Corning Inc. Email correspondence March 18th - April 4th 2016.

traditional techniques of Indian glass manufacture in the subcontinent during the early Mughal period, helping to place the objects of this thesis within a long and continuous tradition of glass blowing.

Comparative look at *Shish Mahals*, Mirror and Window Glass

Speaking of Mughal *shish mahals*, Dunlop Wallace recorded the following in the 1884 *Pottery Gazette*:

> *Dr. Tennant is of the opinion that, before the arrival of Europeans in Hindostan, not a house in all India was furnished with glass windows; the Hindoos made trinkets and ornaments of glass, but were unable to build furnaces of sufficient power to make useful things. This cannot have been true of north India, as the emperor Jehangir planted the beautiful gardens of Shalimar, Lahore, and in those gardens he is said to have built a palace for the peerless Nourmahal. Where he got his glass from is not known; the system of canals and the magnificent building left by him attest a high degree of civilization. There is a small glass manufactory still carried on in Kashmir, which may have originated in this palace, as the mosaic industry of Agra originated in the Taj.*[124]

The ability of the Mughals to build palaces and buildings of spectacular construction and design awed European visitors for centuries, yet despite this, the origins of certain decorative features presented within the architectural ornamentation remained questionable. This is particularly true with regards to mirror decoration, known within an architectural context as *shish mahals*, rooms decorated entirely with mirrors. The above comment, despite its late nineteenth century dating, reflects a continual scepticism surrounding the ability of Indian craftsmen to produce glass, specifically, glass objects larger than 'trinkets' (i.e. beads, bangles, and small vials). A brief examination into the history of mirror making might therefore shed light onto the plausible origins of glass blowing in India. While mirrors, or 'looking-glass' as they were commonly referred to in European accounts, appear as flat objects, they were initially made from large, blown globes of glass. The documented uses of mirrors in India within the context of *shish mahals* might represent the earliest examples of blown glass objects in India, well before later nineteenth century European accounts of glass blowing.

Shish Mahals decorated both Imperial and provincial palaces in northern India starting from around the first quarter of the seventeenth century. The Lahore Fort presents a *shish mahal* in the Masumman Burj, in the Shah Burj Quadrangle reportedly built by Asif Khan, the then Governor of Lahore, for Mughal Emperor Shah Jahan

[124] Wallace Dunlop, "Glass in India: Glass in the Old World," *The Pottery Gazette* (November 1, 1884), p. 1225.

(reigned 1628-58) between 1631-2 (fig. 42).[125] This private zone of the Lahore Fort occupies the extreme north-western corner, and comprises a sequence of chambers that are fronted by a line of five lobed arches, each decorated with *pietra dura* ornament, and intricate mirror work decorating the plastered walls on three sides, as well as the flat ceiling and multifaceted cove.[126] Yet even before this date, s*hish mahal* decoration was recorded on other parts of the Lahore fort by the traveling English merchant, William Finch, who visited Emperor Jahangir's court in 1608.[127]

Fig. 42: Walls of the Shish Mahal within the Lahore Fort, Pakistan, 1631-2
[Photo credit: Mohsin Kani, December 2017]

Around the same time as the Lahore Fort *shish mahal* was constructed, the *Diwan-i-Khas* of the Amer (Amber) Fort in Jaipur was built. [128] This room, attributed to the reign of Jai Singh I (reigned 1621-67), was built to the east of the Diwan-i-Am court,

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[125] The commemorative plaque before the entrance to the Shish Mahal, written by the Directorate General of the Archaeology, Punjab states: "Shish Mahal (Palace of Mirrors) was built by Asif Khan, the then Governor of Lahore for Emperor Shah Jahan in 1631-2. It is a most decorated place in the fort, embellished with mirror work, stucco tracery, guild work, pietra dura work and fret work in marble, etc. Palace consists of a spacious loft hall with several rooms behind and on either sides and a vast courtyard in front."

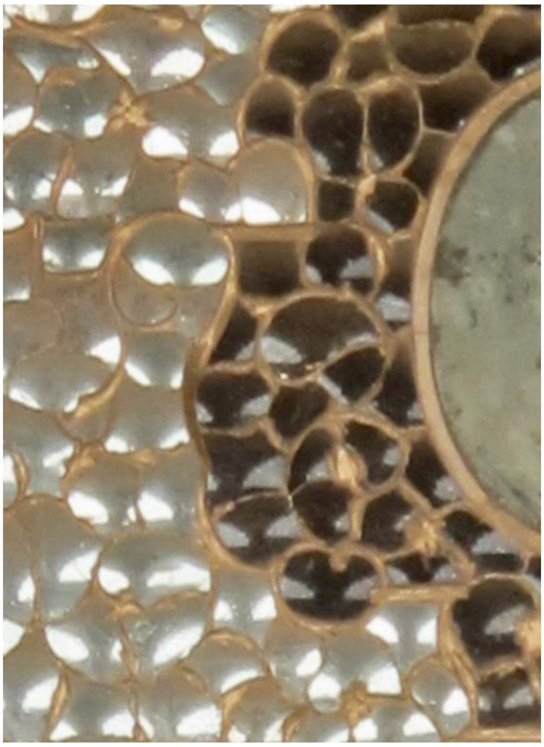
[126] George Mitchell and Amit Pasricha. *Mughal Architecture & Gardens* (Suffolk: Antique Collector's Club, 2011), p. 279-80.

[127] William Finch. *Early Travels in India, 1583-1619*, William Foster (ed.), reprint, Delhi, 1968, p. 164.

[128] Chandramani Singh (ed.) *Protected Monuments of Rajasthan* (Jaipur: Jawahar Kala Kendra, 2002), p, 206-7. Another secondary source mentions the local technique of manufacturing the mirror glass used in the Amber palace, Rajasthan; see: Kamaladevi Chattopadhyay. *Handicrafts of India* (New Delhi: Indian Council for Cultural Relations, 1985), p. 129.

and is known as the Jai Mandir (or *Shish Mahal* room), named on account of its mosaic mirror glass decoration and colourful foil and paint adorning its inner walls (fig. 43).[129]

Fig. 43: Detail of the walls of the Shish Mahal within the Amber Fort, Jaipur, post 1620



Figs. 44 and 45: Detail of the convex shaped and foil backed *Shish Mahal*, Lahore Fort
[Photo credit: Mohsin Kani, December 2017]

[129] According to Giles Tilloston, the Amber *shish mahal* has been heavily restored in recent times; today most of what remains dates to the 1990s. However, the original scheme of the glass mirrors, prior to this restoration, was convex in shape. This account was communicated in an email to the author in 31 July 2017.

Both examples of palaces, one in modern day Pakistan and the other in Rajasthan, present walls decorated with glass mirrors that are slightly convex in shape, and often further backed with coloured foil or paint (figs. 44 and 45). The convex shape of the mirrors used in the *shish mahal* decoration represents a key feature differentiating mirror making practices, both amongst European factories and between Europe and South Asia.

Until the early fourteenth century, mirrors in Europe were made of highly polished metal; however, around this time, Nuremberg glass manufacturers introduced a mixture of tin, antimony and resin into a hot globe of molten glass, and then cut the cooled globe into small convex mirrors (or lenses).[130] This technique gained popularity, and stimulated a large number of Germany mirror glass imports into England, where, during the Tudor-Stuart period, no comparable looking-glasses were being manufactured.[131] In about 1500, a new process of mirror-making emerged which involved silvering cold, flat plates of glass by applying a thin sheet of tin foil with mercury as the cementing medium. This technique, possibly developed in Flanders, was quickly adopted by Venetian glass makers who used plates of Italian *cristallo* glass, which were ground and polished before silvering. From this date onwards, Italians produced the finest and largest mirrors in Europe.

It is Venetian mirrors, or 'looking-glasses' that are mentioned in European trade accounts as suggested gifts for the Mughal emperor Jahangir during the first quarter of the seventeenth century. Writing in 1612 from the Dutch factory in Masulipatam, Anthony Schorer mentions that "handsome mirrors also can be readily sold, provided the glass is finer than is used elsewhere".[132] Six years later, Hans de Haze writes again from Masulipatam requesting that "200 large-sized gilded mirrors" be sent annually

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[130] Eleanor Godfrey. *The Development of English Glassmaking: 1560-1640* (Oxford: Clarendon Press, 1975), p. 234.

[131] Today, most of the looking glasses that existed in the time of Henry VIII and Elizabeth I would be classed as jewellery rather than furniture, and they probably stood on tables or were kept in drawers to be brought out when required for exhibition or use. In many cases, they were too highly valued to be left permanently exposed, and too insignificant to be sufficiently decorative hanging on a wall. See: Geoffrey Wills. *English Looking Glasses: A Study of the Glass, Frames and Makers (1670-1820)* (London: Country Life Ltd, 1965), p. 16.

[132] William Harrison Moreland (ed.) *Relations of Golconda in the Early Seventeenth Century* (London: Hakluyt Society, 1931), p. 62; cited in Markel (1993), p. 48.

from Holland.[133] While repeated requests for the import of Dutch mirrors into the Mughal courts at Agra continued until 1627, the English factors seem to have had less success in profiting from the sale of their imports. According to one letter written by Francis Fettiplace at Agra to the East India Company on December 15, 1619, looking – glasses "bread much trouble and yield noe profit".[134] The low demand for English imported mirror-glass could have been attributed to competing imports from Dutch factors, or Venetian mirror-glasses arriving from Iran, as Thomas Kerridge embarrassingly describes to Sir Thomas Roe in October 1616, while witnessing the Safavid Ambassador Muhammed Raza Beg giving gifts to Emperor Jahangir: "7 Venetian looking-glass, but these soe faire, so rich that I was ashamed of the relation".[135] While Venetian mirrors were also imported from Iran, Chevalier Chardin (traveling in Iran from 1666-70) comments that "the silvering of the glass is unknown in all of the Orient, the tin and lead on the back of the glass mirrors falls away more easily than in Europe, something that occurs in Persia due to the extreme dryness of the air; and in India, on the other hand, due to the great humidity. The use of glass mirrors in these Oriental countries has only occurred since the Europeans started trading there."[136] Chardin's comments confirm the use of mirror-glass in India, which supports earlier accounts of imports and gifts to the Mughal court, but it does not help to confidently attribute the origins of the mirror glass, nor, more relevantly, describe how it was made.

Mirror-glass starts to be manufactured in England from 1621, as documented by Sir Robert Mansell's petition presented to Parliament; however, as none of Mansell's looking glasses have survived, it is difficult to determine the exact technique in which these glass mirrors were manufactured.[137] During the seventeenth century, mirror glass was most commonly made by the cylindrical method (i.e., blowing the glass into large tubes, or globes, and then cutting it in panes or sheets, which were cooled horizontally);

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[133] Om Prakash. *The Dutch Factories in India 1617-1623: A Collection of Dutch East India Company Documents Pertaining to India* (New Delhi: Munshiram Manoharlal, 1984), pp. 30, 68, 165; cited in Markel (1993), p. 48.

[134] William Foster (ed.) *The English Factories in India 1618-1621 – A Calendar of Documents in the India Office, British Museum and Public Record Office* (Oxford: Clarendon Press, 1906), Vol. 1, p. 164 *(O.C. 827)*

[135] Ibid, p. 295.

[136] "Etamure du verre etant inconnue en tout l'Orient, et l'etaim qui est au dos des glaces, s'y perdant plus aisement qu'en Europe, chose qui arrive en Perse, a cause de la grande secheresse de l'air; et aux Indes, au contraire, a cause de sa grande humidite. L'on n'a l'usage des miroirs de verre en ces pays orientaux, que depuis le commerce que les Europeens y font." See: Chevalier Chardin. *Voyages du Chevalier Chardin en Perse, et autres lieux de l'Orient*, ed. L. Langles (Paris: Le Normant, 1811), Vol. 4, p. 140-1.

[137] Geoffrey Wills. *English Looking Glasses: A Study of the Glass, Frames and Makers (1670-1820)* (London: Country Life Ltd, 1965), p. 42.

however, the silvering process varied, presumably depending on the size of the blown glass globe. While a 1710 German account of mirror making witnessed at the Glass House at Foxhall (known by the name of the Duke of Buckingham's House) describes this cylindrical process,[138] as do later eighteenth century accounts and drawings done by Denis Diederot (figs. 46 and 47), all recorded techniques mention that the silvering process occurred after the glass panes were cooled.[139] This thus implies that the glass plates were sufficiently flattened before the mercury and tin was added, either as a sheet, or poured and spread evenly across.

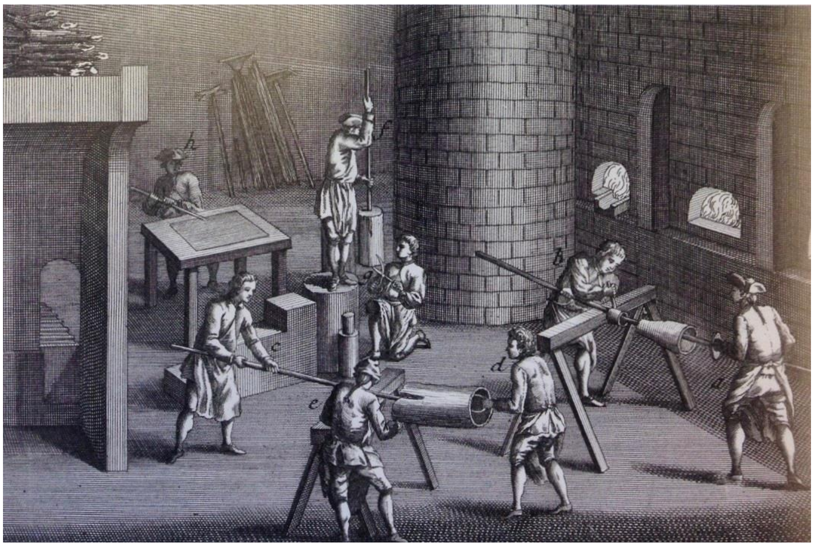

Fig. 46: The second stage of making sheet glass by the cylinder method. Denis Diderot, "Glaces", *Encyclopédie, ou Dictionnaire raisonné des Sciences, des Arts et des Métiers* (1765), vol. 4, pl. 36.

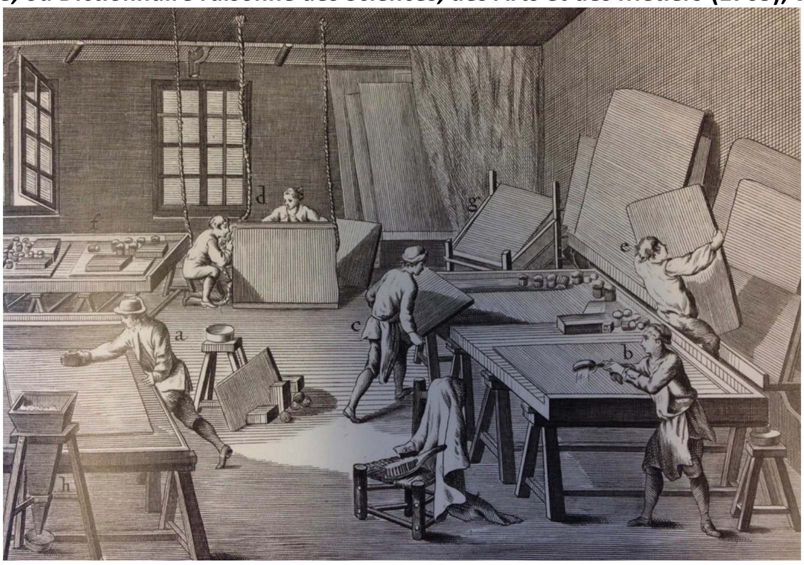

Fig. 47: Mirroring sheet glass. Denis Diderot, "Glaces", *Encyclopédie, ou Dictionnaire raisonné des Sciences, des Arts et des Métiers* (1771), vol. 8, pl. 1.

[138] This account appears in *London in 1710, from the Travels of Z.C. von Uffenbach*, translated and edited by W.H. Quarrell and Margaret Mare, 1934, p. 132; cited in Willis (1965), p. 45.

[139] For a descriptive account of this approach, see the English 1747 publication cited in: Dwight P. Lanmon. *The Golden Age of English Glass: 1650-1775* (Suffolk: Antique Collector's Club Ltd, 2011), p. 260.

This reason for signalling this distinction relates back to the convex shape of the mirror decoration appearing within the *shish mahal* rooms of the Lahore and Amber Fort. While European mirrors were certainly imported into India during the first half of the seventeenth century, at the time when mirrors were used as a decorative feature in Mughal architecture (both Imperial and Provincial), it seems unlikely that these same European imports were used as the architectural ornamentation decorating the Mughal forts in Lahore and Jaipur. While looking-glasses were considered an extremely expensive luxury in Europe during the seventeenth and eighteenth centuries, and appear to have secured a sizeable profit once sold in India, as claimed by Thomas Rastell, speaking from Surat in 1621, "The double looking-glass, which cost 100l., is sould for 1,250 ruppees" the European looking-glasses were most certainly not the same ones used to decorate Mughal *shish mahals*.[140] Rather, the tradition of mirror making already existed in India and developed independent of European imports.

Jan Knock and Torben Sode claimed that the production of lead-backed mirrors in Western India dated back to around the year 1500.[141] While this statement and their article both support the local manufacture of mirrors made in Western India, specifically in the region of Kapadwanj, it seems more likely that the origins of this tradition date to the late sixteenth or early seventeenth century in north India, either in Lahore, Agra or Delhi, in one of the alternating Mughal capitals at the time. In Abu-l Fazl's late sixteenth century chronicle of Akbar's royal provinces (or *subahs*), he mentions glass making in Bihar and Agra, both *subahs* of north India. While precise accounts are not given of the types of glass manufactured in these provinces, the gilded glass specifically referenced in Bihar could be an alternative visual description for the silvering of glass globes used to manufacture mirrors. The gold may be a reference to silver lining; or rather, an account of the gold coloured foil added to the glass to further enhance the mirrors once adhered to the walls. This speculative assertion remains unsubstantiated, as no further evidence supports the details of glass manufacture during Akbar's reign (1556-1605). However, his *Ain-i-Akbari* does make mention of glass used for windows ('*Ain* 86, *The Prices of Building Material, Etc.)* and "glass-cutters, 100 d. per gaz" ('*Ain* 87, *On the Wages of*

[140] Thomas Rastell goes onto comment that, "The three rubies, cost 90*l*., sould 1,400 rup[ees]", cited in William Foster (ed.). *The English Factories in India 1618-1621 – A Calendar of Documents in the India Office, British Museum and Public Record Office*, vol. 1-2 (Oxford: Clarendon Press, 1906), p. 327.
[141] Jan Kock and Torben Sode, "Medieval Glass Mirrors in Southern Scandinavia and their Technique, as Still Practiced in India," *Journal of Glass Studies* 44 (2002), p. 84.

Labourers), which confirm a type of glass production existing.[142] This specific Mughal reference to window glass aptly corresponds to several English East India Company accounts recorded from 1610-19, which mention that imported window glass was unprofitable, "useless", and "should not be sent", as expressed by William Biddulph, who, writing from the Mughal Camp to the Company in December 1619 said, "Furs, window-glass, swords, hot waters or wines should not be sent."[143] The lack of interest in imported European window glass might stem from the availability of it already existing within Mughal workshops in north India.

Indian paintings dated from Shah Jahan's period (1628-58) and slightly later both serve as visual evidence attesting to the use of windowpane glass within architectural structures of Imperial Mughal and provincial court buildings. The painting of Shah Jahan watching an elephant fight depicts two rectangular windows flanking the Emperor and his sons, who stand in profile behind an opened window (figs. 48 and 49). The two rectangular windows, each comprised of undecorated darkened square panels separated by faint white divides, are different from the intricately carved *jali* screens decorating the upper register of the palace, suggesting a different media and purpose. Furthermore, the window's placement within the intimate and private royal chambers of the standing Emperor and his sons could signify their importance as protective shields affording the royals with privacy from the public audience.

Fig. 48: Detail of figure 49 (MET. 1989.135)

[142] Abu'l Fazl Allami, *The Āʾīni Akbarī* ; translated from the original Persian by H. Blochmann, 3[nd] ed., Vol. 1 (New Delhi : Oriental Books Reprint Corp. 1977), p. 235 and 236, respectively.
[143] Ibid, pp, 21, 53, 141, 164, 168.

Fig. 49: Shah Jahan Watching an Elephant Fight, folio from a Padshanama, by Bulaqi, India, probably 1639 (MET. 1989.135)

Another painting dated to the early eighteenth century illustrates a more convincing representation of windowpane glass, as seen through the delicate shadowing of the individual square panels (fig. 50). Like the Shah Jahan painting, the window glass is arranged in a series of square panels, each separated by a fine divide; however, the panels in this painting are further delineated by subtle hues and colours that intentionally accent the light's reflection through the glass. Both paintings, one Imperial

Mughal and the other from a Rajasthani court, serves as further evidence of glass in northern India which compliments the existence of *shsih mahals* decorating the forts of Lahore and Jaipur. While no known surviving window glass from the early Mughal period exists, visual representations and historic accounts nonetheless support their use within architectural complexes.

Fig. 50: Maharana Amar Singh II with ladies of the Zenana outside the Picture Hall at Rajnagar, attributed to Stipple Master, Udaipur, India, ca. 1707-8 (MET.1998.161)

According to English descriptive accounts, window glass was made by the same cylindrical method as employed for mirror glass, the former having been used in England by the early fourteenth century. In 1590, the English glass industry was separated according to specific products of manufacture, with seven or eight glasshouses designated exclusively to the production of window glass; while this date precedes the dating for commercially manufactured English mirror glass, the designation of a particular glasshouse devoted to a specific glass making technique is noteworthy.[144] Assuming that Indian glasshouses at the time made window glass in the same manner as English factories (i.e., the blown cylindrical method), the traditions and techniques used for the production of Indian window glass could be the same as mirror glass, and thus made in the same glasshouses. The documented production of window glass appearing in Akbar's *Ain-i-Akbari* therefore presumes that Mughal craftsmen were familiar with glass blowing, and could have therefore transferred the same techniques employed for making window glass to other objects, such as mirror glass. It seems highly likely that both window and mirror glass were manufactured simultaneously at the same glasshouses in north India during Akbar's reign.

Should both mirror and window glass production in India date to the late sixteenth century, thus pre-dating documented English and Dutch imports, this would explain why differences in silvering techniques exist between English and Indian mirror manufacturers, as two independent mirror manufacturing industries existed simultaneously: one in Europe and another in North India. According to a 1747 English account of mirror silvering, the plate of glass was laid upon a horizontal plain and covered with a thin sheet of 'leaf lead', over which was poured 'quicksilver' [mercury] until the lead was completely covered.[145] Conversely, an 1872 account recorded in the Arts of the Punjab (in the town of Karnal), describes the silvering technique as, "while held at the end of the rod, neck upwards, a spoonful of the silvering mixture is poured in through the neck, the globe is turned round and round while the mixture spreads all over the inner surface, adhering as it spreads."[146] The same account continues to describe the size of the blown glass globes as comparable to an "ordinary *gharas*" [a water carrier, or *lota*], claiming that the practice has continued for "four or five hundred years" for the ornamentation of walls and ceilings. This particular practice of lining blown glass globes with a silvering mixture is unique to South Asia, and appears to have existed since the early Mughal period. In addition, the relatively small size of the blown

144 Eleanor Godfrey. *The Development of English Glassmaking: 1560-1640* (Oxford: Clarendon Press, 1975), p. 223.

145 R. Campbell, The London Tradesman (1747); quoted in Jeremy T. Stedman, "The Glass Grinder – 1747", *Class Circle News* 20 (Feb 1982), p. 2.

146 This account was given by Major Parsons, Deputy Commissioner of Karnal, and published in Henry Baden-Powell. *Hand-book of the Manufactures and Arts of the Punjab, with a combined glossary and index of vernacular trades and technical terms* (Lahore, Punjab Printing Company, 1872) - glass XIX – Glass Manufacture, pp. 235-9.

glass globes differs from that of the cylindrical method, the latter forming large blown cylinders that were cut, flattened, and then covered with either foil or liquid mercury. The small size of the Indian globes enabled the silvering to be done instantaneously, which facilitated the speed in which these mirrors could be made. Furthermore, once these globes were cooled and cut into pieces, the natural convex shape was retained, as the globe was never flattened during its annealing (cooling) stage. This subtle convex shape can still be detected in the mirror cuttings used to decorate the *shish mahals* of the Lahore and Amber Forts.

The tradition of mirror decoration continues today, with the majority of mirror glass used to decorate spangles of cloth and other small ornaments (such as jewellery and household utensils). While historical accounts of glass manufacturing mention Karnal (in the Punjab), Kashmir, and the *subahs* of Bihar and Agra, today a sizeable industry continues in the town of Kapadwanj in western India. This industry was traditionally dominated by Sunni families, who have more recently used recycled glass instead of river sand. However, the blowing and silvering process has remained the same, with a combination of 5% zinc and 95% lead used for the mixture, which is poured slowly into the blown, spheroid-shaped globes.[147]

Glass mirrors have stretched well beyond their initial use as architectural ornamentation in Mughal palaces and forts. Today, the tradition continues widespread amongst the tribes of Kutch and Sourashtra in Gujarat, as well as within various Rajasthani tribes, the latter using glass mirror in embroideries known as *abhala bharat*.[148] However, the undocumented origins of Indian mirror glass might represent the earliest evidence of blown glass in South Asia, which would then significantly pre-date early nineteenth century European accounts of glass blowing industries. While further research into this specific subject requires more detailed attention, it can be argued that blown glass existed in north India from Akbar's period, pre-dating foreign European imports, thus reflecting an indigenous industry that developed independent of external influences. Mirror glass and *shish mahals* therefore represent the earliest examples of glass blowing in South Asia, which only contextualise the objects of this thesis within a long history and tradition of glass making.

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[147] Victoria Rivers, "Indian Mirror Embroidery from Gujarat," *Ornament* 16 (1993), p. 66.

[148] Jan Kock and Torben Sode, "Medieval Glass Mirrors in Southern Scandinavia and their Technique, as Still Practiced in India," *Journal of Glass Studies* 44 (2002), p. 93.

It should first be noted that the following nineteenth and twentieth century European accounts repeatedly mention defaults and imperfections visually detected in the glass objects manufactured throughout South Asia, all traits attributed to inadequate temperature and furnace construction. These descriptive features, recounted on repeated occasion, do represent traits seen within many of the glass objects of this thesis; yet despite this, these accounts largely reflect an early colonial perception and placement of indigenous industrial crafts within an isolated context, one devoid of the extent to which social, political and economic transformations had on nineteenth century craftsmanship in South Asia. While European prejudices cannot be removed from these accounts, many of which, nonetheless, provide rich and detailed descriptions of glass manufacture, their subsequent absorption into the greater discourse and understanding of Indian glass making requires considerable scrutiny. This scrutiny will be contextualised later in this chapter.

Fig. 51: ***Bangle-makers and their kiln*, India, Benares 1815-20**
(British Library, London Or.141)

Based on the nineteenth and twentieth century European accounts, three different types of glass compositions appear to have existed simultaneously in India and were used separately depending on the types of glass manufactured. A stiff, opaque glass was used for bangle (*churis*) manufacture, a technique of glass making that reflected a long and continuous tradition within the history of Indian glass (fig. 51).[149]

The second type of glass represented the recycling of European cullet, which was sometimes mixed with locally sourced ingredients. This type of glass manufacture represented the largest type of glass blowing used in factories across northern India in the Hoshiarpur districts of the Punjab, in the United Provinces, Madras, in the Bombay Presidency, and Bengal. A third type of glass, which could have already been manufactured in 1800 when Buchanan described the earliest recorded European account of glass making in India, is referenced as 'country glass' in late nineteenth century surveys, and is later chemically confirmed in early twentieth century accounts as being of a soda-lime-silica variety. This third characterisation of glass used for blown objects utilized locally available raw ingredients that were entirely void of lead and potash on account of "the high price of red lead, litharge, and potassium carbonate, none of which are strictly indigenous products: although red lead and litharge are made in Calcutta from Burma lead".[150] It seems that the glass described in the late nineteenth and early twentieth century accounts were of an entirely different compositional variety to the European lead glass of the late seventeenth and eighteenth century.

The first type of glass manufacture (bangles or *churis*) will not be discussed, even though the majority of glasshouses in South Asia (with the exception of Lahore) manufactured both blown objects along with bangles.[151] The type of glass manufacture discussed relates only to the objects included within the following case studies; these free and mould blown objects reflect one of two types of Indian glass manufacture: those made from 'country glass' (i.e. locally sourced ingredients) or recycled European cullet. The following industries will be discussed chronologically and according to region.

Francis Buchanan's 1800 account of glass production represents the earliest known European account of glass manufacture in India, yet its recordings of glass production in the town of Chinapatam, Mysore, have not been mentioned in any

[149] Brill (1986 and 2009).
[150] Edward Dixon, "The Industrial outlook: Indian glass industry (part 2)," *Current Science* (1937), p. 181.
[151] C.J. Hallifax, "Pottery and Glass Industries of the Punjab, III: Glass," *The Journal of Indian Art* (London: Ivie Hamilton, 1894), p. 47.

subsequent surveys of glass manufacture in India.[152] Buchanan, a surgeon and botanist, was assigned with the responsibility of surveying the kingdom of Mysore, which had recently been annexed by the East India Company. In his accounts he describes two types of traditional glassmaking: one for bangles and the other for small bottles. The bottles are "wrought up", implying their manufacture by a casting or core moulding process, as opposed to blown.[153] The ingredients used to make one crucible of green colour glass, however, indicated that the same quantity of broken glass was added as powered white quartz (*banaji callu*); the green colouring agents used were copper and iron ore (*caricullu*).[154] No further details describe the type of broken glass used, but it was most probably waste glass from the same material used to manufacture bangles and small vessels (i.e. stiff, opaque glass). Buchanan further illustrates the furnaces of Chinapatam, describing that wood functioned as the primary fuel source (unlike in England where wood had been prohibited since 1615 and replaced by coal.[155]

Martin Montgomery's slightly later description of glass blowing in Patna, Bihar in 1807 represents the earliest European account of glass blowing in India; however, only four years later Francis Buchanan gives an almost identical account of the same industry and production in Patna.[156] Both accounts mention the use of European recycled glass for the production of Indian manufactured objects, while also describing the visual imperfections within the glass caused by inadequate temperatures and insufficiently heated furnaces. Montgomery states, "The *shishahgurs* blow glass. The material consists entirely of European glass-ware; but, although they only use the fragments of the finer kinds, their work is rude, owing to the imperfection of the furnace, the glass is

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[152] Francis Buchanan. *Journey from Madras through the countries of Mysore, Canara, and Malabar, Vol. I, II, II* (London: Bulmer & Co., 1807), Vol. 1, pp. 147-50.

[153] Ibid, p. 147.

[154] Buchanan describes, "For the making of green glass – for one crucible - take the following articles according to apothecary's weight: Broken glass (14.9 lb); *Banaji Callu*, powdered white quartz (14.9 lb); *Loha*, an old button like brass was given to me as a specimen (3 oz 2 dr); Copper (2 oz 9 dr); *Caricullu*, iron ore with manganese (2 oz 1 dr); *Soulu* or impure soda (29 lb 6 oz)", Vol. 1, p. 148.

[155] The re-melting of broken glassware (or cullet) can be done at around 500 degrees Celsius, whereas 1200 degrees Celsius temperatures are necessary for new (or primary) glass. The economic incentives of trading cullet have fuelled the wider production of glass blowing in regions not capable (or unknowledgeable) in the primary production of glass. For specific mention of re-melting temperatures, and the wider discussion of traded cullet to (or via) Sri Lanka during the Medieval period, see: Stefano Carboni, "The Mantai Glass" in *Mantai City by the Sea,* John Carswell, Siran Deraniyagala and Alan Graham (eds.) (Aichwald: Archaeological Department of Sri Lanka & Linden Soft Verlag, 2013), pp. 313-48.

[156] Francis Buchanan. *An Account of the Districts of Bihar and Patna in 1811-1812* (Patna: The Bihar and Orissa Research Society, 1935), Vol. 2, Book 5 (of the State of Arts and Commerce).

usually filled with air bubbles, waves, in nobs, and every other imperfection: it even in general looses part of its pellucidity (transparency or translucency)".[157] Although both Montgomery and Buchanan's observations were recorded in the early nineteenth century, these practices and methods of manufacture could have been employed during the late eighteenth century, or earlier (fig. 52).

Fig. 52 *Glass Blower,* India, Patna, Company School, circa 1850
Collection of James Broun-Ramsay, Marquess of Dalhousie, Governor-General of India (1848-1860)
Sotheby's London, *Of Royal and Noble Descent* sale, 19th January 2016, lot 106

The accounts made by both Buchanan and Montgomery describe furnaces and fuel sources, suggesting that temperature and environmental conditions played a crucial part in the quality of glass manufacture in India. While the use of cullet or recycled glass has, since antiquity, been used in the manufacturing of glass – largely fuelling the wider production of glass in regions that did not have the technical means or knowledge to manufacture raw glass – evidence of primary glass production of glass suitable for beads, bangles, and small vessels existed in India since the first century, as proven by

157 Martin Montgomery (ed.) *The History, Antiquities, Topography, and Statistics of Eastern India; comprising the districts of Behar, Shahabad, Bhagulpoor, Goruckpoor, Dinajepoor, Puraniya, Rungpoor and Assam* (London: H. Allen and Co., 1838), Vol. 1, pp. 330-33.

archaeological finds from the ancient site of Kopia (in modern day Uttar Pradesh); yet evidence of the production of primary glass suitable for blown objects, one that utilizes raw ingredients sourced locally, does not exist (in known documented sources) until the early twentieth century.[158] According to George Watt, speaking in 1880:

> *India abounds in materials which readily yield these necessary constituents. Perhaps the simplest of these is reh, which contains soda in the form of carbonate, and a large quantity of silica ready mixed. Notwithstanding the abundance of this, and other glass making materials, glass making in India has not advanced beyond the first and very rudest stage. Too much alkali is employed, and too little heat given, with the not unnatural consequence that the resulting material is a coarse, impure, dirty-coloured mass, full of flaws and air bubbles, unfitted for any better use than the manufacture of beads, coarse bangles, and other minor and unimportant articles.*[159]

Watt, speaking almost seventy years after Buchanan and Montgomery's observations, suggests that little evolved in the methods or techniques of glass manufacture in India. While his reference supports the use of locally sourced materials (and not recycled European cullet), he does not provide a precise place of production; his comments are general, despite expressing specific challenges facing Indian glass production.

The following late nineteenth century surveys were done on behalf of an 1883 resolution of the Government of India to address the concern felt for the general decline in the decorative arts, and to better understand the extent of an indigenous glass industry by detailing both the objects produced and the methods of manufacture employed in each region. The surveys were conducted by various contributors, and subsequently compiled into the *Journal of Indian Art and Industry*. These descriptive accounts document each region's glass production, providing methods of manufacture, types of objects made, and (in some instances) the same challenges as echoed by Buchanan, Montgomery, and Watt. The regions surveyed in this Journal were the Punjab (Lahore, Hoshiarpur, and Patiala), Bengal (Calcutta and Patna), northwest provinces and Awadh (Benares and Lucknow), and the Kaira District of the Bombay Presidency (Kapadwanj).

[158] For discussion on the existence of primary glass production in India dated from 200 BCE-100AD, see: Robert H. Brill and Alok K. Kanungo, "Kopia, India's First Glassmaking Site: Dating and Chemical Analysis," *Journal of Glass Studies* 51 (2009), pp. 11-23.
[159] George Watt (ed.) *A Dictionary of the Economic Products of India, Vol. 1-3* (Calcutta: Department of Revenue and Agriculture, 1880), Vol. 3, pp. 503-5.

In 1872 the glass industry in the Punjab was considered to still be in its earliest infancy, attributable to the absence of either good materials or suitable furnaces required to make pure glass; yet despite this, objects were nonetheless blown into shapes such as candles, vases, globes, and bottles.[160] The Lahore glass manufacturers used white glass, which was "made either of fused glass imported from Europe in the lump, or of melted fragments of European vessels" to make small vessels and mould blown bottles, the result of which was considered "very fair".[161] According to the Jullundur report of 1893, Lahore imported Rs. 16,230 worth of glass of supposed European origin, a large portion of which was distributed over the province.[162] These statistics of imported glass suggest a wider secondary production of recycled European glass manufactured throughout the Punjab.

J.L. Kipling (Curator of the Lahore Museum) surveyed the glass industry in the Hoshiarpur district of the Punjab, stating that:

> *It is a curious fact, and one which testifies to the strange simplicity and narrow needs of rustic life in the Punjab, that although Churigars produce glass of agreeable colour and at a cheap rate, there is no use for it but in the form of churis, or bangles, small phials for attars. But there are no bottles, vases, drinking cups, or any of the hundred forms into which, in other parts of the world, glass is wrought".*[163]

For the 1881 Punjab Exhibition, several small vases, basins, bowls and cups were made in various colours, the chemical properties of each described as: tin and lead (for green), black *anjani*, or manganese oxide (for purple), copper (for deep blue) and tin and lead mixed with a small proportion of *anjani* (for a yellow). These vessels were deemed technically imperfect, filled with air bubbles, knots, and unevenly shaped. While the methods for manufacturing blown vessels in Hoshiarpur reflected techniques employed elsewhere (i.e. the glass workers separated the vessel from the blow pipe with the touch of cold water, and while still soft, tooled the vessel's mouth and lip with an iron instrument) Kipling attributed the lack of high quality glassware to a lack of cheap fuel.

The manufacture of glass in Patiala in the Punjab owed its existence to the Maharaja, who imported the glass from England "in the shape of bricks or blocks

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[160] Henry Baden-Powell. *Hand-book of the Manufactures and Arts of the Punjab, with a combined glossary and index of vernacular trades and technical terms* (Lahore: Punjab Printing Company, 1872), p. 235.
[161] Ibid, p. 235 and 238.
[162] Hallifax, (1894), pp. 47-9.
[163] John Lockwood Kipling, "The Industries of the Punjab," *The Journal of Indian Art*, Vol. 2 (London: Ivie Hamilton, 1888), pp. 39-40.

weighing about 4lbs each; its costs Rs. 40 per maund;" the art of glassblowing supposedly taught thirty years prior (circa 1840) from a gentleman at Cawnpore, in Awadh.[164] These bricks refer to rectangular shaped ingots similar to those described in the early eighteenth century India Office Records as well as the 1765 Albion wreckage, suggesting that a continued demand for English potash-lead glass existed over a century later.

According to C.J. Hallifax (speaking in 1894), the glass industry in the Punjab could never compete with imported goods, and would never develop into a larger profitable industry based on the cost of fuel, which "can be reduced only by the erection of proper furnaces."[165] Hallifax continues to describe:

> *The small scale on which the industry exists in the Punjab, and the import of good and cheap ware, render any advance in the character or extent of the local industry unlikely, and unless vitality is imparted to it by the foundation of large works, glass making will continue to exist as one of the unimportant industries of the province, for a long as there is a demand for such particularly native articles as the churi and the chorpani there is no fear of its extinction.*[166]

Hallifax describes an abundant demand for the continued tradition of glass bangle making (*churi*), which used both wood and mustard leaves as the primary fuel sources; however, larger objects reliant upon stronger heat temperatures and 'proper' furnaces never advanced, relying instead on cheaper glass imports.

Trailokya Nath Mukharji (of the Indian Museum, Calcutta) surveyed the glass blowing industry of Bengal in 1896.[167] His report suggested that very little glass production of high quality existed, concerning itself predominantly with perfume bottles, lamps, ink bottles and bangles made in Calcutta, Patna, and a few surrounding towns. Like the other regional industries, Calcutta used broken imported glassware that was recycled into new shapes. Already in the late nineteenth century, a European supervised glasshouse - the Pioneer Glass Company – specialized in medicine bottles and other glass articles in the town of Titagarh (north of modern day Kolkata). Mukharji also commented on green glass manufactured in Bihar, produced by adding peroxide of

[164] Baden-Powell (1872), p. 238.
[165] Hallifax (1894), p. 47.
[166] Ibid.
[167] Trailokya Nath Mukharji, "Pottery and Glassware of Bengal, II: Glassware", *The Journal of Indian Art* (London: Ivie Hamilton: 1896) pp. 99-102.

copper, and blue glass made by adding an oxide of tin, although he claimed that blue was less commonly manufactured.

According to Mukharji, Patna represented the only area that possessed the potential for manufacturing high quality glass. Montgomery already mentioned glass blowing in Patna in 1807, and that glassware was made from recycled European glass. Almost a century later Patna still relied on recycled European glass, but created an array of glass articles including bottles, *lotas* (water carriers), flower vases, baskets, drinking vessels, cups, and saucers. Some of these objects were made in yellow and blue glass, and some even decorated with gilt decoration; the gilded objects are the only examples of gold decorated glassware described within the nineteenth and twentieth century surveys, suggesting that glass making in Patna developed into a more sophisticated art form.[168] According to the 1883 *Journal of Indian Art*, the Patna glass specimens exhibited at the Calcutta Exhibition were of "considerable excellence;" yet, despite the elegant forms and excellent specimens produced in Patna during the late nineteenth century, Mukharji believed that "the industry is on the point of extinction for want of demand. Only two or three families are engaged in it, but they make no fancy glassware without order".[169]

The glass industries of the northwest provinces and Awadh used a combination of country and European glass for the manufacture of blown vessels. H.R.C. Dobbs conducted the survey of these regions in 1897, observing that small phials and flasks for holding Ganges water were blown in Aligarh, Bareilly, Bijnor, Buldanshahr, Etah, Rae, Bareli, and Saharanpu, the last of which also manufactured hand blown small toys and *huqqa* mouthpieces.[170] These objects were all made from country glass, which was of "a different substance from the European glass [and] does not coalesce with it".[171] In Benares (Varanasi) and Lucknow pickle jars, small lamp globes, vases, and phials were all made from European glass. Irrespective of the type of glass used and objects made, the glass blowing techniques were identical across various districts; the furnaces (called *das*) were made of clay and used wood as fuel.

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[168] Mukharji (1896), p. 102.
[169] Ibid.
[170] H.R.C. Dobbs, "The Pottery and Glass Industries of the North-West Provinces and Oudh", *The Journal of Indian Art* (London, 1896), p. 5.
[171] Ibid, pp. 5-6.

The last region surveyed was the Kaira District of the Bombay Presidency, in particular the glass-manufacturing town of Kapadwanj. Several scholars have long postulated that this region represented one of the only centers where both an indigenous and successful Indian glass industry existed prior to the arrival of the British in India, one that utilised raw ingredients suitable for blown glass and not imported European cullet.[172] To date, the earliest recorded evidence of glassmaking in Kapadwanj is dated to the nineteenth century.[173] Kapadwanj's role in manufacturing vessels, bottles, sprinklers, bangles and mirrors was reported in the nineteenth century by B.A. Gupte:

> *Very little glass is produced in the Presidency, and that principally is manufactured at Kapadvanj in the Kaira District and is remarkable for iridescent properties and good colour resembling old Venetian. The shapes too of the little vessels and cups are very quaint and beautiful. The material for making glass are 'us,' an alkaline earth obtained locally, impure carbonate of soda 'sajikhar,' and a variety of dark, flinty sand from Jaipur…It [the glass] is then broken up into small pieces, re-melted, and shaped into bangles and small vessels.*[174]

While this account describes the primary production of glass used for small vessels and bangles, it excludes the manufacture of larger free blown globes, "a very favourite article of manufacture [used for] glass fragments for embroidery".[175] As previously discussed, the tradition of blowing globes of thin glass lined with mercury and then broken into fragments was used in embroidery decoration.[176] Yet despite the supposedly long and continuous tradition of glass mirror making in Kapadwanj, during the nineteenth century the town was also known to produce a variety of objects - rosewater sprinklers, wine cups, water tumbles and spouted vessels - in a variety of monochrome colours, such as peacock blue, dark blue, deep green, violet and amber

[172] Moreshwar Dikshit, "A Brief Study of the Glass Industry at Kapadwanj," *Bulletin: Museum and Picture Gallery, Baroda, India* 20 (1968), p. 3.
[173] Scholars such as Moreshwar Dikshit and Stephen Markel believed that a glass blowing industry existed in Kapadwanj from the seventeenth century through the early nineteenth centuries; Dikshit even claims that "it is not possible to say when exactly the industry started, but there is reason to believe that it flourished in the 17th and 18th century." See: Dikshit (1968), p. 3 and Stephen Markel, "India and 'Indianate' Vessels in the Los Angeles County Museum of Art," *Journal of Glass Studies* 33 (1991), p. 90.
[174] Cited in: Victoria Z. River, "Indian Mirror Embroidery from Gujarat," *Ornament* 16 (1993), p. 66.
[175] Edward Maconochie. *A Monograph on the Pottery and Glass-Ware of the Bombay Presidency* (Bombay, 1895), p. 9. According to Rosemary Crill, no known examples of shish decoration exist on textiles dated to before the nineteenth century.
[176] Kock and Sode (2002), pp. 79-94.

(figs. 53 and 54).[177] Kapadwanj glass is characteristically coarse due to its numerous bubbles and inclusions, creating a brittle texture similar to "the outer shell of an ostrich egg".[178] Without further historical evidence and chemical analysis conducted on Kapadwanj glass, its remains impossible to determine when the glassware was manufactured, and whether it was made using exclusively local ingredients or recycled English cullet.


Fig. 53: *Jar,* India, Gujarat, Kapadwanj, circa 1800; 7.14 x 7.94 cm
Los Angeles County Museum of Art (M.89.83.9)
Fig. 54: *Rosewater Sprinkler,* Cat. 58

These late nineteenth century descriptions of glass manufacturing in the Punjab, Bengal, Awadh, and Bombay Provinces describe the types of objects produced, the glass employed, and the subsequent manufacturing techniques; however, they do not divulge any details regarding how these industries were organized. Mukharji alluded to the business in Patna run by families, while suggestion was also made of larger European supervised factories near Calcutta. In 1880 Watt makes reference to the glass making industry being almost entirely confined to a few families, as well as glass made in "the School of Art, Jeypore and by one or two men in the bazar".[179] In Kapawanj the glassmakers were Muslims; the Hindus of the town "deem it against their religion to

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[177] For more examples see the Los Angeles County Museum of Art: M.89.83.2a-b; M.89.83.1a-b; M.89.83.3; M.89.83.9.
[178] Dikshit (1968), p 4.
[179] Watt (1880), p. 504.

follow that profession".[180] Kipling expressed that "if the Hoshiarpur glassmakers could be brought nearer to European centres, it is quite possible they might learn to extend their trade", implying that they resided in smaller towns or villages.[181] It appears from these fragmented remarks that the nineteenth century glass industry was spread throughout the provinces, and not centralized within larger cities or European centres. Dikshit speculated in his 1969 survey on *The History of Indian Glass* that the bangle (*churis*) industry largely functioned as a cottage industry, in which only a few primary production centres manufactured the raw glass that was then transported to various regions and diffused throughout the provinces, towns and villages.[182] Centres such as Jalesar and Firozabad (near Delhi) traditionally served as such centres.[183]

In the early twentieth century, the glass centre of Firozabad alone had fifty to sixty factories, many producing only crude block glass known as 'bangle stone', which was bought by bangle makers and re-melted for the manufacture of bangles elsewhere.[184] If the dissemination of glass from larger primary centres fuelled a secondary production or cottage industry of bangles throughout South Asia, then this traditional framework underpinning India's bangle industry could have also functioned for blown glass vessels. It seems, therefore, that blown glass– which was often made in the same glasshouses as *churis* – functioned in a parallel manner, using recycled European cullet that was subsequently diffused to the smaller, regional factories or family operated glasshouses for re-melting and re-shaping into new vessels. The Jullundur report of 1893 supports this structure, as Rs. 16,230 worth of European glass was imported into Lahore and subsequently distributed throughout the region for secondary glass production.

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[180] *The Journal of Indian Art* (1886), p. 81.
[181] Kipling (1886), Vol. 2, p. 40.
[182] Moreshwar Dikshit. *History of Indian Glass* (Bombay: University of Bombay, 1969), pp. 147-8.
[183] Sode and Kock (2001), pp. 155-169.
[184] C. S. Fox, "Notes on Glass Manufacture," *Bulletins of Indian Industries & Labour*, No. 29 (Calcutta: Superintendent of Government Printing, 1922), p. 20.

Fig. 55: Glass furnace at Nagpur, Maharashtra in 1935 (After Dixon 1937, p.17)

By the early twentieth century the smaller productions of blown glass seem to have ceased almost entirely, being replaced by larger European-managed factories that attempted to compete with cheap foreign imports (fig. 55). It seems that the recycled European cullet of the potash-lead variety no longer sustained a secondary production of glass manufacture; it was instead replaced by an Indian or 'local' variety that used the natural ingredients readily available throughout the subcontinent. Between 1892 and 1914 three glass factories existed in India; after 1918 more factories developed under European management, employing European trained executives.[185] By the 1930s approximately forty factories existed for the manufacture of blown glass, as distinct from the fifty factories and numerous cottage furnaces active in Firozabad alone (fig. 56).[186] Edward Dixon claimed in 1936 that these larger factories seemed to have been situated in closer proximity to central markets rather than to the sources of raw materials.[187]

185 Edward Dixon, "The Industrial outlook: Indian glass industry (part 1)," *Current Science*, no. 3 (1937), p. 130.

186 Ibid.

187 Edward Dixon. *A Survey of the Indian Glass Industry*, no. 2, Bulletins of Indian Industrial Research (Delhi: Manager of Publications, 1936), p. 2.

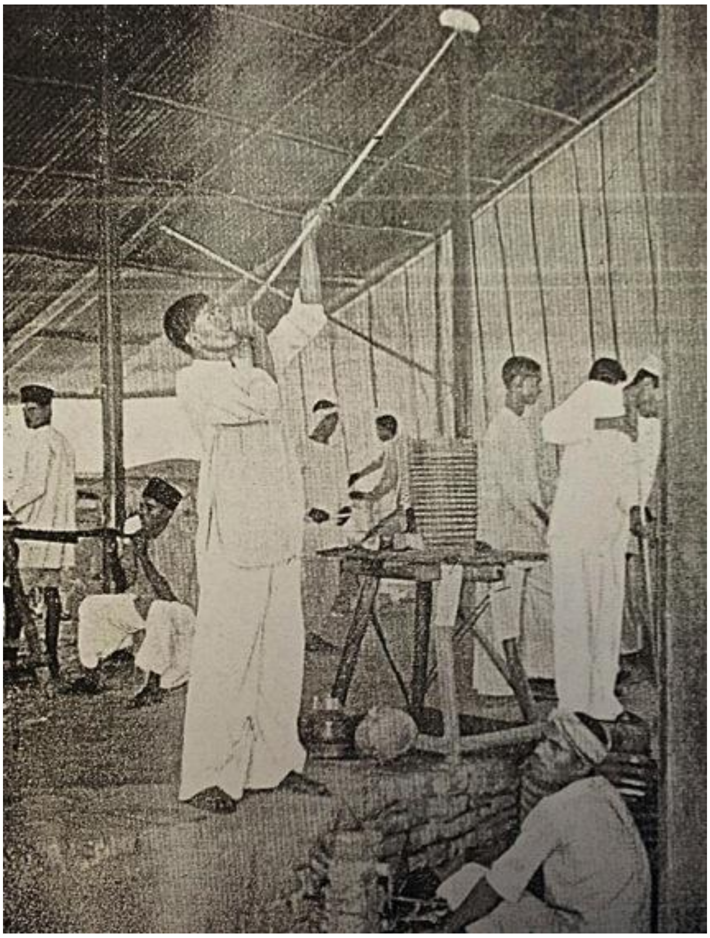

Fig. 56: Blowing Hurricane Lamp Globes, Central Glass Works Factory, Nagpur in 1935 (After Dixon 1937, p.16)

The raw materials used for the manufacture of blown vessels in these factories were sand, lime, soda ash, borax, saltpetre, arsenious oxide and the various colouring agents; the glass was considered of a soda-lime variety. Based on an average of seventeen different glass batches tested in 1937, the main constituents of a typical Indian blown glass expressed in weight percentages were: silica (74%); sodium oxide (17.4%); calcium oxide (6.8%); and potassium oxide from saltpetre (1.4%).[188] As previously stated, twentieth century Indian glass did not include lead or potash oxide on account of the high price of lead. The chief raw materials, with the exception of soda ash (sodium carbonate) were all found in abundance in India, yet no one place produced all these raw items in large quantities, so that no particular district or province could be

[188] According to Dixon, Indian glass of this compositional variety would have been easy to melt, on account of the high percentage of sodium oxide within the batch, yet would have conversely had a high coefficient of thermal expansion that would have been liable to cracking when subjected to a sudden temperature change. The glass would have also been only slightly water soluble, even in cold water, quickly loosing its brilliance when exposed to the atmosphere, and making it more susceptible to atmospheric deterioration and crizzling. See: Dixon (1937), part 2, p. 187.

favoured as a glass-manufacturing centre above all others.[189] The oxidising, reducing, colouring, decolouring, and opacifying agents were also imported during the twentieth century.

Despite the majority of raw ingredients sourced locally, impurities in the sand and the fact that these ingredients were not properly cleaned before melting (a process deemed too costly) greatly affected the colour and overall quality of Indian glassware.[190] The raw ingredients were often melted with waste glass or cullet from the factory itself, in temperatures of around 1200-1500 degrees Celsius. These temperatures were sustained by coal, which was largely sourced from the Bengal coalfields; despite coal being a more effective and efficient fuel for melting glass (as opposed to wood or mustard leaves), it also constituted the most expensive component of the manufacturing process.[191]

According to Dixon, by the twentieth century all glasshouses practiced a similar, modernised method of glass manufacture, one that utilised power driven materials, larger furnaces, coal, and various imported manufacturing agents. The quality of this twentieth century glass stemmed not from technical differences, but rather, the attention given by workers and supervisors, which according to Dixon, included inferior methods of cleaning raw materials, inattentive computation and control of glass mixtures, and unregulated environmental conditions. His comments on quality were attributed to lack of supervision, and "not necessarily to any want of skill on the part of the glass blowers….almost any article, however badly made, will usually be accepted".[192] These comments deflect responsibility from the glass blower onto the supervisor, thus shifting the accountability away from the skilled artisans, who most probably already possessed (or could easily be equipped) with the necessary knowledge and skills required to produce finer glassware. Dixon's comments rather reflect an industry motivated by industrial demands for cheap consumable goods, of which fine quality production was of less importance or concern. This twentieth century industry adequately served its purpose in providing cheaply available goods. As will be discussed

[189] Edward Dixon, "The Industrial outlook: Indian glass industry (part 2)," *Current Science* (1937), p. 181.
[190] Dixon (1936), p. 15.
[191] Fox (1922), p. 46.
[192] Edward Dixon. *A Survey of the Indian Glass Industry*, no. 2, Bulletins of Indian Industrial Research (Manager of Publications, Delhi, 1936), p. 27

in the following section, demand dictated quality, and was not (as Dixon observed) based on lack or want of skill on the part of the glass blowers.

Colonial Comments and Comparative Industries

While nineteenth century surveys of Indian glass production often suggest that the industry was at an infancy state, and only capable of producing objects of inferior quality – due to inadequate furnaces, insufficient fuel sources, and social dis-interest - these accounts failed to recognise the long and continuous tradition of glass production in South Asia; the influence of comparable and competitive crafts; the shift in social preferences and tastes; the impact of colonial influences; and the availability of resources (both domestic and foreign) had on shaping glass production during the eighteenth and nineteenth centuries. General Abbott, acting as the Deputy Commissioner of the Hoshiarpur District of the Punjab (1850-58), claimed that the glassmaking industry failed there due to "the entire absence of any native demand."[193] This late nineteenth century observation echoes in other comments made by Europeans at the time, yet none attempted to analyse the wider socio-cultural context surrounding the material itself, or the impact this had on local demand for glass objects.

Glass production was historically practiced by Sunni Muslims, with some of the earliest forms of glazed tile work found upon Islamic tombs in and around Delhi dating to the Tughlaq and Lodi Dynasty (fourteenth and sixteen centuries). The practice of glazing pottery, itself a form of glass production, represented a distinct Muslim practice that differed in several fundamental aspects from Hindu potters, often resulting in separate workshops. These differences stemmed predominantly from religious associations embedded within the raw material itself, which ultimately dictated the types of traditional techniques employed (china clay, or *chinimitti* versus common clay).[194] In Muslim practice, the application of a glaze not only enhanced the material's decorative quality, but it also prolonged its longevity, enabling the object to benefit from

[193] John Lockwood Kipling, "The Industries of the Punjab," *The Journal of Indian Art*, Vol. 2 (London: Ivie Hamilton, 1888), pp. 39-40.

[194] According to tradition, the Lord Shiva, when preparing for his marriage to Parvati, realised that he had no water pot (*kumbh*) for the ritual, so took a bead out of his rosary and created a man and a woman, and ordered them to make pots. Thus, a class of *kumharas* (potters) was created, with the name *Rudra, Loka-Rudra* being another name for Shiva attributed to this professional sect of Hindus. See: Gurcharan Singh. *Pottery in India* (New Delhi: Vikas Publishing House, 1979), p. 25-6. Another legend claims that when the epic churning of the ocean took place and the Gods took out the nectar, they needed a vessel to keep it, so Viswakarma, the celestial artificer, moulded a pot. See: Kamaladevi Chattopadhyay. *Handicrafts of India* (New Delhi: Indian Council for Cultural Relations, 1985), p. 3.

multiple uses or reuse. Conversely, Hindus held a belief that clay and earthenware objects, being made of an organic substance, were either meant to be disregarded after use or simply left to decay, disintegrate, or absorb back into nature; these objects possessed an ephemeral quality whose function was directly connected to the fundamental essence of its materiality.[195] This Hindu belief was, furthermore, intrinsically connected to the strict practice of disregarding eating and drinking vessels after use - especially if handled by lower castes – as they were deemed unclean and unworthy for keeping.[196] This caste-based Hindu belief dictated that glazed pottery (and even glass vessels) should not be used within the context of food and drink, a practice that continues within ardent religious circles and amongst certain social groups. Buchanan, speaking in Patna in the early nineteenth century, makes mention of this distsinction stating that Hindus would “shudder at the idea of eating from a vessel of china ware, queen’s ware, or glass.”[197] Such a similar practice also extends towards certain Sikh communities, who use iron and steel vessels for food, drink, and devotional practice, a tradition rooted in the belief that natural beneficial properties were embeddied within the metal or alloy. For this reason, Sikhs also always wear a steel bracelet, which serves as one of the five emblems of their *Khalsa* (Order of the Pure).[198] In each element (clay or steel), symbolic and sacred properties are derived from the pure, untainted substance itself, which allow for certain vessels to be made within specific contexts. Conversely glass, as a chemically constituted material created by man, presents a host of different meanings and associations. It is precisely because of these differences that glass was only manipulated into certain types of vessels by specific religions or castes. Understanding the nuanced and symbolic associations embedded

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[195] Clay, as either oven baked or sun dried, has traditionally played a fundamental role within religious, devotional practice in South Asia, in particular for making images. The technical practice of clay is recorded in various *Agama* literatures of different religious sects dating back to the 12th century. In these, clay was listed amongst the four materials considered suitable for making the *Dhruvabera*, main deity. Furthermore, clay embodies symbolic associations that are linked to the seven elements of the human body. See: K.M. Varma. *The Indian Technique of Clay Modelling* (Calcutta: Calcutta Press Private Ltd., 1970), pp. 1-6.

[196] See: Gurcharan Singh. *Pottery in India* (New Delhi: Vikas Publishing House, 1979), p. 29; Geeta Jayaram Sodhi, “Traditional Potters and Technological Change in a North Indian Town” *Sociological Bulletin* 55 (2006), p. 370; and Kamaladevi Chattopadhyay. *Handicrafts of India* (New Delhi: Indian Council for Cultural Relations, 1985), p. 4.

[197] Francis Buchanan. *An Account of the Districts of Bihar and Patna in 1811-1812* (Patna: The Bihar and Orissa Research Society, 1935), Vol. 2, p. 618.

[198] Nikky-Guninder Kaur Singh, “The Sikh Religion” in *The Arts of the Sikh Kingdoms*, Susan Stronge (ed.) (London: V&A Publications, 1999), p. 34.

within the materiality of glass helps to better contextualise the motivations stimulating its demand, and thus the reasonings of its manufacture and function.

Although Hindus might not have commissioned glass vessels for eating and drinking, they certainly used other glass objects such as candlesticks, vases, and pots. Furthermore, Hindus' regular use of mirror glass and ornaments, used in both a devotional and decorative context, would have represented a steady demand for glass objects that stimulated glass production, and in doing so, would have sustained a particular glass industry. The assumption that poor quality glass stemmed from a lack of local demand merely reflects a simplified and singular understanding of this complex and nuanced industry. Indeed, blown glass vessels were made to commission, and thus reflected local demand; however, Indian craftsmen possessed both the ability and skill to make finer glassware, should demand dictate production. Indian glass makers already had the knowledge to make a variety of glassware, including mirrors, window pane glass, ornaments, and blown vessels. Nineteenth century European observations of Indian glass thus failed to consider the diversity and complexity of the industry, as well as the plausible implications that foreign trade, political forces, and new industrial technologies had on local production. These later implications play an equally important role in understanding the shift in glass production during the nineteenth century.

Traditional Indian crafts transformed considerably throughout the late eighteenth and nineteenth centuries, and yet a common perception is that artisan skills were lost; on the contrary, these skills were withheld. Tirthankar Roy's studies of artisans in colonial India highlights that, while foreign trade had a critical impact on certain crafts, other crafts that were less effected by trade – and yet continued to be producers of mass consumables – still changed profoundly.[199] Roy attributes this transformation of local markets to increased trade, faster and cheaper transportation, and easier access to information; for a wide range of crafts, "larger and more accessible markets did not necessarily bring on competition from machinery, rather they implied heightened intra-artisan competition."[200] Within this context, a study of the brass industry provides a suitable parallel to that of glass, as the former transformed not because of foreign competition, but because imports impacted traditional methods of

[199] Tirthankar Roy, "Home Market and the Artisans in Colonial India: A Study of Brass-Ware," *Modern Asian Studies* 30 (1996), p. 357.
[200] Tirthankar Roy, "Out of Tradition: Master Artisans and Economic Change in Colonial India," *The Journal of Asian Studies* 66 (2007), p. 964.

manufacture and the level to which these consumables could be made. In the specific case of brass-ware, imported sheets of brass eliminated the need to melt the scrap in smaller furnaces; as copper required higher melting temperatures, it rendered itself more economically advantageous for melting within larger furnaces. Furthermore, imported sheets allowed for both a standard and quality of metal to be ensured throughout production; as copper became increasingly used in manufacturing utensils, it eventually replaced earthenware vessels (whenever possible). This trend parallels glass production in several ways.[201]

Numerous accounts of glass industries recorded throughout the nineteenth century mention the use of European glass cullet in the manufacture of blown glass vessels. This cullet, like the imported copper sheets, provided a standard composition for glass that facilitated production: it required less temperature to melt; could be more easily transported to glasshouses; and enabled more objects to be made. Because of increased trade, cheaper transportation, and imported cullet, glass became more accessible and easily available. Over time, it competed with copper as a suitable substitute for earthenware vessels.

Within this competitive industry, artists found themselves creating a greater variety of consumer goods, which were not lost or abandoned with the rise in industrialized utilitarian goods. On the contrary, the nineteenth century witnessed a strong market for handmade consumer goods that became associated with status, rituals, and occasions, and served as cultural symbols within the context of nationalism and the re-creation of heritage.[202] While markets and meanings constantly changed to suit the demand for simpler and cheaper goods, old skills and traditional craftsmanship increased. This shift can be partially attributed to the inspiration drawn from European imports, which the affluent and urbanite Indians sought to copy using local craftsmen engaged in traditional techniques; yet these copied examples demonstrated comparable quality and sold at a cheaper price. Imports did not stifle local craftsmanship, on the contrary, they successfully "induced import-substitution" by local artisans.[203] The ability of local craftsmen, and in particular glass makers, to adapt to new demands, shifting

[201] Roy also observes that Hindus dislike for reusable vessels for food and drink traditionally facilitated the easy replaceability of earthenware; however, this practice turned when, realisation of prejudices apart, a "cheaper transportation, and resultant growth of internal trade and integrated markets." Roy (1996), p. 362.
[202] Roy (2007), p. 964.
[203] Roy (1996), p. 363.

tastes, and foreign imports showed the resilience and ingenuity of craftsmen. Their ability to adapt to new markets, to adopt new techniques, to preserve or dilute quality, and to reach new clients were decisions determined by families or individuals. As glassmaking was traditionally organised according to small family units that operated within the same area, competition was fiercest amongst families and not between regional craftsmen or glasshouses. Glass production was thus more susceptible to local influences, although some were equally affected by larger regional transitions, transformations, or epidemics taking place at the time. Such was the case at the turn of the twentieth century, when a plague devastated the district of Bihar, affecting many crafts and skilled artisans.[204] Another example shows how certain glass industries emerged due to a shift from one industry to another, allowing craftsmen to transfer traditional skills to suit new demands and tastes.

This phenomenon occurred with the example of diamond cutting in Lucknow, a long and distinguished tradition that degraded in quality in the late nineteenth century with the substitution of inferior materials. After the British annexation of Awadh in 1856, the craft of diamond cutting declined, but some of the polishers switched successfully to another material introduced by a master artisan in the glass industry, that of semi-precious stone imitations.[205] In 1880, William Hoey described this particular practice of counterfeits, claiming it was carried out "to great perfection" by a certain Kallan Khan, who manufactured "glass brilliants into which he infuses colour so skilfully as to deceive dealers in precious stones".[206] This shift from diamond to glass cutters shows an example of how traditions could be transferred across media, and while the quality of this work was more determined by the material itself, the shift nonetheless allowed for craftsmen to continue applying traditional skills and to adapt to shifting markets. It also reveals the rise of yet another glass industry that evolved during the late nineteenth century with the increase in British and the decline in diamond commissions; this shift shows how regional transitions transformed traditional skills. These skills were not lost; their transfer to another media only allowed for other industries to develop.

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[204] Roy (2007), p. 982.
[205] Ibid, p. 981.
[206] William Hoey. *A Monograph on Trade and Manufacture in Northern India* (Lucknow: American Methodist Mission Press, 1880), p. 56.

Many European accounts failed to examine comparable industries; to understand the religious associations embedded within the material and role this played in influencing production; and to consider how glass industries might have transformed based on foreign imports, the availability of resources, and the rise in industrialised utilitarian objects. With regards to comparable industries, these nineteenth century accounts all attribute the poor quality of glass to inferior furnace construction and inadequate heat temperatures; however, these assertions are easily negated when compared to the long and sophisticated tradition of iron smelting practiced in South Asia, an ancient craft dating back more than three thousand years that required large amounts of fuel for attaining temperatures of around 1100 degrees Celsius.[207] Furthermore, the relationship between quantity of production and quality of design (or material) is craft specific, and cannot be generalised across all industries. Indeed, the textile industry was indisputably decimated as a result of foreign imports, as were carpet weavers; those who had traditionally served local patrons witnessed a shift in selling at export markets, or catering to large commercial houses.[208] This shift from select clientele to mass production often led to a decline in the quality of manufactured goods; however, even in these instances the artisans adapted by customising quality to suit production demand. High quality goods continued in production, while certain crafts or artisans tailored production accordingly, when necessary. This was especially the case during the nineteenth century with the rise in both foreign and domestic industrialisation.

Still, other industries appeared less effected by trade and imports, while others like glass even benefited from increased imports, not because craftsmen were incapable of making locally produced glass, but because ingots, lump glass and cullet provided an easier and cheaper means of manufacturing a larger assortment of commercially available objects. This, compounded by a wider social shift away from glass' devotional or decorative uses, allowed for a rise in production of utilitarian glass vessels. The nineteenth and twentieth century surveys thus not only failed to contextualise glass

[207] In the case of iron smelting, charcoal (produced from heated wood in the absence of oxygen) was used for the melting of most metals. For an article that discusses the decline of traditional iron smelting in Southern India during the late colonial period, see: Sashi Sivarmkrishna, "Production Cycles and Decline in Traditional Iron Smelting in the Maidan, Southern India c. 1750-1950," *Environmental History* 15 (2009): 163-197.

[208] Roy (2007), p. 964.

within a long legacy of Indian glass production – taking into account the complex and nuanced industry - but moreover, disregarded the abundance of sophisticated and splendid objects such as those included within this thesis's Catalogue.

Patna and Lucknow: Places of Production and Circulation of Glass

The cities of Patna, Bihar and Lucknow, Awadh each represent places of historical importance with regards to the manufacture and trade of glass. From the late sixteenth century, each province was engaged in either the production or circulation of glass, a unique feature that continued in each city throughout the nineteenth century. By focussing on Patna and Lucknow – two cities situated in northern India - each will show that indeed a long and continuous tradition of glass production existed in South Asia, one responsible for the attribution of several objects included in the Catalogue.

The historic wealth and attractiveness of Patna stemmed largely from its idyllic positioning, placed at the river Ganges, and nestled amongst flat plains and hilly forests. Patna was long regarded as an agricultural haven, producing the finest cultivation of rice, fruits and flowers, which in quality and quantity was "rarely to be equalled."[209] Akbar's *Ain-i-Akbari* speaks of Patna's flourishing agriculture as well as its other commercial riches, claiming, "The houses for the most part are roofed and with tiles…Gilded glass is manufactured here. In the Sarkar of Bihar, near the village of Rajgir is a quarry of stone resembling marble, of which ornaments are made. Good paper is here manufactured…Precious stones from foreign ports are brought here and a constant traffic carried on."[210]

Patna and Bihar came officially under Mughal Emperor Akbar's control in 1574, and in the above reference recorded in the late sixteenth century, the *subah* (province) of Bihar served as one of the twelve administrative units of the Mughal Empire created by Akbar in 1580. Its importance as a Mughal capital was shown through its development as a political, commercial and cultural centre, not only functioning as the headquarters for a long line of distinguished *subahdars* (governors), including princes and close relatives to the emperors, but also as a key centre of trade and commerce. Patna's placement on the southern bank of the river Ganga, and its roads connecting it to Benares, Agra, Delhi and Lahore, meant that it was easily accessible by both water

[209] Abu-l Fazl' Allami, *The A'ini Akbari*, translated by H.S. Jarrett, 3 vol., 2nd rev. Ed by Jadu-Nath Sarkar (New Delhi: Oriental Books Reprint Corp., 1977), Vol. 2, pp. 163-4.
[210] Ibid.

and land routes. As English merchant Ralph Finch commended in 1586, large consignments of sugar, opium, raw cotton and cotton textiles were regularly loaded onto boats at Patna for exportation to Bengal.[211] Already by 1620 Patna was described as the "chefest mart towne of all Bengala", signalling its success and strength as a Mughal trading town. Its reputation was only further heighted with the establishment of the first English factory in 1657, who, like the Dutch, profited from the abundant saltpetre deposits that lay scattered over the region. Saltpetre (a necessity for the manufacture of gunpowder, and later English glass), cotton, indigo, and opium all represented principal goods that were manufactured in Patna and regularly exported throughout the seventeenth century, so much so that over 600 brokers were reportedly operating in Patna at this time.[212]

Already in the early seventeenth century Patna had attracted large numbers of scholars and artists, some of whom resided in the city whilst others merely travelled through to Bengal and further west.[213] Given the diversity of trade, commerce, and culture flourishing within the city, a variety of artists and craftsmen would have emerged to suit the needs of both residents and tradesman alike, including glass houses and factories. While glass production in Patna traces back to the late sixteenth century, if not earlier - based on accounts recorded in Akbar's *Ain-i-Akbari* - a late seventeenth century account makes specific mention of 'Patna glass' in relation to diplomatic gifts given by the English East India Company to the King of Burma. This account, recorded in the accounts accompanying the Mission of Fleetwood and Lesly to Ava, Burma in 1696, describes that "twenty Patna glass bottles" were delivered to the King, along with forty bottles of rose water, three gold sashes, a gold shawl, and twenty viss of sandal wood, all commodities of Indian manufacture traded at the time.[214] That same year, records of Fort St George in Madras (at the time, the Factory overseeing official EIC relations with Burma) mention the arrival of "4 boxes Looking Glasses and 3 Chests Glasswere" while the following year, two bottles rose water and a glass hubble-bubble (*huqqa*) were given

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[211] Kumkum Chatterjee. *Merchants, Politics and Society in Early Modern India. Bihar: 1733-1820* (Leiden: Brill, 1996), p. 17.

[212] C. R. Wilson. *The early annals of the English in Bengal, being the Bengal public consultations for the first half of the eighteenth century, summarised, extracted, and edited with introductions and illustrative addenda* (Calcutta: Thacker, Spinx & Co.Calcutta, 1900), pp. 45-6.

[213] Qeyamuddin Ahmad, "Patna-Azimabad (1540-1765): A Sketch," in *Patna Through the Ages: Glimpes of History, Society and Economy* (Patna: Janaki Prakashan, 1988), p. 77.

[214] David George and Edward Hall. *Early English Intercourse with Burma, 1587-1743 and the Tragedy of Negrais* (London: Routledge, 1968), pp. 173-4.

to the King of Arcott at St. Thomas.[215] Neither account mentions where these glass items were manufactured, yet both the glass bottles and *huqqa* bases were presented as gifts. The specific mention of Patna, however, draws attention to a precise place of production, which is further referenced in yet another account given by English traveller John Marshall, who observed that in Patna glasses with sand in them are made "like our houre-glasses in England, which are exact gurry [ghari]."[216]

These seventeenth century accounts of Patna's glass production are echoed in later eighteenth century records, supporting a continuous tradition, one stimulated by a combination of local demand, domestic trade, and foreign exports. The city of Patna witnessed considerable urban growth during the early years of this century, in part stimulated by the governorship of Prince Azim-ush-Shan (the grandson of Mughal Emperor Aurangzeb), who envisioned creating a city that reflected the splendour of Shahjahanabad in Delhi.[217] At this time, the Prince also renamed the city of Patna after himself, Azimabad. One of the recorded developments of Prince Azim's urban sprawl was the grouping of similar professions according to ethic background. It should be mentioned here that the glass industry in Patna, as elsewhere throughout South Asia, was predominantly a Sunni Muslim industry; the classifications of caste based industries were thus further differentiated by religious differences, with traditions of glass making embedded within family practices. In the eighteenth century, this occurred through the city's physical demarcation of the *Sheeh Mahal*, the known area where makers of glass objects lived.[218] Whether this area remained constrained to a single area of Patna remains unknown, yet it most likely shifted to suit the continual changes and expansion of the city. The demands for glass seem to have remained constant throughout the eighteenth century, fuelling a continual production of glass objects, as noted in a Persian

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[215] *Records of Fort St George for 1696: India Office Transcripts from Factory Records*, Vol. 23 (Madras: Superintendent Government Press, 1921), no. 9, p. 6; Fort St George, 21st Jan 1696; the huqqa account was written as: "Yesterday the Kings Duan and this day the kings Buxee[?] from Arcott arrived at St. Thomas to each of whom sent two bottles Rose water and a Glass Hubble-bubble with a compliment." [IOR/G/19/8, folio 237; Factory Records Fort St George, vol. 8, 8th January 1697]

[216] S. A. Khan (ed.) *John Marshall in India – Notes and Observations in Bengal* (London, 1927), p. 281.

[217] The Prince had been appointed *subahdari* of Bengal earlier, and was given charge of Bihar and Orissa in 1702; although the actual administrator of this large area (the precursor of the sprawling Presidency of Bengal) was the elderly Diwan Murshid Quli Khan. Due to the Prince's disputes with the Diwan, he moved to to Patna around 1704, and obtained the Emperor's permission to rename the town after himself. See: Qeyamuddin Ahmad (1988), p. 79.

[218] Other example include Dhawalpura, where prosperous citizens lived; Sads-us-Sadurki Gali, where writers and poets lived; Zargartola, where embroidery workers worked. See: Nripendra Kumar Shrivastava, "Contribution of Trade and Commerce in the Trend and Pattern of Urban Growth of Patna (1657-1765)," *Proceedings of the Indian History Congress* 71 (2010), p. 330.

glossary compiled in 1748, which mentions that Azimabad (Patna) produced the finest glassware including hubble-bubbles (*huqqas*), which were taken by merchants to other towns.[219]

With the Battle of Plassey in 1757, and later the Battle of Buxar in 1764, Patna became a political pawn between the British, the Mughals and the Nawabs of Bengal in their fight for regional control and political sovereignty. Patna ultimately lost its place of protection as a Mughal city, as Bihar became a sub province of the Presidency of Bengal, thus removing itself politically and administratively from both Delhi and Bengal. While marked differences in trade and commerce occurred throughout this latter half of the eighteenth century as a result of increased British rule, the effects of this upon glass production and consumption cannot be measured.[220] The production and trade of glass in Patna most likely continued throughout the eighteenth century, functioning to fulfil both local and regional demands. The documented emergence of markets during the latter part of this century, especially those stimulated by the increase in European private traders, probably increased production and consumption of glass vessels. However, detailed descriptions and records of glass industries in and around Patna only appear in the early nineteenth century. These accounts, compiled by Francis Buchanan in 1811-12, form a part of his wider survey of the districts of Bihar and Patna.

Based on Buchanan's accounts, the glass industry of Patna reflected a combination of both locally manufactured goods as well as second hand imports from Calcutta. The local manufacture of glass was chiefly dominated by Muslims (or Muhammedans, as termed by Buchanan), as according to him, Hindus - who would "shudder at the idea of eating from a vessel of china ware, queen's ware, or glass" - would not engage in the making of glass objects.[221] Glass making, as religion and tradition dictated, represented a Muslim industry. The men who engaged in this profession were allegedly poor, making no more than two rupees a month.[222] However, in 1812 Patna City had seventy-four *churisaz* (glass bracelet) makers and three

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[219] Anand Ram Mukhlis, *Mir'at-al istilah*, BM or. 1813, s.v. *bada-i Shiraz*; cited in Ahsan Jan Qaisar. *The Indian Response to European Technology and Culture, AD 1498-1707* (Oxford: Oxford University Press, 1982), p. 77.
[220] For a detailed account of this period of transition, see: Kumkum Chatterjee. *Merchants, Politics and Society in Early Modern India. Bihar: 1733-1820* (Leiden: Brill, 1996), chapter 5.
[221] Francis Buchanan. *An Account of the Districts of Bihar and Patna in 1811-1812* (Patna: The Bihar and Orissa Research Society, 1935), Vol. 2, p. 618.
[222] Ibid, p. 622.

shishahgur (glass blowing) families, suggesting that sufficient demand for this poorly compensated industry existed amongst both Hindus and Muslims, the former supporting *tikisaz* makers in their production of small mirror ornaments, which the "native women paste on their foreheads between their eyes."[223]

Another sub-sect of the glass industry was the falsifying of stones for rings, which were made of plates of glass sandwiched between coloured foils. These workers were called *Minomurussas*. The final type of glass production in Patna was that of glass blowers (*shishahgurs*), who, as Martin Montgomery mentioned in his 1807 account of glass making in Patna, used only the finer fragments of recycled European glassware. Buchanan's description of blown glass vessels and *shishahgurs* echoes an exact account of Montgomery's recorded only four years earlier, with the same lack of local demand, poor furnace construction, and inadequate heat temperatures expressed to explain the glassware's imperfections. Nonetheless, fourteen glasshouses in Patna were devoted exclusively to the manufacture of raw glass used to make mirrors and ornaments. These workers were numerous, and benefited from a thriving local demand.[224]

The locally made objects of Patna, in particular the *churisaz* makers (those who manufactured glass ornaments) would retail their goods at either markets or small shops, the latter reportedly having capitals of between ten and fifty rupees. Buchanan does mention that glass beads and looking glasses represented some of the wares (or *manihari* goods) imported into Patna from Calcutta, some of which then continued to be traded throughout South Asia. While Buchanan does not specify where the *shishahgurs* sold their blown glass objects, these vessels probably appealed to a combination of both European and Muslim merchants and patrons. As these blown vessels were not explicitly mentioned as objects retailed in the local markets or shops, nor mentioned as imported goods, they could have represented an export market, one which utilised the already heavily trafficked land or river routes, such as that connecting Patna and

[223] Ibid.

[224] Buchanan describes this manufacturing process as the following: "They collect the saline efflorescence from Aghan and Magh (from the middle of November to the middle of February), and as they collect it through into a cistern or reservoir lined with smooth kneaded clay. This cistern usually holds 20 mans (1600 lbs.) of the saline earth, and to collect this quantity requires from 10 to 20 days of a family's labour. The cistern is then filled with water, and this is allowed to evaporate by the action of the air, which requires from 10 to 12 days. When dry, the bottom of the cistern is found covered with a thick saline crust, a conservable part of the earth, with which the soda was originally mixed, having subsided, before this saline substance began to separate from the water. This soda makes glass without addition, as it contains a great portion of earthy matter"; Ibid, p. 620-22.

Calcutta. Mention is made of one particular Patna merchant named Motfurkat, who lived by selling old European mirrors that had been purchased at public sales, as well as repaired glass lanterns and broken crystal glass; his stock reportedly worth two hundred rupees.[225] Another local merchant dealt in the sale of "old glass ware, the refuse of the Calcutta shops, and in the most execrable liquors; both of which, I [Buchanan] presume, are chiefly purchased by natives." Buchanan's observations thus suggest that in the early nineteenth century a complex glass industry existed in Patna, one based on both local production and domestic imports. Moreover, the glass industry benefited from a range of glass products required to suit both the demands of local consumers, as well as regional sellers.

According to the 1883 *Journal of Indian Art*, the Patna glass specimens exhibited at the Calcutta Exhibition were of "considerable excellence" while Trailokya Nath Mukharji of the Indian Museum, Calcutta claimed in 1896 that Patna produced the highest quality of glassware in the region, making bottles, *lotas* (water carriers), flower vases, baskets, drinking vessels, cups, and saucers, some further ornamented with gilded decoration.[226] Although, it was also noted that the Patna glass industry at this time was dwindling, as it was dependent on only two or three families who seldom benefited from commissions of either complex or fancy (i.e. gilded) orders.

By the early nineteenth century, approximately six hundred Mughal (i.e., Muslim) families resided in the district of Bihar, with just over two hundred living in Patna.[227] This small number of Muslim residents is proportionally related to the small number of *shishahgur,* or glass blowers, recorded in Patna City (three). Although Muslims used glass vessels for food and drink, once a family acquired a glass set, there would have been no further demand for such commissions (unless for special occasions, or to replace a broken piece); thus, these specific types of glassware were most likely not produced in vast quantities. Rather, bottles, *lotas* (water carriers), flower vases, and baskets – objects suited to both Hindus and Muslims - probably possessed a wider appeal and therefore constituted the majority of blown glass vessels produced in Patna. The mid-nineteenth century Company School painting of Patna glass blowers (fig. 57) shows men blowing large globes to be worked into small bottles or phials, as seen by

[225] Ibid, p. 691.
[226] Trailokya Nath Mukharji, "Pottery and Glassware of Bengal, II: Glassware," *The Journal of Indian Art* (London: Ivie Hamilton: 1896), p. 102.
[227] Buchanan (1935), p. 311.

those annealing in the furnace. Glass bottles, which functioned as containers for medicines, oils, or perfumes, would have been a popular type of glass object produced and consumed, as indeed represented by examples within the Catalogue of this thesis; unlike the large number of mould blown rectangular case bottles appearing within the Catalogue, these phials, bottles, and vases are blown freely and worked with tools. Examples of Patna objects with the Catalogue include: Cat. 39; 46; 56; 57; 62; 63; 64; 65; and 100 (figs. 58, 59 and 60).

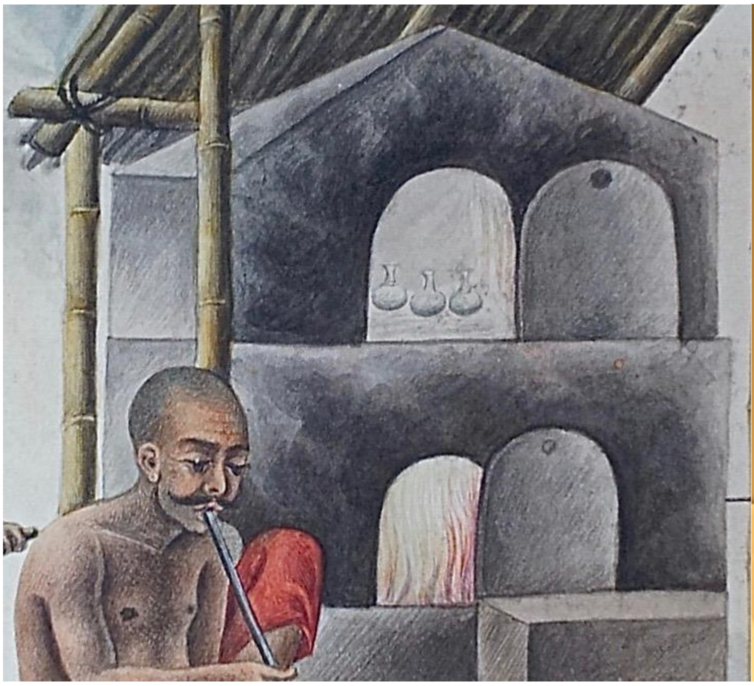


Fig. 57: Detail of figure 52 - Fig. 58: Cat. 56

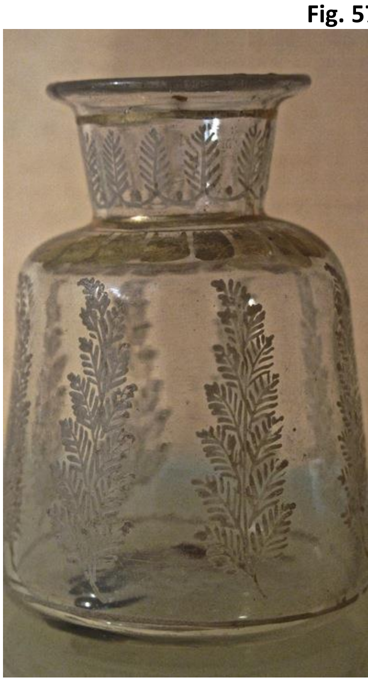


Fig. 59: Cat. 39 – Fig. 60: Cat. 64

Socio-religious associations meant that the glass industry in Patna might have developed or adjusted according to different ethnic and religious communities, which evolved as the city expanded and faced changing regional powers. It was thus the demand for glass that motivated production and determined the types of glass manufactured in Patna. Irrespective of the type or quality of glass production, Patna remained a constant place of glass manufacture: in the sixteenth century it made gilded glass; in the seventeenth century it produced bottles worthy of diplomatic gifts for the King of Burma; in the eighteenth century it thrived in making the finest glassware traded by merchants and tradesmen; and in the nineteenth century it supplied glass mirrors, ornaments, and blown glass vessels. Patna, a city that traces glass making back to Akbar's reign, represents a city with a long and lasting legacy of glass production.

Lucknow represented a city of commerce and consumption that complimented Patna as a place of glass production. Already in Akbar's *Ain-i Akbari*, the *subah* of Awadh was engaged in a lively trade of goods, claiming that "from the northern mountains quantities of goods are carried on the backs of men, of stout ponies and of goats, such as gold, copper, lead…in exchange they carry back white and coloured cloths, amber, salt, ornaments, glass and earthen ware."[228] Like Bihar, by 1580 the *subah* of Awadh formed one of the twelve principle administrative units within the Mughal Empire; however it was during the eighteenth and nineteenth centuries that the city of Lucknow emerged as a centre for trade, commerce and artistic production. The reasons for Lucknow's emergence are multifaceted, but stem largely from Delhi's political fractioning and a regional rise of European hegemony. Throughout the eighteenth century, Lucknow witnessed several waves of migration, each precipitated by the constant attacks on the Imperial capital Delhi; these resulted in an exodus of artists and skilled craftsmen who, seeking patronage elsewhere, settled in Lucknow. The sack of Delhi in 1739 by the Iranian ruler Nadir Shah (ruled 1736-47) represented the first exodus, followed later invasions from Sikhs, Marathas, and Afghan Rohillas, and lastly the British occupation of Delhi in 1803.[229] These exoduses from Delhi were further fuelled by the patronage found within the court of Awadh under the reigns of Shuha al-Daula (r. 1754-75) and his son, Asaf al-Daula (r. 1775-97), whose pursuit and support of

[228] Abu-l Fazl, Jarret (1977), Vol. 2, p. 181.
[229] Stephen Markel, "The Dynastic History of Lucknow," in *India's Fabled City: The Art of Courtly Lucknow* (Los Angeles: Los Angeles Museum of County Art, 2011), p. 14.

the arts served - in the face of the growing English East India Company hegemony – as a means of asserting dynastic ambitions.[230] The riches and political importance of Awadh continued to attract those eager to find fortunes and to join the nawabs and court elite. These included rajas, wealthy landlords, and Europeans, many of whom over time became long-term residents of Lucknow. It is against this backdrop that the city's distinct cultural contours were defined, creating a hybrid of artistic forms and a wealth of circulated commodities.[231] It is within this context of courtly wealth and commercial exchange that glass found a particular place within the Lucknow elites.

The recorded number of Europeans residing in eighteenth century India was very small, with numbers only increasing within the fourth quarter of the eighteenth century. According to Rosie-Llewellyn-Jones, an estimated 5000 European men and women lived in India in 1784.[232] While the English East India Company might have been amongst the first to benefit from Lucknow's wealth, it was only in 1774 that a British resident was appointed to the court, which at the time was at Faizabad, approximately ninety miles east of Lucknow. From the onset, the aim of the British was to cement relationships with the Nawabs and to obtain large quantities of wealth.[233] This wealth, however, was not dependent on the sale of imported British manufactured goods, which remained low (until the early nineteenth century) as "neither Company nor private merchants did much to introduce new technology into India" but rather, from the procurement and successful sale of European artefacts.[234] While other groups and foreigners, including Armenians, Iranians and Afghans, also sought out financial opportunities in Lucknow, it was the Europeans, and in particular a French and Swiss-French man, who engaged most actively in the trade and sale of glass within Awadh.

[230] The capital of Awadh alternated during the eighteenth century between Lucknow and Faizabad, and in strictly chronological terms, was the following: Faizabad, 1722-54; Lucknow, 1754-65; Faizabad, 1765-75; Lucknow, 1775 – onward.

[231] For a more detailed discussion of the hybrid Awadh style that flourished in the eighteenth century, see Tushara Bindu Gude's publication, "Hybrid Visions: The Cultural Landscape of Awadh" in *India's Fabled City: The Art of Courtly Lucknow* (Los Angeles: Los Angeles Museum of County Art, 2011)

[232] Rosie Llewellyn-Jones (ed.) *A Man of the Enlightenment in Eighteenth-century India* (Permanent Black: Delhi, 2003), p. 11.

[233] According to the India Office Records, the task of Nathaniel Middleton, and his successor John Bristow, was to cement "the Friendship between the Company and the Vizier [Shuja al-Daula] and the obtaining of large Sums of Money said to be due from him"; Bengal Secret Consultations 28 December 1774, India Office Records, British Library, quoted in Rosie Llewellyn-Jones, A Fatal Relationship: The Nawabs, the British, and the City of Lucknow (Delhi: Oxford University Press, 1985), 88-89.

[234] P.J. Marshall. *Bengal: The British Bridgehead 1740-1828* (New Cambridge History of India, Orient Longman Ltd, 1990).

The translated letters of Claude Martin (1735-1800) and Antoine-Louis Henri Polier (1741-95) document transactions and deals taking place across northern India during the late eighteenth century, and reflect the skilled manner in which European merchants procured and profited from traded commodities. Glass appears in several of these accounts as bottles and mirrors, the latter used within the context of architectural ornamentation. Claude Martin, originally from Lyon, France, was an opportunistic tradesman whose clients included the Nawabs of Awadh and elite Europeans. He was also both a supplier and collector of objects d'art and artefacts, and in particular, looking glasses, which he imported in large quantities from France and England.[235] These mirrors, which came to Lucknow by river from Calcutta, were used to decorate his two Lucknow homes built along the banks of the Gomti River: Constantia and Farhad Baksh. The Farhad Baksh was described as having two of its public rooms covered with glass, including "a pair ten feet in length, and proportionately wide," these reportedly valued at 4,500 pounds. The fashion of decorating rooms or walls with mirrors has already been discussed, with examples of *shish mahals* in Mughal buildings (Lahore and Jaipur) dating back to the early seventeenth century. Yet this penchant continues in the homes of later Lucknowi residents, including Europeans and the Nawab of Awadh, Asaf al-Daula. The Nawab had a 'looking-glass house' in his *Imambarah* palace, which was described in 1791 by Abu Talib ibn Muhammed as the "finest and most strongly built" of all buildings, and had "a number of glass chandeliers, with and without glass shades, plain and coloured."[236] Despite this, the Nawab was unsatisfied with his ornaments, and continually spent an additional four or five lakhs of rupees on further furnishings, many of which were European imports. It is likely that the Nawab remained a loyal and consistent client of Martin's, sharing with him a keen fondness for European glass ornaments, amongst other objects.

Like Martin, Polier represented a shrewd business man who cultivated close ties with a number of dignitaries and elites, even gaining the Mughal title of *Asralan-i-Jang* ('the lion of the battle') given by the Mughal Emperor Shah Alam. During his stay in Awadh and Delhi in the 1770s and early 1780s, his correspondences were addressed to

[235] William Chubb*. The Lucknow Menagerie: Natural History Drawings from the Collection of Claude Martin (1735-1800)* (London: Niall Hobhouse, 2001)

[236] Abu Talib ibn Muhammad, H*istory of Asafu'd Daulah, Nawab Wazir of Oudh, Being a Translation of "Tafzihu'l Ghafilin"*, translated from the original Persian by W. Hoey (Lucknow: Pustak Kendra, 1885), p. 73-4 [1205 A.H./10th September, 1790 – 30th August, 1791]

the Mughal Emperor, the rulers of Awadh and wazirs of the empire, and nobles of the Mughal state, whilst traders, agents and artists figure repeatedly within his letters.[237] Polier also engaged in the trade of mirrors, and makes regular mention of one particular set of four intended for Monsieur Gentil, who had recently arrived to Lucknow; a later correspondence confirms that Monsieur Gentil was pleased with his acquired mirrors.[238] The sale of mirrors appeared lucrative, based on the quoted price for a pair of small mirrors, valued at Rs 400, and Rs 2000 for a big mirror (the latter sale offered by Mirza Ali Khan) as well as valuable – regardless of condition - based on Polier's instructions to "get worn out mirrors polished and then han[ed] over" to his agents.[239] In one letter addressed to Oshra Mistri Gora – Polier's agent in the service of Shuja-ud-Daula – he requests the shipment of a chest of glasses, which are to be "wrapped up carefully in cotton"; while in another to Manik Ram (Polier's trusted Bengali agent), six glass chandeliers and eight glass candlesticks are instructed to be taken to Delhi by a certain Niyaz Ali Khan (presumably an agent or merchant).[240] It appears from the variety of glassware exchanged and traded between both Delhi and Lucknow that a demand for glass objects existed in India during the late eighteenth century; however, whether these objects reflected domestic products as opposed to foreign imports remains unknown.

Both Polier and Martin traded glass mirrors, chandeliers, bottles, and candlesticks, but comment was also made on another type of glass defined by its weight and quantity rather than by explicit object type, thus referring to lump glass, cullet or glass ingots. Polier, in correspondence with Manik Ram, writes "it is difficult to cart the two hundred man* glass that is there [Faizabad] to this place [Delhi] because of the disturbance on route. You may therefore deposit this glass with the Nawab Asaf-ud-Daula."[241] Martin makes an even more assertive claim on the importance of this type of glass stating, "In respect to the sale of the glass, you have written that a person has

[237] There are 1833 letters in this collection relating to the first phase of the period of Polier's stay in north India between Rabi I*, 1187 (June 1773) and Safar, 1194 AH (March 1780). Both volumes together, copied in nasta'liq and shikast, apparently by different hands, comprise 771 folios and are today kept in the Bibliotheque Nationale, Paris. See: Muzaffar Alam and Seema Alavi. *A European Experience of the Mughal Orient: The I'jaz-I Arsalani (Persian Letters, 1773-1779) of Antoine-Louis Henri Pollier* (New Delhi: Oxford University Press, 2001), p. 7

[238] Folio 22b, p. 108 in Alam and Alavi (2001).

[239] Ibid.

[240] Ibid, folio 39a, p. 118; and folio 264a, p. 252.

[241] Folio 371b, p. 324 in Alam and Alavi (2001). *A man refers to a measure of general use in India, but varying in value in different places; defined in Alam and Alavi (2001), p. 394.

given 28 rupees and 8 annas per mound as earnest money, but I do not and shall not sell it, even for 29 rupees, I shall not sell it."[242] The description of a man or mound of glass refers to glass that has not yet been worked into objects and ornaments, whether vessels, mirrors, or even chandeliers, and is waiting for re-melting. The importance of both comments derives from the value attached to the glass's weight or quantity (in its raw and unworked state): Polier's suggested that his glass be deposited directly with the Nawab of Awadh; and Martin deemed his glass maunds were more valuable than their proposed price of sale. These references not only attest to the weight, value and trade of raw glass, but in doing so, suggest that a secondary glass industry existed at a courtly or elite level in or around the regions of Delhi and Awadh during the late eighteenth century.

Secondary sources have accredited both Polier and Martin with encouraging new cottage industries, developing purpose built workshops, and even introducing new designs in the craft bazaar.[243] While both Europeans might have stimulated the production of smaller glasshouses, they also could have contributed to the development of a more sophisticated glass industry at the Lucknow court. Polier's letter not only confirms that glass was to be deposited directly with the Nawab of Awadh (Asaf al-Daula), but this glass would have found a suitable place for production with the Nawab, who at this time, was consciously and increasingly promoting Lucknow as a centre of artistic patronage. Asaf al-Daula, more than his father before him, patronised a new generation of artists who took established forms further and created a new Lucknow school of cultured expression, one not content with matching the "faded glories of other capitals, [but seeking] to surpass them all."[244] It is within this context of a cultured court and cultivated clientele that Lucknow's unique style emerged, one defined by its use of lush floral imagery, jungle patterns, hunting scenes, and the use of certain selected motifs (the *dhaniya* or coriander flower, and the fish). This distinct Awadh aesthetic, which appeared across a myriad of art forms produced during the late eighteenth and nineteenth century, also exists on several glass objects within the thesis's Catalogue.

[242] Letter 125 [letters from Najafgarh], p. 165 in Rosie Llewellyn-Jones (ed.) *A Man of the Enlightenment in Eighteenth-century India* (Delhi: Permanent Black, 2003).

[243] For Polier see the introduction by Alam and Alavi (2001), p. 55; for Martin see Llewellyn-Jones (2003), p. 127 who claims that workshops were made for both rose-petal and cloth-weaving.

[244] Michael Fisher. *A Clash of Cultures: Awadh, the British, and the Mughals* (New Delhi: Manohar, 1987), p. 72.

The glass objects attributed to Lucknow are based largely on stylistic comparisons to other objects, namely works on paper and metal ware. As Stephen Markel has attributed, the particularly dense jungle pattern covering the glass *huqqa* base (Cat. 111) corresponds so strongly with the floral sprays decorating the pages of the Polier Album (commissioned around 1780) that both a similar dating (circa 1775) and place of production (Awadh) can be given to the *huqqa*.[245] The stylistic correspondence between the floral sprays of Polier's commissioned album and the glass *huqqa* not only reveal the extent of Polier's influence upon designs and craft, but in doing so, allows for a clearer attribution for glass' date and place of production. Furthermore, the distinctly dense yet delicate patterns decorating the surface of this group of glass objects distinguishes them as a unique group; their decorations so similar to one another, yet different to the majority of other glass objects within the Catalogue, that they must come from the same region, and even workshop or atelier. Two particular glass objects demonstrate this Lucknow jungle motif: *huqqa* base (fig. 61; Cat. 111) and ewer (fig. 62; Cat. 99), both of which show a similar, densely decorated floral motif encircling the rounded bases.

Figs. 61 and 62: details of Catalogue 111 and 99

This motif, unique to both objects, draws its floral inspiration from works on paper, as seen on the Polier album; however, its dense arrangement covering the entire surface of the vessel corresponds strongly to Lucknow silver designs, as seen in figure 63. This stunning effect, mastered by Lucknow silver craftsmen during the nineteenth

[245] The exact floral comparison comes from a folio page titled, *Shah Jahan*, from a portrait album in the Polier Album, Awadh, Faizabad or Lucknow, circa 1780 (Museum fur Asiatische Kunst, Berlin; I 5063, folio 9b); cited in Markel, *Lucknow* (2011), cat. 127 and 99, p. 203.

century, successfully converted the entire surface of an object into a continuous intertwined array of lush stems and flowers.[246]

Fig. 63: Detail of a silver bowl with forest scene, Lucknow, ca. 1900
(After Dehejia 2008, cat. 78, p. 175)

The transfer of patterns across a variety of media was common within ateliers and courts, and appears no different in Lucknow and Faizabad. This is demonstrated by the lush floral patterning of jungle scenes, but also with another motif characteristic of Lucknow drawings and decorative arts: floral sprays emerging from a single vase. While subtle differences in arrangement, treatment, and shape of vases exist between these renditions, a common motif nonetheless features prevalently upon all examples. This particular motif found popularity amongst Lucknow artists, appearing in drawings (fig. 64), upon enamelled metalwork, (fig. 65), and glass (fig. 66). Curiously, this motif appears more commonly on glass bottles and cups (Cat. 24; 33; 70; 96; 97) and exists on only two bell-shaped *huqqas* (Cat. 194 and 243; fig. 67).

[246] For a more detailed discussion of Lucknow silver designs and production, see Vidya Dehejia, "Regional Styles of Silverware. Lucknow Silver: The Jungle and the Hunt" in *Delight in Design: Indian Silver for the Raj* (Singapore: Mapin Publishing, 2008), p. 171.

Fig. 64: ***An Elaborate Vase and Floral Design on Gold Ground,*** **India, Lucknow, 1750-1800 (Cleveland Museum of Art 2013.354)**

Fig. 66: Cat. 33

Fig. 65: Water pipe base, India, Lucknow, late eighteenth-early nineteenth century, gilt enameled silver (Los Angeles County Museum of Art, M.2005.95)

Fig. 67: Cat. 243

These visual comparisons help to attribute these glass objects to Lucknow, while both Polier and Martin's comments provide evidence for glass production in addition to the trade of mirrors, chandeliers, and candlesticks - which reflect a combination of domestic and foreign imports – circulating around Awadh and Delhi. While Patna served as a centre of glass production during the late eighteenth and nineteenth century, the glass objects attributed to Lucknow represent local manufacture; although, it also remains possible that these objects were blown in Patna, and transported to Awadh for decoration and sale. However, given the concentrated wealth of both the court and clientele in Awadh, it seems more likely that these glass objects were commissioned, blown, and decorated in Lucknow. A painting depicting Muzzaffar Jang, Nawab of Faizobad in around 1770 shows him smoking a glass *huqqa* base with blue floral insets (fig. 68).

Fig. 68: *Muzzaffar Jang, Nawab of Faizobad, in his harem,* Faizobad, Awadh circa 1770 (Bibliotèque Nationale, Paris Mss.Or.Smith-Lesouef 230, f.55)

While the illustrated *huqqa* cannot confidently reveal its decorative surface pattern, examples of globular glass *huqqa* bases with floral insets exist (figs. 69 and 70). These examples not only represent yet another decorative style of Lucknow glass produced during the late eighteenth century, but also reveal the sophisticated level of glass production that occurred at the court or elite level.

 

Fig. 69: Cat. 223 - Fig 70: Cat. 135

Lucknow thus represented a complementary city to Patna, one that benefited from the trade of both domestic and foreign imported glass objects, and produced its own sophisticated and splendid vessels. Dating from the late sixteenth century, the *subah* of Awadh imported glass, yet it was in the eighteenth century with the heighted artistic patronage of the Awadh court, the influx of regional and European residents, and the emergence of a unique Awadh aesthetic that glass appears more abundantly in documented accounts, visual depictions, and physical examples. Certainly a closer and deeper examination into Lucknow glass production would yield further insights into details of glass production during the eighteenth century; however, to date, H.R.C. Dobbs's survey of 1897 provides some information regarding Awadh's glass production. Dobbs noted that the glass industry of Awadh used a combination of country glass (i.e., that made from locally sourced raw materials) and imported European glass, claiming that those objects made from country glass were "of a different substance from the European glass [and] does not coalesce with it."[247] While the vast majority of chemically analysed objects of this thesis are arguably made of English glass, either imported as lump glass, ingots or cullet, those attributed as Lucknow were most likely made in Awadh. Indeed, both Polier and Martin's references to 'man' and mounds of glass probably represent European glass imported from either Madras or Calcutta, and transported to the Awadh and Delhi courts by land routes.

[247] H.R.C. Dobbs, "The Pottery and Glass Industries of the North-West Provinces and Oudh", *The Journal of Indian Art* (London, 1896), pp: 5-6.

Patna and Lucknow represent only two centres of glass trade and manufacture known to have operated in South Asia during the eighteenth and nineteenth centuries. It is very likely that other cities and courts scattered throughout South Asia were manufacturing glass to suit local demands and tastes – be it bangles, beads, mirror ornaments, or blown vessels – yet the specific focus on these two northern cities reflects a long and continuous legacy of glass production, one that can be confidently attributed to producing many of the glass vessels of this thesis.

Conclusion

The objects chemically analysed and discussed within this thesis consist of a potash-lead composition similar to late seventeenth and eighteenth century English glass. When substantiated by India Office Records of the early eighteenth century, which document the import of lump glass, cullet, and glass ingots within the private papers of English Company officials travelling to Madras or the Bay of Bengal, and, later nineteenth century surveys documenting the use of European glass for the production of Indian glassware, it seems reasonable to presume that these glass vessels (and indeed the majority of those included with in the Catalogue) were manufactured from eighteenth century European glass imports, which were then distributed to local glasshouses and reworked into splendid objects. Yet these objects correspond to one trajectory, and represent one history of glass production in South Asia. When contextualised within the long and continuous tradition of glass making in India, these objects reveal a shift in social associations surrounding the media that, with the increase in foreign imports and the rise in transport routes, facilitated the use of glass objects beyond the devotional or decorative to the utilitarian. This, compounded by the rise in concentrated wealth circulating around certain courts (such as Awadh) encouraged elites, royals and members of the court to commission fine quality glass vessels.

The objects of this thesis represent those made for the elite. However, glass reflected a media that held a wide and versatile function amongst a variety of castes, religious groups, and ethnicities, whether used as mirror ornamentation, imitation jewels, beads, or bangles. The glass industry was highly stratified, with specific glasshouses or families manufacturing types of glass determined by local demand. Yet still today, the period of late modern and early colonial Indian glass cannot escape its European prejudice or past. Whether perceived as an un-innovative industry, as one confined by overwhelming social dis-interest, as one inferior and inadequate in quality, or, more generally, as having developed entirely from the introduction of European glass imports, these historiographies need to be subverted and re-examined within an Indian context. As the studies of mirror glass, Lucknow and Patna have shown, glass represented a complex industry that benefited from various patrons to produce an assortment of accomplished objects. Its development over the centuries (in particular the late modern and early colonial period) reflected local and regional transformations, which at the time were intrinsically intertwined within the larger political fractioning of the Mughal Empire, the continual threat of territorial expansion by regional tribes and ethnic groups, and the increasing hold of English hegemony. The political backdrop of this transitional period places glass production as one strongly rooted in past traditions, yet evolving to suit new tastes resulting from these political instabilities and influences. The exceptionally fine quality of this thesis' glass objects arguable demonstrates the culmination of traditions, skills, tastes, influences, and patronage, making this the pinnacle period of glass production within the history of Indian glass. The wealth of objects shown in the preceding case studies supports this culmination whilst honouring the long and continuous tradition of glassmaking found within the Indian subcontinent.

CASE BOTTLES: COBALT BLUE & TRANSPARENT

Origins of Form

The shape of these particular case bottles reflects one commonly produced in Europe starting from the late seventeenth century, and cannot thus far be traced to an indigenous form found within other mediums across South Asia. While these bottles have commonly been classified as 'Dutch Gin Bottles', they were in fact produced in similar forms and in larger quantities in both England and Germany.[248]

England, which had already established itself as an important centre for glass bottle making from the late seventeenth century - boasting some forty-two bottle manufacturing houses that produced a total of nearly three million bottles annually - exported glass bottles to both the Continent and their newly established colonies throughout the eighteenth century.[249] The Dutch market witnessed a flood of foreign glass imports from England, Germany and the Southern Provinces during the first half of the eighteenth century, which drastically impacted their local glass production and influenced glass forms, making the identification of a distinctive Dutch bottle difficult to determine.

Moreover, while gin was popular in Holland amongst the middle classes already in the third quarter of the seventeenth century, it was consumed based on its belief in possessing specific diuretic properties.[250] This association meant that gin was initially found in apothecary stores, and the bottles used to store gin consequently used by apothecaries. The mass production and distribution of rectangular Dutch bottles used to store and transport gin as an alcoholic beverage only developed with the emergence of major gin distilleries around Rotterdam during the second half of the eighteenth century.[251]

Despite uncertain origins surrounding these bottles' form, the shape has roots as a medicine container and not an alcoholic bottle. This is further supported by the storage cases used to transport bottles of this shape and size. Rectangular shaped bodies with shortened necks facilitated easy storage within portable wooden cases that carried up to twelve bottles of various medicines used by traveling doctors or

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[248] Carboni (2001), pp. 286-7.

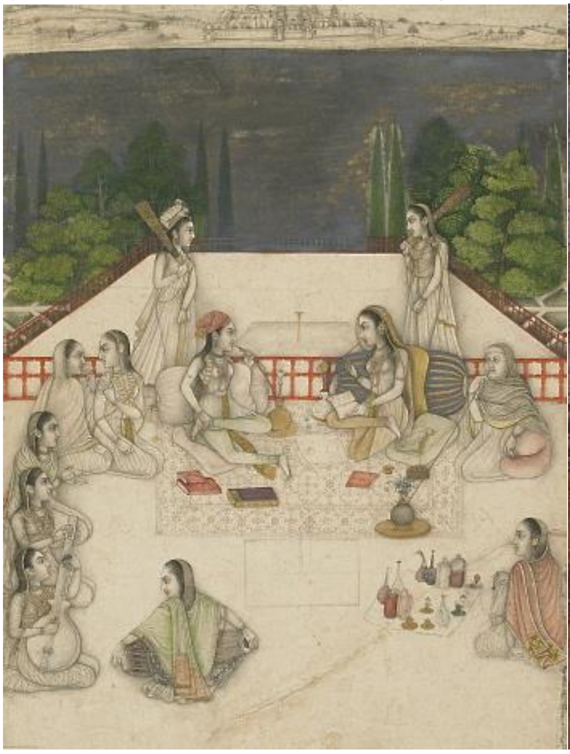
[249] Ivor Noel Hume, "The Glass Wine Bottle in Colonial Virginia," *Journal of Glass Studies* 3 (1963), pp. 91-113.

[250] Robert McNulty, "Common Beverage Bottles: Their Production, use and Forms in Seventeenth and Eighteenth Century Netherlands, Part I," *Journal of Glass Studies* 13 (1971), p. 103.

[251] Ibid, p. 100.

apothecaries. The wooden case – of which these 'case bottles' are commonly referred – was already associated with the bottles shape from around the mid-seventeenth century.[252] The form of this bottle can therefore neither be attributed as uniquely Dutch nor a container for gin.

Representations in Indian paintings



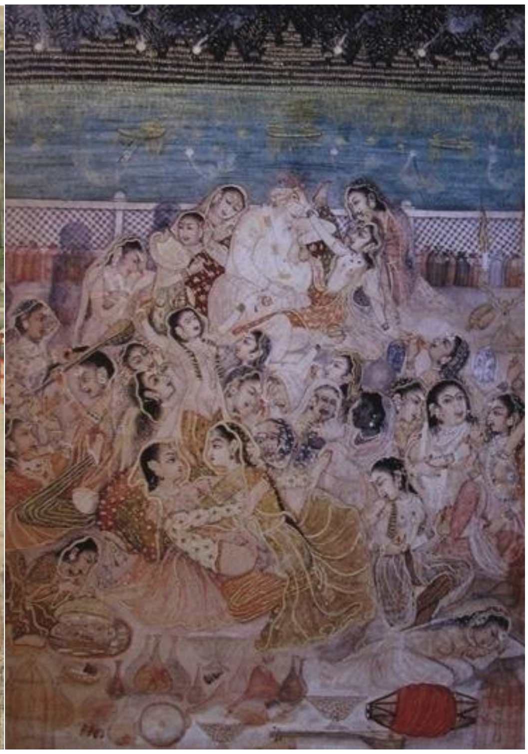


Fig. 71: *Two women seated on a terrace, surrounded by attendants and musicians,* India, Mughal, circa 1650 (Freer Gallery of Art, Smithsonian Institute, Washington DC F1907.217)
Fig. 72: *Orgiastic Scene,* Ascribed to Bhavanidas India, Kishangarh, circa 1740 Collection Stuart Cary Welch (After Habighorst, Reichart, Sharma 2007, fig. 61)

Despite these bottles representing approximately thirty-five percent of the Indian glass objects included within the Catalogue, their appearance within Indian paintings is paradoxically small given the number of examples extant. Illustrations depicting rectangular shaped glass bottles start appearing in paintings dated to the second half of the seventeenth century (albeit rare), continuing in more regular appearance in paintings dated to the eighteenth century (fig. 71). These illustrated examples, however, depict undecorated bottles that are either transparent or olive green in colour, and are slightly larger in size. Based on the red colouring visible through the bottles clear glass, these larger bottles served as wine containers, and were used in outdoor, courtly scenes illustrating acts of love and leisure. This particular context is highlighted in a mid-eighteenth century Mughal painting, in which numerous large

[252] Ibid, p. 105.

bottles of clear and olive colour glass filled with red liquids (presumably wine) are piled against the distant wall (figs. 72 and 75). This scene, while more explicit in its eroticism than the earlier example, shows the bottles functioning in the same manner: as containers for wine intended to further heighten an already erotic engagement, or to enhance a social scene in which an already intoxicating act (smoking *huqqa*) is taking place. In both paintings, the glass bottles represent objects worthy of inclusion within a courtly setting.

This bottle also appears in more intimate illustrations of lovers, as seen in another eighteenth century painting of the young Mughal prince, Dara Shikoh, lying with his mistress. In the distant niche, a large olive green bottle stands amongst other bottles, their red contents faintly seen from a far (fig. 73). Olive green bottles, while illustrated in a few eighteenth century paintings, only exist in one known example currently in the Metropolitan Museum of Art, New York (fig. 74). While the MET bottle is similar to illustrated examples, it does have important differences to those bottles discussed within this study: it is almost double their height (standing at 27cm); was not made in a two-part mould; has a shorter cylindrical neck; more pronounced kicked-in base; and is olive green in colouring. These technical differences, however, do not detract from the bottles context, as it too was most likely used as a container for wine and spirits, as supported by its visual representation in paintings.

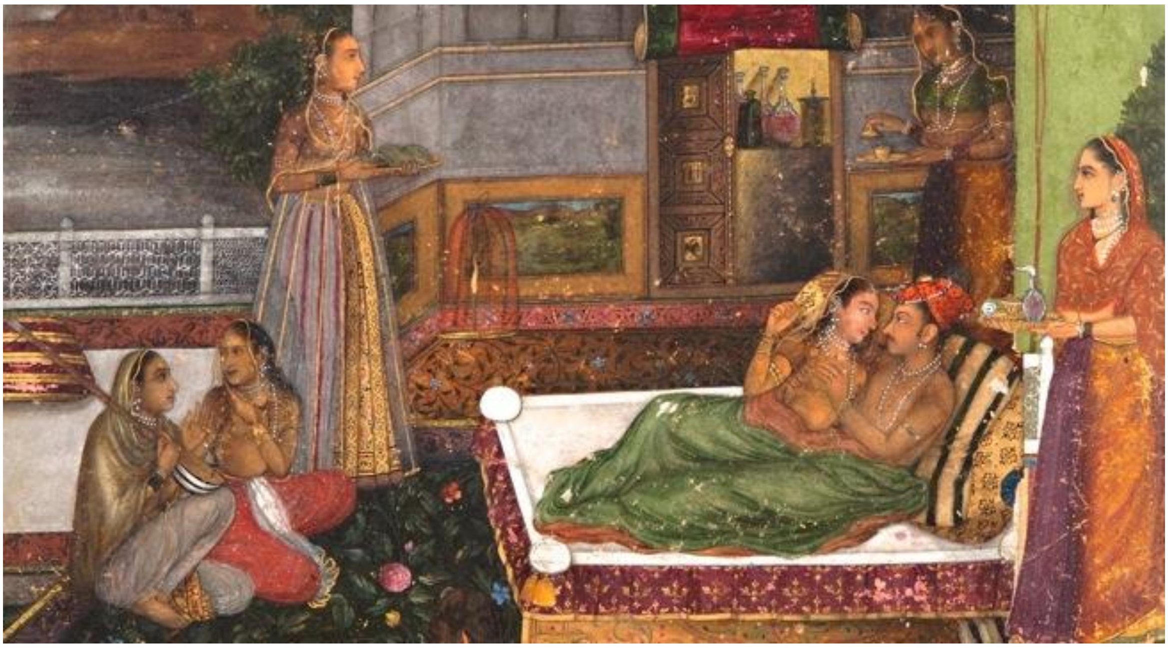


Fig. 73: ***Prince Dara Shikuh and His Mistress on a Terrace at Night,*** **Mughal, eighteenth century (Aga Khan Museum Toronto AKM00189)**

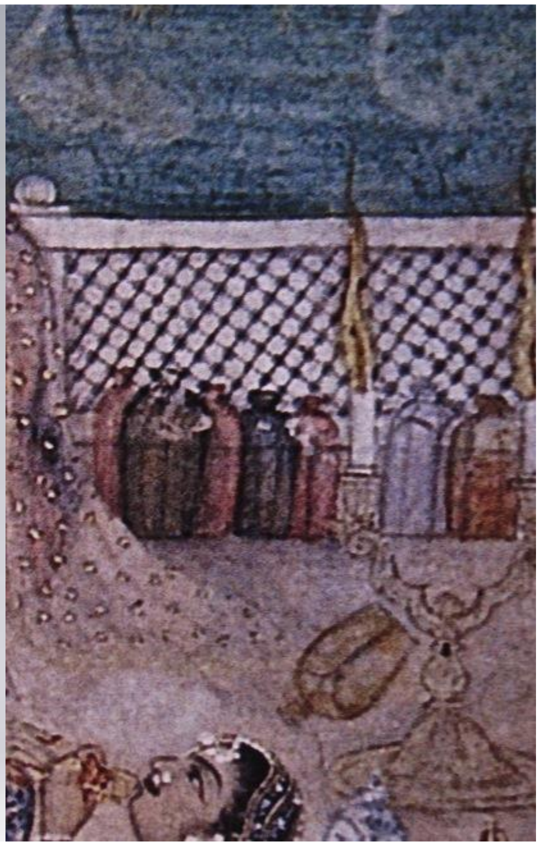
 

Fig. 74: ***Bottle with European and Indian Figures*****, Cat. 1**
Fig. 75: Detail of fig. 72

Blue rectangular bottles only start appearing in Indian paintings dated to around the mid-eighteenth century, and to date, only two such examples have been found. The first painting illustrates a lady smoking a hand held *huqqa* on a terrace; she is alone, with two small blue bottles placed on a table along with a metal rosewater sprinkler and footed bowl (fig. 76). The other painting shows a courtly lady surrounded by attendants and musicians, in the intimate setting of her *zenana* (the royal lady's chambers) (figs. 77 and 78). In both paintings, the blue illustrated bottles appear amongst other decorative objects, accompanying leisurely acts of courtly women.

The more intimate and private setting in which these illustrated blue bottles appear may suggest that they did not function as wine containers – like the larger bottles – but rather, stored perfume or scented oils; instead, the women engage in intimate activities surrounded by female attendants and luxury objects intended to enhance their pleasure and status. The glass bottles illustrated in these paintings signify objects worthy of courtly status, an association that is further suggested by their inclusion amongst other luxury goods (porcelain and metal), and purposely illustrated in the foreground (as opposed to a distance niche or wall) to more clearly reveal their detail. This conscious placement of the bottles illustrates their importance, while their rare appearance in paintings reflects their private function as containers for perfumes or oils.

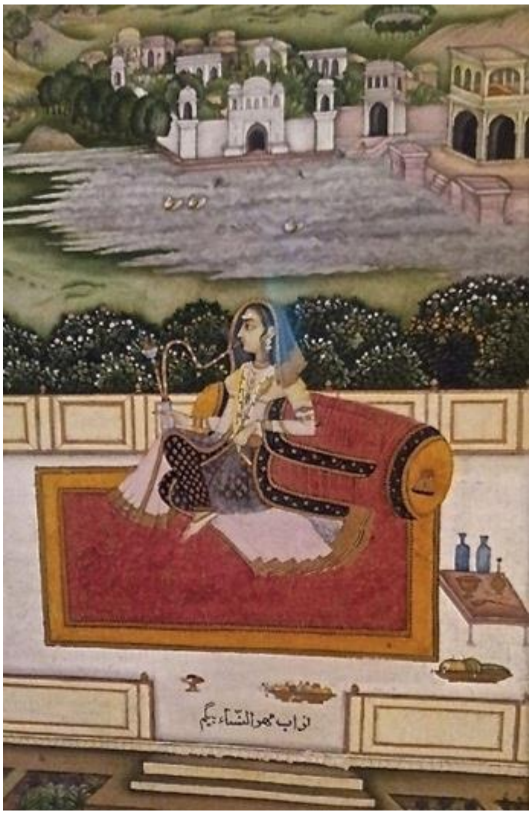


Fig. 76: *A Lady Smoking a Hand-Held Hookah on a Terrace*, Mughal, late eighteenth century (Ashmolean Museum, Oxford EA 2012.31)
Fig. 77: *Scene in a zenana*, India, Provincial Mughal, Lucknow, circa 1760 Artcurial Paris, 24 May 2016 (lot 215); former collection Joseph Soustiel

Fig. 78: Detail of figure 77

Bottles in Context: Perfumes of Pleasure & Power

Examining the role of perfumes in South Asia helps contextualise the bottles' use and importance as containers for valuable and sacred substances. While these small, delicate glass bottles might only appear within Indian paintings starting from around the mid-eighteenth century, perfume has long preceded this illustrated date within the historiography of South Asian texts and traditions, embodying a sacred and profane role within both religious and royal practices. Its importance and use thus sheds further light onto the value and meaning of these glass bottles.

Perfumes played an important role within religious, royal and erotic practices in early and medieval South Asia, as reflected by texts providing lavish descriptions of smells, perfumes, and the elaborate use of aromatics. According to the studies on the subject done by James McHugh, "a good perfume should be like a well-run kingdom, with the correct balance of allies (mild materials), neutrals, and enemies (pungent materials)….it should also be harmonious with incenses and garlands, the season, and the humoral character of a person – god or human – wearing it...The skilled use of perfumes delighted the gods, appeased kings, and excited lovers."[253] The power of perfume in possessing transformative qualities that effected both inanimate and animate beings, physical and temporal spaces, and sacred and profane places was reflected in a compendium of texts and treaties recorded in ancient and medieval India, which have recently been the source of scholarly attention. As Emma Jane Flatt noted, not only were perfumes and aromatics integral in magical rituals and worship, but perfumes and fragrances also had a particular place for certain types of spirits; they also were inherently linked to medicinal cures and thus overlapped with medical texts in detailing the benefits of a particular olfactant.[254] Perfumes were perfectly placed within popular Perso-Arabic medical thought, which was itself based on the humoral system, as scent directly affected the spirit. As the fourteenth century physician Ibn Qayyim al-Jawziyyah explained:

> *A sweet scent is the nourishment of the spirit and the spirit is the instrument of the faculties and the faculties increase with scent; for it is beneficial for brain and heart and the other internal organs, and makes the heart rejoice, pleases the*

[253] James McHugh. *Sandalwood and Carrion: Smell in Indian Religion and Culture* (Oxford: Oxford University Press, 2012), p. 5.

[254] Emma Jane Flatt, "Spices, Smells and Spells: The Use of Olfactory Substances in the Conjuring of Spirits," *South Asian Studies* 32 (2016): pp. 11-12.

soul, and revitalizes the spirit. It is truest of all for the spirit and the most suitable for it, for there is a close relationship between scent and the good spirit.[255]

The power of certain fragrances to stimulate the heart, mind and body meant that smells possessed physiological attributes that could alter the emotional state of a person; smells, beyond their olfactory properties and physical alterations, therefore had a transformative effect on humans.[256] Smells, moreover, were believed to mirror one's own inner qualities, and thus came to reflect certain social stigmas associated with either good or bad smells. As Emma Jane Flatt argued, smelling bad signified a low social status, carrying connotations of poverty, immorality and the lack of intelligence, while acquiring a good smell conveyed the opposite: intelligence, wealth and piety.[257] The positive physical and ephemeral effects of good smelling perfumes, and the social implications attached to such smells, meant that perfume occupied a vital part of daily practice within both a religious and royal context.

Perfume, as a substance often made from a combination of properties – including camphor and musk, which were transported great distances and at great costs – rendered perfumes expensive, elite, and rare.[258] Nonetheless, perfumes were regularly consumed by the elite and royal, and were more commonly used by men. According to two ancient and medieval treaties, the *Nagarasarvasva* and the *Gandhasastra,* perfumes were used by gentlemen deemed to be "upright, well-known, and sophisticated pleasure loving".[259] Like gemstones, perfumes were considered as necessary accessories for the love life of established, well to do men. Not only were perfumes intrinsically linked to an aesthetic appeal, but moreover, to an amorous and erotic desire. Within this context, perfumes were intended to please men, and to fulfil

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255 Ibn Qayyim al-Jawziyyah, *Medicine of the Prophet*, trans. by Penelope Johnson (Cambridge: The Islamic Texts Society, 1998), p. 1999 in Flatt (2016), p. 12.

256 According to the physician Ibn Sina, certain fragrances, which he referred to as exhilarants (*mufarrih*) would act physiologically upon the heart (*dil*) causing it to expand with direct ameliorating consequences for both the emotional state of a person and upon their physical health; see: Flatt (2016), p. 12.

257 Ibid.

258 According to McHugh, flowers – local, not exotic, and liable to fade – were probably not expensive items in ancient and medieval India. This is borne out by various statements in dharma literature. In terms of theft, which in *dharmasastra* texts is punished according to the type of object stolen, flowers are classed together with objects of relatively low value, such as food, water, plants, and small quantities of unhusked grain. The same applies to taxation, where flowers are not classed with livestock and gold but rather with a variety of things that were of lesser value, such as roots, medicine and firewood. See: McHugh (2012), p. 8.

259 The *Nagarasarvasva* (Complete Man-About-Town) was an erotic text produced in a Buddhistic context; while the *Gandhasastra* (Treatise on Perfumery) appears in texts dated after the tenth century. See: McHugh, p. 145 and Appendix I.

a "male nose".[260] While women of elite and royal status benefited from the use of perfumes – either by sharing a fragrant space, or through their encounters with perfumed men – perfume was more popularly applied by men, especially during the early Mughal period.

Perfume – used to scent public and private places or people - was directly connected to masculine modes of courtly conduct, which itself embodied virility, sexuality, and manliness. Such symbolisms and uses of perfume were recorded in male conduct books dated to the mid to late seventeenth century, stating that a *Mirza* should always provide perfumes at his parties, to pleasure his discerning guests with fragrances; in addition, his appearance should be attended to, with appropriate scents and perfumes applied.[261] Perfuming a public space not only symbolised his ability to exercise control over a physical place, but to indirectly exert power (and thus authority) over its inhabiting occupants. Within this context, fragrances embodied a subtle power over a public space, infusing it with the desired scents of the particular individual. Beyond the transformative or ephemeral qualities associated with scent and smell, perfume played a larger role within a greater aesthetic agenda, one that conveyed wealth, luxury, power, and above all, status.

Already in 1604, toward the end of Mughal Emperor Akbar's reign, perfumes were recorded within the grand bazaar of the royal Bijapur court, along with other amazing and wonderful spectacles including wine, dances, and jewels.[262] In the ninth year of Emperor Jahangir's reign, in 1614, he mentions perfume within presents ordered at the end of the month to be given as gifts; that same year he boasts of the rose's restorative properties claiming, "there is no other scent of equal excellence to it. It restores hearts that have bone and brings back withered spirits."[263] These royal accounts attest to perfume's particular place within a courtly context and its positive transformative effects; however, by the late eighteenth century, perfume was not only consumed by those at the royal Mughal court or in the Deccan, and most likely circulated amongst Europeans, regional royals, and the wealthy elite. Antoine Polier, a

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260 McHugh (2012), p. 147.

261 Rosalind O'Hanlon, "Manliness and Imperial Service in Mughal North India," *Journal of the Economic and Social History of the Orient*, 42 (1999), pp. 77-8.

262 Asad Beg. "Wikaya'I Asad Beg (Memoirs of Asad Beg)", *The History of India as told by its own Historians: The Muhammadan Period*, Vol. 6, John Dowson (ed.), repr. Calcutta 1953, p. 164.

263 Henry Beveridge (ed.) *Tuzuk-i-Jahangiri or Memoirs of Jahangir*, translated by Alexander Rogers (London: Royal Asiatic Society, 1909), Vol. 1, p. 270 and 278.

resident at the time between Awadh and Delhi, mentions perfume bottles in two of his letters written to his trusted Indian agents; while not explicitly stated, these perfume bottles were intended for sale to a wealthy customer or client. In addition, Polier specifically refers to Azimabad (Patna) as the place where such perfumes were housed.[264] Whether Patna also manufactured perfume at this time remains unknown; however, it certainly would have produced and supplied the glass bottles in which the perfumes were stored. According to Emma Jane Flatt, perfume making was a courtly accomplishment; the courtly elite were not only consuming perfumes that were already made, but making it themselves for precisely the host of transformative reasons previously mentioned.[265] Both the perfumes and glass bottles could have been manufactured in the same city or court – be it Patna, Awadh, Delhi, or elsewhere – yet co-existed as two separate industries whose products were integrated into a single consumable good. Given the courtly affiliation with perfume production, and its use by royals within daily or ritualistic practice, it can be assumed that glass production in the form of bottles, vials and small containers accompanied perfume making. The two industries most certainly co-existed within certain courts during the eighteenth century. While the following case studies will only examine one particular shape of perfume container – a mould blown rectangular bottle – other forms of perfume bottles also exist, which not only reflect the diversity and sophistication of glassmakers, but moreover, the demand for such objects. Such examples of splendid specimens include figures 79, 80, 81, and 82.

It is within this royal and courtly context that perfume bottles are to be understood: as precious protectors of a valuable substance; as beautiful objects reflecting an emotive or amorous desire; as guardians of intimate and erotic properties; and as luxury items intended for the elite and royal court. This proposed function is further demonstrated by the following case studies of cobalt and transparent bottles.

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[264] Muzaffar Alam and Seema Alavi*. A European Experience of the Mughal Orient: The I'jaz-I Arsalani (Persian Letters, 1773-1779) of Antoine-Louis Henri Pollier* (New Delhi: Oxford University Press, 2001), folio 23a and 43a

[265] Emma Jane Flatt, "Foreign Fragrances, Plebeian Stinks, & Magical Aromas: The Transformative Powers of Smell," *The Aesthetics Project*, New Delhi, 2015; accessed on YouTube on 13 Nov 2017; https://www.youtube.com/watch?v=6JzJqhLaZkQ


Fig. 79: Cat. 49 - Fig. 80: Cat 51


Fig. 81: Cat. 50 – Fig. 82: Cat 52

CASE STUDY 1: Cobalt Blue Case Bottles

Introduction

The four mould blown and splendidly decorated bottles discussed in this case study – previously believed to have been manufactured in Europe and sent to India for decoration – were most likely made in India using imported English glass ingots.[266] New research into the chemical composition of the glass and the discovery of early eighteenth century records of English cullet, lump glass, and ingots imported into India support this, while examining the quality of the glass, nineteenth century surveys of Indian glass industries, and the bottles' surface decoration further supports their Indian attribution. The four cobalt blue bottles are currently in the following collections: the Victoria and Albert Museum, London IS.14-1867 and IS.15-1867 (figs. 83 and 84), the British Museum, London SLMisc.341 (fig. 85) and the Los Angeles County Museum of Art M.88.129.204 (fig. 86); they have been grouped as a collection based on the similarities in their colour of glass, size, shape, and surface decoration. Furthermore, the British Museum bottle has a provenance dating back to 1753, which, when stylistically compared to the other bottles, can date this collection to the first half of the eighteenth century.[267]

Comparative analysis of Shape, Glass, Technique, and Manufacture

The four bottles were each manufactured in a square sectioned, two-part mould that was triangular in shape with a hinge that joined at the sides. A more prominent diagonal moulding mark is noticeable across the base, with the faint ridge along the edges cleverly concealed by the painted decoration.

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[266] The belief that these bottles were "Dutch gin bottles" was popularised by Dikshit (1969), p. 148, yet later re-examined by Carboni (2001), pp. 286-7, who put forth the argument that both German and English glass houses were manufacturing similar shaped bottles during this time; however, Susan Stronge states that "the passing resemblance to case bottles of the Netherlands suggest the craftsmen copied a European model, though the decoration is purely Indian." Cited in: Reino Liefkes (ed.) *Glass* (London: V&A: 1997, p. 105, cat. 134. For articles on similar European bottles, see: Hume (1963), pp. 91-113.

[267] Sir Hans Sloane bequeathed this bottle to the British Museum upon his death at the age of ninety-three, and while no records indicate that Sloane ever traveled to India, this bottle could have been presented or purchased from an intermediary who brought it back from India sometime in the first half of the eighteenth century. See: John Brooks. *Sir Hans Sloane: The Great Collector and his Circle* (London: Batchwood Press, 1954) and Gavin De Beers. *Sir Hans Sloane and the British Museum* (London: Oxford University Press, 1953).

Fig. 83: Cat. 26 (Victoria & Albert Museum 14-1867)
Fig. 84: Cat. 27 (Victoria & Albert Museum 15-1867)

Fig. 85: Cat. 31 (Los Angeles County Museum of Art M.88.129.204)
Fig. 86: Cat.29 (British Museum SLMisc.341)

The mould terminated just below the neck, which was then tooled into a short, cylindrical shape.[268] At the base of each bottle – at the exact point where the diagonal mould mark crosses – is an abrasive, circular pontil mark measuring approximately 30 mm in width, with some excess glass around the mark (figs. 87 and 88).[269]

Fig. 87: View of the base and pontil mark of bottle BM SLMisc.341
Fig. 88: View of the base and pontil mark of bottle V&A 15-1867

The height of each bottle measures around 14 cm, with their widths varying slightly from 5.5 to 7.8 cm; the British Museum measures the widest with the others measuring within a centimetre's difference. Additionally, the weight of the Victoria & Albert Museum bottles (IS.14-1867 and IS.15-1867) and the British Museum bottle differ enormously: 183 g, 295.1 g, and 315 g, respectively. While the thickness of the bottle's walls has not been measured, the glass around their necks measures approximately 0.5 cm in thickness. The difference in the bottle's width and weight may suggest the use of a different mould, although their similarity in shape, height, and pontil mark indicates a similar tradition or trend in bottle manufacturing. While this bottle shape was manufactured in abundance in Europe, both the moulds and glassmaking techniques could have been transferred to India.[270]

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[268] Two types of lips commonly appear on rectangular shaped case bottles: a rounded rim and a fine everted one. It has been suggested that the rounded rim most likely had a pewter screw cap and was used as a container for wine, spirits, or other liquors, while the splayed lip held a fitted cork and was used by alchemists or apothecaries; Hume (1963), p. 106.

[269] The excess of glass around the pontil mark indicates the use of a glass tipped punty, an empontilling technique popularly practiced by both English and Continental glassmakers when making small bottles and flasks. This technique continued throughout the mid nineteenth century until the advent of the flame torch and snap case, both modern techniques that subsequently removed pontil marks. See: Oliver Jones, "Glass Bottle Push-Ups and Pontil Marks," *Historical Archaeology* 5 (1971), pp. 68 - 72.

[270] Two earlier examples of similarly shaped bottles demonstrate the existence of this form in both Bohemia, Central Europe (see LACMA 48.24.146a-b) and Venice, Italy (see British Museum 1896.0122.1) dated to 1572 and circa 1690-1700, respectively.

The glass of both the British Museum and the Victoria and Albert Museum bottle were tested using a Bruker ArTAX x-ray fluorescence (XRF) spectrometer (fig. 19 and figs. 11 and 12, respectively).[271] The chemical analyses of these tests indicated that lead (Pb) was the predominant element, with traces of potassium (K), iron (Fe) and manganese (Mn) also detected. The dominant peaks in lead with smaller levels of potassium categorise the glass as being of a potash-lead variety. This composition suggests an English characterisation of glass; one developed in England in the late seventeenth century, and consequently adopted by most major English (and European) glasshouses throughout the eighteenth century.

While these bottles were thought to have been manufactured in Europe and sent to India for decoration, contrary to this belief, transporting glass bottles would have increased their risk of breakage; those bottles arriving intact would have then had to be sold at a sufficiently advantageous price to offer a real economic advantage to the trading merchants.[272] Conversely, glass ingots, lump glass, or cullet took up less cargo space, had little breakage risk, and could produce many more vessels once melted down and re-blown. Given eighteenth century records of imported English lump glass and ingots, as well as later nineteenth century accounts of recycled European glassware used in the manufacture of Indian blown vessels, evidence may support their Indian manufacture.

The four bottles present uncountable seeds that are scattered throughout the glass layers, with small bubbles (approximately 1 cm in width) concentrated generally around or along the base (fig. 89). The finer, elongated bubbles visible around the bottles' necks were most likely already present as seeds within cullet or ingots, and were simply stretched out during the tooling process (fig. 90). Slightly larger bubbles, however, could have been created during the re-melting of scrap, waste, or cullet glass, which get trapped within the smaller pieces of recycled glass as it melts.[273]

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[271] British Museum operating conditions: 50 kV X-ray tube voltage, 0-50 keV spectral range, 0.5 mA current, 0.65 mm diameter collimator and 200 seconds live time; Victoria & Albert Museum experimental parameters: 50 kV X-ray tube voltage, 600 A current, and 100 seconds live time.

[272] Carboni attributes these bottles as 'Netherlands for the India market' in *Glass of the Sultans* (New York: Metropolitan Museum of Art, 2001), pp. 286-7.

[273] The author is indebted to Peter Drobny for providing insights in the secondary re-melting of glass, and its affects on the visual qualities or characteristics seen in the glass; email exchange April 2016.

Fig. 89: Bottom corner of the British Museum's (SLMisc.341)

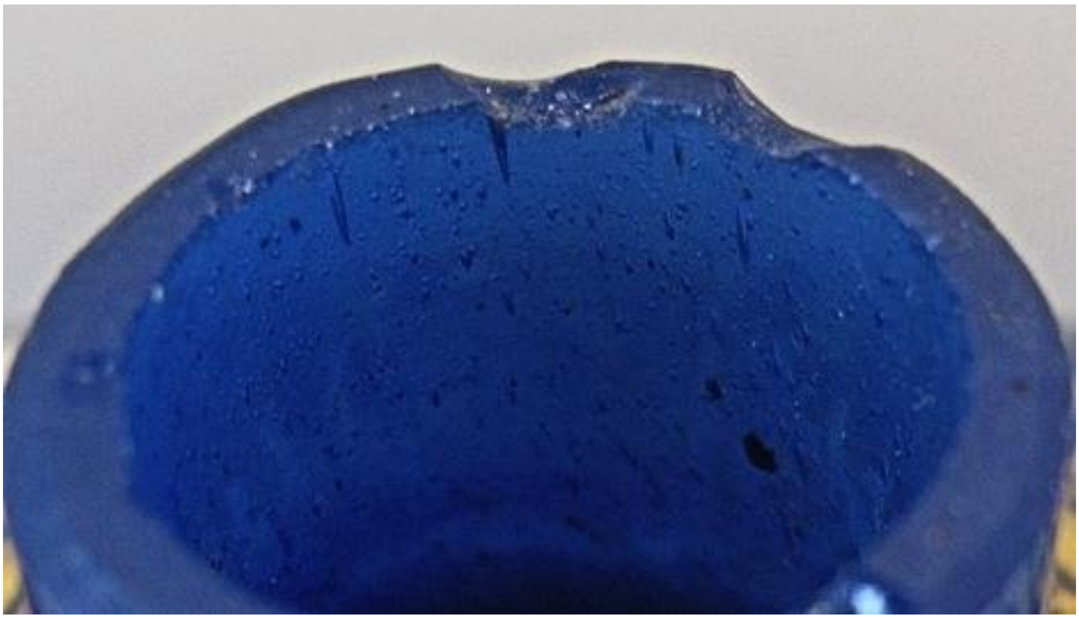

Fig. 90: Detail of the neck of the British Museum bottle (SLMisc.341)

Numerous inclusions also appear around the bottles' necks, sides, and within the surface layers, which reflect environmental contamination created from the crucible, punty, blowpipe, furnace, or environment at large. The extent of debris could also reflect the type of fuel used; the use of burnt wood could have more easily caused it to enter into the combustion atmosphere, arriving into the chamber or glass pot.

The British Museum bottle displays several visible inclusions around the neck, which are slightly raised above the glass's surface. This same bottle also presents darkened inclusions on its sides, which along with the numerous small air bubbles in the glass's surface layers, creates a relatively roughened appearance. The Victoria & Albert Museum bottle (IS.15-1867) presents similar darkened inclusions around its base, also embedded within the glass layers, along with numerous seeds scattered throughout the glass (fig. 91).

The use of dark, cobalt blue could have served as an aesthetic preference, or consciously used to cleverly conceal the glass's various visual traits. It remains impossible to determine the type of cobalt used in the glass bottles, and furthermore, whether it was added to the melted potash-lead batch in India or was already present within the imported lump glass, cullet, or ingots. The India Office Records from the first half of the eighteenth century do not specify the colour of the glass requested within the private papers of Company officers; however, the 1765 Albion wreckage did reveal transparent blue coloured glass ingots amongst the ship's cargo.[274]

Fig. 91: Close up of the glass of the Victoria & Albert bottle (IS.15-1867)

According to the late nineteenth century records of the India Geological Department, cobalt naturally occurred in India, but was only sourced from the ancient

[274] According to Redknap and Freestone, the ingots appeared almost opaque; however, even the stronger blues were quite pale and would have appeared transparent if the glass was used in thin-walled vessels; Redknap and Freestone (1995), p. 146.

Babai copper mines at Khetri in the province of Rajasthan, between Delhi and Jaipur.[275] Cobalt ore, locally referred to as *shta*, was extracted by crushing and panning black slate from these copper mines, and was used as a colourant for blue enamel work by tile glazers and jewellers (fig. 92).[276] Dr. Hendley, in 1883 commenting on the Jaipur enamellers, states "large quantities of cobalt are obtained from Bhagore near Khetri, the chief town of a tributary state of Jeypore, and are used in producing the beautiful blue enamel."[277]

Fig. 92: *Stem Cup,* India, Jaipur, 17th-18th century; Enamel on copper, gold and silver
The Cleveland Museum of Art (1962.429)

Despite the abundant use of cobalt for blue enamel work for jewellers and metal workers, the extraction of *shta* reportedly ceased in 1908, being replaced by a better quality of imported cobalt; indeed later twentieth century surveys of Indian glass production reveal that the cobalt oxide was imported.[278] It seems highly plausible, however, that the same cobalt source of Khetri also functioned as the colourant for the

[275] Watt (1880), Vol. 2, p. 396.
[276] Coggin-Brown and Dey (1955), cited in Gill, Rehren and Freestone (2014), p. 552.
[277] Hendley (1886), section 10, p. 4.
[278] Gill, Rehren and Freestone (2014), p. 553 and Dixon (1937), p. 184.

cobalt blue glass.[279] By adding only a small amount of cobalt to the imported transparent potash-lead glass, the local glassmakers could control the number of coloured vessels, while utilising the same source of cullet.

Surface Decoration

Much like the cobalt blue colouring possibly used to conceal the glass's visual traits, the heavy surface decoration adorning these four bottles could function in a similar manner. The painting and gilding across all four sides of the bottles, covering large parts of the cobalt glass with a rich decoration of figures and floral sprays, reflects an Indian tradition of painting. All four bottles are decorated on opposite sides with either a floral spray or single figure. The two Victoria & Albert Museum bottles have alternate figural and vegetal motifs, whereas the British Museum bottle depicts a combination of flowers and small birds; the Los Angeles County Museum of Art (LACMA) bottle is painted with only floral and vegetal sprays.

Earlier scholarship postulated that Indian glass merely imitated a pre-existing decorative tradition already practiced on other mediums; it was an imitative rather than an innovative decorative art.[280] While similarities in motifs can be seen on other mediums, the combination of designs with varied decorative techniques makes decoration on glass different to other decorative objects, and thus unique. These bottles attribution as Dutch has been further assumed based on their supposed Dutch decoration, or, less commonly, their Iranian decoration. Dikshit claimed in his 1969 survey on *The History of Indian Glass* that these bottles "stand out as a class by themselves as the work of Dutch painters who were prompted to copy Indian patterns, designs and even subjects to suit the taste of their Indian customers"; while an early 1955 catalogue of the British Museum bottle described it as a "square Persian bottle, brightly decorated with enamel painting on a blue background."[281] Another 1991 catalogue entry of the same bottle claimed that "the quality of the glass is poor, and the painting follows a Persian style as it developed in India."[282] These older attributions to either 'Persian' or European decoration no longer pertain to these four bottles, as the patterns, figures and floral motifs reflect Indian painterly traditions.

[279] Gill, Rehren and Freestone (2014), pp. 546-555.
[280] Simon Digby, "A Corpus of Mughal Glass," *Bulletin of the School of Oriental and African Studies* 36 (1973), p. 90.
[281] Dikshit (1969); Jaroslav Vavra. *5000 Years of Glass-Making: The History of Glass* (Prague: Artia, 1955), fig. 48.
[282] Hugh Tait. *Five Thousand Years of Glass* (British Museum Press: London, 1995).

The most intriguing similarity between these four bottles is the outlined decoration along their edges: a fine, light pink border accented with red diagonal dashes (figs. 93-96). The border of both the Victoria & Albert Museum bottles frames a polylobed arch, pierced at the corners and along the sides with a single painted floral spray; whereas the other bottles have only a fine border that simply outlines the bottles' edges. The function of this border serves to both separate and frame the decorative motifs on each side, but also to outline the natural contours of the bottle's shape. This border also represents an identifying visual marker that stylistically groups these bottles as a collection, and to a common atelier or period, as no other known case bottles have a similar decorative border.

Figs. 93-96: Detailed views of the edges of the bottles, left to right
British Museum (SLMisc.341) – LACMA (M.88.129.204) – V&A (14-1867) – V&A (15-1867)

The floral sprays on the bottles' sides appear as either a large composition of similar sprays stemming from a vegetal tuft, or a complex floral arrangement of diverse flowers. The LACMA bottle depicts lush sprays stemming from a single tuft, which repeats itself in an almost identical formation across all four sides (figs. 97 and 98). The British Museum bottle, however, depicts a similar stylised floral spray of white and red carnations on two opposing sides, with a denser composition of intertwined flowers, leaves, branches, and a single green parakeet perched upon an upper branch on the other opposing sides (figs. 99 and 100).

Figs. 97 and 98: Two opposing sides of the LACMA bottle (M.88.129.204)

Figs. 99 and 100: Two opposing sides of the British Museum bottle (SLMisc.341)

Figs. 101 and 102: Floral sprays on opposing sides of the V&A bottles (14-1867 & 15-1867)

Each Victoria & Albert Museum bottle has a spray of three marigolds with smaller buds on one side, and three red and white carnations on the other, all stemming from a single vegetal tuft (figs. 101 and 102). This compositional arrangement of larger floral sprays stemming from a single, central tuft represents a common decorative motif found on almost all Indian case bottles (cobalt blue and transparent); the more complex floral arrangement of diverse flowers exists on only one other known case bottle, which is gold painted on translucent cobalt blue glass.[283]

The flowers painted on these bottles represent species found within India.[284] By the eighteenth century, floral sprays of this type had already been canonised within the Mughal repertoire of floral patterns and motifs. As already discussed in the introductory chapter, such flowers found inspiration from drawings and illustrations already in existence, many of which had long been transferred or applied to other media. Two eighteenth century floral studies illustrate a continued tradition of delicately capturing India's indigenous flowers (figs. 103 and 104); the composition, detailing, and flower types appearing upon LACMA's bottle so strongly correspond to figure 104 that inspiration for the bottle's sprays must have been drawn from such works on paper.

[283] Corning Museum of Glass (COR 62.1.6)
[284] Sir J.D. Hooker. *The flora of British India* (Ashford: L. Reeve, 1875-97).

However, the floral sprays stemming from a single vegetal tuft, which appear upon both the V&A bottles, are so generic in their rendition and depiction that they alone cannot further attribute an atelier, painterly school, or region of production. Such flowers (as the marigold) were, by the eighteenth century, products of a generic aesthetic that were readily repeated and transferred across media. While the same flowers might appear upon these four bottles – including marigolds, chrysanthemum, and tulips – the bottles can be further paired according to stylistic similarities and treatment. Despite subtle differences in shape, the composition, colouring, delicacy in detail, and types of flowers of the British Museum and LACMA bottles connect them more closely to one another than to the V&A bottles, suggesting that these two were either done by a similar hand, or were inspired or even copied from a similar source.

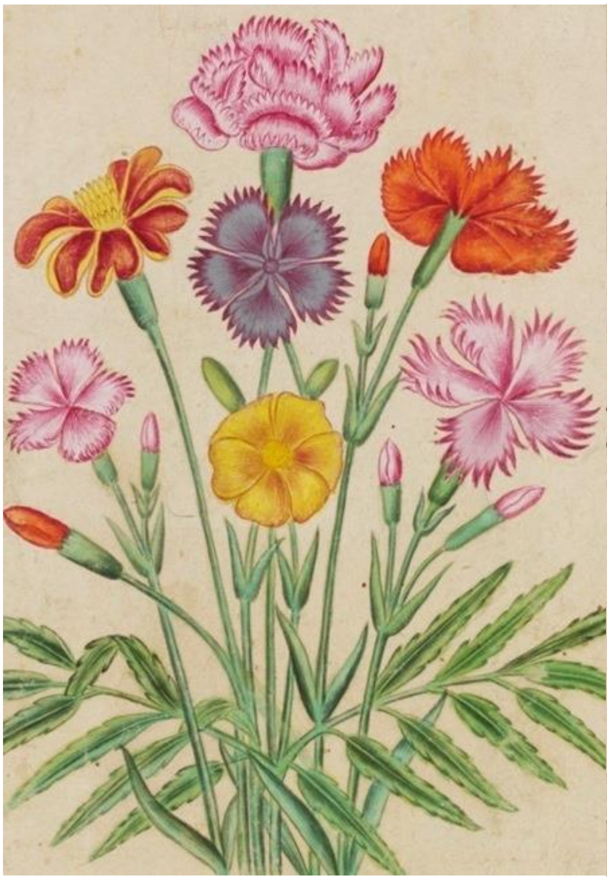

Fig. 103: ***Flower Studies, Small Clive Album*****, India, Mughal, circa 1700-50**
V&A (IS.48:18/B-1956)
Fig. 104: ***Floral Bouquet,*** **India*****,*** **Mughal, circa 1700-50 – LACMA (AC1999.127.14)**

Both the Victoria & Albert Museum bottles depict figural representations on two opposing sides of the bottle. While the treatment of figures, textiles, and vegetation suggests the same painterly atelier, the subjects – and stories - differ significantly. The Victoria & Albert Museum bottle (IS.14-1867) depicts Layla and Majnun, a popular lover's tale which, from its inception in the seventh century, represented a source of countless inspirations and illustrations (figs. 105 and 106).[285]

Fig. 105: Painting of Majnun (V&A IS.14-1867)
Fig. 106: Painting of Layla (V&A IS.14-1867)

Mughal painters of the seventeenth and eighteenth century developed an archetypal composition that followed canonical conventions of representing this story.[286] The commonly represented story illustrated in paintings and upon this glass bottle is of an emaciated love-lorn Majnun sitting in an isolated, mountainous landscape surrounded by animals (a dog at his feet and parakeet perched upon his head), holding an open book of poetry and beads. On the bottle, Layla kneels on a carpet against a large patterned cushion. The inclusion of carpets and cushions alludes to the luxury of her tent, a rendition that appears in the Persian poet Jami's 1484 text, but which appears less

[285] Thought to pre-date Islam, the story first emerged in Arabic verse, and is ascribed to a poet named Qays who called himself Majnun. In the twelfth century, the Persian poet Nizami turned the Arabic verses into a poem, part of his Khamsa (quintet of tales), and spawned a new lineage of imitation; see: Aitken, Molly Emma. *The Intelligence of Tradition in Rajput Court Painting* (New Haven: Yale University Press, 2010), p. 157.
[286] Ibid, p. 159.

commonly in painted illustrations; the bottle does not depict a tent, and while Layla and Majnun are often re-united in paintings, the bottle's representation could suggest the opposite, that both figures are separated in space and time. [287] According to the text, the lovers are never physically united, and while similar colours and prints aesthetically connect both figures to one another, their appearance on opposing sides of the bottle further suggests their physical separation.[288]

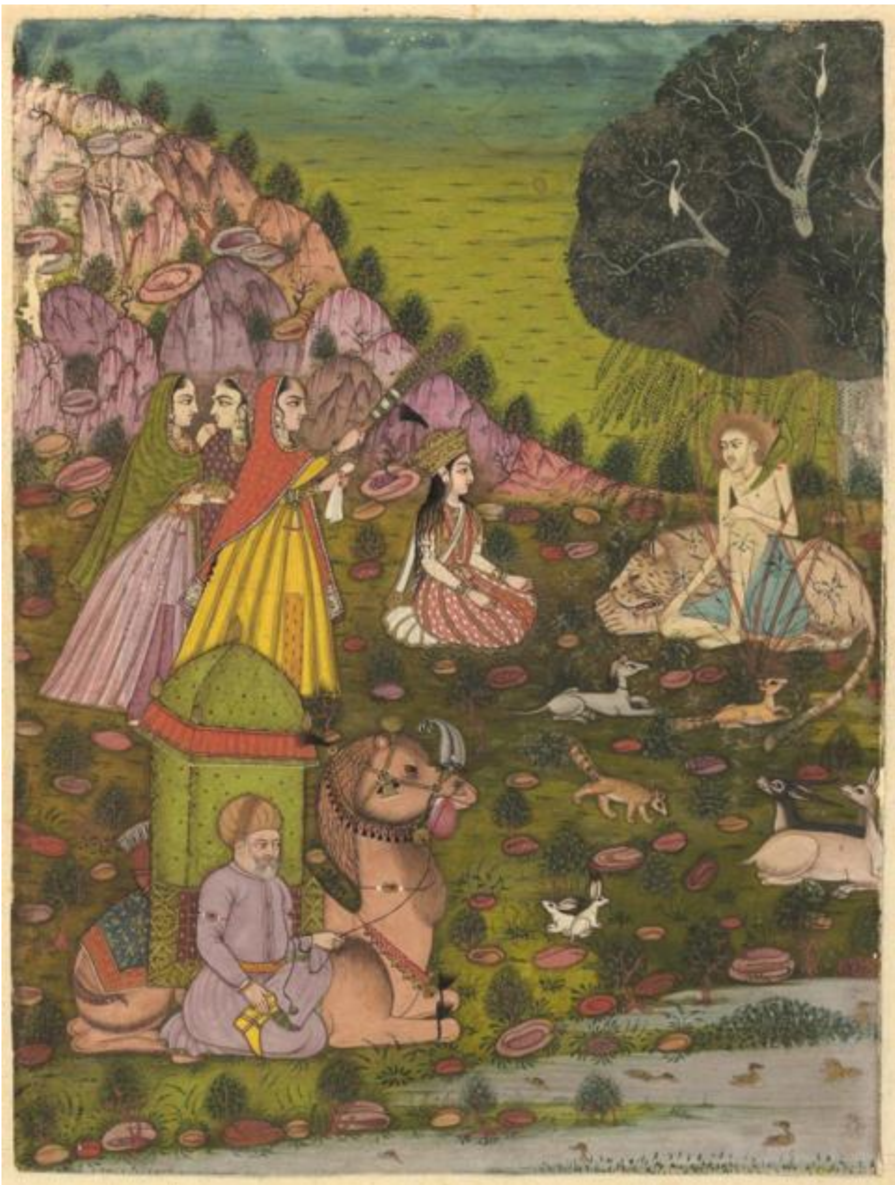

Fig. 107: *Layla and Majnun,* India, Rajasthan, eighteenth century
National Gallery of Victoria, Melbourne (AS62-1980)

The story itself was translated into local languages, appearing as a standard repertoire of *qissas* (folktales) and widely sung and illustrated throughout North India in

[287] Ibid, p. 157.
[288] Nizami Ganjavi. *The Story of Layla and Majnun*. Rudolf Gelpke (trans. and ed.) (Bruno Cassirer Ltd: London, 1966), pp. 187-189.

the eighteenth and nineteenth century.[289] The mystical associations of love and longing found a particular audience amongst Hindu courts, serving as a strong source of inspiration amongst Rajasthani schools of painting (fig. 107).[290] Rajasthani depictions of Layla and Majnun followed their Mughal predecessors, respecting the integrity of the traditional composition and narrative whilst articulating subtle differences in form, figure, dress, and mood. The illustration of Lalya and Manjun on the bottle honours a traditional story, yet its placement on a rectangular glass bottle suggests a deeper symbolism that connects the image with the bottle's contents. Whether the bottle stored perfumes or scented oils, the image symbolically evoked a feeling of love and longing, one perhaps felt by its immediate owner, yet reminiscent of a continuous tradition of tragedy, love and loss.

The other Victoria & Albert Museum bottle (IS.15-1867) depicts a woman standing in profile carrying a flywhisk and a tray with a *pandan* box in the other, while on the opposing side, a bare chested man sits on a small carpet against a large striped bolster (figs. 108 and 109). The lady's lack of ornamented jewellery, modest dress, and actions indicate her status as an attendant serving her master. The flywhisk itself signals an object used for the elite within outdoor settings and often accompanying paintings illustrating leisurely or courtly activities. A similar illustration from an early eighteenth century Rajasthani album, 'Songs of the Seasons', depicts an attendant engaged in a similar action; she carries a flywhisk made of peacock feathers, yet her dress, stance, and facial gestures are all similar to the bottle's depiction (figs. 110 and 111).

The particular treatment of facial features of both women – almond shaped, elongated eyes with pronounced thickened eyebrows, straightened noses, and rounded chins – suggests a strong similarity in painterly techniques and treatment, which could support a Rajasthani inspiration for the painting on the bottle.

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[289] Hindi depictions of Layla and Majnun were not uncommon, and a Jodhpur maharaja wrote his own version of the story in the nineteenth century. The lovers also appeared on the ceiling of a late nineteenth-century painted *chhatri* (stone pavilion) at Shekhavati (northeast Rajasthan); Aitken (2010), p. 180.

[290] Ibid, p. 200.


Fig. 108: Sage or holy man (V&A IS.15-1867)
Fig. 109: Female attendant (V&A IS.15-1867)

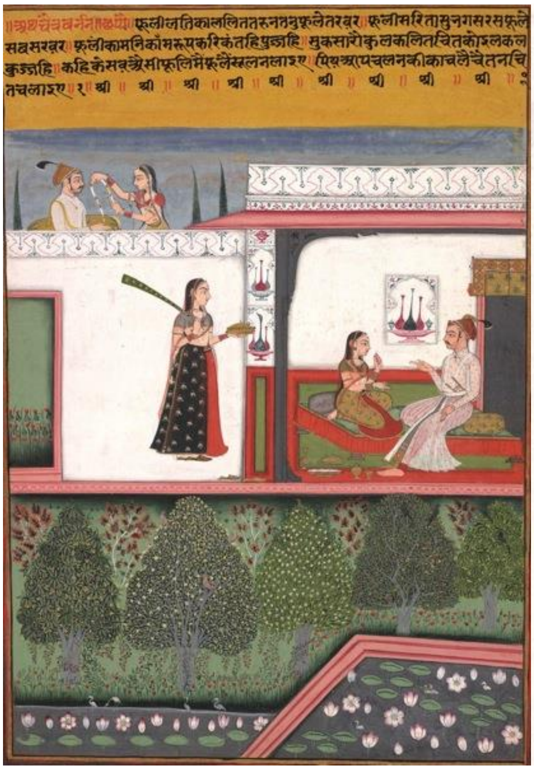


Fig. 110: *The month of Chaitra. March/April*, Rajasthan, Mewar, 1700-1725
British Museum (1999, 1202, 0.1.12)
Fig. 111: detail of fig. 110

Like the female, the man is dressed humbly, with *malas* of tulsi beads gathered around his neck and long nails representing features commonly associated with sages. His depiction could serve as a direct reference to the illustrious seven sages of Indian mythology, the *sapta rishis*, familiar to practically every Hindu.[291] A late seventeenth century Rajasthani painting depicts these great sages, two of whom have attributes and characteristics similar to the man on the bottle (fig. 112). The top central sage in the painting, identified as Jamadagni, has a full beard and holds a rosary of prayer beads; to his right sits Guatama, who is shown with extraordinarily long nails. The seated man on the bottle also has darkened long nails, which he cusps towards his chest. This man's pose could have a sacred association related to performance, which sages often engaged in to achieve or arrive at their semi-divine status.[292] The man's particular association could be further supported by the depiction of the attendant on the opposing side of the bottle, whose modest dress compliments the sage's, and who carries a covered box, the contents of which could contain betel leaf or pan, which when chewed, induce a pyscho-stimulated state.[293]

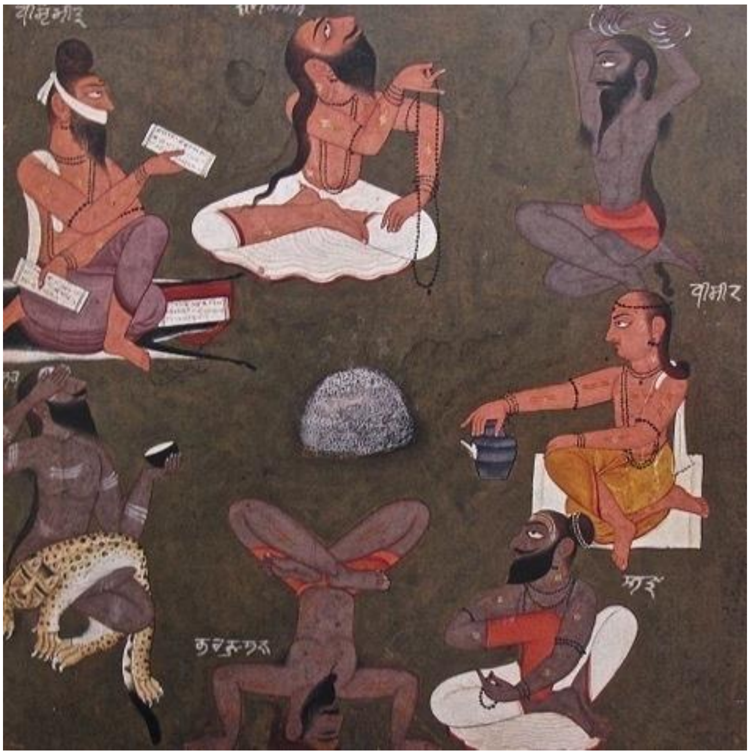

Fig. 112: *The Seven Great Sages*, Ascribed to the Master at the Court of Mankot, Rajasthan, circa 1675-1700 (Government Museum and Art Gallery, Chandigarh Acc.No.1343)

[291] B.N. Goswamy and Eberhard Fischer. *Pahari Masters: Court Painters of Northern India* (Delhi: Oxford University Press, 1997), p. 106.
[292] Goswamy (1997), p. 106.
[293] Habighorst, Reichart and Sharma (eds.) *Love for Pleasure: Betel, Tobacco, Wine and Drugs in Indian Miniatures* (Koblenz: Ragaputra Edition, 2007), pp. 11-23.

The attendant is thus assisting her master in attaining a divinely state of higher consciousness achieved through intoxication, an act that demonstrates his religious piety and devotion. Like the other Victoria & Albert Museum bottle, both figures are intended to share the same space in time, despite also appearing on opposite sides. Furthermore, the colour palette used for both the Victoria & Albert Museum bottles is virtually identical, with the same red and green colours used alternatively for the textiles and mountains, yet another visual tool connecting these bottles to each other and a common atelier.

The Dutch 'Six Struivers' Coin

A final feature found on two of the four bottles is the existence of a Dutch 'Six Struiver' coin soldered onto the silver fixtures wrapped around the bottles' neck, securing them from breakage. This coin and fixture only appears on the Victoria & Albert Museum bottles; LACMA's bottle only has a silver cap (fig. 113).

Fig. 113: Detail of silver fixture on Victoria & Albert Museum bottle 15-1867

The existence of a minted Dutch coin attached to the Victoria & Albert Museum bottles has long validated their attribution as Dutch, further associating their place of production and decoration with Western India – Ahmedabad or Surat – where the Dutch East India Company held Factories from the early seventeenth century. Only a total of four such glass bottles have Dutch insignia coins attached (two transparent bottles also in the Victoria & Albert collection).

The silver caps are thinly wrapped around the necks and reinforced by a hinge and chain that attaches the cap to its silver base. The Victoria & Albert Museum attributes the silver caps as being of Indian workmanship; although the silver has not been tested, the caps each have an import stamp. While this particular silver stamp was introduced from 1814, the stamps could have been added at any point from this date to 1867 when the bottles arrived into the Victoria & Albert Museum collection.

Fig. 114: Obverse side of Dutch Six Struivers' coin (Victoria & Albert bottle 15-1867)
Fig. 115: Reverse side of Dutch Six Struivers' coin (Victoria & Albert bottle 15-1867)

The Dutch coins soldered onto the silver caps cannot serve as a more precise dating, as they were introduced into the Holland mint in 1671 and continued until 1793.[294] Both coins are identical in shape, size, and representation. On the obverse side they reveal a ship of five sails in the centre with a marginal Latin legend reading: CONFIDENTES VIGILATE DEO, translated as "*Watchfully trusting God"* (fig. 114). The reverse side has a Dutch Coat of Arms showing a lion in the centre, with the number 6 and the letter S appearing on either side, indicating the denomination of the coin as 'Six Stuivers' (fig. 115). Dikshit claimed that a further legend read around the margin of the coin, now lost to soldering, generally beginning with (ii) MO.NO.ORD.HOLL.ET.WESTERI. with a date above the Coat of Arms to indicate the coin's exact minting date. This legend represents a contraction of "Moneta Nova Ordinum Hollandiae et West Fresiae"

[294] The author thanks Barrie Cook, Coins and Medals expert at the British Museum for confirming the dating of these coins.

and stands for 'the new money of the orders of Holland and West Friesland.'[295] As these coins were minted for one hundred and twenty-two years, and the dates of both coins have been lost to soldering, the coins cannot serve as a reliable marker of attribution or provenance. The appearance of Dutch coins does not make the bottles Dutch, however, the possible Indian attribution to the silver fixtures could further support their Indian origin.

Concluding Interpretations

Each of these four bottles represents a splendid example of Indian craftsmanship and decoration. While these bottles have not previously been catalogued as a group, the similarities of their decoration – in particular the fine pink and red stripped borders – serves as a stylistic marker connecting them as a collection while also attributing them to a similar painterly atelier or region. Furthermore, the 1753 provenance of the British Museum bottle represents an unusually rare and early date, which – when compared on stylistic measures - can confidently date the other three bottles to the first half of the eighteenth century.

These four cobalt blue bottles do not represent the only blue glass objects in the Catalogue, nor are they the only shape used as containers for perfume. Rather, this group reflects the artistic splendour of Indian glass decoration, highlighting how glass embodied a suitable media used to transfer or convey popular folktales and stories, which, in themselves, aptly reflected the properties of the stored contents. Perfume, imbued with multiple associations and connotations, above all possessed the ability to ignite amorous desires, some which were inherently erotic while others simply heightened physiological sensations in the body. Illustrating Layla and Majnun and a sage and devotee/attendant serve as easily identifiable archetypes that would have immediately conjured up emotive feelings associated with love and devotion. In the case of Layla and Majnun, the painter had consciously and deliberately chosen to illustrate an emaciated Majnun; as an easily recognizable figure already visually depicted within folklore traditions across northern India, this scene would have instantaneously triggered connotations associated with love, longing, and loss. This highly emotive visual sensation was thus ideally suited as an accompaniment for a fragrance scent, one which – through its own host of olfactory properties and powers – would have also triggered various evocative feelings. In this instance, the visual perfectly complimented the

[295] Dikshit (1969), p. 107.

fragrant, even going so far as to elevate the perfume beyond its fleeting ephemeral state by giving it a lasting and tangible visual memory. While the stored perfumes eventually disappeared with use, the bottles remained as visual reminders.

Perfume was more popularly used by men, yet there is no indication beyond this to assume that these glass bottles were uniquely commissioned for a male gaze. Visual illustrations depicting blue bottles show leisurely women within a royal or courtly context. The bottles were most likely used by both men and women of an elite social status, and could have included Europeans and Indians. The bottles themselves were made at a larger court in either western or northern India, one which probably also manufactured perfume and had an established painting atelier. While the bottles could have been manufactured in one place and transported to another for decoration, it seems more likely that a wealthy patron ensured that both production and painting occurred within close proximity to one another.

Without further insights into the provenance of these bottles, it remains difficult to trace their history back before their arrival into European collections (1753 and 1867, British Museum and Victoria & Albert Museum, respectively). To date, only two known comparable cobalt blue glass bottles exist within an Indian collection; all other examples currently reside outside of India.[296] Whether Indians made these bottles for European export cannot yet be entirely discounted, although it rather seems that they were initially made for elite members of Indian society, and later given as gifts or sold to Europeans who admired their beauty and found purpose in their function as containers. The latter would thus explain the later soldering of Dutch coins, for example. However, irrespective of patron, these perfume bottles represent a type of object commonly found within the Catalogue. As exquisite examples of Indian glass production they demonstrate the sophisticated skill of craftsmanship as well as the suitability of glass as a luxury container for perfume.

[296] These two cobalt blue glass bottles were published in an article written by Jagdish Mittal in *Marg*, and at the time were within the collection of the Salar Jung Museum; however, the author could not personally locate these objects during her visit to Hyderabad in 2013.

CASE STUDY 2: Transparent Case Bottles

Comparative analysis of Shape, Glass, Technique, and Manufacture

Many more case bottles of a transparent, greyish-clear glass exist than those of cobalt blue. While subtle differences in size exist between the bottles, their general shape is almost identical; the grouping of these two case studies stems from differences in colour of glass and surface decoration. This particular case study examines the following transparent case bottles currently within collections outside of India: Stiftung Museum Kunstpalast, Düsseldorf P.1989-50 (cat. 12); Museum Angewandte Kunst, Frankfurt 13195A & B (cat. 3); Los Angeles County Museum of Art M.88.129.198 (cat. 4), M.88.129.199 (cat. 5), M.88.129.200 (cat. 6), M.88.129.201 (cat. 7), M.88.129.202 (cat. 8), M.88.129.203 (cat. 9); Tareq Rajab Museum, Kuwait GLS-711-TSR (cat. 14) and GSL-712-TSR (cat. 15); the al-Sabah Museum, Kuwait LNS 82G (cat. 16); the Corning Museum of Glass, New York 2002.1.1a, b, c, d (cat. 11) and 59.1.583 (cat. 10); and the Metropolitan Museum of Art, New York 21.16.11 (cat. 13).

Each bottle was made in a square sectioned, two-part mould that is triangular in shape, as seen by the visible moulding mark diagonally cutting the bottom of the base. As with the cobalt blue bottles, this fine diagonal line imprints the base, leaving a faint indentation in the glass. The moulding marks along the sides of the bottles cannot be seen or felt due to the heavy gilding that decorates the edges. Like the cobalt blue bottles, these seventeen bottles extend upwards towards a cylindrical neck; however, the primary difference between these bottles and those of the first case study is that their necks flare outwards to a fine splayed lip. Visible tooling marks are seen around the edges of the lips, which are uneven in both form and thickness, an indication that they have been manipulated by hand. The width of the splayed lips is approximately two centimetres on all bottles, while the length of the cylindrical neck varies slightly depending on the height of the bottle.

A further grouping can thus be established between these bottles based on size (fig. 116). Five bottles appear noticeably smaller than the remaining twelve (Dusseldorf P.1989-50; Frankfurt 13195A & B; LACMA.M.88.129.199; LACMA.M.88.129.202), measuring between 9.8 and 10.6 cm in height, with a base width of 5.5 to 6.3 cm. The other twelve bottles stand between 12.7 and 14 cm in height, with the two bottles with missing necks measuring at 11.8 cm (GSL-712-TSR and LNS 82G), and their bases measuring between 5.8 and 7 cm.

Fig. 116: Case bottles from LACMA (left to right): M.88.129.202 - M.88.129.198 - M.88.129.203 - M.88.129.200 - M.88.129.199

The shape of all bottles is generally similar, with slight variation in the extent to which the shoulder tapers towards the base. As in the first case study, the sides of these bottles appear slightly concave, with 'chill marks' in ranging relief on all sides. The main difference amongst the bottles, which may indicate differences in mould forms, is seen in the roundness of the upper shoulder. The five smaller bottles all present rounded shoulders that gradually curve upwards towards the neck; while this rounded shoulder also appears on the larger bottles, a square version (similar to British Museum bottle SLMisc.341) also exists, which does not reflect a characteristic of the smaller shaped bottles. This angular shoulder is best seen in the four Corning bottles (COR.2002.1.1a-d) that measure to a maximum height of 15.1 cm (including their brass stopper) (fig. 117).

Fig. 117: Corning bottles 2002.1.1a-d

This difference could result from the uneven dispersal of the melted glass within the mould, leading to possible slumping or slogging as the bottle cooled. Another explanation could be that the bottle's shape changed when re-exposed to heat, when the neck and everted lip was tooled, or if the decoration was low-fired to fuse the paint to the bottle's surface.

As with the cobalt blue bottles, the pontil marks appear at the exact point where the diagonal moulding mark crosses the base. A similar empontiling technique was also used, leaving a small, circular abrasive mark measuring approximately 2 to 2.5 cm on all bottles. While no evident traces of glass remain on the bottles, which would confirm the use of a glass-tipped punty – a standardised manufacturing method popular amongst both Continental and English glassmakers in producing bottles - the similarity of pontil marks on these case bottles supports the hypothesis of a common atelier or centre of glass production.[297]

Fig. 118: Detail of the base of bottle GLS-711-TSR (Tareq Rajab Museum)
Fig. 119: Detail of the base of bottle LACMA M.88.129.202

H.R.C. Dobbs's late nineteenth century account of a pickle jar (*achari*) manufactured in a Lucknow glass factory mentions the use of "a gum made with saltpetre, borax, arsenic and water" for adhering a broken tumbler (made of European glass) to a blowpipe, and later the use of a *kund*, a solid bar of iron that the glass blower "sticks it into the center of the bottom, making the bottom rise into a cone inside the vessel."[298] Dobb's description does not mention the use of a glass tipped punty in manufacturing the pickle jar, and as the case bottles show no remnants of glass around

[297] Jones (1971), pp. 68 -72.
[298] H.R.C. Dobbs, "The Pottery and Glass Industries of the North-West Provinces and Oudh", *The Journal of Indian Art* (London, 1896), p. 5.

their pontil mark, perhaps a similar empontilling technique was used. The pontil marks appearing on the case bottles could have occurred during the mould blowing process, or, were created afterwards when the bottle was reheated in the furnace to fuse the painted decoration to the glass (figs. 118 and 119).

Only the Corning Museum of Glass bottle (COR.59.1.583) has been tested through an X-Ray fluorescence spectrometer, indicating that lead (Pb) was the predominant element, with minor traces of potassium (K) also detected (fig. 33).[299] In addition to COR.59.1.583, three transparent glass bottles from the al-Sabah Museum in Kuwait were reportedly characterised as also being of a "lead-potash quality", although the exact methods of analysis were not specified. One of these bottles (LNS 428 GA) is not included in this case study, based on differences in decorative style and technique, yet it is of a similar translucent greyish colourless glass and shape (cat. 23). The compositional analysis of this glass bottle revealed the following: Na2O: 0.8%; MgO: 0.3%; Al2O3: 0.3%; SiO2: 55.0%; K2O: 9.2%; CaO: 0.5%; MnO: 0.1%; Fe2O3: 0.2%; PbO: 33.2%, indicating that lead was the predominant element (33.2%) with traces of potassium (9.2%).[300] Two other case bottles currently in the LACMA collection also mention a similar potash-lead composition (M.188.129.201 and M.188.129.203) based on a comparative compositional analysis to those bottles in the al-Sabah collection.[301] The mention of five bottles being of a potash-lead glass variety supports the analysis done by the Corning Museum of Glass on bottle 59.1.583. Visually analysing the glass bottles could reveal similarities in production that – like the cobalt blue bottles – may further support their Indian manufacture.

The bottles' transparent, greyish colouring more easily lends itself to a 'clearer' examination of the glass where bubbles, seeds and crizzling could suggest quality and manufacturing techniques. The most visible trait seen within all seventeen bottles is the regular dispersal of small bubbles and seeds embedded throughout the glass, suggesting a similar type of glass or manufacturing technique. Larger bubbles measuring approximately 0.5 cm in length also appear concentrated around the base of most

[299] This bottle was tested in the bottom corner using a Bruker TRACeR III-V Portable x-ray fluorescence spectrometer. The test was done by Stephen Koob, Chief Conservator at the Corning Museum of Glass, New York in June 2015.

[300] Carboni (2001), p 389, cat. 106a-c.

[301] This comparison is made by Stefano Carboni in *Glass of the Sultans* (2001), p. 288, fig. 140.

bottles, or towards the outer layer of the glass along the sides; these could have formed in the initial melting of the batch, or become trapped when blown into the metal mould.

A more difficult distinction to decipher with the naked eye is between seeds, un-melted batch stones, and crizzling marks, which present small dots of varying translucency and formation within the glass. Un-melted batch stones represent raw elements (most often silica) that have not sufficiently melted, creating a concentration of dark dots predominantly isolated – yet not exclusive – to a particular area of the glass. Crizzling, however, represents the natural deterioration of the glass created by a chemical imbalance within the glass composition, and can be accelerated by certain circumstances and environmental conditions.[302] Three stages of crizzling exist – initial, incipient, and full-blown – yet only the first stage visually manifests itself in small dots similar to batch stones and seeds; these dots reflect moisture absorbed from the alkali, which leaches out to the glass's surface and creates small dots often appearing in 'constellation-like' clusters isolated to certain areas, as opposed to a more advanced stage where a cloudy layer uniformly covers the glass.[303] According to Dr. Robert H. Brill, most crizzled glass compositions show less than 4% calcium oxide (CaO).[304] The XRF analyses conducted on the Corning case bottle cannot provide more detailed percentages of chemical elements within the glass; however, the al-Sabah bottle (LNS 428 GA) indicated a CaO level of 0.5%, suggesting that (according to Brill) the potash-lead characterization of this glass – with low levels of calcium oxide – was more susceptible to crizzling.

Indeed, each case bottle demonstrates varying degrees of crizzling. As seen in the Tareq Rajab Museum bottle GSL-712-TSR (fig. 120), clusters of small dots are detected within the glass, around the pontil mark, with the glass itself appearing cloudy. These signs indicate severe crizzling, which often occurred in environmental conditions with humidity higher than 55%.[305] While the lower lime levels (calcium oxide) could have already compromised the longevity of the glass, both the contents stored within the bottles and their environmental conditions only further accelerated this deterioration

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[302] Refer backt to footnote 71 for definition of crizzling.

[303] These are terms given by Stephen P. Koob, *Conservation and Care of Glass Objects* (New York: Archetype Publications, 2006), pp. 118-124.

[304] Ibid, p.118.

[305] The appearance of a cloudy or hazy appearance on the surface that develops in the third crizzling stage occurs if the humidity is above 55%, with only fine crystals developing if the humidity remains lower than 40%; Ibid, p. 118.

process. The form of the bottle naturally presents a restricted climate where air cannot easily circulate, allowing moisture to develop inside, and if covered with a cork or screw cap, would have only further restricted the circulation of air. Furthermore, the substance stored within the glass could have accelerated the glass's crizzling.

Fig. 120: Detailed view of crizzling on bottle GLS-712-TSR (Tareq Rajab Museum)

Four bottles - LACMA. M.188.129.202; LACMA. M.188.129.203; LACMA.M.188.129.202; and GLS-711.TSR - all display early signs of crizzling based on the 'constellation' effect of dots seen around the base. In addition, these four bottles have noticeable golden-brown stains concentrated around the insides and edges of the base (figs. 118 and 119). The stored substance could have encouraged the crizzling visibly detected in the glass, which – although detrimental to the glass – nonetheless confirms that the bottles were used, and not merely kept as decorative objects.[306] Lastly, the bottles were perhaps seldom sufficiently cleaned, as not to damage their surface decoration. While the potash-lead glass of these bottles represented a type of composition subject to deterioration over time, the use of these bottles, within possibly humid conditions in India, and as containers for liquids, certainly could have accelerated this process.

[306] No samples of this superficial substance covering the inside of these four bottles has been taken or tested; however, the discolouration confirms what Carboni already suggested, that 'such bottles may have contained perfumed water, rather than drinkable liquids, as no known drinking vessels have been associated with them'; Carboni and Whitehouse (2001), p. 276.

Surface Decoration

In recent publications these bottles have been attributed to the Kathiawar Peninsula, Gujarat, in Western India, and dated to the second quarter of the eighteenth century.[307] Given the popular attribution of these bottles to the region of Gujarat, painterly ateliers within the territory – such as Ahmedabad, Surat, Bhuj, and perhaps Hyderabad in Sind - have also been proposed as possible places of decoration.[308] While Western India could still represent a region of decoration, it seems more likely, based on visual comparisons to painterly schools, that these bottles follow a Rajasthani style of painting. In any event, the similarity of both surface decoration and technique confidently connect these seventeen bottles to either a common region, or possible atelier.

As with the cobalt blue case bottles, these transparent bottles follow a similar mode of decoration, with two opposing sides decorated in floral sprays (normally the same flower on opposite sides) and figures (sometimes with an animal or young child) on the opposing side. The decorative technique of all bottles is identical; they are painted and gilded directly onto the glass's surface, then fired at a low temperature sufficient enough to fuse the decoration in a semi-permanent manner.[309] The gold, which outlines, highlights, and details the framed compositions, is applied by liquid paint and not foil.

The most striking visual feature first detected on these bottles is the gilded patterning along the edges, neck and everted rim, outlining the flowers, and decorating the background. The gilding on these bottles functions as more than a supplementary motif meant to highlight the polychrome figures and flowers; it serves to stylistically connect these bottles to a common painting atelier or workshop. The necks of all bottles are painted in isolated vertical bands that terminate in subtle points (perhaps a stylised leaf), with a solid gilt band running above and encircling the everted rim. A fine triangle and tripartite leaf motif decorates the bottom of the neck and around the upper shoulder, flanked by two finer solid gilt bands. Each side of the bottle is also decorated with an arch comprising five polylobed arches and columns, with a herringbone, chevron or *gopha* pattern running along the edges (fig. 121). The arches physically and

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[307] Stephen Markel, "India and 'Indianate' Vessels in the Los Angeles County Museum of Art," *Journal of Glass Studies* 33 (1991), p. 88.
[308] Carboni and Whitehouse (2001), p. 287.
[309] Ibid, p. 390.

aesthetically frame the scene, enclosing the figures or floral sprays within a contained space. The background of densely gilded foliage gives an allusion of an outdoor garden or setting.


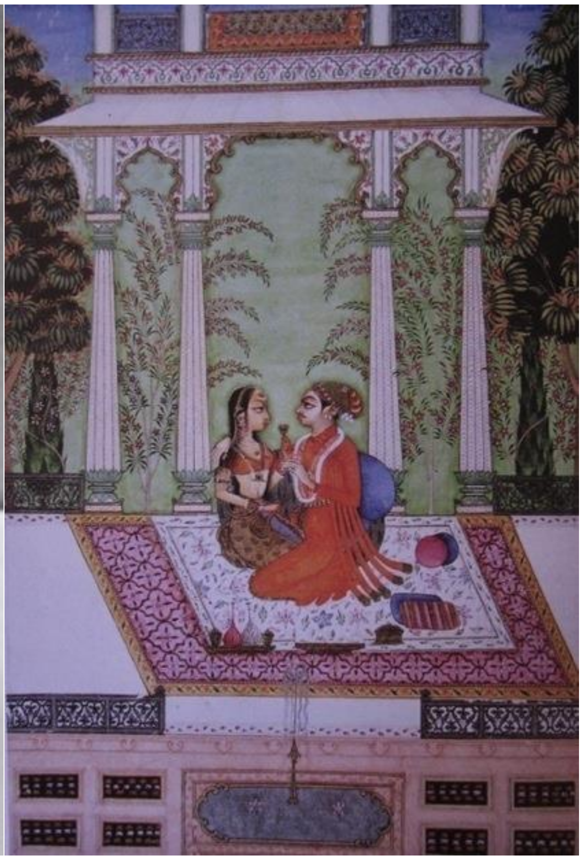

Fig. 121: Detail of edge and arches on bottle LACMA M.88.129.198
Fig. 122: *Prince with his Lady,* Rajasthan, Bikaner, circa 1730 - 50
(After Habighorst 2007*,* p. 90, fig. 58.)

Polylobed arches trace their roots back to Mughal architecture, emerging only during Shah Jahan’s reign (1628-58); during this time lobed profiles and arches were applied as architectural elements, in miniature form decorating walls and niches used to store items, or even behind water cascades in royal gardens.[310] Examples of polylobed arches can be seen in Shah Jahan’s *Diwan-i Amm* (public audience hall) built in 1637, and his *Moti Masjid* (Pearl Mosque) built in 1653, in the Agra Red Fort.[311] The five lobed arches on these bottles, however, are not unique to Mughal architecture of Delhi or Agra, and can also be seen in Rajasthani paintings of the late seventeenth century.[312] A Bikaner painting dated to 1730-50 shows similar polylobed arches, yet with a chevron pattern decorating the columns (fig. 122). While this distinctive type of architectural

[310] George Mitchell. *Mughal Architecture & Gardens* (Suffolk: Antique Collector’s Club, 2011), pp. 49-50.
[311] Ibid, pp. 154-5 and 158-9.
[312] For another painting with similar architectural decoration see British Museum 1999,1202,0.5.8.

style started under Shah Jahan's reign in the first half of the seventeenth century, it spread into other regions throughout the eighteenth century, in both Rajasthan and Lucknow, Awadh.[313] It seems highly likely that the painter of these bottles drew upon local architectural elements, either in his immediate surroundings or replicated in paintings. While the architecture alone cannot reveal where these bottles were decorated, the commonality of this feature, in both style and treatment, upon all seventeen bottles represents a stylistic similarity connecting these bottles to a painterly tradition or atelier.

Each of the bottles is decorated on opposing sides with the same floral motif. While the general composition of these floral sprays varies slightly, the type of flower on each bottle is different. All bottles follow a standard compositional format, that is, three to eight floral sprays, sometimes accompanied by closed buds, stemming from a single vegetal tuft. Irrespective of the number of sprays depicted, the composition dominates the entire side of the bottle, with smaller green or gilt leaves and flowers decorating the background. Five of the bottles illustrate flowers with only three sprays (fig. 123), GSL-711-TSR; COR.59.1.583; LACMA.M.88.129.199; Frankfurt 13195A & B – the last three also being shorter in height - with four bottles illustrating six sprays (fig. 124), COR.2001.1.1C,D; LACMA.M.88.129.202; LACMA.M.88.129.203; three illustrating seven sprays, COR.2001.1.1B; LACMA.M.88.129.200; Dusseldorf P.1989-50; and two with eight sprays (fig. 125), LNS 82 G and COR.2001.1.1A. The unique example is MET bottle 21.16.11, which illustrates a denser arrangement of numerous smaller flowers (fig. 126).

Despite the number of floral sprays illustrated on each bottle, the overall composition and treatment of each stylistically connects them to a similar decorative tradition. While no evidence supports the fact that they were painted by the same hand, it appears that a standardised composition was followed, allowing differences in the types of flowers chosen, with slight variation in arrangement (perhaps depending on the bottle's height). The difference in types of flowers, however, could have several proposed functions. Assuming the bottles were intended as a set (as supported by the wooden case box accompanying the Corning bottles COR.2002.1.1a-d), then such differences could aesthetically enhance the collection: they could reveal the painter's

[313] For examples of such polylobed arches in illustrations and drawing of architecture in Awadh, see: Catherine Asher, "Lucknow's Architectural Heritage," in *India's Fabled City: The Art of Courtly Lucknow* (Los Angeles: Los Angeles County Museum of Art, 2011), pp. 120-143.

skill in illustrating diverse flowers whilst providing the patron with a visual variety; or, the type of flower could reflect the bottle's contents, such as floral perfumes, ointments or waters, thus serving as a type of visual label.


Fig. 123: Frankfurt (13195A) – Fig. 124: LACMA M.88.129.203


Fig. 125: LNS 82 G - Fig. 126: MET 21.26.11

The overall treatment of figures is also very similar: they are all depicted in profile, dressed in similar costume, and engaged in an action that most often involves another figure, animal or small child. The bottles reflect yet another standardised format of figural representation similar to that of the flowers, showing only slight variation in facial detailing (men's moustaches and jewelled ornamentation) and costume (women's waists revealed or concealed). The figures appear similar in size and are proportionally framed within the polylobed arches; their differences primarily reflected in their gestures or activities. The lack of individualised characteristics or attributions cannot assign these figures to a specific person, thus implying that the illustrations do not intend to represent portraits. Rather, the figures are anonymous archetypes meant to showcase activities commonly associated with courtly culture and royal status.

Male figures predominantly appear in scenes that include women and are shown standing opposite them, often touching. When they are not facing a woman, they appear alone on the opposing side, seated in a throne-like chair with an animal or objet at their feet. The male figures are all dressed in *jamas*: the classic tailored robe of Mughal India, usually tied at the side of the chest and waist, or sometimes in front, but always with a well-defined and full, gathered skirt. It is worn over pants, with a sash (*patka*) of contrasting colour tied around the waist. With the exception of one man dressed in white, all the male figures are dressed in colourful *jamas*, most commonly red or green and decorated with small flowers.

The length of their *jamas* also falls around the mid-calf; both the colouring and length alone suggests that the figures are not from Awadh, where men's fashion styles during the eighteenth century supported ankle-length *jamas* of predominantly cream or white cotton.[314] Not only do the *jama* styles differentiate fashion tastes between regions, but turbans and their subsequent ornamentation can also distinguish provinces and levels of society.[315] The men illustrated on the case bottles all have identically wrapped turbans sitting pronounced at the back of their head, revealing only slight tendrils of dark hair around their ears and behind their necks (figs. 127 and 129). Their

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[314] Rosemary Crill, "Textiles and Dress in Lucknow in the Eighteenth and Nineteenth Centuries," in *India's Fabled City: The Art of Courtly Lucknow* (Los Angeles: Los Angeles County Museum of Art, 2011), p. 229. A well-known painting of *Colonel Morduant's Cock Match* by Johann Zoffany, painted in 1784-86, shows the dress of all levels of Awadhi society, including a few women (Tate Britain 1994.T06856).

[315] A portrait by Tilly Kettle of *Nawab Shuja al-Duala with the Heir Apparent, Mirza Amani, later Asaf al-Duala* of Faizabad in 1772 depicts the ruler with his heir apparent both in white ankle-length *jamas* with traditional Lucknow style bands around their turbans, called a *goshpech (*Musee National du Chateau de Versailles et de Trianon, MV3888, Inv.10053,LP 6412).

turbans are coloured in either green or red stripes (those dressed in green *jamas* have alternating red turbans), with solid gilt sashes and a gilded turban ornament (*sarpech*), and some with the addition of a gold painted feather (figs. 128 and 132).



Fig. 127: GSL-712-TSR - Fig. 128: LACMA.M.88.129.198 – Fig. 129: MET 21.26.11



Fig. 130: COR.2001.1.1B - Fig. 131: COR.2001.1.1B – Fig. 132: LACMA 88.129.200

Unlike the women, little jewellery, ornamentation, or accoutrements accompany the men, with the exception of their turban ornaments; only three men are illustrated wearing a strand of pearls (figs. 128, 130 and 131). Furthermore, only two bottles illustrate men with weapons tucked into their sashes (figs. 128 and 132), revealing a dagger and a *katar* (punch dagger), respectively. These two men are also seated on throne-chairs with the addition of gold feathers inserted into their turbans; one has a crane standing at his feet (fig. 132) and the other a globular shaped *huqqa* (fig. 130).

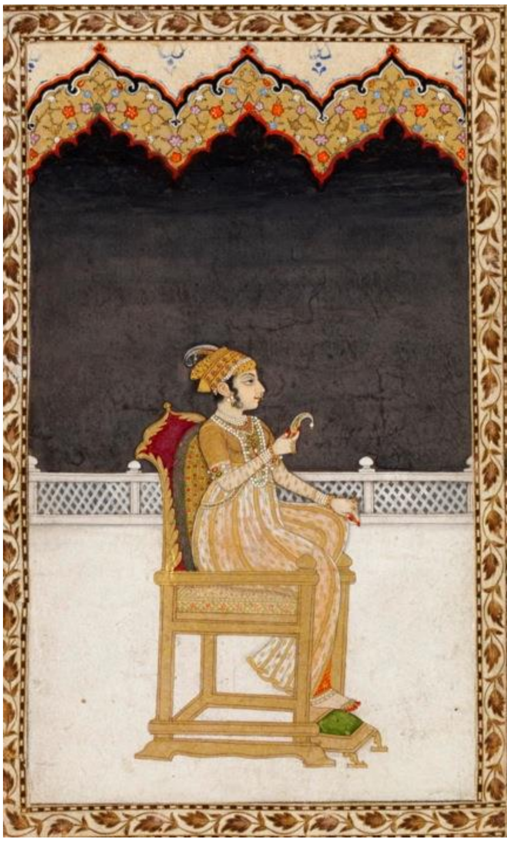


Fig. 133: Portrait of a Rajasthani princess, Rajasthan, eighteenth century (V&A IM.86.1922)
Fig. 134: *Prince greeting his four sons*, India, Murshidabad, circa 1770-80 (V&A IS.239.1955)

Paintings of seated princes (and princesses) adorned in jewels and accompanied with ornaments or objects appear within numerous Indian paintings, serving as a type of portraiture intended to capture the importance of a particular person (fig. 133 and 134). The type of throne-chair, previously described as “sledge-like” in form and attributed as Dutch,[316] appears upon nine bottles; its distinctive shape – tri-lobed back terminating in a point with additional panels connecting the chair’s arms with its legs – is more commonly illustrated in seventeenth and eighteenth century courtly paintings from

[316] Dikshit initially gave this chair both its description and Dutch attribution; see Dikshit (1969), pp. 109.

northern India, including Rajasthan and Awadh.[317] According to Amin Jaffer, these chairs were purposely wide to enable the Emperors or royals to sit cross-legged. In subsequent illustrations of such chairs, the seats are typically upholstered, with the arms, legs and lobed back covered with sheets of gold and encrusted with precious stones. As seen on both the bottles and paintings, the stretchers touch the ground and extend beyond the front of the chair, developing into a footrest, an inclusion that reveals the chair's importance as a symbol of royal rank, and emphasizes the sitter's elevated status.[318]

These distinctively shaped chairs not only serve as symbols of status, but also signify a royal tradition that harps back to an Indo-Persian courtly culture of asserting royal authority. Within a public and often ceremonial context, royals were physically elevated upon chairs to reinforce their patrimonial authority as rulers, fathers, and kings of their people and empire. The image of kingdom was inextricably connected to patrimonial themes of authority, of which publically explicit displays of power, status, and manhood were crucial. The royal seat, throne or chair represented an implicit image within this construction. The bottles' depiction of seated men thus reinforces this tradition; the distinctively shaped chair serves as an immediate visual indicator that signifies royal status.

While more apparent symbolic visual signs accompany these seated men, the standing men also demonstrate subtle signs of royalty and elite status, shown by the inclusion of strings of pearls, turban ornaments, and moreover, a woman of equal dress and ornamentation. Herein lies a departure from the painterly tradition of royal portraiture of the late seventeenth and eighteenth centuries, in which emperors or royals were often depicted singularly in standing profile against a coloured background, often holding an object or piece of ornamental jewellery.[319] The absence of an isolated standing man upon these bottles shows a shift in associations or connotations of elite manliness; the bottle's depictions suggest that manliness derived more from actions and

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[317] This distinctively shaped chair has not been attributed to any particular region of India or Pakistan, and is not included within the Catalogue of Amin Jaffer's publication on *Furniture from British India and Ceylon* (London: V&A Publishing, 2001); although illustrations of chairs with similar lobed backs and/or adjoined legs appear within the section of 'Chairs at Indian courts', figures 41, 42, 44, and 48.

[318] The particular feature of the footrest relate closely to a type of chair found on the East African coast known as the 'Lamu' chairs, as they have been termed. For more discussion of these chairs see: Jaffer (2001), p. 114.

[319] Numerous examples of such paintings exist, but the height of its style can be found in examples from the Late Shah Jahan album, circa 1650. While folios of this album are dispersed within collections and institutions, some specific examples include: *Ram Singh of Amber* (VMFA; 68.8.64); *Rao Chattarsal of Bundi* (LACMA; M.83.1.3); and *Islam Khan Mashadi* (MET; 55.121.26).

objects rather than an emphasis on the individualised figure. While the painterly tradition of courtly portraiture would have been the known precursor for conveying royal or courtly status at the time, the bottle's illustrations represent a conscious departure from this tradition, instead focussing on other actions or symbols associated with manliness: that of an authoritative and distinguished ruler; and an able and amorous lover. The men depicted on these bottles, irrespective of age or individualism, reinforce particular notions of masculinity prevalent within eighteenth century courtly culture.

In the North Indian context, and especially at the seventeenth century Mughal courts of Emperors Jahangir and Shah Jahan, the models of courtly masculinity were defined by conduct books and interpreted through social sophistication and connoisseurship, as reinforced through a refined cultivation of literature, poetry, art, and dress. The importance of both consumption and display – in particular the man's ability to create a pleasing physical environment, both public and private - also helped to define manliness and manhood, power and authority.[320] Textures, fragrances, colours, tastes and sounds all represented a part of this outward and public expression, while love, desire, virility, and attraction represented a part of this inward and intimate expression. Objects, ornaments and perfumes each played a vital role in defining manliness within the public sphere.

Masculine dress formed an essential component of this outward expression, exuding standards of manliness as defined by the inclusion of a sash, *kamar* band, *kamar pesh* or *patka*. The development of this dress extended beyond fashion, and came to signify a man's readiness for immediate action and service. Hence, these robes of honour and accompanying accoutrements (such as daggers) took on a meaning of masculinity that denoted bravery, heroism, and commitment to service, traits that were inherently connected to manhood and royal authority. The seated men illustrated upon the bottles reveal both dress (pearls, weapons, *patka*) and status symbols (throne-chair, *huqqa*, pet bird) that reinforce courtly modes of authority, which by the eighteenth century, were already well established within both royal practice and visual imagery.

In addition to dress and status symbols, the inclusion of a woman serves as yet another tool for conveying manliness: that of able and amorous lover. On the opposing

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[320] Rosalind O'Hanlon, "Manliness and Imperial Service in Mughal North India," *Journal of the Economic and Social History of the Orient* 42 (1999), p. 69.

sides of the seated man, a woman and man stand facing one another. Variations of this image appear on several bottles, including Dusseldorf, P.1989-50 (fig. 135) – in which the man's arms are placed on the woman's waist and arm – and on bottle GSL-712-TSR (fig. 136), where the man clasps the woman's wrist. These physical signs between and man and woman are intended to represent demonstrative signs of tenderness and affection. The woman - a princess, courtesan, or *nayika* (feminine heroine) – thus functions as a foil in complementing the male in his endeavours to express his sexuality and masculinity.


Fig. 135: SMKGH P.1989-50 – Fig. 136: GSL-712-TSR

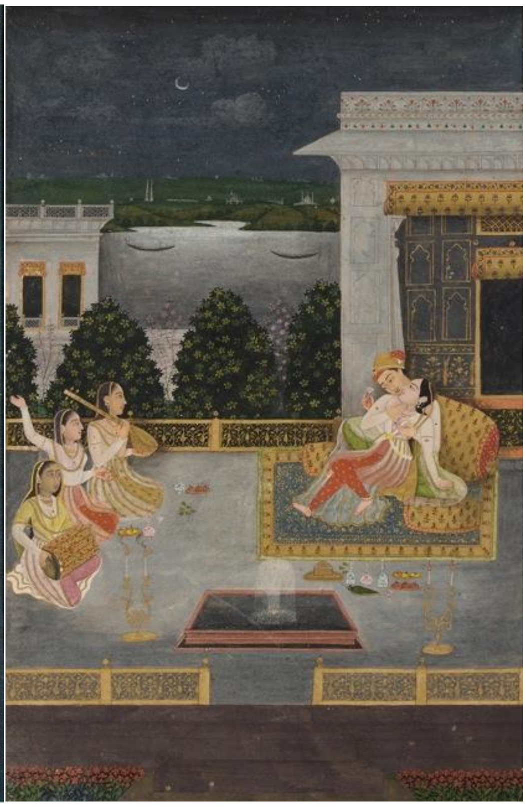

Fig. 137: ***Mahlaqa Bhai with a lover***, **Hyderabad, circa 1795 (San Diego Museum of Art; 1990.559)**
Fig. 138: ***Lovers on a terrace with three musicians***, **Mughal dynasty, eighteenth century**
Freer Gallery of Art, Smithsonian Institute Washington DC (F1907.232)

Numerous visual representations of lovers or couples exist in Indian paintings. Some of these scenes show more formal displays of affection (fig. 137), while others illustrate couples entangled in tender embrace whilst lounging before an audience of entertainers or performers (fig. 138). The formal representation of the bottles' lovers could suggest a more official or ceremonial circumstance, one that was purposely less demonstrative yet nonetheless clearly conveyed its intentions of affection. Furthermore, the verticality of the standing figures stylistically suits the rectangular format of the bottles. However, the purpose of including couples standing face to face, often subtly touching, represents a visual expression of love and desire, which, within the context of masculinity and manhood, serves as a foil in defining man's ability to seduce and attract. Interpreting this particular amorous image within an isolated context of masculinity helps to further perpetuate the idea that these perfume bottles were intended for male use. The male gaze would have thus been fulfilled by images and imagery that were of particular interest to men, as defined by those that directly reinforced definitions of masculine authority and status.

The notion of the male gaze is only further reinforced by the visual imagery depicted on the opposing sides of the bottles; these include scenes of *nayikas* engaged in activities and accompanied by symbols that define royal status, femininity, and sexuality. Like the male figures, these women depict non-individualised representations of roles associated with courtly culture. The illustrated *nayikas* themselves symbolise ideals of physical beauty and womanly perfection; they represent anonymous or fictional archetypal women. While masculine codes of courtly conduct and etiquette existed during the mid to late seventeenth century, so did poems describing the idealised woman or heroine. The *Rasikapriya*, a compilation of poems by the sixteenth century poet Kesava Das, enumerated types of heroines and dwelled on the poetic conventions of female beauty; his extensive metaphors idealised women and heroines: "feet like lotuses; her neck and arms, as jars, and belly as betel-leaf: as swans her gait, and limbs that shone as burnished gold."[321] Poems and music long venerated the female heroine, expressing in words an imaginable and intangible ideal; illustrated poetry and ragas, however, conversely conventionalised the heroine, eventually transforming her into a singularised and dematerialised image.[322] This image of the *nayika* or heroine became canonised as the female illustrated across Indian schools of painting.

As Molly Emma Aitken has examined in her study of Pahari and Rajput style painting, "*Nayika* paintings show a superiority owed solely to beauty and charm. They suggest strategies for achieving position: cosmetic adornments, attractive poses, expressive attitudes which draw on the lover's desire and secure his protection."[323] This image, which Aitken's classifies as fetishised, holds different meanings depending on the female or male audience and gaze. To the female viewer, the *nayika's* image represented a symbol of womanly perfection to be emulated; to the male, it represented idealized female beauty.[324] The women portrayed on the bottles thus

[321] Desava Das, *The Rasikapriya of Keshavadasa*, trans. K.P. Bahadur (Delhi: Motilal Banarsidass, 1972), 31
[322] For a more detailed discussion about the feminine and masculine within early Mughal music, see the works of Katherine Butler Schofield: "Learning to Taste the Emotions: The Mughal Rasika" in *Tellings and Text: Music, Literature and Performance in North India*, Francesca Orsini and Katherine Butler Schofield (eds.); and "If Music be the Food of Love: Masculinity and Eroticism in the Mughal *mehfil*" in *Love in South Asia: A Cultural History*, Francesca Orsini (ed.) (Cambridge: Cambridge University Press, 2006): 61-83. For discussions related to the classifications of heroines within poetry at the Mughal court, see: Allison Busch, "Hidden in Plain View: Brajbhasha Poets at the Mughal Court," *Modern Asian Studies,* 44 (2010): 267-309.
[323] Molly Emma Aitken, "Spectatorship and Femininity in Kangra Style Painting" in *Representing the Body: Gender Issues in Indian Art*, Vidya Dehejia (ed.) (The Book Review Literary Trust: New Delhi, 1994), p. 95.
[324] As Molly Emma Aitken argued, "Seventeenth century Mughal painting gradually embraced innumerable such translations of *nayika* imagery, shifting away from the Persian preference for the

follow an already established ideal conveyed across popular painting culture and courts in northern India.

Women appear more regularly and diversely across the seventeen glass bottles; although like the men, none are depicted singularly in standing profile. However, the women are seated upon identical throne-chairs, denoting their royal status, and are equally ornamented with fine jewels. The women compliment the men in costume colour and textile pattern, with differences depicted only in the length of their bodices (*cholis*) and the patterning of their skirts (*lahangas*). Three of the six seated women gesture towards their mouth in a sign of communication or speech (figs. 139, 140, 141), while two depict women with small boys (figs. 141 and 142) clothed with only a short *janghia* tied around their waist and a belt of bells. While the chair represents a symbol of status, the inclusion of children represents fertility, maternity, and love, symbols that denote obligation and duty on the one hand, and affection, tenderness and devotion on the other. The particular inclusion of a young boy further symbolises lineage and legacy, with males possessing a unique place of pride within South Asian hierarchy and family structure. This imagery would have appealed to both men and women, representing a symbol of fertility, procreation, love and protection.

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beautiful boy toward a greater attention to female beauty and the poetics of heterosexual love, though the former remained a theme. Figures seemingly based in *Ragamala* or other marga iconographies, but similarly loosed from their original contexts, would eventually abound." See: Molly Emma Aitken, "The Laud Ragamala Album, Bikaner, and the Sociability of Subimperial Painting," *Archives of Asian Art* 63 (2013), p. 50.


Fig. 139: Tareq Rajab Museum, Kuwait (GSL-712-TSR) – Fig. 140: LACMA M.88.129.199


Fig. 141: LACMA.M.88.129.200 - Fig. 142: COR.59.1.583

Courtly scenes of women with children exist in paintings, such as the late seventeenth century Rajasthani painting (fig. 143) depicting a seated woman playing with a child. The stance, throne-chair and dress of the illustrated woman closely resembles those depicted upon the bottles, showing that such imagery was already popular within the visual repertoire of courtly representations. In this instance, the *nayika* as mother serves as a powerful and emotive symbol of both feminine and masculine pride.

Fig. 143: ***Lady Playing with a Child,*** **Rajasthan, Bikaner, late seventeenth century**
National Gallery of Victoria, Melbourne

Another *nayika* scene depicted upon five bottles is that of a woman standing on one leg grasping above at a tree branch, accompanied by one (or sometimes two) collared deer or blackbuck (Dusseldorf.P.1989-50; LNS82G; MET21.26.11; LACMA.M.88.129.198; LACMA.M.88.129.202). The treatment of the female figures, deer, trees, and dress is almost identical in each scene, with variation seen mainly in the colour of dress and deer. With the exception of bottle LACMA.M.88.129.202, all women stand on their left foot, with their right leg crossed over their knee; the lady on bottle LNS 82G stands upon a small golden pedestal or stool (fig. 144). On all bottles, the ladies' right arm grasps at an overhanging tree branch, while her left hand holds an unidentified gold object, possibly a bundle of grass. The collars or string of bells around the deer's neck identify the animal as a pet.

Fig. 144: al-Sabah Museum (LNS 82 G)
Fig. 145: *The Pet Deer*, Rajasthan, Pahari, eighteenth century
(After Coomaraswamy 1975, Plate XLVIIIA)

The similarity of these scenes hints towards an iconography associated with the *Todi Ragini,* the feminine form of *raga* (musical mode or melody) from the *Ragamala* series, a musical tradition whose complex visual narrative varied according to school and period.[325] The text, from which numerous Rajasthani illustrations derive their inspiration and developed a standardised iconography states: *"The Nayika walks lonely with her vina in hands amidst the trees of a forest, surrounded by deer which she has fascinated by her play".*[326] The textual and often visual iconography of this particular *Ragini* depicts a *vina* (a stringed musical instrument), a visual tool that is entirely absent within the bottles' illustrations; however, despite this, the similarity of subject and scene suggests that *Ragamalas* such as this served as visual inspiration for the bottles. Referring back to Aitken's examination of the *nayika*, such female iconographies, many rooted loosely

[325] This particular *ragini* is thought to have originated as an enchanting song sung by village women to keep deer from eating their crops, and often evokes a mood of delightful adoration; it is traditionally performed in the late morning; see: Walter Kaufman. *The Ragas of North India* (New York: Da Capo, 1984), p. 551. The iconography used to identify each musical mode is largely interpretive, and thus highly complex; deciphering the iconographies associated with each particular *Ragamala* painting continues to challenge scholars. For a more recent interpretation of this complexity, see the introductory essay by Anna L. Dallapiccola. *Ragamala Paintings from India: From the Claudio Moscatelli Collection* (London: Philip Wilson Publishers, 2011).

[326] Klaus Ebeling. *Ragamala Painting* (New Delhi: Ravi Kumar, 1973), p. 118.

within *Ragamala* or other textual imagery, became standardised representations of the female heroine.[327] This was especially the case amongst Rajasthani courts, where *Ragamala* images developed into a standard iconography that was subsequently repeated throughout various ateliers, courts, and reigns (fig. 145). As such, the *nayika's* became a template for all female depictions. The woman with pet deer thus showcases yet another *nayika,* that of lover or admirer of animals and nature, one whose iconographic inspiration drew upon pictorial traditions found within illustrated works on paper.

The last image depicts women bathing. Three different variations of bathers appear on the bottles: a maid scrubbing lac from the *nayika's* feet whilst she sits upon the throne-chair (fig. 146); a maid combing a seated *nayika's* hair (fig. 147); and a maid offering a towel to a standing *nayika* as she washes (or combs) her hair (fig. 148). In all three representations the *nayikas* are bare breasted, adorned with strands of pearls and jewels. The image of the semi-nude bather dates back to both Sanskrit and vernacular sources, and has a long tradition within the visual iconography of both Iranian painting and Hindu temple sculpture.[328] Sanskrit and vernacular court poetry of the fourteenth century venerates such bathing beauties, as the poet Vidyapati describes, "I saw my love when she was bathing, and a stream of water pouring from her hair…the filmy muslin clung upon her breast".[329]

The iconography of this particular image, and its abundant representation in paintings dated from the seventeenth century, including those connected to the courts of Jodhpur, Kota, Bikaner, and Jaipur (fig. 149) shows the subsequent popularity of this image amongst both Hindu and Muslim viewers.[330] The transcultural appeal of this image also harps back to a structure of paintings that depict the *nayika* with her attendants, a formula commonly found in Rajput images of gods and kings, and in

[327] Molly Emma Aitken, "The Laud Ragamala Album, Bikaner, and the Sociability of Subimperial Painting," *Archives of Asian Art*, 63 (2013), p. 50.

[328] For an example of an Iranian painting, see Muhammad Mumin's just-bathed odalisque in the Read Album in the Morgan Library & Museum, New York.

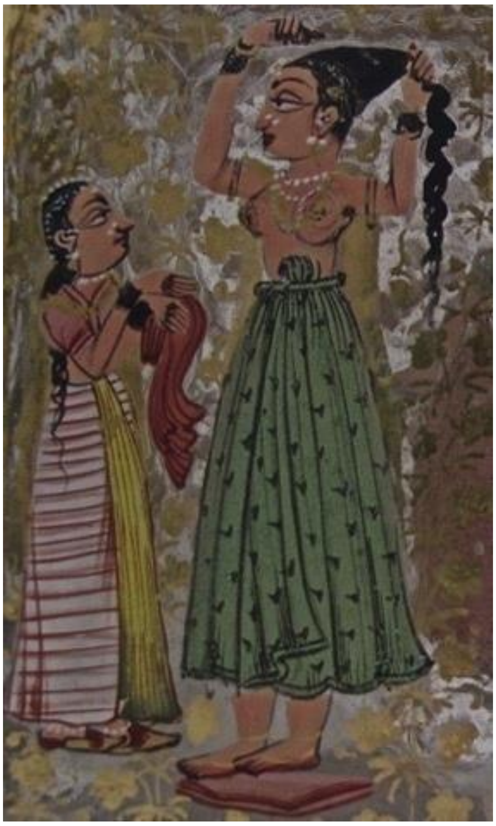
[329] Joan Cummins, "Awash in Meaning: Literary Sources for Early Pahari Bathing Scenes," in *A Celebration of Love: The Romantic Heroine in the Indian Arts,* ed. Harsha V. Dehejia (New Delhi: Roli Books, 2004), 156.

[330] See: *Queen Rajavati Bathing*, Rajasthan, Bikaner, 1644; published in Vicky Ducrot. *Four Centuries of Rajput Painting: Mewar, Marwar, and Khundhar Indian Miniatures from the Collection of Isabella and Vicky Ducrot* (Milan, Skira: 2009), cat. Bni, p. 128; *Lady Bathing*, Rajasthan, Kota, 1820 (Formerly Stuart C. Welch Collection), published in Milo Cleveleand Beach. *Rajput Painting at Bundi and Kota* (Ascona: Artibus Asiae Publishers, 1974), fig. 86; and *A lady at her toilet with a maid,* by Amar Das, Rajasthan, Jodhpur, dated 1827 (Formerly Sangram Singh Nawalgarh Collection), published in Rosemary Crill. *Marwar Painting: A History of the Jodhpur Style* (Mumbai: India Book House Limited, 2000), figure 116.

Mughal representations of the emperors.[331] While the scene may represent an inherently erotic subject, the painting's structure reinforces a devotional quality found in traditional styles and schools of Indian painting. Furthermore, this image, more than the others, directly imposes a desiring gaze upon the image of the *nayika*, which, according to Aitken, "underline for women viewers the necessity of seeing female beatify with a male eye".[332] Here, the semi-nude bathing *nayika* appeals to the male conception of beauty and femininity, yet was equally critical for women striving for self-preservation and promotion within the *zenana* or courtly culture. The bathing *nayika,* while not referencing a particular story or poem, nonetheless holds popular appeal for both men and women. Her depiction on the glass bottles, as containers of perfume, suggests both a practical and symbolic function: as ointments and oils used to fragrant oneself after bathing, itself an integral part of the bathing ritual; and as beautiful objects whose visual iconography was intended to be appreciated and emulated by both elite men and women.


Fig. 146: LACMA.M.88.129.203 – Fig. 147: COR.2002.1.1 D

[331] Molly Emma Aitken, "Spectatorship and Femininity in Kangra Style Painting" in *Representing the Body: Gender Issues in Indian Art,* ed. Vidya Dehejia (The Book Review Literary Trust: New Delhi, 1994), p. 87.
[332] Ibid, p. 95.



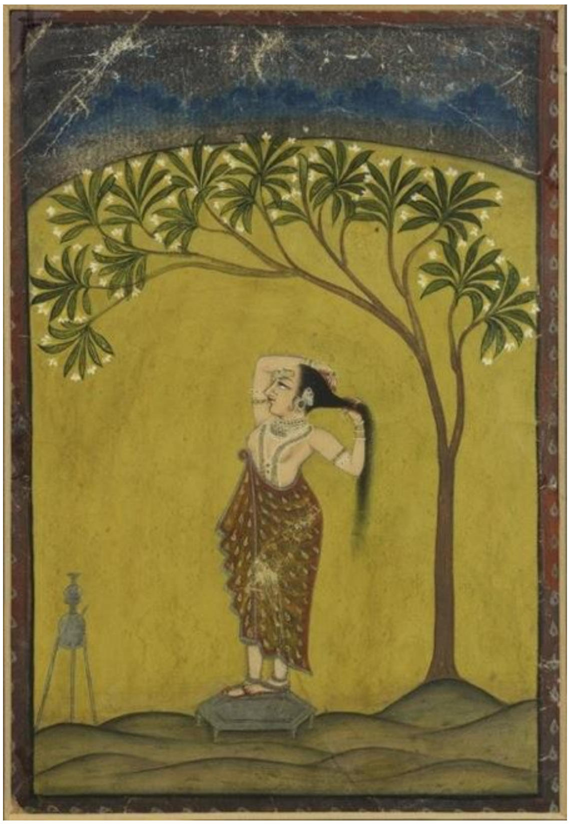


Fig. 148: Corning 2002.1.1C
Fig. 149*: Maiden standing braiding her hair,* Rajasthan, late eighteenth century
(Private Collection, London)

Challenging a Past Attribution

In past scholarship, these bottles have been popularly attributed to the Kathiawar Peninsula, an attribution that stems from several theories, none of which has been substantiated through viable archival evidence.[333] The dominant presence of English and Dutch Factories situated in and around Gujarat since the early seventeenth century presents one reason supporting this attribution, especially given the prior belief that these bottles were manufactured in Europe and shipped to India for subsequent decoration. This belief has only been further supported by the existence of minted Dutch coins soldered onto the caps of several case bottles, confirming both their manufacture as Dutch and their decoration as Gujarat, or from the Kathiawar Peninsula. The most problematic theory supporting this attribution, however, comes from an unsubstantiated historic account of an Indian glassmaker – Ram Singh Malam, known as 'the Navigator' – who supposedly introduced glassmaking into the region of Kutch, in Gujarat, sometime in the mid-eighteenth century.[334] This account is deliciously

[333] Carboni in both of his publications, *Glass of the Sultans* (2001) and *Glass from Islamic Lands* (2001), references Stephen Markel's 1991 attribution.
[334] Rushbrook Williams. *The Black Hills, Kutch in History and Legend: A Study in Indian Local Loyalties*

described in unbelievable detail in William L.F. Rushbrook's 1958 book, *The Black Hills, Kutch in History and Legend*, yet to date no other accompanying references, citations, or bibliographic lists substantiate such a person or event.[335] The complete absence of supporting evidence only problematizes this attribution, although examining this versatile craftsman, Ram Singh, and his patron, Maharao Lakhpatji (commonly referred to as Lakho) within a wider artistic context could help deconstruct this attribution.

According to Rushbrook, Ram Singh, a native to the coastal town of Okhamandal on the northwest tip of the Kathiawar Peninsula, learned the craft of tile making, glass blowing, and enamelling in the Netherlands, where he resided for almost eighteen years (until the age of thirty) after being rescued from a shipwreck off the coast of Africa.[336] Upon his return to the coastal town of Mandvi, in Gujarat, Ram Singh quickly established the fortuitous acquaintance of the ruler of Kutch, Maharao Lakhpatji (r. 1741-60), whose insatiable desire for European workmanship laid the foundation upon which Ram Singh's ingenuity flourished.[337] Considered a man of considerable vanity and opulence, Lakho's keen curiosity in European artefacts encouraged Ram Singh to establish enamelling workshops and a glass factory near the coast town of Mandvi, where suitable sands could be easily sourced.[338] No accounts mention the type of glass manufactured in this factory, although it most likely manufactured the mirrors used to decorate Lakho's famous Hall of Mirrors at his Bhuj palace. A European account dated to 1827 describes this famous Hall, which was decorated with Venetian glass lanterns and rich ornaments, largely acquired from foreign countries.[339]

(London: Weidenfeld and Nicolson, 1958), pp. 136-142.

[335] Rushbrook's accounts of Ram Singh and a glass factory in Kutch have been subsequently published in Robert Skelton, ed., *The Indian Heritage: Court Life & Arts under Mughal Rule.* (London: Victoria & Albert Museum Press, 1982), p. 18; B,N. Goswamy and A.L. Dallapiccola*, A Place Apart: Painting in Kutch* (Delhi: Oxford University Press, 1983), pp. 20-22; Stephen Markel, "India and 'Indianate' Vessels in the Los Angeles County Museum of Art," *Journal of Glass Studies* 33 (1991), p. 88; Dr. Bhowmik (ed.) *Art, Culture and Natural History of Kutch* (Museum ad Picture Gallery: Vadodara, 1977), p. 69; Carboni and Whitehouse (2001), p. 287.

[336] Rushbrook (1958), p. 138.

[337] Captain Charles Walter, "Brief Sketch of the History of Kutch; prepared in July 1827" in *Selections from Records of Government: Bombay* (Bombay: Printed for Government at the Bombay Education Society's Press, 1855), p. 112.

[338] Rushbrook (1958), p. 139.

[339] Some of these decoration were believed to have been brought to Bhuj by Ram Singh himself, as Lakho supported Ram Singh's capabilities by encouraging him to travel twice back to Europe, visiting Venice and Austria amongst other places, to perfect his knowledge of both glass making and iron founding; on one trip he even took a group of Kutchi apprentices. See Rushbrook (1958), p.140 and Walter (1855), p. 112.

According to this same 1827 account, upon Lakho's death in 1760 the glass factory was neglected, and in the succeeding reign entirely discontinued.[340] Later publications describing the reigns proceeding Lakho do not make any mention of glass amongst local industries or goods traded. A general condition report done on the Province of Kathiawar in 1842 mentions the import of various European manufactures of piece-goods, cloths, cutlery and metals, claiming that "manufacture and arts have been annihilated by the united power of capital and machinery in England, and the invention of steam: those still existing are simple, and suited only to the wants of the population. The carpenters, blacksmiths, and stone-masons of Kathiawar are equal in skill to those of any part of India, exclusive of the capitals; the blacksmiths are most prized who have immigrated from Kutch."[341] This description, recorded approximately one hundred years after Ram Singh's influence, does not include glass production amongst the industries, although it could have reflected such a small, concentrated industry of little consequential value, and was thus not worthy of mention in this report.

The mention of the coastal town of Mandvi based on its good quality sands implies that a primary production of glass manufacture took place at the factory. While Ram Singh supposedly learned the techniques of glass blowing, did he also learn how to make glass from locally sourced raw materials? The seventeen case bottles discussed in this study are made of a distinctive European potash-lead variety, made of either imported lump glass or remelted English cullet. The region of Kutch had no official contact with the East India Company until 1809, although glass could have travelled north by alternative means or contacts well before this date.[342] Records from 1699 include unspecified glassware amongst items imported by the English East India Company to Bombay, while a 1717 India Office Record mentions a certain Alvaro d'Foncesca requesting permission to send out "1,200 Pounds worth of rough coral and lump glass to Bombay for investing in diamonds."[343] Only two known records of

[340] Walter, (1855), p. 112.
[341] Captain George LeGrand Jacob, "Report upon the General Condition, in the Year 1842, of the Province of Kathiawar," in *Bombay Presidency: Historical Memoirs of Kathiawar* (Bombay: Government Central Press, 1894), p. 193.
[342] Dr. Bhowmik (ed.) *Art, Culture and Natural History of Kutch* (Museum ad Picture Gallery: Vadodara, 1977), p. 2.
[343] IOR/L/AG/1/1/10 – General Leger F, 122 (1 July 1694-31 August 1703), folio 63 and IOR/E/1/8 ff. 82-82v.

imported glass appear during Lakho's reign (1741-1760), and these refer to plate glass (most likely mirrors) that were imported into the Bay of Bengal.[344]

It remains plausible that Ram Singh's glass factory in Mandvi recycled European glassware to make objects for Lakho's Durbar at Bhuj, although the factory more probably manufactured mirrors. A painting of *Maharao Desalji with Rao Lakhpat* dated to 1745 shows two glass bottles decorating the upper niches of the background, included amongst other luxury imports, which could represent imported glass or objects manufactured in the Mandvi glass factory (fig. 150).[345]

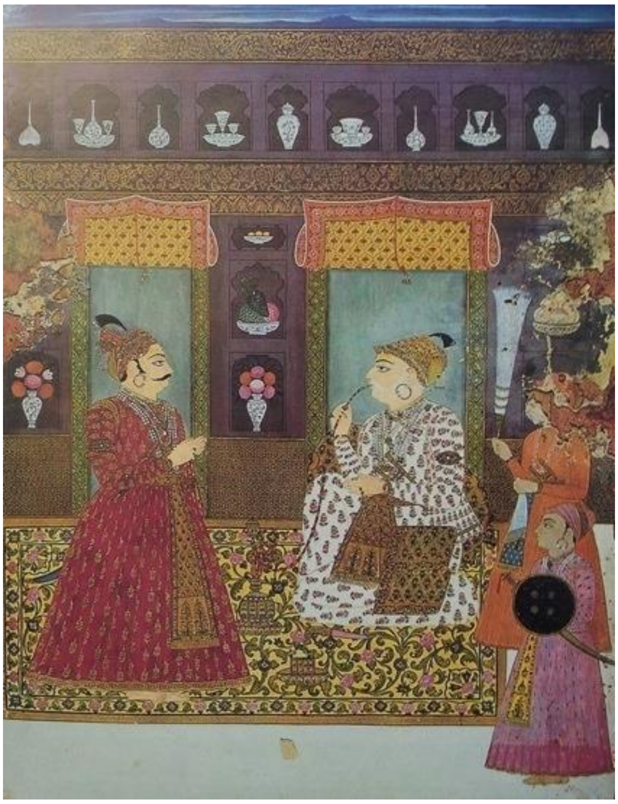


Fig. 150: *Maharao Desalji with Rao Lakhpat, Kutch*, dated 1745
Collection of Goenka Academy of Art & Music, Calcutta

According to Colonel Tod, who visited Lakho's *Aina Mahal* in 1823, much of the glassware decorating the Palace's shelves and interior was "like a pawnbroker's shop, the resemblance being not a little increased by a variety of glass figures, which decorated the walls themselves."[346] This glassware represented a large and diverse group of European manufactured objects, most likely acquired in the later eighteenth and early nineteenth centuries and, "correspond to the pattern of hoarding Western

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344 For the reference to plate glass see: IOR/E/1/30 ff. 79-80v; for the reference to glassware see: IOR/Z/E/4/34/D365.
345 Published in *The Arts of Kutch* (2000), p. 63.
346 B.N. Goswamy and A.L. Dallapiccola. *A Place Apart: Painting in Kutch* (Delhi: Oxford University Press, 1983), p. 66 [taken originally from Travels in Western India, pp. 461-2].

articles, regardless of value or quality, which accrued among Indian elites in the early period of British hegemony."[347]

As no records beyond Rushbrook's account mention either Ram Singh or his glass factory, his entire existence seems a mere fable. Furthermore, as no accounts of glass production exist in Kutch after Lakho's death, no archival evidence supports the existence of any glass industry. What remains is a story conceived around Lakho's insatiable desire for European goods, which possibly fuelled a local glass factory intended to produce mirrors for his famous palace (fig. 151). This speculative theory in no way connects the seventeen case bottles to either Kutch or Lakho's reign.

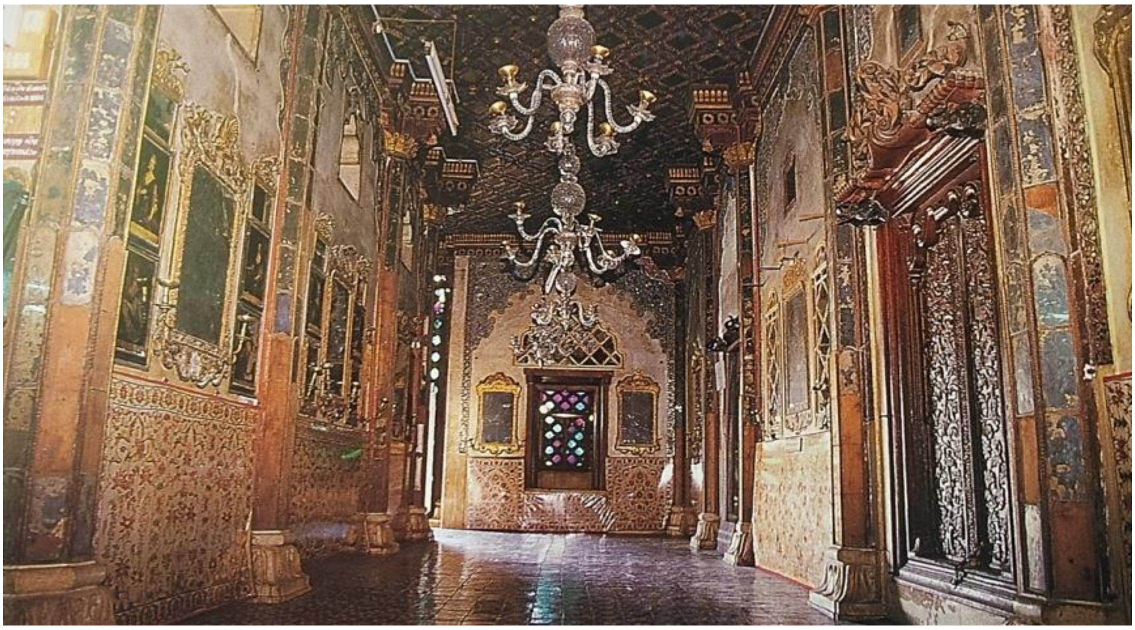

Fig. 151: Corridor in the Aina Mahal in Bhuj, Kutch – Photograph courtesy of Ramesh Soni.

Another means of deconstructing these bottles' attribution is by comparing the bottles' figural representations to eighteenth century Kutch painting. A portrait of Rao Lakhpatji created during the early part of his reign (second quarter of the eighteenth century) reveals distinctive facial features and fashions associated with this region, period, and school of painting: slanted, elongated eyes; flat noses terminating in a distinguishable point; bulging turbans decorated with flamboyant ornamentation; and calf-length loose pants worn underneath men's *jamas* (fig. 152).

[347] Amin Jaffer, "The Aina Mahal: an early example of 'Europeanerie'" in *The Arts of Kutch*, Christopher W. London (ed.) (Mumbai: Marg Publications 2000), p. 73.

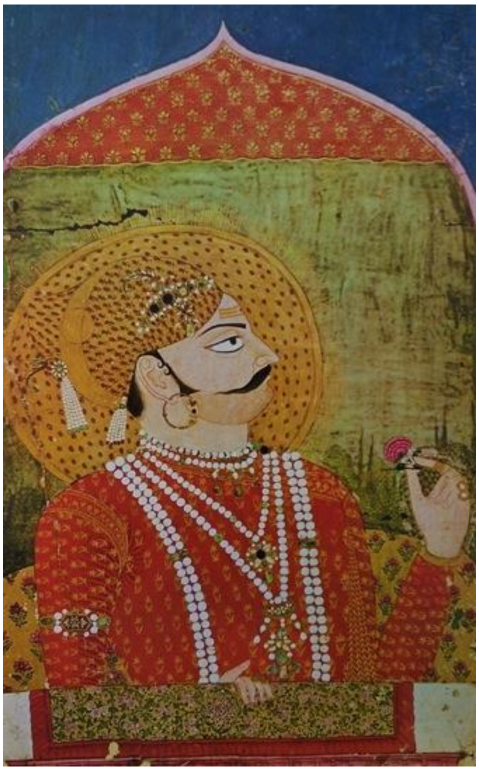

Fig. 152: ***Portrait of Rao Lakhpatji*****, Kutch 1725-50**
Collection of Mr and Mrs Uhde, Germany

Fig. 153: ***The Royal Procession of Rao Lakhpatji*****, Kutch 1725-50**
Collection of Mr and Mrs Uhde, Germany (after Goswamy & Dallapiccola 1983, plate IV)

Another painting, *The Royal Procession of Rao Lakhpatji,* shows the traditional male costumes worn by attendants (fig. 153). Both paintings reveal fashion styles and details in portraiture that differ entirely from the men illustrated on the seventeen case bottles, suggesting that Kutchi painting did not serve as either the inspiration or model for the bottles figures.

Concluding Interpretations

The seventeen case bottles, while similar in shape and technique to the cobalt blue bottles, demonstrate notable differences in imagery. Furthermore, the similarity of each of the seventeen bottle's iconography and treatment more strongly connect them to a common painterly tradition or atelier. These bottles most likely functioned as perfume containers, yet their iconography – a combination of floral motifs and courtly activities – serves to visually reinforce the importance or status of its owner, rather than highlight the value of its stored contents. Unlike the LACMA or British Museum cobalt blue bottles that are decorated solely with floral sprays, the existence of figural scenes associated with courtly culture more assuredly connects the bottles with royal status.

Perfume was consumed by royals within both a public and private context. Consumed more popularly by men, perfumes played a vital role in defining masculine modes of conduct, etiquette and manliness. The imagery of men upon the bottles depicted with symbols of status only confirms the already established elite role perfume played within courtly culture.

However, while much of the above discussion has examined the visual iconography of the bottles within the context of the male gaze, the bottles could have been used and appreciated by women. Despite the popularity of perfume amongst men, the bottles themselves could have existed within the *zenana* or women's palace, and, although eliciting a different response to the male viewer, would have been enjoyed by both men and women.[348] The anonymous nature of the illustrated *nayikas* and men take inspiration from iconographies and painterly traditions already established within courts of northern India, including Rajasthan. The familiarity with this painterly tradition would have enabled the bottle's iconography to be easily understood

[348] According to Molly Emma Aitken, "a file in the 1891 inventory of the Mewar royal collections is labeled "zanana" or "women's palace". The file provides the numbers, princes and descriptions of 256 paintings that were assigned to Mewar's queens: every one of these paintings was a portrait of a male ruler. With few exceptions, such as a portrait of Jodhpur's Maharaja Takhat Simh, they depicted Mewar maharanas in a variety of poses and settings: standing with a flower in one hand, sitting on a throne, listening to musicians, watching the moon from a roof, playing holi, enjoying games of chaupar, smoking huqqas, and shooting tigers and boar, to name a few examples. These paintings were probably provided to the zenana rather than purchased by its women"; see: Molly Emma Aitken, "Pardah and Portrayal: Rajput Women as Subjects, Patrons and Collectors, *Artibus Asiae* 62 (2002), p 253.

as type casts, or templates, of royal representations.

No two bottles depict the same four images. Furthermore, none present a clear and continuous narrative (like that of Layla and Majnun). Instead, each image is illustrated in isolation, and understood as a single representation of an action; the overall continuity and commonality of each image lies in its courtly connotation and context.

The glass bottles themselves were most likely manufactured and decorated at a courtly atelier or workshop in northern India. The detailed treatment of flowers and figures, and the abundant use of gold paint, suggest an established painterly workshop and wealthy patron. While similarities in dress and style correspond to Rajasthani painterly traditions, the throne-chair can be found across northern India in both the Mughal and Awadh courts.

Like the cobalt blue bottles, these transparent bottles today remain in collections outside of India. Rather than being made for export, these bottles most likely passed from wealthy Indians to Europeans, either given as gifts or purchased. While no early provenance exists for these bottles that can help to establish a clearer dating (unlike the British Museum's 1753 provenance), stylistic comparisons place their dating to the second half of the eighteenth century. The number of surviving transparent bottles testifies to their importance as containers.

HUQQA BASES: GLOBULAR & BELL-SHAPED

Introduction

The exact date of tobacco's entry into India remains unknown. While the earliest documented source of tobacco arriving into the Mughal courts appears in 1604, the plant is believed to have already existed in the Deccan prior to this date.[349] While no known sources mention either the plant or the act of smoking prior to this recorded date, tobacco cultivation and consumption start regularly appearing in both Indian and European primary accounts from the early seventeenth century.[350] The history of smoking devices is inherently connected to the introduction and subsequent spread of tobacco in India; its proliferation eventually leading to the development of a distinctive form of smoking device – the *huqqa* base – unique to South Asia. This object, existing in both a globular and bell-shape, becomes the predominant smoking device used in India amongst certain classes, its eventual manufacture into glass developing from its earlier metal prototype. Tracing the introduction of tobacco in India and the development of smoking devices helps contextualise the glass *huqqas* discussed within this case study.

History of Tobacco in India

Christopher Columbus witnessed the act of tobacco smoking during one of his first voyages to the New World sometime after 1492, in either Cuba, the Caribbean Islands, or Brazil.[351] In his journal he described, "highly prized dried leaves…the herbs for smoking which they [indigenous men and women] are in the habit of using."[352] From its initial discovery by Western sailors, tobacco and the act of smoking were inextricably connected; through trading merchants the plant and act then spread quickly across the

[349] Some scholars, such as Sir George Watt, speculate that tobacco was already being consumed and traded in the Deccan for almost a century before its official entry into the Mughal courts. See: Sir George Watt, *The Commercial Products of India: being an abridgment of "The dictionary of the economic products of India"* (London: Published under the authority of His Majesty's Secretary of State for India in Council, 1908), p. 796.

[350] The founder of the Mughal Empire, Babur, made no special reference to the tobacco plant in his descriptive account of interesting animals and plants found in Hindustan between 1519-25. Similarly, no mention of tobacco appears in Emperor Akbar's (r. 1556-1605) great administrative compendium, the *Ain-i Akbari,* or within any official revenue documents attesting to the Empires' manufactures, productions, cultivations, or trade. See: Sir George Watt. *The Commercial Products of India,* 796 and W.H. Moreland, *India at the Death of Akbar* (Delhi: Atma Ram, 1962), p. 148.

[351] William Floor, "The Art of Smoking in Iran and Other Uses of Tobacco", *Iranian Studies* 35 (2002), p. 47.

[352] Recorded October 15th and November 6th 1492, respectively; published in: Cecil Jane, trans., *The Journal of Christopher Columbus* (London: Torino, 1960), p. 56.

Atlantic, arriving first into the European ports of Lisbon, Naples and Genoa, and then – with diplomatic relations and trade routes – further east into Asia.[353]

The lack of conclusive evidence makes documenting tobacco's arrival and spread throughout India difficult to trace prior to its first recorded reference in 1604; despite this, the plant and act of smoking most likely arrived with Portuguese merchants who, by 1498, had already circumnavigated the Cape of Good Hope and arrived along the western shores of India. The 1604 reference is important not only as the first documented account of tobacco and smoking devices in India, but also for its descriptive account of the controversial medical properties surrounding the plant, and its firm attribution to Bijapur, in the Deccan, as its place of discovery.[354] Asad Beg, the man responsible for this account, is forever immortalized in history as the Iranian diplomatic envoy accredited with introducing tobacco into the Mughal Empire, and while his account represents the earliest Mughal record, by the second quarter of the seventeenth century numerous Europeans describe the plant's widespread cultivation and popular consumption amongst various castes.[355] Sir Thomas Roe, the first official English Ambassador to the Mughal court from 1615-19, commented that "a pipe of tobacco contents the ordinary people", while Johan Albrecht de Mandelslo, who travelled in Gujarat from 1638-9, commented that governor of Ahmedabad, Azam Khan, was "not prevented from smoking tobacco, a servant holding the pipe to his mouth with

[353] Rudi Matthee, "Exotic substances: the introduction and global spread of tobacco, coffee, cocoa, tea, and distilled liquor, sixteenth to eighteenth centuries," in *Drugs and Narcotics in History*, Roy Porter and Mikulas Teich (eds.) (Cambridge: Cambridge University Press, 1995), p. 25.

[354] The version of this text has been translated for Sir. H. M. Elliot by Mr. B. W. Chapman of the Bengal Civil Service, but remains to date the primary source referenced. In the introductory pages of this text, Sir Elliot imparts some comments addressing the character of Asad Beg, claiming that he was "well known and noted for his kindness, magnanimity, benevolence, and great experience in business"; See: John Dowson (ed.), "Asad Beg, *Wikaya'I Asad Beg* (Memoirs of Asad Beg)", *The History of India as told by its own Historians*, Vol. 6 (Calcutta, 1953), pp. 150-174.

[355] In 1612, Robert Clarkson, an employee of the English Factory in Surat (Gujarat), first mentions the curing of the plant, while another East India Company officer mentions cultivation in Andra Pradesh, near the eastern region of Masulipatam. For the reference to Robert Clarkson; see: Willam Foster, ed., The Voyage of Thomas Best to the East Indies, 1612-14 (London: Hakluyt Soceity, 1934), p. 35; for the reference to Andra Pradesh; see: Irfan Habib, *The Agrarian System of Mughal India* (Bombay: Asia Publishing House, 1963), 45. The French voyager, Jean-Baptiste Tavernier (1605-1689) comments on tobacco cultivation in the central region of Madhya Pradesh, saying "it grows abundantly in the neighborhood of Burhanpur; and in certain years I have known the people to neglect harvesting it because they had too much, and they allowed half the crop to decay;" see: William Crooke (ed.), *Jean-Baptiste Tavernier. Travels in India by Jean-Baptiste Tavernier, Baron of Aubonne* (Oxford: Oxford University Press, 1925), Vol. 2, p. 23.

one hand and setting fire to it, with the other."[356] Melchisédec Thevernot's travels in India (1665-67) described how tobacco was frequently used by the nobles and viewed as customary entertainment after meals.[357] Unfortunately, none of these accounts describe the material or shape of these pipes; they only confirm that smoking devices were used for the consumption of tobacco in India during the seventeenth century.

Smoking Devices: Evolution of Form

To date, scholarly debate still questions whether the act of smoking arrived into Central and South Asia with the introduction of tobacco in the late sixteenth century, or already existed as a means of consuming opium, hashish, or even indigenous types of tobacco. Moreshwar Dikshit argues that smoking existed as an after dinner ritual in India since the Gupta period, citing literary references dated to the seventh century that allude to the practice, yet no archaeological evidence supports any smoking contrivances beyond literary allusions to smoking.[358] Another speculation stems from excavations near Nishapur, Iran that revealed sphero-conical pottery vessels, dated to the ninth and tenth century, which are believed to represent the earliest forms of smoking devices used for cannabis.[359] More recent scholarship, however, suggests that the habit began in the Middle East and South Asia with the introduction of tobacco smoking brought by Westerners; prior to this hashish, cannabis, and opium were ingested in either a pellet (swallowed) or powder form (infused into teas).[360]

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[356] Thomas Roe and John Fryer. *Travels in India in the Seventeenth Century* (New Delhi: J. Jetley, 1993), 454-55 and M.S. Commissariat, *Mandelslo's Travels in Western India, 1638-9* (London: Oxford University Press, 1931), 34.
[357] Surendra Sen (ed.) *Indian Travels of Thevenot and Careri* (New Delhi: National Archives of Delhi, 1949), p. 280.
[358] Dikshit (1969), p. 82.
[359] Sphero-conical pottery vessels such as those excavated in Nishapur have been found throughout the Middle East, although not in large quantities, but in significant numbers to suggest a common use between the eleventh and fourteenth centuries. These objects have been associated with perfume flasks, rosewater bottles, or even smoking devices. St. John Simpson discusses the issues that have led archaeologists for decades to attribute smokers' pipes found in the Middle East to Ayyubid-Mamluk times. Each interpretation of a pre-seventeenth century context for a smoker's pipe on archaeological sties has been largely based, according to Simpson, on surface finds that do not take either historical or cultural evidence into consideration, mis attributing the finds as representing smoking devices dated earlier than actually proven. See: St. John Simpson, "Ottoman Clay Pipes from Jerusalem and the Levant. A critical review of the published evidence," *Society for Clay Pipe Research Newsletter* 28 (1990), pp. 6-16. See also: Edward J. Keall, "Smokers Pipes and the Fine Pottery Tradition of Hays", *Proceedings of the Seminar for Arabian Studies*, Archaeopress, Vol. 22, Proceedings of the Twenty Fifth Seminar for Arabian Studies held at Cambridge on 23rd-25th July 1991 (1992), pp. 29-46.
[360] For scholars supporting this opinion see: William Floor, "The Art of Smoking in Iran and Other Uses of Tobacco", *Iranian Studies* 35 (2002), p. 48; Edward J. Keall, "Smokers Pipes and the Fine Pottery Tradition of Hays" (1991), p. 32.; and James Grehan, "Smoking and 'Early Modern' Sociability: The Great Tobacco

The first pipes introduced into India were most likely small clay pipes that were easily transportable by European merchants; these pipes were already manufactured in London from around 1580.[361] The shift of smoking from dry pipes to water pipes (*huqqas*), however, reflects a transition unique to South Asia, as the inclusion of water did not derive from either a Native American or European smoking tradition.[362] Some scholars attribute the invention of the *huqqa* with Iran, although based on etymological and physiological grounds evidence actually supports its development in India.[363]

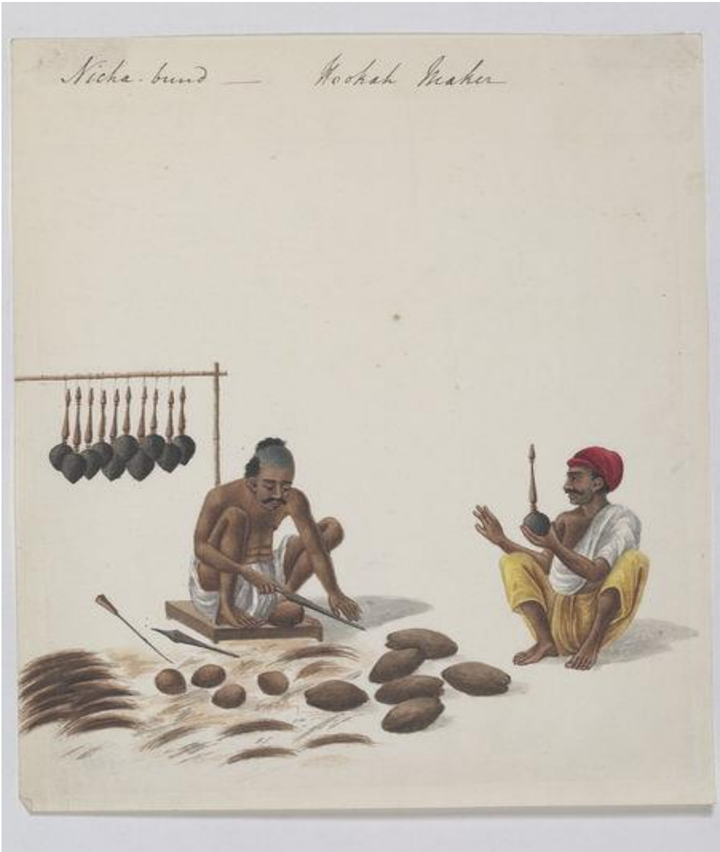

Fig. 154*: Hookah Maker*, India, Patna, Company School, circa 1826
Victoria & Albert Museum (IS.44-1964)

It seems that the first smoking devices in India were made of hollowed out coconuts, into which was inserted a straight (bamboo) reed to facilitate smoking the

debate in the Ottoman Middle East Seventeenth to Eighteenth Centuries", *The American Historical Review* 111 (2006), pp. 1352-1377.

[361] Rudi Matthee, "Exotic substances: the introduction and global spread of tobacco, coffee, cocoa, tea, and distilled liquor, sixteenth to eighteenth centuries," *Drugs and Narcotics in History*, Roy Porter and Mikulas Teich (eds.) (Cambridge: Cambridge University Press, 1995), p. 26.

[362] Keall (1993), p. 279.

[363] Rudi Matthee discusses the etymological roots of the water pipe, stating that it is called a *qalyan* in Persian, *huqqa* in India, and *nargilah* or *shishah* in the Arab lands; and that the Persian term *qalyan* derives from the word *ghalyan*, which stems from the Arabic verb *ghala*, to 'boil' or to 'bubble''; see: Rudi Matthee (2004) p. 56. According to Edward J. Keall, the actual word *narghile* (Turkish) or *nargilah* (Persian) – both used to simply describe water pipes –derived from the Sanskrit word *nariyal* or *narikela*, meaning coconut; see Keall (1993), p. 279.

filtered tobacco. This type of smoking device, popular amongst the poor, continued in India throughout the nineteenth century, as illustrated by later nineteenth century Indian Company School paintings showing *huqqa* makers using coconuts (fig. 154). While coconuts grow in abundance in southern India they are not indigenous to Iran. Unfortunately, no surviving *huqqas* confidently dated to before the seventeenth century exist, although smoking devices appear in early seventeenth century Indian texts and paintings.

The first smoking devices recorded in India during the early seventeenth century do not appear to be water pipes, or *huqqas*. Asad Beg's descriptive account of 1604 describes the smoking device he found in Bijapur during his diplomatic sojourn. Upon showing his findings to Emperor Akbar he describes:

> *I prepared a handsome pipe of jewel work. The stem, the finest to be procured at Achin, was three cubits in length, beautifully dried and coloured, both and being adorned with jewels and enamel. I happened to come across a very handsome mouthpiece of Yaman cornelian, oval-shaped, which I set to the stem; the whole was very handsome. There was also a golden burner for lighting it, as a proper accompaniment.*[364]

Asad Beg's description does not specify the use of water, making it unclear whether this reference is to a *huqqa*.

Mark Zebrowski believed that this apparatus may be closer to the Ottoman Turkish *chibuk*, a long-stemmed tobacco pipe popular during this time.[365] Such a smoking device is illustrated in the earliest known Indian painting depicting a prince smoking, dated to 1607-8 (fig. 155).[366] This painting, made under Mughal patronage in the Deccan, illustrates a long stemmed pipe that is neither decorated with jewels nor enamel, like that described by Asad Beg, yet is easily three cubits in length and terminates in a small bowl (used to store the flammable substances). While this illustrated pipe corresponds in shape to what Zebrowski calls a Turkish *chibuk*, long-stemmed pipes with small bowls also correspond to those used in England and the Netherlands, which were originally made of clay, wood, or eventually engraved silver

[364] Asad Beg (1953), p. 165.

[365] Marc Zebrowski. *Gold, Silver and Bronze from Mughal India* (London: Alexandria Press, 1997), p. 244, footnote 1.

[366] *A Mughal prince smoking a long-stemmed pipe, seated in an interior with attendants and a child,* signed by Mushfiq, made for Abd al-Rahim Khan-Khanan, India, Mughal patronage in the Deccan, dated 1607-8 (Sotheby's London, April 2014, lot 69).

depending on the consumer's class.[367] Other early illustrations of smoking devices continue to illustrate a long, fine smoking reed protruding from the neck; however, the chillum (the piece used to store the burnable substances) and base vary in shape and size, developing gradually to a more rounded, globular shape.[368]

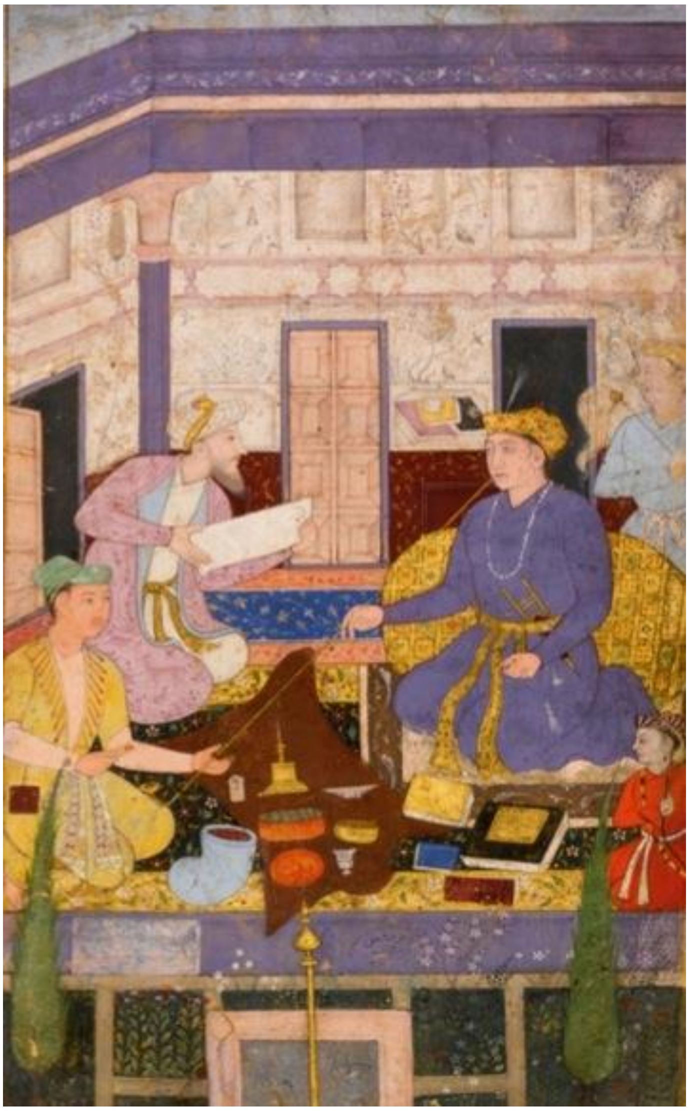

Fig. 155: *A Mughal prince smoking a long-stemmed pipe;* Signed by Mushfiq, India, Mughal patronage in the Deccan, dated 1607-8 - Sotheby's London, April 2014 (lot 69)

The coconut seems to have served as the initial inspiration for this shape, as seen in the famous Mughal painting of 1618-19 recording the meeting in Isfahan of Khan Alam, the Mughal ambassador, with Shah Abbas in which Khan Alam's attendant carries a tiny portable smoking device, possibly made of a carved coconut shell (fig. 156). This

[367] Rudi Matthee (2004) p. 63.
[368] For a similar Turkish example see Englebert Kaempfer's album "Persian costumes with animals with some drawings" done during his travels in Iran between 1684-85 (British Museum 1974.0617.0.1.10); for an Iranian example see *A Girl Smoking* by Muhammad Qasim, Isfahan, seventeenth century, published in Matthee (2004) p. 64.

small, oval (or ovoid) smoking device continues in other representations, including a 1625-30 Mughal painting of five holy men in a landscape, formerly in the collection of Stuart Cary Welch (fig. 157).[369] These smoking devices were most likely made of either metal or earthenware (clay) and probably filled with water – and thus *huqqas* - as confirmed by Edward Terry's description (speaking in India between 1616-18):

> *For smoking purposes they used little earthen pots, with a narrow neck, which had an open round top. Out of its belly came the spout, whose lower part was 'filled with water'. They put the tobacco leaf on the top and burnt coal on it. The spout 'stood on the ground'. They fastened small narrow canes or reed to it [spout].*[370]

Terry's description provides an early datable account for the use of water in smoking devices, and while a standard smoking form had not yet developed in India during the first quarter of the seventeenth century, the *huqqa* had.[371]

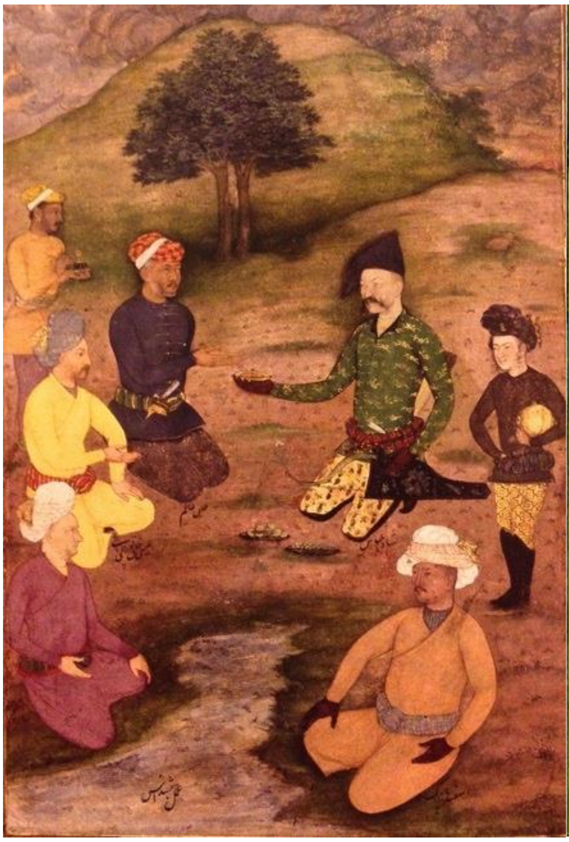
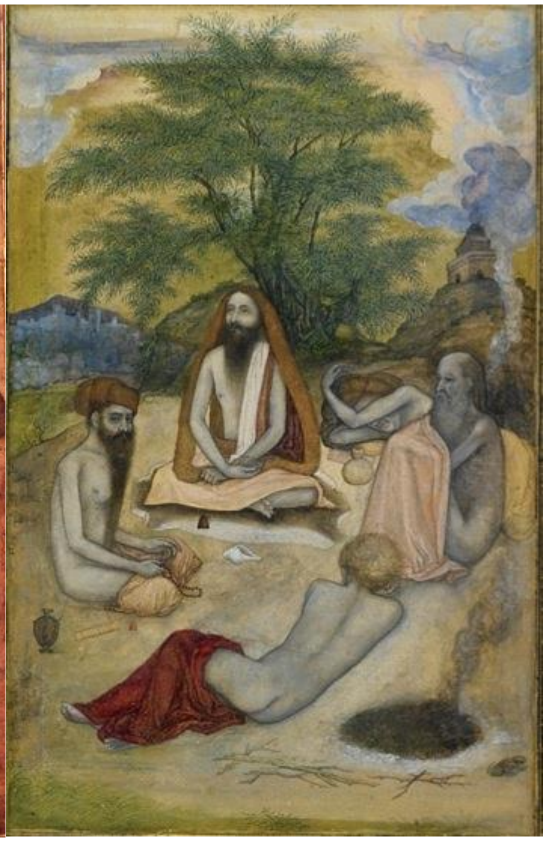

Fig. 156: *Shah 'Abbas and Khan 'Alam meeting in a landscape*
By Bishandas, Mughal, ca. 1620 (Museum of Fine Arts, Boston no. 14.655)
Fig. 157: *Five Holy Men*, Attributable to Govardhan, India, Mughal, circa 1625-30
Formerly in the Stuart Cary Welch Collection

[369] *Five Holy Men*, attributable to Govardhan, India, Mughal, circa 1625-30, formerly in the collection of Stuart Cary Welch, published in Welch 1995, no. 12, p. 336.
[370] Mohammad Azhar. *European Travellers Under the Mughals: 1580-1627* (Delhi: Navrang Oriental Publishers, 1975), p. 104.
[371] Zebrowski (1997), p. 207.

Fig. 158: Abyssinian nobleman smoking huqqa, India, Deccan, Bidar, 1630
Andhra Pradesh State Museum, Hyderabad
Fig. 159: *Masnavi of Zafar Khan*, Mughal, circa 1645 [Royal Asiatic Society, London (MS Persian.310)]

Shortly after this date, the ovoid shaped *huqqa* evolved into a rounder, more globular shape, as demonstrated by surviving examples made in metal, or *bidri*, a type of cast alloy metal inlaid with brass, silver or gold from Bidar in the Deccan. According to Jagdish Mittal, the earliest depiction of a globular shaped *bidri huqqa* appears in a portrait of an Abyssinian nobleman, dated to around 1630 in Bidar or Bijapur (fig. 158).[372] While this metal making technique originated in the Deccan, illustrated representations of *bidri huqqas* also appear in Rajasthani, central Indian, and Mughal paintings of ruling chiefs (*nawabs*) smoking, such as in the painting from the *Masnavi of Zafar Khan* dated to around 1645, showing the spread of this *huqqa* style beyond the Deccan (fig. 159).[373]

[372] This painting was published in Jagdish Mittal*, Bidri Ware and Damascene work in Jagdish and Kamla Mittal Museum of Indian Art* (Hyderabad: Jkmmia, 2011), figure 5, p. 26. It should also be mentioned that this illustrated *huqqa* base may be made of oxidized metal or silver.

[373] As Mughal emperor Aurangzeb's campaigns continued in the Deccan in Aurangabad, from 1636 until his death in 1707, many *bidris* were acquired and circulated amongst rajas, princes and soldiers in the imperial army, eventually traveling north throughout the various territories; Jagdish Mittal (2011), p. 26. This painting was published in Jeremiah P. Lotsy, *The Art of the Book in India* (London: The British Library, 1982), no. 83.

From the 1670s, illustrations start depicting a standardised globular form of *huqqa* base with a 'snake' or flexible coil emerging from its opening, a shift away from the previous stiff reeds projecting laterally from the base or neck (fig. 160).[374]

Fig. 160: *Bhupali Ragini,* India, Basohli, circa 1680-85
Victoria & Albert Museum (IS.28-1954)

The globular shape of the *huqqa* could have developed from its ovoid coconut prototype, or – according to some scholars – from the traditional Indian *lota*, *surahis* or water-jars, which date back to the first century CE (fig. 161).[375] Like the *lota*, which balanced upon padded rings on top of women's heads, the globular shaped *huqqas* also balanced on rings that ensured greater stability by accommodating their convex shaped bases; illustrations often show them with such base rings, although only a few surviving

[374] Mark Zebrowski considers the lateral reed a 'Persian fashion' of smoking, one which continues in later illustrations and examples of Iranian *huqqas*. The 'snake' or flexible cord emerging from the *huqqas* opening is unique to Indian *huqqas*; see: Zebrowski (1997), p. 228.
[375] Simno Digby and Ralph Pinder-Wilson believe the globular shape developed from the *lota*. See: Ralph Pinder-Wilson, "A Glass *Huqqa* Bowl," *The British Museum Quarterly* (1962), pp. 91-94. Two surviving examples of *lotas* are currently in the collection of the British Museum (the Wardak Vase and the Kulu Vase, 1880.93 and 1880.22, respectively).

examples of decorated metal rings exist.[376] Stefano Carboni has suggested that, while metal *huqqa* bases required the support of a ring, globular glass *huqqas* may not have as their naturally kicked-in base allowed for the object to stand by itself.[377] All Indian representations of globular *huqqa* bases (irrespective of medium) depict them standing upon on a ring.

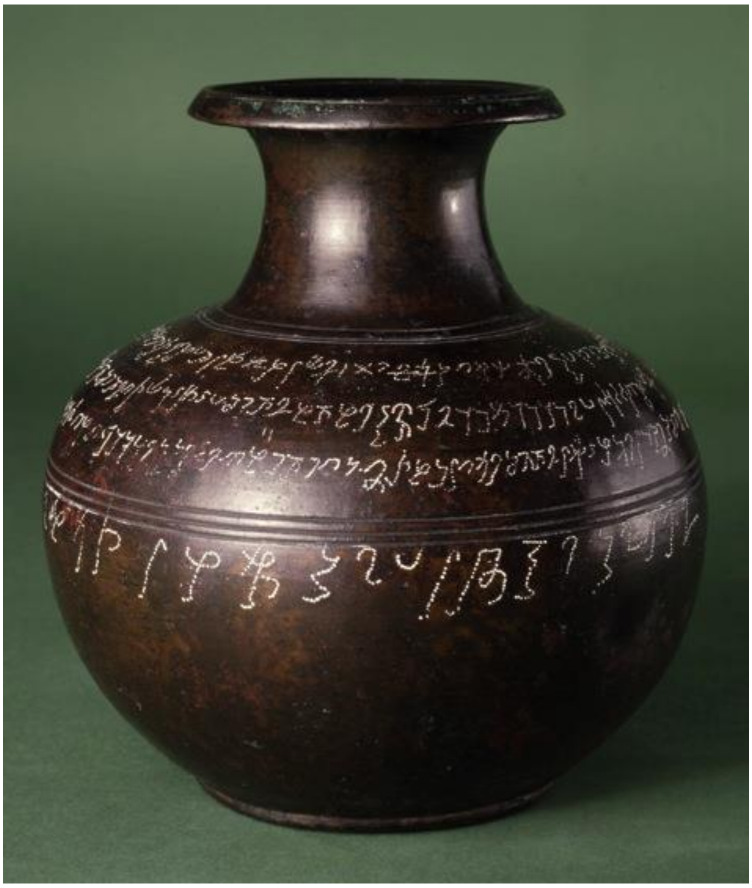

Fig. 161: *The Wardak Vase*, Afghanistan, Gandara, dated 178 AD, Cast copper alloy inscribed
The British Museum (1880.93)

From the last quarter of the seventeenth century, globular shaped *huqqa* bases appear regularly in Indian paintings from Northern India (Mughal Empire), Basohli (in region of Jammu and Kashmir), and in the Deccan (central India) in metal ware (figs. 162 and 163) and porcelain (figs. 164 and 165), both of which are corroborated by surviving examples.[378]

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[376] Zebrowski (1997), p. 228. The best known example of a metal *huqqa* base ring is currently in the al-Sabah collection, Kuwait (LNS 2 J).
[377] Carboni (2001), p. 371.
[378] The earliest dated globular huqqa base is dated October 1634, with an inscription giving the name of owner and the town (Udgir, approximately thirty kilometres from Bidar) where the base was made; this object is currently in the collection of Jagdish and Kamla Mittal, Hyderabad (76.1222. ME.1); published in *Bidri ware* (2011), p. 49. According to Robert Aldermann, this early date is contested as the first letter of the date is illegible; see: John Robert Alderman, "Bidri ware," *Sultans of the Deccan India 1500-1700: Opulence and Fantasy (*New York: The Metropolitan Museum of Art, 2015), p. 179. For two examples of

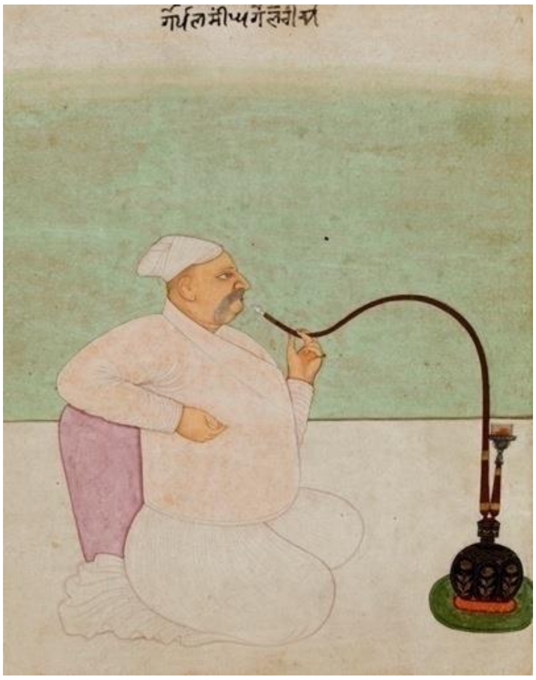
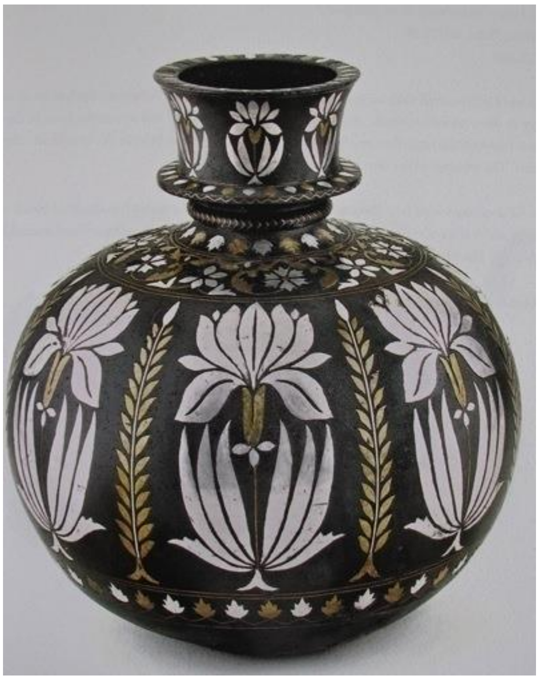

Fig. 162: ***Mian Gopal Singh, ruler of Guler,*** **India, Jammu, circa 1700**
Victoria & Albert Museum (IS.184-1951)
Fig. 163: ***Globular Hookah Base*****, Deccan, Bidar, circa 1700**
Jagdish & Kamla Mittal Museum of Indian Art, Hyderabad (76.1224.ME.3)

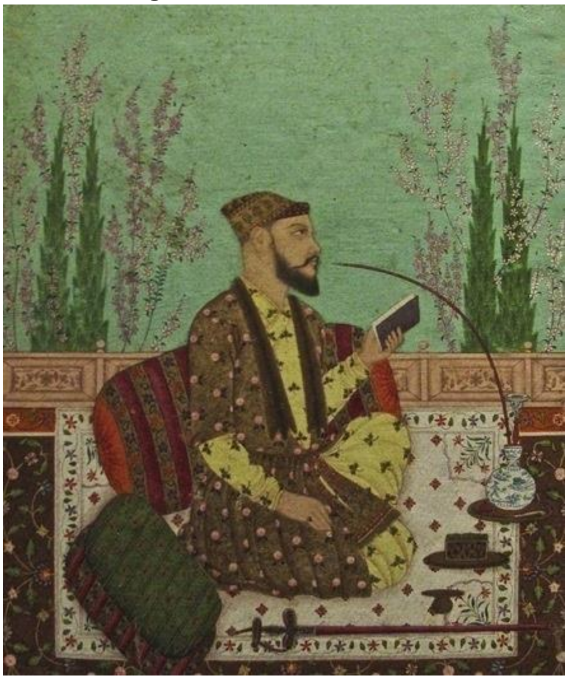


Fig. 164: ***The military commander and later governor, Muhammad Ibrahim (d. 1688), smoking a water-pipe of Chinese porcelain,*** **India, Golconda, circa 1675**
Private collection [After ***Love for Pleasure: Wine, Tobacco and Drugs in Indian Paintings*** **(Berlin: Pergamonmuseum, March – June 2016; photo taken by author]**
Fig. 165: ***Huqqa Base with floral medallions*****, China, Jingdezhen, Kangxi period (1662-1722)**
The Metropolitan Museum of Art, New York (79.2.359a-c)

blue and white porcelain *huqqas* see: the British Museum (1956.1017.2) and Metropolitan Museum of Art (79.2.359a-c).

The standardisation of this shape and its manufacture in other media supports the popularity of this particular smoking device, which by the late seventeenth century developed into its unique and distinguishable Indian form. It is only towards the very end of the seventeenth century, however, that examples of globular glass *huqqas* start appearing in Indian illustrations.

While many scholars believe that globular glass *huqqas* developed from other media already in production and circulation, primarily the metal *bidri* models made in the Deccan, no evidence supports a glass manufacture or workshop having existed in the Deccan, nor has a glass *huqqa* been confidently attributed to that region.[379]

Fig. 166: *Raja Kirpal of Basohli Smoking a Huqqa*, Himachal Pradesh, Basohli, circa 1690
The Chester Beatty Library, Dublin (58.1)

The earliest depictions of globular glass *huqqa* bases appear in illustrations depicting Raja Kirpal of Basohli smoking, dated to 1690 (fig. 166). Two such paintings illustrate a *huqqa* of similar shape and size, painted in a greyish-white colour with vertical ribbed

[379] While Digby and Carboni have both made this claim (see Digby, "A Corpus of Indian Glass", p. 92; and Carboni (2001) p. 371) Abu-l Fazl reports that in Berar, the reservoir contains "the essential materials for the manufacture of glass", citing the Deccan as a suitable place for glass making, although no further references to glass production exist within his accounts or any subsequent descriptions or surveys of the Deccan (see: Abu-l Fazl'Allami, *The A'ini Akbari*, translated by H.S. Jarrett, Vol.3, 2nd rev., Jadu-Nath Sarkar (ed.) (New Delhi: Oriental Books Reprint Corp. 1977), p. 239).

patterning across the body.[380] According to Stephen Markel, these illustrated *huqqas* represent foreign imports, as their decorative pattern reflects a distinctive feature associated with the factory or followers of English glassmaker, George Ravenscroft (1618-1681).[381]

Fig. 167: *Huqqa Base*, ca. 1700, Cat. 258 - Fig. 168: *Huqqa Base*, ca. 1700, Cat. 259

Fig. 169: *Basin with Raven's Head Seal,* England, London, Savoy Glasshouse, circa 1676
Corning Museum of Glass, New York (2008.2.12)

[380] See: *Raja Kirpal Pal of Basohli Smoking a Hookah tended by a girl*, Basohli, circa 1680-90; Published in: Daniel J. Ehnbom, *Indian Miniatures, The Ehrenfeld Collection*, catalogue of the traveling exhibition organized by the American Federation of Arts, September 1985-Novembe 1987, no. 86.

[381] Stephen Markel, "Western Imports and the Nature of Later Indian Glassware," *Asian Art* (1993), pp. 35-59.

Several surviving examples of such illustrated *huqqas* exist, all attributed to late seventeenth century English manufacture, including one in the Chhatrapati Shivaji Maharaj Vastu Sangrahalaya, Mumbai (fig. 167) and the Salar Jung Museum, Hyderabad (fig. 168). Another example of late seventeenth century English glass with similar vertical ribbed patterning is a 1676 Ravenscroft spittoon (or spit container) in the Corning Museum of Glass collection (fig. 169).[382]

The superimposition of distinctively English decorative features upon uniquely Indian forms – globular *huqqas* and *spittoons* – raises the question whether such objects were manufactured in England or India. Several records of trade accounts, gifts received, and goods sold do document the English export of glass, and the Indian import of *huqqas* during the late seventeenth and early eighteenth century.

On September 18th 1675, George Ravenscroft entered into an agreement with the Worshipful Company of Glass Sellers that granted him permission to export four hundred pounds worth of flint (lead) glass "to Ireland or any other parts."[383] Also at this time, East India Company records document the specific import of glass *huqqa* bases into Surat, a western port city in Gujarat. A 1697 letter attests to the sale of twenty-two *huqqa* bases by English factors to a certain Indian merchant Agha 'Peeree'.[384] Another 1694 East India Company account mentions *huqqas* within the list of exported goods, as suitable gifts to be given, "in the latter is included the p[ar]ticular presents that I think needful to be sent the huble bubles and Glass wares must be bespoake according to the p[ar]ticulars inclosed re[eive]d from Bengal."[385] Yet another account dated to the 3rd April 1682 mentions a *huqqa* within a list of items presented to the Faujdar of Hugli, in Bengal, while a 1703 letter mentions several 'hubble-bubbles' (the onomatopoetic name

[382] Another *huqqa*, formerly in the collection of the Maharaja of Kutch (and dated to around 1690) represents yet another example of a globular *huqqa* embellished with uniquely English decorative techniques; published in Markel (1993), fig. 11. A Ravenscroft lead glass goblet with a coin of James II, dated to 1687, shows the same decorative features as seen on the former Maharaja of Kutch's globular *huqqa* (British Museum 1925.0216.1.CR).

[383] Smith and Whitehouse (2013), p. 104. The agreement read as follows: "We under written doe consent and are willing that Mr. George Ravenscroft may Transport beyond sea to Ireland or anij other parts the vallew of foure hundred pounds worth of his flint Glasses made before the first of August Last, to be soe Transported before the first of March next Insueing and it shall not be taken for anj Breach of Artikels with our Trade of Glass selling what he hath or shall soe send to that vallew and tell the time above mentioned." See: William Ramsey, *The Worshipful Company of Glass Sellers of London*, London: printed for the company by T. Connor, 1898, p. 83.

[384] India Office, *Surat Letters* G/36/5, 26 July 1697, f. 88.

[385] Francis Buckley, "Glass for the Eastern Market," *Glass* (1932), pp. 156-157.

given to *huqqas* by the English) offered for sale in Surat, and purchased by several Indian merchants and brokers.[386]

Sufficient historical evidence supports the export of English *huqqas* to India during the late seventeenth century and early eighteenth century, furthering Markel's belief that those *huqqas* illustrated in the Bahsohi paintings of Raja Kirpal are of English origin. No other paintings from this period depict similarly decorated *huqqas*, making it difficult to determine the extant of English glass *huqqas* imported during this time, while later eighteenth century paintings illustrate globular *huqqas* decorated in colourful polychrome or gilded floral motifs, different entirely to English glassware yet similar to Indian decorative traditions.

It seem that the English factories of Ravenscroft and his followers were influenced by Indian smoking devices and *huqqa* forms already in existence in other media, and manufactured glass *huqqas* for export to India where, at the time, no comparable glass manufacturers existed.[387] These English manufactured *huqqas* could have, in turn, influenced the development of Indian glass *huqqa* bases, which starting in the eighteenth century begin appearing more regularly in Indian paintings. The development of the *huqqa* base, in its standardised earlier globular form, appears in numerous illustrated and physical examples, demonstrating its popularity amongst various social classes in India.

The exact date of its manufacture in glass remains unknown, and is largely based on comparative visual representations. While historical records support the import of English lump glass, ingots, and *huqqas* into India during the first half of the eighteenth century, their appearance in Indian paintings can only be confidently attributed to the mid-eighteenth century. This is seen in two paintings, one from the Deccan (figs. 170 and 171) and the other from Murshidabad, Bengal (fig. 172), in which two non-decorated, translucent greyish colourless *huqqa* bases are depicted. The undecorated nature of these two examples was perhaps purposefully intended to highlight the material, and thus signify the importance of the glass as a luxury item. Furthermore, their decoration – void of vertical ribbing – is entirely different from the glass *huqqas*

[386] P. K. Gode, "The History of Tobacco in India and Europe between A.D. 1500 and 1800", *Studies in Indian Cultural History, I* (Hoshiarpur, 1961), pp. 432-3; India Office, *Surat Letters* G/36/8, 10 Nov. 1702, p. 532 and India Office, *Surat Letters* G/36/8, July 1703, pp. 841-6.

[387] A similar globular form exists in English glass decanters of the late seventeenth century; the round body and long cylindrical neck of two Ravenscroft examples could suggest a possible English source for the English globular *huqqas* (British Museum OA.110 and Victoria & Albert Museum C.198-1956).

manufactured by Ravenscroft and his followers, suggesting that these illustrated *huqqas* are non-English in origin. Irrespective of dating or provenance, the following two case studies demonstrate two distinctive types of Indian *huqqa* forms manufactured in glass sometime during the eighteenth century.


Fig. 170: *A princess with attendants on a terrace*, India, Deccan, circa 1750
Sotheby's London, 20 April 2016 (lot 71)
Fig. 171: Detail of fig. 170

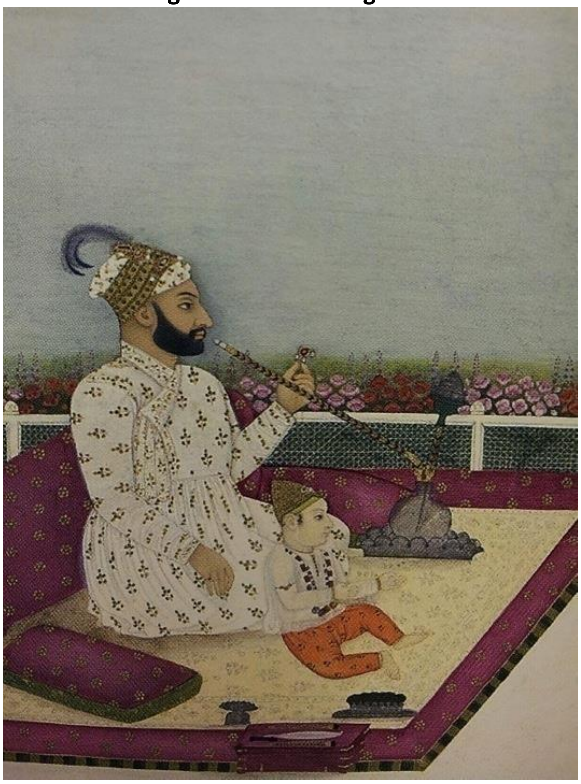

Fig. 172: *Ghulam Husain Khan*, Murshidabad, Bengal, ca. 1760 (Ashmolean, MS Douce Or.a.3,f.16r)

CASE STUDY 3: Globular Green Glass *Huqqa* Bases

Introduction

Huqqa bases represent approximately half of the objects comprising the Catalogue, and of these, half are globular in shape. Approximately five percent of all studied *huqqa* bases are of transparent green glass, of which only eight known globular bases exist. This particular case study will examine six of the eight known examples, which have been grouped accordingly based on their size, shape, glass colour, and gilded decoration. The examples discussed in this case study are currently in the following collections: the Freer Gallery of Art, Smithsonian Institute, Washington DC LTS.1985.1.349.4 (fig. 173); the Musee Guimet, Paris MA.6802 (fig. 174); the David Collection, Copenhagen 10.2010 (fig. 175); the al-Sabah Collection, Kuwait LNS.73G (fig. 176); the Victoria & Albert Museum, London IM.15-1930 (fig. 177); and the British Museum, London 1961.10-16.1 (fig. 178). Each *huqqa* will be referenced by its corresponding acquisition or accession number.

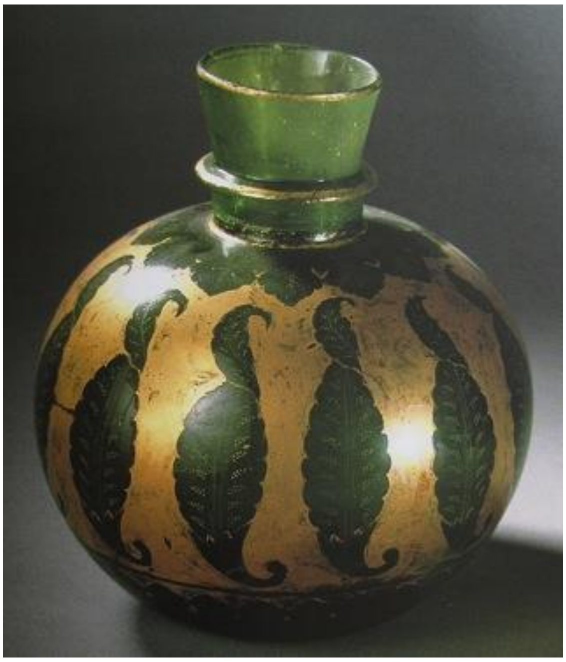

Fig. 173: Cat. 119 – Fig. 174: Cat. 120

Fig. 175: Cat. 118 – Fig. 176: Cat. 129

Fig. 177: Cat. 117 – Fig. 178: Cat. 116

Representations in Indian paintings

Green coloured *huqqas* do not appear frequently in Indian paintings. To date, less than ten total images have been located that illustrate green *huqqas* of varying shapes, sizes, and styles; these date to the eighteen and nineteenth century. The earliest image depicting a globular green *huqqa* base dates to the first half of the eighteenth century (fig. 179).

The illustrated *huqqa* is light green in colouring and decorated with gilded iris sprays. While neither the chillum stand, pipe, nor water can be seen inside the *huqqa* base, it is clear that this depiction is intended to represent a glass *huqqa*. The colour, although a significantly lighter shade of green than the glass *huqqas* in this study, does not correspond to any known enamelled metal vessels of this period. While this *huqqa* base could be made of jade, a material popular amongst the royal Mughal courts, jade *huqqa* bases of the eighteenth and nineteenth century were not gilt painted, but rather inlaid with either *kundan*-set precious or semi-precious stones (fig. 180).[388]

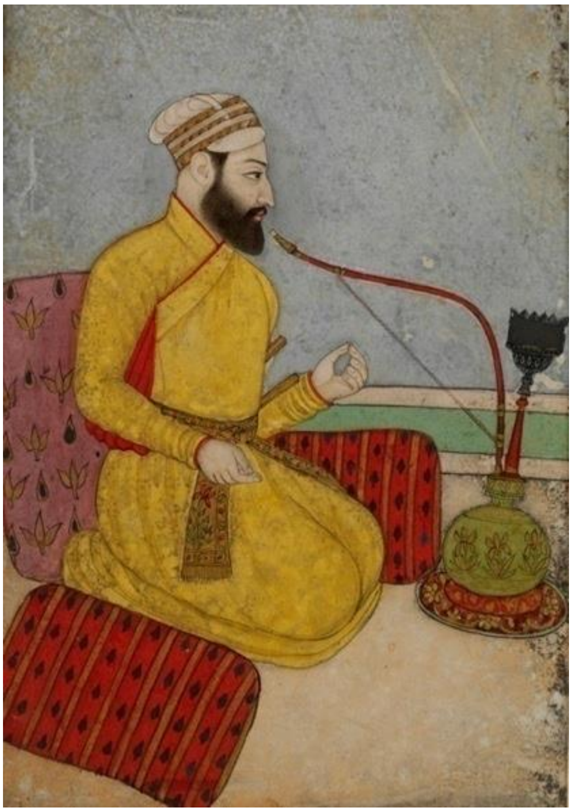

Fig. 179: *Man smoking a huqqa*, Mughal Empire, circa 1700-50
Victoria & Albert Museum (D.361-1908)

Fig. 180: *Jeweled Jade Huqqa base,* India, nineteenth century (Al Thani Collection)
Fig. 181: Detail, fig. 183

[388] Two eighteenth century examples demonstrate this different decorative style, not only using stones of contrasting colour, but also within a complex arrangement that covers the entire vessel (Victoria & Albert Museum BT018 and 02593.IS).

This particular illustrated *huqqa* base represents one of the few gilt painted examples of green colour globular *huqqas*; the rarity of Indian images illustrating green *huqqas* aptly corresponds to their rarity within the Catalogue. Another mid eighteenth century painting from Murshidabad, Bengal shows a woman smoking a light green *huqqa*, its visible watermarks a clear testament to its medium (fig. 182); while another late eighteenth Rajasthani painting shows a darker green *huqqa* with a stylised floral motif similar to the previous painting and V&A IM.15-1930 *huqqa* (figs. 181 and 183).

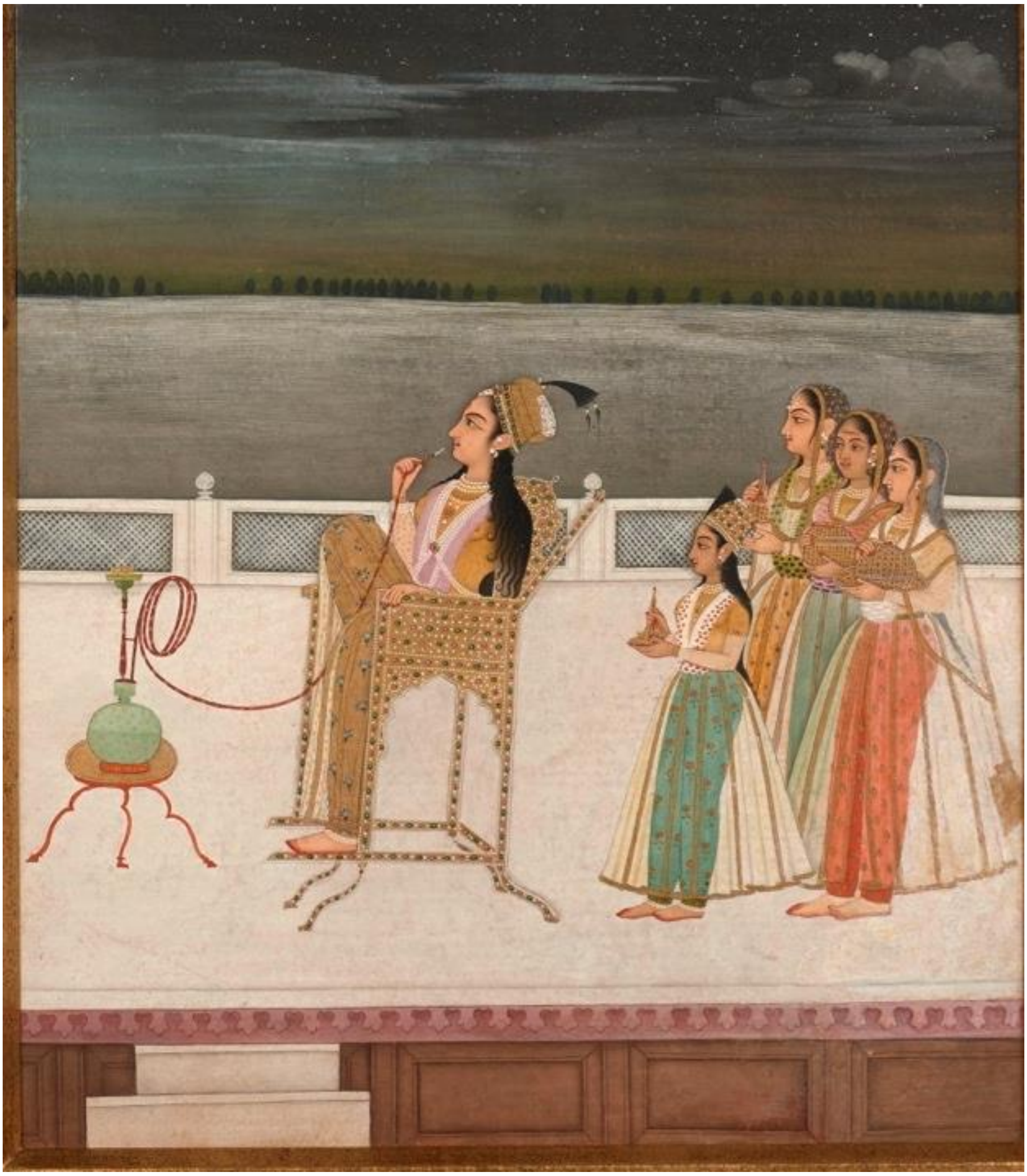

Fig. 182: Woman smoking a huqqa, India, Provincial Mughal, Murshidabad, circa 1750
Artcurial Paris, 24 May 2016 (lot 214); Former Collection Joseph Soustiel

While the abovementioned paintings depict decorated *huqqas*, undecorated illustrated *huqqas* also exist. A 1725 painting from Hyderabad shows soldiers smoking undecorated green *huqqas* made of glass, as seen by the faint watermarks within each base (fig. 184). The undecorated nature of these *huqqas,* as well as their use by soldiers, differs drastically from the previous illustrated depictions in which princes, rajas and royals enjoy smoking, suggesting that they were perhaps neither rare nor luxurious smoking devices. Furthermore, this illustration suggests that glass, as a material was – by the second quarter of the eighteenth century – perhaps neither precious nor expensive to manufacture; it is thus the decoration that denotes its value. The illustrated green *huqqas* accompanying princes, rajas and royals were all ornately decorated, implying that the skill of the painter was regarded more highly than that of the glassblower. The tradition of decorating objects dictated that glass - like metal or jade - would be decorated with equal exuberance and splendour; the greater courtly tradition of lavishly decorating objects permeated all media, including glass. [389] The six *huqqa* bases discussed in this study represent examples of decorative splendour, most probably commissioned and used by elite members of society.

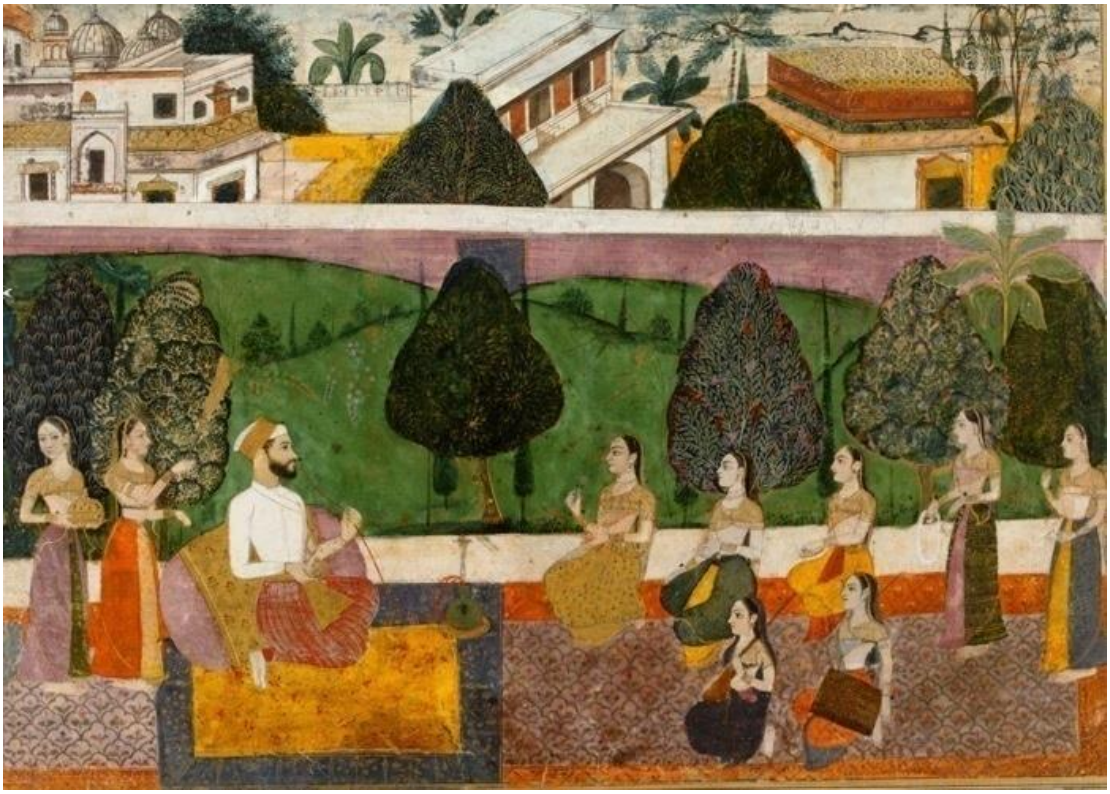

Fig. 183: ***A nobleman seated on a terrace smoking a huqqa*, India, Rajasthan**
Late eighteenth century (Victoria & Albert Museum IM.245-1921)

[389] Skelton, (1982), pp. 104-7.

Fig. 184: *Soldiers enjoying Huqqa,* Hyderabad, Deccan, circa 1725
National Museum Delhi (Acc.No.55.24/64)

Comparative analysis of Shape, Glass, Technique, and Manufacture

The six *huqqa* bases are all similar in shape, size and manufacturing technique. They are free blown (meaning not shaped in a mould) and tooled on the pontil. After having been blow out into its globular shape, the glass was then transferred onto a punty, which allowed the opening of the *huqqa* to be worked (or tooled) and the cylindrical neck to be formed. At this point the *huqqa's* neck was further manipulated to create a pronounced indentation that encircled the interior of the neck approximately two-thirds from the top (fig. 185). Where this indentation exists – which, when examined, feels like a subtle ridge – a thick band of glass is applied to the exterior of the neck (fig. 186). [390] While most Indian *huqqas* present this internal indentation, every *huqqa* base examined thus far (including the six in this case study) presents a 'projected collar' or applied ring. Despite the consistent appearance of this ring, no traces of its application can be seen or felt, suggesting that tooling and possibly an additional low firing may have helped to conceal it. Furthermore, the accuracy of the applied ring –

[390] The author has speculated that the projected collar and interior indentation of the neck were formed by compressing the neck onto itself whilst the glass was still relatively hot, and thus malleable; however, it seems more likely that the inside was created using a tool (jacks, for example) with the rim applied shortly thereafter. See: Carboni and Whitehouse (2001), p. 63 and cats. 136-138.

appearing between two-thirds and halfway from the neck – has a consistent thickness of approximately 0.5 cm, and an even width of 0.5 cm protruding from the neck itself.

Fig 185*:* Detail. al-Sabah *huqqa*, Kuwait (LNS.73G)

Fig. 186: Detail. British Museum *huqqa*, London (1961.10-16.1)

The purpose for this internal indentation could have been to help secure or fix the *huqqa's* pipe and coil (once inserted) inside the base; or, it could reflect a technical tool intended to provide further support to the applied ring, which itself would have reinforced the long cylindrical neck from breakage whilst providing a tactile tool for carrying the base. Both the internal indentation and applied ring represent features unique to Indian *huqqa* bases.

All six bases are generally evenly globular in shape with only slight difference in roundness. Each *huqqa* measures between approximately 19 and 19.5 cm in height, with the exception of example MA.6802 measuring at only 15.5 cm. The maximum diameter of these taller *huqqas* also measures between 17.5 and 18 cm, with the shorter example MA.6802 measuring only 13.4 cm in width. Both height and width are of almost even measurements, creating a well-proportioned shape that appears standard across globular shaped *huqqa* bases. The six bases weight between 545g (LNS 73G) and 705.1g (I.M.15-1930).

All *huqqas* present abrasive pontil marks at the centre of their bases, varying between two and three centimetres in width. The breakage point appears particularly rough on two examples, IM.15-1930 (fig. 187) and 10.2010 (fig. 188), with visible glass traces from the punty left behind, an indication that glass was added to the punty before adhering to the base.

Fig. 187: Detail. Victoria & Albert (IM.15-1930)
Fig. 188: Detail. David Collection (10.2010)

The six *huqqas* also present kicked-in bases, meaning the centre of the base pushes inwards slightly. The kicked-in bases on all six *huqqas* create a flattened surface upon which the bases stand evenly without the support of an additional ring (as already suggested by Carboni). Both examples with abrasive pontil marks also have relatively pronounced kicked-in bases pushing several centimetres up into the *huqqa's* body, suggesting that the punty was added with considerable force.

Two of the six *huqqas* have been tested through XRF analysis: IM.15-1930 (figs. 14 and 15) and 1961.10-16.1 (fig. 17). The results of both analyses showed that the predominant elements found were iron (Fe), copper (Cu), and lead (Pb), with traces of potassium (K), calcium (Ca) and manganese (Mn) also detected. These two tested examples are different to the other tested objects, as well as to each other. While both *huqqa* bases have lead as a primary element – a predominant characteristic associated with the other tested examples – the level of lead is significantly smaller, with noticeably higher levels of both copper and iron.

The differences between both tested *huqqas* are that example IM.15-1930 has its highest peak in iron (Fe), followed by a significantly lower peak in both copper (Cu) and lead (Pb); while iron, copper and lead all represent dominant elements, lead constitutes the lowest of the three. *Huqqa* 1961.10-16.1 shows the same three dominant elements (iron, copper and lead), yet with its highest peak in copper (Cu), followed closely by lead (Pb) and then iron (Fe). Both *huqqa* bases also showed trace elements of calcium (Ca) that were slightly more elevated than that of potassium (K).

Both iron and copper would have been added as the main colouring agents intended to turn the glass a deep green colour. Iron appears naturally within the silica and fluxing agent, its level dependent on the sufficient cleaning of these raw materials.[391] The addition of iron existing beyond its natural occurrence within the silica would have further intensified the green colouring. The addition of copper, conversely, functioned uniquely as a colouring agent. Unlike cobalt oxide, copper was needed in larger quantities to sufficiently colour the glass, which explains its larger quantities within the two tested *huqqas*.[392]

The smaller amounts of calcium within both *huqqas* represents an unusual characteristic rarely encountered above trace levels in British potash-lead glass of the late seventeenth and eighteenth century, but has been more commonly found in Dutch

[391] In its natural unpurified form iron adds a greenish-blue tint. Since before the invention of glassblowing, manganese has been added to clean the tinted discolouration created from the iron, and has, since antiquity, been called the 'glassmakers soap' based on this cleansing quality. Traces of manganese were found in both the tested *huqqas*, as well as all tested case bottles. See: Hugh Tait (ed.) *5000 Years of Glass* (London: The British Museum, 2012), p. 22 and 179.

[392] Speaking in the early twentieth century, Dixon mentions that colouring agents used for glass making were imported into India; he furthermore describes that Potassium dichromate and copper oxide is used to make lemon green glass, and iron oxide for green; Dixon (1937), p. 184.

potash-lead glass.[393] The presence of calcium in these two examples, coupled with their lower lead quantities (determined by the relationship or ratio of lead to potassium peaks in the XRF analyses) could suggest that the glass was not of a typical late seventeenth and eighteenth century English composition or origin.[394] As already discussed, Dutch glass with a lead oxide level of up to 20% contained calcium oxide levels of approximately 4%, whereas English lead crystal glass (with lead amounts ranging from 20% to 35%) have calcium oxide levels of less than one percent.[395] The detection of calcium in the XRF analyses suggests an elevated level higher than four percent.

Considering these two *huqqa* bases represent the only tested glass examples with detectable calcium traces, it questions whether a connection or correlation exists between the colouring agents (copper and iron) to that of calcium. Despite both *huqqas* having lower lead levels than the case bottles, the presence of lead as a predominant element nonetheless characterises their glass as of a potash-lead variety. Several suggested theories could explain their elevated calcium with conversely lower lead levels.

While the 1765 Albion wreckage revealed transparent green ingots amongst the ship's cargo, this tested glass yielded lead oxide levels of between 33-40%, with copper oxide traces of around 1% and undetectable levels of calcium.[396] The lower lead levels tested within the two *huqqa* bases could result in smaller quantities of imported English ingots or cullet mixed with local materials to ration the glass imports. Conversely, the elevated iron levels within the glass could result from the contamination of lead waste-glass reused to supplement the ration of imported potash-lead glass, such as adding rod-end cullet, blacks, or moils.[397] Later twentieth century records of India's glass production mention that such contaminated glass was kept and recycled into the remelted batch.[398]

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[393] The author would like to thank Colin Brain for bringing this to her attention; written comments on 'Indian Glass' provided by Colin Brain, 21 June 2015.
[394] D. Dungworth and C. Brain, "Investigation of Late 17th century Crystal Glass," Center for *Archaeological Report*, 21 (English Heritage: 2005).
[395] Ibid, p. 404.
[396] Mark Redknap and Ian Freestone, "Eighteenth-Century Glass Ingots from England: Further Light on the Post-Medieval Glass Trade," *Trade and Discovery: The Scientific Study of Artefacts from Post-Medieval Europe and Beyond,* Duncan Hook (ed.) (British Museum: London, 1995), p. 146.
[397] Adding rod-end cullet to the secondary re-melting of imported potash-lead glass would have elevated the lead levels, whilst simultaneously increasing the iron levels created from the contaminated blowpipe. The author thanks Colin Brain for this observation, 21st June 2015.
[398] While Dixon does not explicitly state this, his description of the local glass gatherers method of minimising the amount of waste glass infers to the conscientious re-use of all wasted glass materials, including rod-end cullet. See: Dixon (1936), pp. 16-18.

The calcium traces detected within the *huqqas* – unless already present within the imported cullet or ingots – arguably arrived through the addition of local ingredients, furnaces, or refractory bricks, which leached into the glass batch. Rich levels of calcium appear in the sand (silica) sourced from Rajasthan (the so called 'black sand'), which was reportedly used for the primary production of both mirror and bead making in the region of Gujarat.[399] Twentieth century surveys of glass production indicate that calcium oxide (lime), obtained in the form of limestone or shell lime, was found in abundance in India and used as the second most important oxide in manufacturing Indian glass.[400] The glass furnaces mostly consisted of closed fireclay pots constructed with refractory bricks made primarily of locally obtained clay, which was high in both iron and calcium levels.[401] The most plausible explanation for the chemical compositions of these *huqqas* is that they were made of English potash-lead glass mixed with locally sourced silica, and contaminated by rod-end cullet or refractory bricks and furnaces, which affected their lead and calcium oxide levels. Their manufacture in India can be further supported through closer examination into the quality of the glass, and the objects' manufacturing techniques.

The green colouring of the *huqqas* has been characterised in varying degrees based on Carboni's colour table; example LNS 73G measures a 4-5, the darkest of green appearing in this table.[402] The other *huqqas* discussed in this study are all visually similar in colouring to example LNS 73G. In addition to colour, the quality of glass is similar in all examples, revealing seeds, air bubbles of varying sizes, inclusions, watermarks, and signs of crizzling.

Huqqa BM.1961.10-16.1 is filled with seeds and small bubbles that, according to a 1968 catalogue description, "render the glass translucent rather than transparent."[403] Several medium sized bubbles, the largest measuring approximately 1 cm in length, appear towards the surface layers of the glass, and are localised around the bottom of the base (fig. 189). Seeds and slim, vertically stretched bubbles also appear around the neck and upper rim, where the *huqqa* was hand tooled, along with some dark inclusions. Furthermore, foggy patches, 'constellations' of fine dots, and a milky film runs

[399] Kock and Sode (2002), p. 84.
[400] Dixon (1936), p. 7.
[401] Ibid, p. 12. According to Watts, the best clay bricks were largely made at Raniganj (west Bengal) and at Jubalpore (Madhya Pradesh); Watts (1880), vol. 2, p. 363.
[402] Carboni (2001), table of colours, p. 404.
[403] Pinder-Wilson and Tait (1968), no. 162, p. 123.

horizontally across the inside of the base, presenting a watermark and varying degrees of crizzling. These signs all indicate that water was stored inside the water pipe.

Fig. 189: Base of British Museum *huqqa* BM.1961.10-16.1

Fig. 190: Detail of the glass of al-Sabah *huqqa* LNS 73G

Huqqa LNS 73G is similarly filled with seeds and small air bubbles, the largest measuring approximately 0.5 cm in length around the base and in between the floral sprays (fig. 190). Smaller bubbles appear on the glass surface (despite the heavy gilding) as risen bumps that can be felt along the surface. This example also presents a strong layer of milky film with darker patches of fogginess, signs of more advanced crizzling, with dirt seen along the inside of the base (examined from the opening). Lastly, a pronounced mark encircles the bottom of the base, where it has been placed upon the ground (undoubtedly without the support of a *huqqa* ring), another indication of its use.

Fig. 191: Detail of the glass and base of V&A *huqqa* I.M.15-1930

Example 10.2010 presents a long vertical bubble measuring approximately 1.5 cm at the neck, which was most likely formed in the batch and simply elongated with tooling. Like example LNS 73G, this *huqqa* presents a pronounced mark encircling the bottom of its base, a clear sign of its use (and possibly age). *Huqqa* I.M.15-1930, despite its heavy gilded decoration, presents a few dark inclusions along its surface, with a noticeable one seen through one of the stylised leaves upon the body (fig. 191).

These traits within the glass batch reflect a variety of aspects related to the cleaning, melting, and blowing. The small bubbles (seeds or 'stones') appearing on the surface of all *huqqa* bases could be a result of very fine sands that did not sufficiently melt, and were carried to the glass's surface by gas bubbles. The fine grains could not have melted due to either inadequate heat temperatures, or comparatively low levels of fluxing agents (alkalis) added to the batch. While India produced sands of high quality (most popularly those deposits situated at Sawai Madhopur near Jaipur), the size of the sand grains was neither particularly fine nor evenly shaped.[404] While these grains can be cleaned (eliminating any iron traces that could potentially decolourise the glass) and screened (to separate grain sizes), few Indian glass manufacturers sufficiently purified their raw ingredients beyond an elementary screening.[405] It seems, therefore, that the traits within the glass could reflect a lack of proper purifying knowledge on the part of the glassmaker; or rather, that these traits reflected a preferred aesthetic, and were

[404] Dixon (1937), p. 181.
[405] Ibid, 181.

thus not important to refine or remove. Furthermore, as the dark green glass would have been covered with rich gilding, much of the glass would have been disguised or concealed with patterns and decorations.

Surface Decoration

The six *huqqa* bases are all decorated in gilding. While no two *huqqa* decorations are the same, similarities in patterns and motifs appear on all six examples. Five of the six bases are decorated in the reverse gilt technique, meaning that the patterns are depicted in the negative space against the gold background, with further details highlighted in gold or paint; *huqqa* 1961.10-16.1 represents the only example where the gilded motifs have been painted directly onto the glass. The six *huqqa* bases all follow a similar compositional format of isolated vertical sprays (floral or vegetal) circling around the body and flanked by a stylised inverted leaf pattern decorating the upper shoulder, with a running scroll motif encircling the bottom of the base. The applied ring on all bases is painted in solid gilding, and on all (except *huqqa* MA 6802) the upper neck is painted with isolated floral sprays. The compositional commonality and treatment of motifs reflects a standardised decorative pattern, while the level and sophistication of gilding reflects an established painterly tradition, one most certainly associated with royal status or courtly culture.

Huqqa 1961.10-16.1 is painted with six large flowering poppy plants, each comprised of three blossoms stemming from a tuft of leaves, with six smaller poppy sprays decorating its neck.[406] A wider band of inverted stylised leaves - punctuated by small circles and a running vegetal scroll enclosed by two plain bands - flanks the dominant floral sprays. Around the neck runs a similar running vine and creeper motif, flanked by two fine triangular and tripartite leaf and fine gilt bands (fig. 192). The gilding on this example is rich and heavily applied, with no additional cold painted highlights detailing the leaves or petals, as found on the other examples.

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[406] Former curator of the British Museum, Ralph Pinder-Wilson, claimed in 1962 that the museum's *huqqa* must be dated around 1700; "if the form of the vessels was already current at the time, so too is the style of decoration; in particular the regularly disposed flowering plants rendered naturalistically had become the stock-in-trade of the decorative artist - whether in *pietra dura* work, textiles, or manuscript illumination - from the reign of Shah Jahan onwards."See: Ralph Pinder-Wilson, "A Glass Huqqa Bowl," *The British Museum Quarterly* (1962), p. 94. Based on more recent chemical analysis of the *huqqa* base, trade documents of imported English lead glass, and Indian paintings depicting green coloured globular *huqqas*, the dating of this *huqqa* base is more authoritatively placed to the second half of the eighteenth century.

Fig. 192: Top view of British Museum *huqqa* 1961.10-16.1
Fig. 193: Top view of al-Sabah *huqqa* LNS 73 G

Huqqa LNS 73 G is a mirror representation of 1961.10-16, following a similar compositional style and pattern, yet done in the reverse-gilt technique (fig. 193). The body of this base is decorated with eight poppies, each comprising three large floral sprays with smaller buds stemming from a single vegetal tuft. Along the base and upper shoulder runs a stylised band of slanted leaves. The upper neck is decorated with six isolated poppy plants, and a vegetal scroll flanked by two solid gilt bands.

Both *huqqa* bases 10.2010 and LTS.1985.1.349.4 depict stylised cypress trees alternating between floral sprays (fig. 194). The body of *huqqa* 10.2010 is decorated with six large marigold plants, each comprising three sprays of smaller buds stemming from a vegetal tuft (fig. 195).

Fig. 194: Top view of Freer Gallery of Art *huqqa* LTS.1985.1.349.4
Fig. 195: David Collection *huqqa* 10.2010

Fig. 196: *Huqqa*, Cat. 156
Fig. 197: *Huqqa Base*, India, Deccan, late seventeenth – early eighteenth century
Victoria & Albert Museum (IS.3539-1883)

Around its neck are six smaller floral sprays with a fine band of solid gilt circles, and along the upper shoulder and base, a band of inverted stylised leaves. The stylised leaves, cypress trees, and vegetal tufts are all further detailed with light green or white paint. The cypress tree represents a decorative motif found less commonly on glass objects; *huqqa* LTS.1985.1.349.4 represents one of three known Indian glass examples illustrating this plant (fig. 196).[407] The formal alternation between the vertical cypress tree and floral spray does appear on two globular shaped *bidri huqqas* dated to around 1700 (fig. 197).[408]

An unusual decorative feature unique to only a few *huqqa* bases is painted decoration along the inside of the base. *Huqqa* LTS.1985.1.349.4 is painted in such a manner, the details of the floral sprays highlighted with light yellow, white or green paint (figs. 198 and 199). This technique required enormous skill; the painter would have inserted a long brush from the neck's opening to delicately paint these details. This detailing gives more depth to the vegetal sprays, and although the *huqqa* contained water, the painter (or patron) nonetheless agreed that the visual splendour of this effect

[407] Two bell-shaped glass huqqa bases have vertical cypress trees decorating their body: one gilt painted and the other green and gold enamel painted over the raised appliqué decoration (Salar Jung 132/HQ-2733 and the al-Sabah Collection LNS 123G, respectively).
[408] See examples: Jagdish & Kamla Mittal Museum of Indian Art, Hyderabad (76.1224.ME.3) and Victoria & Albert Museum (IS.3539-1883). For a globular huqqa base with only cypress decoration, see: Victoria & Albert Museum (IS.100-1898).

was greater than the practicality of its longevity. Over time, this paint still appears in remarkable condition.

Figs. 198 and 199: Detail of the painted decoration (exterior and interior) of *huqqa* LTS.1985.1.349.4

Both *huqqa* bases 10.2010 and LTS.1985.1.349.4, along with MA 6802 and I.M.15-1930, share a common stylised inverted leaf pattern decorating their upper shoulders. On all four examples, this stylised band is the same size with similar light colour detailing accentuating the veins of the leaves. *Huqqa* MA 6802 is decorated around the body with twelve stylised leaves, each detailed with small light dots, representing a similar compositional format to previous examples discussed. While the stylised leaves remain unidentifiable, their formalised treatment with light colour detailing represents a stylistic feature common to this collection of *huqqas*.

Conversely, *huqqa* I.M.15-1930 represents the only example of the six bases that depicts a unique composition: it is decorated with six rows of isolated stylised leaves, similar in shape and treatment to the inverted bands decorating the abovementioned *huqqas* (fig. 200). The composition covers the base in a highly rigid vegetal pattern, one that appears on only one other *huqqa* base of an entirely different shape, as well as a green glass spittoon, both in collections in Hyderabad (fig. 201).[409]

[409] Grenade shape huqqa base, Salar Jung Museum, Hyderabad (142/HQ-2743); Spittoon, Jagdish and Kamla Mittal Museum of Indian Art, Hyderabad (74.1475).

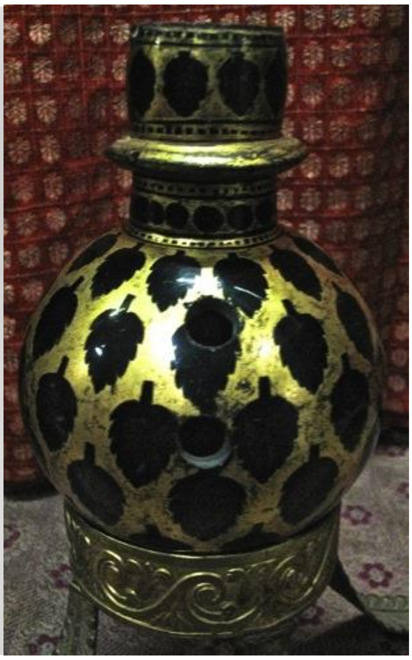

Fig. 200: Top view of *huqqa* V&A I.M.15-1930
Fig. 201: *Huqqa base*, Cat. 202

Concluding Interpretations

The decorative patterns seen across these six *huqqa* bases demonstrate popular motifs common to the Mughal repertoire, yet not necessarily isolated to the Mughal region. The poppy motif – seen on examples LNS 73 G and 1961.10-16 – is often presumed to be an appropriate flower placed upon smoking devices and is a part of both the Mughal and Deccani decorative repertoire.[410] Depicted as a single flowering spray formally arranged against a plain background, the poppy also appears on *bidri huqqas*.[411] As Sir George Watt observed in 1902, "one of the oldest and at the same time most beautiful patterns employed [in *bidri*] portrays the poppy plant, a design which recurs all over India".[412] It would be a mistake to categorise this particular pattern as specifically Mughal, as by the eighteenth century traditional motifs and decorative trends travelled. The standardisation of floral patterns and their subsequent treatment across various mediums cannot alone help to further identify a particular region of production or decoration for these *huqqa* bases. Furthermore, globular green *huqqas* appear within eighteenth century Indian paintings from northern India, the Deccan, and Rajasthan.

While these six *huqqa* basses might not be attributable to a particular region, atelier or court, each reflects an exquisite example of Indian glass. The abundant use of

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410 Zebrowski (1997), p. 232.
411 For an example, see one in the Jagdish and Kamla Mittal collection, Hyderabad (76.1248.ME.27), published in Mittal (2011), p. 25.
412 Sir George Watt, *Indian Art at Delhi, being the official catalogue of the Delhi exhibition 1902-3* (Calcutta, 1903), pp. 46-49.

gold, in particular, suggests a wealthy or royal patron, while the sophisticated treatment of gilded patterning (often delineated with further detailing, particularly within the base's interior) attests to a courtly workshop, such as Delhi, Awadh or Bengal. Furthermore, the combined chemical composition of the glass (potash-lead with elevated copper, iron, and calcium levels) reflects a type of glass that is uniquely characteristic of Indian production.

Given the scarcity of Indian paintings illustrating green glass *huqqa* bases, visual evidence remains scant; however, each painting of a decorated glass *huqqa* depicts a nobleman or woman smoking within the confines of a private terrace, either surrounded by attendants and musicians, or alone. The proliferation and popularity of smoking was not limited to a royal or courtly context, nor was it confined to men.[413] Indeed, ladies too indulged in smoking, as depicted in numerous images dated to the eighteenth century, such as the portrait of a dancing girl by the British Painter Tilly Kettle, painted in 1772 in Faizabad, the then capital of Awadh.[414] However, such images of women smoking appear in a royal context, and more commonly within the company of other women, attendants, entertainers, or a prince.[415] While smoking devices existed in great abundance and media across various castes and classes, illustrated examples of decorated glass *huqqas* appear exclusively within a courtly context. As glass *huqqas* were smoked by a single individual, each base's decoration would have been specifically commissioned to reflect his or her taste, as well as showcase the sophisticated craftsmanship of the royal atelier. To date, no two green glass *huqqa* bases are identical in surface decoration, thus supporting the fact that these green *huqqas* represent special and specific commissions.

The earliest known provenance of two green glass *huqqa* bases dates to the early twentieth century, although each example itself is attributed to the eighteenth century. The provenance of the David Collection *huqqa* base (10.2010), as cited in the Bonham's sale catalogue of April 2010 (from which the *huqqa* was purchased for a historic record of 234,000 GBP), stated that John Clough (1904-47), the High Court Judge in Calcutta and collector of Indian works of art and furniture, previously owned the *huqqa*. His twin

[413] K.M. Ashraf. *Life and Conditions of the People of Hindustan* (New Delhi, 1970), p. 264.
[414] See: *Young Indian woman with Hookah*; Tilly Kettle: Faizabad 1772; Yale Center for British Art, Paul Mellon Collection: B1981.25.385.
[415] See: S.P. Verma, "Food and Use of Tobacco" in *Ordinary life in Mughal India: the Evidence from Painting* (New Delhi: Aryan Books International, 2012), pg. 21-23.

brother, Julian Clough, was the then Head of the Calcutta Office for the large Scottish-based tea company, James Finlay, and later became the Company's Chairman. The *huqqa* remained within the family until its sale in London in 2010. While this *huqqa* base could have been manufactured outside of Calcutta, or even Bengal, its arrival into an established and influential European home residing in western India, the then political seat of the British Raj, reinforces the value and importance of the object as already deemed by the early twentieth century. Prior to this date, this specimen (of immaculate condition) most certainly belonged to a royal nobleman attached to the courts of Delhi or Bengal (probably Murshidabad).

The Victoria & Albert Museum *huqqa* base (I.M. 15-1930) was officially purchased by the museum in 1930 from Mr C. Nordlinger for £175 (today's equivalent of around £10,600), after having been on loan to the Museum from 6th April 1927. In the Museum's registered files, the *huqqa* was described as already being of considerable rarity and great beauty.[416] The Museum, well aware of its value, made a fortuitous acquisition that, even at the time, reflected an amazing purchase. While the initial correspondences attributed the *huqqa* base to the period of Shah Jahan (circa 1650), the dating has since reflected the later eighteenth century attribution. Despite the provenance remaining unknown prior to Mr Nordlinger, the *huqqa*, like the David Collection's, most likely transferred ownership from a royal or courtly Indian to a British civil servant sometime in the late nineteenth century. As globular shaped *huqqa* bases start to fall out of fashion around the mid eighteenth century (instead being replaced by bell shaped *huqqas*), these six exquisitely decorated examples of Indian glass can be confidently attributed to the first half of the eighteenth century.

[416] Registered file 1930/4835, dated 29th May 1930.

CASE STUDY 4: Bell Shaped Transparent *Huqqa* Bases

Introduction

Around the 1730s, depictions of bell-shaped *huqqa* bases start appearing in Indian paintings. This flattened base represents a modified form of the globular *huqqa*. The emergence of a new *huqqa* base most likely developed out of convenience and practicality, as it stood more stably without the additional support of a ring. While bell-shaped *huqqas* appear more commonly in Indian paintings dated to the second half of the eighteenth century, globular *huqqas* still continued in production and use until even after 1800; representations of both forms appear in Indian paintings throughout the eighteenth century. The simultaneous production and use of both forms does not represent a "concurrence of competing forms" [417] but rather a personal preference dictated by patronage or region.

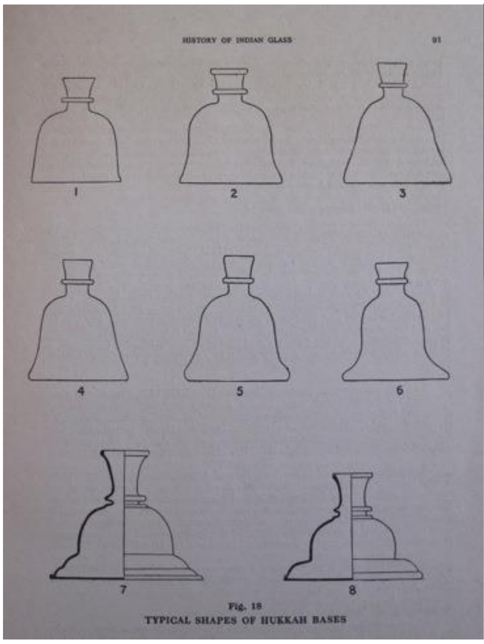

Fig. 202: Typical shapes of *huqqa* bases (after Dikshit 1969, fig 18, p. 91)
Fig. 203: Cat. 248

Several differences in shape appear amongst the bell-shaped *huqqa*, most noticeably the 'skirting' of the base, which after 1800, becomes more pronounced.[418] Dikshit provides an illustrate diagram in his 1969 survey in which he illustrates the typical shapes of bell-shaped *huqqa* bases (fig. 202).[419] The cylindrical neck with applied ring represents a common feature upon all bell and globular shaped *huqqa* bases; however, the degree to which the base rounds or flares outwards differs (fig. 203). It

[417] Zebrowski (1997), p. 236.
[418] Mittal (2011), p. 22.
[419] Typical shapes of huqqa bases published in Dikshit (1969), fig 18, p. 91.

seems that these subtle variations in shape do not follow a chronological progression, as the shapes simultaneously appear in both representations and surviving examples. Dikshit attributed the origin of the bell-shape to the Songati, a pawn in the Indian game of the same name, while Zebrowski believed it naturally developed from the pre-existing globular *huqqa*, which had its roots in the traditional Indian *lota*.[420] Irrespective of influences, the bell-shape *huqqa* appears as a popular shape, which, like the globular form, follow a standardised shape and size.

This case study will examine six examples of transparent bell-shaped *huqqa* bases decorated with wheel-cut and gilded decoration. These six examples have been selected as representations of different types of decorative patterns found upon bell-shaped *huqqas*. As gilding frequently accompanies wheel-cut decoration on bell-shaped *huqqa* bases, these six *huqqas* attempt to demonstrate the diversity of this decorative technique as seen through a variety of both floral and geometric designs. While similarities in technique and pattern exist on each of the six examples, like the globular *huqqa* bases, no two bell-shaped decorations are identical. Furthermore, two of the six bases have been scientifically tested, one through EDS analysis and the other by XRF.

 

Fig. 204: Cat. 193 - Fig. 205: Cat. 194

[420] Dikshit (1969), p. 91-2 and Zebrowski (1997), p. 228.

Fig. 206: Cat. 192 - Fig. 207: Cat. 168

Fig. 208: Cat. 174 - Fig. 209: Cat. 176

The examples discussed in this case study are currently in the following collections: the National Museum, Delhi 78.972 (fig. 204); the Corning Museum of Glass, New York 74.6.1 (fig. 205); the Virginia Museum of Fine Arts, Richmond 68.8.138 (fig. 206); the David Collection, Copenhagen 30.1979 (fig. 207); Jagdish & Kamla Mittal Museum of Indian Art, Hyderabad 75.1475 (fig. 208); the National Museum, Delhi 61.834 (fig. 209).

Representations in Indian paintings

Bell-shaped *huqqas* start first appearing in Indian paintings dated to around 1730. Determining whether these illustrated depictions are glass *huqqas*, again, remains challenging. In some depictions the base is clearly made of metal or porcelain based on its colouring and decoration; however, the decorations appearing upon these illustrated *huqqas* closely parallel the glass examples discussed within this study, showing a familiarity or popularity of designs and styles across mediums.

The bell-shaped *huqqa* illustrated in a 1730 Rajasthani painting of a princess lighting a sparkler clearly depicts a golden colour *huqqa*, made presumably of metal or gold, decorated with isolated flowers set within oval shaped medallions (fig. 210). Irrespective of medium, the treatment of flowers within repeated medallions represents a common decorative feature found on bell-shaped glass *huqqas*.

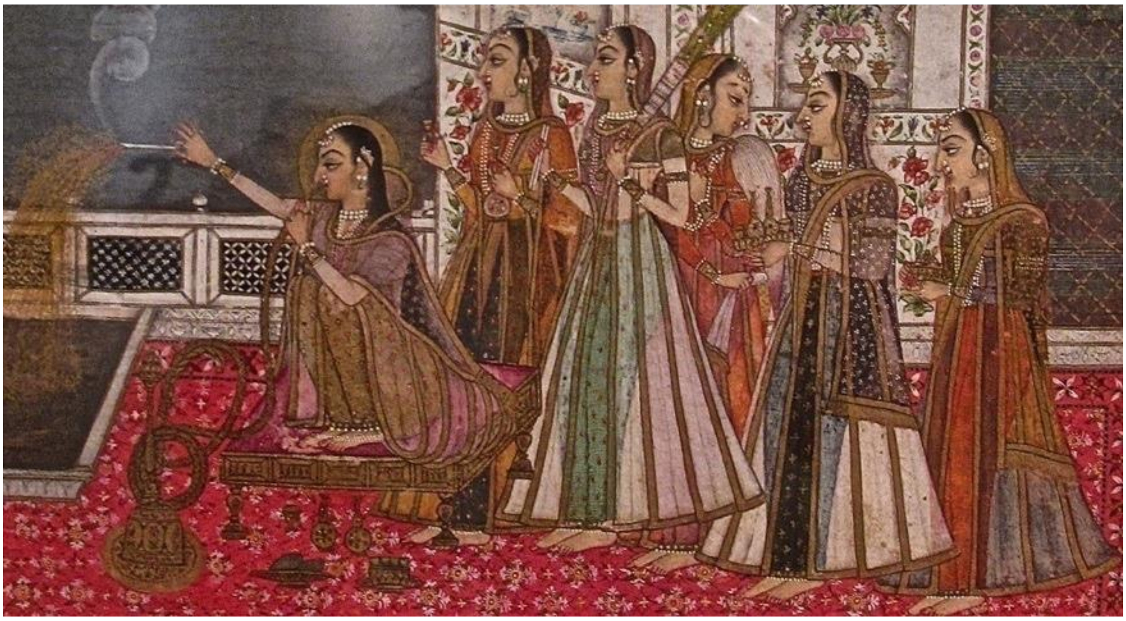

Fig. 210: *Princess lighting a sparkler,* By Bhawani Das, Rajasthan, Kishangarh, circa 1730-40 National Museum Delhi (Acc. No. 51.205)

Another Rajasthani painting (Pahari school) from around 1735-40 depicts Muhammad Shah seated on a terrace smoking a white colour *huqqa* decorated with isolated polychrome floral sprays (fig. 211). This *huqqa* is most certainly made of glass, with its single floral spray decoration representing a distinctive Mughal motif, one already seen on the globular green *huqqa* bases and repeated on later bell-shaped *huqqas*, such as on example 30.1979 (fig. 207), as well as several other bell-shaped *huqqas* with wheel-cut and gilded sprays (Cats. 169-173).

Fig. 211: *Muhammad Shah seated on a terrace smoking a huqqa*, Pahari School, Guler, circa 1735-40 British Museum (1948,1009,0.148)

By the third quarter of the eighteenth century glass bell shape *huqqas* appear in Indian paintings attributed to Awadh (fig. 212) and the Mughal Empire (figs. 214 and 215); the painting from Faizabad, Awadh is decorated with a floral glass bouquet inserted in the centre of the base, while the *huqqa* illustrated in the Mughal painting presents some remnants of gilded decoration, albeit almost entirely worn. While many more examples of gilded bell-shaped *huqqas* exists, these two paintings nonetheless demonstrate that, by the third quarter of the eighteenth century, bell-shaped glass *huqqas* were in use. At this time surface patterning also shifts from floral to uniquely geometric. Yet another painting from Awadh (Lucknow) dated to around 1770 shows two bell shaped *huqqas*; the one illustrated to the right demonstrates a distinctive alternating panel patterning similar to figs. 204 and 206 (figs. 213 and 215). The emergence of a uniquely geometric pattern – seen in surviving examples and reinforced by Lucknow paintings dated to the third quarter of the eighteenth century – reinforces the experimental and innovative aesthetic that emerged in Awadh at the time. As already discussed, Lucknow represented a centre of artistic fervour; a result of the city's diverse and culturally sophisticated clientele, including Indians and Europeans alike. This shift away from the standardized floral repertoire reflects a confident experimentation in design and a change in tastes and aesthetic preferences.

Fig. 212: ***Muzzaffar Jang, Nawab of Faizobad, in his harem,*** **Faizobad, Awadh, circa 1770 (Bibliotèque Nationale, Paris Mss.Or.Smith-Lesouef 230, f.55)**

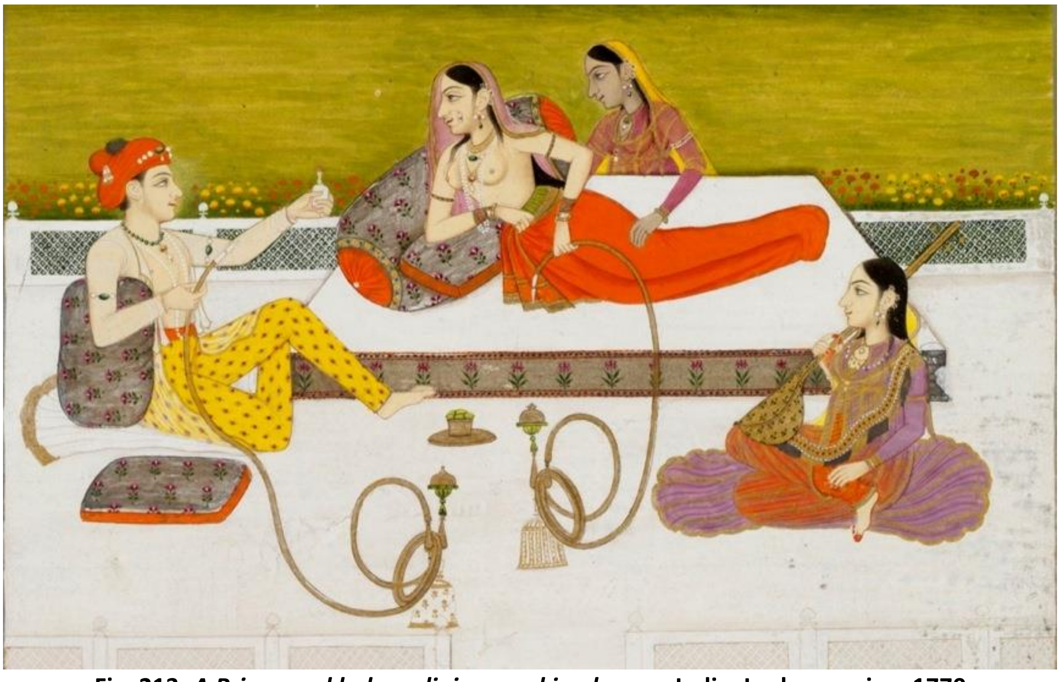

Fig. 213: ***A Prince and lady reclining smoking huqqa,*** **India, Lucknow, circa 1770 (Victoria & Albert Museum IS.285-1951)**


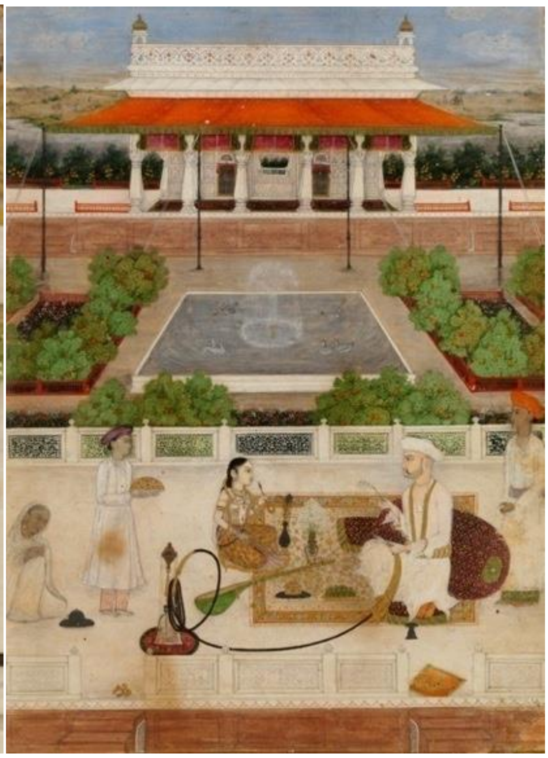

Fig. 214: Detail of fig. 215
Fig. 215: *Maratha nobleman and wife,* Mughal Empire, late eighteenth century
Victoria & Albert Museum (IM.252-1921)


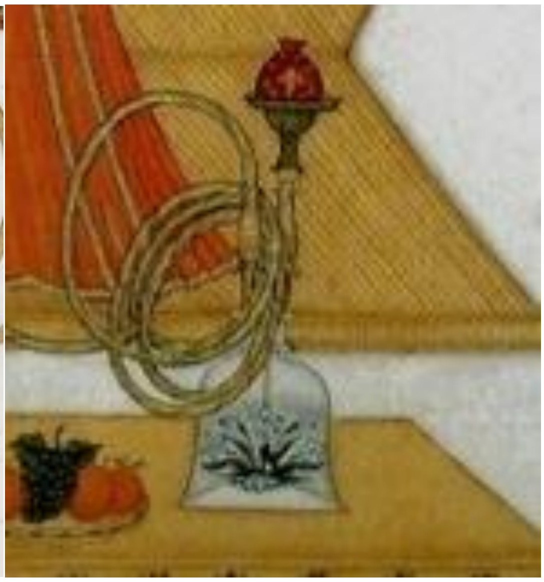

Fig. 216: Detail of fig. 213 - Fig. 217: Detail of fig. 212

Comparative analysis of Shape, Glass, Technique, and Manufacture

The six *huqqa* bases reflect a similar size and shape, with only two examples flaring less widely at the base (61.834 and 78.972, both in the National Museum, Delhi). The manufacturing technique is similar to that previously described with the globular green glass *huqqas*: each is free blown and transferred onto a pontil while manipulated or tooled with instruments.

Fig. 218: Detail of applied ring (VMFA 68.8.138)

The applied ring is similarly created by tooling the interior of the neck to create an internal indentation, and then applying a ring of glass around the neck approximately two-thirds from the top (fig. 218). While each *huqqa* curves out to a flattened base of varying degree, each presents a slightly concaved base with a small unpolished pontil mark in the centre (figs. 219 and 220). The relative subtlety of the bases' concavity, as opposed to the pronounced kicked-in ones seen on the green globular examples, as well as the small and un-abrasive pontil marks suggest a different manufacturing process, one unique to bell-shaped *huqqas*.

All six *huqqa* bases measure approximately the same height, with the shortest measuring 17.1 cm (CMG 74.6.1) and the tallest 19 cm (VMFA 68.8.138); at their widest points, the bases measure between 16.5 and 17.5 cm, respectively. Both the height and width (like the globular shaped *huqqas*) are of an evenly proportioned size and standardised shape. Unlike the globular *huqqas*, the weight of these bell-shaped *huqqas* is lighter, ranging from 453.7g (CMG 74.6.1) to 529.7g (DC 30.1979), despite a difference of only one centimetre in height between the two. By looking at a broken bell-shaped *huqqa* base currently in the collection of the Virginia Museum of Fine Arts (VMFA) (fig. 221), one notices the thinness of the glass, which measures no more than a few millimetres in thickness. The thinly blown glass could reflect upon a more skilled glass blower, or simply an evolution of techniques and a familiarity with the material.

Examining the type of glass and techniques employed for each *huqqa* base will reveal further insights into production.

Fig. 219: Detail of concaved base (National Museum, Delhi, 78.972)
Fig. 220: Detail of the pontil mark (CMG 74.6.1)

Fig. 221: Detail of thickness of the glass (Virginia Museum of Fine Arts, Richmond, 1968.3)

All six *huqqa* bases are made of a greyish, colourless type of glass that is not entirely transparent. Two examples have been tested through two different types of analyses: EDS and XRF. The Corning Museum of Glass *huqqa* was tested through XRF analysis, the results indicating that lead and potash represented the predominant elements, with traces of copper (Cu), iron (Fe), Manganese (Mn) and titanium (Ti) (fig. 30). The elevated peaks in lead and potash characterise the glass as a potash-lead variety typical amongst eighteenth century European glassmakers, while the absence of calcium (Ca) further identifies it as English. Unusual elements present within this *huqqa* are titanium (Ti) and Zinc (Zn), which measure in small peaks yet do not appear in either the case bottles or green globular *huqqa* bases. When compared to the weight percentages of the EDS analysis of the VMFA *huqqa* (68.8.137), both titanium (Ti) and Zinc (Zn) were not detected. Similarly, small traces of iron and manganese were presented within the Corning *huqqa*, with only 0.1% or undetected levels measured in the VMFA *huqqa*.[421] The VMFA.68.8.137 glass percentages of silica, potash, and lead all correspond with the glass ingots salvaged and tested from the Albion ship, which have been confirmed as English in origin.

The very low concentrations of below 0.3% for other elements, including iron, zinc and titanium implies the use of pure sources for both potash and silica. The minor or undetectable levels of these elements in the VMFA *huqqa* similarly supports the use of pure raw materials; however, the minor peaks in titanium, iron, and zinc appearing in the Corning bell-shaped *huqqa* 74.6.1 suggests an otherwise impure use or treatment of raw ingredients. While both types of glass could be characterised as potash-lead, the differences between trace elements suggest that this glass did not come from the same source. An English origin still remains plausible, yet perhaps the glass batches were manufactured at different factories at different times. Subtle variations could reflect differences of workmanship, or the sourcing and cleansing of raw ingredients. Another possibility is that these trace elements entered into the batch during the re-melting or blowing phase; the iron, zinc or titanium all could have entered from the blowpipe itself, or simply the environment at large. More probably, the *huqqas* were manufactured in India from re-melted European glass, which initially varied compositionally based on its original place of manufacture, and was later further chemically and aesthetically altered by various local environmental conditions.

All six examples of bell-shaped *huqqas* present noticeable signs of cording, or chemical inhomogeneity normally caused by the insufficient melting of ingredients or cullet.[422] Chemical inhomogeneity represents one of four traits visible in the six glass *huqqas*, the other three being batch stones, bubbles and seeds, and inclusions. Given the transparent colouring of the glass and the lager undecorated spaces, cording marks can be more easily detected as diagonal lines running across the upper shoulder, body

[421] Dye (2001), Table 2: Glass Huqqa Base Compositions, p. 533.

[422]According to David Whitehouse, a cord is defined as a part of the glass that differs in composition from the surrounding matrix, producing a change in the refractive index that enables a cord, streak, or wavy line to be seen in the glass; see David Whitehouse. *Glass: A Pocket Dictionary of Terms Commonly Used to Describe Glass and Glassmaking* (Corning: Corning Museum of Glass, 2006), p. 25.

and base. Sometimes several parallel cording lines appear in one area, or as a more pronounced singular streak, as in National Museum, Delhi 61.834 (fig. 222). Cording cannot be felt, despite its raised appearance, but is embedded within the glass.

Fig. 222: Detail of a cording mark (National Museum, Delhi 61.834)

Like cording marks, batch stones (un-melted grains of quartz or silica) reflect the insufficient melting of raw materials, and appear as visible dots along the surface, often raised, creating an uneven texture. Batch stones are most visibly seen in *huqqa* 75.1475 (fig. 223) dotted or scattered throughout the glass.

Fig. 223: Detail of batch stones (JKMM 75.1475)

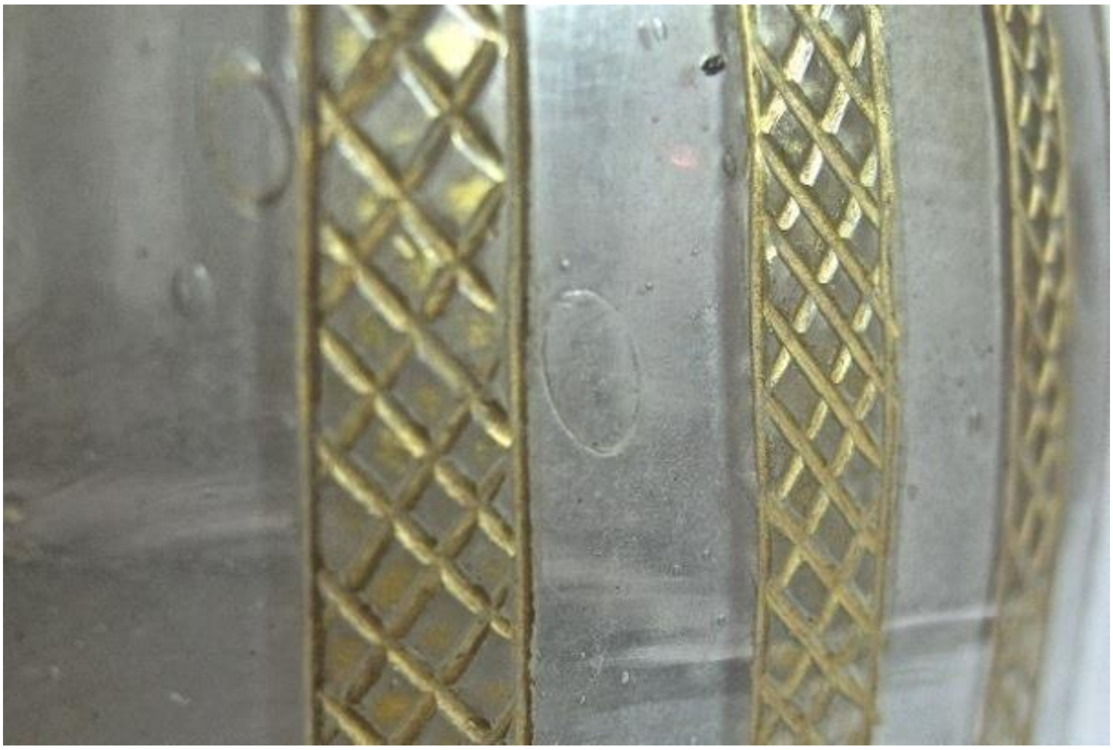

Fig. 224: Detail of bubbles (National Museum, Delhi 78.972)

Another feature prevalent in all examples are bubbles. Unlike the green globular *huqqa* bases, the glass of these six *huqqas* is not filled with seeds, but rather, isolated bubbles of medium size along the neck, body, and base. Overall, the glass seems cleaner, with only a few visible bubbles either created during the melting or manufacturing stage. On all six *huqqas* fine elongated bubbles are seen around the neck, which were most probably shaped during the tooling phase. On *huqqa* 78.972 (fig. 224) several medium to large sized bubbles appear on the body – measuring approximately 2.5 cm in length – with the majority concentrated around the base; these larger bubbles also appear within the surface layers of the glass.

Surface Decoration: Traditions in Wheel-Cutting

Each *huqqa* is decorated with wheel-cut patterning. The wheel-cut technique of decorating glass represents one that followed hard stone engraving.[423] Wheel-cut engraving on glass appears to have been a common practice of Syrian and Egyptian glassmakers from the 1st century AD, with reticulations consisting of concave, oval, or circular facets decorating glassware found in Mesopotamia and modern day Iran, attributed to the Sassanian period.[424] The varied decorative techniques using a wheel

[423] Robert Jesse Charleston, "Wheel-Engraving and Cutting: Some Early Equipment. I Engraving," *Journal of Glass Studies* 6 (1964), p. 83.
[424] Ralph Pinder-Wilson, "Cut-Glass Vessels from Persia and Mesopotamia," *The British Museum Quarterly* 27 (1963), p. 34.

continued on glass objects throughout the Islamic world until the twelfth century.[425] This long and distinguished history of glass engraving seems, after this point, to have ceased entirely; it is not until the eighteenth century that it reappears on Mughal glass objects, for reasons not entirely explained or fully understood.[426] A long established tradition of hard stone cutting (on both rock crystal and gems) was already familiar in India prior to the eighteenth century, with indigenous schools of carving developing and conforming to the aesthetic canons of Mughal patronage of the seventeenth and eighteenth century (fig. 225).[427] Fine examples of jade engraved objects made for Emperor Jahangir (r. 1605-28) demonstrate the lapidary's mastery of the wheel-cut technique, exemplified by the extraordinary jade cup of Shah Jahan (fig. 226).

Fig. 225: Carved Emerald, India, dated 1695-6 - Museum of Islamic Art, Doha JE.86.2002
Fig. 226: Wine cup of Shah Jahan, White nephrite jade, Mughal, 1657
Victoria & Albert Museum, IS.12-1962

The lapidary technique used for hard stone cutting represents an engraving method that most likely remained unchanged since very early times. While it cannot be sure what exact tools a glass engraver used during the Mughal period, it could reasonably be inferred that the methods and equipment's used by hard stone engravers were the same as glass cutters.[428] Based on wheel-cut and lapidary depictions in Indian paintings dated from the seventeenth to nineteenth century, it appears that two related techniques existed, both comprising a fine bow attached to a rotating wheel, which the

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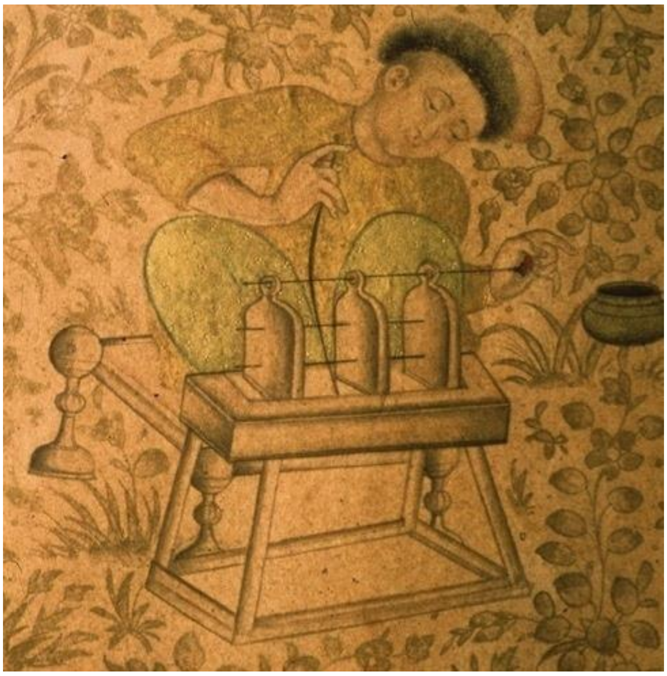
[425] For a discussion of various types of engraving techniques seen on Islamic glass see: Jens Kroger, "Scratched Glass," in *Glass: From Sassanian Antecedents to European Imitations* (London: Khalili Publications, 2006), pp. 140-9 and pp. 168-9.
[426] Carboni (2001), p. 384.
[427] Robert Skelton, "Shah Jahan's Jade Cup," (London: *Victoria & Albert Museum Masterpieces*, 1978).
[428] Charleston, "Wheel-Engraving and Cutting" (1964), p. 92.

lapidary moved at his desired speed, enabling him to apply the necessary pressure to the hand-held engraved object. The technique often used for finer engraving consisted of simple wooden spindles held in wooden lathes, which the lapidary rotated with a bow or pedal on the ground. The wooden spindles had, at their ends, an attached wheel or tip, which could be freely rotated and easily removed based on the lapidary's desired engraving effect. The small rotating wheels were made of lac mixed with grinding powder, with tips of diamond chips or hard stone, to which the lapidary continually applied a moist powder when turning the wheel.[429]



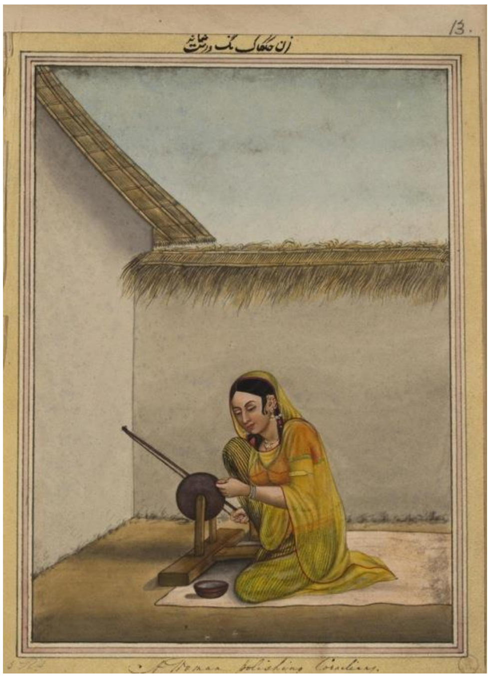


Fig. 227: ***Detail from the border of the Gulshan Album*, India, Mughal, late seventeenth century**
Naprsek Museum, Prague (after Hajek, 1960, plate 10)
Fig. 228: ***A lapidary's wife seated at a wheel*, Lucknow, circa 1815-20**
Victoria & Albert Museum (AL.7970:13)

An illustration of such a technique appears in the borders of the Gulshan album, made for the Mughal emperor during the first quarter of the seventeenth century (fig. 227). The other bow-lathe technique, which appears more frequently in later nineteenth century Company school illustrations (fig. 228) uses a larger bow saw (the blade traditionally made of steel), to which the lapidary again continually applied a moist abrasive powder (such as corundum), with his free hand. Gradually, the rotating action with the added abrasive powder wore the stone, creating the desired engraved effect.

It appears that a comparable wheel-cutting technique also existed in Iran during the late seventeenth century, as described by the French traveller Jean Chardin:

[429] Skelton (1978).

The Persian lapidaries make their wheels of two parts of emery to one of lac….They rotate these wheels hafted on to a circular mandrel, with a bow which they hold in one hand, while with the other they hold the stone against the wheel…When they want to polish the stone, they put in place of this wheel another made of red willow, on which they throw putty or Tripoli. The sea engravers employ the bow and a very small copper wheel with emery. They use Persian and Indian emery.[430]

While Robert Skelton claims that the first jades made for Jahangir show very strong Iranian influence, it is unclear whether this is in reference to the style or technique of engraving, as a long tradition of hard-stone carving existed in India prior to Chardin's observations.[431] The technique described by Chardin is similar to that used in India, even referencing the same types of grinding stones used to cut the objects.

While a bow and lathe method of engraving was used in both Iran and India during the seventeenth century, and most certainly earlier, there is no evidence to suggest that this method was in use in late Medieval Europe.[432] It appears that glass cutting in England developed from German inspired cut-glass imports of the early eighteenth century; shortly thereafter, London glass workers responded by decorating smaller articles of glass by this technique.[433] A London glass seller makes specific mention of 'diamond-cut' glass in a 1735 advertisement.[434] It appears that during the early eighteenth century both diamond and wheel-cut techniques were used to decorate glassware; however, the wheel-cut techniques demonstrated amongst eighteenth century Indian *huqqa* bases does not appear on comparable English glassware.

[430] Jean Chardin, *Voyages du Chevalier Chardin en Perse*, cited C.J. Lamm, *Mittelalterliche Glaser…aus dem Nahen Osten* (Berlin, 1930), p. 516.
[431] See: Skelton, "Shah Jahan's Jade Cup" (1978). For a more detailed discussion of Iran style jades in India, see: A.S. Melikian-Chirvani, "Sa'ida-ye Gilani and the Iranian Style Jades of Hindustan," *Bulletin of the Asia Institute, New Series* 13 (1999), pp. 83-140.
[432] The *facon de Venice* glassware popular throughout Europe in the fifteenth and sixteenth centuries was naturally unsuitable for any form of deep cutting, as its soda-lime *cristallo* composition was simply too soft to engrave; it was not until the late sixteenth century that Bohemian glassmakers who were experimenting with glass compositions produced a harder glass that lent itself more easily to wheel cut decorations. Bohemian and German glass seems to represent the earliest examples of experimentation in deep cut decoration, as opposed to diamond-point engraving, which was already an established form of decoration from the late sixteenth century, with Nuremburg serving as the leading glass engraving school. See: Charleston, "Wheel-engraving and cutting" (1964), p. 88, 92 and Hugh Tait (ed.) *5000 Years of Glass* (London: The British Museum Press, 2012), p. 149 and 179.
[433] Francis Buckley, "The Development of English Cut Glass in the Eighteenth Century," *The Burlington Magazine for Connoisseurs*. 45 (1924), p. 300.
[434] Ibid, p. 300.

It seems that the Indian technique of wheel cutting upon glass developed independently from the diamond or deeper cut engravings of European glass. The globular shaped English *huqqas* dated to around 1690 do not present such engraving techniques, nor does any of the glassware manufactured by Ravenscroft or his followers. Given the tradition and familiarity of wheel cutting on hard stones, it seems that the Indian craftsmen and lapidaries simply transferred the decorative technique from one medium to another. While European glassware, some which most certainly presented such cut decorations, was imported into India from the early seventeenth century, there is no evidence to support the notion that Indian wheel-cut decoration developed in response to these foreign glass imports.[435] Rather, what enabled Indian wheel cutting upon glass was the import of English potash-lead glass, which provided the necessary hardness and durability required for such a hard cutting technique.

The six *huqqa* bases are all wheel-cut and gilt filled. The gilding either fills the cut hollows, or entirely covers a band or selected area. The decoration upon each of the six examples demonstrates a different patterning used for decorating bell-shaped *huqqa* bases. While no two decorations are alike, similarities in treatment and motifs can be detected across all six bases: three *huqqa* bases depict floral motifs, either isolated or framed within medallions, whereby the other three have geometric patterning. One *huqqa* is unique in its representation of colonnaded arches with vases. The decorative motif of floral sprays represents one already seen on both bottles and *huqqas*, and while its treatment follows a similar Mughal decorative repertoire of stylised sprays formally arranged against a plain background, the wheel-cut and gilding render this decorative style unique. A universal feature appearing on the six examples is that gilding fills all wheel-cut decorations.

Example 30.1979 is decorated across the body with six isolated floral sprays, each comprising three flowers of twelve petals stemming from a single vegetal tuft (fig. 207). The flowers are non-descript, but could represent dandelions. The upper shoulder and base are cut and gilded with a running vine and creeper pattern that is flanked by rows of circular hollows and inverted stylised leaves. The upper neck is similarly cut and

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[435] Carboni claims that, "the influence of Bohemian and English glass probably played a more important role in the production of wheel-cut glass vessels. By the end of the 17th century Bohemian glass, which was typically wheel-cut, was being exported to the Indian market. English lead glass had flooded the same market by the second quarter of the 18th century." Carboni (2001), pp. 384-5.

gilded with small isolated flowers (identical to those on the body) with a band of circular hollows encircling the rim.

Example 75.1475 presents a similar decorative technique and style, with an identical running vine and creeper pattern across the upper shoulder and base as well as inverted stylised leaves. Circular cut and gilded hollows represent a common decorative motif found on all six *huqqa* bases, appearing most commonly around the neck and shoulder, but also along the base or comprising the medallions themselves. The medallions framing the isolated floral sprays on example 75.1475 are simply cut in a polylobed (or vegetal) shape (fig. 230). The six large floral sprays (depicting either roses or marigolds) on this *huqqa* have one large central flower with two smaller buds on either side. The space in between each medallion is decorated with a small cut and gilded trefoil, while the upper neck is decorated with this same pattern and framed by two solid gilt bands. The framing of stylised floral sprays within medallions represents a decorative motif more commonly used on bell-shaped glass *huqqas*, although as a motif, can be found on globular *bidri huqqa* bases dated to the second half of the seventeenth century (fig. 231). This may be due to the fact that bell-shaped surfaces were easier to handle, manipulate, and engrave; the elongated bell-shape lent itself more readily to the addition of oval medallions.


Fig. 229: Detail of cut medallion (National Museum, Delhi 61.834)
Fig. 230: Detail of cut medallion (JKMM 75.1475)

This same motif appears on *huqqa* 61.834, yet unlike other cut medallions, is decorated with circular hollows, a feature unique to this particular *huqqa* base (fig. 229). The six large sprays enclosed within the medallions are not flowers but rather stylised leaves, an alternative vegetal motif found on both bell and globular shaped *huqqas,* yet more often depicted against a plain background and not within a medallion.[436] Like the other two *huqqas*, this one has a similar running vine and creeper motif running along the base and upper shoulder, along with finer bands of cut and gilded circular hollows.

Fig. 231: Detail of globular shaped bidri *huqqa* base, India, Deccan, 1650-1700
Victoria & Albert Museum (IS.27-1980)

The other three *huqqa* bases depict dominant geometric patterns. *Huqqa* 68.8.138 is decorated with cut and gilded vertical panels of alternating chequered, stylised leaves ('heart' shape) and geometric hollows ('scale'-like), decorated with a wide horizontal band of hollows across the upper shoulder and base (fig. 232). The repetition of circular cut patterns creates a scale-like effect that differs drastically from the floral elegance of the other *huqqas*. The overall visual effect of this particular base is not matched by others *huqqas*, strongly questioning where the inspiration for this decorative style emerged. Vertical panels of flowers do appear on bell-shaped *bidri*

[436] Two bell-shaped huqqa bases with isolated leaf decoration not framed within medallions are in the Salar Jung Museum, Hyderabad (SJM 124 and SJM 118).

huqqas, such as one currently in a collection in Hyderabad, yet both the decoration and execution are softer on this *bidri* example than upon the glass *huqqa* base (fig. 234).


Fig. 232: VMFA 68.8.138
Fig. 233: Bidri *huqqa* base, India, Deccan, Bidar, circa 1750 (JKMM 76.1251.ME.30)


Fig. 234: NMD 78.973 – Fig. 235: Detail of COR 74.6.1

Huqqa 78.972 depicts a similar pattern of vertical geometric panels, each further detailed with cut criss-crosses (fig. 234). Despite the formal rigidity of this geometric pattern, the upper shoulder and base are decorated with stylised leaf patterns, which, while still rigid in their execution attempt to balance the vertical formality. The wheel-cut decoration on this particular *huqqa* also appears less refined, with the cuts deeper and less delicately rendered. Perhaps the cutting reflects an amateur craftsman or a less wealthy patron.

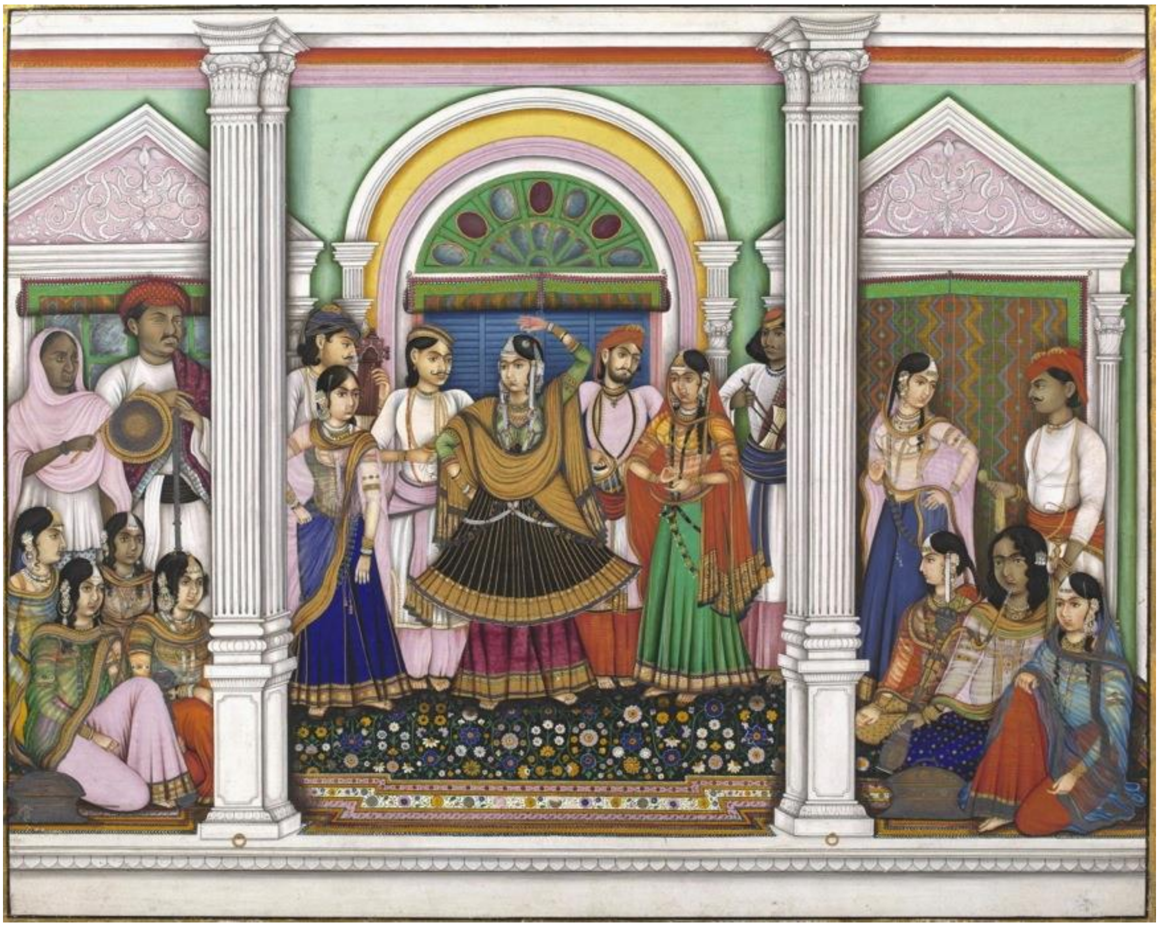

Fig. 236: *A Nautch,* India, Delhi, ca.1820 (Victoria & Albert Museum IS.9-1955)

This last supposition could also account for *huqqa* 74.6.1 (fig. 235). The decoration on this base again represents a unique decorative motif; the six colonnaded arches enclosing an urn (or vase) only appears on one other known glass object (cat. 243). The standing vase with protruding flowers is a motif that appear on textiles, paintings and glass objects previously attributed to Awadh; yet in these examples the vase is softer and more elegantly rendered, with a bulbous upper shoulder that narrows to a slender neck.[437] Here also the singular, undecorated arched domes differ from the

[437] For two similarly depicted vases on textiles see: Victoria & Albert Museum (IS.131-1950) and Victoria & Albert Museum (IM.29-1928); for an example on metal ware see: Jagdish & Kamla Mittal Museum of

polylobed arches seen in Mughal architecture and upon the transparent case bottles. The colonnaded arches upon this bell-shaped *huqqa* base more aptly reflect European architecture of nineteenth century India, where a 'European vogue' appears more prevalently across architectural decoration and within decorative arts.[438] Such architecture can be seen in an 1820 painting of a *nautch* party in a European mansion (fig. 236).

While this *huqqa's* engraver could have taken inspiration from his surrounding environment, or simply copied European architectural elements depicted in another medium, several decorative features nonetheless identify this *huqqa* as being Indian in manufacture. The band of circular hollows running across the base and upper shoulder represent a popular motif found on many bell-shaped *huqqas*. Furthermore, the fine triangle and tri-partite leaf pattern above the arches represents a motif common to the transparent case bottles. As the transparent case bottles are undeniably decorated in a distinctive Indian manner, it seems that this particular feature represents an Indian motif, one that is subtly used on this *huqqa*.

While the wheel-cut decorations appear, more or less, to reflect a standardised articulation and technique, the gold paint similarly reflects a common treatment and colour. Only the gilding upon *huqqa* VMFA 68.8.138 has been tested through EDS analyses, the compositions of which yielded the following results: 0.3% copper (Cu); 2.1% silver (Ag); 97.5% gold (Au). The predominant gold percentages indicate a high quality of gold used for the gilding. As the wheel-cut decoration reflects a cold decorating technique, conversely, the gilding reflects both a cold and hot technique. The gold surface was applied after the glass was engraved. The wavy edges and lack of thicker areas indicate that the gold was applied with a brush. The following passage describes the gold technique of this *huqqa*:

> *The gold may have been suspended in a binder such as glue or honey, as is often described, or possibly a salt solution. The glass surface where some of the gold has worn away is slightly etched, and there is no remaining evidence of a binder having been used. The surface where the gold has slightly worn away does not fluoresce under ultraviolet illumination; it is possible that the huqqa base was heated after the application of the gold to fuse it to the glass.*[439]

Islamic Art, Hyderabad (76.1260.ME.39); for an example on glass see: Stiftung Museum Kunstpalast - Glasmuseum Hentrich (P 1985-98).

[438] Skelton (1982), pp. 18-19.

[439] Dye (2001), Appendix 2, p. 528, *Huqqa* Base 209.

It seems highly plausible that this similar treatment was used for all gilded *huqqa* bases.

Concluding Interpretations

The bell-shaped *huqqa* base starts appearing in Indian paintings from around 1730. While the globular shaped *huqqa* continues in paintings until around 1800, it appears primarily within provincial schools of painting; bell-shaped *huqqas* after the mid- eighteenth century replace globular *huqqas* within an Imperial context.[440]

The decoration upon bell-shaped *huqqas* follows a similar decorative Mughal repertoire as seen on the preceding globular shaped bases; however, variations in motifs and new geometric patterns emerge that appear unique to bell-shaped *huqqas*. For reasons not entirely understood, wheel-cut patterning emerges in abundant fashion as a common decorative feature found only on bell-shaped *huqqa* bases. Given the popularity and proliferation of smoking during the late eighteenth and nineteenth century, as well as the increasing cosmopolitan culture surrounding many courts (such as Awadh), these variations would have been directly translated by an increased experimentation in new patterns and designs. Furthermore, as *huqqas* represented intimate smoking devices, the special commissioning of a *huqqa* reflected an individual's particular taste. The vast number of uniquely decorated *huqqa* bases demonstrates this, as no two bases are identically patterned.

By this period, glass was firmly established as a suitable media for smoking devices, which furthered the production of bell-shaped glass *huqqa* bases. However, even in eighteenth century illustrations of glass *huqqas* and smoking, glass only appears within a royal or courtly context. Its association as a luxury object also makes the objects of this particular study elite, despite smoking's popularisation and proliferation.

440 Zebrowski (1997), p. 229.

DINING WARE OBJECTS: Salvers, Covered Jars & Bowls, Cups & Ewers

CASE STUDY 5: Scalloped Salvers

Introduction

The salver, tray, *sini*, or *thali*, exists in twenty-two examples of transparent, colour, and opalescent glass, differing in size, shape and decoration within the corpus of material examined for this thesis. Many of these most likely served as part of a larger dinner service, which probably included cups, bowls, and covered jars all decorated in a similar manner. Unfortunately no such complete set exists, although a few examples of similarly decorated small cups and saucers exist to support this idea. Zebrowski proposed that trays could have functioned as an accompaniment to 'smoking sets', upon which the ring, *huqqa*, and chillam would have all stood; this set would have been made in the same material with the same decoration.[441] Unfortunately, no such set exists in metal or *bidri* ware; the salvers included in this study most likely only functioned in the context of dinning ware, existing in their own right as serving trays for food and drink.

The four salvers within this study all have a scalloped edge. Two are of an opalescent pale green glass, one in a flashed transparent and cobalt blue glass, and the other in a translucent colourless grey glass. The surface decorations differ, from painted, gilded, wheel-cut and appliqué (low-fused enamel), demonstrating the diversity of artistic skills used to decorate glass. This diversity stems from different artistic influences or inspirations, some of which are seen on other glass examples, while others are unique to these four glass salvers. Despite differences in shape, size, colour of glass, and surface decoration each object represents an excellent example of technical and artistic accomplishment.

The four salvers are currently in the following collections: Corning Museum of Glass, New York 74.6.2 (fig. 237); The Metropolitan Museum of Art, New York 1987.158 (fig. 238); The Metropolitan Museum of Art, New York 1971.84 (fig. 239); and the Jagdish and Kamla Mittal Museum of Indian Art, Hyderabad 76.1474 (fig. 240).

[441] Zebrowski (1997), p. 247.

Fig. 237: Cat. 79

Fig. 238: Cat. 78.

Fig. 239: Cat. 81

Fig. 240: Cat. 77

Form & Function: History and Representation

The shape of the scalloped edge salver can be traced back to surviving examples of both metal ware and jade plates of the seventeenth century. While scalloped edges were carved into jade plates, they were moulded in both metal and glass examples. One of the earliest examples of this shape appears in a *bidri* ware plate dated to the late seventeenth century and measuring 31 cm in diameter with twenty-eight scalloped lobes encircling its outer rim (fig. 241).[442] The scalloped edge continues on later *bidri* examples, such as a mid-eighteenth century tray with forty scalloped lobes decorating its rim, attributed to either the Deccan or North India, currently in the Virginia Museum of Fine Arts (91.298).


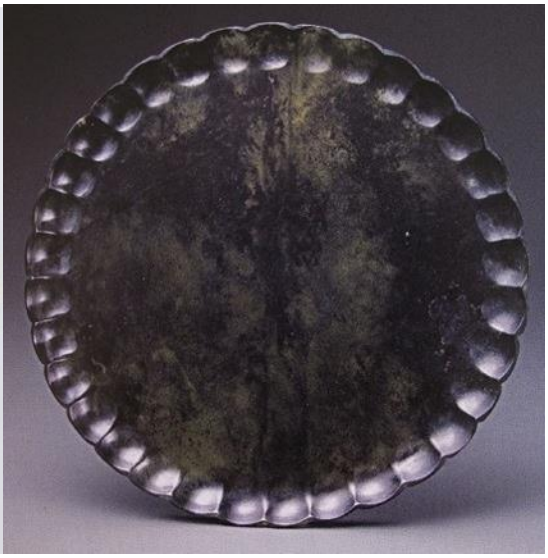

Fig. 241: *Bidri salver*, India, Deccan, late 17th century, Private Collection
Fig. 242: *Jade salver*, India, Deccan, 17th century, al-Sabah collection, Kuwait (LNS 219 HS

The numbers of scalloped lobes on the glass salvers vary from thirty-eight (fig. 239), twenty-seven (fig. 237) and eighteen (figs. 238 and 240). Jade salvers with scalloped edges are generally much smaller than the *bidri* examples, as seen in a late seventeenth century example measuring 13.5 cm in diameter with thirty-two engraved scallops encircling its outer rim (fig. 242). Based on surviving examples of both metal ware and jade, the scalloped edge most likely developed as a stylistic decorative feature in the late seventeenth century; no earlier examples have thus far been identified.

It is often difficult to identify the exact material of salvers represented in Indian paintings, as they lie flat on the surface, often carrying a selection of cups, bowls, or fruits; they function more as serving trays than plates to be eaten from. At best, only

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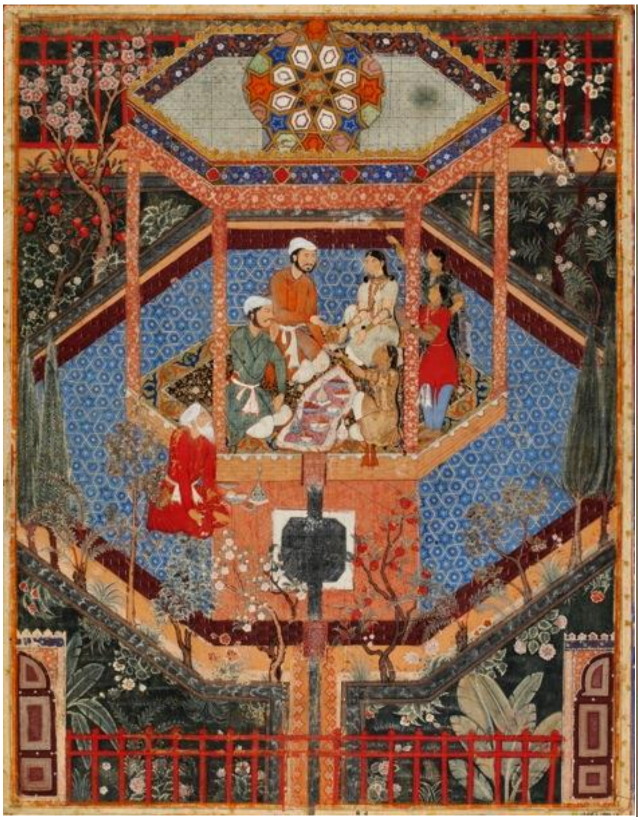
[442] Private collection, London; published in *Sultans of the Deccan 1500-1800* (2015), fig. 92. This attribution was made by Stuart Cary Welch; see Welch, 1985, no. 161, pp. 245-6.

the outer rim is visible, imparting perhaps a glimpse of its colour, with no detail of patterning or decoration seen.



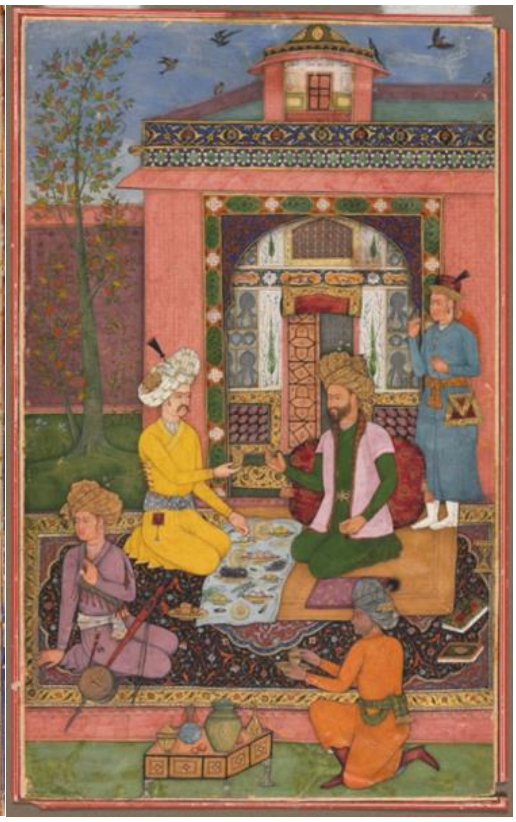


Fig. 243: ***Prince Alamshah Rustam with Mirh Afruz in a garden pavillion*****, from the** ***Hamzanama,*** **Mughal dynasty, circa 1562-1577 (Victoria & Albert Museum IS.1506-1883)**
Fig. 244: ***A Feast in a Pavilion Setting*****, India, Mughal Dynasty, circa 1620**
Cleveland Museum of Art (1920.1966)

Illustrations of dining ware appear in early Mughal paintings depicting feasts or ceremonial events where food and drink is shared. Some of Emperor Akbar's earliest commissioned albums, such as his *Hamzanama* (Story of Hamza)*,* circa 1562-77, illustrate garden pavilion scenes with bowls, cups and plates placed upon the ground (figs. 243 and 245). Another Mughal painting dated to around 1620 shows a similar pavilion feast in which a variety of dining ware objects are placed on a carpet and a square table (fig. 244). In both paintings the plates stand on a tubular foot rings (a feature found on Indian glass plates and salvers, see Cat. 82 and 86), and while these illustrated plates cannot be confidently attributed to glass, the form and function of them remains unchanged from the earliest representations of ceremonial or courtly feasting, to later eighteenth century paintings of leisure and entertainment (figs. 246 and 247).[443]

[443] The dinning ware objects illustrated in these paintings, if glass, were most likely foreign imports. English East India Company records of the same period support the import of English drinking glassware to

Fig. 245: Detail of figure 243

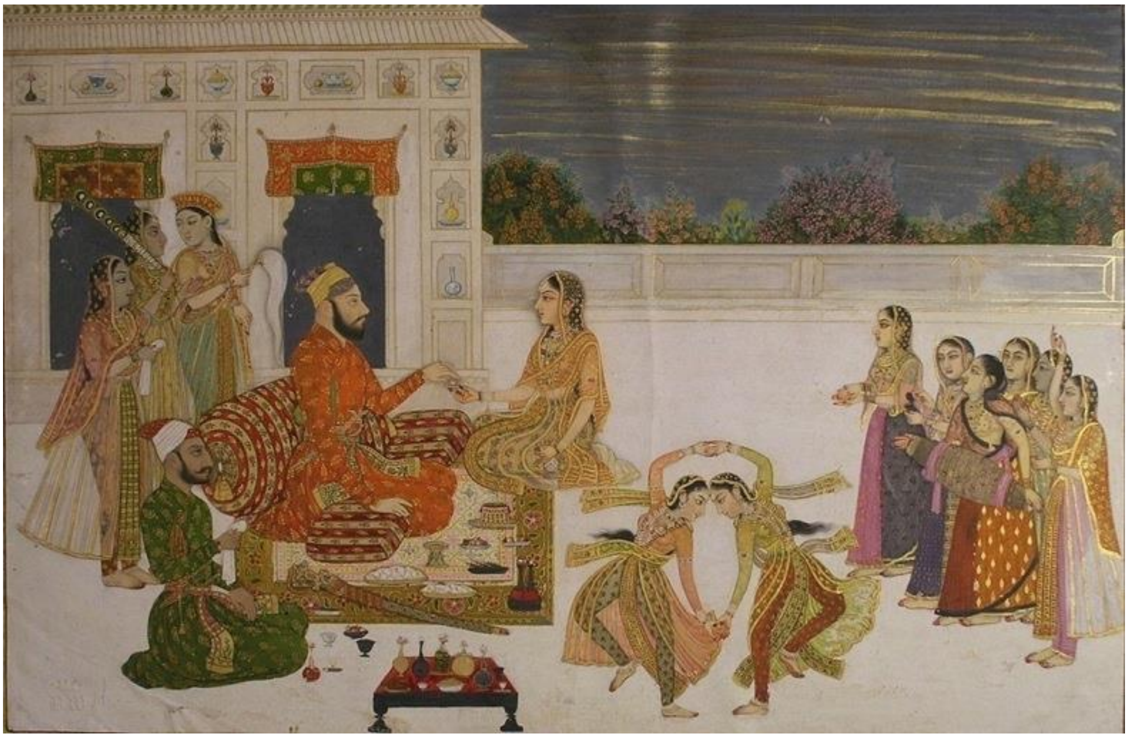


Fig. 246: *Evening Entertainment on a Terrace*, India, Mughal, circa 1720-40
The David Collection, Copenhagen (D 16/1994)

Madras and Surat. It is reasonable to suppose that other dinning ware objects could have been included amongst these glassware imports, even if there is no specific mention of them; See: IOR/L/AG/1/1/3, folio 529 [General Leger: 8th Feb, 1667] mentions “Drinking Glafses”.

Fig. 247: Detail of figure 246

Comparative Analysis of Shape, Glass, Technique, and Manufacture

These four salvers are all mould blown. The difference in both size and number of scallops (eighteen to twenty-eight) indicates that each was made in a different mould. Both salvers with eighteen scallops measure 10.2 cm in diameter; whereas MET salver 1971.84 has thirty-eight scallops and measures 23.7 in diameter. The last salver is oval shaped and measures 24.8 by 18.3 cm with twenty-seven scallops. The weights of three of the four salvers also vary: the smallest (MET 1987.158) weighing 63.9g; the second smallest (76.1474) weighing 172.7g; and the largest circular (MET 1971.84) weighting 635g. Despite these differences, the overall shape and manufacturing technique of all four salvers is similar; they are rounded in shape with a slightly raised centre and concavity around the edge.

The walls are shallowly curved and terminate in a rounded rim on the smaller examples (MET 1987.158 and 76.1474) and a flattened, grounded rim on the larger two (fig. 248). All salvers are elevated on a slightly raised base, where the moulded scalloped edging terminates, presenting an even, flattened surface. A small circular pontil mark appears in the centre of all, measuring a maximum length of 1 cm, and is neither abrasive nor obtrusive in appearance (fig. 249). Furthermore, the exterior surface of each remains undecorated.

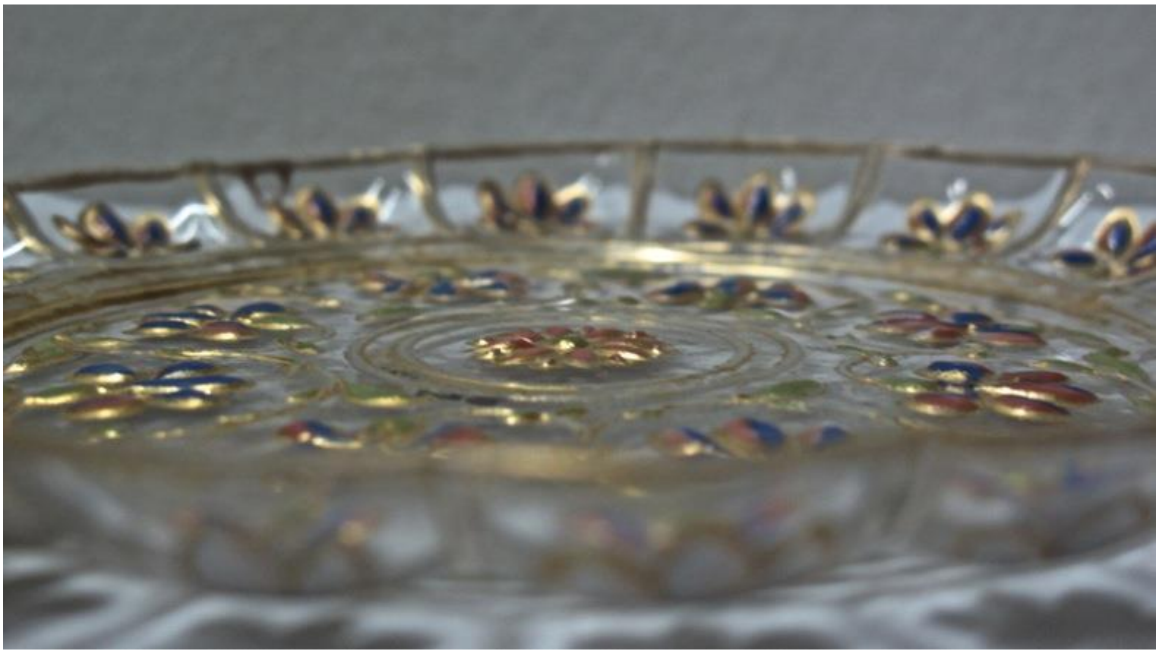


Fig. 248: Detail of shallow wall and rim (JKMM 76.1474)

Fig. 249: Reverse and pontil mark (CMG 74.6.2)

The glass colouring, and therefore composition, also differs for each salver: 76.1474 is of a transparent clear glass; MET 1971.84 of a flashed transparent cobalt and clear glass; and both MET 1987.158 and COR 74.6.2 of opalescent pale green glass. Despite differences in glass, air bubbles of varying sizes appear in all examples, most visibly detected along the exterior lobed cavetto and bases. Furthermore, inclusions and chill marks are also detected along the bases.

Salver 76.1474 is made of transparent clear glass, and presents visible seeds, large bubbles, refractory stones, and inclusions. Both the seeds and refractory stones appear throughout the glass, yet are most visible in the flattened centre of the salver; these appear as small dots, or constellations in clear and slightly darkened colours. The salver also has larger bubbles close to or within the scalloped lobes, the largest measuring approximately 1.5 cm in length (fig. 250). A few minor inclusions are scattered throughout the glass, with chill marks faintly detected along the base, an indication that it was made in a metal mould.

Fig. 250: Detail view of glass (JKMM 76.1474)

MET 1971.84 is made of flashed or cased glass, meaning, two layers of glass in which the initial gather is encased by another glass colour; unfortunately, the detailed image below does not adequately illustrate the doubled layering effect of this glass technique (fig. 251).

The intention of cased or flashed glass was usually to be carved in order to create decorative patterns by revealing the inner glass layer.[444] This technique was practiced by early glassmakers in the Near East and West, but fell into desuetude until it was 're-discovered' in the eighteenth century.[445] The technique was widely employed in Bohemia in the second quarter of the nineteenth century, and is commonly found on Chinese snuff bottles from the early eighteenth through nineteenth century.[446] While an

[444] Carboni (2001), p. 394.
[445] Phelps Warren, "Later Chinese Glass: 1650-1900," *Journal of Glass Studies* 19 (1977), p, 113.
[446] Carboni (2001), p. 394.

interesting parallel to flashing is found in Chinese eleventh and twelfth century porcellaneous stoneware, where a slip of one colour is carved away to reveal a second colour beneath, it remains unknown whether Chinese glassmakers independently discovered this method or were introduced to it from the West.[447] The Chinese connection to this Indian plate seems similarly farfetched; it seems more likely that the emergence of this decorative technique in both Chinese and Indian glass arrived from either European craftsmen sometime in the eighteenth century, or merely developed independently in response to European imports, which were copied through a process of trail and error.

Fig. 251: Detail of two layers of flashed (or cased) glass (MET 1971.84)

Fig. 252: Detail of glass (MET 1971.84)

[447] Ibid, p. 394.

The broken piece from the edge of this salver allows for the flashed colours to be more easily examined, revealing that the initial colour was a light, transparent blue, with darker cobalt blue added. The lighter layers of glass on the exterior reveal that the glass is filled with seeds and bubbles of various sizes running throughout the layers (fig. 252). Furthermore, small dark inclusions and chill marks appear along the exterior edge of the scalloped lobes and base, indications of contamination and the use of a metal mould.

Given the opalescent nature of the pale green glass, detecting visual traits is more challenging; however, light colour bubbles contrast the pale green, and can be seen in areas not gilded or painted. The MET salver 1987.158 presents small dark inclusions around the base and central floral motif (fig. 253). Small indentations also appear upon its surface, indicating the bursting of small bubbles, which may have popped when removed from the metal mould (fig. 254).   As with the other examples, subtle chill marks appear around the base.

Fig. 253: Detail of base (MET 1987.158)

Fig. 254: Detail of burst bubbles (MET 1987.158)

Corning plate 74.6.2 presents several visible bubbles differing in size, the largest measuring approximately 3 cm in length, appearing on the front of the plate towards the scalloped edge (fig. 255).

Fig. 255: Detail of bubbles in glass, fig. 209 (CMG 74.6.2)

As with the other opalescent green salver, small bubbles at the glass's upper surface layers have burst. In addition, seeds and small dark inclusions appear scattered throughout the glass. Like the other three examples, the base of this oval shaped salver presents chill marks, although considerably less visible than on the transparent examples.

The use of opalescent pale green glass for these two salvers represents an attempt to imitate jade. Three known plates exist in opalescent pale green glass, yet only the Corning plate 74.6.2 has been tested through XRF analysis. The results of this analysis yielded the following: iron (Fe) and tin (Sn) representing the predominant elements, with potassium (K), lead (Pb) detected in smaller amounts and traces of copper (Cu), manganese (Mn) and calcium (Ca) (fig. 34). The opacity in the glass is created by the growth of crystals within the glass matrix. This occurs during the cooling phase, when the tin fuses with the lead oxide, creating tiny refractory particles that block the passage of light. While the use of tin as an opacifying agent in pottery glazes started in the Far East from the Bronze era, evidence supports the use of both tin and lead as opacifying agents to produce opaque white glass in London glasshouses only since around 1670, although it is possible that it was used earlier.[448] From this date both London and Dublin glassmakers possessed the technology to produce a wide range of opaque colours, yet no evidence supports a strong domestic (or international) market for such colour glassware.[449] A mid-eighteenth century English observation of the use of tin in specifically creating opaque white glass exists; according to Dossie, writing in *The Handmaid to the Arts* in 1758, "The substances that have been used for producing an opake whiteness, are, calcined tin (commonly called putty,) calcined antimony, ...".[450]

English experimentations in making opaque white glass in Europe most likely derived from the Italian desire to imitate Chinese hard-past porcelain, starting around 1500.[451] The Italian practice of making opaque white glass, called, *lattimo* – a technique created by adding either bone ash or chalk to the raw batch - became popular during the Renaissance.[452] As this glass making technique travelled across Europe in the sixteenth and seventeenth centuries, objects were purposely manufactured in white opaque glass to provide a monochrome background suitable for the application of polychrome enamel colours. The popularity of this glass making technique in England, since its supposed introduction in the late seventeenth century, most likely arrived with Italian glassmakers who were already familiar with these techniques. While opaque white glass was intended to imitate Chinese porcelain, no other evidence supports the experimentation of other opacified colour glass in England during the late seventeenth or eighteenth centuries, or the intent to imitate Chinese jade.

Given the elevated lead levels in the glass, it is plausible that this opacified pale green glass originated in England; however, this type of glass was clearly unpopular, as

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448 For an article discussing tin-opacification in pottery glazes see: R.B. Mason and M.S Tite, "The Beginnings of the tin-opacification of pottery glazes," *Archaeometry* 39 (1997), pp. 41-58; the dating of English glasshouses using tin was mentioned in an email correspondence by Colin Brain, dated August 8th, 2015. For further information on this see: Christopher Merret. *The Art of Glass, wherein are shown the wayes to make and colour Glass, Pastes, Enamels, Lakes, and other Curiosities* (London: Octavian Pulleyn, 1662).

449 An excavation in Dublin found a wide range of coloured glass-making residues, but it has only been possible to identify one possible surviving coloured-glass that may have been made there; see: J.M. Hearne. *Glassmaking in Ireland : from medieval times to the contemporary* (Dublin: Irish Academic Press, 2010).

450 R. Dossie. *The Handmaid to the Arts* (London, 1758), Vol. 2, p. 284.

451 Robert Jesse Charleston, "English Eighteenth –Century Opaque White Glass," *The Magazine Antiques* 66 (1954), pp. 294-297; and Timothy H. Clarke, "Lattimo – A Group of Venetian Glass Enameled on an Opaque-White Ground," *Journal of Glass Studies* 16 (1974), pp. 22-52.

452 Florian Knothe, "East Meets West: Cross-Cultural Influences in Glassmaking in the 18th and 19th Centuries," *Journal of Glass Studies* 52 (2010), pp. 201-216; and Paul Perrot, *Three Great Centuries of Venetian Glass, special exhibition catalogue* (Corning: Corning Museum of Glass, 1958).

no known examples of English origin have been identified. Perhaps opacified white glass was imported into India, and both the iron and copper used as green colouring agents were added during the subsequent re-melting. To date, only four known opacified white glass objects attributable as Indian exist: a large basin (fig. 256; cat. 103); a candle stick holder (fig. 257; cat. 105); a footed bowl and plate (figs. 258 and 259; cat. 104); and a bell-shaped *huqqa* base (fig. 260), yet only white colour *huqqa* bases are illustrated in eighteenth century Indian paintings.[453] While more representations of white colour *huqqas* exist than surviving examples, their representation within eighteenth century paintings, nonetheless, supports their existence (fig. 261).

Fig. 256: Cat.103 – Fig. 257 – Cat. 105

Figs. 258 and 259: Cat. 104

[453] See: *Husain Ali Khan Entertaining His Brothers* (The Sayyid Brothers), c. 1712-1719, India, Mughal, 18th century; Cleveland Museum of Art (2013.334); and *A Prince and lady reclining smoking huqqa*, India, Lucknow, circa 1770; Victoria & Albert Museum (IS.285-1951)

 

Fig. 260: *Huqqa base*, Cat. 166 (SJM 148)
Fig. 261: Detail of fig. 213 (V&A IS.285-1951)

The opalescent pale green salvers, therefore, could have used white glass as a base, and added both iron and copper as green colouring agents; however, no evidence to date supports the import of opacified or opalescent glass into the Indian subcontinent. The 1765 Albion wreckage only revealed transparent colour ingots.[454] The high iron levels in the Corning plate were most certainly intentionally added, but could have also reflected contamination entering from either the iron rod or blowpipe. The lower copper traces would have been added as colourants, yet unlike the high copper levels existing in the green globular *huqqa* bases, they appear in much lower percentages. More likely, these opalescent pale green salvers reflect experimentations in Indian glass making, one whose motivation stemmed from a desire to imitate an already long and well-established admiration for jade objects.

Imitation Jade

The two plates in the Metropolitan Museum of Art and the Corning Museum of Glass represent rare examples of opalescent green painted glass.[455] This glass technique, of which only a limited number of known examples exist, was probably inspired by

[454] Redknap and Freestone (1995), p. 146.
[455] The third example is of a semi-translucent green glass with gilded decoration, yet does not have a scalloped edge; it is currently in the Stiftung Museum Kunstpalast - Glasmuseum Hentrich (Sammlungen), Dusseldorf (P.1985-97).

carved green jade objects.[456] While the adoption of glass as an imitation, or substitute, for semi-precious stones and gems has a long history in India, its imitation of jade only started much later, probably around the eighteenth century.[457] The desire to replicate or imitate an expensive, highly valued material encouraged glassmakers to experiment in new manufacturing techniques, yet the scarcity of surviving examples raises the question whether the glassmakers were successful in their endeavours, or whether the patrons encouraged these new techniques. Given the exquisite examples of decorated jade objects created for members of the royal Mughal court, and the continuation of jade production throughout the eighteenth and nineteenth century, these two objects represent apparent anomalies.

The early Mughal Emperors inherited their love for jade from their ancestors, the Timurids.[458] Not only did jade symbolically serve as a means of legitimising their Timurid ancestry, but it also represented a symbol of social status.[459] Nephrite jade was known in Central Asia, in the eastern Turkestan region of Khotan, since the fourth or third century BCE,[460] but Mughal jades bearing dated dedicatory inscriptions appear within the first few years of Jahangir's reign (r. 1605-27); although, these jade carving workshops were most likely already established under Akbar, if not earlier (fig. 262).[461] The

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[456] Warren (1977), p. 117; and Stefano Carboni, "Islamic Art: Arts Vitraria: Glass in the Metropolitan Museum of Art," *The Metropolitan Museum of Art Bulletin* 59 (2001), p 32.
[457] Dikshit (1969), p. 49.
[458] Debates still surround whether jade carving was introduced into the Islamic world under the Timurids in the fifteenth century. Robert Skelton claimed in 1996 stated, "Although the material [jade] was thus known in the Islamic lands before the 15th century, there is no evidence of it being worked by lapidaries under Islamic patronage until Timur's grandson Ulugh Beg (1394-1449) acquired two large blocks of greenish-black nephrite in 1425. These were taken to Samarkand to be carved and inscribed for use as Timur's tombstone in the Fur-i Mir." For more discussion on this see: Robert Skelton, "Islamic Art, 8: Jade," *The Dictionary of Art*, Vol. 16 (1996), p. 527; J.M. Rogers. *Islamic Art and Design 1500-1700* (London: The British Museum, 1983), p. 149; and Manuel Keene, "Old World Jades outside China, from Ancient Times to the Fifteenth Century," *Muqarnas* 21 (2004), p. 193.
[459] Stephen Markel, "Carved Jades of the Mughal Period," *Arts of Asia* (1987), p. 123.
[460] Pedro Moura Carvalho, *Gems and Jewels of Mughal India (Nasser D. Khalili Collection of Islamic Art)* (London: Khalili Collections, 2007), p. 52.
[461] For more research into the long history of jade carving in Iran see: Melikian-Chirvani, A.S. "The Iranian Wine Horn from Pre-Achaemenid Antiquity to the Safavid Age" *Bulletin of the Asia Institute* 10 (1996): 85-139; for the relationship between Iranian and Hindustani jades see: A.S. Melikian-Chirvani, "Sa'ida-ye Gilani and the Iranian Style Jades of Hindustan," *Bulletin of the Asia Institute, New Series* 13 (1999), pp. 83-140. For examples of a jade carving done during Jahangir's reign see the example in the Brooklyn Museum, New York (inv, no. 178.22) and Ulugh Beg's jug in the Calouste Gulbenkian Museum, Lisbon (inv. No. 328).

lapidaries responsible for carving jade used the same bow drills as the agate, rock crystal, carnelian, and later glass as the lapidaries had done for centuries before.[462]

Fig. 262: *Jahangir's jade wine cup*, India, Mughal, dated 1613 (V&A, IM.152-1924)
Fig. 263: *Archer's ring*, India, Mughal, circa 1650 (V&A, 02522,IS)

While the earliest jades carved under Akbar's reign are considered relatively plain and show a preference for darker green jade, those made under Jahangir used paler jades, which, starting around the late 1620s, developed a naturalistic yet stylised decorative floral patterning carved in low relief.[463] During the reign of Shah Jahan (r. 1628-58) jades inlaid with precious metal thread and stones become popularised (fig. 263). The French traveller Francois Bernier, who was in India between 1656 and 1688 wrote that jade was held "in great estimation in the court of the Mogol…cups and vases are made of this stone. I have [seen] some of [the] most exquisite workmanship, inlaid with strings of gold, and enriched with precious stones."[464]

It is in the eighteenth century when jade carving shifts stylistically from the classicised purity of both Jahangir, and later Shah Jahan's more embellished jades, into a 'non-classical Mughal style'.[465] Here, examples of jade carving and decoration most

[462] Moti Chandra, "The art of cutting hard stone ware in Ancient and Modern India," *Journal of the Gujarat Research Society* I (1939), pp. 71-85.
[463] Skelton (1982), p. 15; and Markel (1992), p. 53.
[464] Francis Bernier, *Travels in the Mogul Empire AD 1656-1668*, trans. A Constable (London: Oxford University Press, 1891; reprint 2nd ed., Rev. V.A. Smith, New Delhi: Oriental Books Reprint, 1983), p. 423.
[465] Teng Shu-p'ing, author of the National Palace Museum catalogue on Islamic jades (published in 1983 and again in 2007) traced the evolution of form and decoration of carved Hindustan jades of the seventeenth and eighteenth century, proposing that the stylistic differences of the later non-classical Mughal style jades are due in part "to regional stylistic variation and relatively late date, but also to some extent to the addition of local Hindu, Western Asian Turkish, or East Asian Chinese stylistic elements." See: Teng Shu-ping, trans. David M. Kamen, *Catalogue of a Special Exhibition of Hindustan Jade in the National Palace Museum* (Taipei: National Palace Museum, 1983), pp. 75-9.

strongly correspond in both scalloped rim and painted decoration to the two opalescent glass salvers of the MET and Corning (figs. 264 and 265).[466]


Fig. 264: ***Box and cover*****, jade and gold, India, eighteenth century (V&A, 02544.IS)**
Fig. 265: ***Dagger hilt,*** **jade and gold, India, eighteenth century (V&A, 02583.IS)**

While many scalloped edged jade plates or salvers remain undecorated, a few gold examples exist.[467] The existence, albeit rare, of only gilded and painted carved jades demonstrates how these objects could have influenced glass production and decoration, whilst furthermore, providing a plausible date for the opalescent green glass salvers.

Surface Decoration

The MET salver 1987.158 represents a spectacular example of painting upon glass; despite its small size, the detailing is most accomplished. The centre of the plate is painted with a large pink flower in full blossom, delicately highlighted with deeper pink details outlining the leaves' veins (fig. 266). The flower itself is most probably a rose, a flower that held a long tradition of use as a decorative motif across Mughal north and central India, often depicted in full bloom.[468] Gold paint initially surrounded the central blossom, filling the remaining areas, but has since worn, leaving only traces of gilding between the leaves. The central flower has been attributed as Mughal or Deccani, with

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[466] Ibid, See: figs. 168 – 182, pp. 137 – 145.

[467] See examples no. 11 of table 12, and jade plate 191 for examples of gold paste painting technique; and no. 12 of table 12 as well as plates 19, 39, 78, 204, and 207 for painting technique, in Shu-p'ing Teng. *Exquisite Beauty: Islamic Jades* (Taiwan: National Palace Museum, 2007).

[468] The particular use of a rose on this saucer does not have any significant symbolism beyond its decorative feature, although it shares a long history of representation within both Persian style in India and later Mughal decorative arts. The rose was reportedly admired by Jahangir during his 1620 visit to Kashmir, and appears in flower studies by artists of Shah Jahan's period, such as in the album that Prince Dara Shikoh presented to his wife Nadira Banu Begam in 1641/42 [BL, ms.Add.Or.3129, fol.63v], as well as in the Small Clive Album, thought to have been given by Shuja ud-Daula, the Nawab of Awadh, to Lord Clive during his last visit to India in 1765-67 [V&A IS.48: 24B-1956].

the diminutive petals associated with contemporaneous illustrated manuscripts from Northern and Central India.[469] A fine running vine and creeper motif painted in pink against white encircles the central spray; this same motif vertically separates each scalloped lobe decorated with a stylised, single gilded leaf. The elaborate and elegant execution of the central floral motif does not rival any other decoration appearing on Indian glass; given the salver's small size, its artistic accomplishment suggests that it must have been commissioned for a royal patron. Its size further suggests it was a saucer that could have belonged to a larger set, of which no comparative examples in either glass or decoration exist.

Fig. 266: Detail of MET 1987.158

Similar singular floral sprays also appear on jade salvers, although these carvings do not achieve the same degree of detailed elegance as the painted rose on the salver. Two examples of carved floral sprays exist on jade salvers dating to the seventeenth (fig. 267) and eighteenth century (fig. 268); these are executed with a bold elegance, each detailing the petals' veins with subtle technical mastery. The similarity in shape, size, composition and detail show strong similarities between the glass salver and its Indian jade counterparts.[470]

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[469] Carboni, "Islamic Art," MET Bulletin (2001), p. 32.

[470] For a more detailed discussion of the artistic and technical connection between Chinese and Indian jade carving traditions see: Robert Skelton, "The Relations between the Chinese and Indian Jade Carving Traditions" in *The Westward Influence of Chinese Arts from the 14th to the 18th century*, *Colloquies on Art & Archaeology in Asia* 3 (London: SOAS, 1972), pp. 98-108.

Fig. 267: ***Jade plate*****, India, seventeenth century (after Teng 2007, plate 54, p. 64)**

Fig. 268: ***Jade plate*****, India, seventeenth century (after Teng 2007, plate 178, p. 142)**

The decoration on the Corning plate 74.6.2 is influenced by both jade and *bidri* ware designs of the seventeenth and eighteenth centuries. This plate is decorated with a central oval shaped cartouche of arabesques, encircled by a herringbone band, two fine solid gilt bands, and a stylised leaf (or tripartite lobe) pattern punctuated by small dots (fig. 269). The stylised leaf patterning, in particular, is identical to that of the green globular *huqqa* base in the British Museum (fig. 270); these represent the only two glass examples with such a motif.

Fig. 269: Detail of CMG 74.6.2

Fig. 270: Detail of upper shoulder, BM 1961.10-16.1

Fig. 271: *Bidri plate*, India, Deccan, mid-seventeenth century (JKMM 76.1227.ME.6)

A solid gilt band connects each tripartite lobe to a larger tripartite motif encircling the plate's extremity, creating an effect similar to rays radiating from the central medallion. Each lobe is decorated with a single stylised floral spray, the same motif again appearing around the upper neck of the British Museum green globular *huqqa*. The similarities between both decorative motifs could suggest the same painterly workshop or atelier; however, the plate's gilded bands and overall composition more strongly corresponds to a mid-seventeenth century *bidri* plate in Hyderabad (fig. 271). This *bidri* plate provides a date for when this particular pattern emerged, and while the glass plate is not dated as early, its compositional patterning might have roots in the seventeenth century Deccan.

Several jade plates illustrated in Teng's 2007 catalogue are decorated with floral patterns in gold foil affixed with transparent paste similar to that of the Corning plate 74.6.2 (figs. 272 and 273). The use of plain gold (foil or thread) to decorate carved jades is stylistically similar to gilded decorations seen on glass; the contrast of gold against a monochrome surface (grey, white, or pale green jade) creates an elegant effect, one which may have started during Shah Jahan's reign but continued throughout the eighteenth century.[471]

Fig. 272: *Jade salver with gold foil*, India, eighteenth century (after Teng 2007, pl. 186, p. 226)

[471] Shu-p'ing Teng (2007), p. 240.

Fig. 273: ***Jade salver with gold foil*****, India, nineteenth century (after Teng 2007, pl. 187, p. 227)**

The MET salver 1971.84 is decorated with flashed or cased glass and cut deeply to expose its contrasting colours (fig. 274). The initial glass gathering was of transparent light blue glass, then encased with a darker cobalt blue. Once mould blown and sufficiently annealed, the plate was then wheel-cut and gilded. The cobalt blue floral decoration, carved in high relief, contrasts the lighter background, while the cavetto (moulded with thirty-eight oval shaped leaves) adds a beguiling complexity to the already accomplished carving of iris sprays.

Fig. 274: Detail of flashed glass, fig. 211 (MET 1971.84)
Fig. 275: ***Tray with Flowering plants*****, Deccan, Bidar, seventeenth century**
Private collection, London (after Haidar and Sardar 2015, fig. 93)

A small circular medallion decorates the centre of the salver, with iris sprays set in triangular cartouches radiating outwards towards the lobed cavetto. A fine chequered gilt band frames each carved motif, from the central medallion to the outer rim, creating a geometric contrast to the salver's floral elegance. The overall effect of patterns and colours is dynamic, bold and highly elegant. Stylised floral sprays set within polylobed cartouches radiating from a central medallion also appear on *bidri* plates dated to the seventeenth century (fig. 275); as with the opacified jade salvers, the pattern on this glass plate may have taken its inspiration from pre-existing metal ware objects.

The simplified stylisation of the MET flashed salver, in comparison to the complex intricacy of the *bidri* plate, nonetheless demonstrates a technical skill of both flashed glass making and wheel-cut carving. The salver weighs 635g and is thickly moulded, which most certainly facilitated the articulation of its deep wheel-cut decoration. While wheel cutting exists on other glass objects (mostly *huqqa* bases) no other examples of Indian engraved flashed glassware exist, making this example unique.[472] Furthermore, the raised relief patterning would have made balancing items upon the salver difficult; this salver was most likely only admired as an example of accomplished artistic achievement.

Salver 76.1474 represents another example of artistic accomplishment intended for admiration and not use. This small transparent salver decorated in raised pink, blue and green enamel outlined in gilt represents an 'appliqué' decorative style not seen on many glass examples (fig. 276). This technique requires firing a layer of white enamel glass before applying the colour paints and gilt; the relief pattern created by the white enamelling would then be painted, gilded, and fired a second time. It required enormous technical skill in order to sufficiently fuse the enamels to the glass whilst not melting the object itself. The use of applied and fused low-fired glass is not unique in the history of Islamic glassmaking; in particular, it was known to the early Mumluk painters.[473] It is, nevertheless, extremely rare. It remains unknown how this technique was transmitted to the Indian craftsmen, but it most likely arrived with the introduction of enamels with the East India Company traders in the early seventeenth century.[474] The appliqué decoration across this salver depicts isolated iris sprays of pink, blue and green

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[472] Only one other object attributed by Carboni as being Indian made and decorated exists in flashed (or cased) glass, yet this small snuff or perfume flask has not been carved. This object is currently in the al-Sabah Collection, Kuwait (LNS 2183 G); see: Carboni (2001), p, 394.
[473] Carboni (2001), p. 375.
[474] Stronge (2010), p. 218.

and outlined in gold within eighteen scalloped lobes encircling the central medallion. The appliqué technique of iris sprays only appears on a few other glass examples, including a covered bowl (cat. 68), two globular *huqqa* bases (cats. 124 and 126), and a case bottle (cat. 30). Given the raised quality of this decorative technique, it seems highly unlikely that this salver would have balanced other objects upon it, or been used to serve food. Its exceptional condition further supports its function as purely decorative.

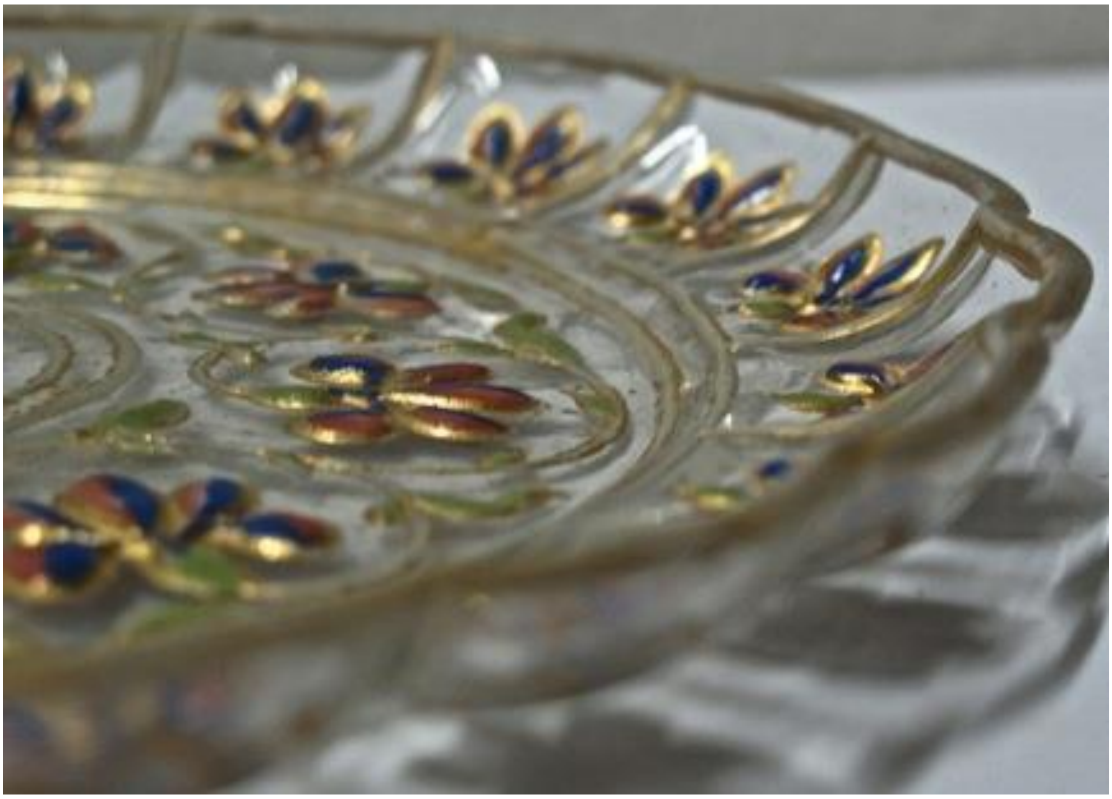


Fig. 276: Detail of appliqué technique (JKMM 76.1474)

Concluding Interpretations

Each of these four salvers represents an example of either a glass making or decorative technique that renders it unique within the corpus of glassware examined in this thesis. The two opalescent, pale green plates demonstrate the attempt to imitate jade, while the blue salver represents a rare example of flashed glass. The transparent salver, while not unique in colour, has a rare appliqué patterning. The scalloped lobed edging of all four salvers isolates them as a group. While salvers appear as serving trays within Indian paintings dated from the late sixteenth century, the scalloped edge only appears in metal ware and carved jade from the mid-seventeenth century. Furthermore, the surface decoration – a variety of cold painted, gilded, wheel-cut and appliqué – demonstrates a level of artistic achievement that suggests their function as salvers to be admired and appreciated.

The composition of Corning Museum of Glass plate 74.6.2 has lower lead levels compared to other tested specimens, which may simply reflect the chemical composition of the opalescent glass; its high iron and tin levels reflect colouring and opacifying agents used to render the glass its opalescent pale green colour. Furthermore, the Corning Museum records indicated that this plate was acquired in Delhi, suggesting a possible Indian provenance, whilst offering a date of 1735 for its production, which, as Carboni comments, "is acceptable on art-historical grounds though inexplicably precise in the absence of further information."[475] The various traits visually detected within all four salvers support their Indian manufacture, and while each was made in a separate mould, the overall similarity of their shape reflects a certain degree of popularity. The decoration of each salver suggests that each was done at either a different workshop or at a different time, with such differences reflective of a patron's particular taste, or a tradition practiced (or experimented with) at a courtly atelier.

Each salver furthermore belonged to a larger set of glassware used within the context of entertaining and serving food and drink. While each salver may represent a unique example, the commonality of shape and form alone suggests that more types and variations of such dishes were manufactured. Curiously, however, is the fact that no other types of glass objects were made in either opalescent pale green or flashed glass, suggesting that these glass techniques and aesthetics were unfavourable amongst local patrons, or that the practice was so localized that it fell out of fashion with any shift in taste. Another plausible solution is that patrons who could afford special commissions of imitation jade glass would have also afforded actual jade objects, thus preferring the real material over its imitation; while flashed glass, made in abundance in Central Europe throughout the nineteenth century (Bohemian glass) was reportedly imported in such great quantities by India's rich royals that it might have killed any local incentive to produce commercially competitive, or viable, flashed glass.[476] The market, saturated by such imports, was fuelled by the desire of Indian elites to fill their homes with European (Bohemian) flashed and coloured glassware, which, if indeed imported at such large

[475] Carboni (2001), p. 394.
[476] Jaffer (2000), p. 73.

quantities, might have been cheaper than any localised production. In any event, both types of glass production clearly did not gain popularity - despite the extraordinary artistic and technical quality of these salvers - as so few examples exist today within known collections. Nonetheless, these salvers demonstrate a distinctive pattern and sophisticated level of craftsmanship, making each an exquisite example of Indian glass.

CASE STUDY 6: Covered Jars & Bowls

Introduction

Six jars – with and without lids – all of a similar shape and size, yet differing in colour and decorative style, appear within the corpus of glassware examined in this thesis, yet only two will be discussed within this case study: a transparent cobalt blue glass decorated with gilded lily and iris sprays in the British Museum 1878,1230.324 (fig. 277); and a splendid and rare opacified yellow glass painted with small floral sprays within vegetal ogees in the Jagdish and Kamla Mittal Museum of Indian Art, Hyderabad 76.1476 (fig. 278).[477]

Fig. 277: Cat. 61 (BM 1878,1230.324)
Fig. 278: Cat. 62 (JKMM 76.1476)

Conversely, only two examples of covered bowls exist, one of transparent clear glass decorated with appliqué irises, currently in the British Museum S.342 (fig. 279), and another in transparent cobalt blue decorated in the reverse-gilt technique with cold paint decoration, currently in the National Museum, Delhi 57.31/12 (fig. 280). These, and the two jars, have been grouped as a case study because of their similar shape, because both British Museum examples have been analysed through XRF testing, and because each represents an example of superb surface decoration.

[477] Pinder-Wilson describes this exact ogee pattern on the British Museum ewer (SLMisc.343) as "acanthus leaves arranged in diaper"; see Pinder-Wilson and Tait (1968), p. 124.

Fig. 279: Cat. 68 (BM S.342)

Fig. 280: Cat. 67 (NMD 57.31/12)

The shape of both covered jars is the same: a rounded, bulbous body that extends upwards to a slightly flared cylindrical collar, with a small inverted pedestal added. The lid is circular in shape and slightly concave, with a small, rounded knob that terminates at the top. The two covered bowls present similar circular shapes that flare less bulbously outwards, yet also stand upon small footed rims added, with a circular shaped lid terminating in a small bulbous knob (identical to that of the jars'). While examples of bases (both jars and bowls) exist without lids, the lids on these examples are missing, as covering both jars or bowls would have served a practical purpose of keeping flies or other smaller insects out of the food and drink. As these containers were more often used in outdoor settings, covering the food ensured that the contents within remained unspoiled.

Indian paintings frequently illustrate feasts taking place outdoors, underneath pavilions or upon terraces, with an assortment of plates, cups and bowls displayed upon the floor, small table, or decorating the background niches, as seen in the previously illustrated *Hamzanama* painting (fig. 243) that illustrates a selection of metal, jade, and either opacified white glass or porcelain standing upon a short table in the distant background underneath a tree. The white covered bowls or jars strongly resemble the covered glass bowls in shape, while their inclusion in an outdoor setting supports their need to be covered. These objects are not only incorporated directly into the feast or placed within the foreground, but commonly appear as painted images in the background of paintings decorating niches, thus serving a dual function as both utilitarian and decorative. This latter association is suggested in the previously discussed Mughal painting dated to around 1620 (fig. 244), in which a feast occurs in a pavilion; a similarly shaped covered bowl stands upon the table in the foreground (fig. 281), while a selection of painted bottles (presumably used as containers for wine) and small cups decorate the arched niches, most likely representations of glass (fig. 282).

Fig. 281: Detail of figure 244

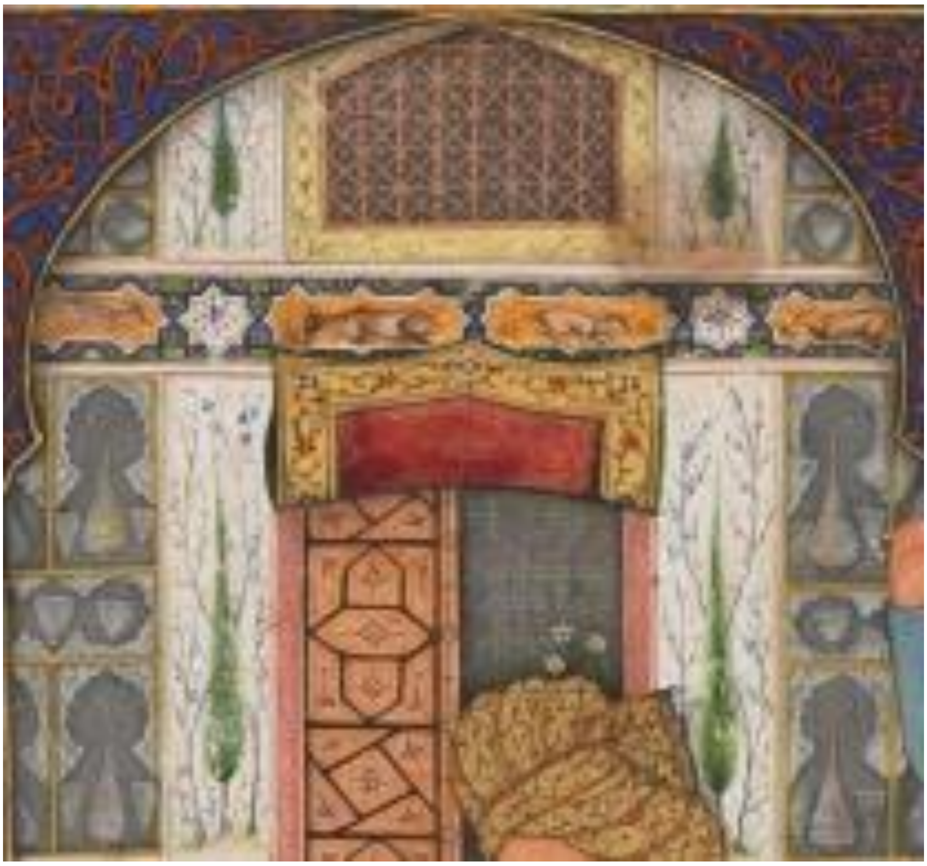


Fig. 282: Detail of figure 244

Both the covered jar and bowl derive their shape from earlier examples existing in various media, such as jade, rock crystal, metal, and even celadon ware, which trace their roots back to Timurid decorative traditions (fig. 283).[478] The famous Timurid wine tanker of Ulugh Beg, presented to Emperor Jahangir in 1613-14 by Shah Abbas, demonstrates the arrival of both the bulbous shaped jar and carved jade into the Mughal courts (fig. 284).[479] This bulbous shaped container with lid also appears in an Imperial Timurid painting dated to 1487 (figs. 285 and 286); the placement of these green covered jars in the niches supports their earlier shape and tradition of decorative display.


Fig. 283: *Jar with Lid*, Timurid dynasty, Central Asia, Herat, fifteenth century (MET 65.55a,b)
Fig. 284: *Wine Tankard*, made for Ulugh Beg, probably Herat, circa 1425-50; Mughal handle and inscription dated 1613-14 (Calouste Gulbenkian Museum, Lisbon 328)

Both the covered jar and bowl exist in other mediums than glass, supporting the popularity of this form across various materials and decorative styles, such as a seventeenth century gold cup with cover, decorated in enamel and set with diamonds and emeralds (fig. 287), and an eighteenth century carved rock crystal inlaid with gold and rubies (fig. 288).

[478] This bulbous body with cylindrical flared neck appears in other carved jade and metal jars dated to 15th century Timurid dynasty. For a jade example see: British Museum (1945.1017.257), carved with the following inscription added later, *"This cup of jade, choice gem, is [the cup] of Jahangir Shah, son of Shah Akbar. Let the water of life be in his cup, so that it may be the water of Khizr, life prolonging"*.
[479] Stronge (2010), pp. 212-14.

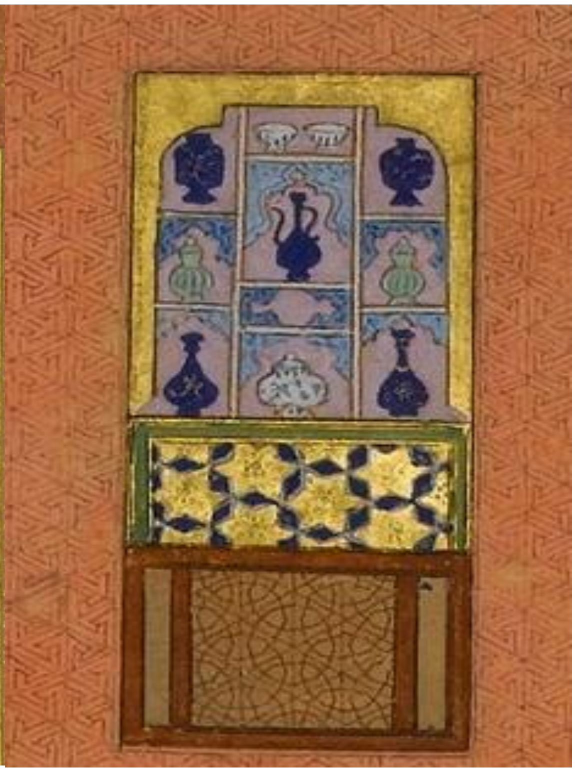


Fig. 285: ***The Beggar who Professed his love for a Prince*****, Folio 28r from a** ***Mantiq al-tair*** **(Language of the Birds), Timurid dynasty, Herat, dated 1487 (MET 63.210.28)**
Fig. 286: Detail of figure 285

The covered bowl appears throughout eighteenth century illustrations, as demonstrated in a painting of a prince enjoying music in the National Museum, Delhi (fig. 289); in this painting, the covered bowl rests upon a metal tray, presumably intended to display and further distinguish this small object. Its inclusion amongst other cups, plates, and bottles suggests its purpose as a utilitarian object; however, its placement within a courtly scene implies its importance as a luxury object.

Fig. 287: ***Gold cup with cover,*** **India, seventeenth century (The Hermitage Museum V3-726)**
Fig. 288: ***Covered bowl*****, India, eighteenth century (Musee Guimet Paris 2/1982)**

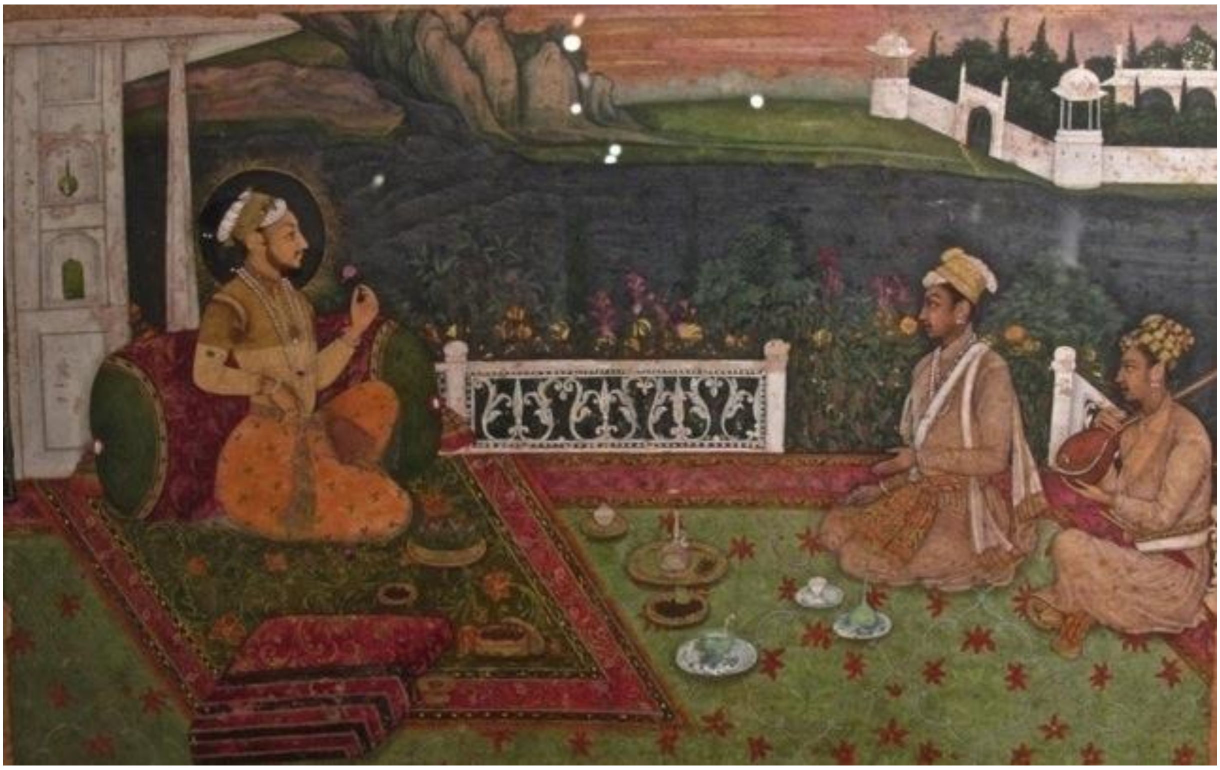


Fig. 289: ***Prince Enjoying Music,*** **India, Deccan, Golconda, circa 1700 (NMD Acc. No. 55.24.66)**

Comparative Analysis of Shape, Glass, Technique, and Manufacture

All four objects are free blown. The base and lid were manufactured separately, with the knob tooled and pedestal added later. The two covered jars measure 8.5 cm and 10.8 cm in height, and weight 303.2g and 253.g (BM 1878,1230.324 and 76.1476, respectively).

Both jars were made in a similar manner. The larger bulbous body was free blown, while the cylindrical neck manipulated and shaped with tooling instruments. The upper rims are rounded on both examples, each presenting faint tooling marks. The bases, unlike the necks, were formed by the addition of extra glass; however the technique differs on each example. On BM 1878,1230.324 the rim was simply wrapped around the base and tooled to form a slightly splayed pedestal (fig. 290).

On 76.1476, an additional of layer glass was added to the base, flattened and tooled to form the splayed rim (fig. 291). This is clearly visible by a broken section of the additional layer that exposes the roughened pontil mark in the centre. It also appears that the base of this jar was initially narrower, with a relatively pronounced kicked-in base that is seen from the jar's interior. The addition of another layer of glass perhaps helped to further stabilise the jar, while the splayed rim created both an elegant and practical solution, stabilising its rounded shape while elevating it slightly. The small circular pontil mark in the centre of this jar is relatively un-abrasive, indicating that the jar was indeed transferred onto a punty and tooled.

Fig. 290: Detail of base fig. 245 (BM 1878,1230.324)

Fig. 291: Detail of the base and lid, fig. 246 (JKMM 76.1476)

Conversely, example BM 1878,1230.324 presents a larger circular mark, whose roughened surface cuts into the base, suggesting a forceful breakage as well as the use of a larger pontil rod. Both lids were manufactured using the same techniques: each was blown, cut and tooled to form the appropriate size corresponding with the neck's opening. The lids are concave in shape, with rounded rims that fit securely into the jars' neck, each presenting faint tooling marks. The circular knobs each terminate with slightly flattened, abrasive tops where the pontil was attached and subsequently removed; this mark is detected on all examples, but is most noticeable on jar 76.1476.

Both covered bowls are manufactured in exactly the same manner, the main difference stemming from the treatment of the base, which was cut and tooled after being blown. The even, flat rim encircling the bases' rim indicates that the blown globe was cut before being further shaped and tooled on the pontil. Both bowls are similarly circular in shape and size, measuring 9 cm and 7 cm in height, 12.6 cm and 12.8 cm in the width of their opening, and weighing 331.1g and 593.9g (National Museum, Delhi 57.31/12 and BM S.342, respectively); both also stand upon similarly shaped inverted pedestals that were added after (figs. 292 and 293). The base of both bowls is slightly kicked-in, each presenting a small abrasive pontil mark in the centre. The lids are manufactured in the exact same manner as the jars, with flat breakage points at the top of the knobs indicating where the punty was attached (fig. 294).

Fig. 292: Detail of base (NMD 57.31/12)
Fig. 293: Detail of base (BM S.342)

The glass of all four examples presents similar traits despite differences in colouring. Only the examples in the British Museum, London have been tested by XRF analysis, yielding the following results: lead (Pb) representing the predominant element, with strong traces of potash (K) (figs. 21 and 23). All four objects present bubbles, seeds, refractory stones and dark inclusions.

Fig. 294: Detail of lid and knob (BM S.342)

Fig. 295: Detail of horizontal cording steaks or marks (BM S.342)

The transparent clear colouring of bowl S.342 allows for certain traits to be more easily detected. This glass possesses a brilliant, almost crystalline quality, suggesting a high level of lead. Strong cording marks are seen throughout the glass; these appear as fine horizontal bands encircling the lid and body (fig. 295).[480] A few medium sized bubbles appear around the base, yet unlike other colour glass examples included within these studies, the glass is void of numerous seeds and small bubbles. The glass does, however, present refractory stones or signs of crizzling concentrated around the base and in isolated parts of the bowl's body (fig. 296).

Fig. 296: Detail of the glass and base (BM S.342)

[480] These marks could be marvering marks, which are created when the glass gather is rolled out onto the marver (a flat smooth surface) before being blown. Any imprints appearing on the glass gather at this point would be consequently blown out into the vessel; Whitehouse (2006), p. 54.

The two transparent cobalt blue examples – covered bowl and jar – present glass filled with numerous small bubbles and seeds as well as dark inclusions of varying sizes. British Museum covered jar BM 1878,1230.324 has seeds and small bubbles throughout the glass, and while these are not particularly large (the largest measuring approximately 0.5 cm in length) they cloud the overall transparent quality of the glass. Adding to this are numerous dark inclusions embedded within the top layers and surface of the glass, the largest measuring approximately 0.3 cm in length in the middle of the jar's body; other inclusions appear across its body and neck (fig. 297).

Covered bowl 57.31/12 presents a glass that is similarly filled with small seeds and inclusions. Unlike the transparent clear bowl, this example does not present many medium sized bubbles – the largest measuring approximately 0.4 cm in length and placed in the centre of the base's interior - yet it is filled with uncountable seeds and inclusions (fig. 298). While the detailed surface decoration masks these traits, they are nonetheless clearly detected when examined from the interior of the bowl.

Fig. 297: Detail of glass (BM 1878,1230.324)

Fig. 298: Detail of glass (NMD 57.31/12)

Like the transparent bowl, this bowl has rings of horizontal lines encircling the interior of both its body and lid. The even spacing of these lines suggests manufacturing marks as opposed to cording lines, possibly created by a tooling instrument used to shape the bowl (fig. 299).

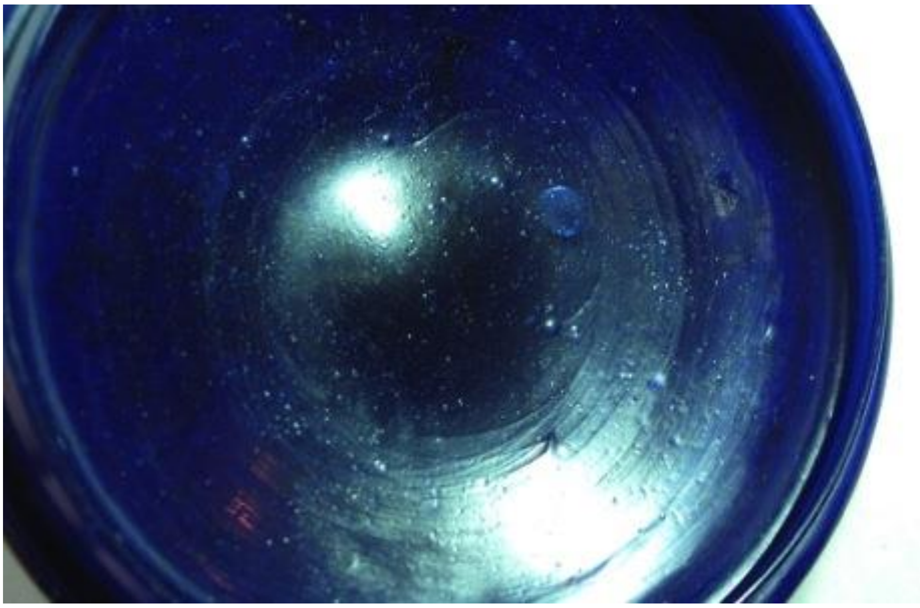


Fig. 299: Detail of interior of lid (NMD 57.31/12)

Fig. 300: Detail of interior (JKMM 76.1476)

The opacified yellow colouring of covered jar 76.1476 only exists on a few other Indian glass objects; why it should be so rare has yet to be fully understood, but it is perhaps due to the cost of manufacturing opacified yellow glass (sulphur was traditionally added to create yellow), or that the technique remained localized to a specific glass house or region.[481] Three other examples of opacified yellow glass objects appear within the Catalogue; these are all small rectangular or circular vials painted with floral sprays.[482] Without further chemical testing, the glass can only be understood through its various visual traits; however, the surface decoration and opacified colour conceal any bubbles that would appear in the surface layers. No bubbles can be detected, but refractory stones and uncountable dark inclusions exist; these are easily visible from the jar's interior (fig. 300).

Surface Decoration

All four examples are decorated with gilding. Both covered jars are painted with solid gilt decoration; whereas the covered bowls present a combination of decorative techniques including reverse-gilding with gold paint, and appliqué with enamel and gilding. Despite differences in decorative techniques employed on each example, similarities in motifs define these objects as undeniably Indian in execution and style. Covered jar 1878,1230.324 is decorated with eight isolated lily sprays around the neck, and a fine triangular and tripartite leaf band with inverted stylised leaves encircling the upper shoulder (a combination of stylised elements very similar to the British Museum's globular green *huqqa* base, 1961.10-16.1).

Around the body are seven large lily sprays, a flower infrequently seen on Indian glass, while the lid is, conversely, decorated with the popular iris spray. The lily sprays are flanked by a solid gilt band around the bottom rim, and a similar triangular and tripartite leaf band with gilt circles around the gilded knob (fig. 301). A solid gilt band of fine diagonal dashes decorates the outside rim of the pedestal. The iris sprays painted on the covered jar's lid are identical in shape and stylisation to those appearing on both the body and lid of the British Museum covered bowl S.342 (fig. 302), which is decorated with the appliqué technique of raised white enamelled flowers painted in cobalt blue with green leaves and gold outlining. The lid of this bowl is decorated with eight iris sprays, while the bowl has ten, each flanked by a band of small, stylised appliqué and gilt painted leaves. Solid gilt bands cover the bowl's outer edges, pedestal, and knob. A further delicate detail on this bowl is the addition of a small, eight-petal floral spray in

[481] Jagdish Mittal called this colour a 'Nizami yellow', yet to date no such reference to this colour and its connection to the Nizams of Hyderabad has appeared in any texts or literature. This remark was verbally expressed during a visit to his Museum in Hyderabad in November, 2013.

[482] Bharat Kala Bhavan Museum in Varanasi (BKB.9195), the Corning Museum of Glass, New York (66.19B), and a very similarly shaped and decorated bulbous jar appeared in a Christie's South Kensington auction of 'Arts of India', June 2014.

the centre of the interior. The iris flower on this bowl is similar to the globular *huqqa* base from the Victoria & Albert Museum, with irises and leaves rendered in the same stylised appliqué manner (cat. 124). This striking similarity suggests that both objects must have been decorated in the same courtly workshop, one replicating similar styles and having the knowledge of this complex decorative technique.

Fig. 301: Top view (BM 1878,1230.324)
Fig. 302: Top view (BM S.342)

The decorations appearing on the other two covered objects share some similarities, yet represent different painterly techniques that reflect another influence or even atelier and region. The opacified yellow covered jar is decorated entirely with a pattern comprising three-leaf floral sprays set within vegetal ogees (also referred to as interlocking foliate medallions) (fig. 303).

Fig. 303: Detail of gilded pattern on body (JKMM 76.1476)

A fine herringbone and solid circular band decorates the upper shoulder, with an inverted stylised leaf pattern surrounding the knob. Like the other covered jar, solid gilt bands cover the bowl's outer edges, pedestal, and knob. The origin of this ogee pattern encasing floral sprays can be traced back to Mughal carpets dated to the 1650s (fig. 304); however, this pattern is not unique to carpets, and appears throughout the seventeenth and eighteenth century in other mediums, including metal trays.[483] On a seventeenth century *bidri* plate, the concentric bands of horizontally organized ogees decrease in size as they approach a central medallion (fig. 305), although unlike the glass covered jar, this ogee pattern does not have a small leaf or flower punctuating each side of the ogee. This vegetal or foliate embellishment is seen on other glass examples, including *huqqa* bases (both globular and bell shaped), large serving dishes (cat. 76), a pandan cover (cat. 101), bottle (cat. 37), and ewer (cat. 98). On each, the ogees are organized in registers, decreasing in concentric size on the plates and ewer.

While this pattern is neither unique within Indian decorative traditions, nor Indian glass objects, its execution on this small opacified jar demonstrates considerable artistic skill, one that complements the rarity of its yellow colouring.[484]

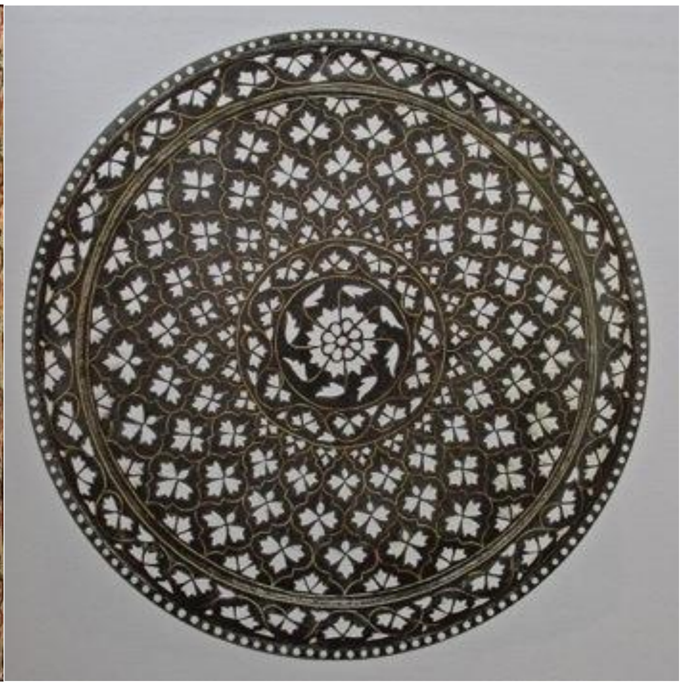


Fig. 304: *Carpet*, Kashmir or Lahore, circa 1650 (V&A T.403-1910)
Fig. 305: *Plate*, Deccan, Bidar, late seventeenth century (JKMM 76.1231 ME.10)

[483] Ekhtiar, Soucek, Canby, and Haidar (eds.) *Masterpieces from the Department of Islamic Art in the Metropolitan Museum of Art* (New York: The Metropolitan Museum of Art, 2011), p. 375. For a copper tray of similar decoration see one in the Nasser D Khalili Collection of Islamic Art, London (Inv.no.M.T.W.744), published in Zebrowski (1997), fig. 442, p. 260.
[484] For examples of this ogee pattern appearing in a nineteenth century, North India pattern book, see: Pedro Moura Carvalho, *Gems and Jewels of Mughal India (Nasser D. Khalili Collection of Islamic Art)* (London: Khalili Collections, 2007), pp. 290-1, folios 2D and 4D.

The last example, covered bowl 57.31.12, is entirely painted with light green arabesques punctuated by small white flowers, encircling four polylobed shaped medallions executed in the reverse gilt technique, each revealing a four-petal spray. The borders of the bowl and lid are decorated with a band of hatched triangles flanked by finer solid gilt bands (fig. 306). While the reverse-gilt technique has already been seen on previous examples discussed, this bowl represents the only example in which it is combined with another decorative technique (fig. 307). The finesse of the arabesque enamel work with the reverse gilt makes for a highly elegant and sophisticated specimen, unique in both technique and composition.

Fig. 306: Detail of decoration (NMD 57.31/12)

Fig. 307: Detail of lid (NMD 57.31/12)

The painted arabesques, which were low-fired, were done after the gilding. Dikshit claimed that the whole design of this bowl had a carpet-like appearance, and that "from the tasteful decoration this piece appears to belong to Jahangir's reign and is an outstanding example of Mughal art."[485] Indeed, when compared to illustrations of carpets in Indian paintings of the eighteenth century, the painting upon the bowl could have drawn inspiration from a carpet or textile; although, the dating to Jahangir's reign (1605-27) is too early (fig. 308).

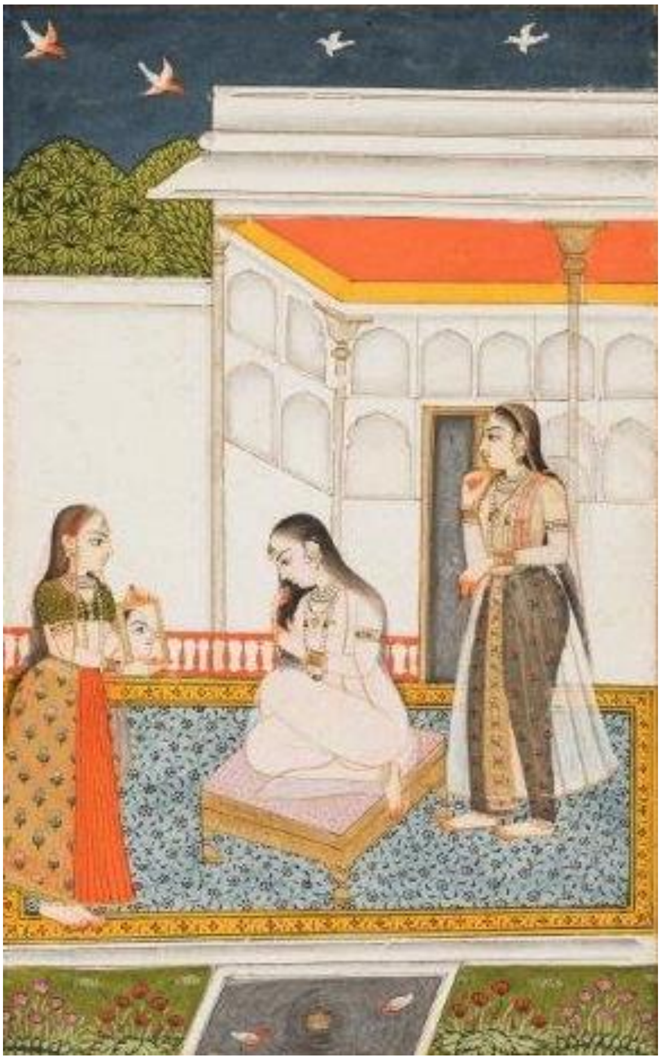


Fig. 308: *Ragini Malkos*, Hyderabad, circa 1745
San Diego Museum of Art, Edwin Binney 3rd Collection 1990.530

The fine arabesque patterning covering the entire background is both elegant and organized, and differs entirely from the formal stylised sprays more commonly seen on Indian glass examples, which are void of any background detailing. While this pattern could possibly be associated with Lucknow, the decoration upon this covered bowl conveys a detailed intricacy that is organized and elegant in its execution. Furthermore,

[485] Dikshit (1969), p. 101, plate XXVI.B.

the absence of either vegetal or animal figures does not correspond with what has been commonly associated or attributed to a Lucknowi decorative tradition, as seen on *huqqa* base cat. 111. The cobalt blue colouring of the glass corresponds to other glass examples confidently dated to the first half of the eighteenth century, which have been identified as potash-lead in composition; yet without examining the glass, no such assumption for this splendid specimen can be made. The visual traits detected in the glass support its Indian manufacture, while its decoration – an intricate pattern reminiscent of a textile or carpet – suggests a level of sophistication and detail comparable with objects manufactured at a courtly atelier or workshop.

Concluding Interpretations

These covered jars and bowls derive their shape from Central Asian traditions that have long since been appropriated into Indian decorative arts. The covered jar, in particular, can be traced back to Timurid metal and jade objects; both forms appear in the earliest of Mughal paintings dated to the late sixteenth century, and continue in representations of seventeenth and eighteenth century paintings, either as decorative objects placed in background niches or as utilitarian vessels incorporated into the scene. The glass of both British Museum examples demonstrates a potash-lead composition, one most probably English in origin (like the previous examples discussed) that was imported as cullet or ingots and re-melted and worked in Indian glasshouses. The items, once blown, were decorated in a courtly workshop or atelier. The patterns appearing on both British Museum examples demonstrate a clear Mughal decorative motif, both similar to each other and other glass examples (notably globular *huqqa* bases). The opacified yellow covered jar and cobalt blue bowl diverge from the dominant stylised sprays set against plain backgrounds – a popular Mughal motif decorating many glass objects – but instead are decorated with finer, detailed patterns that cover the entire surface. The ogee represents a motif seen on other examples of textiles, metal ware, and illustrated pattern books, dating back to the 1650s. The covered bowl, conversely, represents a rare example of technique and style, combining reverse-gilt with enamel and executed in elegant finesse. All four examples represent splendid specimens of Indian artistic accomplishment.

CASE STUDY 7: Cups

Introduction

Five small cups exist within the corpus of material examined for this study; these are either in translucent cobalt blue or translucent greyish colourless glass. Only two have been tested through XRF, and will be discussed in this case study: Victoria & Albert Museum, London C.140-1936 (fig. 309) and the British Museum, London 1878,0301.36a,b (fig. 310).

Fig. 309: Cat. 96 (V&A C.140-1936)

Fig. 310: Cat. 94 (BM 1878,0301.36a,b)

Form & Function: History and Representation

The form of all cups is almost identical: they are circular in shape, with bulbous bases that flare outwards to rounded, slightly splayed upper rims. Each is free blown and tooled on the pontil, with small flared foot rims added after. The bases are slightly kicked-in with small, roughened pontil marks in the centre. Example C.140-1936 is made of translucent greyish colourless glass and measures 5.4 cm in height and 7.3 cm in diameter of its opening. Example 1878,0301.36a,b is made of translucent cobalt blue glass and measures 4.3 cm in height and equally 7.3 cm in diameter. Both are comparable in weight: 74.2g and 70.9g, respectively.

Fig. 311: *Jadeite Cup,* China, Ming dynasty (1368-1644) (MET 02.18.359)

The shape of these cups can be traced back to the Chinese Ming period, with jade cups dated from the fourteenth century (fig. 311). Cups of this shape also appear in some of the earliest paintings commissioned by Mughal emperor Akbar in the late sixteenth century, as seen in the *Hamzanama* (figs. 312 and 313). What is most noticeable about the depiction of the cup in this *Hamzanama* illustration, other than confirming its early shape, is its placement upside down upon a wine bottle. The inverted placement of the cup upon the bottle directly associates its function as a wine, and not teacup. The pale green cup illustrated in this painting most likely represents a carved jade cup, again showing the continuation of Timurid traditions upon early

Mughal tastes. Carved jade cups of a similar shape exist from the Mughal period, their function often attributed as wine cups or bowls.[486]

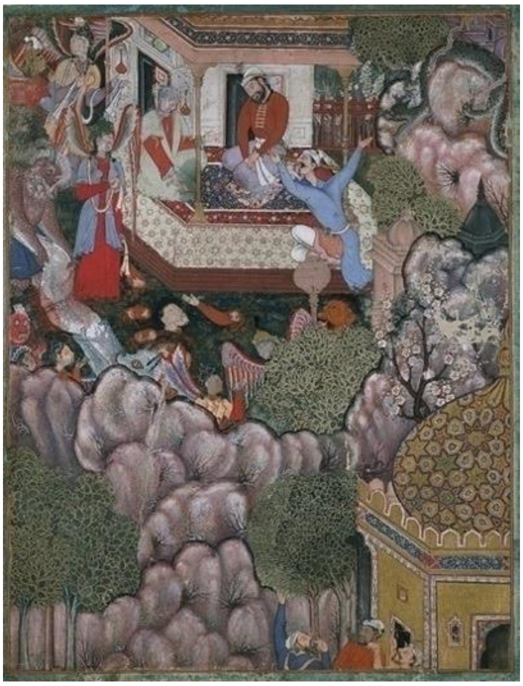
 

Fig. 312: *Hamza converses with Hura the genie while a dragon approaches* from the *Hamzanama,* Mughal dynasty, circa 1562-1577 (Victoria & Albert Museum IS.1505-1883)
Fig. 313: Detail of figure 312

The common association of this form functioning as a teacup stems from the similarity of this shape existing in porcelain, which was mass-produced in China for the European export market starting from the late sixteenth century; the south western town of Jingdezhen fulfilled Dutch and Portuguese orders for Chinese porcelain during the mid-seventeenth to mid-eighteenth century, which were made exclusively for export to Europe (fig. 314). They functioned in Europe as teacups and were a symbol of an exotic eastern form decorated to suit European sensibilities and tastes.

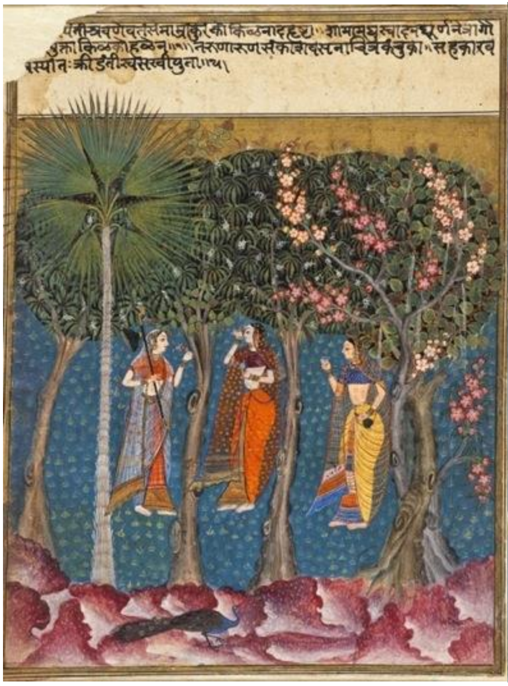
It is misleading, however, to assume that the similarity of shape presumes a similarity in function. This small cup was certainly not used for drinking tea in South Asia, but rather for wine, as tea drinking did not gain widespread popularity in India until the early twentieth century, despite the earliest reported commercial harvesting of the plant beginning in the 1820s, with the first shipment of manufactured Indian tea for export ready in 1838.[487] Early representations of similarly shaped vessels demonstrate

[486] Shu-p'ing Teng (2007), fig. 57, p. 66 and 244.

[487] The East India Company had the monopoly of the tea trade with China, which caused that company to discourage any tea ventures in India. In 1 8 13, however, Parliament curtailed the company's powers in India and served notice that the China monopoly would end in 1833. In 1836, Mr. C.A. Bruce was

this function, including a late sixteenth century Deccani painting of a woman holding a small cup and tall-stemmed ewer (figs. 315 and 316). While the contents within this ewer cannot be determined, it most likely contained wine based on other illustrations of similarly shaped vessels, as seen in a seventeenth century Mughal painting from the Davis Album (figs. 317 and 318).[488]

Fig. 314: *Chinese Tea Bowl and Saucer,* China, Jingdezhen, 1662-1722, Porcelain, decorated in under glaze cobalt blue (Victoria & Albert Museum C.778&A-1910)



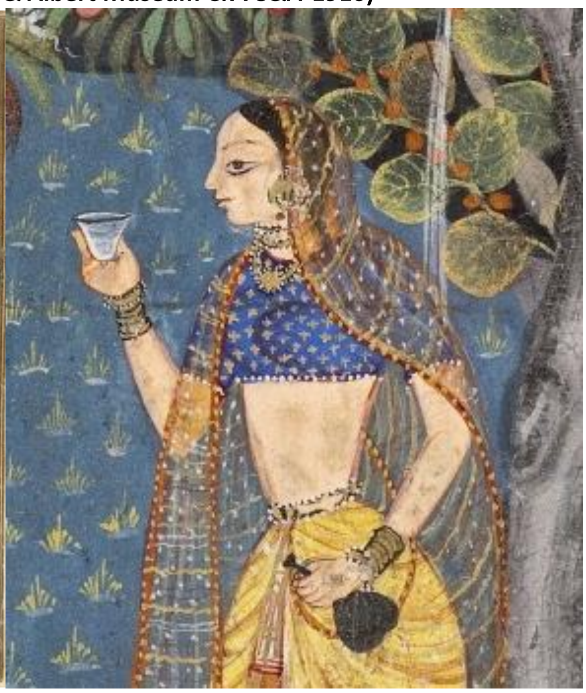


Fig. 315: *Gauri Ragini,* Deccan, late sixteenth century (LACMA, Bequest of Edwin Binney 3rd M.90.141.2)
Fig. 316: Detail of figure 315

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appointed the first Superintendent of Tea Culture in Assam. See: Arnold Whittaker, "The Development of the Tea Industry in India and Pakistan," *Journal of the Royal Society of Arts* 97 (1949), pp. 678-687.

[488] Representations of blue cups in Indian paintings are rare; the only known illustration dated to the early seventeenth century portrays a man holding a cobalt blue colour bowl to a woman's mouth (British Museum 1947,1011,0.1). Examples of both blue painted porcelain and blue enamel metal cups exist from the seventeenth and eighteenth century. See: *Porcelain Cup*, China, The Metropolitan Museum of Art, New York 46.67.36; and *Stem Cup,* India, Jaipur (Cleveland Museum of Art Inv.no. 1962.429).

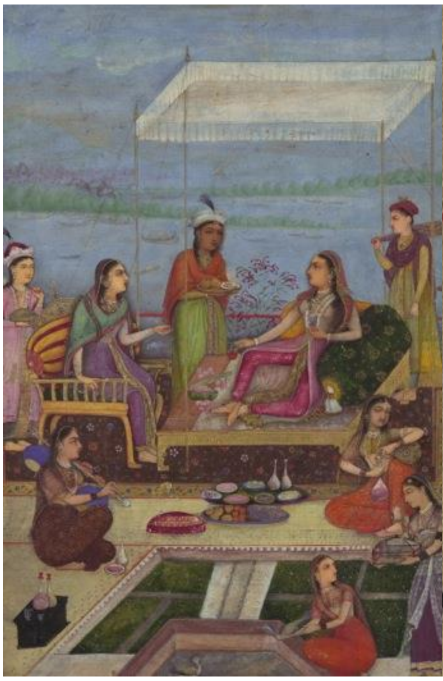


Fig. 317: ***Princess Entertaining a Visitor on the Balcony,*** **India, circa 1650-1700**
(MET 30.95.174.22)
Fig. 318: Detail of figure 317


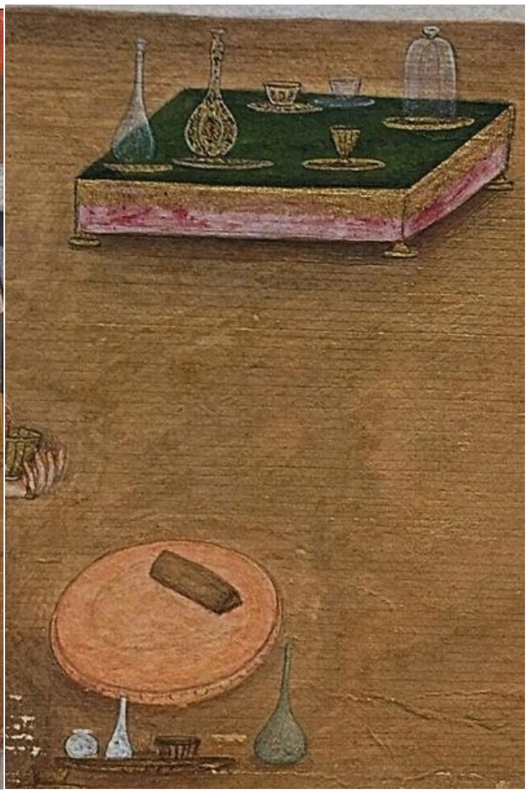

Fig. 318: ***Maidens on a Terrace with Musicians and Servants***
Provincial Mughal, eighteenth century (Bonham's London, April 2014, lot 333)
Fig. 319: Detail of figure 318

Unlike previous illustrations of salvers and covered jars or bowls that are grouped amongst other objects, the cup is painted alone, held in one hand with a bottle in the other. In these illustrations, the cup accompanies portraits of standing figures, severing as a luxury symbol to illustrate the figure’s status; this occurs more often in paintings dated to the late sixteenth and early seventeenth century.[489] This context of luxury and status still continues in later eighteenth century illustrations; however, in these depictions the cup more often rests upon a saucer amongst other items accompanying a courtly scene of entertainment and leisure (figs. 318 and 319).

Comparative Analysis of Shape, Glass, Technique, and Manufacture

As previously mentioned, both cups are of a similar size, shape, and manufacture. A slight difference can be detected in the severity of the splayed rim, and the roundness of the base. Example C.140-1936 flares out more noticeably at the upper rim, with its body slightly less rounded (fig. 320).


Fig. 320: Detail of splayed rim and kicked-in base (V&A C.140-1936)
Fig. 321: Detail of base (V&A C.140-1936)

Both glass cups are also uneven in shape, with some sides slumping more than others; their uneven form attests to their manufacture as free blown objects. The main difference between both cups, however, derives from their footed rim, which has been added (in the same manner seen on the covered jars and bowls), yet is thicker on example C.140-1936, with a flattened rim that has been tooled or cut (fig. 321). This cup also presents a more pronounced kicked-in base that terminates in a triangular shaped point in its base. These differences in manufacture could suggest a different atelier, or

[489] For other seventeenth and eighteenth century Indian paintings illustrating figures standing holding a small glass cup and bottle see: Victoria & Albert Museum (S.48:27/B-1956); Freer Gallery of Art, Smithsonian Institute Washington DC (F1907.763); British Museum (1920,0917,0.327)

perhaps a different glassblower who simply employed different manufacturing techniques.

Both objects have been tested through XRF analysis, and yield very similar results. Example C.140-1936 was analysed at the bottom of its rim, as this presented the only area reasonably free from gold or other decorative elements. The results showed that lead (Pb) was the predominant element, with potassium (K), calcium (Ca) and trace amounts of iron (Fe) and copper (Cu) (figs. 8 and 9). Cup 1878,0301.36a,b was tested at the base, approximately halfway from the pontil mark and footed rim, and yielded results indicating lead (Pb) as the primary component, with low potassium (K) levels and traces of iron (Fe), copper (Cu) and calcium (Ca) (fig. 25). Both indicate that lead is the predominant element, with detectable levels of potassium, which characterise the glass as a potash-lead type common in England during the late seventeenth and eighteenth century.

Fig. 322: Detail of glass, fig. 276 (V&A C.140-1936)

The quality of the glass in both examples varies slightly. Like most of the cobalt blue or coloured glass discussed, this cup is similarly filled with small seeds, air bubbles and dark inclusions (fig. 322). The bubbles appear to be within all layers of the glass, and not especially concentrated to one particular region (such as the base). The overall, even spreading of seeds implies that these were formed during the melting phase, resulting from insufficient cleaning and melting of raw ingredients, and not from the manufacture when the cup was blown out. The inclusions, similarly spaced throughout cup, reflect contamination that could have entered into the raw batch from the environment at large, the blowpipe or punty, or even during the annealing (cooling) phase.

The transparent quality of cup 1878,0301.36a,b is similar to the British Museum covered bowl (S.342) previously discussed. The glass does not present many seeds, and has only a few bubbles measuring approximately 0.3 cm in length concentrated around the base (fig. 323).

Fig. 323: Detail of base (BM 1878,0301.36a,b)

Fig. 324: Detail of glass with refractory stones and cording (BM 1878,0301.36a,b)

The glass does have several refractory stones, which appear in clusters around the body; these could, however, be signs of crizzling (fig. 324). The glass is furthermore presented with fine concentric horizontal bands, similar to BM S.342. These could be signs of chemical inhomogeneity, where the glass has not sufficiently re-melted, or could reflect manufacturing marks (such as marvering or another instrument used to form the cup's shape). One large inclusion appears along the upper edge of the cup's rim, with several smaller inclusions concentrated at the base; these are embedded in the upper surface layers of the glass and most likely arrived after the cup was blown.

Surface Decoration

The decoration on both cups differs, yet is similar to other examples of saucers, cups, and bottles, suggesting that they were part of a larger service or set. Cup 1878,0301.36a,b is catalogued in the British Museum accompanying another saucer, yet their patterns are not identical. While the saucer is circular in shape and made of transparent clear glass, its gilded decoration consists of large eight-petal floral sprays attached to an encircling arabesque motif (fig. 325).

Fig. 325: Cat. 94

The rim of the saucer, like the cup, has a fine herringbone band, yet the cup's motif consists of iris sprays each encircled by a running vine and creeper motif. The similarity of gilded floral sprays and arabesques painted on transparent glass certainly alludes to a similar decorative style, yet the two are clearly not identical in pattern. The iris sprays decorating this cup are not dissimilar to the Mughal repertoire of floral motifs already executed on glass objects. Their stylised treatment against a plain background, contrasted by a geometric motif (herringbone pattern) appears on many glass examples previously discussed and cannot be further identified more precisely with a particular painterly tradition or even decorative region.

The pattern running across cup C.140-1936 appears on several other cobalt blue glass dinning ware objects, suggesting a decorative group that also belonged to a larger set. These vessels include a bottle (fig. 327; cat. 33), a small cup (Victoria & Albert Museum C.141-1936; fig. 326), a saucer (cat. 87), and a ewer and small cup (cat. 97).[490] These six items represent the largest testament to a collection of glass dining ware existing. The cups, saucer and bottle in the Victoria & Albert Museum were from the Wilfred Buckley Collection, donated to the Museum in 1936 by his wife, and were previously acquired from the glass dealer A. Churchill; their provenance before this remains unknown.[491] The other two vessels in the Los Angeles County Museum of Art were previously in the collection of Doris and Ed Wiener before being donated to the museum in 1984; before this they were in the collection of Calcutta antique dealer, C.L. Nowlakha.[492]

Fig. 326: Cat. 96 - Fig. 327: Cat. 33

The decoration upon five of the six cobalt blue objects (excluding the saucer) consists of a gilt painted vase holding a profusion of flowers standing on a laden tray. On all examples the vase is the same shape: a bulbous bodied base narrowing to a splayed rim with two curved handles adjoined. The decoration on cup C.140-1936 has two such vases, each with a profusion of diverse floral sprays that continue to weave around the cup's body, decorating its entire surface; its upper rim is decorated with a

[490] The Victoria & Albert Museum items were all exhibited at the Persian exhibition of 1931 at the Royal Academy (no.299D, E, and F); Pope Vol. 6, plate 1449.
[491] Skelton (1982), p. 126.
[492] This provenance confirmed in person by Mr. Nowlakha in London in April, 2016.

triangle and tripartite leaf band (a feature that appears unchanged across all six items) and a fine solid gilt band encircling its pedestal.

Concluding Interpretations

These small wine cups trace their shape back to the Chinese Ming period, while their representation in Indian paintings dates to the late sixteenth century. In these paintings, their inverted placement upon long necked wine bottles supports their function as accompanying wine cups. Furthermore, such cups – identical in shape and size – are often illustrated in sixteenth century paintings of standing figures holding a cup and wine bottle. Later seventeenth and eighteenth century paintings depict cups placed with a variety of other vessels more commonly within the foreground of a painting of entertainment and leisure. In all paintings, such cups hold wine and appear within a royal or courtly context.

As drinking tea did not come into vogue in India until well into the nineteenth century, these cups and accompanying saucers were used exclusively for wine; however, their presupposed function might have shifted with time according to patron. As these objects entered into European collections, their pre-existing use might have been abandoned and replaced with the more favourable trend of drinking tea. The patterning of the cobalt blue cups, which stylistically connect to the only known set of glassware – including a bottle, ewer, and saucer – supports the fact that the cups were attached to a specially commissioned set. Examining the provenance of this set in the following case study will shed further light upon when and for whom these cups were made.

CASE STUDY 8: Ewers

Introduction

Three ewers exist within the corpus of glassware compiled within the Catalogue, which are in the following collections: Los Angeles County Museum of Art M.84.124.2a-c (fig. 328); National Museum, Delhi 57.31/22 (fig. 331); and the British Museum, London SLMisc.343 (fig. 332). Two of the three ewers discussed in this case study represent exceptionally rare examples of Indian glass: one inscribed with visual evidence of past ownership and the other accompanied by historical records of provenance. Both the visual and written record provides rare evidence of dating and attribution.

Fig. 328: Cat. 97 (LACMA M.84.124.2a-c)

Crest of John Deane

The LACMA ewer with lid and accompanying cup are both inscribed with the Crest of John Deane, a colonial administrator of the English East India Company and President of Bengal from 1728 to 1732 (fig. 329).[493] This crest – a horse's head and crown incised

[493] This insignia was deciphered by the College of Arms (www.college-of-arms.gov.uk), to whom LACMA's senior curator of South Asian Art, Stephen Markel, sent an image of the Crest. This identification was

into the bulbous shaped vase - appears on one of the two vases decorating the LACMA ewer, and both vases decorating the wider panels of the Victoria & Albert Museum bottle (fig. 330).[494] This crest functions as a rare marker that confirms an owner, approximate dating, and place of use.

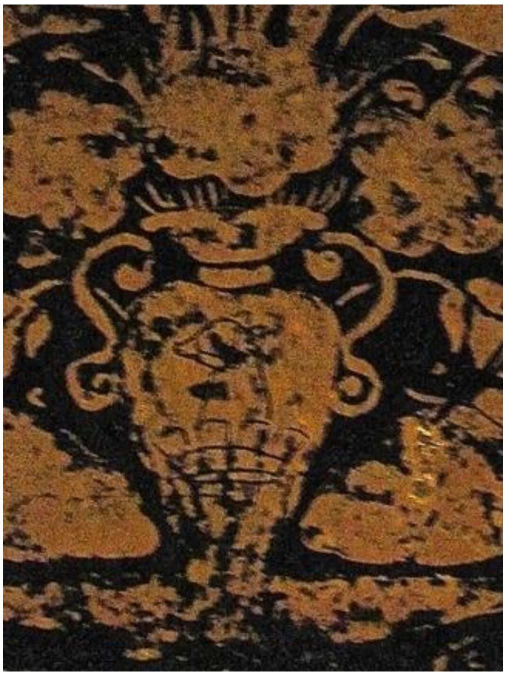

Fig. 329: Detail of the Crest of John Deane on ewer
Fig. 330: Detail of the Crest of John Deane on bottle

John Deane benefited from a long professional career in India. Records already mention his name in November 1711, when – as was common practice in the Honourable East India Company – one member succeeded another in rank or position when another deceased. Such a vacancy occurred, leaving John Deane – after considerable debate and a vote – to take the place as next in succession in the Council. Deane was ordered up from his post in Ballasore (then a small EIC trading post in West Bengal) as soon as his duties there were completed; on January 7th, 1712 Deane officially took on his new position as Secretary in the Council.[495] Only a few months after taking this position, on May 3rd 1712 Deane married Mrs. Jaconima Maria Bonkett; the

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confirmed by the college, and has since accompanied the cataloguing of LACMA's glass objects (ewer and cup). The appearance of this exact crest on the V&A's bottle, however, had not been formally recognized by the Museum, and thus represents a breakthrough in connecting the London example with those in Los Angeles.

[494] Skelton (1982), fig. 397, p. 126.

[495] C. R. Wilson, *The Early Annals of the English in Bengal, being the Bengal Public Consultations for the first half of the Eighteenth Century* (London: Thacker Spink & Co., 1990), p. 30 [Fort William, November 6th 1711]

certificate stated that the marriage was conducted by "Honorable John Russell Esquire President of Affaires of the Honorable United Company of Merchants of England trading to the East Indies there being no Protestant Minister in Bengall in the presence of us."[496] The following year, serving as the youngest member of the Council, Deane was given responsibility in running the store and keeping the books/ledger accounts; in his role as Storekeeper, Deane cared for, "Iron ordnance; anchors and grapnels; white lead; goods bought of the old Company; goods bought from Benjar."[497] It appears that several years later, in 1721, Deane received yet another promotion, this time succeeding Samuel Feake, in favour that "the Council should have extra members because of its youthful composition".[498] Although still acting as a colonial administrator, Deane eventually rose to become the President of the Bengal. A detailed official letter of his appointment by the Court Directors, written from London on 14th February 1727 confirms his position, title, and responsibility.[499] Following almost immediate appointment as President, however, Deane began to exercise his power to curry family favours and accumulate considerable private wealth, such as employing his nephew, Drue Deane, in the service of the EIC, and requesting persmission to transport the value of £5500 in foreign silver, £500 in wrought plate, £1000 in gold and silver thread and lace, and £2300 in coral."[500] The year following his appointment, in 1728, Deane requested an increased dinner and table allowance to meet his obligations in hosting Council members; this recommended increase was granted.[501]

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[496] Ibid, P. 249 [Fort William, 30th July 1716 [Marriage Certificate of Mr. John Deane]

[497] Ibid, P. 132 [Fort William, 27th July 1713

[498] IOR/D/18 [Minutes of the Committee of Correspondence, 1719-27], f62v
12 Dec 1721.

[499] IOR/D/18 [Minutes of the Committee of Correspondence, 1719-27], ff.25 [London 14 Feb 1727}:
"The United Company of Merchants of England Trading to the East Indies to all to whom these Presents shall come send Greeting, know ye that we the said Company reposing special trust and confidence in the fidelity, prudence, justice and circumspection of John Deane Esq. have made constituted and ordained, and by these presents to make constitute and ordain the said John Deane to be President of and for all the said Company's Affairs in the Bay of Bengall, and other the Place and Provinces thereunto belonging in the East Indies and also to be our Governor and Commander in Chief of our Fort William in the Bay of Bengall and all the Towns and Territory's thereunto belonging, and of all and singular the Forts, Territories and Jurisdictions thereof and of the Forces which now are, or hereafter may or shall be, employed for the Service of the said United Company for the time being, and to continue in the Exercise of the same during our and their pleasure, and until the contrary thereof shall be signified under the seal of the said United Company of Merchants of England Trading to the East Indies or under the hands of thirteen or more of the Court of Directors of the said Company for the time being…"

[500] IOR/D/19 [Minutes of the Committee of Correspondence, 1727-36],f9 [25 Jan 1728]; and IOR/E/1/19 ff.46-7v [31 Jan 1728, letter 25]

[501] IOR/D/19 [Minutes of the Committee of Correspondence, 1727-36], f10v [31 Jan 1728]

Deane, like other Company members in India during the third quarter of the eighteenth century, exercised his elite power to accumulate considerable amounts of personal wealth, which was easily done as the British-owned merchant fleet, at the time based in Calcutta, rapidly grew based on its successfully secured trade routes to western India, the Persian Gulf, and the Red Sea; private trade, as documented in requests such as Deane's, allowed for private individuals to benefit from the Company's commercially established routes.[502] In 1731, with unsatisfactory cargoes and the state of affairs in Bengal, the Directors of the Company purged many members of the Council; at this time, Governor Deane was removed from office and ordered home. A letter from November 1732 outlines the unsatisfactory state of affairs in which Deane left Bengal, citing debt, merchant complaints, and his dealings with the salt trade in Patna as both unanswered and questionable.[503] While Deane reportedly left Bengal with £12,400 in Company bills (from 1729-30), he was also accused of trading extensively with the Ostend Company and with lending "six lacks of rupees or £60,000" to the Dutch.[504] Despite this, Deane appears to have left Bengal in affluent circumstances.

Deane's position as Director Governor of Bengal during a period of British commercial growth in western India made him a man of considerable means, and certainly one worthy of commissioning a fine set of glassware. As the Crest appearing on the ewer, cup and bottle only correspond with more senior officials serving in the Honourable East India Company, it is fair to assume that the glass objects were only commissioned during his most senior appointment, and were thus made sometime between 1728-32. This date furthermore corroborates with documented sources of imported lump glass and ingots arriving into India from England, many of which travelled to the Bay of Bengal. While no glass production has been attributed to Bengal at this time, both Patna and Lucknow served as known glass-making centres. This set could have been commissioned at a more established workshop, and transported by river routes further east to Calcutta; or, been made at a local factory whose existence, to date, remains unknown. Despite not being able to attribute an exact place of production, this set of glass objects nonetheless provides rare evidence of known

[502] P. J. Marshall. *East Indian Fortunes: The British in Bengal in the Eighteenth Century* (Oxford: Clarendon Press, 1976), p. 228.
[503] IOR/D/19 [Minutes of the Committee of Correspondence, 1727-36], f90
[504] L. Warnier to Directors, 26 Jan 1733, IOR, Home Miscellaneous, 74, p. 518; cited in Marshall (1976), p. 228.

provenance, one that confidently dates the objects to the second quarter of the eighteenth century.

The other ewer, currently in the National Museum in Delhi, is catalogued as a *huqqa* base; despite this vessel's missing neck, handle and spout, the form of its bulbous shaped body is almost identical to the LACMA ewer. According to the Museum's records, this object was purchased from C.L. Nowlakha, an antique dealer in Calcutta, in 1957.[505]

The third object, another ewer, represents the only known example of such a spectacular specimen existing in glass; its rarity attributed to its technical mastery, high level of artistic accomplishment, and early provenance. It represents one of two glass objects dating back to Sir Hans Sloane's bequest to the British Museum in 1753. This early provenance, like the Crest of John Deane, dates the object to sometime within the first half of the eighteenth century.

Fig. 331: Cat. 99 (NMD 57.31/22)

[505] These records were provided personally by the Department keeper, Ms. Anamika Pathak, in December 2012.

Fig. 332: Cat. 98 (BM SLMisc.343)

Form & Function: History and Representation

The LACMA ewer has been identified as such based on its shape; however, it has been alternatively suggested that the form actually derived from a Chinese-style wine pot.[506] A similarly shaped Chinese rock crystal vessel supports this association (fig. 333), and while the actual function of both glass ewers remains unknown, given the similarity of shape and the association of the smaller cups to that of wine (as suggested in the previous case study), this identification could be more accurate than its current classification. The small cup accompanying the LACMA ewer is furthermore decorated in a similar manner, not only indicating that they belong to the same set, but that the cup's function is directly connected to the ewer. The shape of the bulbous bodied ewer could

[506] Stuart C. Welch. *The Art of Mughal India: Painting and Precious Object* (New York: The Asia Society, 1963), p. 1-3, fig. 51.

arguably derive its form from Central Asian and Timurid wine tankers, such as the famous carved jade vessel made for Ulugh Beg (fig. 284). The ewer could have also evolved from a traditional Indian ewer that has an onion shaped body terminating in a pointed pinnacle, the handle of which is arched and placed on top of the vessel (fig. 334). While some scholars believed this form to have originated in Iran, and to have spread to India during the fifteenth and sixteenth centuries, according to Zebrowski, the abundance of Indian examples as against known Iranian ones, and the existence of such a ewer made for a Hindu temple in 1415, suggest otherwise.[507]

Fig. 333: *Wine Pot*, China, middle Qing dynasty, about 1700-1800
(Los Angeles County Museum of Art M.76.2.4a-b)
Fig. 334: *Kettle Ewer with Dragon-Headed Spout*, North India, late sixteenth – early seventeenth century
(Metropolitan Museum of Art, 30.95.194)

The most common form of Mughal ewer, the *aftaba*, consists (according to Zebrowski) of "a slightly pear shaped body, curved handle and spout, a tall neck with a bulge or disk in the centre, and a crescent shaped top."[508] The earliest occurrence of this particular form is a ewer published as Turkey or Iran, 14th century; however, the circular shaped body also has roots in both Sultanate and Timurid traditions.[509] This basic ewer shape evolved during the seventeenth and eighteenth century, with a domed top replacing the crescent one, and bodies expanding into rounder forms. The abundance of metal ware ewers with a similar shape, made predominantly in either brass or *bidri*, suggest a popularised shape that spread throughout South Asia, with no association with

[507] Zebrowski cites a known, dated Iranian ewer (dated 1011H/1602-3) referenced in A.S. Melikian-Chirvani 1982, no. 147; Zebrowski (1997), p. 153.
[508] Zebrowski (1997), p. 153.
[509] A.S. Melikian-Chirvani (1971), no. 145; published in Zebrowski (1997) plate 207.

a particular region.[510] Examples of both seventeenth century *bidri* ewers from the Deccan, Bidar (fig. 335), and brass ewers from Lahore (fig. 336) prove the popularity of such a form throughout the subcontinent so that it is impossible to associate the British Museum's glass ewer's shape with a particular region.[511]


Fig. 335: *Bidri ewer*, Deccan, Bidar, seventeenth century (Victoria & Albert Museum 1479-1904)
Fig. 336: *Brass ewer*, North India, probably Lahore, late seventeenth century (LACMA AC1995.52.1)

Representations of ewers, or similarly shaped vessels, in Indian paintings are rare. One of the few such representations dates to emperor Akbar's reign, and is a folio from his *Akbarnama* album, dated between 1586-9 (fig. 337). In the niche behind Akbar are several painted colourful bottles of various size and shape, including a green ewer and small cup, which could be representations of jade, celadon ware, or glass vessels (fig. 338). Several surviving examples of carved jade ewers with handles dated to the Mughal period are in the National Palace Museum, Taiwan.[512] The shape of these carved vessels and the *Akbarnama* illustration strongly corresponds with LACMA's ewer, confirming the shape's early existence within the Mughal courts. Furthermore, the illustration's inclusion of a small cup accompanying the pot confirms that both vessels were used ensemble.

[510] Zebrowski (1997), p. 159.
[511] For discussion of the shape and decorative style of the V&A bidri ewer, see: Susan Stronge, *Bidriware: Inlaid Metalwork from India* (London: Victoria & Albert Museum Publishing, 1985), p. 39-40.
[512] Shu-p'ing Teng (2007), figs. 97, 98, 99, pp. 94-95.

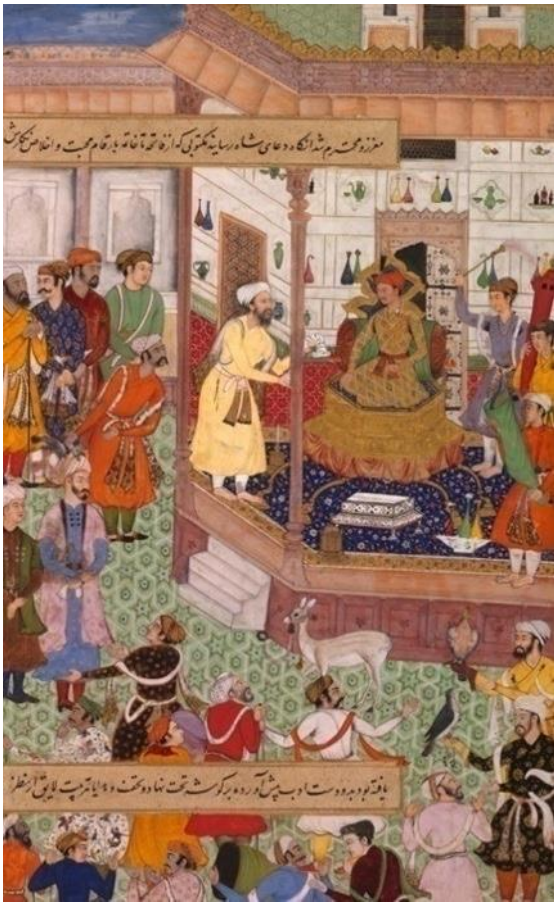


Fig. 337: *Akbarnama, Akbar receives Iranian ambassador Sayyid Beg in 1562,* Mughal, 1586-1589, Outline by La'l, painting by Nand (Victoria & Albert Museum IS.2:27-1896)
Fig. 338: Detail of figure 337

Illustrations of similarly shaped vessels already appear in Timurid paintings, such as the previously illustrated Imperial album folio from a *Mantiq al-tair* (Language of the Birds) dated to 1487, Herat (fig. 287). In the centre of the distant niche behind the prince stands a cobalt blue ewer that is identical in shape and colour to the British Museum SLMisc.343.

Representations of the ewer’s shape vary in seventeenth and eighteenth century depictions. While the general form of a bulbous body with spout and curved handle appears in all representations, the shape and embellishments vary. An ewer appears as one of the five decorative elements placed upon the table of the famous Mughal painting of Jahangir entertaining the Safavid emperor Shah Abbas, dated to around 1620 (fig. 339).


Fig. 339: *Jahangir Entertains Shah Abbas,* St. Petersburg Album, Mughal dynasty, circa 1620 (Freer Gallery of Art, Smithsonian Institute Washington DC F1942.16a)
Fig. 340: Page from the Gulshan album; borders Mughal, signed by Abu'l Hasan, circa 1620-30 (Golestan Palace Museum, Tehran: Manuscript No. 1663, folio 217)

This white ewer, made of metal or silver, most likely represented a European (probably Italian) import; although the overall shape of the elongated, round body with curved spout and handle resemble features also found on the glass ewer.[513] Another detailed illustration decorating the borders of a page from the Gulshan album depicts an attendant pouring wine from a Chinese blue and white porcelain ewer (of similar shape) into a bottle (fig. 340).[514] This detailed border further confirms the possibility of this form, even with its subtle variations of shape and medium, serving as a wine vessel.[515] According to Hugh Tait, the British Museum's ewer imitates the form of a brass ewer already common in the South Asia form the sixteenth century.[516] While similarities in form are clearly seen between the glass and metal shapes, no cobalt blue glass ewer has, thus far, been identified in any known paintings from the Mughal period. When these shapes do make their way into illustrations, they either appear amongst a variety

[513] Richard Ettinghausen has attributed the origins of each of the vessels illustrated in this painting, claiming the ewer as Italian. See: Richard Ettinghausen. *Paintings of the Sultans and Emperors of India in American Collections* (New Delhi: Lalit Kala Akademi, 1961), plate 13.
[514] Published in Susan Stronge. *Made for Mughal Emperors: Royal Treasures from Hindustan* (London: I.B. Taurus, 2010), plate 184, p. 223
[515] For an example of a similar Chinese ewer see: *Blue and white porcelain ewer*, China, Kang Xi period, 1662-1722, Height: 32 cm (Myrna Myers Collection, Paris); published in Zebrowski (1997), plate 226.
[516] Hugh Tait (ed.) *5000 Years of Glass* (London: British Museum Press, 2012), no. 175, p. 139.

of other decorative items on display, or are used in an act of serving; they are not singled out as unique objects.

Comparative Analysis of Shape, Glass, Technique, and Manufacture

All three objects are free blown and tooled on the pontil, with the pedestal, lid, handle and spout added. Ewer M.84.124.2a-c and ewer SLMisc.343 have additional fittings made of brass, with the brass spout possibly added later. Ewer SLMisc.343 measures 29 cm in height with its widest point between the handle and spout measuring 23 cm. It weights 1370.2g and is comprised of six parts. It has a flattened piriform body that extends to a tall cylindrical neck with two collared rims, the lower rim formed by the addition of glass while the upper rim folded down upon itself.

Figs. 341-343: Views of the mouth, lid and handle (BM SLMisc.343)

The lid is dome shaped with a circular knob on top, similar to those on both the covered jars and bowls. The curved handle joins from the top of the neck to the middle of the body, with a similarly curved spout tapering to a fine collar terminating in a bulbous shaped mouth. Both the handle and spout are free blown separately and tooled once attached to the body (figs. 341-343). The cylindrical base splays slightly outwards and has an additional tooled ring; the abrasive pontil mark at the base's centre measures approximately 1 cm in width. Additional brass fittings secure the upper handle to the collared neck, while the lid is secured to the handle by a metal tongue that swivels on a pin attached to the metal collar on the handle. Subtle tooling marks are seen around the rims and collars, yet most visibly along the curved handle. The lid has since been damaged and restored, but the rest of the vessel remains in excellent condition (fig. 344).

Fig. 344: Detail of lid (BM SLMisc.343)

All three ewers are manufactured in a similar manner, with the bulbous body free blown and tooled, with lid, handles and spout added. The LACMA ewer measures 18.7 cm in width (between the handle and spout), and 15.2 cm in height. Ewer 57.31/22 measures 13.2 cm in height, and weights 601.9 g; assuming that this specimen had a similar cylindrical neck and lid to LACMA's, it would have measured only slightly higher. This ewer is not uniformly round, with some parts of its body slumping slightly, and narrows in shape as it extends to what presumably would have been a cylindrical collar and additional lid. The breakage points on both opposing sides clearly indicate the addition of elements. On one side a hole punctuates the glass, with a thin flattened rim of additional glass surrounding this hole; the abrasive breakage marks testify to the existence of a possible spout (fig. 345). On the opposing side only a triangular shaped roughened glass piece remains, the remnants of a supposed handle (fig. 346). The top of this pot has been flattened, perhaps after its initial break, while several severe cracks run throughout the body.

Fig. 345: Detail of possible spout (NMD 57.31/22)
Fig. 346: Detail of possible handle (NMD 57.31/22)

Fig. 347: Detail of base and pontil mark (NMD 57.31/22)

Unlike other covered jars, bowls, cups and the ewer, the base on this ewer has been tooled from the same piece of glass. The bottom of the body narrows slightly and has been shaped to form a wide stable base that is slightly narrower than the body itself; the pot has a pronounced kicked-in base with a small abrasive pontil mark in its centre (fig. 347).

The ewer represents the only specimen of the three that has been tested through XRF analysis. The results of this test yielded the following results: lead (Pb) was the predominant element, with detectable traces of potassium (K) and minor traces of calcium (Ca) and iron (Fe) (fig. 27). The cobalt blue colouring agents were added at too low a percentage to have been detected by this testing method; however, its composition characterises the glass as a potash-lead variety.

The cobalt blue glass of the British Museum and LACMA ewer is difficult to visually analyse given the object's heavy surface gilding. The British Museum example can be best examined underneath its lid, where the glass has not been decorated, despite this area being damaged and since repaired. This small section shows numerous small seeds and refractory stones within the glass, similar to all other cobalt blue glass discussed in the preceding case studies. Despite the ewer's heavy gilding, the surface of the piriform body presents several raised dots, that could indicate either refractory stones that have risen to the glass's surface during the melting phase, and been consequently blown out into the vessel, or small inclusions from environmental contamination. These markings, along with what appear to be chill marks (or perhaps tooling marks) across the body give a slightly uneven, bumpy effect. Upon closer examination of both the base and mouth, uncountable small dark inclusions and refractory stones appear within the glass.[517]

The National Museum, Delhi ewer is made of a transparent pale amethyst glass. While this colour of glass, made by the addition of manganese, appears more commonly in later rose water sprinklers, only one other example exists within the Catalogue: a bell-shaped *huqqa* base (cat. 165). The colour of this ewer, however, differs from this *huqqa*; it is darker purple with reddish-brown hues. Visible traits can be seen throughout, including large air bubbles, seeds, refractory stones, inclusions, and crizzling. Given the broken nature of the vessel, the glass can be more easily examined despite its heavy surface decoration (fig. 348). Several medium sized air bubbles, measuring approximately 2 cm in length, appear on the body and base, along with uncountable small bubbles and seeds running throughout the glass layers. A few small dark inclusions appear scattered throughout the vessel, but unlike the cobalt blue glass, do not exist in excess quantity. When examined from the inside, a uniformed layer of white

[517] Pinder-Wilson describes the glass ewer as having "small bubbles in glass which tends to opaque". See: Pinder-Wilson and Tait (1968), p. 124.

milky film can be seen covering the vessel's interior, with some cloudier patches seen from the exterior, signs of more advanced crizzling.

As so few specimens exist in this colour, it seems that amethyst was perhaps not popular amongst glass makers, although transparent purple did represent one of the ingot colours salvaged from the 1765 Albion wreckage.[518] While the glass could have attempted to imitate amethyst stones, the light colour (unlike emerald green, cobalt blue, or opacified yellow and pale green) does not sufficiently mask the glass's visual traits, rendering it, perhaps, an unsuitable –and thus unpopular - colour choice for Indian glassmakers.

Fig. 348: Detail of glass (NMD 57.31/22)

Surface Decoration

As previously described, the decoration covering the LACMA ewer consists of two bulbous shaped vases, each with a profusion of diverse floral sprays, which weave entirely around the vessel's body. The upper shoulder and base are decorated with a fine triangle and tripartite leaf motif, with a further band of small solid circles and squares. The cylindrical neck and lid are each gilt painted with running floral motifs of varying sprays, while the handle and lid's knob are painted in solid gilt. A fine solid band of diagonal dashes decorate the pedestal.

The decoration of the bulbous shaped vase with profusion of floral sprays has been attributed to an Awadh aesthetic that emerges across media – including works on paper (fig. 349) – during the eighteenth century. This distinctive motif presents a lush

[518] Redknap and Freestone (1995), p. 146.

array of flowers that cover the object's entire surface, similar to the dense jungle pattern that appears upon a variety of Lucknow objects (such as metal or silver ware). The similar treatment of densely depicted floral sprays, and the specific inclusion of a bulbous shaped vase, represents visual traits associated with an eighteenth century Awadh aesthetic. Moreover, the abundant use of gilt, and the fine execution of painting attest to a high level of workmanship associated with the courtly patronage of Lucknow of Faizabad.

Fig. 349: *An Elaborate Vase and Floral Design on Gold Ground,* India, Lucknow, 1750-1800 (Cleveland Museum of Art 2013.354)
Fig. 350: Cat. 97 (LACMA M.84.124.2a-c)

The decoration upon this LACMA vessel is similar to other cobalt blue glassware previously mentioned; however, certain decorative features also appear on the British Museum ewer, such as the running floral motifs and triangular and tripartite bands (fig. 351). The ewer's entire body and spout are gilded in what Pinder-Wilson described in 1968 as "a spray of three poppies framed by acanthus leaves arranged in diaper" and its neck, shoulder, foot, handle and spout decorated with "chevron bands and floral scrolls."[519] The diaper patterning framed in acanthus leaves is what has been referred to in previous case studies as a vegetal ogee. Hugh Tait calls this pattern "reminiscent of textiles", as this feature appeared on the mid seventeenth century Mughal carpets made in either Kashmir or Lahore.[520] The attribution of the flowers as poppies cannot be

[519] Pinder-Wilson and Tait (1968), p. 124.
[520] Tait (2012), p 139.

certain given their small size and undetailed execution; however, their composition within vegetal ogees represents a familiar decorative feature.

The densely decorated pattern covering the entire surface of the exquisite ewer connect it to a courtly atelier or workshop, one, which based in similarities with the LACMA ewer, suggest Awadh (Lucknow) as a probable place of production. Both the highly complex method of manufacturing the ewer (comprised of six parts) and the detailed execution of its richly gilded surface, make this example one of the finest Indian glass objects. Such a high level of artistic mastery connects its manufacture with a courtly atelier, one which, given its 1753 provenance and decoration, point towards Lucknow (or possibly Delhi).

Fig. 351: Detail of upper shoulder decoration on ewer (BM SLMisc.343)

The National Museum, Delhi ewer represents another such example of splendid surface decoration, although entirely different from the other ewers (fig. 352). The gilded decoration covering this ewer is neither stylised nor formalised; it is unlike any type of pattern previously discussed in these case studies. The overall composition depicts four curving trees, each with a profusion of diverse floral sprays stemming from a rocky landscape. Both the treatment of the trees and rocks have a chinoiserie feel; the fine tree trunk and branches similar to that of a bonsai tree. While certain aspects have a Far Eastern sensibility, the small floral sprays are clearly Indian, and have already appeared on other glass examples discussed. The difference in treatment is the attempted effect at creating shading and depth through a crisscrossing of petals and leaves, a pattern not seen on any other Indian glass objects. While the overall composition of four trees, each evenly spaced around the vessel's body, creates a sense of organization, the lush treatment of intertwining leaves, branches, and flowers conversely creates a dense display of patterns.


Fig. 352: View of surface decoration (NMD 57.31/22)
Fig. 354: Cat. 111

The only comparable example of such decoration exists on a green globular *huqqa* base (fig. 354), attributed as Lucknow circa 1780.[521] The similarity of both patterns, each of which resembles the dense jungle scene, has been attributed to Awadh. Based solely on stylistic comparisons, the ewer follows this aesthetic, which when examined in relation to the *huqqa* base, silver ware objects, and Shah Jahan's album page borders, all confidently attribute this style to that of late eighteenth century Lucknow. The rich and dense jungle-like patterning of both the ewer and *huqqa* base appear not to have been a popular choice of motif for glass objects, for reasons unknown, as only these two objects present such a pattern. However, the finesse and richness of surface pattern, like the other ewers, suggest a royal or courtly workshop. The Delhi ewer can therefore follow the *huqqa's* attribution as Lucknow circa 1780.

Concluding Interpretations

These three ewers all represent exceptional examples of Indian craftsmanship, and attest to the high level of artistic accomplishment glass achieved during the eighteenth century. Moreover, the LACMA and British Museum ewer serve as rare examples of objects with documented provenance: the Crest of John Deane incised

[521] Markel (1991), fig. 7, p. 87. For a stylistic comparison to the detail of a floral border of on Shah Jahan, c.1780, Faizabad or Lucknow see: Markel (2011), plate 127, p. 203; folio currently in the Museum fur Asiatische Kunst, Perlin, Polier album (I 5063, folio 9b).

upon the ewer, cup, and V&A's bottle attribute a dating between 1728-32; while the British Museum ewer's arrival into its permanent collection in 1753 dates it to the first half of the eighteenth century.

While John Deane served as the President of Bengal, his status ensured that he could have commissioned a variety of suitable objects used for public entertaining or private use. His requested increase in table allowance confirms that he received regular visitors, and that, in his position as President, such occasions warranted the use of fine serving dishes. Interestingly, however, was Deane's conscientious choice of glass as a suitable media. Certainly as President Deane would have encountered other fine glass objects in use in India, and therefore could have commissioned a special set based on its availability and affordability. At the time of his Presidency, Faizabad (the then capital of Awadh) represented a growing city with a cultivated court and wealthy elite; fine glass objects would have certainly been a part of its courtly artistic production. As such, Deane probably commissioned his glass set from an already established workshop such as Faizabad; the attribution of his set with Awadh is further supported by the distinctive vase and flower motif decorating Deane's glass, a motif found upon later Lucknowi decorative arts.

Deane's glassware not only reflects some of the finest examples of Indian glass, but also shows that sets were, at one time, commissioned. This small set, comprising two cups, a ewer, and bottle, suggests that it was made for drinking wine, a leisurely pastime shared by both Indians and Europeans. The decision to make a set in glass, especially by such a public and prominent figure (the President of Bengal) shows the important role glass played within the context of conveying luxury and power.

The attribution of Deane's set along with the British Museum and National Museum, Delhi ewers to Lucknow is based on stylistic similarities. Furthermore, the abundant use of gilt and the sophisticated level of surface decoration suggests that these objects were commissioned at a wealthy, and established, courtly atelier. To date, only three Indian glass ewers exist, itself a testament of their rarity and importance. These three objects each reflect the pinnacle of eighteenth century Indian glass production.

CONCLUSION

This thesis attempts to better understand this corpus of material by applying a methodological approach that examines their form and function, the chemical composition of the glass, and their surface decoration. The aim of this approach was to separate the objects into three categories, each of which, when examined individually, would allow for a more cohesive understanding of the object.

With the exception of the case bottles, the form of these varied glass objects derive their inspiration predominantly from Central Asian and Indian influences, which, if analysed separately, cannot categorically define them as Indian. The amalgamation of European shapes decorated with either Asian or Indian designs reflects a wider trend of European Companies (Dutch VOC and English East India) manufacturing objects for an export market. The trade of patterns, designs, shapes and forms throughout the sixteenth to nineteenth centuries reflects a long and continuous trend that is not unique to either glass or India. The case bottles discussed in this thesis reflect one such example of a European form manufactured in both Chinese and Japanese porcelain and decorated with Asian motifs. The *huqqa* base, conversely, reflects a unique form originating in South Asia. The ewers also represent examples of traditional Indian forms produced in innumerable examples and decorative variations of metal and *bidri* ware.

The dining ware vessels include a variety of objects whose forms stem from a combination of influences, including Central Asian and Timurid. Most interesting, however, is the association of a shape with its function. The small cup, for example, has often been catalogued as a teacup; its association further supported by its pairing with a small saucer often of similar decoration. This association stems from the cup's production in porcelain, an export for the European market, where it was consequently used as a teacup. Despite the similarity in shape, this cup was only used to drink wine in India. The visual representation of small cups in Indian paintings supports this function; their inverted placement upon wine bottles or their inclusion amongst scenes in which drinking wine occurs only confirms their association and use.

For the most part, the types of objects manufactured in glass also appeared in other media, including jade, porcelain, and metal. No shape within the Catalogue is unique to glass. It is curious, however, that some types of object seem to have never been manufactured in glass in India, such as long stemmed wine cups, vases, or lamps, as produced in other cultures. The types of Indian objects manufactured reflect those already in existence in other mediums, supporting the notion that glass was an imitative and not an innovative practice. There appeared to be little experimentation in producing new forms unique to glass; instead, traditional forms already in use were merely replicated.

The social context of how objects were used can only be understood through the visual representation of glass in Indian paintings. As so little archival and historical evidence details glass production or consumption in India prior to the nineteenth century, the visual representation serves as documentary evidence supporting both its existence and function. Representations of glass in paintings from the late sixteenth to twentieth century represent the strongest body of supplementary material upon which to better understand Indian glass.

The chemical analysis of glass represents the single greatest contribution to furthering the understanding and discussion of Indian glass. While two *huqqa* bases had previously been examined through EDS testing, the results published in 2001, no further cohesive study of glass other than *huqqa* bases had been done. The XRF analyses conducted for the specific purpose of this thesis revealed that the majority of the nineteen tested specimens – of diverse shapes, sizes, and colour glass – are of a potash-lead composition similar to European glass of the late seventeenth and eighteenth century. While the calcium traces tested within some specimens reflect an element found only within Dutch glass, calcium could have arguably entered into the batch from a secondary re-melting of raw materials (cullet) or from contamination of environmental conditions. The arguments presented in the preceding case studies support the use of English lead glass, with variations in elements (iron, copper, and calcium) arriving during the secondary glass production in India. Not only do the XRF analyses further the understanding of the type of glass used to manufacture these objects, but when substantiated by the earliest known India Office Records (dated from 1716), which document the import of lump glass, cullet, and glass ingots within the private papers of English Company officials travelling to Madras or the Bay of Bengal, and, later nineteenth century surveys documenting the use of European glass for the production of Indian glassware (in the Punjab, Bombay, Bengal, and Awadh provinces), it seems reasonable to presume that Indian glass vessels of this thesis and Catalogue were manufactured from eighteenth and nineteenth century European glass imports, which were distributed to local glasshouses and reworked into new objects. This process continued in India until the early twentieth century, when more modern and industrialized glass factories emerged that utilised locally sourced raw ingredients. At this point, a soda-lime-silica type of glass came to chemically characterise Indian glass.

Europeans professed several theories for why the Indian glass industry utilised locally sourced ingredients only in the twentieth century, despite the subcontinent having an abundance of all the necessary raw materials prior to this date. The first commonly attributed reason was fuel; the inability to heat raw ingredients at a sufficiently high temperature stemmed from both the type of fuel used (wood as opposed to coal) and the costs associated with this fuel source. The second related reason was the inadequate construction of furnaces, which again, created insufficient temperatures required to sustain the necessary heat needed to melt the glass. Both the construction of furnaces and type of fuel assumed that the raw ingredients could not sufficiently melt to create a clean, raw glass adequate for high quality blown objects. In addition, late nineteenth and early twentieth century European surveys claimed that the materials themselves were not properly cleaned, resulting in the numerous visible flaws and imperfections embedded within Indian glass. Surveys such as these ultimately subjected the industry to one that was inferior in quality and incapable of developing beyond its 'infancy' state. Much of the study and subsequent understanding of Indian glass from this period has, to date, been tainted by this singular European interpretation, and failed to place this glass within India's long and complex tradion of glass making.

Indeed, Indians had the abundance of raw materials required for high quality glass production, as well as the knowledge of glass making, the exposure to blown glass objects for centuries, and the familiarity with making primary glass (as done for beads and bangles). South Asia had long been in contact with glass blowing civilizations and cultures since the first century AD. [522] The site of Arikamendu, north of Pondicherry on

[522] For literary evidence see: P.K. Gode, *Studies in Indian Cultural History, Vol. III* (Poona: Bhankarkar Oriental Research Institute, 1969), p. 89. For archeological evidence see: Stefano Carboni, "The Mantai Glass" in *Mantai City by the Sea,* John Carswell, Siran Deraniyagala and Alan Graham (eds.) (Aichwald: Archeaological Department of Sri Lanka & Linden Soft Verlag, 2013), pp. 313-48. For documentary evidence see: S. D. Goitein, "The Medieval Glass Industry as Reflected in the Cairo Geniza," *Readings in Glass History, Vol. 2,* Anita Engle (ed.) (Jerusalem: Phoenix Publications, 1973), pp. 18; and S. D. Goitein,

the eastern coast of India, represented a Roman trading town that yielded excavated remains of blown glass objects dated to the first century AD. Other examples of blown glass objects have also been excavated at various sites throughout South Asia, primarily in the northwestern regions of the Punjab and in modern day Afghanistan and Pakistan. These finds attest to the subcontinent having been exposed to glass objects, and possibly even glass making, for centuries prior to the earliest known evidence attesting to glass blowing in India in the early nineteenth century. Furthermore, South Asia has a long and distinguished history of glass making for beads, bangles, and small objects. While this glass has been characterised as a stiff, opaque glass that is high in alumina and low in lime, the familiarity with glass production (both melting of raw materials and manufacturing of small objects) attests to a civilization and culture that used glass for centuries. Why then, did the Indians not exploit the potential of glass blowing as other regions did following its invention in the first century AD? Why did the transference of glass technology not occur in South Asia before the late Mughal period, despite an established familiarity with the material? If in fact the evidence is lacking, is it merely a question of recovering or reporting evidence, or rather, examining whether the transfer of techniques occurred, or if a weak local demand for glass existed?[523]

When compared to Iran, which was producing glass bottles and rose water sprinklers from raw ingredients sourced locally already in the late sixteenth century, given the exchange of influences between both cultures, where is the evidence of such a comparable industry existing in India at this time? The same Iranian and European travellers and tradesmen crossed eastward into India, and could have transferred both the technologies and techniques to local craftsmen. Innumerable examples of paintings depicting glass bottles exist in both works on paper and upon architectural ornamentation in South Asia during the late sixteenth and seventeenth centuries, and yet are these visual illustrations depictions of imported glass or actual objects made in Akbar or Jahangir's royal ateliers? Mirrors and window glass were both manufactured in Akbar's royal ateliers, demonstrating a similar technique to that deployed for blown vessels. Could one established royal atelier (mirror making) not have simultaneously stimulated the production of another? Like Iranian glass, both Venetian and English

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"From the Mediterranean to India: Documents on the Trade to India, South Arabia, and East Africa from the Eleventh and Twelfth Centuries," *Speculum: A Journal of Mediaeval Studies* 29 (1954), p. 185.

[523] See: Carol Meyer, "Glass from Quseir Al-Qadim and the Indian Ocean Trade," *The Oriental Institute of the University of Chicago* 53 (1992), pp. 1-201.

façon de Venice glass vessels (imported in large quantities into India during this period) could have also influenced local production at the time; instead, these glass vessels remained as luxury imports. Unlike other arts, such as Christian styles of painting and enamel decoration, which were introduced by Europeans and shortly thereafter imitated and adopted by Indian craftsmen, no attempt to develop comparable or competitive glass from imports seems to have occurred during the early Mughal period.

Instead, unique forms of Indian glass only develop sometime during the first half of the eighteenth century. These objects seem to reflect a shift in social associations surrounding the media that, with the increase in foreign imports and the rise in transport routes, facilitated the use of glass objects beyond the devotional or decorative to the utilitarian. This, compounded by the rise in concentrated wealth circulating around certain courts encouraged elites, royals and members of the court to commission a variety of new and fine quality glass vessels. Yet this transition to create blown vessels (bottles, *huqqa* bases, and dining ware objects) only begins in the eighteenth century, with no evidence yet suggesting that similar objects existed prior to this date. The underlying question surrounding this shift and period of production, and why glass blowing never developed into a larger, more competitive industry comparable to other arts, is perhaps rooted in deeper questions that this thesis has only attempted to marginally answer. Should the answers stem from cultural desires or associations derived from the raw material itself, then further research into religious treaties and texts will hopefully present clearer answers.

What can be confidently stated on the basis of research conducted thus far is that glass reflected a media that held a wide and versatile function amongst a variety of castes, religious groups, and ethnicities in India, whether used as mirror ornamentation, imitation jewels, beads, bangles or blown vessels. The glass industry was highly stratified, with specific glasshouses or Muslim families manufacturing types of glass determined by local demand. As the studies of mirror glass, Lucknow and Patna have shown, glass represented a complex industry that benefited from various patrons to produce an assortment of accomplished objects. Its development over the centuries (in particular the late modern and early colonial period) reflected local and regional transformations, which at the time were intrinsically intertwined within the larger political fractioning of the Mughal Empire, the continual threat of territorial expansion by regional tribes and ethnic groups, and the increasing hold of British hegemony. The political backdrop of this transitional period places glass production as one strongly rooted in past traditions, yet evolving to suit new tastes resulting from these political instabilities and influences.

The exceptionally fine quality of this thesis' glass objects represents an amalgamation of European, Chinese and Indian influences of shapes, glass compositions, techniques, and decorative styles, and demonstrates a culmination of traditions, skills, tastes, and patronage. Unlike the shapes and forms, the decoration upon these vessels is not, as past scholars have postulated, imitative but innovative. The mix of techniques and styles appearing on these glass objects is unique to glass. The appliqué technique combined with gilding and cold painting, for example, does not appear on any other media or types of objects. The decoration itself, a variation of floral, figurative, and geometric is unmistakably Indian in style and treatment; however, the regularity of patterns appearing on a variety of objects presumes the existence of an established repertoire of motifs. While few patterns can be confidently attributed to a particular region, the abundant use of gilt and the detailed execution of surface decoration both allude to the objects' commissioning by a wealthy, royal or courtly atelier. These objects, irrespective of exact date and provenance, represent sophisticated and splendid objects made for admiration above use.

The overall combination of form and function, glass, and decoration helps better understand the variety of objects within this thesis. Research into both chemical compositions and historical documents, in particular EDS testing and records documenting eighteenth century glass production, circulation and use, would further substantiate the assumptions and arguments presented in this thesis. This thesis has attempted to create a cohesive body of objects to examine, and to better understand their origin, function, and differences in form, glass, and surface decoration. Despite lingering questions of dating and provenance, these objects can be discussed and understood as undeniably Indian in both production and decoration. Furthermore, their exquisite surface decoration demonstrates the capability of Indian craftsmen in creating objects of extraordinary artistic accomplishment.

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