GLASS AND LAPIDARY BEADS AT JAMESTOWN, VIRGINIA: AN UPDATED ASSESSMENT

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An updated assessment of the trade beads in the Jamestown collection has long been overdue since Heather Lapham's 1998 study. The size and variation of the collection has expanded to include nearly 4,000 glass beads representing over 100 Kidd and Kidd varieties, as well as nearly 100 lapidary beads made of amber, coral, jet, amethyst, carnelian, chalcedony, agate, and quartz. The Jamestown assemblage strongly resembles those found at 16th-century Spanish colonial sites, due to the presence of navy blue Nueva Cadiz beads manufactured in Venice and faceted quartz-crystal beads likely produced in Spain. Other beads in the collection, however, may have been imported from Venice, the Netherlands, or elsewhere. Investigation of their origins has significance for understanding the position of the Jamestown settlement within the development of early 17th-century international and local trade. The compilation of counts and typology establishes a necessary baseline upon which to build.

INTRODUCTION

Glass trade beads are a durable and distinctive piece of material culture providing insight into the processes of colonization. Changes in the distribution and frequency of different types of beads can be used to assess temporal change at colonial and native sites, and to investigate local and international relationships and trade. The manufacture and distribution of trade beads was influenced by shifts in European politics as new centers of production and exchange emerged, craftsmen migrated or developed new techniques, and new colonies were established. Separate regional glass bead chronologies have been created, but a truly comprehensive assessment of trade beads from the colonization of the Americas remains to be written. In order to situate the Jamestown assemblage, it is necessary to consult chronologies not only of English trade in the 17th-century Middle Atlantic, but also 16th-century Spanish collections from the Southeast and French material from the Northeast. The sometimes significant overlap in varieties, manufacturing locations, and techniques present in these different assemblages is important to assess and interpret.

The English arrival at Jamestown, Virginia, in May of 1607 marks an important transitional period in the colonization of the East Coast. While English trade bead chronologies nominally begin with Jamestown, they are largely based on data from later sites (Marcoux 2012). Trade with the Virginia Indians was crucial to the beginnings of the colony, as the beads sent by the Virginia Company of London were exchanged for corn to feed the colonists (Kingsbury 1993). The size and diversity of the assemblage hints at the vital importance of glass beads to Jamestown's success. Much of this significant data from early, tightly dated contexts has not yet been integrated into the overall chronologies of glass beads in the English Middle Atlantic colonies. Jamestown's situation just after the turn of the 17th century represents a period of change in European manufacturing trends as well that can provide further insight into shifting trade patterns and colonial expansion.

In the 16th century, glass manufacture was largely dominated by Venice and the glassworks located on the nearby island of Murano. Beginning in the 1590s, however, many artisans emigrated from religious persecution in the region, as well as working conditions that imposed secrecy and control (Little 2010). The Netherlands was a more welcoming destination, especially for non-Catholics. As Dutch workshops were fed by the influx of new craftsmen and their techniques, Amsterdam emerged as a center of glass manufacturing, producing many forms closely resembling Venetian products (Karklins 2012). This migration coincides with the disappearance of several distinctive Venetian types such as Nueva Cadiz and chevron beads from Spanish contexts and the appearance of similar Dutch variants farther north in French and English contexts (Little 2010).

Bradley (2014) notes the strong resemblance between the glass bead assemblages found on English and French sites from the very early 17th century. Most sites contain an abundance of simple white and blue beads, although tubular forms are more common to the north, and English sites are dominated by round or oval forms. While Bradley (2014) considers it likely that many of the glass beads found on early French sites were manufactured in the Netherlands, the Jamestown assemblage includes varieties such as navy blue Nueva Cadiz beads not produced by the Dutch. Because the beads in the Jamestown collection contain this variety, and overall bear the strongest resemblance to 16th-century Spanish trade bead assemblages, they are still thought to likely be of Venetian origin (Lapham 2001). Venice remained a dominant force in the glass industry, and Dutch manufacturing waned by the end of the 17th century (Karklins 2012). The strong similarities between products from different locations and the overall trends toward smaller, simpler, less-distinctive beads makes it difficult to determine the exact source of many trade bead assemblages.

GLASS BEAD CHRONOLOGIES

Marvin Smith's (1976) chronology of Spanish trade beads in the Southeast, widely referenced since its publication, proposed two slightly different sets of dates but ultimately favored one over the other. Based on further excavations and new data, Keith Little reassessed Smith's hypotheses in 2010 and found evidence to support the series Smith initially rejected. In this chronology, Complex I encompasses pre-1550 contexts representing early Spanish exploration and conquest. Its assemblages contain Nueva Cadiz plain (IIIc), Nueva Cadiz twisted (IIIc'), faceted chevron (IIIm1), simple purple (IIa), and blown glass beads. Complex II dates to between 1550 and 1600, although the beginning of this period should likely be pushed up based on the Nueva Cadiz and chevron beads recently excavated by John Worth at the Tristan de Luna site dated between 1559 and 1561 (Marvin T. Smith 2019: pers. comm.). The beads include simple blue (IIa40 and IIa44), transparent green (IIa28), dark blue (IIa55), opaque white (IIa13), gooseberry (IIb18), blue with red-on-white stripes (IIbb27), blue with white stripes (IIb57 and other varieties), flush-eye (IIg), blue with alternating red and white stripes (IIb71 and other varieties), heat-rounded chevron (IVk6), three-layered blue/white/blue (IVa16), undecorated compound including Cornaline d'Aleppo (IVa5), faceted chevron (IIIk, IIIm), Nueva Cadiz Plain (IIIc), and simple purple (IIa). The migration of glassworkers from Venice to the Netherlands in the 1590s coincides with the disappearance of Nueva Cadiz and faceted chevron beads from Spanish contexts and their reappearance in the early 17th century on sites connected to English and French colonization and trade (Little 2010).

In 2012, Jon Marcoux used quantitative seriation of discrete mortuary contexts to create a chronology of English trade beads in the Southeast between the settlement of Jamestown in 1607 and the Revolutionary War in 1783. Cluster 1 dates to the first half of the 17th century, prior to the founding of Charles Town, South Carolina, in 1670. These assemblages are dominated by drawn compound seed beads with clear or light blue translucent cores and opaque outer surfaces (IVa). Although the data Marcoux analyzed for his seriation came from slightly later, more-southern sites, he noted the presence of compound seed beads in a variety of color combinations, including the Cluster 1 varieties, at Jamestown in early fort contexts dated between 1607 and 1623. Cluster 2 assemblages dating between 1670 and 1715 are dominated by drawn monochrome necklace beads (IIa) and necklace beads with simple and complex stripes (IIb and IIbb). Red-on-green Cornaline d'Aleppo seed, tubular, and necklace beads (IVa5, IVbb3, IIIa1) are limited to this cluster and form a subset along with "rattlesnake" beads (IIj), and furnace-wound raspberry beads (WIId). Marcoux also includes flush-eye beads (IIg) in this cluster, although other authors including Marvin T. Smith (2019: pers. comm.) disagree. Cluster 3, dating from 1715 to 1750, contains primarily wound beads (WIb, WIc, WIIc, WIIe, and WIcb) along with three varieties of drawn beads with simple stripes (IIb'6, IIb32, and IIb39). Cluster 4 assemblages dating to the second half of the 18th century are primarily comprised of small, monochrome, tubular seed beads.

While the French did not establish colonies in the Northeast until the 17th century, they were present in the area and trading with Native groups from the first half of the 16th century. Beginning around 1555, glass beads appear in contact sites in the mid-Atlantic region (Turgeon 2001). Kenyon and Kenyon's (1983) Glass Bead Period I dates to between 1580 and 1600. Several bead varieties such as oval white (IIa15), round apple green (IIa24*), round robin's egg blue (IIa40), round bright navy (IIa55), round and oval translucent white-striped gooseberry (IIb18 and IIb19), and oval blue with white stripes (IIb67 and IIb73) which are characteristic of trade in the Northeast are also found in archaeological contexts in Paris (Turgeon 2001). Many of these glass bead varieties appear in the Jamestown assemblage as well.

Frit-core beads are also a notable component of Period 1 French bead assemblages. The core of these beads consists of sand or crushed quartz, and they are usually dark blue with raised white decorations. Thought to be manufactured in France, they are found in Northeastern sites dating to the end of the 16th century (Karklins 2016; Turgeon 2001). New finds have pushed the dates into the early 17th century, but the practice of keeping such items as heirlooms must also be considered (Karklins 2019; Karklins and Bonneau 2018). The single frit-core bead excavated at Jamestown (Figure 1) is responsible for confidently expanding the date range into

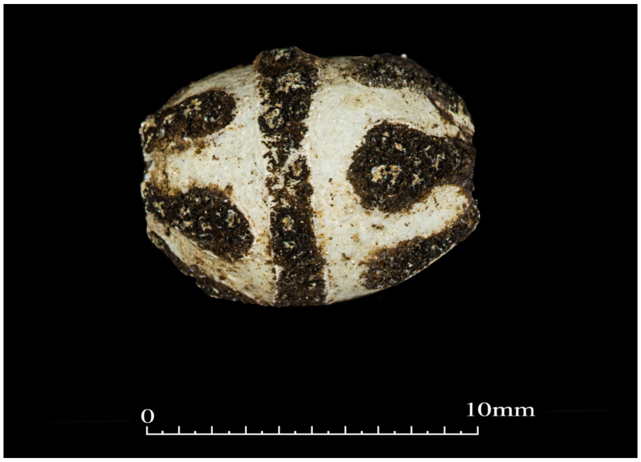

Figure 1. Variety 4A frit-core bead (all photos by Charles Durfor).

the first decade of the 17th century, since it was found in a well in use between 1608 and 1610 (Karklins 2016). The Jamestown specimen is described as Type 4A, since the colors of the Type 4 pattern are reversed and the decoration is dark blue against a white background.

PREVIOUS RESEARCH AT JAMESTOWN

Heather Lapham's (1998) assessment of the most common bead varieties found at Jamestown and their historical significance is quite thorough, and can now be confirmed and expanded using the last two decades of data. She assessed an assemblage of 337 glass beads and identified 26 varieties using the Kidd and Kidd (1970) typology. Currently, 3,966 glass beads have been assessed and sorted into 103 different Kidd varieties. The seven bead varieties previously found to be the most common in the assemblage remain the same, as can be seen in Table 1. The relative percentages also remain quite similar, despite the vast increase in data. The percentage of the total assemblage represented by these seven varieties decreases somewhat as the variety in the collection increases. There are 40 varieties, each of which is currently represented by a single unique bead and several have only two or three examples. Many other varieties are present in numbers of ten or more that would be an acceptable sample size elsewhere, despite not making up a statistically significant percentage of Jamestown's large collection.

Lapham also briefly discussed the lapidary beads found at Jamestown. Six faceted, clear quartz beads (four round and two long barrels) formed part of the bead assemblage in 1998. Lapham marked the similarities between these half dozen quartz beads and the Florida cut-crystal beads described by Fairbanks (1968) in 16th-century Spanish assemblages. Two faceted jet beads, two roughly faceted carnelian beads, and one round agate bead along with three fragments were also present. Lapham noted that the two jet beads are of the type used on rosaries in Spanish contexts, and that carnelian and agate beads are also seen at Spanish colonial sites (Deagan 1987). The Jamestown collection currently contains 93 complete lapidary beads and eight fragments, with the addition of chalcedony, amber, and amethyst.

THE COLLECTION

The majority of Jamestown's glass beads were manufactured using a method known as drawing. Beadmakers would draw a hollow globe of molten glass into a long tube which could then be chopped into many segments. Rods of differently colored glass laid along the gather would produce stripes (generally indicated by "b" in the Kidd typology), and a narrow rod on top of a wider one, or three laid side by side, would produce compound stripes

Table 1. The Seven Most Frequent Kidd Varieties in 1998 and 2018.

Kidd Variety	1998 Count	1998 %	2018 Count	2018 %
IIa40	65	19.4	937	23.6
IIIc3	23	6.9	482.5	12.2
IIIc1	38	11.3	442.5	11.2
IIa13	43	12.8	413.5	10.4
IIb18	19	5.7	251	6.3
WI*	18	5.4	137	4.4
IIa56	49	14.6	122	3.1
Totals:	**255**	**76.1**	**2785.5**	**59**

(bb). Polyhedral beads with square cross-sections could be achieved through marvering or pushing the gather into a square-sectioned mold. Twisting the molten draw produced a spiral effect visible in some striped and polyhedral varieties. Once chopped into the desired bead lengths, the tubular shape could be left alone (classes I and III), or heat rounded into a spherical, round, or oval shape (classes II and IV) (Karklins 2012). Facets could be ground on the surface of any of these, if desired.

As noted by Lapham (1998) and confirmed by new data, there is abundant evidence of *a speo* heat rounding in Jamestown's beads, particularly among the round robin's egg blue variety (IIa40). In this technique, short segments of cane were placed on a pronged spit in small batches and rotated continuously in a furnace to form rounded or oval beads. Each prong held multiple beads at a time, and two or more could slip down and become joined together end to end. Even single beads can sometimes be seen as having sagged somewhat on the spit and cooled with slight deformations. Beads could also fuse with those on the next prong, with their perforations parallel. These could sometimes still be separated and used, leaving a visible raised circular scar. These distinctive flaws can be identified in an archaeological assemblage. The *a speo* method was in use by the early 17th century and generally fell out of use at the end of the 18th century with the adoption of more efficient techniques. Beads showing evidence of *a speo* rounding are commonly found in East Coast assemblages dating between 1612 and the 1770s, but it is quite possible that some beadmakers continued to use the process until, and perhaps even after, the introduction of the tumbling process in 1819 (Karklins 1993). During this time it was the dominant method of producing round and oval beads more than 6 mm in diameter, while the *ferrazza* technique was used on smaller beads.

Class I: Drawn Simple Tubular

Simple tubular beads of different varieties are a large source of variation in the Jamestown assemblage, as many examples are unique within the collection. New finds of these varieties are partially responsible for the increased variety in the collection since Lapham's 1998 analysis. At that time, the assemblage contained just six beads of four different simple tubular varieties, all striped. The current assessment of the collection includes 63 simple tubular beads of 18 different varieties including undecorated (Ia), simple-striped (Ib), compound-striped (Ibb), and twisted-striped (Ib', Ibb', and Id') varieties. The most common variety is Ibb*, one not found in the Kidd typology (Figure 2). The green body and three white-on-redwood stripes are most similar to variety Ibb'1, but the stripes are straight, not twisted.

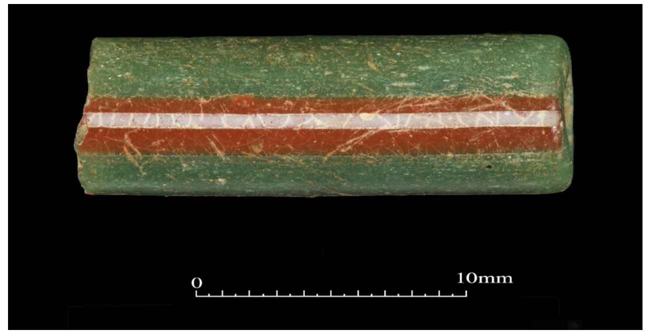

Figure 2. Ibb* bead with white-on-redwood stripes.

Class II: Drawn Simple Heat Rounded

Undecorated, heat-rounded beads of simple construction, designated IIa in the Kidd system, are very plentiful but difficult to interpret in the archaeological record. Many have long temporal ranges spanning several centuries and are found in trade bead assemblages of diverse origins. Chemical analysis may reveal more about their place of manufacture or narrow a date range, but it can still be difficult to interpret the underlying reasons behind changes in chemical composition. Differences in glass chemistry can result from changing trends over time as convention or resource availability shifted, differences in practice between manufacturing locations, trade patterns, or a combination of factors (Turgeon 2001). Assigning cause and effect relationships to dates, chemistry, and location is not a simple matter. It is hoped that ongoing research into the chemical composition of several varieties of beads from a number of Jamestown contexts, including the tightly dated John Smith well (1607-1610) and second well (1611-1612), will shed some more light on the sources of Jamestown's assemblage.

Opaque white round beads (IIa13) represent 10.4% of the collection, while the oval version (IIa15) represents 1.7%. Changes in chemical composition are not particularly helpful in dating these varieties in early Jamestown contexts, since the transition from tin to antimony to opacify the glass occurred gradually in the late 17th century and was completed around 1675 (Sempowski et al. 2000). Some examples show deformation on the ends at the perforation suggesting glass sagging during *a speo* rounding, indicating manufacture sometime after 1612 and likely before 1819 (Karklins 1993).

Round robin's egg blue beads (IIa40) are one of the most common varieties in late 16th- through 17th-century contexts up and down the East Coast (Lapham 1998). Though this variety is extremely temporally and spatially widespread, variations in chemical composition have been noted in beads excavated in the Northeast (Chafe, Hancock, and Kenyon 1986; Fitzgerald, Knight, and Bain 1995; Hancock et al. 1994). Differences in chemistry could be a result of changes in manufacturing over time, varying techniques between different manufacturers, or a combination of several factors. Chafe, Hancock, and Kenyon (1986) and Hancock, Chafe, and Kenyon (1994) noted that earlier beads from the 16th century contained more copper and less manganese, sodium, and calcium. Fitzgerald, Knight, and Bain (1995) found early beads with both high and low copper contents, leading to questions about whether the decrease in copper was purely a chronological phenomenon. Different manufacturing locations were proposed as a source of variation, with early high-copper beads thought to originate in the Basque region of southern Europe while low-copper beads produced in central Europe were present in the 16th century and became the norm in the 17th century. Early robin's egg blue beads are the only ones that Francis (2009a) suspects were being produced by French glassmakers.

IIa40 beads represent 23.6% of the current glass bead assemblage. They have been excavated from a wide variety of contexts dating from the earliest fort period (1607-1610) to late 17th-century features. Chemical analysis of several beads from contexts dated to different periods is currently ongoing, and will hopefully provide more information about their makeup and subsequently their place of manufacture. There is also abundant evidence of *a speo* rounding among the IIa40 beads. Several beads are fused end to end in pairs (Figure 3) and even a group of three, and other mild deformations indicative of the process are relatively abundant. Circular and oval robin's egg blue beads (IIa41 and IIa42, respectively) have also been found at Jamestown since 1998, though they constitute <1% of the collection.

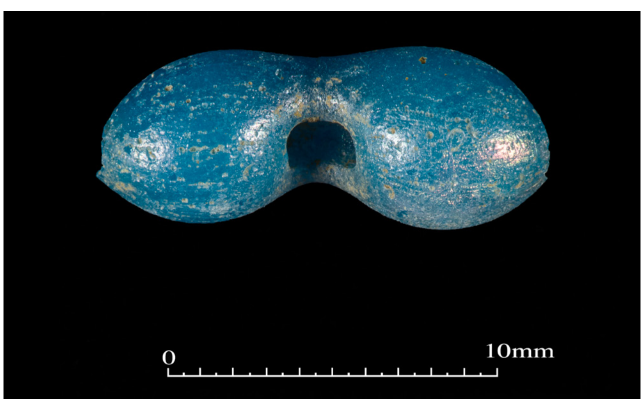

Figure 3. Fused IIa40 beads showing evidence of *a speo* heat rounding.

Small circular navy blue beads (IIa56) account for 3.1% of the current glass bead assemblage at Jamestown. Lapham (1998) calculated a percentage of 14.2%, but this number was heavily influenced by the excavation of 52 beads of this variety in a single layer of Pit 1, found together as though originally strung into a necklace. She describes this variety as characteristic of early 17th-century trade in the Middle Atlantic but notes that the variety in general, and particularly the assemblage found at Jamestown, is very small and recovered due to fine screening. She proposes that this recovery method may explain lower numbers of this variety recovered elsewhere. Currently, 1.3% of the collection is identified as IIa55, round navy blue beads extremely similar to the circular IIa56, and the challenge of differentiating between the two may also influence the count.

"Gooseberry" beads (IIb18) are round and translucent with thin white stripes. Although class IIb comprises single layer beads with surface decoration, known as complex varieties, the stripes of gooseberry beads are between two layers of translucent glass, causing Lapham (1998) to argue that they should instead be classed as composite beads. At Jamestown, the stripes generally vary in number from 8 to 12, slightly below the typical range of 12 to 15, and well below the 18 stripes frequently seen in Dutch examples (Lapham 2001). IIb18 beads comprise 6.3% of Jamestown's glass bead collection, and an additional three beads (<1%) are designated IIb19 which has a distinctive elongated olive shape. This shape may indicate an early 16th-century date (Smith 1983; Turgeon 2001). Generally, round gooseberry beads are present in the Chesapeake region between the late 16th and mid-18th centuries, a broader date range than in the Northeast where they are found less frequently after the early 17th century (Lapham 1998).

Flush-eye beads, designated IIg in the Kidd typology, are round beads with inset cane decorations. The Jamestown collection contains several specimens. One half bead in very poor condition is believed to represent variety IIg1, black with three white dots. There is one IIg3 bead with three redwood stars on white dots on bright blue dots against a white background. Two beads in the collection are designated IIg4, and are white with three bright navy dots each containing two white rings (Figure 4). Flush-eye beads are considered an "index fossil" in southeastern Spanish contexts, due to their limited date range between 1575 and 1630 (Marcoux 2012; Smith 1982). Yet in Marcoux's (2012) English chronology, they appear in Cluster 2 which covers the 1670-1715 period.

Class III: Drawn Compound Tubular

Three-layered tubular beads with square cross sections are called Nueva Cadiz after a 16th-century Spanish port excavated in the late 1950s by Jose Cruxent and his

Figure 4. Flush-eye bead with white rings on blue dots.

collaborators on an island off the coast of Venezuela (Marvin T. Smith 2019: pers. comm.). Variety IIIc1 consists of a turquoise outer layer and core, with a white middle layer (Figure 5). Variety IIIc3 has a bright navy exterior, white middle layer, and a light grey core (Figure 6). The ends are faceted. The turquoise examples vary in length with several being 25 mm or longer. Although the navy examples are shorter and much more consistent in length, they generally have a greater diameter than the turquoise beads. These trends are consistent with those seen in the early 16th-century Spanish trade in the Southeast (Lapham 1998; Smith and Good 1982).

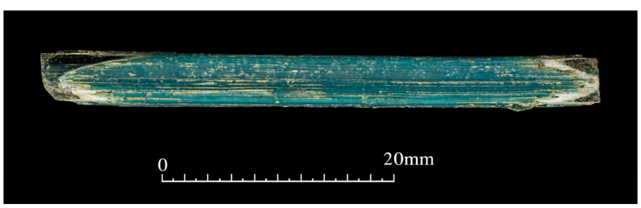

Figure 5. Long turquoise Nueva Cadiz (IIIc1) bead.

True Nueva Cadiz beads from Spanish sites date from the early to mid-16th century, and similar but not identical varieties then appear farther north on the East Coast in the late 16th and early 17th centuries (Lapham 1998). The later varieties seen in the French trade in the Northeast are turquoise or redwood, and sometimes twisted, rather than straight (Fairbanks 1968; Lapham 1998). The navy blue IIIc3 variety, however, has not been found on any other sites outside the Spanish-colonized Southeast (Lapham 2001; Marcoux 2012). Unlike other Venetian varieties imitated by various production centers, there is little evidence that navy blue Nueva Cadiz beads were ever manufactured by either the Dutch or the French (Karklins 1974; Turgeon 2001). They comprise 12.2% of the current Jamestown collection, even more than the already notable 6.9% found in 1998 when Lapham conducted her analysis. The representation of IIIc1 in the collection stayed very stable at 11.2%.

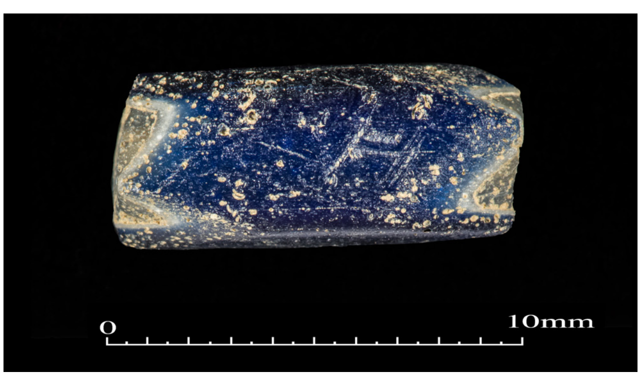

Figure 6. Navy blue Nueva Cadiz (IIIc3) bead.

The chevron beads (IIIm1) have seven layers: a bright navy exterior, followed by white, redwood, white, bright navy, white, and a bright blue core (Figure 7, left). Though chevron beads represent just 2% of the current assemblage, the number of specimens has risen from just seven in 1998 to 78, a significant increase in sample size. The seven layers and ground facets, as well as the very large size of several examples, are typical of manufacturing techniques in the 16th and very early 17th centuries. Early in the 17th century the number of layers was reduced from seven to four or five and heat rounding replaced ground facets (Smith 1976, 1983).

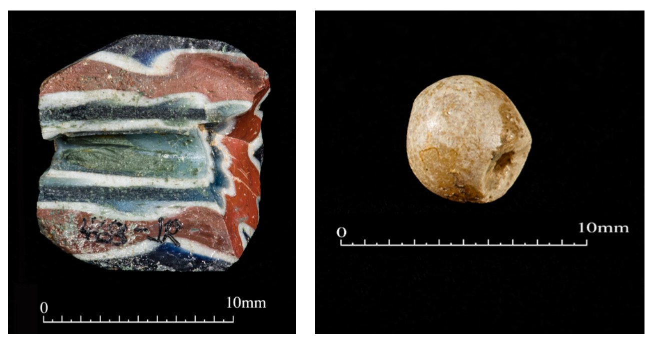

Figure 7. Left: Broken chevron (IIIm1) bead. Right: Wound truncated teardrop (WI*).

Class IV: Drawn Compound Heat Rounded

Heat-rounded beads with two or more layers of glass (Kidd type IVa), especially undecorated compound seed beads, are an important part of the 17th-century English trade assemblage. Due to the very small size of many of these beads, extremely fine screening and other careful excavation techniques are required to recover them, which can influence sampling. Compound seed beads are a major component of Cluster 1 in Marcoux's (2012) chronology of

English trade beads. Cluster 1 represents the first half of the 17th century, prior to founding of Charles Town in 1670. While it nominally begins at Jamestown in 1607, the data used to construct the chronology was sourced from somewhat later sites. Marcoux does cite the presence of Cluster 1 varieties at Jamestown along with a variety of other rounded beads with two or three layers of glass from Lapham's 2001 paper. In her 1998 assessment of Jamestown's bead collection, Lapham recorded the presence of seven different IVa types, totaling 10.4% of the assemblage. While several more IVa varieties have been found since then, all together they currently represent just 4.4% of the collection. Nearly 50 of these are IVa17 which were recovered together with fragments of copper wire from the John Smith well dated to the years between 1608 and 1610.

"Star" beads (such as IVk2*, IVk5*, and IVk6) found in small numbers at Jamestown are later 17th-century chevron varieties. While typical examples of IVk2 have four layers (bright navy exterior/white/turquoise/white core), the only example found so far at Jamestown has a thick core of colorless glass, rather than white. Variety IVk6 has an outer layer of dark palm green, followed by white, redwood, white, and a colorless core. Both varieties are small and heat rounded. The bead identified as variety IVk5* is a twisted polyhedral tube with seven layers (bright navy exterior/white/redwood/white/turquoise/white/turquoise core), a color pattern seen in many of Jamestown's other chevron beads. The inner three layers in this specimen are not typically seen in this variety which generally has only four layers due to the trend towards simplicity in later chevron varieties (Smith 1976).

Wound

Wound beads were manufactured one at a time by winding molten glass around a narrow metal mandrel until it reached the intended size. This could be done at the lamp or in a furnace. Additional layers or surface decoration could be added, and the glass could be shaped and molded while it remained plastic (Karklins 2012). Kidd types beginning with a "W" indicate this manufacturing technique. Wound beads of 16 different varieties represent 7.3% of the current Jamestown collection. This is a slight overall increase from 6% in Lapham's (1998) study and a large expansion in variation from only two wound varieties identified in the assemblage at that time. Wound beads were prevalent in the mid-18th century, when Jamestown Island was dominated by farmland.

The most common wound beads are in the form of short truncated teardrops with the smaller end ground flat or even slightly concave (Figure 7, right), currently designated WI*.[1] This distinctive shape worked in opaque light yellowish-brown glass represents 4.4% of the collection. Nineteen beads, just under 0.5% of the collection, exhibit the same form in opaque light green and are designated WI**. The glass is unusually heavy, perhaps indicating a high lead content as hypothesized by Lapham (1998), but this still has not been tested. The weight and opacity of the glass, along with the distinctive ground ends, differentiate these beads from similar forms found to the Northeast and may make them unique to Jamestown (Lapham 1998).

Other wound beads appear in moderate numbers. Twenty-four rounded, opaque yellowish-brown beads, 0.61% of the collection, are identified as WIId3 or "raspberry" beads due to their rows of tightly packed nodes (Figure 8). Another 1.13% of the collection, also yellowish-brown, is identified as WIIe, WIIe*, and WIIe**. WIIe (melon) beads are round or oval with ribs running parallel to the perforation. In the variety identified as WIIe* (Figure 9, left), comprising 0.71% of the collection, some of the ribs have a "twisted rope" pattern. In the WIIe** variety (Figure 9, right), which trends towards oval, the longitudinal ribs are bisected by a rib extending around the middle.

Figure 8. WIId3 raspberry bead.

Lapidary

Lapham (1998, 2001) briefly discussed the eleven beads and three fragments fashioned from quartz, carnelian, agate, and jet in addition to the assemblage of glass beads. The number of lapidary beads has expanded over the past two decades. The total assemblage of hard stone and organic lapidary beads now includes 96 whole beads and eight fragments fashioned from amber, coral, jet, amethyst, carnelian, chalcedony, agate, and quartz.

Amber, not present in the collection at the time of Lapham's 1998 analysis, is now represented by nine

Figure 9. Left: WIIe* "twisted rope" melon bead; Right: WIIe** melon bead with encircling rib.

complete and three fragmentary beads of various shapes. Amber beads are rare to the north of the Spanish colonies in Florida and Georgia (Francis 2009b; Turgeon 2001). The Baltic region has been the primary source of amber for millennia, and is a likely original source for the beads found at Jamestown (Francis 2009b). The collection now also contains three coral beads. Two are round, while the other is irregularly shaped, and the larger of the round beads has faded from bright orange to pale pink. Coral, likely sourced from the Mediterranean, was highly valued by Europeans but not favored as a trade item by Native Americans (Turgeon 2001; Merry Outlaw 2019: pers. comm.). The number of jet beads in the assemblage has increased from two to nearly 30 of various shapes, many of which are round or faceted forms commonly used in rosaries.

Carnelian, a variety of chalcedony colored orange and red by iron oxide, comprises 28 of Jamestown's lapidary beads (Figure 10, left). The collection also contains three beads made of other, less colorful, shades of chalcedony. The carnelian beads are circular and faceted, while the grey chalcedony beads are round or oval. India has been the main source of carnelian beads throughout history, and a likely original source of the Jamestown specimens (Francis 2009c). The 11 agate beads in the assemblage range in color from pink and gray to black (Figure 10, right). Most are smooth ovals, although the three fragments were originally part of faceted tubular beads. The origin of these agate beads is uncertain, but one possibility is the German gemworking city of Idar-Oberstein, a major source of lapidary beads since 1500. The city is best known for agate beads due to local deposits of both agate and a sandstone with the perfect consistency to work semiprecious stone (Frazier, Frazier, and Lehrer 1998-1999). Carnelian and agate, while not particularly common, are nevertheless associated with Spanish colonial sites (Deagan 1987; Francis 2009c).

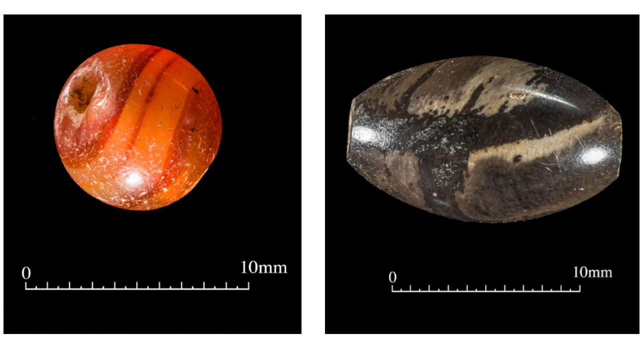

Figure 10. Left: faceted carnelian bead; Right: Black agate bead.

The most common lapidary beads at Jamestown are quartz, numbering 38 and one half. While a few of them are smooth and spherical, most are faceted into round, circular, or oblong barrel forms in the manner known as cut crystal (Figure 11). These beads are primarily associated with 16th-century Spanish sites in the American Southeast, though their date range has been expanded into the early 17th century as well, from 1550 to 1625 (Deagan 1987). While rare north of Virginia, quartz-crystal beads have been found in New York and Canada. Turgeon (2001) examined cut-crystal beads from French sites in both Quebec and Paris, but found no evidence of their manufacture in his study of Parisian beadmaking. Recently, three new examples were found in legacy collections from two 17th-century sites in Ontario and were analyzed by Karklins et al. (2018). The original source of the cut-crystal beads has long been uncertain. India, with its long history of lapidary bead production, is a common initial theory (Francis 2009c; Merry Outlaw 2019: pers. comm.). Francis (2009c), however, rejected India, as well as Venice and Paris, as the source of the beads found in North America due to the relatively low quality of the

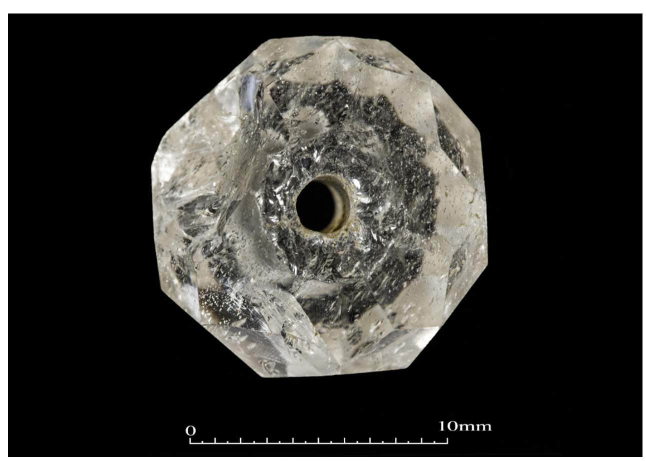

Figure 11. Cut-crystal bead.

stone and drilling methods. He instead proposed Castile, Spain, as the most likely place of manufacture. Many of the cut-crystal beads found at Jamestown are also crafted from imperfect quartz or have large scars from the drilling process, indicating that they may also have originated in Spain or elsewhere, rather than the centers of high-quality craftsmanship in India or Venice.

DISCUSSION

The Jamestown colony is situated at an important transition period in European and colonial history at the turn of the 17th century. The first permanent English settlement was influenced locally not only by significant Spanish colonization to the south, but also by the political and social climate of the European continent. Glass beads are an excellent window into the complexities of the relationships between the European manufacturers, colonists, and the Native peoples they traded with. Records of the Virginia Company of London show that the colonists requested supplies of the blue and white beads favored by the Native Virginians to trade for corn, but do not indicate how the Virginia Company acquired them (Kingsbury 1993). It does appear that imported trade goods passed through London merchants on their way to Jamestown. Jamestown's assemblage of 3,966 glass trade beads has provided an amazing opportunity to investigate these colonial connections and how they shifted over time.

Analysis of the Jamestown assemblage has shown that some of the glass and lapidary beads bear a striking resemblance to types strongly associated with Spanish-colonial sites. This is notable due to the ongoing conflict and rivalry between Spain and England at the time Jamestown was founded. Many of the glass beads were likely produced in Venice, the dominant glass manufacturing center in Europe, despite competition from the Netherlands in the 17th century. The lapidary beads also strongly resemble late 16th-century Spanish assemblages, especially the cut quartz-crystal beads which may even have been manufactured in Spain. Other bead types, such as the frit-core specimen found in the John Smith well, raise questions about connections with French trade to the north.

The Jamestown bead assemblage spans much of the range of Marcoux's (2012) English glass trade bead chronology, and the many dated contexts could contribute to its further improvement. Drawn compound seed beads represent Cluster 1 which covers the period between the settlement of Jamestown in 1607 and the founding of Charles Town, South Carolina, in 1670. The data from Jamestown are particularly valuable since they represent the starting point of the chronology, while Marcoux analyzed assemblages from somewhat later sites. Cluster 2, which ranges from 1670 to 1715, is represented by drawn monochrome necklace beads as well as more decorated types such as flush-eye beads, cornaline d'Aleppo beads, and wound raspberry beads. Cluster 3 wound beads – dating from 1715 to 1750 when Jamestown Island was more sparsely inhabited – are also present in the collection. Because many contexts excavated at Jamestown have been dated with a high degree of confidence based on historical documentation and material culture analysis using other artifact types, further analysis by context could provide valuable data interpreting changes in English trade bead assemblages over time.

This assessment of Jamestown's extensive bead collection has raised as many questions as it has answered. Now that the assemblage has been physically rehoused by feature, assigned Kidd variety numbers, and undergone some preliminary assessment, the door is open for more detailed analysis. Spatial analysis of trade beads across the Preservation Virginia property could further an understanding of how and where beads were kept, used, or discarded on the site. The discovery of so many bead varieties represented by one or a small number of beads raises questions about the relative value of different beads based on manufacture and preference within local trade networks. In addition to comparisons between dated contexts, ongoing and future chemical analysis has the potential to shed light on the date and location of manufacture of various types. While this paper has looked in depth at the glass and lapidary beads, the organization of the Jamestown bead collection also provided an opportunity to identify beads of multiple different material types, including those made from the shell of the local mussel *Geukensia Demissa*, bone, and wood. Learning more about the manufacture and both international and local trade pathways of Jamestown's trade beads could provide further insight into the settlement's situation in broader colonial trade networks over time. The possibilities for future research are extensive, and can only serve to broaden our understanding of the role of Jamestown and its community on colonialism in early America.

ENDNOTES

1. Lapham occasionally refers to them as WIe* in her reports.

REFERENCES CITED

Bradley, James W.

2014 Glass Beads from Champlain's Habitation on Saint Croix Island, Maine, 1604-1613. *Beads: Journal of the Society of Bead Researchers* 26:47-63.

Chafe, Anne, Ron Hancock, and Ian Kenyon
1986 A Note on the Neutron Activation Analysis of 16th- and 17th-Century Blue Glass Trade Beads from the Eastern Great Lakes. *The Bead Forum* 9:13-18.

Deagan, Kathleen
1987 *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800. Vol. 1: Ceramics, Glassware, and Beads*. Smithsonian Institution Press, Washington, DC.

Fairbanks, Charles H.
1968 Early Spanish Colonial Beads. *Conference on Historic Site Archaeology Papers 1967* 2(1):3-21.

Fitzgerald, William, Dean Knight, and Allison Bain
1995 Untanglers of Matters Temporal and Cultural: Glass Beads and the Early Contact Period Huron Ball Site. *Canadian Journal of Archaeology* 19:117-138.

Frazier, S., A. Frazier, and G. Lehrer
1998-1999 A History of Gem Beadmaking in Idar-Oberstein. *Beads: Journal of the Society of Bead Researchers* 10-11:35-47.

Francis, Peter, Jr.
2009a The Glass Beads of the *Paternostri* of the Netherlands and France. In *The Beads of St. Catherine's Island*, edited by Elliot H. Blair, L.S.A. Pendleton, and Peter Francis, Jr., pp. 73-80. American Museum of Natural History Anthropological Papers 89.
2009b Imported Beads Made from Organic Materials. In *The Beads of St. Catherine's Island*, edited by Elliot H. Blair, L.S.A. Pendleton, and Peter Francis, Jr., pp. 113-116. American Museum of Natural History Anthropological Papers 89.
2009c Imported Beads of Hard Stone. In *The Beads of St. Catherine's Island*, edited by Elliot H. Blair, L.S.A. Pendleton, and Peter Francis, Jr., pp. 117-122. American Museum of Natural History Anthropological Papers 89.

Hancock. R. G. V., A. Chafe, and I. Kenyon
1994 Neutron Activation Analysis of Sixteenth- and Seventeenth-Century European Blue Glass Beads from the Eastern Great Lakes Area of North America. *Archaeometry* 36(2):253-266.

Karklins, Karlis
1974 Seventeenth Century Dutch Beads. *Historical Archaeology* 8:64-82.
1993 The *a Speo* Method of Heat Rounding Drawn Glass Beads and its Archaeological Manifestations. *Beads: Journal of the Society of Bead Researchers* 5:27-36.
2012 Guide to the Description and Classification of Glass Beads Found in the Americas. *Beads: Journal of the Society of Bead Researchers* 24:62-90.
2016 Frit-Core Beads in North America. *Beads: Journal of the Society of Bead Researchers* 28:60-65.
2019 Even More on Frit-Core Beads. *Beads: Journal of the Society of Bead Researchers* 31:75-78.

Karklins, Karlis and Adelphine Bonneau
2018 More on Frit-Core Beads in North America. *Beads: Journal of the Society of Bead Researchers* 30:55-59.

Karklins, Karlis, Alicia Hawkins, Heather Walder, and Scott Fairgrieve
2018 Florida Cut-Crystal Beads in Ontario. *Beads: Journal of the Society of Bead Researchers* 30:44-51.

Kenyon, Ian T. and Thomas Kenyon
1983 Comments on Seventeenth Century Glass Trade Beads from Ontario. In *Proceedings of the 1982 Glass Trade Bead Conference*, edited by C.F. Hayes III, pp. 59-74. Rochester Museum and Science Center, Research Records 16.

Kidd, Kenneth E. and Martha A. Kidd
1970 A Classification System for Glass Beads for the Use of Field Archaeologists. *Canadian Historic Sites: Occasional Papers in Archaeology and History* 1:45-89. Ottawa.

Kingsbury, Susan Myra (ed.)
1993 *The Records of the Virginia Company of London, the Court Book from the Manuscript in the Library of Congress*. Heritage Books, Bowie, MD.

Lapham, Heather A.
1998 Glass Beads from 1607 James Fort, Jamestown, Virginia. Report to The Association for the Preservation of Virginia Antiquities Jamestown Rediscovery.
2001 More Than "A Few Blew Beads": The Glass and Stone Beads from Jamestown Rediscovery's 1994-1997 Excavations. *Journal of the Jamestown Rediscovery Center* 1:n.p.

Little, Keith J.
2010 Sixteenth-Century Glass Bead Chronology in Southeastern North America. *Southeastern Archaeology* 29:222-232.

Marcoux, Jon Bernard
2012 Glass Trade Beads from the English Colonial Period in the Southeast, ca. AD 1607-1783. *Southeastern Archaeology* 31:157-184.

Sempowski, M.L., A.W. Nohe, J.-F. Moreau, I. Kenyon, K. Karklins, S. Aufreiter, and R. G.V. Hancock

2000 On the Transition from Tin-Rich to Antimony-Rich European White Soda-Glass Trade Beads for the Senecas of Northeastern North America. *Journal of Radioanalytical and Nuclear Chemistry* 244(3):559-566.

Smith, Marvin T.

1976 The Chevron Trade Bead in North America. *The Bead Journal* 3(1):15-17.

1982 "Eye" Beads in the Southeast. *Conference on Historic Site Archeology Papers 1979* 14:116-127.

1983 Chronology from Glass Beads: The Spanish Period in the Southeast, c. A.D. 1513-1670. In *Proceedings of the 1982 Glass Trade Bead Conference*, edited by C.F. Hayes III, pp. 147-158. Rochester Museum and Science Center, Research Records 16.

Smith, Marvin T. and Mary E. Good

1982 *Early Sixteenth Century Glass Beads in the Spanish Colonial Trade*. Cottonlandia Museum Publications, Greenwood, MS.

Turgeon, Laurier

2001 French Beads in France and North America during the Sixteenth and Early Seventeenth Centuries. *Historical Archaeology* 35(4):58-82.

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