

# More Than "A Few Blew Beads": The Glass and Stone Beads from *Jamestown Rediscovery's* 1994-1997 Excavations

Heather A. Lapham  
*University of Virginia*

## Abstract

Investigation of the glass and stone beads uncovered during *Jamestown Rediscovery's* 1994-1997 field seasons identified 28 different varieties and established a material line of evidence on which to base subsequent studies regarding intercultural relations, exchange networks, and global commerce. Historically verified blue beads dominated the assemblage, including dozens of robin's-egg blue, nueva cadiz-like turquoise, and nueva cadiz-like navy blue examples. The overall assemblage resembled collections from 16th-century Spanish colonial sites more than those from 17th-century English settlements in America. The distinctiveness of Jamestown's beads might suggest changes in bead production practices and reveal a transformation in European trade kits.

## 1. Introduction

In January of 1608, English Captains Christopher Newport and John Smith led a team of colonists on a trading venture to Chief Powhatan's home village at Werowocomoco. Once the Powhatan leader had informed the colonists of the price he wanted for his corn, the two English captains began to argue amongst themselves about fair exchange values. Tension mounted between Newport and Smith but was eased when they saw Chief Powhatan's reaction to a handful of European beads. Powhatan, who had declined to participate in any trade up to this point, "fixed his humour upon a few blew beads" and "importunately desired them" (Barbour 1986 I:217). Smith then increased the Algonquian leader's eagerness to exchange by embellishing the beads' significance. He informed Powhatan that the blue beads being offered were "composed of a most rare substance of the colour of the skyes, and not to be worne but by the greatest kings in the world" (Ibid., II:156). So fascinated with these items was the Algonquian chief that "for a pound or two of blew beads" he offered "2 or 300 bushels of corne" (ibid.). Although Jamestown's early European settlers considered glass beads to be trifles, the Powhatans held them in high esteem. For the local indigenous population, glass beads were highly symbolic and ritually charged objects whose ownership was linked to elite status (Potter 1989, 1993; Rountree 1989).

Beads recovered from archaeological sites offer scholars a wealth of information about past cultural preferences, sociopolitical systems, exchange networks, and intercultural relations. The study presented here provides a general survey of the glass and stone beads found during *Jamestown Rediscovery's* 1994-1997 field seasons and attempts to answer the following questions:

- What varieties of beads did Jamestown colonists bring to the New World for trade with the indigenous population?
- How does the bead assemblage from 1607 James Fort compare with collections from other early historical settlements in the Americas?
- What insights regarding regional and global bead commerce can be learned from Jamestown's collection?

## 2. *Jamestown Rediscovery* Beads

### 2.1 Glass Beads

This study examined 337 glass beads, representing 28 varieties (Figure 1). They were identified and classified according to the Kidd and Kidd (1970) typological system.<sup>1</sup> An asterisk (\*) marked varieties that did not appear in the Kidds' typology or differed slightly from an existing variety.<sup>2</sup> Over three quarters of the Jamestown assemblage consisted of the following seven glass bead varieties listed below:

Round robin's-egg blue beads (Kidd IIa40)	19%
Circular navy blue beads (Kidd IIa56)	15%
Round white beads (Kidd IIa13)	13%
Nueva cadiz-like turquoise beads (Kidd IIIc1)	11%
Nueva cadiz-like navy blue beads (Kidd IIIc3)	7%
Gooseberry beads (Kidd IIb18)	6%
Cone-shaped yellow beads (Kidd WI*)	5%

#### 2.11 Round Robin's-Egg Blue Beads

Robin's-egg blue beads (Kidd IIa40) are one of the most temporally and spatially widespread bead types. They have been found in archaeological contexts from the late 16<sup>th</sup>- through the middle 17<sup>th</sup>-centuries, from as far north as Ontario, Canada, to as far south as Florida (cf., Bradley 1977; Deagan 1987; Kent 1983; Kenyon and Fitzgerald 1986; Lapham 1995; Miller et al. 1983; Rumrill 1991; Sempowski 1994; Smith 1983; Wray 1983).

The seeming ubiquity of these beads has led scholars to question their collective physical similarity. A recent neutron activation analysis detected distinct differences in the chemical content of robin's-egg blue bead samples from separate

time periods (Chafe et al. 1986; Hancock et al. 1994). Hancock et al. (1994) found that changes in the amounts of certain elements, particularly copper, occurred ca. 1600. Late 16<sup>th</sup>-century beads tested higher in copper than early 17<sup>th</sup>-century beads. Hancock et al. suggested a variety of influencing factors, including modifications in the manufacturing process, a change in the source of raw materials, emergence of new glass factories, and different bead sources and suppliers (Ibid.). Archaeologists continue to debate the reasons for the chemical transformation. Fitzgerald et al. (1995) attributed the shift in chemical signatures to differences in regional European glass-manufacturing recipes, rather than to the date of manufacture. They associated high-copper content robin's-egg blue beads with Basque traders in the Great Lakes region and those of low-copper content with traders from northern France and central Europe. Both European polities were active in the Northeast during the late 16th century.

*Jamestown Rediscovery's* robin's-egg blue beads vary in color (Figure 2). Although differential preservation factors and fluctuating soil acidity cannot be ruled out as a cause for the variability, recent chemical composition studies have indicated that copper, the primary colorant of these beads, is a highly inconsistent pigment. Depending on the composition of the base glass, it can produce hues ranging from blues to greens (Hancock et al. 1994:261). Future chemical testing can determine whether the variable hues seen in Jamestown's robin's-egg blue beads indicate their high copper content and add new insight to the discussion of why different chemical signatures exist for these beads.

Most of the robin's-egg blue beads in the Jamestown assemblage exhibited characteristics of the *a speo* method of heat rounding. Using a pronged iron spit that is rotated in the furnace, the *a speo* method often produces unique disfigurements in beads. (Karklins 1993). These imperfections include the partial fusion of multiple beads, conchoidal scars that result from a break in a partial fusion between two beads, and lopsided beads that "sag" during rounding (Ibid., 30-34). Jamestown specimens that showed evidence of *a speo* heat altering included two small beads that were partially fused together at their ends and several other specimens with slight unbroken glass projections likely associated with the initial stages of heat deformation (see Figure 3, top right).<sup>3</sup>

## 2.12 Circular Navy Blue Beads

Often present in early 17<sup>th</sup>-century assemblages, circular navy blue beads (Kidd IIa56) are characteristic of initial European/indigenous trade in the Middle Atlantic region and adjacent areas (cf., Bradley 1977; Eastman 2000; Fitzgerald et al. 1995; Huey 1983; Kent 1983; Kenyon and Fitzgerald 1986; Lapham 1995; Miller et al. 1983; Rumrill 1991; Sempowski 1994; Smith 1983; Turgeon 2000). Fifty-two of these were found together in one layer of Pit 1, apparently strung together when initially deposited. The circular navy blue beads in Jamestown's collection

are remarkably tiny (Figure 3). Over 50% were classed as very small (less than 2.0 mm). Those measured averaged 1.1 mm in length and 2.0 mm in diameter, dimensions equivalent to the size of a pinhead. Most of these beads would have been lost had the excavators relied solely on 1/4"-mesh screens, instead of the 1/8"- and 1/16"- hardware cloth that they used for sealed contexts. The dearth of very small circular navy blue beads from other early historic sites might have resulted from less precise recovery strategies.

### 2.13 Round White Beads

Like circular navy blue beads, round white beads (Kidd IIa13) (Figure 4) are fairly common on early 17th-century sites in eastern North America. Although not particularly diagnostic artifacts, they are regularly found in archaeological contexts linked to initial European/indigenous trading ventures in the greater Middle Atlantic and Northeast.

### 2.14 Nueva Cadiz-like Beads

The Jamestown assemblage contains two varieties of nueva cadiz-like beads: square-tubular turquoise blue beads (Kidd IIIc1) (Figure 5) and square-tubular navy blue beads (Kidd IIIc3) (Figure 6). Both types are square in cross section, exhibit faceted/ground ends, contain an opaque white middle glass layer, and differ only in the color of blue in the outer glass layer and core. All of the nueva cadiz-like beads in the Jamestown sample except one contain three layers of glass. The exception, a turquoise bead, exhibits five layers. In addition, all but one example adheres to a standard color sequence. A lone navy blue bead contains a core of transparent apple-green glass.

Both turquoise and navy blue varieties have long been referred to as "nueva cadiz" beads, a term used widely to describe long, tubular beads of square cross-section. Nueva cadiz beads derive their name from excavations of the 16<sup>th</sup>-century Spanish port of Nueva Cadiz, located on Cubagua Island off the coast of Venezuela. "True" nueva cadiz beads were found in great quantity at the site and are linked specifically with early-to-middle 16<sup>th</sup>-century Spanish explorations of south-eastern North America and adjacent territories (Smith and Good 1982).<sup>4</sup>

Nueva cadiz-like varieties occur in small quantities on other sites in the northern Middle Atlantic and Northeast. The late 16<sup>th</sup> and early 17<sup>th</sup> centuries saw a revival of nueva cadiz beads, although the later beads differed in color and color sequence from true nueva cadiz beads of the early 16<sup>th</sup> century (Smith and Good 1982).<sup>5</sup> Nueva cadiz-like varieties have been found in several early 17<sup>th</sup>-century contexts. These include sites affiliated with the Susquehanna of south-central Pennsylvania (Kent 1983; Smith and Graybill 1977), the Monongahela of western Pennsylvania (Lapham 1995; Lapham and Johnson 1999), and the Iroquois in New York and southern Ontario (Fitzgerald 1990; Kenyon 1982; Sempowski

1994; Wray et al. 1991; see also summary in Smith and Good 1982:51-52).

Specimens recovered from indigenous sites tend to be one of two varieties:

- 1) a turquoise bead (Kidd IIIc1) similar but not identical to examples in Jamestown's assemblage, and
- 2) a twisted turquoise bead with an opaque redwood core (Kidd IIIc'3) that is not found in the Jamestown collection.

Jamestown's nueva cadiz-like beads differed significantly in three ways from those found at the aforementioned native sites. First, nueva cadiz-like varieties occurred in much greater quantities at Jamestown than any at other site in the Middle Atlantic and northeastern regions. Whereas nearly a fifth of the beads uncovered by the *Jamestown Rediscovery* project from 1994 to 1997 were nueva cadiz-like beads, these types usually made up less than 1% of the bead assemblage at the native sites. Second, the navy blue variety appears to be unique to Jamestown Island. It has not yet been found in any other late 16<sup>th</sup>- or early 17<sup>th</sup>-century context. Third, the turquoise nueva cadiz-like beads found at Jamestown are smaller in size, particularly in diameter, than those found at other contemporaneous sites.<sup>6</sup> The average diameter of the turquoise nueva cadiz-like beads in the Jamestown assemblage is 3.8 mm, whereas the four beads from the Monongahela Foly Farm site in northwestern Pennsylvania average 6.7 mm (Lapham 1995) and the single specimen from the Susquehanna Schultz site in central Pennsylvania is 5.0 mm in diameter (Smith and Graybill 1977:59). Differences between nueva cadiz-like beads unearthed at Jamestown and those found elsewhere in the Middle Atlantic and Northeast attest to the uniqueness of the two Jamestown varieties and to their affinity with 16<sup>th</sup>-century Spanish types.

### 2.15 Gooseberry Beads

Gooseberry beads (Kidd IIb18) are round, white-striped, and comprised of a colorless glass that often appears gray or yellow in tinge (Figure 7).<sup>7</sup> The number of stripes on Jamestown's gooseberry beads varied between 8, 11, and 12. Gooseberry beads have been found in contexts that date from the late 16<sup>th</sup>- through the middle 18<sup>th</sup>-centuries in the Middle Atlantic and southeastern regions (Deagan 1987; Miller et al. 1983; Smith 1983). In the Northeast, however, they tend to be more common on late 16<sup>th</sup>- and early 17<sup>th</sup>-century sites (Kenyon and Fitzgerald 1986; Wray 1983). Gooseberry beads changed in form over time. Those of an elongated olive shape are associated with early 16<sup>th</sup>-century contexts. Rounder examples like those in the *Jamestown Rediscovery* assemblage date to the 17<sup>th</sup>-century. Barrel-shaped gooseberry beads are usually found in early 18<sup>th</sup>-century contexts (Smith 1983:150).

### 2.16 Cone-Shaped Yellow Beads

Cone-shaped yellow beads (Kidd WI\*) (Figure 8) are one of two varieties in the Jamestown assemblage manufactured by the winding process. Comprised of an

unusually heavy glass, these opaque beads and their base glass may contain a high lead content. Their overall shape has been described as a "short truncated convex cone" and likened to a "short pear" (Beck 1928: Plate II). The smaller end has been ground or filed to a flat or slightly convex surface. The average measurements of the cone-shaped yellow beads were 5.4 mm in length, 5.7 mm in diameter on the small end, and 7.4 mm on the large end. These beads may be unique to Jamestown.<sup>8</sup>

### 2.17 Other Varieties

The Jamestown assemblage also contained seven chevron beads (Kidd III m1) (Figure 9), named for the distinctive star-like patterns they form when viewed from an end. Each was tubular-shaped and comprised of seven glass layers with faceted/ground ends. Five of the seven specimens were medium sized<sup>1</sup>; two were very large.<sup>9</sup> Several characteristics of chevron beads changed over time (Smith 1976:15, 1983:148). Earlier varieties exhibited the physical qualities seen in the Jamestown collection. Later varieties tended to be rounded rather than tubular in shape and the number of glass layers decreased from seven to five or sometimes four. Later chevrons date to the early 17<sup>th</sup>-century at other sites, but have not been found in *Jamestown Rediscovery* contexts.

Two melon-shaped beads of opaque yellow glass with molded impressions of alternating vertical ridges and "twisted rope" designs (Kidd WIIe\*) were identified in the Jamestown assemblage as well (Figure 10). These beads are vaguely similar to the "seven oaks gilded molded" bead described by Smith (1983: Figure 1, Row 4). Seven oaks gilded molded beads have been found on several sites associated with regions of Spanish colonization in Florida and Georgia (Ibid.).

### 2.2 Stone Beads

The Jamestown collection yielded 14 stone beads of various materials, including quartz crystal, carnelian, agate, and jet (Figure 11). The faceted quartz crystal beads (Figure 12) are strikingly similar to the variety identified by Fairbanks (1968) as a "Florida cut crystal" (see also Smith 1983:Figure 1, Row 2). Faceted quartz crystal beads typically date to the last half of the 16<sup>th</sup> century and have rarely been found north of Spanish territory (Brain 1975; Deagan 1987; Fairbanks 1968; Smith 1983). Carnelian and agate beads (Figure 13) are also traditionally associated with Spanish colonial sites (Deagan 1987). Jet beads (Figure 13) nearly identical to those in the Jamestown assemblage appear to have been used elsewhere on rosary strands (Deagan 1987; Miller et al. 1983).

### 2.3 Chronology

Well over half of the beads considered in this study are associated with features dating to the Fort Period (1607-1623). Another 20% of the collection are from Post-Fort Period features (1624-1660). The remaining beads are either from

mixed contexts, like plowzone, or proveniences filled during both periods (Figure 14). Bead proportions contained significant temporal distinctions. Five varieties that occurred exclusively in Fort-Period contexts included: circular navy blue (IIa56), chevron (IIIIm1), the single frit-cored variety, quartz crystal, and carnelian. Turquoise and navy blue nueva cadiz-like (IIIc1 and IIIc3), cone-shaped yellow (WI\*), and those similar to seven oaks gilded molded (WIIe\*) dropped proportionately from Fort Period to Post-Fort Period. Robin's-egg blue (IIa40), round white (IIa13), and gooseberry (IIb18) increased significantly during the Post-Fort Period. Overall, most of the bead varieties traditionally associated with 16<sup>th</sup>-century Spanish assemblages found at Jamestown were exclusive to or dominant in the Fort-Period assemblage. Likewise, many of the bead types not associated with early Spanish collections were seen more often and in greater quantity in Post-Fort contexts.

### 3. The Spanish Bead Quandary

Jamestown's collection contains both common and uncommon bead varieties. Some of the beads are typical of an early 17<sup>th</sup>-century colonial assemblage in the Middle Atlantic. Other varieties are more unusual and are uncharacteristic of early English trade goods in the New World. The Jamestown assemblage includes beads that have been associated exclusively with areas of Spanish exploration and settlement in the Southeast (Brain 1975; Deagan 1987; Mitchem and Leader 1988; Pearson 1977; Smith 1983; Smith and Good 1982).<sup>10</sup> Had it not been known that these beads came from early Fort-Period contexts at Jamestown Island, scholars might have assumed that their presence suggested Spanish occupation in the Chesapeake. The similarities between certain Jamestown bead types and those characteristically associated with early Spanish trade—particularly turquoise and navy blue nueva cadiz-like beads, melon-shaped yellow beads, and the faceted quartz crystal beads—raise the following questions:

- What is the relationship between these varieties found at Jamestown and analogous bead types found on sites associated with 16<sup>th</sup>-century Spanish colonization efforts?
- Could these beads have been acquired from the same manufacturing source by Spain and later by England?

Venice, Italy, dominated the glass industry of 16<sup>th</sup>-century Europe with its finely crafted decorative wares and beads (Francis 1988; Kidd 1979). By the 17<sup>th</sup>-century, however, other European countries were also manufacturing glass beads. Nations like the Netherlands and France produced beads of a similar quality but most often in much smaller quantities (Francis 1988; Karklins 1974; Kidd 1979; Turgeon 2000). Although circumstantial evidence exists for glass bead making in Spain, it is likely that most beads found on middle 16<sup>th</sup>-century sites and later in

Spanish America were manufactured in Venice (Deagan 1987:158-159; Smith and Good 1982:12-15). Scholars continue to debate where early 16<sup>th</sup>-century nueva-cadiz varieties were manufactured (Ibid.). Glass factories in the Netherlands known to manufacture beads that rivaled Venetian merchandise operated from 1597 to ca. 1697 (Karklins 1974). The late starting production date for the Dutch suggested that nueva cadiz beads found in association with 16<sup>th</sup>-century Spanish trade were not made in the Netherlands. Although Karklins' (1974) extensive study of the Dutch bead industry identified several nueva cadiz-like beads from early 17<sup>th</sup>-century contexts in Holland, few similarities existed between Dutch varieties and those found on Spanish sites (Smith and Good 1982:14-15). Dutch nueva cadiz-like beads differed from those in the Jamestown assemblage as well.<sup>11</sup> Significant differences also existed between other bead varieties both produced in the Netherlands and found at Jamestown.<sup>12</sup> Overall, Venice is the most likely source of manufacture for many of the glass beads found at Jamestown.<sup>13</sup>

If most of the glass beads intended for trade in the Americas on mid-to-late 16<sup>th</sup>-century, and possibly earlier, Spanish and early 17<sup>th</sup>-century English colonial sites were produced in Venice, then it appears that there is a notable reduction in the size of the beads manufactured over time. Sixteenth-century Spanish nueva cadiz and faceted seven-layer chevrons are generally much larger in both length and diameter than those found at Jamestown. They are also more diverse in color and often contain more layers of glass. Perhaps in an attempt to maximize profit, the Venetian glass bead industry began to produce similar varieties in smaller sizes and simpler forms to sell at an equal or greater price. The Venetian bead trend toward simplicity continued through the 1600s as simpler one-layer beads tend to dominate colonial site bead assemblages from the first and second quarter of the 17<sup>th</sup> century.<sup>14</sup>

## 4. Conclusion

Colonists establishing the first permanent English settlement in America brought with them a variety of glass beads for trade with the local indigenous population. Blue beads dominated their assemblage, especially those that were robin's-egg blue, nueva cadiz-like turquoise, and nueva cadiz-like navy blue. Jamestown's beads resembled those in collections from 16<sup>th</sup>-century Spanish colonial sites more than examples from other early 17<sup>th</sup>-century English settlements in America. The bead assemblage found by recent *Jamestown Rediscovery* excavations suggested a transition in Venetian bead production practices from the larger and more elaborate varieties found on earlier Spanish sites to the smaller and less decorative types on later English sites. Jamestown's bead collection is unique and may represent an interim mix of bead styles or the last remnants of outdated Venetian merchandise.

## 5. References

- Barbour, Philip L., ed.  
1986 *The Complete Works of Captain John Smith (1580-1631)*. 3 Volumes. University of North Carolina, Chapel Hill.
- Beck, Horace C.  
1928 Classification and Nomenclature of Beads and Pendants. *Archaeologia* 77:1-76.
- Bradley, James W.  
1977 The Pompey Center Site: The Impact of European Trade Goods, 1600-1620. *Archaeological Society of New York, William M. Beauchamp Chapter Bulletin* 2(1):1-19.
- Brain, Jeffrey P.  
1975 Artifacts of the Adelantado. *The Conference on Historic Site Archaeology Papers 8*, edited by Stanley South, pp. 129-138, Institute of Archeology and Anthropology, University of South Carolina, Columbia.  
1979 *Tunica Treasure*. The Peabody Museum of Archaeology and Ethnology, Harvard University, Cambridge.
- 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. *Bead Forum* 9:13-18.
- Deagan, Kathleen  
1987 *Artifacts of the Spanish Colonies of Florida and the Caribbean, 1500-1800*. Smithsonian Institution, Washington, D.C.
- Eastman, Jane M.  
2000 Glass Beads and Long Distance Exchange in North Carolina's Interior. Paper presented at the annual meeting of the Society for Historical Archaeology, Québec City, Canada.
- Fairbanks, Charles H.  
1968 Early Spanish Colonial Beads. *The Conference on Historic Site Archaeology Papers*, Vol. 2, edited by Stanley South, pp. 3-21, Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Fitzgerald, William R.  
1982 A Refinement of Historic Neutral Chronologies: Evidence from Shaver Hill, Christianson and Dwyer. *Ontario Archaeology* 38:31-46.
- Fitzgerald, William R., Dean H. 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.

- Francis, Peter, Jr.  
1988 *Glass Trade Beads of Europe*. Lapis Route Books, Lake Placid.
- Hancock, R. G. V., A. Chafe, and I. Kenyon  
1994 Neutron Activation Analysis of Sixteenth- and Seventeenth-century European Blue Glass Trade Beads from the Eastern Great Lakes Area of North America. *Archaeometry* 36(2):253-266.
- Harrington, J. C.  
1952 *Glassmaking at Jamestown: America's First Industry*. Dietz Press, Richmond.
- Harris, Elizabeth  
1982 Nueva Cadiz and Associated Beads: A New Look. *Archaeological Research Booklets* 17, Lancaster, Pennsylvania.
- Huey, Paul R.  
1983 Glass Trade Beads from Fort Orange (1624-1676), Albany, New York. *Proceedings of the 1982 Glass Bead Conference*, edited by Charles F. Hayes, pp. 83-110, Research Records 16, Rochester Museum and Science Division, Rochester.
- Karklins, Karlis  
1974 Seventeenth Century Dutch Beads. *Historical Archaeology* 8:64-82.  
1985 Guide to the Description and Classification of Glass Beads. *Glass Beads*, 2nd edition, Studies in Archaeology, Architecture, and History, Parks Canada, Ottawa.  
1993 The *A Speo* Method of Heat Rounding Drawn Glass Beads and its Archaeological Manifestations. *Beads* 5:27-36.
- Kelso, William M.  
1996 *Jamestown Rediscovery II: Search for 1607 James Fort*. The Association for the Preservation of Virginia Antiquities, Richmond.
- Kelso, William M., Nicholas M. Lucchetti, and Beverly A. Straube  
1997 *Jamestown Rediscovery III*. The Association for the Preservation of Virginia Antiquities, Richmond.  
1998 *Jamestown Rediscovery IV*. The Association for the Preservation of Virginia Antiquities, Richmond.
- Kent, Barry C.  
1983 The Susquehanna Bead Sequence. *Proceedings of the 1982 Glass Bead Conference*, edited by Charles F. Hayes, pp. 75-81, Research Records 16, Rochester Museum and Science Division, Rochester, New York.
- Kenyon, Ian T.  
1982 *The Grimsby Site: A Historic Neutral Cemetery*. Royal Ontario Museum, Toronto.
- Kenyon, Ian T. and William R. Fitzgerald  
1986 Dutch Glass Beads in the Northeast: An Ontario Perspective. *Man in the Northeast* 32:1-34.

Kidd, Kenneth E.

- 1979 *Glass Bead-Making From the Middle Ages to the Early 19th Century*.  
History and Archaeology 30, Parks Canada, Ottawa.

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, Parks Canada, Ottawa. Reprinted in Proceedings of the 1982 Glass Bead Conference, edited by Charles F. Hayes, Appendix, pp. 219-257, Research Records 16, Rochester Museum and Science Division, Rochester, New York, 1983.

Lapham, Heather A.

- 1995 The Analysis of European Glass Trade Beads Recovered from Monogahela Sites in Greene County, Pennsylvania. Report submitted to The Bead Society of Greater Washington, Washington, D.C.

Lapham, Heather A. and William C. Johnson

- 1999 Postcontact Exchange in the Lower Upper Ohio River Valley. Paper presented at the 66<sup>th</sup> Annual Meeting of the Eastern States Archeological Federation, Cincinnati, Ohio.

Miller, Henry M., Dennis J. Pogue, and Michael A. Smolek

- 1983 Beads from the Seventeenth Century Chesapeake. *Proceedings of the 1982 Glass Bead Conference*, edited by Charles F. Hayes, pp. 127-144, Research Records 16, Rochester Museum and Science Division, Rochester, New York.

Mitchem, Jeffrey M. and Jonathan M. Leader

- 1988 Early Sixteenth Century Beads from Tatham Mound, Citrus County, Florida: Data and Interpretations. *Florida Anthropologist* 41(1):42-60.

Mouer, Daniel, Douglas McLearn, Taft Kiser, Christopher Egghart, Beverly Binns, and Dane Magoon.

- 1992 *Jordan's Journey: A Preliminary Report on Archaeology at Site 44PG302, Prince George County, Virginia, 1990-1991*. Virginia Commonwealth University Archaeological Resource Center, Richmond.

Pearson, Charles

- 1977 Evidence of Early Spanish Contact on the Georgia Coast. *Historical Archaeology* 11:74-83.

Potter, Stephen R.

- 1989 Early English effects on Virginia Algonquian Exchange and Tribute in the Tidewater Potomac. *Powhatan's Mantle*, edited by P. Wood, G. Waselkov and T. Hartley, pp. 151-172, University of Nebraska, Lincoln.
- 1993 *Commoners, Tribute, and Chiefs*. University of Virginia, Charlottesville.

- Ross, Lester A.  
1974 Hudson's Bay Company Glass Trade Beads: Manufacturing Types Imported to Fort Vancouver (1829-1960). *The Bead Journal* 1(2): 15-22.  
1990 Trade Beads from Hudson's Bay Company Fort Vancouver (1829-1860), Vancouver, Washington. *Beads* 2:29-67.
- Rountree, Helen C.  
1989 *The Powhatan Indians of Virginia*. University of Oklahoma, Norman.
- Rumrill, Donald A.  
1991 The Mohawk Glass Trade Bead Chronology: Ca. 1560-1785. *Beads* 3:5-45.
- Sempowski, Martha L.  
1994 Early Historic Exchange Between the Seneca and the Susquehannock. *Proceedings of the 1992 People to People Conference*, edited by Charles F. Hayes, pp. 51-64, Research Records 23, Rochester Museum and Science Center, Rochester.
- Smith, Ira F. and Jeffrey R. Graybill  
1977 A Report on the Shenks Ferry and Susquehannock Components at the Funk Site, Lancaster County, Pennsylvania. *Man in the Northeast* 13:45-65.
- Smith, Marvin T.  
1976 The Chevron Trade Bead in North America. *The Bead Journal* 3(1):15-17.  
1983 Chronology from Glass Beads: the Spanish Period in the Southeast, c. A.D. 1513-1670. *Proceedings of the 1982 Glass Bead Conference*, edited by Charles F. Hayes, pp. 147-158, Research Records 16, Rochester Museum and Science Division, Rochester, New York.
- Smith, Marvin T. and Mary Elizabeth Good  
1982 *Early Seventeenth Century Glass Beads in the Spanish Colonial Trade*. Cottonlandia Museum Publications, Greenwood.
- Sprague, Roderick  
1983 Tile Bead Manufacturing. *Proceedings of the 1982 Glass Bead Conference*, edited by Charles F. Hayes, pp. 167-172, Research Records 16, Rochester Museum and Science Division, Rochester, New York.
- Turgeon, Laurier  
2000 French Beads in France and North America During the Sixteenth and Early Seventeenth Centuries. Paper presented at the Annual Meeting of the Society for Historical Archaeology, Quebec City, Quebec, Canada.
- Wray, Charles F.  
1983 Seneca Glass Trade Beads c. A.D. 1550-1820. *Proceedings of the 1982 Glass Bead Conference*, edited by Charles F. Hayes, pp. 41-49, Research Records 16, Rochester Museum and Science Division, Rochester, New York.

Wray, Charles F., Martha L. Sempowski and Lorraine P. Saunders  
1991 *Tram and Cameron: Two Early Contact Era Sites*. Research Records 21,  
Rochester Museum and Science Center, Rochester, New York.6.  
Endnotes

## 6. Notes

1. The Kidd and Kidd (1970) typology defines bead varieties based on manufacturing process and physical characteristics such as shape, size, and color. Four classes of drawn beads, designated by roman numerals, are recognized. The classes differ based on bead structure (the number of glass layers) and finishing treatment (whether or not a bead has been heat altered to a spherical shape). Within each class, individual bead varieties are defined by the presence or absence of decorative elements (such as stripes or inlays), glass color and diaphaniety, bead shape, and size. Wound beads are denoted by the prefix "W". Size designations conform to those outlined in Kidd and Kidd (1970): very small (under 2 mm), small (2-4 mm), medium (4-6 mm), large (6-10 mm), and very large (over 10 mm).
2. Although valid criticisms of the Kidds' typology have been voiced (Karklins 1985:86-87; Ross 1990:62), their classification system, along with Karklins' supplement (1985), is useful in identifying glass beads from late 16<sup>th</sup>- to middle 17<sup>th</sup>- century sites in eastern North America. The standardization that this typology provides allows for temporal and regional comparative studies at the expense of overlooking minor differences within bead varieties.
3. See Karklins 1993: Figure 3, top, and Figure 5. Deagan (1989:170, Fig. 7.5) and others have also suggested that the connected double bead seen in Figure 2 may represent a joining bead from a rosary. Although some Catholic items have been found in Fort-Period contexts, historical records suggest the lack of a Catholic presence at Jamestown Island during this time.
4. In Peru, the Spanish incorporated nueva cadiz beads into colonial jewelry (Fairbanks 1968:7,12). No evidence, archaeological or historical, suggests that Jamestown's colonists used nueva cadiz-like beads in a similar manner.
5. Elizabeth Harris's (1982) comparative photographs demonstrated differences between nueva cadiz-like beads of the 17<sup>th</sup>-century and true nueva cadiz varieties of the early-to-mid 16<sup>th</sup>-century.
6. The 38 turquoise beads ranged in size from 5.9-49.6 mm in length and 3.6-5.2 mm in diameter with an average length of 13.4 mm (median: 9.4 mm) and an average diameter of 3.8 mm (median: 4.0 mm). The seven navy blue beads ranged from 6.0-13.0 mm in length and 4.2-5.4 mm in diameter with an average length of 6.2 mm (median: 8.3 mm) and an average diameter of 4.0 mm (median: 4.5 mm). Although both varieties exhibited similar diameters, the navy blue variety was generally shorter in length than the turquoise type. A similar pattern was noted among nueva cadiz beads associated with early 16<sup>th</sup>-century Spanish trade. Navy blue beads tended to be shorter and smaller than turquoise-colored varieties (Smith and Good 1982:53).
7. The Kidds' typology classified gooseberry beads as a complex variety, signifying that they are a group of beads comprised of *one* glass layer and decorated with stripes, inlays, or appli-

ques. These beads, however, are composed of three glass layers. Technically, they should be considered a composite manufacture, which refers to beads that are comprised of *two or more* glass layers and decorated with stripes, inlays, or appliques.

8. Donald Rumrill, in *The Mohawk Glass Trade Bead Chronology: Ca. 1560-1785*, identified a glass bead variety (typed as Kidd WLe\*) that he described as a "truncated cone" of "transparent light gold" glass from several late 17<sup>th</sup>-century Mohawk sites in New York (1991:23). The beads do not appear to be the same as those found at Jamestown as they were neither unusually heavy nor did they exhibit readily apparent filed ends (Mary Rumrill, personal communication).

9. All chevrons adhered to the traditional color sequence for this variety with one exception. A very large specimen exhibited a fifth layer and core of translucent aqua blue glass.

10. In the Southeast, nueva cadiz beads generally date to the first half of the 16<sup>th</sup> century. Seven oaks gilded molded and faceted cut quartz crystal beads date to the middle-to-late 16<sup>th</sup> century. All three varieties have rarely been found north of Spanish territory (Brain 1975; Deagan 1987; Mitchem and Leader 1988; Pearson 1977; Smith 1983; Smith and Good 1982). Faceted chevron and gooseberry beads, in contrast, date to the late 16<sup>th</sup>- and early 17<sup>th</sup>-century in the Northeast as well. Consequently, they cannot be associated exclusively with Spanish trade.

11. Karklins (1984) reported no Dutch examples of the navy blue nueva cadiz-like variety. Color and color-sequence differences were also apparent between the turquoise nueva cadiz-like beads found at Jamestown and those from the Netherlands. The diameter of Dutch nueva cadiz-like beads also tends to be larger than Jamestown's. In general, Dutch varieties are more similar to the nueva cadiz-like beads found in small numbers on indigenous sites in the northern Middle Atlantic and Northeast than to those in Jamestown's assemblage.

12. Dutch chevrons differed somewhat in color from those at Jamestown. Likewise, gooseberry beads from the Netherlands were decorated with 13 or 18 white stripes per bead, whereas the Jamestown variety maintained 8, 11, or 12 stripes.

13. Although ample historical and archaeological evidence exists of glassmaking at James Fort during the first quarter of the 17<sup>th</sup>-century, there is only one glass-bead type that may be unique to the island. Historical records indicate that Jamestown colonists made two attempts, in 1608 and 1621, at glass making in the colony (Harrington 1972). Both ventures produced several trial batches of glass that were shipped to England (Ibid.). No mention, however, is made of attempting bead manufacture, until the 1621 venture. Excavations at the Fort site have uncovered glass slag, a waste product of glassmaking activities, in early 17<sup>th</sup>-century contexts (Kelso, et. al. 1997:25). It is assumed that local bead production would result in distinctive beads as well as the waste that results from other glassmaking endeavors. To this point, only the cone-shaped yellow bead is exclusive to Jamestown, and it may have parallels in the later Northeast.

14. This suggested model of reduction in Venetian bead manufacture does not explain why late 16<sup>th</sup>-century Spanish colonial sites in America have produced a dearth of nueva cadiz and nueva cadiz-like beads. Future research would benefit from a chemical composition study comparing Jamestown's nueva cadiz-like beads with those from early 16<sup>th</sup>-century Spanish contexts.